

Muscidae (Diptera) from Madagascar: Identification Keys, Descriptions of New Species, and New Records

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The Madagascan Muscidae fauna is known only from scattered publications by a variety of authors, containing mainly descriptions of new species. Previous records of Madagascan muscids amount to 78 species in 27 genera (Pont 1980). The present study of the Muscidae collected by the “Madagascar Arthropod Biodiversity Project”, developed by the California Academy of Sciences, San Francisco, California, has provided the stimulus for this paper in which all the genera and species recorded from Madagascar are keyed, 23 new species are described, and 7 species and 3 genera are newly recorded from Madagascar. Almost 80% of the previously known Madagascan muscid fauna has been recognised among the material studied. In addition to the new species described herein, replacement names are given for two homonyms: *Dichaetomyia zielkei* new name (for *Dichaetomyia apicalis* Zielke, 1972, preocc.) and *Dichaetomyia frontata* new name (for *Dichaetomyia frontalis* Zielke, 1972, preocc.). One new synonym is established: *Dichaetomyia rangeri* Zielke, 1973 (syn: *Dichaetomyia scutellaris* Zielke, 1974). The species newly recorded from Madagascar are: *Atherigona (Acritochaeta) orientalis* Schiner, 1868; *Atherigona (Atherigona) addita* Malloch, 1923; *Brontaea flexa* (Wiedemann, 1830); *Dichaetomyia (Dichaetomyia) albivitta* (Stein, 1906); *Helina lucida* (Stein, 1913); *Lispe niveimaculata* Stein, 1906 and *Lispocephala pectinata* (Stein, 1900). The genera newly recorded from Madagascar are: *Azelia* Robineau-Desvoidy, *Phaonia* Robineau-Desvoidy and *Spilogona* Schnabl.

The Muscidae is a speciose family of the calyptrate Diptera that contains some 4500 described species in 86 genera (Carvalho et al. 2005). It is represented in all zoogeographical regions, and species occur in a wide variety of habitats except for the most arid.

Adults can be recognized by the absence of a series of strong setae on meron; vein A_1+CuA_2 not reaching wing margin; male reproductive system without the accessory pair of glands; the absence of abdominal spiracles 6 and 7 in the female ovipositor (spiracle 6 re-acquired in two genera), the latter character being an autapomorphy of the family.

Many species are of medical and veterinary importance, as vectors of certain etiological agents that can cause diseases. Others are of agricultural importance as pests of cereal crops, whilst others are of importance in biological control as predators of other insects that can cause injury to man and animals.

Although there have been considerable advances in our knowledge of the taxonomy of these flies in recent years, many species in all regions are still to be described.

The Afrotropical Muscidae fauna has been dealt with in the comprehensive revisions by Emden

(1939, 1940, 1941, 1942a,b, 1943, 1951) and in the more recent revisions such as Zielke (1971) for the Muscini, Dike (1989, 1990) and Deeming (1987) for the Atherigonini, and Zumpt (1973) for the Stomoxyinae. Since Emden's work, species have been described by Crosskey, Deeming, Dike, Kleynhans, Paterson, Peris, Pont, Snyder, Zielke and Zumpt, and keys have been published by Zumpt (1969) for *Aethiopomyia*, Paterson (1960) for *Alluaudinella*, Snyder (1953) for *Mydaea* (in part), Pont and Dear (1976) for *Ochromusca*, Pont (1974) for *Passeromyia*, and Crosskey (1962) for *Pygophora* (summarised in Pont 1980).

Knowledge of the Madagascan Muscidae fauna is scattered in the publications of these authors and consists mainly of the descriptions of new species. Pont (1980) listed 78 species in 27 genera from Madagascar, and nothing further has been added since then apart from the paper by Deeming (1987) on the genus *Atherigona* Rondani. Until the present contribution, the most speciose genera were *Dichaetomyia* Malloch, with 14 species, followed by *Lispe* Latreille with 13 species and *Atherigona* with 10. Most of the other genera were represented by a very small number of species.

The study of the muscids collected by the "Madagascar Arthropod Biodiversity Project" developed by the California Academy of Sciences, San Francisco California, has provided the impulse for this contribution, in which all the genera and species recorded from Madagascar are keyed, with seven species and three genera newly recorded from Madagascar and 23 species described as new to science. Almost 80% of the previously known Madagascan muscid fauna is represented in the material studied. Some species are common, with a large series of specimens represented in museum collections; others are rare and are sometimes represented by only a single specimen.

There is still material to be examined, so the data presented herein are preliminary and the Madagascan muscid fauna is certainly much richer. The main aim of this contribution is to summarise the present knowledge of this fauna and to serve as a guide for the identification of the recorded species, thereby assisting with future studies.

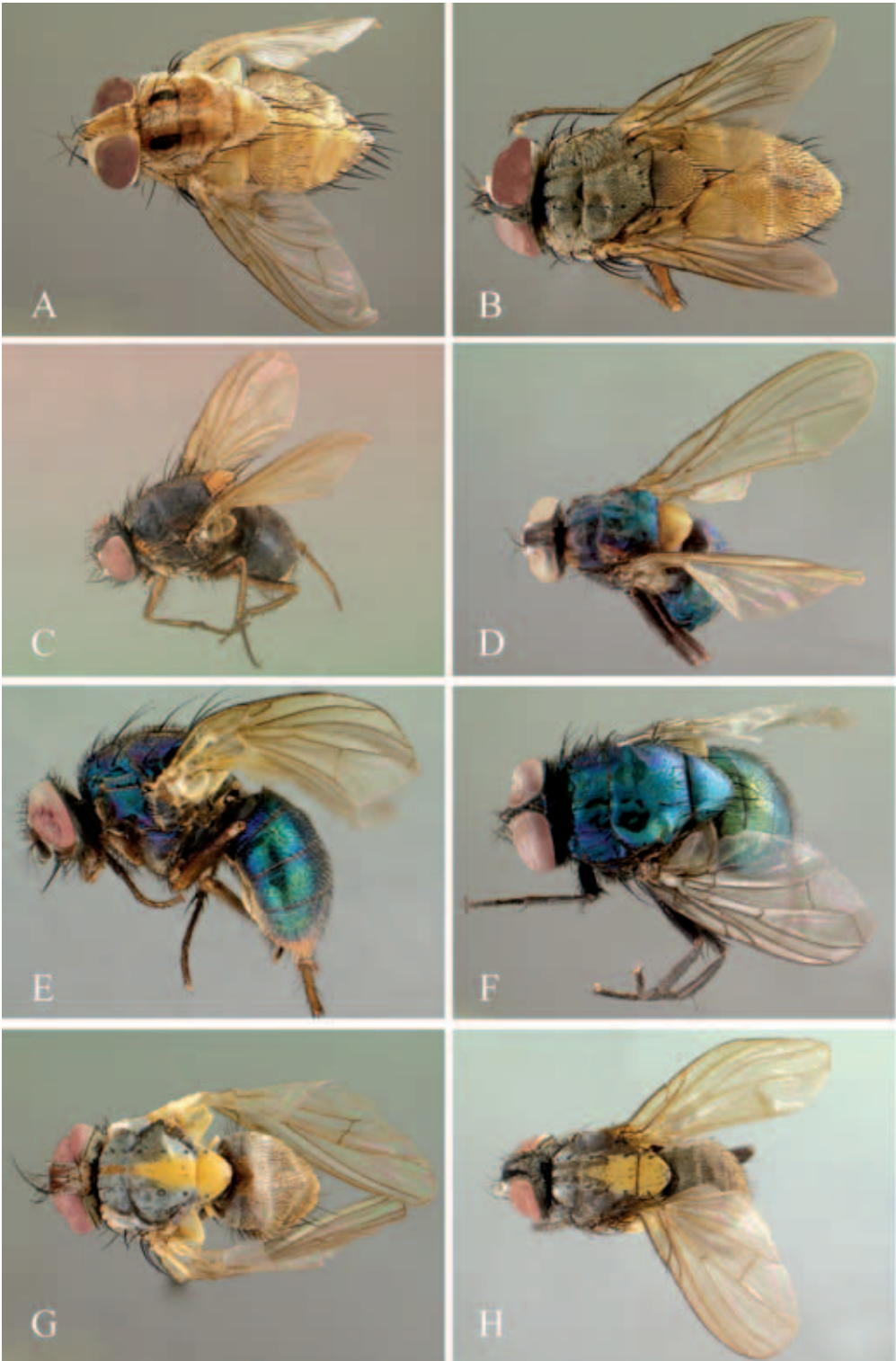
MATERIALS AND METHODS

The Madagascar Arthropod Biodiversity Project

The Madagascar Arthropod Biodiversity Project is an attempt to assess the entire arthropod fauna of Madagascar. It has been partially funded by NSF Grant DEB-0072713; Brian Fisher is the principal investigator and Charles E. Griswold, the co-principal investigator. The collecting phase of the project began in 2001 and continued until early 2005. There was a field crew of as many as 24 persons. Six trapping techniques were used in the field to capture arthropods from more than seventy localities. The techniques utilized were light traps, Malaise traps, pitfall traps, mini-Winkler extractors, beating, and collecting the insects off the vegetation with nets. Considerable additional support with Malaise trapping was obtained from E.I. Schlinger and the Schlinger Foundation, which employed a field technician full time who was almost continuously moving around the country and collecting the samples from long-term trapping sites. All samples were collected into 95% ETOH for potential DNA analysis. During the off-season (April until October), the field crew was trained to sort arthropods to order, and in some cases to family. Sorted samples were then shipped to San Francisco where further sorting took place before reshipping specimens to collaborators. There are now approximately 105 collaborators identifying and further sorting specimens. The Schlinger Malaise traps, as opposed to the other traps, were in continuous operation for several

PLATE 1

A. *Alluaudinella bivittata* (Macquart); B. *Dimorphia cognata* (Robineau-Desvoidy); C. *Deltotus facetus* Séguay; D. *Dichaetomyia* (*Dichaetomyia*) *scutellata* (Séguay); E. *Deltotus viola* Zielke; F. *Neomyia setulosa* (Zielke); G. *Spilogona fulvipollinosa*, new species; H. *Helina carpiæ*, new species.



years. By mid-2005 all samples had been sorted and sent to San Francisco, except for 1200 Malaise trap samples. It is expected to take another two years for all of these samples to be sorted.

A Biota database has been created to store information about the specimens. Each "block" of specimens receives a lot number, and individual specimens receive an individual code number. Taxonomic information about each specimen is recorded in the database down to the lowest level available, i.e. family, subfamily, genus, species, etc. A code number is assigned to each collecting event and this, along with locality information, is entered into a Microsoft Word file, so that many locality labels can be prepared quickly and easily.

The localities where collecting was carried out were carefully planned beforehand after consultations with other field biologists working in the area and the study of geological and vegetation maps. At the end of the project, the database will be used to reassemble the arthropod faunal components and to prepare detailed maps of distributions and faunal "hotspots". These will be used to argue the case to the Malagasy government for new conservation areas and for the stronger protection of existing areas.

RESULTS

The Muscidae

About 1800 specimens have been studied during the preparation of this paper. The material is basically that collected during the Madagascar project. Additional material collected beforehand, in 1998 and 1999, during the "Schlinger Foundation Madagascar Expedition", was also examined.

Muscid flies had to be sorted from mixed Diptera samples, dried, pinned and labelled before being studied.

All material studied will be deposited in the collection of the California Academy of Sciences, San Francisco, California (CAS), with a few specimens deposited in the Museu Nacional, Rio de Janeiro, Brazil (MNRJ) and The Natural History Museum, London, UK (BMNH). Some material in the Natal Museum, Pietermaritzburg, South Africa (NMSA) and the Muséum National d'Histoire Naturelle, Paris, France (MNHNP) has also been listed, for the sake of completeness.

The holotypes of the new species are also deposited in the CAS collection; some paratypes, when possible, have been referred to the MNRJ and BMNH collections.

Dissected terminalia have been placed in glycerine in a microvial pinned with the respective specimen.

Colour photos were made using Syncroscopy/JVC Auto-Montage with a Leica M 420 optical microscope, the drawings were made with an optical microscope Olympus CH-2 fixed with a camera lucida.

The terminology follows McAlpine (1981), and for the special characters of *Atherigona*, such as the trifoliate process, we follow Pont (1986a) and Pont and Magpayo (1995).

Some Madagascan muscid types described by Zielke (1974) and deposited in the CAS collection were also examined and information about them is included in this paper: *Annaria scutellaris* (now = *Dichaetomyia rangeri* Zielke) (Type no. CAS 11871), *Annaria harlekini* (now *Dichaetomyia harlekini*) (Type no. CAS 11870), *Graphomyia rossi* (Type no. CAS 11874) and *Limnophora rossi* (Type no. CAS 11883).

In several instances, identifications were confirmed by A.C.P. by comparison with identified specimens in the Natural History Museum (London, U.K.) and the Museum für Naturkunde of the Humboldt-Universität (Berlin, Germany).

For each genus recorded from Madagascar, we give a brief diagnosis, a key for the identification of the Madagascan species (including our new species as well as the new records), and brief

comments on the state of our taxonomic knowledge in the Afrotropical region and in Madagascar. Several of the keys have been adapted from Emden (1939, 1940, 1951), Couri and Pont (1999), Carvalho and Couri (2002), Zumpt (1973), and others.

The classification follows Pont (1980, 1986b), with the more recent synonyms in the Coenosiini proposed by Couri and Pont (2000) as follows (junior synonyms in parentheses): *Coenosia* Meigen (= *Tenuicosta* Stein) and *Lispocephala* Pokorny (= *Pectiniseta* Stein). We have followed Pont (1986b) in considering *Ophyra* Robineau-Desvoidy to be a junior synonym of *Hydrotaea* Robineau-Desvoidy, although recent opinions have been divided about this (Schuehli et al. 2004; Savage and Wheeler 2004; Carvalho et al. 2005). References to the original descriptions of the genera and species, together with details of synonymy and geographic distribution, will be found in the *Catalogue of the Diptera of the Afrotropical Region* (Pont 1980) and are not repeated here.

Key to the Madagascan Genera of Muscidae

The key includes all the genera now known to be present in Madagascar, in the sense in which they are treated here. The numbers of species in the key are the numbers now known from Madagascar, including the new species and the new records.

1. Proboscis usually elongated, strongly sclerotized, modified into a piercing organ; palpus less than half the length of proboscis; arista with long hairs on the dorsal surface and bare on the ventral surface or, at most, with 3–4 ventral hairs; prosternum and anepimeron setulose; 2 species
 *Stomoxys* Geoffroy
 Proboscis retractile, not modified into a piercing organ, weakly or moderately sclerotized; prosternum and anepimeron setulose or bare; arista bare, pubescent or plumose, pectinate only in the male of *Lispocephala pectinata* 2
2. Head angular in profile; antenna long and inserted above mid-level of eye (Fig. 1); presutural dorsocentral setae very short and fine, almost indistinct from the ground-setulae; 1 species in subgenus *Acritochaeta* and 13 species in subgenus *Atherigona*, total 14 species
 *Atherigona* Rondani
 Head shape not as above; antennal insertion below mid level of eye; presutural dorsocentral setae well developed or not differentiated from the ground-setulae 3
3. Anepimeron setulose. 4
 Anepimeron bare. 11
4. Lower calypter of the *Musca*-type, i.e. the inner margin at first following the margin of the scutellum then diverging suddenly outward into the more or less broadly truncated apical margin . . 5
 Lower calypter of the *Phaonia*-type, i.e. the inner margin diverging immediately and at right-angles from the supra-squamal ridge, and tongue-like in shape 9
5. Palpi yellow; tibiae yellow; antennae orange, flagellomere sometimes infuscated towards tip; arista short-plumose, the longest individual hairs equal to width of antennal flagellomere; stem-vein bare; female without proclinate orbital setae; 2 species. *Alluaudinella* Giglio-Tos
 Palpi black; legs entirely black; antennae black; the other characters not present in combination
 6
6. Body shining metallic green or blue; mid tibia with a strong ventral seta 7
 Body black or bluish-black, not metallic shining green or blue; mid tibia without a ventral seta
 8
7. Suprasquamal ridge setulose (Fig. 2); infra-alar bulla setulose; 3 species
 *Neomyia* Robineau-Desvoidy

- Suprasquamal ridge and infra-alar bulla bare; 2 species *Pyrellia* Robineau-Desvoidy
8. Vein M with an angular forward bend towards vein R_{4+5} (Fig. 4); 2 species in subgenus *Byomya*;
1 species in subgenus *Eumusca*; 1 species in subgenus *Musca*; total 4 species . *Musca* Linnaeus
Vein M with a smoothly rounded forward curve towards vein R_{4+5} (Fig. 5); 2 species
. *Morellia* Robineau-Desvoidy
9. Palpus greatly enlarged in apical part, spoon-like; parafacial with setulae; prosternum bare; 15
species *Lispe* Latreille
Palpus not enlarged, narrow; parafacial bare; prosternum setulose 10
10. Vein R1 bare dorsally; 2, 3 or 4 pairs of postsutural dorsocentral setae; male cercal plate with-
out spines, with normal setae and setulae; female frons without proclinate orbital setae; 19
species *Dichaetomyia* Malloch
Vein R1 with setulae along dorsal surface; 2 pairs of postsutural dorsocentral setae; male cercal
plate with 2 marginal spines (Fig. 3) (male of *D. facetus* unknown); female frons with a pair of
proclinate orbital setae; 3 species *Deltotus* Séguy
11. Hind coxa with setulae present on posterior apical margin; 1 species (not identified)
. *Azelia* Robineau-Desvoidy
Hind coxa bare on posterior apical margin. 12
12. Wing with the subcosta running in a smooth even curve from humeral cross-vein to costa; body
colour metallic black, blue or green; gena with or without a strong differentiated upcurved seta;
female ocellar triangle shining, long or short, almost reaching lunula, and frons with a pair of
proclinate orbital setae and inclinate interfrontal setae; 2 species
. *Hydrotaea* Robineau-Desvoidy
Wing with the subcosta with a slightly sinuous course from humeral cross-vein to costa, not
smoothly bowed; body colour usually not metallic black, blue or green; gena without a differen-
tiated upcurved seta; female ocellar triangle usually short, and frons without proclinate orbital or
inclinate interfrontal setae. 13
13. Wing with at least one setula on ventral surface of Rs node or base of R_{4+5} (the Madagascan
Phaonia described here with ventral setulae on base of R_{4+5}). 14
Wing without setulae on ventral surface of Rs node or base of vein R_{4+5} 19
14. Prosternum with lateral setulae; prealar seta absent; 9 species
. *Limnophora* Robineau-Desvoidy
Prosternum bare or only with 1–2 setulae on either side; prealar seta present or absent 15
15. Anterior katapisternal seta absent; lower calypter, truncated, of the *Musca*-type (see above, cou-
plet 4a); vein R_{4+5} without dorsal setulae; 1 species *Graphomya* Robineau-Desvoidy
Anterior katapisternal seta present; lower calypter not broad and truncated, tongue-shaped, of the
Phaonia-type (see above, couplet 4b); R_{4+5} with a few dorsal setulae basally 16
16. Veins Sc, Rs and M setulose, usually as follows: vein R before humeral cross-vein, on both sur-
faces; on the basal part of Sc, on both surfaces; ventral surface of R_{4+5} almost to cross-vein r-m;
on both surfaces of M to beyond cross-vein dm-cu; and on ventral surface of Cu; 1 species
. *Dimorphia* Malloch
Wing veins not setulose as described above. 17
17. Hind tibia with a strong posterodorsal seta (calcar) inserted at apical three-fourths; 2 species
. *Phaonia* Robineau-Desvoidy
Hind tibia without a strong posterodorsal seta (calcar) inserted on apical three-fourths. . . . 18
18. Dorsal surface of vein R_{4+5} bare; prealar seta absent in male; presutural acrostichal setulae in 4
more or less regular rows, those in outer rows longer and stronger; one well developed prostig-
matal seta; 2 species. *Hebecnema* Schnabl

- Dorsal surface of vein R_{4+5} setulose; prealar seta present; presutural acrostichal setulae not arranged in 4 more or less regular rows; two well developed prostigmatal setae; 3 species
 *Myospila* Rondani
19. Presutural dorsocentral setae absent; palpi moderately dilated; 1 species
 *Lispacoenosia* Snyder
- Presutural dorsocentral setae present; palpi usually filiform 20
20. Proboscis with the labella not reduced and the prestomal teeth hardly developed, and prementum dusted; prealar seta present, but if absent then sternite 1 with setulae 21
- Proboscis with labella usually reduced and/or prestomal teeth strongly developed, and prementum shining, undusted; prealar seta absent; sternite 1 bare 23
21. Apical section of vein M distinctly curved forward towards vein R_{4+5} ; 3 pairs of presutural dorsocentral setae; arista plumose; 1 species (not identified) *Fraserella* Steyskal
- Apical section of vein M straight or only slightly curved forward towards vein R_{4+5} ; never with 3 pairs of presutural dorsocentral setae; arista plumose or bare 22
22. Arista bare; sternite 1 with many setulae near posterior margin; prealar seta absent; male eyes large in profile and occupying most of the head; 5 species. *Brontaea* Kowarz
- Arista plumose, with the longest individual hairs longer than width of flagellomere; sternite 1 usually bare; male eyes in profile not unusually large; 6 species . . . *Helina* Robineau-Desvoidy
23. Katepisternal setae 1+1–3; ovipositor of the *Mydaea*-type, short, with a spinose hypoproct . 24
- Katepisternal setae usually 1:1:1, placed at the angles of an equilateral triangle; ovipositor long, with setulose hypoproct 25
24. Arista bare; ground-colour black, entire body whitish dusted, and the head wholly white to silvery-white; small species, wing-length about 3 mm, confined to the seashore; 1 species, this taxon to be described elsewhere Undescribed genus
- Arista plumose; ground-colour brown, with postpronotum yellow, body not entirely whitish dusted and head with at least interfrontalia not silvery-white; larger species, wing-length about 6 mm, species of the inland forests; 1 species. *Spilogona* Schnabl
25. Two pairs of reclinate orbital setae (Fig. 6) 26
- One pair of reclinate orbital setae (Fig. 7) 29
26. One pair of long presutural dorsocentral setae, sometimes preceded by a very short second pair
 27
- Two pairs of more or less subequal presutural dorsocentral setae. 28
27. Arista with long hairs on basal half (Fig. 6); scutellum with both basal and apical pairs of setae strong; fore tibia with one median seta on posterior surface; 1 species *Pygophora* Schiner
- Arista with hairs along its entire length; scutellum with only the apical pair of setae strong, fore tibia without one median seta on posterior surface; 1 species. *Orchisia* Rondani
28. Ocellar setae short, hair-like; outer margin of eye emarginated on basal half; hind tibia without a posteroventral seta; 3 species (1 not identified) *Cephalispa* Malloch
- Ocellar setae long; outer margin of eye not emarginated on basal half; hind tibia with a posteroventral seta; 2 species. *Lispocephala* Pokorny
29. Antennal flagellomere very long, reaching beyond epistoma, and profrons projecting (Fig. 8); frons much longer than wide; 2 pairs of strong postsutural dorsocentral setae; costa continuing around wing to apex of vein M; 1 species *Anaphalantus* Loew
- Antennal flagellomere not so long and not reaching epistoma, and profrons not projecting; frons moderately longer than wide; 3 pairs of strongpostsutural dorsocentral setae, except in *C. nova* in which the costa does not reach beyond the apex of vein R_{4+5} ; 7 species . . . *Coenosia* Meigen

SYSTEMATICS

Of the 78 species previously known to occur in Madagascar, 44 have been recognised among the material studied. Additionally, seven species are newly recorded from Madagascar and 23 species are described as new to science; three genera are newly recorded from Madagascar. The Madagascan muscid fauna is now known to contain 117 species assigned to 30 genera of which 55% of the species are endemic.

New records: Species

Atherigona (Acritochaeta) orientalis, Schiner, 1868
Atherigona (Atherigona) addita Malloch, 1923
Brontaea flexa (Wiedemann, 1830)
Dichaetomyia (Panaga) albivitta (Stein, 1906)
Helina lucida (Stein, 1913)
Lispe niveimaculata Stein, 1906
Lispocephala pectinata (Stein, 1900)

New records: Genera

Azelia Robineau-Desvoidy
Phaonia Robineau Desvoidy
Spilogona Schnabl

New species

Atherigona (Atherigona) nigradorsalis, sp. nov.
Atherigona (Atherigona) quadriseta, sp. nov.
Atherigona (Atherigona) variata, sp. nov.
Brontaea differa, sp. nov.
Cephalispa azurea, sp. nov.
Cephalispa curta, sp. nov.
Coenosia aberrans, sp. nov.
Dichaetomyia (Dichaetomyia) nigra, sp. nov.
Dichaetomyia (Dichaetomyia) tricolorata, sp. nov.
Dichaetomyia (Panaga) colorata, sp. nov.
Dichaetomyia (Panaga) flabellifera, sp. nov.
Hebecnema humeralis, sp. nov.
Helina flavomaculata, sp. nov.
Helina carpiæ, sp. nov.
Helina grisella, sp. nov.
Hydrotaea bella, sp. nov.
Limnophora mesovittata, sp. nov.
Limnophora triangularis, sp. nov.
Lispe argentata, sp. nov.
Phaonia plurivittata, sp. nov.
Phaonia univittata, sp. nov.
Pyrellia ampullacea, sp. nov.
Spilogona fulvipollinosa, sp. nov.

Eggs of the genus *Stylogaster* Macquart (Diptera, Conopidae) were found impaled mainly in the eyes, mesonotum and abdomen of a few specimens (Couri and Pont 2006). This genus is known to occur in North and South America, Africa south of Sahara, Madagascar, parts of Asia, the Philippines and New Guinea (Smith 1967). No attempt has been made to identify the species of *Stylogaster* involved.

Alluadinella Giglio-Tos, 1895

DIAGNOSIS.— The genus includes moderate to robust and large flies, usually yellow to rufous, but blackish in ground-colour in *A. stuckenbergi* Paterson, 1960; eyes widely separated in both sexes, but less so in male than in female; palpus flattened, strap-like, with characteristic short blunt dorsal setae; lower calypter broad, of the *Musca*-type, truncated behind; vein M straight or only very slightly curved forwards; dorsocentrals 3+4; suprasquamal ridge and proepisternal depression bare; anepimeron setulose; katepisternals 1+2. [REF. Paterson 1960].

AFROTROPICAL FAUNA.— *Alluadinella* is confined to the Afrotropical region and is known from 6 species. Paterson (1960) redescribed the genus and gave a key for the identification of all the species, which can be distinguished mainly by the colour patterns of the mesonotum. The genus is closely related to *Aethiopomyia* Malloch and *Ochromusca* Malloch, as all known species use dead or dying snails as a nutrient medium for their larvae (Paterson 1960, Pont and Dear 1976). The three genera appear as a monophyletic group in the cladistic analysis made by Couri and Carvalho (2003).

MADAGASCAN FAUNA.— Two species are recorded from Madagascar, *A. bivittata* (Macquart, 1843) and *A. stuckenbergi* Paterson, 1960, the latter endemic and known only from the male. Adults of *A. bivittata* are often seen on human faeces in the bush or in the forests to which the flies are restricted. The larvae are saprophagous, not parasitic, and the females oviposit on dead or moribund snails, especially of the genus *Achatina* (Paterson, 1960). Paterson (1960) unsuccessfully attempted to induce females of *A. bivittata* to oviposit on healthy snails. Only *A. bivittata* was found among the material studied.

Key to the Madagascan Species of *Alluadinella*

1. Dark species, mesonotum, pleura, scutellum and abdomen largely dark brown in ground-colour, with paler areas; mesonotum with a median vitta of pale dust (Madagascar)
 - *A. stuckenbergi* Paterson
 - Paler species, largely yellowish, with a pair of presutural elongated black spots on mesonotum along the dorsocentral row of setae, approximately between the first and second pairs (Mauritius, widespread east to southern Africa, Madagascar, Réunion, Seychelles) . *A. bivittata* (Macquart)

MATERIAL EXAMINED: KNOWN SPECIES

A. bivittata: **MADAGASCAR: Toliara Province:** Forêt de Mite, elev. 75 m, 20.7 km 29° NWN Tongobory; 23°31'27"S 44°7'17"E, pitfall trap—in gallery forest, 27 February–3 March 2002, Fisher, Griswold *et al.*, collection code: BLF5848, 1 male, CASENT 3008894. Parc National d'Andohahela, Tsimelaha, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 16–17 December 2002, M. Irwin, F. Parker, R. Harin Hala, collection code: MA-02-20-09, 1 female, CASENT 3010895. Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap in deciduous dry forest, 6–16 December 2001, Harin' Hala, collection code: MA-02-18A-05, 1 male, CASENT 3010827. 4 km NW Manombo, 3–10 November 2003, R. Harin' Hala and M.E. Irwin, 1 female, CASENT 8067653. **Antsiranana Province:** Forêt de Binara, elev. 375 m, 7.5 km 230° SW Daraina; 13°15'18"S 49°37'00"E, pitfall trap—tropical dry forest, 1 December 2003, B.L. Fisher, collection code: BLF9558, 1 male, CASENT 3008973; 1 female, CASENT 3008976 (MNRJ); 1 female, CASENT 3008974; 1 female, CASENT3008975; Sakalava Beach, dwarf littoral forest, elev. 10 m, 12°15'46"S 49°23'51"E, Malaise trap, across sand, 31 May–7 June 2001, R. Harin' Hala, collection code: MA-01-048-11, 1 male, CASENT 3009857 (MNRJ); 1 female, CASENT 3009859; 1 female, CASENT 3009858. Parc National de Marojejy, elev. 2000 m, 25.4 km 30° NNE Andapa, 10.9 km 311° NW Manantenina, 14°26'42"S 49°44'06"E, yellow pan trap—montane shrubland, 23 November 2003, B.L. Fisher, collection code: BLF9323, 1 female, CASENT 3008936. **Toamasina Province:** Maroantsetra, June, July and November

1959, 3 males, J. Vadon (MNHNP). **Antsiranana Province:** Nossi-Bé, H.R. villa, January 1952, 1 female, N.H.L.Krauss (BMNH).

Anaphalantus Loew, 1857

DIAGNOSIS.— Male dichoptic; frons parallel-sided, longer than wide, strongly projecting beyond eyes at the level of base of antenna (Fig. 8); one pair of reclinate orbital setae; antennal flagellomere very long, reaching beyond epistoma; labella reduced, prestomal teeth developed; arista bare; prealar seta absent; scutellum with two strong pairs of setae; both calypters of approximately the same size; anepimeron bare; dorsocentrals 1+3, the first postsutural usually very small; katapisternals 1:1:1.

AFROTROPICAL FAUNA.— Only one species known, occurring only in the Afrotropical region, with a widespread distribution, including Annobon, Madagascar and Yemen: *A. longicornis* (Macquart, 1843).

MADAGASCAN FAUNA.— *A. longicornis* can be recognized by the shape of the head with its intense golden pollinosity; thorax and abdomen dark shining; abdomen long and narrow.

MATERIAL EXAMINED: KNOWN SPECIES

A. longicornis: **MADAGASCAR: Toamasina Province:** Périnet (Parc National Andasibe), December 1955, 1 female, B.R. Stuckenberg (NMSA).

Atherigona Rondani, 1856

DIAGNOSIS.— This genus can be easily distinguished from all other muscid flies by the characteristically angular head, with long face and antennal flagellomere (Fig. 1); arista bare; one pair of reclinate orbital setae; palpus strongly differentiated between the two sexes; dorsocentral setae reduced; katapisternals 1+2; hind tibia without calcar; wing veins bare; adult male (sg. *Atherigona*) usually with a trifoliate process (Fig. 11) and a hypopygial prominence (Fig. 9); adult female with a pair of small anterior plates on tergite 8 of ovipositor. Small flies, uniform in general appearance and structure; general colour grey or yellowish-grey, with very short setae on mesonotum and legs. [REF. Deeming 1971 (for Nigerian species), Deeming 1979 (for Comoros Archipelago species), Deeming 1987 (for Malagasy species), Dike 1989, 1990 (for Afrotropical species), Pont 1986a (for Australian species), and Pont and Magpayo 1995 (for Philippine Islands species)].

AFROTROPICAL FAUNA.— *Atherigona* is a speciose genus known in the Afrotropical region from some 126 species, 14 of them belonging to the subgenus *Acritochaeta* Grimshaw and 112 to the subgenus *Atherigona* Rondani. Most of the *Acritochaeta* species are known to live in a wide range of decaying plant or animal material, being saprophagous or facultatively carnivorous, while the *Atherigona* s.s. species are of considerable economic importance as they are significant pests of cereal crops. In Africa, they have been found attacking sorghum, rice, wheat, maize, barley and various millets. In this subgenus, the shape of the hypopygial prominence and trifoliate process are important characters for the identification of the species.

MADAGASCAN FAUNA.— According to Pont (1980), only two species were known from Madagascar, but since that time Deeming (1987) has reviewed the species of the Malgasian subregion and has recorded 9 species from Madagascar: *bimaculata* Stein, 1910, *contrastiloba* Deeming, 1987, *bifurcata* Deeming, 1987, *matilei* Deeming, 1975, *trapezia* Emden, 1940, *madagascarensis* Deeming, 1987, *bedfordi* Emden, 1940 (as *humeralis* Wiedemann, misidentification), *humeralis* (Wiedemann, 1830) (as *ferruginea* Emden, 1940), and *laevigata* (Loew, 1852). *A. contrastiloba* and *A. bimaculata* have been found in our material, and we here also record two species as new for

Madagascar (*A. addita* Malloch, 1923, and *A. orientalis* Schiner, 1868) and describe three new species. The key given below is for males only. It is no more than a guide to the identification of the species, which must always be confirmed by examination of the hypopygial prominence and trifoliate process.

The Madagascan *Atherigona* fauna will certainly be found to be much richer than this, and the present contribution must be considered as preliminary as there are still hundreds of specimens in CAS to be examined.

Key to the Madagascan Species of *Atherigona* — Males

1. Palpus elongate, flattened; presutural acrostichal setulae in 4–5 rows; without hypopygial prominence or trifoliate process. Subgenus *Acritochaeta* Grimshaw. (Nicobar Is., widespread Afrotropical region, including Cape Verde Is., Mauritius, Réunion, Madagascar, Rodriguez, Seychelles, South Yemen; also Canary Is., Middle East, Oriental and Australian Regions to Hawaii, southern Nearctic Region, northern Neotropical Region) *A. orientalis* Schiner
Palpi short, club-like, strikingly swollen in apical part; presutural acrostichal setulae in 2–3 rows; hypopygial prominence and trifoliate process present. Subgenus *Atherigona* Rondani 2
2. Palpi black. 3
Palpi yellow 4
3. Fronto-orbital plates shining black, without trace of dust; wing with brown clouds on humeral cross-vein and on wing-margin between subcosta and vein R1; hypopygial prominence knob-like; ground-colour of abdomen yellow, with dark spots, tergite 4 with two extra lateral brown marks in addition to the usual lateral pair (widespread in the Afrotropical region, including Madagascar, Mauritius, Seychelles) *A. bimaculata* Stein
Fronto-orbital plates weakly yellowish-grey dusted, subshining; wing with a trace of brown clouding apically and on cross-vein dm-cu; hypopygial prominence knob-shaped; dorsum of abdomen entirely black on tergites 1+2 to 5 (Madagascar) *A. madagascarensis* Deeming
Fronto-orbital plates densely dusted; wing clear, without dark markings; hypopygial prominence bifurcate; ground-colour of abdomen yellow, with the usual paired spots on tergites 3 and 4 (Madagascar) *A. quadriseta*, sp. nov.
4. Frontal vitta yellow, or half-yellow and half-black 5
Frontal vitta wholly black. 8
5. Frontal vitta and fore femur wholly yellow 6
Frontal vitta yellow on anterior half or third, dark brown or black posteriorly. 7
6. Ground-colour of scutum and scutellum entirely dark; wing-tip narrowly and faintly infuscated; fore tarsus with long erect fine sinuous dorsal hairs, tarsomere 4 anteriorly concave on basal half, and convex and with a brush of fine sinuate hairs on apical half (widespread in the Afrotropical region, including Madagascar, Egypt, Israel) (*humeralis* of authors, misidentification) *A. bedfordi* Emden
Ground-colour of scutum mostly yellow before suture and laterally, and scutellum also extensively pale; wing clear; fore tarsus without specialised chaetotaxy (widespread in the Afrotropical region, including Madagascar, also Canary Is., North Africa and Middle East) (*feruginea* Emden) *A. humeralis* (Wiedemann)
7. Fronto-orbital plate and occiput dusted; hypopygial prominence bifurcate (Rodriguez, Madagascar) *A. addita* Malloch
Fronto-orbital plate and part of occiput shining, without dust; hypopygial prominence rounded, knob-like (widespread in the Afrotropical region, including Madagascar, Comoros, Seychelles, also Arabian Peninsula, North Africa, Middle East) *A. laevigata* (Loew)

8. Fronto-orbital plate shining, undusted; hypopygial prominence knob-like; trifoliate process black (Madagascar) *A. nigradorsalis*, sp. nov.
Fronto-orbital plate dusted 9
9. Fore femur and fore tibia both entirely yellow; hypopygial prominence weakly bifurcate, the branches rounded; trifoliate process wholly black, the lateral plate with a distinct inner lobe (Madagascar) *A. bifurcata* Deeming
At least fore tibia partly or mainly black 10
10. Fore femur wholly yellow; hypopygial prominence bilobed; trifoliate process black, the shoulder paler, lateral plate with a conspicuous inner lobe (West and East Africa, Madagascar) *A. matilei* Deeming
Fore femur partly black. 11
11. Fore femur with apical half black; hypopygial prominence bifurcate, each branch truncated, not rounded; trifoliate process with the median piece white, membranous, and without any setulae at tip, the median piece narrow in lateral view (Madagascar) *A. contrastiloba* Deeming
Fore femur with apical two-thirds black; hypopygial prominence bifurcate, each branch rather pointed; trifoliate process with lateral plates and most of median piece black, the lateral plates narrow in lateral view (Madagascar) *A. variata*, sp. nov.
Fore femur with a weak dark dorsal streak; hypopygial prominence broadly trapezoidal in outline; trifoliate process black, the median piece rather broad in lateral view (widespread in the Afrotropical region, Madagascar, and perhaps Comoros) *A. trapezia* Emden

MATERIAL EXAMINED: KNOWN SPECIES

A. addita: **MADAGASCAR: Toliara Province:** Manderano, elev. 70 m, 23°31'39"S 44°5'18"E, Malaise trap, edge of marsh, 5 m from road, gallery forest, 23 June–28 July 2002, Frontier Wilderness Project, collection code: MGF035, 1 male, CASENT 3009321; 1 male, CASENT 3009322; 1 male, CASENT 3009323 (MNRJ); 23°31'38"S 44°5'15"E, Malaise trap, gallery forest at edge of marsh near road, 22–29 May 2002, Frontier Wilderness Project, collection code: MGF031, 1 male, CASENT 3008991 (MNRJ); 1 male, CASENT 300889. Sept Lacs, elev. 120 m, 23°31'65"S 44°9'35"E, Malaise trap, gallery forest, 21–26 August 2002, Frontier Wilderness Project, collection code: MGF038, 1 male CASENT 3009240.

A. bimaculata: **MADAGASCAR: Fianarantsoa Province:** Parc National d'Isalo, 9.1 km, 354° N Ranohira, elev. 725 m, 22°28'54"S 45°27'42"E, collected at light, gallery forest, 27–31 January 2003, Fisher, Griswold *et al.*, collection code: BLF7304, 1 male, CASENT 3009304.

A. contrastiloba: **MADAGASCAR: Toliara Province:** Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 male, CASENT 3009409; 1 male, CASENT 3009595; 1 male, CASENT 3009607; 1 male, CASENT 3009683; 1 male, CASENT 3009611; 1 male, CASENT 3009610; 1 male, CASENT 3009613 (BMNH); 1 male, CASENT 3009419 (MNRJ). Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap, deciduous dry forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 male, CASENT 3010083. **Fianarantsoa Province:** Parc National Ranomafana, radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 15–21 December 2001, R. Harin'Hala, collection code: MA-02-09B-07, 1 male, CASENT 3010237; 1 male, CASENT 3009897.

A. orientalis: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 16 October–8 November 2001, R. Harin'Hala, collection code: MA-02-09B-01, 1 male, CASENT 3009726; 1 female, CASENT 3009725. **Toliara Province:** Ifaty, near Hotel Paradisia, in coastal dunes, elev. 9 m, 23° 10.78'S 43°37.01'E, Malaise trap, vegetation in sand area, 26 May–5 June 2002, R. Harin'Hala, collection code: MA-02-16-28, 1 male, CASENT 3009800 (MNRJ); 1 female, CASENT 3009799. Mahafaly Plateau, 6.2 km, 74° ENE Itampolo, 24° 39'13"S 43°59'48"E, elev. 80 m, pitfall trap — in spiny forest thicket, 21–25 February 2002, Fisher, Griswold *et al.*, collection code: BLF5763, 1 female, CASENT 3008962; 1 female, CASENT 3008963

(MNRJ); Ranobe, elev. 30 m, 23°02'22"S 43°36'37"E, Malaise trap — in spiny forest thicket, 5–9 February 2003, Frontier Wilderness Project, collection code: MGF058, 1 female, CASENT 3009203. Parc National d'Andohahela, Forêt d'Ambohibory, 1.7 km, 61° ENE Tsimelahy, 36.1 km 308° NW Tolagnaro, 24°55'48"S 46°38'44"E, elev. 80 m, pitfall trap—in tropical dry forest, elev. 300 m, 16–20 January 2002, Fisher, Griswold et al., collection code: BLF4915, 1 female, CASENT 3008958; 1 female, CASENT 3008959. Forêt de Beroboka, 5.9 km, 131° SE Ankidranoka, 22°13'59"S 43°21'59"E, elev. 80 m, pitfall trap — in tropical dry forest, 21–25 February 2002, Fisher, Griswold et al., collection code: BLF6068, 1 female, CASENT 3009250.

DESCRIPTIONS OF NEW SPECIES OF *ATHERIGONA*

Atherigona (Atherigona) nigridorsalis Couri, Pont, and Penny, sp. nov.

TYPE.— HOLOTYPE: male, deposited in CAS, labelled: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 15–21 December 2001, R. Harin'Hala, collection code: MA-02-09B-07, CASENT 3009823.

DIAGNOSIS.— Males of *A. nigridorsalis* can be easily recognized by the general colour of the body; dark brown shining on dorsum, contrasting with the yellow postpronotal lobes; tergites 1+2 and 3 also dark brown shining on dorsum, contrasting with the yellow lateral and ventral areas of abdomen; tergite 4 with two oblong spots very well marked and visible; median piece of trifoliate process linear, not curved (Fig. 17) and with 6 strong and short setae, 4 on apical margin and two longer subapicals (Fig. 18).

MALE.— Length. Body: 3.0–3.5 mm, wing: 3.2–3.5 mm.

HEAD.— Occiput, frons, ocellar tubercle and fronto-orbital plate shining dark brown; parafacial, face and gena yellow; 4–5 pairs of moderate frontal setae; parafacial and gena narrow. Antennae black, pedicel and arista shining dark brown, flagellomere long, almost reaching oral margin, measuring about 4 times the length of the pedicel. Palpi yellow. Proboscis relatively long and slender, with prementum glossy dark brown.

THORAX.— Dorsum of mesothorax shining dark brown, with no trace of vittae; postpronotal lobe yellow; pleura with grey pollinosity, yellow around anterior spiracle and proepisternum. Presutural acrostichal setulae in 3–4 irregular rows. One strong and two weak proepimeral seta. Three katapisternal setae present. Scutellum with one long subbasal and one long apical setae. Legs mostly yellow; fore femur brown dorsally on apical fourth; fore tibia and tarsi brown; hind tibia yellow to yellowish-brown. Fore femur without preapical excavation, with 3–5 posterodorsal setae on apical half, and one preapical posteroventral. Fore tibia without setae at middle, one anterodorsal and one posterodorsal preapical setae and a ventral apical. Fore tarsus elongated. Mid femur with one posterior preapical seta. Mid tibia with a median posterior seta and a long ventral apical. Hind femur with an anterodorsal and an anteroventral row of setae, the former more developed especially on basal half. Hind tibia with one median anterodorsal, one submedian anteroventral and one submedian posterodorsal. Wing and calypters clear; cross-vein r-m distinctly before middle of cell dm; knob of halteres whitish-yellow.

ABDOMEN.— Tergites 1+2 and 3 completely dark brown shining dorsally; tergite 4 with 2 oblong lateral dark brown shining spots; rest of abdomen yellow. Tergites of normal proportions, and with normal sparse setulae.

TERMINALIA.— Hypopygial prominence knob-like (Figs. 14 and 15); trifoliate process with stalk very long, about five times as long as lateral plate (Fig. 16); stalk and entire process dark brown, except for apex of stalk and apex of median piece which are a little lighter; lateral plates without inner lobe; median piece linear, only a little expanded at apex and with four strong and short spines at apical margin and 2 longer subapical ones (Figs. 17 and 18).

FEMALE.— Unknown.

OTHER MATERIAL EXAMINED.— PARATYPES same data as holotype: 1 male, CASENT 3010221; 1 male, CASENT 3009904 (MNRJ); 1 male, CASENT 3009900 (BMNH); 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09B-12, 1 male, CASENT 3009781; 1 male, CASENT 309811; 1 male, CASENT 3009832.

ETYMOLOGY.— The name is derived from the Latin word *niger*, meaning black or dark, and *dorsum*, meaning back, and refers to the shiny dark brown mesothorax of this species.

DISCUSSION.— In Deeming's (1971) key, *A. nigridorsalis* will run to *A. mirabilis* Deeming, 1971, from which it can be distinguished by the glossy brown ground-colour of the body and by the presence of strong spines at the apex of the median piece of the trifoliate process, whereas *A. mirabilis* has numerous short and fine white hairs apically and preapically on the median piece.

***Atherigona (Atherigona) quadriseta* Couri, Pont, and Penny, sp. nov.**

TYPE.— HOLOTYPE: male, deposited in CAS, labelled: **MADAGASCAR: Toliara Province:** Ifaty, near Hotel Paradisia, in coastal dunes, elev. 9m, 23°10.78'S 43°37.01'E, Malaise trap, vegetation in sand area, 26 May–5 June 2002, R. Harin'Hala, collection code: MA-02-16-28, CASENT 3009804.

DIAGNOSIS.— *A. quadriseta* can be easily recognized among the Madagascan species by its brown palpi and the expanded apex of median piece of the trifoliate process, which bears four setae, of which the two median are curved outwards and the two lateral ones are long and straight (Fig. 22).

MALE.— Length. Body: 3.2–3.5 mm, wing: 3.1–3.3 mm.

HEAD.— Occiput and ocellar tubercle with grey pollinosity; frons dark brown; fronto-orbital plate, parafacial, face and gena yellowish with a little grey pollinosity; 4–5 pairs of moderately long frontal setae; parafacial and gena narrow. Antennae black, pedicel and arista brown; flagellomere long, almost reaching oral margin, measuring about 4 times the length of the pedicel. Palpi brown. Proboscis relatively long and slender, prementum glossy dark brown.

THORAX.— Dorsum of mesothorax shining brown on some more or less extensive areas, especially behind suture, and with grey pollinosity; postpronotal lobe yellow; some specimens with apex of scutellum yellow; pleura yellow with grey pollinosity. Presutural acrostichal setulae in 3–4 irregular rows. One strong and two weak proepimeral setae. Scutellum with one long subbasal and one long apical setae. Three katepisternal setae present. Legs mostly yellow, except for the brown apical half or two-thirds of fore femur, fore tibia except base and all of the fore tarsi; hind tibia and tarsi somewhat yellowish-brown. Fore femur without preapical excavation, with 4–5 posterodorsal setae in apical half, and one preapical posteroventral. Fore tibia without setae at middle; one anterodorsal and one posterodorsal preapical seta and a ventral apical. Fore tarsus elongated. Mid femur with one posterior preapical seta; mid tibia with one median posterior. Hind femur with an anterodorsal row of setae, stronger on apical half; hind tibia with one median anterodorsal, one submedian anteroventral and one submedian posterodorsal setae. Wing and calypters clear; knob of halteres whitish-yellow. Wing with cross-vein r-m distinctly before middle of cell dm.

ABDOMEN.— Abdomen yellow with the following dark brown spots: tergite 1+2 with a faint more or less triangular median brown spot; tergite 3 with two high rectangular lateral spots, almost touching anterior and posterior margins of the tergite; tergite 4 with two roundish lateral brown spots on the posterior half. Tergites of normal proportions, and with normal sparse setulae.

TERMINALIA.— Hypopygial prominence bifurcate (Figs. 19 and 20); trifoliate process with a moderately long stalk, about 3 times as long as lateral plate (Fig. 21); whole process dark brown; median piece very expanded at apex, with four apical setae, the two median ones curved outwards and the two lateral ones long and straight. (Figs. 22–23).

FEMALE.— Unknown.

OTHER MATERIAL EXAMINED.— PARATYPES labelled: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 15–21 December 2001, R. Harin'Hala, collection code: MA-02-09B-07, 1 male, CASENT 3009867; 1 male, CASENT 3009873; 1 male, CASENT 3009878 (BMNH); 1 male, CASENT 3009880 (MNRJ); 1 male, CASENT 30010230; 1 male, CASENT 30010213; 1 male, CASENT 3009871; 1 male, CASENT 3009896; 1 male, CASENT 3009903 (MNRJ). Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09C-12, 1 male, CASENT 3009826; 1 male, CASENT 3009854; 1 male, CASENT 3009820; 1 male, CASENT 3009815; 1 male, CASENT 3009827; 1 male, CASENT 3009808 (BMNH). **Mahajanga Province:** Parc National de Namoroka, 17.8 km, 329° WNW, Vilandro, elev. 100 m, 16°22'36"S 45°19'36"E, Malaise trap, tropical dry forest, 8–12 November 2002, Fisher, Griswold et al., collection code: BLF6508, 1 male, CASENT 3010040.

ETYMOLOGY.— The name is derived from the Latin word *quadri*, meaning four, and *seta*, meaning bristle, and refers to the median piece of the trifoliate process with its four strong setae.

DISCUSSION.— In Deeming's (1971) key, *A. quadriseta* will run to *A. torrida* Deeming, 1971, from which it can be separated by the bifurcate hypopygial prominence and the expanded apex of the median piece of the trifoliate process, with 4 strong setae.

***Atherigona (Atherigona) variata* Couri, Pont, and Penny, sp. nov.**

TYPE.— HOLOTYPE: male, deposited in CAS, labelled: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09C-12, CASENT 3009856.

DIAGNOSIS.— The male of *A. variata* can be distinguished by the very slender and long median piece of the trifoliate process, with basal half brown and apical half entirely white and membranous (Fig. 28). The shape of the hypopygial prominence, with the processes widely separate at base, will also assist with its recognition.

MALE.— Length. Body: 3.5 mm, wing: 3.3 mm.

HEAD.— Occiput and ocellar tubercle with grey pollinosity; frons dark brown; fronto-orbital plate, parafacial, face and gena grey pollinose; 4–5 pairs of moderate frontal setae; parafacial and gena narrow. Antennae black, pedicel and arista brown; flagellomere long, almost reaching oral margin, measuring about 4 times the length of the pedicel. Palpi yellow. Proboscis relatively long and slender; prementum glossy brown.

THORAX.— Dorsum of mesothorax grey pollinose, with one median vitta and a pair of lateral vittae along the dorsocentral rows of setae; postpronotal lobe yellow; pleura yellow with grey pollinosity. Presutural acrostichal setulae in 3–4 irregular rows. One strong and two weak proepimeral setae. Three katepisternal setae present. Scutellum with one long subbasal and one long apical setae. Legs mostly yellow, except for the apical dorsal two-thirds of fore femur and apical half of fore tibia which are brown; hind tibia and tarsi somewhat yellowish-brown. Fore femur without preapical excavation, with 4 posterodorsal setae in apical half, and one preapical posteroventral. Fore tibia without setae at middle; one anterodorsal and one anteroventral preapical seta and a ventral apical. Fore tarsus elongated. Mid femur with one posterior preapical seta; mid tibia with one median posterior. Hind femur with an anterodorsal row of setae; hind tibia with one median anterodorsal, one submedian anteroventral and one submedian posterodorsal setae. Wing and calypters clear; knob of halteres whitish-yellow. Wings with cross-vein r-m distinctly before middle of cell dm.

ABDOMEN.— Abdomen yellow with the following dark brown spots: tergite 1+2 with a faint more or less triangular median brown spot; tergite 3 with a very faint linear median vitta and two

elongated well marked laterals; tergite 4 with two round laterals. Tergites of normal proportions, and with normal sparse setulae.

TERMINALIA.— Hypopygial prominence with processes widely separate at base (Figs. 24 and 25); trifoliate process with a moderately long stalk, about 3 times as long as lateral plate (Fig. 26); stalk and lateral plate dark brown; median piece slender and longer than lateral plate, black on basal half and completely white and membranous on apical half (Figs. 27 and 28).

FEMALE.— Unknown.

OTHER MATERIAL EXAMINED.— **PARATYPE** labelled: **MADAGASCAR: Toliara Province:** Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 male, CASENT 3009612.

ETYMOLOGY.— The name comes from the Latin word *varius*, meaning different, and refers to the colour pattern of the median piece of the trifoliate process, which is black basally and white apically.

DISCUSSION.— In Deeming's (1971) key, *A. variata* will run to *A. soccata* Rondani, 1871, and both species have similar hypopygial prominence with the lobes widely separated at bases; but the median piece of the trifoliate process, black on basal half and completely white and membranous on apical half in the new species, is very different from that of *A. soccata*.

Azelia Robineau-Desvoidy, 1830

DIAGNOSIS.— Male holoptic; eyes bare; arista very short pubescent; female with cruciate interfrontal and proclinate orbital setae; prosternum bare; anepimeron bare; katapisternals 1+1; M straight; mid tibia without ventral seta; hind coxa with setulae on posterior apical surface; hind tibia without a calcar; distiphallus with apical part of juxta spinulose; ovipositor long, with narrow tergites.

The larvae live in mammal dung and are facultative carnivores, the final larval instars preying on other small larvae in the substrate.

AFROTROPICAL FAUNA.— There is only one Afrotropical species, known from Uganda.

MADAGASCAN FAUNA.— Only one unnamed species is known from Madagascar.

MATERIAL EXAMINED: UNNAMED SPECIES

MADAGASCAR: Antananarivo Province: Ankaratra massif, Manjakatempo forest station, January 1956, 1 female, B.R. Stuckenberg (NMSA).

Brontaea Kowarz, 1873

DIAGNOSIS.— Prealar seta absent; arista almost bare, with the longest individual hairs shorter than its basal diameter; dorsocentrals 2+4; prosternum and anepimeron bare; katapisternals 1+2; vein M slightly curved upwards at apex; wing-veins bare; posterior spiracle with bare margins; hind tibia with one short submedian anterodorsal seta and usually a short anteroventral, calcar absent; sternite 1 with several stiff setulae laterally; female ovipositor and egg of the "*Mydaea*-type".

The larvae live in dung of various kinds, where they are obligate carnivores.

AFROTROPICAL FAUNA.— *Brontaea* is represented in the Afrotropical Region by 22 species and is widespread throughout the region, including Madagascar, Mauritius, Réunion, Cape Verde Is., Canary Is., Comoro Is.

MADAGASCAN FAUNA.— Only three species of *Brontaea* have been recorded from Madagascar: *B. gentilis* (Robineau-Desvoidy, 1830), *B. tonitruui* (Wiedemann, 1824) and *B. versicolor* (Stein, 1906). *B. flexa* (Wiedemann, 1830) is recorded for the first time from Madagascar and *B. differa* new species is described.

Key to the Madagascan Species of *Brontaea* (modified from Emden 1951)

1. Mesonotum with an *Anthomyia*-pattern, i.e. grey dusted with a pair of black presutural spots, which may or may not be fused, and a black transverse postsutural band; legs mainly to wholly black 2
 Mesonotum with a different colour pattern, without a black transverse postsutural band; legs with at least the tibiae yellow 4
2. Presutural mesonotal spots fused only at neck; vein M strongly upcurved and sigmoid at apex (widespread in Afrotropical Region, including Madagascar and Comoro Is.)
 *B. versicolor* (Stein)
 Presutural mesonotal spots broadly fused; vein M slightly to moderately upcurved at apex . . . 3
3. Vein M slightly upcurved and not sigmoid at apex; hind marginal bands on abdominal tergites 3 and 4 uninterrupted or only very narrowly interrupted in middle and fused with the small paired paramedian spots of the anterior margin (Mauritius, Ethiopia, Madagascar, Malawi, Mozambique, Nigeria, Réunion, perhaps Rodriguez, Socotra, perhaps D.R. Congo)
 *B. gentilis* (Robineau-Desvoidy)
 Vein M moderately upcurved and sigmoid at apex; hind marginal bands on abdominal tergites 3 and 4 broadly interrupted in middle by pale dust; the paramedian spots short and roundish (widespread in the Afrotropical Region, including Madagascar, Mauritius, Réunion; Canary Is.; Oriental Region to Taiwan and Malaysia) *B. tonitrui* (Wiedemann)
4. Lower calypter enlarged, of the *Musca*-type, both calypters whitish with yellow margins; katepisternals 1+1; ocellar triangle golden-yellow, long, reaching lunula; abdominal tergites 3 and 4 with round brown lateral spots (widespread in the mainland Afrotropical region, Madagascar, Taiwan, India, Okinawa Is.) *B. flexa* (Wiedemann)
 Lower calypter not enlarged, of the *Phaonia*-type, both calypters a little brownish, at least the upper one with brown margins; katepisternals 1+2; ocellar triangle short; abdomen brown without brown spots on tergites 2 and 3; tergites 1+2 and 3 yellow in males and tergite 1+2 yellow in females (Madagascar) *B. differa* new species

MATERIAL EXAMINED: KNOWN SPECIES

B. flexa: **MADAGASCAR: Toliara Province:** Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap—in deciduous dry forest, 4–14 December 2003, R. Harin'Hala, collection code: MA-02-18-76, 1 female, CASENT 3010509; 1 female, CASENT 3010502.

B. gentilis: **MADAGASCAR: Toamasina Province:** dct [District of] Mananara, Ivontaka, 15 m, 10–14 March 1958, 1 male 1 female, B.R. Stuckenberg (NMSA).

B. tonitrui: **MADAGASCAR: Toamasina Province:** dct [District of] Mananara, Ivontaka, 10–14 March 1958, 2 males 2 females, B.R. Stuckenberg (NMSA, BMNH). **Toliara Province:** dct [District of] Ambovombe, Beloha, 175 m, 20–21 February 1957, 1 female, B.R. Stuckenberg (NMSA).

B. versicolor: **MADAGASCAR: Toamasina Province:** Périnet (Parc Nacional Andasibe), 1 female (NMSA). **Antananarivo Province:** Ankaratra massif, Manjakatempo forest station, January 1956, 1 female, B.R. Stuckenberg (NMSA). **Fianarantsoa Province:** Vakoana, Andringitra Ambalavao, 1520 m, 21–24 January 1958, 2 males 1 female, B.R. Stuckenberg (NMSA). Plateau Soaindrana, Andringitra Ambalavao, 2060 m, 14–17 January 1958, 1 female, B.R. Stuckenberg (NMSA).

DESCRIPTIONS OF NEW SPECIES OF *BRONTAEA*

Brontaea differa Couri, Pont, and Penny, sp. nov.

TYPE.—**HOLOTYPE:** male, deposited in CAS, labelled: **MADAGASCAR: Antsiranana Province:** Parc

National de Marojejy, Manantenina River, 28.0 km 38° NE Andapa, 8.2 km 333° NNW Manantenina, elev. 450 m, 14°26'12"S 49°46'30"E, Malaise trap—rain forest, 12–15 November 2003, B.L. Fisher *et al.*, collection code: BLF8723, CASENT 3010152.

DIAGNOSIS.—Dorsum of mesonotum dark brown with yellow pollinosity laterally and on scutellum; postpronotum grey pollinose; both calypters a little brownish, the upper one with brown margins; abdomen dark brown, with tergites 1+2 and 3 yellow in males and only tergite 1+2 yellow in females; abdomen brown without brown spots on tergites 2 and 3; tergite 1+2 yellow

GENERAL COLOR.—Ground-colour brown. Head with frons brown; fronto-orbital plate and gena silvery pollinose; antenna, arista and palpus brown. Mesonotum brown, with yellow pollinosity in some areas (more or less extensive in the series), especially laterally on mesonotum, parts of anepisternum, anepimeron and katepimeron. Calypters a little brownish, at least upper one with brown margins; haltere yellow. Spiracles yellow. Wing clear. Legs yellow, tarsi brown. Male abdomen with tergite 1+2 and 3 yellow and 4–5 brown, the ground setulae with very small dark bristle-dots at their bases; sternites yellow; abdomen of female similar, except that only tergite 1+2 is yellow.

MALE.—Length. Body: 5.6–6.0 mm, wing: 5.0–5.5 mm.

HEAD.—Holoptic, eyes very close together, separated at vertex only by the diameter of ocellar triangle. Frontal row with 5–6 pairs of setae. Ocellar triangle short. Inner and outer vertical setae not developed; ocellar setae moderately long. Antenna inserted at mid-level of eye, with flagellomere about 2.8 times the length of pedicel. Palpus with long dorsal setae.

THORAX.—Dorsocentrals 2+4; acrostichals in four rows, prescutellar pair well-developed; 1 postpronotal; 1 presutural; 2 intra-alars; 1 supra-alar; 2 postsupra-alars. Notopleuron with two setae. Scutellum with one long basal and one long apical pair of setae, similar in length. Anepisternum with a series of 6 long setae. Katepisternals 1+2; some specimens with 1–2 setae close to the posterior one. Lower calypter about 1.8 the length of the upper. Wing veins bare. Fore femur with rows of posteroventral, posterodorsal, posterior and dorsal setae, those in posteroventral row longer and stronger; fore tibia with a preapical dorsal seta, and ventral and posteroventral apicals; mid femur with about 5 ventral setae on basal half and 2 posterior preapicals; mid tibia with one median posterior seta; with anteroventral, ventral and posteroventral apical setae; hind femur with a complete row of anteroventral and anterodorsal setae; hind tibia with a short median to submedian anteroventral and anterodorsal seta, dorsal preapical and one anteroventral apical.

ABDOMEN.—Ground-setae moderately developed; without differentiated setae. Sternite 1 with lateral setulae. Sternite 5 with anterior membrane straight; anterior processes short (Fig. 29).

TERMINALIA.—Cercal plate wider than high and surstyli large (Figs. 30 and 31). Aedeagus as in Figs. 32 and 33.

FEMALE.—Length. Body: 5.5–6.3 mm, wing: 5.9–6.2 mm. Differs from male as follows: Frons at vertex about one-third of head-width; inner and outer vertical setae well developed; ocellar setae long; frontal row with 6–8 setae. Setae on abdomen much shorter than in male.

OVIPOSITOR.—Ovipositor long, with microtrichia along its entire length; tergite 8 with 6 long and strong setae (Figs. 34 and 35); spermathecae pyriform, as in Fig. 35.

OTHER MATERIAL EXAMINED.—**PARATYPES** as follows: same data as holotype, 1 female, CASENT 3010142. **Fianarantsoa Province:** Ranomafana, JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev. 690 m, 10–14 January 2002, R. Harin'Hala, collection code: MA-02-09D-11, 1 male, CASENT 300997856; 1 female, CASENT 3009974; 6–15 December 2001, collection code: MA-02-09D-06, 1 female, CASENT 3010483. Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 14–24 July 2002, R. Harin'Hala, collection code: MA-02-09C-35, 1 male, CASENT 3010482; 1 female, CASENT 3010480 (BMNH); 22–28 November 2001, collection code: MA-02-09C-04, 1 female, CASENT 3009735; 1 female, CASENT 3009736; 12–19 February 2002, collection code: MA-02-

09C-16, 1 female, CASENT 3009758; 26 February–4 March 2002, collection code: MA-02-09C-18, 1 female, CASENT 3010590 (MNRJ). Parc National Ranomafana, radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 16 October–8 November 2001, R. Harin'Hala, collection code: MA-02-09B-01, 1 female, CASENT 3009721; 1 female, CASENT 3009719 (MNRJ); 14–21 January 2002, collection code: MA-02-09B-12, 1 female, CASENT 3009794; 1 female, CASENT 3009787; 15–21 December 2001, collection code: MA-02-09B-07, 1 female, CASENT 3010861 (BMNH). Vohiparara, at broken bridge, elev. 1110 m, 21°13.57'S 47°22.19'E, Malaise trap in high altitude rainforest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09A-12, 1 female, CASENT 3010623; 19–26 February 2002, collection code: MA-02-09A-17, 1 female, CASENT 3010458; collection code: MA-02-09A-09, 1 male, CASENT 3010752.

ETYMOLOGY.— The name comes from the Latin word *differens*, meaning dissimilar, and refers to the distinct colour pattern of the mesonotum.

DISCUSSION.— The previously recorded Madagascan species of *Brontaea* have an “*Anthomyia*-type” pattern on the dorsum of the mesonotum; *B. differa* differs from all of them by its colour pattern.

B. tonitru is represented in the CAS collection by one specimen from the Congo and seven from India, and *B. versicolor* by one specimen from the Congo.

Cephalispa Malloch, 1935

DIAGNOSIS.— Male dichoptic; posterior eye-margin emarginated in basal half; frons parallel-sided, longer than wide; prestomal teeth well-developed; prealar seta absent; two pairs of reclinate orbital setae; ocellar setae short, hair-like; 2 pairs of long presutural dorsocentrals, the first presutural pair very reduced in the two new species described here; anepimeron bare; katapisternals 1:1:1, arranged in an equilateral triangle; both pairs of scutellar setae well developed (apical pair very reduced in *C. curta*, sp. nov.); wing veins bare, vein M straight at apex; hind tibia with a supra-median posterodorsal and anterodorsal seta, a strong median anterodorsal and a submedian anteroventral; abdomen of male lanceolate.

Biology unknown.

AFROTROPICAL FAUNA.— Only one unnamed species is recorded from the Afrotropical Region (Pont 1980), known only from Madagascar.

MADAGASCAN FAUNA.— Two new species were found in our material and are described here. Both agree in all characters with the known Oriental species of *Cephalispa*, except for the rudimentary anterior presutural dorsocentral seta in both species and the weak apical scutellar setae in *C. curta*, sp. nov.

Key to the Madagascan Species of *Cephalispa*

1. Frons dark brown; scutellum concolorous with thorax; apical pair of scutellar setae much shorter than the very long basal pair (Madagascar) *C. curta*, sp. nov.
Frons reddish; scutellum yellow on at least apical two-thirds; apical pair of scutellar setae long, as long as the basal pair (Madagascar) *C. azurea*, sp. nov.

MATERIAL EXAMINED: KNOWN SPECIES

No described *Cephalispa* was found among the material examined.

DESCRIPTIONS OF NEW SPECIES OF *CEPHALISPA**Cephalispa azurea* Couri, Pont, and Penny, sp. nov.

TYPE.— HOLOTYPE: female, deposited in CAS, labelled: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09C-12, CASENT 3009853.

DIAGNOSIS.— This species is easily distinguished by the reduced pair of prescutellar dorsocentral seta; the reddish frons; the mesonotal colour pattern, with little bluish-grey pollinosity, more or less extensive yellow areas on postpronotum and anterior and lateral areas of dorsum of mesonotum, and the almost wholly yellow scutellum.

GENERAL COLOR.— Ground-colour brown, with little bluish-grey pollinosity, and more or less extensive yellow areas on postpronotum and anterior and lateral areas of dorsum of mesonotum; scutellum almost entirely yellow. Head with frons reddish; parafacial and ocellar triangle grey pollinose from certain angles; face, fronto-orbital plate and gena yellowish-grey pollinose; antenna with pedicel yellow and flagellomere almost totally brown; arista brown; palpus yellow. Calypters whitish and hyaline; haltere yellow with whitish knob. Wing clear. Legs yellow. Abdomen brown with sparse bluish-grey pollinosity; tergite 1+2 with a median yellow spot.

FEMALE.— Length: body: 4.3–4.5 mm; wing: 4.1–4.4 mm.

HEAD.— Interocular space about one-third of head-width at level of anterior ocellus. Frontal row with 4 pairs of setae. Ocellar triangle long, reaching middle of frons or surpassing it. Inner and outer vertical setae short; ocellar setae short, hair-like. Antenna inserted slightly above mid-level of eyes, with flagellomere about 2.3–2.5 times as long as pedicel. Palpi filiform.

THORAX.— Dorsocentrals 2+3, the first presutural pair very reduced, almost hair-like; acrostichals in two irregular rows, prescutellar pair developed; 1 postpronotal; 1 presutural; 2 intra-alars; 1 supra-alar; 2 postsupra-alars. Notopleuron with two setae similar in length. Scutellum with one long basal and one long apical pair of setae, subequal in length. Anepisternum with a series of 3 long setae, 2 in upper posterior corner and one in lower; with 3–4 fine and short setae between the second and the third. Katepisternals 1:1:1. Lower calypter about twice as long as the upper one. Wing veins bare. Fore femur with a row of sparse posteroventral and posterodorsal setae, with about 5–7 setae in each row, those on posteroventral surface much longer; one long anterior seta in basal third; fore tibia with no median seta, a preapical dorsal seta and apical posteroventral and posterodorsal setae; mid femur with two anterior setae on middle third, 3–4 posteroventral setae in basal half, one preapical posterior seta and one short posteroventral; mid tibia with two posterior setae on middle third, ventral surface with a long and strong apical seta; hind femur with a sparse anterodorsal and anteroventral row of setae on basal two-thirds, one anteroventral and one anterodorsal on apical third; one posterodorsal preapical; hind tibia with two anterodorsal setae, one median long and one suprmedian shorter; two posterodorsal setae, one median and one suprmedian, similar in length, one submedian anteroventral; a long posterodorsal to dorsal seta on apical third; one posterodorsal preapical and one long and strong ventral apical.

ABDOMEN.— Tergite 4 with a row of discal setae. Tergite 5 with a row of discal and marginal setae.

OVIPOSITOR.— Moderately long, tergites 6 and 7 very large (Figs. 36 and 37); spermathecae as in Fig. 38.

EGG.— As in Fig. 39.

MALE.— Unknown.

OTHER MATERIAL EXAMINED.— PARATYPES: same data as holotype, 1 female, CASENT 30010617. Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap,

in high altitude rainforest, 26–31 March 2002, R. Harin'Hala, collection code: MA-02-09A-22, 1 female, CASENT 3009369; 14–21 January 2002, collection code: MA-02-09A-12, 1 female, CASENT 3010618.

ETYMOLOGY.— The name comes from the French word *azur*, meaning blue, and refers to the bluish-grey pollinosity of the abdomen.

DISCUSSION.— The two new species described here have the first presutural dorsocentral pair of setae strongly reduced, which separates them from their congeners. The two species can be distinguished by their general body colour, the length of the apical pair of scutellar setae, and by the chaetotaxy of mid femur.

***Cephalispa curta* Couri, Pont, and Penny, sp. nov.**

TYPE.— HOLOTYPE: male, deposited in CAS, labelled: **MADAGASCAR: Antsiranana Province:** Parc National de Marojejy, Antranohofa, 26.6 km 31° NNE Andapa, 10.7 km 318° NW Manantenina; elev. 1325 m, 14°26'36"S 49°44'36"E, yellow pan trap—montane shrubland, 18 November 2003, B.L. Fisher, collection code: BLF9081, 1 male, CASENT 3009045.

DIAGNOSIS.— This species can be distinguished by the reduced pair of prescutellar dorsocentral setae and the very short pair of apical scutellar setae.

GENERAL COLOR.— Ground-colour brown, grey pollinose. Head with frons brown; parafacial and ocellar triangle grey pollinose from certain angles; face, fronto-orbital plate and gena yellow pollinose; antenna and arista brown, flagellomere somewhat yellow in some specimens; palpus brownish-yellow to yellow. Mesonotum brown, with grey pollinosity; lateral margins of scutellum more or less extensively yellow. Calypters whitish and hyaline; haltere yellow with knob whitish. Wing clear. Legs yellow. Abdomen mostly brown dorsally and yellow laterally and ventrally, including sternite 5 and terminalia; tergite 1+2 yellow laterally in some males; posterior margins of all segments usually yellow; tergite 5 with two round dark brown spots.

MALE.— Length. Body: 3.8–4.0 mm, wing: 4.0–4.3 mm.

HEAD.— Dichoptic; interocular space about one-third of head-width at level of anterior ocellus. Frontal row with 4 pairs of setae. Ocellar triangle long, reaching middle of frons or surpassing it. Inner and outer verticals short; ocellar setae short, hair-like. Antenna inserted slightly above mid-level of eye, with flagellomere about 2.3–2.5 times as long as pedicel. Palpi filiform.

THORAX.— Dorsocentrals 2+3, the first presutural pair very reduced, almost hair-like; acrostichals in two irregular rows, prescutellar pair developed; 1 postpronotal; 1 presutural; 2 intra-alars; 1 supra-alar; 2 postsupra-alars. Notopleuron with two setae similar in length. Scutellum with one long basal pair of setae and one very short apical pair. Anepisternum with a series of 5 long setae. Katepisternals 1:1:1. Lower calypter about twice as long as upper one. Wing veins bare. Fore femur with a row of sparse posteroventral and posterodorsal setae, with about 5–7 setae in each row, those on posteroventral surface much longer; fore tibia with no median seta, a preapical dorsal seta and apical posteroventral and posterodorsal setae; mid femur with sparse setae (2–3) on basal third of anterodorsal, anteroventral and posteroventral surfaces, one median anterior seta; one preapical posterior and one posteroventral setae; mid tibia with two posterior setae on middle third, ventral surface with a long and strong apical seta; hind femur with a sparse anterodorsal row with about seven setae, 4–5 anteroventral and posteroventral setae on basal two-thirds, one anteroventral on apical third and one posteroventral preapical; hind tibia with two anterodorsal setae, one median long and one suprmedian shorter; two posterodorsal setae, one median and one suprmedian, similar in length, one submedian anteroventral; a long posterodorsal to dorsal seta on apical third; one posterodorsal preapical and one long and strong apical ventral seta.

ABDOMEN.— Tergites 3 and 4 with one pair of lateral setae; tergite 5 with a row of about 4 discal and marginal setae. Sternite 5 projecting, with large anterior processes (Fig. 40).

TERMINALIA.— Cercal plate small, surstyli with spines on internal margin (Figs. 41 and 42). Aedeagus as in Fig. 43.

FEMALE.— Length. Body. 4.0–4.3 mm, wing: 4.0–4.4 mm. Similar to male.

OVIPOSITOR.— Moderately long, tergites 6 and 7 very broad (Figs. 44 and 45); spermathecae as in Fig. 46.

OTHER MATERIAL EXAMINED.— **PARATYPES:** same data as holotype: 1 male, CASENT 3009050; 1 male, CASENT 3009051; 1 male, CASENT 3009048; 1 male, CASENT 3009046 (BMNH); 1 female, CASENT 3009052; 1 female, CASENT 3009049 (BMNH). **Antsiranana Province:** Parc National de Marojejy, 25.7 km 32° NNE Andapa, 10.3 km 314° NW Manantenina, elev. 1575 m, 14°26'42"S 49°44'30"E, yellow pan trap—montane rainforest, 21 November 2003, B.L. Fisher, collection code: BLF9243, 1 male, CASENT 8078200; 1 male, CASENT 8078204; 1 male, CASENT 8078205; 1 male, CASENT 8078206; 1 male, CASENT 8078207; 1 male, CASENT 8078203; 1 male, CASENT 8078208; 1 male, CASENT 8078209; 1 male, CASENT 8078210; 1 male, CASENT 8078212; 1 male, CASENT 8078213; 1 male, CASENT 8078216; 1 male, CASENT 8078225; 1 male, CASENT 8078218; 1 male, CASENT 8078219; 1 male, CASENT 8078222; 1 male, CASENT 8078224; 1 male, CASENT 8078223; 1 male, CASENT 8078233; 1 male, CASENT 8078232; 1 male, CASENT 8078231; 1 male, CASENT 8078230; 1 male, CASENT 8078229; 1 male, CASENT 8078228; 1 male, CASENT 8078226; 1 male, CASENT 8078227; 1 male, CASENT 8078234; 1 male, CASENT 8078215 (MNRJ); 1 male, CASENT 8078220 (MNRJ); 1 male, CASENT 8078211 (BMNH); 1 male, CASENT 8078202 (BMNH); 1 female, CASENT 80782021; 1 female, CASENT 80782201; 1 female, CASENT 8078235; 1 female, CASENT 8078217 (MNRJ); 1 female, CASENT 8078214 (BMNH). **Fianarantsoa Province:** Parc National Ranomafana, Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 12–19 February, R. Harin'Hala, collection code: MA-02-09C-16, 1 female, CASENT 3009776. Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 15–22 November 2001, R. Harin'Hala, collection code: MA-02-09A-03, 1 female, CASENT 3010050; 26–31 March 2002, R. Harin'Hala, collection code: MA-02-09A-22, 1 female, CASENT 3009387; 1 male, CASENT 3009368; 6–15 December 2001, collection code: MA-02-09A-06, 1 male, CASENT 3010003 (MNRJ); 1 female, CASENT 3010008 (MNRJ); 1 female, CASENT 3010002. Radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09B-12, 1 female, CASENT 3009791.

DISCUSSION.— See the discussion under the previous species.

Coenosia Meigen, 1826

DIAGNOSIS.— Male dichoptic; one pair of reclinate orbital setae; frons parallel-sided, longer than wide; labella reduced, prestomal teeth well developed; prealar seta absent; lower proepimeral seta directed downwards; dorsocentrals 1+3 (rarely 2+3); anepimeron bare; katapisternals 1:1:1, arranged in an equilateral triangle; scutellum with both pairs of setae developed; lower calypter about 1.8 times as long as the upper one; hind femur with two preapical setae, one anterodorsal and one dorsal, the posterodorsal absent; hind tibia with one submedian anterodorsal seta and usually one anteroventral; median posterior or posterodorsal setae absent; sternite 1 bare; male hypandrium tubular; female ovipositor long and with many microtrichia. [REF. Curran 1935, Emden 1940].

Very few biologies are known (Skidmore 1985). The larvae are obligative carnivores, living in soil, humus, leaf litter, or decaying vegetation.

AFROTROPICAL FAUNA.— *Coenosia* is the largest muscid genus occurring in the Afrotropical region, with 110 described species (Pont 1980). Species are found throughout the region, including Aldabra, Astove, Cape Verde Is., Madagascar, Seychelles.

MADAGASCAN FAUNA.— Only six *Coenosia* species have been recorded from Madagascar (3 of them endemic): *C. humilis* Meigen, 1826; *C. madagascariensis* (Séguy, 1957); *C. nova* (Stein, 1906); *C. trichocnema* Stein, 1913; *C. nitidiventris* Stein, 1906; and *C. strigipes* Stein 1916. *C.*

humilis and the latter two were found in our material. A highly aberrant *Coenosia* specimen was found in our material and is here described as a new species.

Key to the Madagascar Species of *Coenosia*

1. Katepisternal seta 1+2, the lower one placed below the upper posterior one and not equidistant from the upper two; proepimeral seta directed upwards (Madagascar) *C. aberrans*, sp. nov.
Katepisternal setae 1:1:1, forming an equilateral triangle; proepimeral seta directed downwards 2
2. Costa short, not reaching beyond the tip of vein R₄₊₅; 2 postsutural dorsocentrals; arista with short hairs confined to its base; (Madagascar). *C. nova* (Stein)
Costa, as usual, reaching to the tip of vein M; 3 postsutural dorsocentrals; arista with hairs along its entire length 3
3. Mesonotum and abdomen shining black (Madagascar) *C. nitidiventris* Stein
Mesonotum and abdomen brown with grey pollinosity, not shining 4
4. Legs yellow, including coxae; arista very short plumose; flagellomere black (yellow in some males); small species, under 4 mm long (widespread in Afrotropical Region, including Aldabra, Astove, Cape Verde Is., Madagascar; Palaearctic Region). *C. strigipes* Stein
Most of femora black, the tips sometimes pale; the other characters not all present together . . 5
5. First presutural dorsocentral pair of setae more or less well developed, but not as long as second; arista pubescent, with some longer hairs on upper and median parts (Madagascar)
. *C. madagascariensis* Séguy
Only one pair of presutural dorsocentral setae developed, arista with short hairs 6
6. Antenna short, not reaching epistoma; hind tibia without fine setae along entire length of ventral surface (widespread northeast to southern Africa, Madagascar, St. Helena, also occurring in Holarctic and Oriental Regions). *C. humilis* Meigen
Antenna long, reaching epistoma; hind tibia on ventral surface with fine setae along its entire length (Madagascar) *C. trichocnema* Stein

MATERIAL EXAMINED: KNOWN SPECIES

C. humilis: **MADAGASCAR: Fianarantsoa Province:** Centre, Vakoana, Andringitra Ambalavao, 1520 m, 21–24 January 1958, 1 male, B.R. Stuckenberg (NMSA).

C. nitidiventris: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09B-12, 1 male, CASENT 3009778; 1 female, CASENT 3009780; 15–21 December 2001, R. Harin'Hala, collection code: MA-02-09B-07, 1 female, CASENT 3009924, 1 female CASENT3009920. Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 6–15 December 2001, R. Harin'Hala, collection code: MA-02-09C-12, 1 male, CASENT 3010028; 26 February–4 March 2002, collection code: MA-02-09C-18, 1 female, CASENT 3010596; 1 male, CASENT 3010595; 1 male, CASENT 3010602 (MNRJ); 1 female, CASENT 3010598; 1 female, CASENT 3010594 (MNRJ); 1 male, CASENT 3010593; 1 female, CASENT 3010603. Vohiparara, at broken bridge, elev. 1110 m, 21°13.57'S 47°22.19'E, Malaise trap in high altitude rainforest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09A-12, 1 female, CASENT 3010621 (MNRJ). **Toliara Province:** Ifaty, near Hotel Paradisia, in coastal dunes, elev. 9 m, 23°10.78'S 43°37.01'E, Malaise trap, vegetation in sand area, 26 May–5 June 2002, R. Harin'Hala, collection code: MA-02-16-28, 1 female, CASENT 3009802. **Antsiranana Province:** Sakalava Beach, dwarf littoral forest, 10 m, 12°15'46"S 49°23'51"E, Malaise trap—across sand trail, 1 December 2003, R. Harin'Hala, collection code: BLF9558, 1 male.

C. strigipes: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 6–15 December 2001,

R. Harin'Hala, collection code: MA-02-09A-06, 1 male, CASENT 3009999; 1 male, CASENT 3010015; 1 male, CASENT 3010006 (MNRJ); 1 male, CASENT 3010018; 1 male, CASENT 3010016 (MNRJ); 15–22 November 2001, collection code: MA-02-09A-06, 1 male, CASENT 3009999; 14–21 January 2002, collection code: MA-02-09A-12, 1 female, CASENT 3010620; 1 female, CASENT 3010619; 1 female, CASENT 3010622; 1 female, CASENT 3010246 (MNRJ). Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 6–15 December 2001, R. Harin'Hala, collection code: MA-02-09C-06, 1 male, CASENT 3010027; 1 male, CASENT 3010025; 1 male, CASENT 3010023; 1 male, CASENT 3010026; 23 May–3 June 2002, R. Harin'Hala, collection code: MA-02-09C-30, 1 female, CASENT 3010036. JIRAMA water works, elev. 690 m, 21°14.91'S 47°27.13'E, Malaise trap near river, 8–15 November 2001, R. Harin'Hala, collection code: MA-02-09D-02, 1 male, CASENT 3010723; 15–21 December 2001, collection code: MA-02-09D-07, 1 female, CASENT 3010498. **Toliara Province:** Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap—in deciduous forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-09A-03, 1 male, CASENT 3010046; 1 male, CASENT 3010045; 1 male, CASENT 3010049; 21–31 August 2003, collection code: MA-02-18A-66, 1 female, CASENT 3010297; 9–19 May 2003, collection code: MA-02-18A-55, 1 female, CASENT 3010762; 21 September–2 October 2003, collection code: MA-02-18A-69, 1 female, CASENT 3010793; 1 female, CASENT 3010799; 1 male, CASENT 3010798. 16 km east Sakaraha, Zombitse Nature Reserve, 825m, Malaise trap, in tropical forest on sand, M.E.Irwin and E.I. Schlinger, Schlinger Foundation Madagascar Expedition, 20 April 1998, collection code: 98-MAD-15, 1 male, CASENT 8021588b; 1 female, CASENT 3010269. Parc National d'Andohahela, Tsimelahy, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 28 January–12 February 2004, M. Irwin, F. Parker, R. Harin'Hala, collection code: MA-02-20-53, 1 female, CASENT 8078181; 1 female, CASENT 8078182; 6–18 March 2004, collection code: MA-02-20-56, 1 female, CASENT 8078015. Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 male, CASENT 3009641; 1 male, CASENT 3009596; 1 female, CASENT 3009427; 1 female, CASENT 3009431; 1 female, CASENT 3009449; 1 female, CASENT 3009499 (MNRJ); 1 female, CASENT 3009687; 1 female, CASENT 3009659. Lake Ranobe, elev. 30 m, 23°02'22"S 43°36'37"E, Malaise trap, spiny forest thicket, 17–21 February 2003, Frontier Wilderness Project, collection code: MGF063, 1 male, CASENT 3009267; 1 female, CASENT 3009266; collection code: MGF062, 1 female, CASENT 3009258; 1 female, CASENT 3009255; 1 female, CASENT 3009259; 1 female, CASENT 3009256; 1 female, CASENT 3009260; 23°02.468'S 43°36.607'E, Malaise trap, spiny forest / tamarind forest near lake edge, 25–21 April 2003, Frontier Wilderness Project, collection code: MGF066, 1 female, CASENT 3009285; 1 female, CASENT 3009287; 1 female, CASENT 3009286; 1 female, CASENT 3009289. Fiherenana, 23°10.619'S 43°57.685'E, Malaise trap, in small undisturbed riparian forest valley, 18–22 August 2003, Frontier Wilderness Project, collection code: MGF078, 1 male, CASENT 3009252; elev. 65 m, 23°13.351'S 43°52.853'E, Malaise trap, in degraded riparian forest close to water, 5–10 August 2003, Frontier Wilderness Project, collection code: MGF076, 1 female, CASENT 3009190. Sept Lacs, elev. 120 m, 23°31'65"S 44°9'35"E, Malaise trap, gallery forest, 21–26 August 2002, Frontier Wilderness Project, collection code: MGF038, 1 female, CASENT 3009229; 1 female, CASENT 3009237; elev. 130 m, Malaise trap, gallery forest and mixed scrub on hilltop, collection code: MGF039, 1 female, CASENT 3009199; 1 female, CASENT 3009200. Fort Dauphin, 1 female, R.Paulian (NMSA).

DESCRIPTIONS OF NEW SPECIES OF *COENOSIA*

Coenosia aberrans Couri, Pont, and Penny, sp. nov.

TYPE.— HOLOTYPE: female, deposited in CAS, labelled: **MADAGASCAR: Antsiranana Province:** Parc National de Marojejy, 25.7 km 32° NNE Andapa, 10.3 km 314° NNW Manantenina, elev. 1575 m, 14°26'42"S 49°44'30"E, yellow pan trap montane rain forest, 21 November 2003, B.L. Fisher, collection code: BLF9243.

DIAGNOSIS.— Mesonotum dark brown without vittae, with a little grey pollinosity confined to proepimeron, katapisternum and meron; lower proepimeral seta directed upwards, katapisternals 1+2, the lower one placed below the upper posterior one and closer to it than to anterior upper one; very long anterodorsal and posterodorsal setae on hind tibia.

GENERAL COLOR.— Ground-colour brown with some grey pollinosity on pleura; frons dark brown with a little grey pollinosity on ocellar triangle; parafacial dark brown, face, fronto-orbital plate and gena silvery pollinose. Palpus, antenna and arista uniformly dark brown. Dorsum of mesonotum without vittae. Proepimeron, katepisternum and meron with a little grey pollinosity. Calypters whitish and haltere whitish-yellow. Wing weakly brown. Legs dark brown. Abdomen without spots; anterior margin of tergites 3–5 with a longitudinal shining vitta.

FEMALE.— Length. Body: 4.3mm, wing: 5 mm.

HEAD.— Interocular space about one-third of head-width at level of anterior ocellus. 3 pairs of frontal setae, and 1 pair of reclinate orbital setae. Inner and outer vertical setae developed and similar in length. Ocellar setae long. Antenna short, inserted a little above mid-level of eye; flagellomere about twice as long as pedicel. Palpi falciform.

THORAX.— Dorsocentrals 1+3; acrostichals hair-like, very few and in two irregular series; 1 postpronotal; 1 presutural; 2 intra-alars; 2 supra-alars; 2 postsupra-alars. Notopleuron with two setae, similar in length. Scutellum with one pair of basal and apical setae, both long and similar in length. Lower proepimeral seta directed upwards. Anepisternum with a series of 6 long setae. Katepisternals 1+2, the lower one placed below the posterior upper one. Anepimeron bare. Lower calypter about 2.3 times as long as upper one. Wing veins bare, veins R_{4+5} and M parallel at apex and anal vein very abbreviated. Legs with fore femur with sparse rows of posterodorsal and long ventral setae; fore tibia with a long median posterior seta, and strong posterior, posteroventral and posterodorsal preapicals; mid femur with sparse anteroventral and posteroventral rows of long setae and four anterodorsals on basal third; mid tibia with strong median anterior and posterior setae; preapical posterior long, and apical anterior and ventral setae also long; hind femur with an anteroventral and an anterodorsal row of setae, the anterodorsal with stronger setae; preapical dorsal and anterodorsal setae; hind tibia with a very long and strong median anterodorsal seta; a short anteroventral submedian; a posterodorsal, dorsal and anterodorsal preapical setae, the posterodorsal as long and strong as the anteroventral and one apical ventral.

ABDOMEN.— Lateral pair of setae on tergite 3; tergites 4–5 with sparse discal and marginal rows of setae.

OVIPOSITOR.— Long, with microtrichia on both sides (Figs. 47–48). Spermathecae as in Fig. 48.

MALE.— Unknown.

ETYMOLOGY.— The name comes from the Latin word *aberrans*, meaning wandering or go astray, and refers to the position of the katepusternal setae and the upcurved nature of the lower proepimeral seta.

DISCUSSION.— This is a very aberrant *Coenosia*, but the bristling of hind tibia, with posterodorsal, dorsal and anterodorsal preapical setae, very abbreviated anal vein, the presence of only one presutural dorsocentral, and one reclinate orbital place it among the *Coenosiini*, although the position of the katepisternals and the upcurved lower proepimeral seta are not right for this tribe. Only one specimen was found in the material examined.

Deltotus Séguy, 1935

DIAGNOSIS.— Ground-colour of body shining blue, violet, green, or black and yellowish-brown; one pair of presutural acrostichal setae; arista long plumose; proboscis and palpi short; dorsocentrals 2+2; prosternum and anepimeron setulose; katepisternals 1+3; postalar wall setulose; lower calypter not enlarged, of the *Phaonia*-type; scutellum setulose laterally; hind coxa bare on posterior surface; veins R_1 and R_{4+5} setulose from base to apex; vein M strongly curved forwards

towards vein R_{4+5} in apical part; male cercal plate with 2 marginal spines. (REF. Séguy 1935, Zielke 1972).

Biology unknown; the larvae may be coprophagous.

AFROTROPICAL FAUNA.— Only three species of *Deltotus* are known, all restricted to Madagascar.

MADAGASCAN FAUNA.— Prior to 1972, only one species of *Deltotus* was known, *D. facetus* Séguy, 1935. Zielke (1972) added two new species to the genus, *D. stuckenbergi* Zielke, 1972 and *D. viola* Zielke, 1972, and gave a key to separate the three species. The genus is endemic to Madagascar. *D. facetus* and *D. viola* were found in the material studied. Most of the specimens in the series of *D. viola* are more green metallic than shining violet with blue reflections as stated in the original description, and show variation in the colour of the halteres; two other specimens are violet-metallic, and smaller than the others (about 6mm). In all other characters, all the specimens agree with the original description.

Key to the Madagascar Species of *Deltotus* (modified from Zielke 1972)

1. Postsutural pair of acrostichals hair-like or indistinguishable from the ground-setulae; ground-colour of body shining black and yellowish-brown (Madagascar). *D. facetus* Séguy
- Postsutural pair of acrostichal setae developed and very distinct from the ground-setulae; ground-colour of body shining blue, violet or green 2
2. Postpronotum yellow, contrasting with the ground-colour of thorax (Madagascar) *D. stuckenbergi* Zielke
- Postpronotum concolorous with thorax (Madagascar). *D. viola* Zielke

MATERIAL EXAMINED: KNOWN SPECIES

D. facetus: **MADAGASCAR: Antsiranana Province:** Parc National de Marojejy, Manantenina River, 28.0 km 38° NE Andapa, 8.2 km 333° NNW Manantenina, elev. 450 m, 14°26'12"S 49°46'30"E, Malaise trap—rain forest, 12–15 November 2003, B.L. Fisher *et al.*, collection code: BLF8723, 1 female, CASENT 3009094; 1 female, CASENT 3009095; 1 female, CASENT 3009097; 1 female, CASENT 3009096; 1 female, CASENT 3009098; 1 male, CASENT 3009093 (MNRJ); 1 female, CASENT 3009092; 1 female, CASENT 3008904; 1 female, CASENT 3010126 (MNRJ), 1 female; CASENT 3010127; 1 female, CASENT 3010128; 1 female, CASENT 3010140; 1 female, CASENT 3010141. **Fianarantsoa Province:** Parc National Ranomafana, Talatakely, 30 October–20 November 1998, V.F. Lee, K.J. Ribardo, 1 female, CASENT 8019867; 1 female, CASENT 8019863; 1 female, CASENT 8019860; 1 male, CASENT 80198859; elev. 915–1000 m, 4–20 November 1998, 1 female, CASENT 8019713. Vohiparara, at broken bridge, elev. 1100 m, 21°13.57'S 47°22.19'E, Malaise trap, in high altitude rainforest, 26–31 March 2002, R. Harin'Hala, collection code: MA-02-09A-22, 1 female, CASENT 3009398; 1 male, CASENT 3009402; 1 male, CASENT 3009381; 12–19 March 2002, collection code: MA-02-09A-20, 1 female, CASENT 30010041; 14–21 January 2002, collection code: MA-02-09A-12, 1 female, CASENT 3010613; 31 March–8 April 2002, collection code: MA-02-09A-23, 1 male, CASENT 3010583. Radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 15–21 December 2001, R. Harin'Hala, collection code: MA-02-09B-07, 1 female, CASENT 3010859; 1 female, CASENT 3009877; 1 female, CASENT 3009914. Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 12–19 February 2002, R. Harin'Hala, collection code: MA-02-09C-16, 1 female, CASENT 3009764. **Toliara Province:** Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap—in deciduous forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 female, CASENT 3010122. **Toamasina Province:** Montagne d'Anjanaharibe, 19.5 km 27° NNE Ambinanitelo, elev. 1100 m, 15°10'42"S 49°38'06"E, yellow pan trap in montane rainforest, 12–16 March 2003, B.L. Fisher, C.E. Griswold *et al.*, collection code: BLF8153, 1 female, CASENT 3009195.

D. viola: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken

bridge, elev. 1110 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 26–31 March 2002, R. Harin'Hala, collection code: MA-02-09A-22, 1 female, CASENT 3009380; 1 female, CASENT 3009401; 1 female, CASENT 3009372; 1 female, CASENT 3009388; 1 female, CASENT 3009379; 1 female, CASENT 3009405; 1 female, CASENT 3009379; 31 March–8 April 2002, collection code: MA-02-09A-23, 1 female, CASENT 3010584; 1 female, CASENT 3010585; 1 female, CASENT 3010581; 1 female, CASENT 3010587; 14–26 June 2002, collection code: MA-02-09A-32; 1 female, CASENT 3010304 (MNRJ); 16 October–8 November 2001, collection code: MA-02-09A-01, 1 female, CASENT 3010427. **Toliara Province:** Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap—in deciduous forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 female, CASENT 3010099; 1 female, CASENT 3010114; 1 female, CASENT 3010112 (MNRJ); 1 female, CASENT 3010114; 1 female, CASENT 3010101; 1 female, CASENT 3010103; 1 female, CASENT 3010117; 1 female, CASENT 3010117.

Dichaetomyia Malloch, 1921

DIAGNOSIS.—Eyes of male narrowly separated by the diameter of anterior ocellus or more; eyes in female widely separated; proclinate orbital and crossed interfrontal setae absent; arista long-plumose; dorsocentrals 2+2, 3 or 4, the first presutural seta shorter than the second; prosternum setulose on sides; anepimeron setulose; prealar seta present; postalar wall with sparse hairs or bare; posterior spiracle with some black setulae along lower margin; vein M only slightly curved forwards before apex; hind tibia with a well developed anterodorsal preapical in addition to dorsal one, calcar absent. [REF. Emden 1942a, b]

Few biologies are known (Skidmore 1985). The larvae are obligate carnivores, and have been found in decaying vegetation and dung.

AFROTROPICAL FAUNA.—Two subgenera are recognised within the genus, *Dichaetomyia* s.str. and *Panaga* Curran, both widespread in the Afrotropical region (to which sg. *Panaga* is restricted), with a total of 61 described species, 33 in sg. *Dichaetomyia* and 28 in sg. *Panaga*. Both subgenera can be easily separated by the presence of setulae or stiff hairs on the greater ampulla (infra-alar bulla) in sg. *Panaga*; these are absent in sg. *Dichaetomyia*. The metallic green, blue or violet species of the subgenus *Dichaetomyia* were mainly described by Zielke (1972, 1973 and 1974) in the genus *Annaria* Zielke, 1972, which was based only on the metallic green, blue or violet colour and was synonymized with *Dichaetomyia* by Pont (1980). Except for *D. ovata* (Stein) and *D. albivitta* (Stein), all the species are endemic to Madagascar.

MADAGASCAN FAUNA.—Both subgenera are represented in Madagascar, with the following described species represented: *D. (Dichaetomyia) basialaris* (Zielke, 1972); *D. (Dichaetomyia) coerulea* (Bigot, 1860); *D. (Dichaetomyia) femoralis* (Zielke, 1972); *D. (Dichaetomyia) flavo-scutellata* (Stein, 1918); *D. (Dichaetomyia) frontata* **nom. nov.** (for *Dichaetomyia frontalis* (Zielke, 1972), a junior secondary homonym in *Dichaetomyia* of *Dichaetomyia frontalis* (Stein, 1918)); *D. (Dichaetomyia) harlekini* (Zielke, 1974); *D. (Dichaetomyia) humeralis* (Zielke, 1972); *D. (Dichaetomyia) rangeri* (Zielke, 1973) (synonym: *D. (D.) scutellaris* (Zielke, 1974), **syn.nov.**); *D. (Dichaetomyia) scutellata* (Séguy, 1935); *D. (Dichaetomyia) seyrigi* Séguy, 1938; *D. (Dichaetomyia) tristis* (Zielke, 1972); *D. (Panaga) lucida* Séguy, 1938; *D. (Panaga) madagascariensis* Séguy, 1938; *D. (Panaga) ovata* (Stein, 1918); and *D. (Dichaetomyia) zielkei* **nom. nov.** (for *Dichaetomyia apicalis* (Zielke, 1972), a junior secondary homonym in *Dichaetomyia* of *Dichaetomyia apicalis* (Stein, 1904). With the exception of *D. femoralis*, *D. flavo-scutellata*, *D. frontata* and *D. humeralis*, all these species have been recognised in our material. *D. (Panaga) albivitta* (Stein, 1906), previously known from Togo, Angola, East Africa, Malawi, Sierra Leone, D.R. Congo, and Kenya, is recorded for the first time from Madagascar. Four new species are described here, two in sg. *Dichaetomyia* and two in sg. *Panaga*.

Key to the Madagascan Species of *Dichaetomyia* (partly modified from Zielke 1972)

1. Greater ampulla with setulae or some stiff hairs. Subgenus *Panaga* Curran 2
Greater ampulla bare. Subgenus *Dichaetomyia* Malloch 7
2. 4 pairs of postsutural dorsocentrals; mesonotum yellowish with 2 fine white pollinose vittae along the dorsocentral rows (Togo, Angola, East Africa, Malawi, Sierra Leone, D.R. Congo) *D. (Panaga) albivitta* (Stein)
3 pairs of postsutural dorsocentrals; mesonotum not as described above 3
3. Fore tibia with a posterior median seta; mesonotum orange-reddish, with a broad dark brown vitta with some grey pollinosity, limited by the dorsocentral row of setae and reaching scutellum (Madagascar) *D. (Panaga) lucida* Séguy
Fore tibia without a posterior median seta; mesonotum with a different colour and pattern . . . 4
4. General body colour uniformly yellow, not shining; male flagellomere yellow (Tanzania, Uganda, widespread west Africa to Congo Basin, Madagascar) *D. (Panaga) ovata* (Stein)
General body colour dark brown, a little shining, with some yellow parts such as postpronotum and apex of tergite 5 strongly contrasting with the ground-colour; male flagellomere brown 5
5. Scutellum yellow (Madagascar) *D. (Panaga) colorata*, sp. nov.
Scutellum brown 6
6. Antenna with pedicel brown; mesonotum dark brown with postpronotum and lateral parts (notopleuron and postalar callus) yellow; males unknown (Madagascar) *D. (Panaga) madagascariensis* Séguy
Antenna with pedicel yellowish; mesonotum reddish-brown, slightly shining with 3 grey pollinose vittae, only postpronotum yellowish; males with a preapical ventral tuft of long setae on hind femur (Madagascar) *D. (Panaga) flabellifera*, sp. nov.
7. Metallic blue, green, violet or blue-grey flies 8
Not metallic, general colour brown to yellowish 18
8. Blue-grey flies with three broad longitudinal vittae of grey pollinosity on mesonotum (Madagascar) *D. (Dichaetomyia) coerulea* (Bigot)
Metallic blue, green, violet species, usually with no longitudinal vittae on mesonotum 9
9. All legs including coxae yellow (Madagascar) 10
Legs, or at least the femora, mostly brown or dark 11
10. Basicosta and halteres yellow *D. (Dichaetomyia) femoralis* (Zielke)
Basicosta and halteres dark *D. (Dichaetomyia) frontata*, nom. nov.
11. Postpronotum distinctly yellow and in striking contrast to the colour of the rest of the thorax 12
Postpronotum concolorous with thorax 15
12. Scutellum concolorous with mesonotum (Madagascar) . *D. (Dichaetomyia) humeralis* (Zielke)
Scutellum yellow 13
13. At least anterior half of notopleuron and anepisternum and posterior half of katepisternum yellow; 2 yellow vittae along the dorsocentral rows, reaching the first postsutural dorsocentral seta (Madagascar) *D. (Dichaetomyia) harlekini* (Zielke)
Anterior half of notopleuron and anepisternum and posterior half of katepisternum metallic green, concolorous with the rest of the mesonotum; without yellow vittae along the dorsocentral rows of setae 14
14. Hind tibia with 2 anteroventral setae (Madagascar) *D. (Dichaetomyia) rangeri* (Zielke)
Hind tibia with 1 anteroventral seta (Madagascar) *D. (Dichaetomyia) scutellata* (Séguy)
15. Scutellum yellow (Madagascar) *D. (Dichaetomyia) flavoscutellata* (Stein)

- Scutellum concolorous with mesonotum 16
16. Wing veins brownish, even brown to dark at the base, halteres with knob brown; lower calypter with brown margin (Madagascar) *D. (Dichaetomyia) tristis* (Zielke)
Base of wing veins strikingly yellow; halteres with knob yellow; both calypters whitish or yellowish, without brown margins 17
17. Apical half of tergite 5 yellow (Madagascar) *D. (Dichaetomyia) zielkei* nom.nov.
Apical half of tergite 5 concolorous with rest of abdomen (Madagascar)
. *D. (Dichaetomyia) basialaris* (Zielke)
19. Dorsocentrals 2+4; prosternum densely setulose; wings yellowish (Madagascar)
. *D. (Dichaetomyia) seyrigi* Séguy
- Dorsocentrals 2+2; prosternum moderately setulose; wings not yellowish. 19
19. Mesonotum reddish-brown with a median grey pollinose vitta and a darker vitta outside of this on each side; postpronotum and notopleuron yellow; femora mostly yellow; calypters yellow; abdomen brownish- grey pollinose, with tergite 1+2 and usually basal half of tergite 3 yellow (Madagascar) *D. (Dichaetomyia) tricolorata*, sp. nov.
Mesonotum dark brown with some grey pollinosity, with two black vittae close to the dorsocentral rows of setae, well marked presuturally, and lateral vittae along the intra-alar and supra-alar rows; femora mostly dark brown; calypters with margins brown; abdomen uniformly dark brown (Madagascar) *D. (Dichaetomyia) nigra*, sp. nov.

MATERIAL EXAMINED: KNOWN SPECIES

D. (Dichaetomyia) basialaris: **MADAGASCAR: Toliara Province:** Parc National d'Andohahela, Col du Sedro, 3.8 km 113° ESE Mahamavo, 37.6 km 341° NNW Tolagnaro; 24°45'50"S 46°45'6"E, pitfall trap—montane rainforest, elev. 900 m, 21–25 January 2002, Fisher, Griswold et al., collection code: BLF5013, 1 female, CASENT 3009363. Forêt Classée d'Analavelona, 33.2 km 344° NNW Mahaboboka, elev. 1300 m, 22°38'34"S 44°10'16"E, beating low veg. in montane rainforest, 12–26 February 2003, Fisher, Griswold et al., collection code: BLF7917, 1 male, CASENT 3009261 (MNRJ); 22–28 November 2001, 1 female, CASENT 3009733. **Fianarantsoa Province:** Parc National Ranomafana, Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09C-12, 1 male, CASENT 3009843; 22–28 November 2001, 1 female, CASENT 3009733. Vohiapara, 14 km W of park headquarters, 21°22.63'S 47°37.02'E, in cloud forest, elev. 1150 m, 21 December 1999, M.E.Irwin, E.I. Schlinger and H.H. Rasolondalao, specimen without abdomen, CASENT 8018343. At broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 14–26 June 2002, collection code: MA-02-09A-32, 1 female, CASENT 3010317; 31 March–8 April 2002, collection code: MA-02-09A-23, 1 female, CASENT 3010569; 1 female, CASENT 3010577; 1 male, CASENT 3010580; 25 May–4 June 2001, collection code: MA-02-09A-30, 1 male, CASENT 3010557. JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev 690 m, 10–14 January 2002, R. Harin'Hala, collection code: MA-02-09D-11, 1 female, CASENT 3009956; 28 November–6 December 2001, collection code: MA-02-09D-05, 1 male, CASENT 3010552; 1 male, CASENT 3010549; 1 male, CASENT 3010550 (MNRJ); 1 male, CASENT 3010551; 28 November 2001, collection code: MA-02-09D-04, 1 male, CASENT 3010542. **Antsiranana Province:** Parc National de Marojejy, Antranofofa, 26.6 km 31° NNE Andapa, 10.7 km 318° NW Manantenina, elev. 1325 m, 14°26'36"S 49°44'36"E, yellow pan trap—montane shrubland, 18 November 2003, B.L. Fisher, collection code: BLF9081, 1 female, CASENT 3009039.

D. (Dichaetomyia) coerulea: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Talatakely, Trail FF, elev. 915–1000 m, 4–20 November 1998, V.F. Lee, K.J. Ribardo, 1 female, CASENT 8019762. **Toamasina Province:** Montagne d'Anjanaharibe, 18.0 km 21° NNE Ambinanitelo, elev. 470 m, 15°11'18"S 49°36'54"E, pitfall trap, rainforest, 12–16 March 2003, B.L. Fisher, C.E. Griswold et al., collection code: BLF8003, 1 female, CASENT 3009113.

D. (Dichaetomyia) harlekini: **MADAGASCAR: Antananarivo Province:** 65 km S. of Antananarivo [Tananarive], 25 November 1959, E.S. Ross. Holotypus *Annaria harlekini* [now *Dichaetomyia harlekini*],

female, det. E. Zielke, 1972. Type no. CAS 11870. **Fianarantsoa Province:** Parc National Ranomafana, Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 22–28 November 2001, R. Harin'Hala, collection code: MA-02-09C-04, 1 female, CASENT 3009732. Vohiparara, at broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 6–15 December 2001, R. Harin'Hala, collection code: MA-02-09A-06, 1 female, CASENT 3010004; 14–26 June 2002, collection code: MA-02-09A-32, 1 male, CASENT 3010307.

D. (Dichaetomyia) rangeri: **MADAGASCAR: Toamasina Province:** Périnet, 7 November 1959, E.S. Ross. Holotypus *Annaria scutellaris* [now = *D. rangeri*], male, det. E. Zielke, 1972. Type no. CAS 11871. **Fianarantsoa Province:** Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09C-12, 1 female, CASENT 3009845; 6–15 December 2001, collection code: MA-02-09C-06, 1 female, CASENT 3010021; 26 February–4 March 2002, collection code: MA-02-09C-18, female, CASENT 3009754; 22–28 November 2001, collection code: MA-02-09C-04, 1 female, CASENT 3009750; 1 female, CASENT 3009731; 30 October–20 November 1998, V.F. Lee, K.J. Ribardo, CASENT 8019868. Vohiparara, at broken bridge, elev. 1100 m, 21°13.57'S 47°22.19'E, Malaise trap, in high altitude rainforest, 26–31 March 2002, R. Harin'Hala, collection code: MA-02-09A-22, 1 female, CASENT 3009393; 1 female, CASENT 3010043; 31 March–8 April 2002, collection code: MA-02-09A-23, 1 female, CASENT 3010574; 1 female, CASENT 3010572; 1 female, CASENT 3010571 (MNRJ); 1 female, CASENT 3010576; 14–26 June 2002, collection code: MA-02-09A-32, 1 female, CASENT 3010310; 1 female, CASENT 3010311. JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev. 690 m, 16 October–8 November 2001, R. Harin'Hala, collection code: MA-02-09D-01, 1 female, CASENT 3010412. Radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 28–31 March 2002, R. Harin'Hala, collection code: MA-02-09B-22, 1 female, CASENT 3010679. **Toliara Province:** Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap, deciduous dry forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 male, CASENT 3010107; 1 female, CASENT 3010106 (MNRJ).

D. (Dichaetomyia) scutellata: **MADAGASCAR: Fianarantsoa Province:** Ranomafana, Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 14–24 July 2002, R. Harin'Hala, collection code: MA-02-09C-35, 1 female, CASENT 3010479. Parc National Ranomafana, Talatakely research laboratory area, elev. 940 m, 21°14'53.5"S 47°25'36.9"E, 30 October–20 November 1998, V.F. Lee, K.J. Ribardo, 1 female, CASENT 8019810. Talatakely trail EO-300, elev. 1040 m, 8 November 1998, V.F. Lee, K.J. Ribardo, 1 female, CASENT 8019793. Vohiparara, at broken bridge, elev. 1100 m, 21°13.57'S 47°22.19'E, Malaise trap, in high altitude rainforest, 31 March–8 April 2002, R. Harin'Hala, collection code: MA-02-09A-23, 1 female, CASENT 3010573.

D. (Dichaetomyia) seyrigi: **MADAGASCAR: Mahajanga Province:** Parc National de Namoroka, 16.9 km, 317° NW, Vilanandro, elev. 100 m, 16° 24'24"S 45°18'36"E, yellow pan trap, tropical dry forest, 12–16 November 2002, Fisher, Griswold et al., collection code: BLF6586, 1 female, CASENT 3009291; 1 female, CASENT 3009296; 1 female, CASENT 3009293; 1 female, CASENT 3009301; 1 female, CASENT 3009297; 1 female, CASENT 3009142; 1 female, CASENT 3009295; 1 female, CASENT 3009294, collection code: BLF6587, 1 female, CASENT 3009141; 1 female, CASENT 3009139; 1 female, CASENT 3009140; 1 female, CASENT 3009292 (MNRJ). 9.8 km, 300° WNW, Vilanandro, elev. 140 m, 16° 28'00"S 45°21'00"E, yellow pan trap, tropical dry forest, 4–8 November 2002, Fisher, Griswold et al., collection code: BLF6505, 1 female, CASENT 3009340; 1 female, CASENT 3009347; 1 female, CASENT 3009348; 1 female, CASENT 3009346; 1 female, CASENT 3009345; 1 female, CASENT 3009353; 1 female, CASENT 3009352; 1 female, CASENT 3009344; 1 female, CASENT 3009343; 1 male, CASENT 3009351; 1 female, CASENT 3009338 (MNRJ); 1 female, CASENT 3009342; 1 female, CASENT 3009339; 1 female, CASENT 3009350; 1 female, CASENT 3009341. 17.8 km, 329° WNW, Vilanandro, elev. 100 m, 16°22'36"S 45°19'36"E, Malaise trap, tropical dry forest, 8–12 November 2002, Fisher, Griswold et al., collection code: BLF6511, 1 female, CASENT 3009244; 1 female, CASENT 3009241; 1 female, CASENT 3009242; 1 female, CASENT 3009243. Parc National de Baie de Baly, 12.4 km, 337° NNW, Salala, elev. 10 m, 16°00'36"S 45°15'54"E, yellow pan trap, tropical dry forest, 26–30 November 2002, Fisher, Griswold et al., collection code: BLF6817, 1 female, CASENT 3009112; 1 female, CASENT 3009111; 1 female, CASENT 3009110; 1 female, CASENT 3009109; 1 female, CASENT 3009108; 1 female, CASENT 3009107; 1 female, CASENT 3009106; 1 female, CASENT 3009105;

1 female, CASENT 3009099; 1 female, CASENT 3009100; 1 female, CASENT 3009101; 1 female, CASENT 3009102; 1 female, CASENT 3009103; 1 female, CASENT 3009104; 1 female, CASENT 3009168; 1 female, CASENT 3009176; collection code: BLF6815, 1 male, CASENT 3009149; 1 female, CASENT 3009150; 1 female, CASENT 3009151; 1 female, CASENT 3009152; 1 female, CASENT 3009153; 1 female, CASENT 3009154; 1 female, CASENT 3009155; 1 female, CASENT 3009156; 1 female, CASENT 3009157; 1 female, CASENT 3009158; 1 female, CASENT 3009159; 1 female, CASENT 3009160; 1 female, CASENT 3009161; 1 female, CASENT 3009162; 1 female, CASENT 3009163; 1 female, CASENT 3009164; 1 female, CASENT 3009167; 1 female, CASENT 3009148. Reserve Spéciale de Bemarivo, 23.8 km, 223° SW, Besalampy, elev. 30 m, 16°55'30"S 44°22'06"E, yellow pan trap, tropical dry forest, 19–23 November 2002, Fisher, Griswold et al., collection code: BLF6595, 1 female, CASENT 3008952; collection code: BLF6695, 1 female, CASENT3008951; 1 female, CASENT3008955; 1 female, CASENT3008956; 1 female, CASENT3008953; 1 female, CASENT3008957. **Toliara Province:** Forêt de Mahavelo, Isantoria River, elev. 110 m, 24°45'30"S 46°9'26"E, pitfall trap—in spiny forest thicket, 28 January–1 February 2002, Fisher, Griswold et al., collection code: BLF5239, 1 female, CASENT 3009280; 1 male, CASENT 3009279 (MNRJ); 1 female, CASENT 3009278; 1 female, CASENT 3009277; 1 male, CASENT 3009276; 1 female, CASENT 3009275. Forêt de Beroboka, 5.9 km, 131° SE Ankidranoka, 22°13'59"S 43°21'59"E, elev. 80 m, pitfall trap—in tropical dry forest, 12–16 March 2002, Fisher, Griswold et al., collection code: BLF6068, 1 male, CASENT 3009247. Forêt de Bealoka, Mandrare River, 14.6 km, 329° NNW Amboasary, 24°57'25"S 46°16'17"E, elev. 35m, pitfall trap—in gallery forest, 3–8 February 2002, Fisher, Griswold et al., collection code: BLF5314, 1 female, CASENT 3008889; 1 female, CASENT 3008890; 1 female, CASENT 3008891; 1 female, CASENT 3008892; 1 female, CASENT 3008884; 1 female, CASENT 3008885; 1 female, CASENT 3008893; 1 female, CASENT 3008886; 1 female, CASENT 3008887; 1 female, CASENT 3008889; 1 female, CASENT 3008880; 1 female, CASENT 3008881; 1 female, CASENT 3008882; 1 female, CASENT 3008883; 1 female, CASENT 3008888; pitfall trap in tropical dry forest, elev. 80 m, 12–16 March 2002, collection code: BLF6068, 1 female, CASENT 3009249. Forêt de Tsinjoriaky, 6.2 km, 84° E Tsifota, 22°48'8"S 43°25'14"E, elev. 70 m, general collecting—spiny forest thicket, 6–10 March 2002, Fisher, Griswold et al., collection code: BLF5314, 1 male, CASENT 3008909; collection code: BLF5965, 1 female, CASENT 3008899. Parc National de Tsimanampetsotsa, Forêt de Bemanateza, 20.7 km 81° E Efoetse, 23.0 km, 131° SE Beheloka, 23°59'32"S 43°52'50"E, elev. 90 m, pitfall trap—in spiny forest thicket, 22–26 March 2002, Fisher, Griswold et al., collection code: BLF6258, 1 male, CASENT 3009290. Mitoho Cave, 6.4 km 77° ENE Efoetse, 17.4 km, 170° SE Beheloka, 24°2'50"S 43°45'11"E, elev. 40 m, pitfall trap—in spiny forest thicket, 18–22 March 2002, Fisher, Griswold et al., collection code: BLF6161, 1 male, CASENT 3008950. Mahafaly Plateau, 6.2 km 74° ENE Itampolo, 24°39'13"S 43°59'48"E, elev. 80 m, pitfall trap—in spiny forest thicket, 21–25 February 2002, Fisher, Griswold et al., collection code: BLF5763, 1 female, CASENT 3008960. Reserve Spéciale de Sainte Marie, 14.9 km, 261° W. Marovato, 25°35'40"S 45°8'49"E, elev. 160 m, pitfall trap in spiny forest thicket, 13–19 February 2002, Fisher, Griswold et al., collection code: BLF5650, 1 female, CASENT 3008965. River Ranobe, elev. 30 m, 23°02'22"S 43°36'37"E, Malaise trap—in spiny forest thicket, 17–21 February 2003, Frontier Wilderness Project, collection code: MGF063, 1 female, CASENT 3009265. 5–9 February 2003, collection code: MGF058, 1 female, CASENT 3009202. Ifaty, near Hotel Paradisia, in coastal dunes, elev. 9m, 23°10.78'S 43°37.01'E, Malaise trap, vegetation in sand area, 26 May–5 June 2002, R. Harin'Hala, collection code: MA-02-16-28, 1 female, CASENT 30008947. Mikea Forest, NW of Manombo, elev. 30 m; 22°54.22'S 43°28.53'E, Malaise trap—in deciduous forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 female, CASENT 3010088; 1 female, CASENT 3010092 (MNRJ). Elev. 37 m; 22°54.80'S 43°28.93'E, Malaise trap, spiny forest, 16–26 December 2001, R. Harin'Hala, collection code: MA-02-18B-06, 1 female, CASENT 3010546; 1 male, CASENT 3010547. 16 km east Sakahara, Zombitse Nature Reserve, Malaise trap in tropical forest on sand, 825m, 20 April 1998, M.E. Irwin and E.I. Schlinger, Schlinger Foundation Madagascar Expedition, collection code: 98-MAD-15, 1 male, CASENT 8021702; 1 male, CASENT 8021869; 1 male, CASENT 8021713; 1 male, CASENT 8067667; 1 male, CASENT 8067666 (MNRJ). **Antsiranana Province:** Forêt de Binara, elev. 375 m, 7.5 km 230° SW Daraina; 13°15'18"S 49°37'00"E, pitfall trap—tropical dry forest, 1 December 2003, B.L. Fisher, collection code: BLF9558, 1 female, CASENT 3008967; 1 female, CASENT 3008971 female, CASENT 3008972; 1 female, CASENT 3008970; 1 female, CASENT 3008969; 1 female, CASENT 3008968; 1 female, CASENT 3008981, collec-

tion code: BLF9559, 1 female, CASENT 3008917. Forêt d' Antisahabe, elev. 550 m, 11.4 km 275° W Daraina; 13°12'42"S 49°33'24"E, yellow pan trap—tropical dry forest, 12 December 2003, B.L. Fisher, collection code: BLF10115, 1 female, CASENT 3010239. **Toamasina Province:** Parcelle E3 Tampolo, 17°17'00"S 49°16'00"E, elev. 10 m, yellow pan trap, littoral forest, 14 April 2004, Malagasy ant team, collection code: BLF10730, 1 female, CASENT 3008927.

D. (Dichaetomyia) tristis: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1100m; 21°13.57'S 47°22.19'E, Malaise trap, in high altitude rainforest, 26–31 March 2002, R. Harin'Hala, collection code: MA-02-09A-22, 1 female, CASENT 3009403; 1 female, CASENT 3009392; 31 March–8 April 2002, collection code: MA-02-09A-23, 1 male, CASENT 3010579 (MNRJ); 16 October–8 November 2001, collection code: MA-02-09A-01, 1 female, CASENT 3010423; 14–26 June 2002, collection code: MA-02-09A-32, 1 male, CASENT 3010316. Radio tower at forest edge, elev. 1130 m; 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 15–21 December 2001, R. Harin'Hala, collection code: MA-02-09B-07, 1 male, CASENT 3010854; 1 male, CASENT 3010857. Belle Vue at Talatakely, elev. 1020 m; 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 22–28 November 2001, R. Harin'Hala, collection code: MA-02-09C-04, 1 male, CASENT 3009740; 12–19 February 2002, 1 male, CASENT 3009770 (MNRJ). Trail FF, 4–20 November 1988, elev. 915–1000 m, V.F. Lee and K.J. Ribardo, 1 male, CASENT 8019659. **Antsiranana Province:** Parc National de Marojejy, elev. 2000 m, 25.4 km 30° NNE Andapa, 10.9 km 311° NW Manantenina; 14°26'42"S 49°44'06"E, yellow pan trap—montane shrubland, 23 November 2003, B.L. Fisher, collection code: BLF9323, 1 male, CASENT 3008939; 1 female, CASENT 3008941; 1 male, CASENT 3008937; 1 male, CASENT 3008938; 1 female, CASENT 3010240. Antranohofa, 26.6 km 31° NNE Andapa, 10.7 km 318° NW Manantenina, elev. 1325 m, 14°26'36"S 49°44'36"E, yellow pan trap—montane shrubland, 18 November 2003, B.L. Fisher, collection code: BLF9081, 1 male, CASENT 3009036. **Toliara Province:** Parc National d'Andohahela, Col du Sedro, 3.8 km 113° ESE Mahamavo, 37.6 km 341° NNW Tolagnaro, 24°45'50"S 46°45'6"E, pitfall trap—montane rainforest, elev. 900 m, 21–25 January 2002, Fisher, Griswold et al., collection code: BLF5013, 1 male, CASENT 3009366; 1 female, CASENT 3009365; 1 female, CASENT 3009362.

D. (Dichaetomyia) zielkei: **MADAGASCAR: Toliara Province:** Parc National d'Andohahela, Col du Sedro, 3.8 km 113° ESE Mahamavo, 37.6 km 341° NNW Tolagnaro; 24°45'50"S 46°45'6"E, pitfall trap—montane rainforest, elev. 900 m, 21–25 January 2002, Fisher, Griswold et al., collection code: BLF5013, 1 male, CASENT 3009361 (MNRJ); 1 male, CASENT 3009364. **Toamasina Province:** Montagne d'Anjaaharibe, 19.5 km 27° NNE Ambinanitelo, elev. 110 m, 15°10'42"S 49°38'06"E, yellow pan trap in montane rainforest, 12–16 March 2003, B.L. Fisher, C.E. Griswold et al., collection code: BLF8153, 1 female, CASENT 3009196. Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap—in deciduous dry forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 female, CASENT 3010121. **Fianarantsoa Province:** Parc National Ranomafana, Vohiapara, at broken bridge, elev. 1100 m; 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 14–26 June 2002, collection code: MA-02-09A-32, 1 female, CASENT 3010318.

D. (Panaga) albivitta: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Talatakely, trail FF, elev. 915–1000 m, 4–20 November 1998, V.F. Lee, K.J. Ribardo, 1 female, CASENT 8019714.

D. (Panaga) lucida: **MADAGASCAR: Toliara Province:** Forêt Classée d'Analavelona, 29.2 km 343° NNW Mahaboboka, elev. 1100 m, 22°40'30"S 44°11'24"E, pitfall trap, in montane rainforest, 18–22 February 2003, Fisher, Griswold et al., collection code: BLF7817, 1 female, CASENT 3009172.

D. (Panaga) madagascariensis: **MADAGASCAR: Antsiranana Province:** Parc National de Marojejy, Antranohofa, 26.6 km 31° NNE Andapa, 10.7 km 318° NW Manantenina, elev. 1325 m, 14°26'36"S 49°44'36"E, yellow pan trap—montane shrubland, 18 November 2003, B.L. Fisher, collection code: BLF9081, 1 female, CASENT 3009034. **Fianarantsoa Province:** Parc National Ranomafana Vohiparara, at broken bridge, elev. 1110 m; 21°13.57'S 47°22.19'E, Malaise trap in high altitude rainforest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09A-12, 1 male, CASENT 3010616; 31 March–8 April 2002, collection code: MA-02-09A-23, 1 female, CASENT 3010588 (MNRJ); 25 May–4 June 2002, collection code: MA-02-09A-30, 1 female, CASENT 3010562; JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev. 690 m, 10–14 January 2002, R. Harin'Hala, collection code: MA-02-09D-11, 1 female, CASENT 3009955.

D. (Panaga) ovata: **MADAGASCAR: Toliara Province:** Forêt Classée d'Analavelona, 29.2 km 343° NNW Mahaboboka, elev. 1100 m, 22°40'30"S 44°11'24"E, pitfall trap, in montane rainforest, 18–22 February 2003, Fisher, Griswold et al., collection code: BLF7817, 1 female, CASENT 3009179. Antafoky, elev. 55m, 23°28'43"S 44°3'51"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF003, 1 male, CASENT 3009707. **Mahajanga Province:** Parc National de Baie de Baly 12.4 km, 337° WNW Soalala, elev. 10 m, 16°00'36"S 45°15'54"E, pitfall trap in tropical dry forest, 26–30 November 2002, Fisher, Griswold et al., collection code: BLF6815, 1 female, CASENT 3009165; 1 female, CASENT 3009166 (MNRJ); 1 male, CASENT 3009147.

DESCRIPTIONS OF NEW SPECIES OF *DICHAETOMYIA*

Dichaetomyia (Dichaetomyia) nigra Couri, Pont, and Penny, sp. nov.

TYPE.— **HOLOTYPE:** male, deposited in CAS, labelled: **MADAGASCAR: Toamasina Province:** Parcelle E3 Tampolo, 17°17'00"S 49°16'00"E, elev. 10 m, yellow pan trap, littoral forest, 14 April 2004, Malagasy ant team, collection code: BLF10730, CASENT 3008923.

DIAGNOSIS.— Mesonotum dark brown with some grey pollinosity, with 2 black vittae inside the dorsocentral row of setae that reach a little further than first postsutural dorsocentral seta; lateral black vittae on intra-alar and supra-alar row of setae reaching the level of posterior postsutural dorsocentral; postpronotum yellowish-brown. Abdomen totally dark brown. Dorsocentrals 2+2.

GENERAL COLOR.— Ground-colour dark brown. Head with frons brown; fronto-orbital plate brown, silver pollinose from certain angles; gena brown. Antenna with pedicel reddish-yellow and flagellomere brown. Arista brown, yellow at base. Palpus brown. Mesonotum dark brown with some grey pollinosity, with 2 black vittae inside the dorsocentral row of setae that reach a little further than first postsutural dorsocentral seta; lateral black vittae on intra-alar and supra-alar row of setae reaching the level of posterior presutural dorsocentral; postpronotum yellowish-brown. Anterior spiracle white, strongly contrasting with the surrounding area; posterior spiracle brownish, with black setae on margins. Pleura dark brown, with some paler areas in some specimens. Anepimeron with black setulae. Calypters brownish with darker margins. Haltere light brown, stalk a little darker in most specimens. Wing clear. Legs with coxae brown with grey pollinosity, femora brownish-yellow, trochanters, extreme tips of femora, tibiae and tarsi yellow. Abdomen entirely dark brown, some specimens with some grey pollinosity.

MALE.— Length. Body: 6.3 mm, wing: 6.4 mm.

HEAD.— Eyes with very short and sparse hairs; separated at vertex by the width of the ocellar triangle. Vertical setae not developed. Frontal row with 2 strong pairs of setae close to lunula, the others hair-like, with a moderately developed and reclinate orbital above them. Antenna inserted at mid level of eye; flagellomere about 2.6 as long as pedicel. Arista with long plumes. Gena slender, width similar to that of flagellomere. Palpi slightly clavate.

THORAX.— Acrostichals 0+1; dorsocentrals 2+2; 2 postpronotals; 1 presutural; 2 intra-alars; 2 supra-alars; 2 postsupra-alars. Notopleuron with two setae, the posterior one a little shorter than the anterior. Postalar declivity and suprasquamal ridge bare. Scutellum with one long basal and one long apical pair of setae, similar in size, and with a few fine latero-inferior setulae on basal third. Anepisternum with a series of 4 long setae, the three upper placed close to each other and the fourth placed lower; the row of strong setae interspersed with fine setae; a short seta at upper anterior angle. Katepisternals 1+2. Anepimeron with a tuft of setulae above and some scattered setulae on posterior half. Posterior spiracle with a row of black setulae on lower and posterior margins. Lower calypter about twice as long as upper one. Wing vein R_{4+5} with 1–2 dorsal and ventral setae on the node at base, and dorsally about 3–5 setulae beyond node, and a row of ventrals longer than the dorsals from node almost reaching cross-vein r-m. Fore femur with complete rows of posteroventral,

posterodorsal and dorsal setae; fore tibia with a strong median posterior seta, one dorsal preapical and one posteroventral apical; mid femur with 3 preapical setae, the more dorsal one shorter; mid tibia with 2 strong posterior setae on middle third; strong apical seta on ventral and posteroventral surfaces; hind femur with a complete anterodorsal row of more or less strong setae; 3–4 anteroventral setae on apical third, longer apicad; hind tibia with one median anterodorsal, 2 anteroventrals on median third, one anterodorsal and one dorsal preapical and one ventral apical, all short.

ABDOMEN.—Tergites 4–5 each with a marginal row of setae, not much differentiated from other setulae on Abdomen. Sternite 5 as in Fig. 49.

TERMINALIA.—Cercal plate a little higher than wide; surstyli short, not passing margin of cercal plate (Figs. 50 and 51). Aedeagus as in Figs. 52 and 53.

FEMALE.—Length. Body. 6.4–6.6 mm, wing: 6.7–6.8 mm.

Differs from male as follows: Frons at vertex very wide, about 0.35 of head-width. Inner and outer vertical setae developed.

OVIPOSITOR.—Moderately long; tergites and sternites broad, as in Figs. 54 and 55. Spermathecae as in Fig. 55

OTHER MATERIAL EXAMINED.—**PARATYPES:** same data as holotype: 1 female, CASENT 3008926; 1 female, CASENT 3008925 (MNRJ); 1 female, CASENT 3008924 (BMNH); 18–21 April 2004, collection code: BLF10834, CASENT 3003934; 18–21 April 2004, 1 male, CASENT 3008920. **Antsiranana Province:** Parc National de Marojejy, Manantenina River, 27.6 km 35° NE Andapa, 9.6 km 327° NNW Manantenina, elev. 775m, 14°26'06"S 49°45'36"E, yellow pan trap—rain forest, 15–18 November 2003, B.L. Fisher *et al.*, collection code: BLF8873, 1 female, CASENT 3008931. **Fianarantsoa Province:** Parc National Ranomafana, Talatakely, 30 October–20 November 1998, V.F. Lee, K.J. Ribardo, 1 female, CASENT 8019864.

ETYMOLOGY.—The name comes from the Latin word *niger*, meaning black or dark, and refers to the dark brown mesonotum.

DISCUSSION.—The new species can be distinguished from the others recorded from Madagascar by the colour pattern of the dorsum of mesonotum and by the presence of only two dorsocentral postsutural setae.

***Dichaetomyia (Dichaetomyia) tricolorata* Couri, Pont, and Penny, sp. nov.**

TYPE.—**HOLOTYPE:** male, deposited in CAS, labelled: **MADAGASCAR: Toliara Province:** Parc National d'Andohahela, Tsimelahy, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 15–28 January 2003, M. Irwin, F. Parker, R. Harin Hala, collection code: MA-02-20-52, CASENT 8078035.

DIAGNOSIS.—Mesonotum reddish-brown, with a presutural median grey pollinose vitta, best seen from behind, which continues faintly behind suture, and with less pollinosity than presuturally; presuturally the median vitta is bordered by lateral brown non-pollinose vittae; two grey presutural pollinose areas lateral to the median one, close to the first dorsocentral seta; postpronotum and notopleuron yellow. Legs yellow. Abdomen with tergites 1+2 and basal half of tergite 3 somewhat yellow. Dorsocentrals 2+2.

GENERAL COLOR.—Ground-colour brown. Head with frons brown; fronto-orbital plate brown, silver pollinose; gena brown with very little silver pollinosity. Antenna with pedicel reddish-yellow and flagellomere brown. Palpus brown. Anterior and posterior spiracles yellow. Black setae on posterior spiracle margin strongly contrasting with its pale colour. Pleura yellowish-brown but not uniformly so, with some grey pollinosity. Anepimeron with black setulae. Calypters whitish, with whitish margins. Haltere yellow. Wing clear. Legs yellow. Abdomen brownish-grey pollinose; tergite 1+2 and basal half of tergite 3 yellow; tergites 3–5 with lateral brown spots, those on tergite 5 smaller; the differentiated lateral and discal setae each with a small brown bristle-base.

MALE.—Length. Body: 6.0 mm, wing: 6.2 mm.

HEAD.— Eyes with very short and sparse hairs, separated at vertex by width of ocellar triangle, a little narrower towards middle of eyes and strongly diverging towards lunula. Fronto-orbital plate slender. Vertical setae short. Frontal row with 5 pairs of setae, the longest one close to lunula. Antenna inserted at mid level of eye; flagellomere about 2.6 times as long as pedicel. Arista with long plumes. Gena slender, its width similar to that of flagellomere. Palpus slightly clavate.

THORAX.— Acrostichals 0+1; dorsocentrals 2+2; 2 postpronotals; 1 presutural; 2 intra-alars; 2 supra-alars; 2 postsupra-alars. Notopleuron with two setae, the posterior one a little shorter than the anterior. Postalar declivity and suprasquamal ridge bare. Scutellum with one long basal and one long apical pair of setae, similar in size, and with a few fine latero-inferior setulae on basal two-thirds. Anepisternum with a series of 4 long setae, the three upper ones placed close one to the other, and the fourth placed lower; some fine setae among the strong ones; a short seta at anterior upper angle. Katepisternals 1+2. Anepimeron with a tuft of setulae above and some scattered setulae on posterior half. Posterior spiracle with a row of black setulae on lower and posterior margins. Lower calypter about twice as long as upper one. Wing vein R_{4+5} with 1–3 dorsal and ventral setae on the node, and 1–2 ventrals slightly beyond this. Fore femur with complete rows of posteroventral, posterodorsal and dorsal setae; fore tibia without median or submedian setae; one dorsal preapical and one posteroventral apical; mid femur with about 5 fine and sparse ventral setae on basal half; posterior surface with 2–3 preapical setae; mid tibia with 2 posterior setae on middle third; hind femur with a complete anterodorsal row of more or less strong setae; anteroventral setae on apical third, longer apicad; hind tibia with one median anterodorsal, 2 anteroventrals on median third, one anterodorsal and one dorsal preapical and one ventral apical, all short.

ABDOMEN.— Tergites 1+2–5 each with two pairs of lateral setae; tergites 3–5 each with a discal row of setae. Sternite 5 as in Fig. 56.

TERMINALIA.— Cercal plate and surstyli as in Figs. 57 and 58. Aedeagus as in Figs. 59 and 60.

FEMALE.— Length. Body. 6.0–6.4 mm, wing: 6.2–6.5 mm.

Differs from male as follows: Frons at vertex very wide, about 0.35 of head-width. Inner and outer vertical setae developed.

OVIPOSITOR.— Moderately long; tergites and sternites broad, as in Figs. 61 and 62. Spermathecae as in Fig. 62.

OTHER MATERIAL EXAMINED.— PARATYPES: Same data as holotype: 1 female, CASENT 8078036; 1 male, CASENT 8078037; 1 female, CASENT 8078034; 29 June–10 July 2003, collection code: MA-02-20-31, 1 female, CASENT2070582; 1 female, CASENT 2070589; 1 female, CASENT 2070603; 1 female, CASENT 2070581; 1 female, CASENT 2070597 (BMNH); 28 January–12 February 2004, collection code: MA-02-20-53, 1 female, CASENT 8078189; 1 female, CASENT 8078188 (BMNH); 1 female, CASENT 8078191; 1 female, CASENT 8078190; 6–18 March 2004, collection code: MA-02-20-56, 1 female, CASENT 8078013; 1 male, CASENT 8078014 (MNRJ); 10–21 September 2003, collection code: MA-02-20-39, 1 female, CASENT 3010882; 30 October–9 November 2003, 1 female, CASENT 3010986 (MNRJ).

DISCUSSION.— The new species can be distinguished from the others recorded from Madagascar by the tricoloured pattern of the dorsum of mesonotum and by the presence of only two postsutural dorsocentral setae.

Dichaetomyia (Panaga) colorata Couri, Pont, and Penny, sp. nov.

TYPE.— HOLOTYPE: male, deposited in CAS, labelled: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Talatakely, trail FF, elev. 915–1000 m, 4–20 November 1998, V.F. Lee, K.J. Ribardo, CASENT 8019658.

DIAGNOSIS.— Eyes very strongly developed, their margins touching at mid level; wings bare, general colour dark brown, shining, with scutellum and at least apical half of tergite 5 yellow and

strongly contrasting with the ground-colour.

GENERAL COLOR.— Ground-colour dark brown, somewhat shining. Head with frons brown, reddish-yellow close to lunula; fronto-orbital plate silver pollinose; gena light brown. Antenna with pedicel brownish-yellow and flagellomere brown. Palpus brown. Anterior and posterior spiracles yellow. Black setae on margin of posterior spiracle strongly contrasting with its pale colour. Mesonotum dark brown, a little shining, with 3 pollinose presutural areas in some specimens; postpronotum brownish-yellow; some yellow lateral areas present on mesonotum in some specimens; scutellum entirely yellow, a little shining. Pleura dark brown, not uniform in colour, with some yellowish areas. Anepimeron with black setulae. Calypters slightly brownish, with darker margins. Haltere yellow. Wing clear. Legs with femora brown and tibia and tarsi yellow. Abdomen brown to dark brown, somewhat shining; tergite 5 yellow at least on its apical half.

MALE.— Length. Body: 6.0 mm, wing: 6.3 mm.

HEAD.— Eyes with very short and sparse hairs, very strongly developed, separated at vertex by the width of the ocellar triangle, and just below ocellar triangle with their margins touching and then strongly diverging towards lunula. Fronto-orbital plate very slender. Vertical setae short. Frontal row with about 5 pairs of setae, the longest pair close to lunula. Antenna inserted at mid level of eye; flagellomere about 2.6 times as long as pedicel. Arista with long plumes. Gena slender, its width similar to that of flagellomere. Palpi slightly clavate.

THORAX.— Acrostichals 0+1; dorsocentrals 2+3; 2 postpronotals; 1 presutural; 2 intra-alars; 2 supra-alars; 2 post supra-alars. Notopleuron with two setae, the posterior one a little shorter than the anterior. Postalar declivity and suprasquamal ridge bare. Scutellum with one long basal and one long apical pair of setae, similar in size, and with a few fine latero-inferior setulae on basal two-thirds. Anepisternum with a series of 5 long and strong setae, with some fine setae among them, and a shorter one at anterior upper angle. Katepisternals 1+2. Anepimeron with a tuft of setulae above and a very few scattered ones in posterior half. Posterior spiracle with a row of black setulae on lower margin. Lower calypter about twice as long as upper one. Wing veins bare. Fore femur with complete rows of posteroventral, posterodorsal and dorsal setae; fore tibia without median or submedian setae; one strong dorsal preapical and one posteroventral apical; mid femur with about 4 preapical setae, one dorsal, one posterodorsal and 2 posterior; mid tibia with 2 posterior setae on middle third; hind femur with a complete anterodorsal row of setae and 4–5 anteroventrals on apical third, longer apical; hind tibia with one median anterodorsal, 2 anteroventrals on median third, one anterodorsal and one dorsal preapical and one ventral apical, all short.

ABDOMEN.— Tergites 3–4 each with two pairs of lateral setae; tergites 3–5 each with a discal row of setae, none very differentiated from ground-setulae. Sternite 5 as in Fig. 63.

TERMINALIA.— Cercal plate more or less as wide as high; surstyli short, not passing cercal plate margin (Figs. 64 and 65). Aedeagus as in Figs. 66 and 67.

FEMALE.— Length. Body. 6.0–6.4 mm, wing: 6.2–6.5 mm.

Differs from male as follows: Frons at vertex very wide, about 0.35 of head-width. Inner and outer vertical setae developed.

OVIPOSITOR.— Moderately long; tergites broad as in Figs. 68 and 69. Spermathecae as in Fig. 69.

OTHER MATERIAL EXAMINED.— **MADAGASCAR:** **Antsiranana Province:** Parc National de Marojejy, Antranhofa, 26.6 km 31° NNE Andapa, 10.7 km 318° NW Manantenina, elev. 1325m, 14°26'36"S 49°44'36"E, yellow pan trap—montane shrubland, 18 November 2003, B.L. Fisher, collection code: BLF9081 1 female, CASENT 3009040; 1 female, CASENT 3009037 (MNRJ). **Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 26–31 March 2002, Harin'Hala, collection code: MA-02-09A-22, 1 female, CASENT

3009399; 16 October–8 November 2001, collection code: MA-02-09A-01, 1 male, CASENT 3010420. Radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09B-12, 1 male, CASENT 3009783. Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 26 February–4 March 2002, R. Harin'Hala, collection code: MA-02-09C-18, 1 male, CASENT 3010591. Belle Vue Trail, elev. 1000 m, 21°15.6'S 47°25.6'E, tropical forest, 21 December 1999, M.E. Irwin and E.I. Schlinger, collection code: MEI.99-MA-7, 1 female, CASENT 8018206 (BMNH).

DISCUSSION.— The general body colour very closely resembles *D. madagascariensis*, but in that species the scutellum is black and the abdominal tergite 1+2 is yellow.

***Dichaetomyia (Panaga) flabellifera* Couri, Pont, and Penny, sp. nov.**

TYPE.— HOLOTYPE: male, deposited in CAS, labelled: MADAGASCAR. Fianarantsoa Province: Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 28 January–4 February 2002, R. Harin'Hala, collection code: MA-02-09C-18, 1 male, CASENT 3010478.

DIAGNOSIS.— Males can be easily distinguished by the preapical ventral tuft of long setae on hind femur. The reddish ground-colour of the mesonotum and the yellow postpronotum in almost all the specimens also helps to identify the species.

GENERAL COLOR.— Ground-colour reddish-brown. Head with frons brown, reddish close to lunula; fronto-orbital plate with very little grey pollinosity; gena light brown. Antenna with pedicel yellowish and flagellomere brown. Palpus brown. Anterior and posterior spiracles yellow. Black setae on margin of posterior spiracle strongly contrasting with its pale colour. Mesonotum reddish-brown, a little shining, with 3 grey pollinose vittae, the median one larger and best seen from behind; postpronotum yellowish. Pleura reddish-brown with some grey pollinosity. Anepimeron with black setulae. Calypters whitish with whitish margins. Haltere yellow. Wing clear. Legs yellow. Abdomen brown with tergite 1+2 and usually basal half of tergite 3 yellow; tergite 5 yellow at least at apex.

MALE.— Length. Body: 6.3 mm, wing: 6.2 mm.

HEAD.— Eyes with very short and sparse hairs, well developed, separated at vertex by the width of ocellar triangle, just below ocellar triangle with their margins touching and then strongly diverging towards lunula. Fronto-orbital plate very slender. Vertical setae short. Frontal row with about 4–5 pairs of setae, the longest one close to lunula. Antenna inserted at mid level of eye; flagellomere about 2.6 times as long as pedicel. Arista with long plumes. Gena slender, its width similar to that of flagellomere. Palpus slightly clavate.

THORAX.— Acrostichals 0+1; dorsocentrals 2+3; 2 postpronotals; 1 presutural; 2 intra-alars; 2 supra-alars; 2 postsupra-alars. Notopleuron with two setae, the posterior one a little shorter than the anterior. Postalar declivity and suprasquamal ridge bare. Scutellum with one long basal and one long apical pair of setae, similar in size, and with fine latero-inferior setula on basal two-thirds. Anepisternum with a series of 4–5 long and strong setae, and with some fine setae among them; a shorter one at anterior upper angle. Katepisternals 1+2. Anepimeron with a tuft of setulae above and scattered setulae on posterior half. Posterior spiracle with a row of black setulae on lower margin. Lower calypter about twice as long as upper one. Wing veins bare. Fore femur with complete rows of posteroventral, posterodorsal and dorsal setae; fore tibia without median or submedian setae; one strong dorsal preapical and one posteroventral apical; mid femur with about 4 preapical setae, one dorsal, one posterodorsal and 2 posterior, the latter two longer; mid tibia with 2 posterior setae on middle third; hind femur with a complete anterodorsal row of setae and 2–3 anteroventrals on apical fourth, one preapical dorsal, one anterodorsal and one posterodorsal; posteroventral surface with a preapical tuft of long setae with curled tips; hind tibia with one median anterodorsal, 2 anteroventrals

trials on median third, one anterodorsal and one dorsal preapical and one ventral apical, all short.

ABDOMEN.—Tergites 3–4 each with two pairs of lateral setae; tergites 3–5 each with a discal row of setae, none very differentiated from the ground-setulae. Sternite 5 as in Fig. 70.

TERMINALIA.—Cercal plate with deep median concavities; surstyli passing cercal plate margin (Figs. 71 and 72). Aedeagus as in Figs. 73 and 74.

FEMALE.—Length. Body. 6.0–6.2 mm, wing: 6.2–6.4 mm.

Differs from male as follows: Frons at vertex very wide, about 0.35 of head-width. Inner and outer vertical setae developed. Hind femur without a preapical tuft of setae.

OVIPOSITOR.—Moderately long; tergites broad (Figs. 75 and 76). Spermathecae as in Fig. 76.

OTHER MATERIAL EXAMINED.—**PARATYPES:** Same data as holotype: 28 January–4 February 2002, collection code: MA-02-09C-14, 1 female, CASENT 3010477; 22–28 November 2001, MA-02-09C-04, 1 female, CASENT 3009745; 1 female, CASENT3009730; 1 male, CASENT 3009737 (MNRJ); 3–13 June 2002, collection code: MA-02-09C-31, 1 female, CASENT 3010405; 26 February–4 March 2002, collection code: MA-02-09C-18, 1 female, CASENT 3010592 (MNRJ). Vohiparara, at broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 6–15 December 2001, R. Harin'Hala, collection code: MA-02-09A-06, 1 female, CASENT 3010020 (BMNH); 15–22 April 2002, collection code: MA-02-09A-25, 1 female, CASENT 3010491. Radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09B-12, 1 female, CASENT 3009779. JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev 690 m, 28 November 2001, R. Harin'Hala, collection code: MA-02-09D-04, 1 female, CASENT 3010541; 28 November–6 December 2001, collection code: MA-02-09D-05, 1 female, CASENT 3010548; 16 October–8 November, collection code: MA-02-09D-01, 1 male, CASENT 3010415 (BNMH).

DISCUSSION.—In Emden's (1942a) key, the new species runs to couplet 47 and to *D. immaculiventris* Malloch which differs from the new species by the pale mesonotum with one median dusted vitta and yellow palpus. This new species is actually extraordinarily similar to *Dichaetomyia fasciculifera* (Stein, 1910), from the Seychelles. The male of *D. fasciculifera* differs from that of *D. flabellifera* by having the hind tibia dark brown, the tuft of curled setae on hind femur longer and more compact, and the scutum shining yellow and undusted.

Dimorphia Malloch, 1922

DIAGNOSIS.—Arista plumose; prosternum bare or setulose; anepimeron and meron bare; weak anterior intra-alar seta present only in female; prealar short and strong; several wing veins with black setulae on the greater part of their length, usually on Sc, Rs, R₄₊₅ and M as follows: ventral surface of vein R before the cross-vein, usually on both surfaces; on base of Sc, usually on both surfaces; ventral surface of R₄₊₅ almost to the cross-vein; on both surfaces of M to beyond posterior cross-vein; and also sometimes on lower surface of Cu; vein M distinctly curved upwards at apex; hind tibia without calcar. [REF. Emden 1951].

AFROTROPICAL FAUNA.—Five species are widespread from the east to south of the Afrotropical region, including Mauritius, Madagascar and the Congo Basin. Emden (1951) mentioned that very few characters have been found to segregate the species of the genus and that the colour of the thorax and abdomen are apparently variable in females. He gave a key to the 5 species recorded from the Afrotropical region.

The larva of *D. cognata* breeds in cow dung.

MADAGASCAN FAUNA.—Only one species has been recorded from Madagascar, *D. cognata* (Robineau-Desvoidy, 1830) (as *D. flavicornis* in Emden's (1940) key). The species is widespread in east to southern Africa, also occurring in Cameroun, Réunion, Madagascar and Socotra. It can be recognized by the conspicuously narrowed cell r5 at apex and sinuous cross-vein dm; lower katepis-

ternal seta as strong as anterior one; hind coxa bare on posterior surface. The species was found in the material studied.

MATERIAL EXAMINED: KNOWN SPECIES

D. cognata: **MADAGASCAR: Toliara Province:** Sept Lacs, elev. 120 m, 23°31'65"S 44°9'35"E, Malaise trap, gallery forest, 21–26 August 2002, Frontier Wilderness Project, collection code: MGF038, 1 male, CASENT 3009226. Manderano, elev. 70 m, 23°31'39"S 44°5'18"E, Malaise trap, edge of marsh, 5 m from road, gallery forest, 23 June–28 July 2002, Frontier Wilderness Project, collection code: MGF035, 1 male, CASENT 3009328. Fiherenana, elev. 50 m, 23°14'07"S 43°52'15"E, Malaise trap, in degraded gallery forest, 1–4 December 2002, Frontier Wilderness Project, collection code: MGF049, 1 male, CASENT 3009269. 16 km east Sakaraha, Zombitse Nature Reserve, 825 m, 22°88'23"S 44°70'06"E, 13 December 1999, tropical forest on sand, M.E. Irwin and E.I. Schlinger, Schlinger Foundation Madagascar Expedition, collection code: MEI.99-MA.14, 1 female, CASENT 8018319. Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap, deciduous dry forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 female, CASENT 3010091. Parc National d'Andohahela, Tsimelahy, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 28 March–8 April 2003, M. Irwin, F. Parker, R. Harin'Hala, collection code: MA-02-20-20, 1 male, CASENT 2070508; 8–18 March 2003, collection code: MA-02-20-18, 1 female, CASENT 3010946; 1 female, CASENT 3010945; 30 October–9 November 2003, collection code: MA-02-20-44, 1 female, CASENT 3010995; 1 female, CASENT 3010992; 29 June–10 July 2003, collection code: MA-02-20-31, 1 female, CASENT 2070612; 15–28 January, collection code: MA-02-20-52, 1 female, CASENT 8078030; 28 January–12 February 2003, collection code: MA-02-20-53, 1 female, CASENT 8078199; 1 female, CASENT 8078198. **Mahajanga Province:** Parc National d'Ampijoroa, 160 km N of Maevatanana on RN 04, elev. 43 m; 16°19.16'S 46°48.80'E, Malaise trap, in deciduous forest, 28 September–5 October 2003, R. Harin'Hala, collection code: MA-25-17, 1 female, CASENT 2070634. **Toamasina Province:** dct [District of] Ambatondrazaka, Station Agric. Alaotra, 800 m, 24 December 1957, 3 males, B.R. Stuckenberg (NMSA, BMNH).

Fraserella Steyskal, 1966

DIAGNOSIS.— Eyes haired; arista plumose; two or three pairs of well developed acrostichal setae; dorsocentrals 3+4; lower calypter large; vein M curved forward at apex; mid tibia with a strong submedian posteroventral seta; hind tibia with a short calcar; wing veins bare; prosternum, anepimeron and meron bare.

AFROTROPICAL FAUNA.— The genus is recorded from the Afrotropical region only on the basis of one unnamed species from Madagascar.

MADAGASCAN FAUNA.— Only one unnamed species is known from Madagascar, closely similar to the Oriental species *Fraserella altivolans* Steyskal, 1966.

MATERIAL EXAMINED: UNNAMED SPECIES

MADAGASCAR: Antsiranana Province: dct [District of] Diego Suarez, Montagne d'Ambre, 1000 m, 23 November–4 December 1958, 1 female, B.R. Stuckenberg (NMSA).

Graphomya Robineau-Desvoidy, 1830

DIAGNOSIS.— Mesonotum and abdomen with characteristic colour patterns; male holoptic; female without interfrontal setae; arista enlarged on basal third, plumose; dorsocentrals 2+4; prealar absent; postalar wall, suprasquamal ridge and prosternum bare; anepimeron, proepisternum and prosternum bare; anterior katapisternal seta absent; lower calypter broad, of the *Musca*-type; posterior spiracle bare on margins; hind tibia without calcar; vein M curved forwards at apex; vein R₄₊₅ setulose at base; sternite 1 setulose. (Couri and Carvalho 2002).

The larvae live in liquid or semi-liquid substrates and are highly predaceous, feeding especially on larvae of other Diptera (Syrphidae and Ptychopteridae).

AFROTROPICAL FAUNA.—Thirteen species of *Graphomya* have been recorded from the Afrotropical region, widely distributed throughout the region.

MADAGASCAN FAUNA.—*G. rossi* Zielke, 1974 is the only *Graphomya* species known to occur in Madagascar, and is endemic. The species has a well developed head in relation to the rest of the body; antenna and palpus dark brown; mesonotal and abdominal colour patterns differing from the characteristic markings in *Graphomya*, as follows: one median presutural vitta and two laterals well marked presuturally, none of them reaching scutellum; abdominal tergites 1+2 and 3 yellow with a thin median brownish-grey pollinose vitta, tergites 4 and 5 brown with grey pollinosity on middle third. No *Graphomya* was found among the material studied, but the holotype of *G. rossi* is in the CAS collection and was examined.

MATERIAL EXAMINED: KNOWN SPECIES

G. rossi: **MADAGASCAR**: 65 km S. of Antananarivo [Tananarive], 25 November 1959, E.S. Ross, Holotypus *Graphomya rossi*, E. Zielke det 1972. Type no. CAS11874.

Hebecnema Schnabl, 1889

DIAGNOSIS.—Eyes very well developed, especially in males where they almost touch at the middle; arista plumose; prealar seta absent; presutural acrostichal hairs in 4 more or less regular rows, those in outer rows longer and stronger than those in inner rows; dorsocentrals 2+4; katepis-ternals 1+2; one well developed prostigmatal seta; anepimeron bare; vein M not curved forwards; fore tibia without median seta; hind tibia with one anteroventral and one anterodorsal setae, calcar absent. [REF. Emden 1951]

The larvae are obligate carnivores, living mainly in dung but occasionally in decaying plant material.

AFROTROPICAL FAUNA.—The Afrotropical fauna contains 6 species. Emden (1951) gave a key to 4 of them.

MADAGASCAN FAUNA.—Only *H. semiflava* Stein, 1913 has been recorded from Madagascar. This is a small (body length: 3.5–5.0 mm) muscid with antenna and palpus dark brown; thorax and scutellum dark brown; legs dark brown, tibia brownish-yellow; abdomen dark brown with a little grey pollinosity; hind leg long, longer than the length of mesonotum. It is widespread from east to southern Africa, also occurring in Ghana, Rwanda, D.R. Congo, Mauritius and the Comoros Is. The species was found among our material, and the series shows considerable variation in the colour mainly of the legs, antenna, palpus and halteres, as was also recorded by Emden (1951). A new species was also found and is described here.

Key to the Madagascan Species of *Hebecnema*

1. Postpronotum concolorous with mesonotum; abdomen brown and yellow, but never entirely yellow; legs yellow and brown; flagellomere usually brown (widespread east to southern Africa, also occurring in Ghana, Rwanda, D.R. Congo, Mauritius and the Comoros Is.) . . . *H. semiflava* Stein
Postpronotum yellow, contrasting with the brown mesonotum; abdomen entirely yellow; legs yellow, tarsi somewhat brown; flagellomere entirely yellow (Madagascar)
..... *H. humeralis*, sp. nov.

MATERIAL EXAMINED: KNOWN SPECIES

H. semiflava: **MADAGASCAR: Antsiranana Province:** Parc National de Marojejy, Manantenina River, 28.0 km 38° NE Andapa, 8.2 km 333° NNW Manantenina, elev. 450 m, 14°26'12"S 49°46'30"E, Malaise trap—rain forest, 12–25 November 2003, B.L. Fisher *et al.*, collection code: BLF8723, 1 female, CASENT 3008907; 1 male, CASENT 3000908; 1 female, CASENT 3008909; 1 female, CASENT 3008912; 1 female, CASENT 3008905; 1 female, CASENT 3008910; 1 female, CASENT 3008906 (MNRJ); 1 male, CASENT 3010156; 1 female, CASENT 3010138; 1 male, CASENT 3010139; 1 male, CASENT 3010147 (MNRJ); 1 female, CASENT 3010137; 1 male, CASENT 3010155; 1 male, CASENT 3010153; 1 female, CASENT 3010135; 1 male, CASENT 3010148; 1 female, CASENT 3010134; 1 female, CASENT 3010131; 1 female, CASENT 3010133; 1 female, CASENT 3010154. **Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 6–15 December 2001, R. Harin'Hala, collection code: MA-02-09A-06, 1 female, CASENT 3009998; 1 female, CASENT 3010001; 15–22 November 2001, R. Harin'Hala, collection code: MA-02-09A-03, 1 female, CASENT 3010047; 31 March 2002, collection code: MA-02-09A-22, 1 female, CASENT 3009375; 1 male, CASENT 3009376; 19–26 February 2002, collection code: MA-02-09A-17, 1 female, CASENT 3010454. Radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 15–21 December 2001, R. Harin'Hala, collection code: MA-02-09B-07, 1 female, CASENT 3010856. JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev. 690 m, 10–14 January 2002, R. Harin'Hala, collection code: MA-02-09D-11, 1 female, CASENT 3009940; 1 female, CASENT 3009988; 1 male, CASENT 3009933; 1 female, CASENT 3009941; 16 October–8 November 2001, collection code: MA-02-09D-01, 1 female, CASENT 3010413; 8–15 November 2001, collection code: MA-02-09D-02, 1 female, CASENT 3010725. Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap, deciduous dry forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 female, CASENT 3010119; 1 female, CASENT 3010098. Belle Vue at Talatahely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09C-12, 1 female, CASENT 3009817; 1 female, CASENT 3009814 (MNRJ); 22–28 November 2001, collection code: MA-02-09C-04, 1 female, CASENT 3009749; 12–19 February 2002, collection code: MA-02-09C-16, 1 female, CASENT 3009771. Vakoana, 1520 m, Andringitra Ambalavao, 21–24 January 1958, 1 male, 2 females, B.R. Stuckenberg (NMSA). **Toliara Province:** Sept Lacs, elev. 120 m, 23°31'65"S 44°9'35"E, Malaise trap, gallery forest, 21–26 August 2002, Frontier Wilderness Project, collection code: MGF038, 1 female, CASENT 3009230. Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 female, CASENT 3009598. Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap—in deciduous dry forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 female, CASENT 3010097; 21–31 August 2003, collection code: MA-02-18A-66, 1 female, CASENT 3010293. **Mahajanga Province:** Parc National d'Ampijoroa, 160 km N of Maevatanana on RN 04, elev. 43 m, 16°19.16'S 46°48.80'E, Malaise trap, in deciduous forest, 19–26 October 2003, R. Harin'Hala, collection code: MA-25-20, 1 female, CASENT 30103509. **Toamasina Province:** Moramanga, Route d'Anosibe, 840 m, 18-24 December 1957, 1 male, B.R. Stuckenberg (NMSA). Ivontaka, 15 m, dct [District of] Mananara, 10–14 March 1958, 1 male, B.R. Stuckenberg (BMNH).

DESCRIPTIONS OF NEW SPECIES OF *HEBECNEMA**Hebecnema humeralis*, Couri, Pont, and Penny, sp. nov.

TYPE.—HOLOTYPE: female: **MADAGASCAR: Fianarantsoa Province:** JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev. 690 m, 10–14 January 2002, R. Harin'Hala, collection code: MA-02-09D-11, CASENT 3009932.

DIAGNOSIS.—Antenna with scape, pedicel and arista brownish-yellow. Palpus brown on basal half and yellow on apical half. Anterior spiracle yellow. Mesonotum dark brown, little shining with some grey pollinosity; postpronotum and abdomen entirely yellow and strongly contrasting with mesonotum. Haltere yellow. Legs yellow, tarsi brown.

GENERAL COLOR.— Head with frons and fronto-orbital plates brown, with some grey pollinosity; and parafacial and gena brown, with intense grey pollinosity. Antenna with scape, pedicel and arista brownish-yellow. Palpus brown on basal half and yellow on apical half. Anterior spiracle yellow, posterior spiracle brown. Mesonotum dark brown, a little shining, with no traces of vittae and with some grey pollinosity; postpronotum yellow and strongly contrasting with mesonotum. Calypters whitish-yellow. Haltere yellow. Wing clear. Legs yellow, tarsi brown. Abdomen entirely yellow, with no trace of spots.

FEMALE.— Length. Body: 3.8–5.0 mm, wing: 4.0–5.3 mm.

HEAD.— Frons at vertex about one-third of head-width. Fronto-orbital plate slender. Vertical setae developed. Ocellar triangle short. Frontal row with 5–6 pairs of setae. Antenna inserted at mid level of eye; flagellomere long, about 3.5 times as long as pedicel. Arista with long plumes. Gena slender, less than width of flagellomere. Palpus filiform.

THORAX.— Acrostichals 0+1; dorsocentrals 2+4; 2 postpronotals; 1 presutural; 2 intra-alars; 2 supra-alars; 2 postsupra-alars. Notopleuron with two setae. Postalar declivity and suprasquamal ridge bare. Scutellum with one long basal and one long apical pair of setae, similar in size. Anepisternum with a series of 4 long and strong setae with 2–3 fine setae among them. Katepisternals 1+2, the anterior and the lower ones moderately developed, the posterior one very long. Anepimeron bare. Posterior spiracle with margins bare. Lower calypter about twice as long as upper one. Wing with 1–2 ventral hairs on basal node of vein R_{4+5} . Fore femur with a complete row of posterodorsal, dorsal and posteroventral setae, the latter longer and more spaced; fore tibia without median or submedian setae, one dorsal preapical; mid femur with 2 preapical dorsal setae; mid tibia with 2 posterior setae on middle third and a very strong ventral apical; hind femur with a complete anterodorsal row of setae and 3–4 anteroventrals on apical third; hind tibia with one median anterodorsal and one submedian anteroventral setae, both short; one dorsal preapical and one ventral apical.

ABDOMEN.— Tergite 4 with a marginal row of setae; tergite 5 with a marginal and a discal row of setae.

OVIPOSITOR.— *Mydaea*-type, as in Fig. 77. Spermathecae as in Fig. 77.

MALE.— Unknown.

LARVAE.— General aspect, cephalopharyngeal skeleton and posterior spiracles as in Figs. 78–80.

OTHER MATERIAL EXAMINED.— PARATYPES labelled: **MADAGASCAR: Fianarantsoa Province:** same data as holotype: 1 female, CASENT 3009966; 1 female, CASENT 3009957 (MNRJ); 1 female, CASENT 3009958; 1 female, CASENT 3009959; 1 female, CASENT 3009982 (BMNH); 1 female, CASENT 3009934; 1 female, CASENT 3009963 (MNRJ); 1 female, CASENT 3009952; 1 female, CASENT 3009948. Parc National Ranomafana, Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09C-12, 1 female, CASENT 3009849 (BMNH); 1 female, CASENT 3009822; 14–24 July 2002, collection code: MA-02-09C-35, 1 female, CASENT 3010481. Radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 15–21 December 2001, R. Harin'Hala, collection code: MA-02-09B-07, 1 female, CASENT 3009918; 1 female, CASENT 3009877; 1 female, CASENT 3009914; 1 female, CASENT 3009883; 1 female, CASENT 3009895; 26–31 March 2002, collection code: MA-02-09B-22, 1 female, CASENT 3010682. Vohiparara at broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 25 May–4 June 2001, Harin'Hala, collection code: MA-02-09A-30, 1 female, CASENT 3010559; female, CASENT 3010560; 1 female, CASENT 3010561; 15–22 April 2002, collection code: MA-02-09A-25, 1 female, CASENT 3010488; 1 female, CASENT 3010489.

DISCUSSION.— As stated in Emden (1951), the Afrotropical species of this genus are extremely homogeneous in structural characters and can mainly be separated by colour patterns, although

there is also a considerable infra-specific variation. The new species differs from the other one recorded from Madagascar and also from its other congeners by the yellow flagellomere, postpronotum, legs and abdomen which contrast with the dark brown thorax and face. This pattern is homogeneous throughout the type-series and does not conform to any of the four colour patterns mentioned by Emden (1940) for *H. semiflava*. The new species is viviparous, as the larva was found inside the abdomen, and this is the second record of a viviparous species of *Hebecnema*. Skidmore (1985) stated that: "Whilst most species deposit eggs in the pabulum, at least one species (*infuscata*) appears to be viviparous." *H. infuscata* (Bigot) is known only from New Caledonia and Papua New Guinea, where it is widespread up to 900 m.

Helina Robineau-Desvoidy, 1830

DIAGNOSIS.— Male head holoptic or dichoptic; eyes with few hairs; arista plumose; mesonotum with 4 dark vittae; dorsocentrals 2+3; fore tibia without median seta; veins R₄₊₅ and M conspicuously divergent at apex; prosternum and anepimeron bare; wing veins bare; prealar present in male; hind tibia with the calcar absent.

The larvae are obligate carnivores, and live mainly in moss, humus soil, the diseased and decaying parts of trees or herbaceous plants, and decaying fruits.

AFROTROPICAL FAUNA.— *Helina* is one of the largest muscid genera in the Afrotropical region, with 96 species distributed throughout the region.

MADAGASCAN FAUNA.— Two *Helina* species have been described and are endemic to Madagascar: *H. cyanea* (Stein, 1906) and *H. insignis* (Séguy, 1935), the latter also found in our material. *H. lucida* (Stein, 1913) is recorded for the first time from Madagascar, where it was mainly collected in Mahajanga Province and is represented by a long series (with more material in alcohol). This species has an "Anthomyia-pattern" on the mesonotum, i.e. a transverse brown band just behind suture. It can be easily identified with the key by Emden (1951). Most of the specimens have the transverse band semi-interrupted by a narrow dorsocentral line of pale dust, as in the Eritrean specimens mentioned in Emden's (1951) key. Three new species are described here, *H. flavomaculata*, sp. nov., *H. carpiae*, sp. nov., and *H. grisella*, sp. nov.

Key to the Madagascar Species of *Helina*

1. Mesonotum with an "Anthomyia-pattern", with a transverse brown band just behind suture, partially or entirely interrupted by grey dust along the dorsocentral rows of setae; 2 narrow presutural vittae between acrostichal and dorsocentral rows of setae, not reaching suture (Ethiopia, Kenya, Rwanda, southern Africa, D.R. Congo, Madagascar) *H. lucida* (Stein)
- Mesonotum with a different colour pattern 2
2. Mesonotum and/or abdomen shining blue 3
- Mesonotum brown, not shining blue 5
3. Postpronotum, scutellum and apical half of tergite 5 yellow (Madagascar) *H. flavomaculata*, sp. nov.
- Postpronotum, scutellum and apical half of tergite 5 concolorous with rest of body 4
4. Body covered with a white and velvety pruinosity; head dark brown with silver pollinosity on lunula, fronto-orbital plate, gena and ocellar triangle, the latter reaching lunula (Madagascar) *H. insignis* (Séguy)
- Body not covered with white pruinosity; general colour of head different from that described above *H. cyanea* (Stein)
5. Dorsum of mesonotum with a strongly golden dusted median vitta beginning after suture and

expanding towards scutellum (Madagascar) *H. carpiae*, sp. nov.
Dorsum of mesonotum grey pollinose with no golden dusted median vitta (Madagascar)
. *H. grisella*, sp. nov.

MATERIAL EXAMINED: KNOWN SPECIES

H. insignis: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1110 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 31 March–8 April 2002, R. Harin'Hala, collection code: MA-02-09A-23, 1 female, CASENT 3010570; 1 male, CASENT 3010578; 18 October–8 November, collection code: MA-02-09A-01, 1 female, CASENT 3010419.

H. lucida: **MADAGASCAR: Mahajanga Province:** Parc National d'Ampijoroa, 160 km N of Maevatanana on RN 04, elev. 43 m, 16°19.16'S 46°48.80'E, Malaise trap, in deciduous forest, 12–19 October 2003, R. Harin'Hala, collection code: MA-25-19, 1 male, CASENT 3010512; 1 male, CASENT 3010511; 1 female, CASENT 3010514; 1 female, CASENT 3010537; 1 male, CASENT 3010515; 1 female, CASENT 3010516; 1 male, CASENT 3010519; 1 female, CASENT 3010520 (MNRJ); 1 male, CASENT 3010521; 1 male, CASENT 3010522; 1 male, CASENT 3010523; 1 female, CASENT 3010524; 1 female, CASENT 3010525; 1 male, CASENT 3010526; 1 female, CASENT 3010527; 1 male, CASENT 3010528; 1 male, CASENT 3010529; 1 female, CASENT 3010530; 1 female, CASENT 3010531; 1 male, CASENT 3010532; 1 female, CASENT 3010533; 1 male, CASENT 3010534; 1 female, CASENT 3010535; 1 female, CASENT 3010536; 1 female, CASENT 3010537; 1 female, CASENT 3010538; 1 female, CASENT 3010539; 1 male, CASENT 3010517; 1 male, CASENT 3010540; 19–26 October 2003, collection code: MA-25-20, 1 male, CASENT 3010376; 1 female, CASENT 3010608; 1 female, CASENT 3010609; 1 male, CASENT 3010604; 1 male, CASENT 3010605; 1 male, CASENT 3010606; 1 male, CASENT 3010607 (MNRJ); 1 male, CASENT 3010610; 1 male, CASENT 3010611; 1 female, CASENT 3010844; 1 male, CASENT 3010848; 1 male, CASENT 3010851; 1 female, CASENT 3010846; 1 female, CASENT 3010847; 1 female, CASENT 3010849; 1 female, CASENT 3010850; 1 female, CASENT 3010392; 1 female, CASENT 3010397; 1 female, CASENT 3010396; 1 female, CASENT 3010395; 1 female, CASENT 3010386; 1 female, CASENT 3010378; 1 female, CASENT 3010399; 1 female, CASENT 3010398; 1 male, CASENT 3010371; 1 male, CASENT 3010376; 1 male, CASENT 3010377; 1 male, CASENT 3010513; 1 male, CASENT 3010389; 1 male, CASENT 3010372; 1 male, CASENT 3010381; 1 male, CASENT 3010394; 1 male, CASENT 3010402; 1 female, CASENT 3010377; 1 female, CASENT 3010403; 1 female, CASENT 3010380; 1 female, CASENT 3010390; 1 female, CASENT 3010382; 1 female, CASENT 3010383; 1 female, CASENT 3010401; 1 female, CASENT 3010393; 1 female, CASENT 3010391; 1 female, CASENT 3010400; 26 October–2 November 2003, collection code: MA-25-21, 1 male, CASENT 3010817; 24–31 August 2003, collection code: MA-25-12, 1 female, CASENT 3010692; 1 female, CASENT 3010693 (MNRJ); 1 female, CASENT 3010694; 1 female, CASENT 3010697; 1 female, CASENT 3010699; 1 female, CASENT 3010702; 1 female, CASENT 3010705; 1 female, CASENT 3010708; 1 female, CASENT 3010709; 1 female, CASENT 3010710; 1 female, CASENT 3010711; 1 female, CASENT 3010712; 1 female, CASENT 3010715; 1 female, CASENT 3010716; 1 female, CASENT 3010717 (MNRJ); 1 male, CASENT 3010818; 1 male, CASENT 3010704; 1 male, CASENT 3010696; 1 male, CASENT 3010698 (MNRJ); 1 male, CASENT 3010703 (MNRJ); 1 male, CASENT 3010713; 1 male, CASENT 3010700; 1 male, CASENT 3010695; 1 male, CASENT 3010703; 5–12 October 2003, collection code: MA-25-16, 1 female, CASENT 3010319; 1 female, CASENT 30103335; 1 female, CASENT 3010334; 1 female, CASENT 3010331; 1 female, CASENT 3010349; 1 female, CASENT 3010346; 1 female, CASENT 3010324; 1 female, CASENT 3010338; 9–20 November 2003, collection code: MA-25-23, 1 male, CASENT 3010792; 1 male, CASENT 3010619; 1 male, CASENT 3010621; 1 female, CASENT 3010620; 7–14 September 2003, collection code: MA-25-14, 1 female, CASENT 3010451; 1 female, CASENT 3010448; 1 male, CASENT 3010452; 1 male, CASENT 3010450; 14–22 November 2003, collection code: MA-25-15, 1 female, CASENT 3010733; 1 female, CASENT 3010734; 1 female, CASENT 3010739; 1 female, CASENT 3010736; 1 male, CASENT 3010737; 1 male, CASENT 3010727; 1 male, CASENT 3010732; 1 male, CASENT 3010738; 28 September–5 October 2003, collection code: MA-25-17, 1 male, CASENT 3010472; 1 female, CASENT 3010473; 1 male, CASENT 3010624; 1 male, CASENT 3010625; 1 male, CASENT 3010656; 1 male, CASENT 3010627; 1 male, CASENT 3010648; 1 male, CASENT 3010642; 1 male,

CASENT 3010637; 1 male, CASENT 3010659; 1 male, CASENT 3010654; 1 male, CASENT 3010643; 1 male, CASENT 3010651; 1 male, CASENT 3010638; 1 male, CASENT 3010645; 1 male, CASENT 3010667; 1 male, CASENT 3010649; 1 male, CASENT 3010644; 1 male, CASENT 3010630; 1 male, CASENT 3010634; 1 male, CASENT 3010641; 1 male, CASENT 3010660; 1 male, CASENT 3010663; 1 male, CASENT 3010665; 1 male, CASENT 3010666; 1 male, CASENT 3010632; 1 male, CASENT 3010639; 1 male, CASENT 3010669; 1 male, CASENT 3010671; 1 male, CASENT 3010672; 1 male, CASENT 3010673; 1 male, CASENT 3010674; 1 male, CASENT 3010676; 1 female, CASENT 3010626; 1 female, CASENT 3010628; 1 female, CASENT 3010629; 1 female, CASENT 3010631; 1 female, CASENT 3010633; 1 female, CASENT 3010668; 1 female, CASENT 3010635; 1 female, CASENT 3010636; 1 female, CASENT 3010640; 1 female, CASENT 3010646; 1 female, CASENT 3010647; 1 female, CASENT 3010650; 1 female, CASENT 3010652; 1 female, CASENT 3010653; 1 female, CASENT 3010655; 1 female, CASENT 3010657; 1 female, CASENT 3010658; 1 female, CASENT 3010661; 1 female, CASENT 3010662; 1 female, CASENT 3010664; 1 female, CASENT 3010675; 1 female, CASENT 3010471; 1 female, CASENT 3010470; 1 female, CASENT 3010636; 1 female, CASENT 3010639; 1 female, CASENT 3010631; 1 male, CASENT 3010638. **Toliara Province:** Parc National d'Andohahela, Tsimelahy, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 29 June–10 July 2003, M. Irwin, F. Parker, R. Harin Hala, collection code: MA-02-20-31, 1 male, CASENT 2070583; 1 female, CASENT 2070613. Fiherenana, elev. 65 m, 23°13.351'S 43°52.853'E, Malaise trap, in degraded riparian forest close to water, 5–10 August 2003, Frontier Wilderness Project, collection code: MGF076, 1 female, CASENT 3009189.

DESCRIPTIONS OF NEW SPECIES OF *HELINA*

Helina flavomaculata Couri, Pont, and Penny, sp. nov.

TYPE.— HOLOTYPE: female, deposited in CAS, labelled: MADAGASCAR: Fianarantsoa Province: Radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 31 March–9 April 2002, R. Harin'Hala, collection code: MA-02-09B-23, CASENT 3010409.

DIAGNOSIS.— *H. flavomaculata*, sp. nov. can be distinguished from the other metallic Madagascan Muscidae by the yellow postpronotum, scutellum and apical half of tergite 5, which strongly contrast with other parts of the thorax and abdomen.

GENERAL COLOR.— Ground-colour metallic blue, with postpronotum, scutellum and apical half of tergite 5 yellow. Head with frons dark brown; ocellar triangle grey pollinose; fronto-orbital plate dark brown, grey pollinose from certain angles, between third and fourth frontal pair of setae; and slightly shining around the insertions of the three first and the two last frontals; with a dark brown mark at level of apex of pedicel. Face yellowish, strongly yellow below. Gena brown, grey pollinose. Antenna with pedicel yellow and flagellomere and arista dark brown. Palpus dark brown. Anterior spiracle yellow and posterior one metallic blue. Calypters yellowish, hyaline. Haltere yellow with whitish knob. Wing clear. Legs dark brown, apex of trochanter and extreme base of mid and hind femora yellow. Abdomen metallic green/blue; tergite 5 metallic blue, yellow on apical half.

FEMALE.— Length. Body: 6.2 mm, wing: 6.0 mm.

HEAD.— Interocular space about one-third of head-width at level of anterior ocellus. Vertical setae moderately developed; ocellar seta long. Frontal row with 5 pairs of setae, the longest one close to lunula. Antenna inserted at mid level of eye; flagellomere about 2.5 times as long as pedicel. Arista with long hairs. Gena about as wide as flagellomere. Palpus filiform.

THORAX.— Acrostichals 0+1; dorsocentrals 2+3; 2 postpronotals; 1 presutural; 2 intra-alars; 1 supra-alar; 2 postsupra-alars. Notopleuron with two setae. Postalari declivity and suprasquamal ridge bare. Scutellum with two pairs of long setae. Anepisternum with a series of 4 long and strong setae and a shorter one between third and fourth. Katapisternals 1+1. Anepimeron bare. Posterior spiracle with margins bare. Lower calypter about twice as long as upper one. Wing veins bare. Fore

femur with complete and sparse rows of long posterodorsal and posteroventral setae; fore tibia with a short median anterodorsal seta; with preapical anterodorsal, posterodorsal and posteroventral setae; mid femur with a row of anterior setae on basal half; one anterodorsal seta on apical third; three posterior preapical setae; mid tibia with 2 posterior setae on middle third; one long and strong ventral, anteroventral and posteroventral apical setae; hind femur with a complete row of anterodorsal setae; 4–5 well spaced anteroventral setae, the last two on apical third; hind tibia with 1 anteroventral submedian seta and a very short one above this, and 2 anterodorsals on middle third; one dorsal and posterodorsal preapical and one long and strong ventral apical.

ABDOMEN.—Tergites 4–5 with strong row of discal setae.

OVIPOSITOR.—Ovipositor and spermathecae as in Figs. 81 and 82.

MALE.—Unknown.

OTHER MATERIAL EXAMINED.—**PARATYPES:** **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1100 m, 21°13.57'S 47°22.19'E, Malaise trap, in high altitude rainforest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09A-12, CASENT 3010615.

ETYMOLOGY.—The name comes from the Latin words *flavus*, meaning yellow, and *macula*, meaning spot, and refers to the contrasting colouration of the postpronotum, scutellum, and apical half of tergite 5.

DISCUSSION.—In Emden's (1951) key, the new species runs to *H. juxtamedialis* Emden, as both species have 2 strong presutural dorsocentral setae, but that species is not metallic and the thorax is densely dusted with two pairs of vittae.

Helina carpiae Couri, Pont, and Penny, sp. nov.

TYPE.—**HOLOTYPE:** male, deposited in CAS, labelled: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1100 m, 21°13.57'S 47°22.19'E, Malaise trap, in high altitude rainforest, 12–19 March 2002, R. Harin'Hala, collection code: MA-02-09A-20, CASENT 3010042.

DIAGNOSIS.—*H. carpiae*, sp. nov. has a very peculiar colour pattern on the dorsum of the mesonotum: there is a strongly golden dusted median vitta beginning after suture and expanding towards scutellum (the extent of this area varies in the series before us).

GENERAL COLOR.—Ground-colour dark brown. Head with frons, fronto-orbital plate, parafacial and gena dark brown, with some grey pollinosity, a little more intense on fronto-orbital plate near lunula from certain angles. Antenna and arista dark brown, apex of pedicel grey pollinose. Palpus dark brown. Anterior and posterior spiracles dark brown. Mesonotum dark brown with three grey pollinose vittae, one median and two along dorsocentral rows of setae, more visible presuturally, but extending as far as second pair of postsutural dorsocentral setae; postsuturally with an intense golden pollinose area beginning as a very thin vitta medially just after suture and expanding towards scutellum (the extent of this area varies within the series); scutellum with the same golden pollinosity. Calypters yellowish, with yellow margins. Haltere dark brown. Wing clear. Legs uniformly brown, pulvilli light brown. Abdomen dark brown, with no differentiated markings.

MALE.—Length. Body: 5.0 mm, wing: 4.8 mm.

HEAD.—Holoptic, distance between eyes about 0.16 of head-width at level of anterior ocellus. Vertical setae very short; ocellar setae long. Frontal row with 5 pairs of setae, the longest pair close to lunula. Antenna inserted below mid level of eye; flagellomere about twice as long as pedicel. Arista with long hairs. Gena about twice as wide as flagellomere. Palpus filiform.

THORAX.—Acrostichals 0+1; dorsocentrals 2+3, all long, only the first presutural pair shorter; 2 postpronotals; 1 presutural; 2 intra-alars; 2 supra-alar; 2 postsupra-alars. Notopleuron with two setae, similar in size. Postalar declivity and suprasquamal ridge bare. Scutellum with two pairs of

long setae. Anepisternum with a series of 4–5 long and strong setae and with some fine setae among them. Katepisternals 1+2. Anepimeron bare. Posterior spiracle with margins bare. Lower calypter about twice as long as upper one. Wing veins bare. Fore femur with complete rows of spaced posterodorsal and posteroventral setae, the last ones longer; fore tibia without median or submedian setae; one dorsal preapical; mid femur with a row of spaced anteroventral and anterodorsal setae on basal half; 2 preapical dorsal setae; mid tibia with 2 posterior setae on middle third; one long and strong ventral apical; hind femur with a complete anterodorsal row of spaced setae; 2–3 anteroventrals on apical half; hind tibia with 1 anteroventral submedian seta; 2 anterodorsals on middle third; one dorsal preapical and one ventral apical long and strong.

ABDOMEN.— Tergites 2–5 each with a marginal row of setae; tergites 4 and 5 with a discal row of setae. Sternite 5 as in Fig. 83.

TERMINALIA.— Cercal plate, surstyli and aedeagus as in Figs. 84–86.

FEMALE.— Length. Body: 5.5–6.0 mm, wing: 5.8–6.2 mm.

Differs from male as follows.— Interocular space about one-third of head-width at level of anterior ocellus.

OVIPOSITOR.— Ovipositor and spermatheca as in Figs. 87 and 88.

OTHER MATERIAL EXAMINED.— **PARATYPES:** Same data as holotype: 15–22 November 2001, collection code: MA-02-09A-03, 1 female, CASENT 3010048; 6–15 December 2001, collection code: MA-02-09A-06, 1 female, CASENT 3010012. Radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 15–21 December 2001, R. Harin'Hala, collection code: MA-02-09B-07, 1 female, CASENT 3010852; 31 March–9 April 2002, collection code: MA-02-09B-23, 1 female, CASENT 3010411; 14–21 January 2002, collection code: MA-02-09B-12, 1 female, CASENT 3009784. Belle Vue Trail, elev. 1000 m, 21°15.6'S 47°25.6'E, tropical forest, 21 December 1999, M.E. Irwin and E.I. Schlinger, collection code: MEI.99-MA-7, 1 female, CASENT 8018255; 1 female, CASENT 8018257 (BMNH); 1 female, CASENT 8018258 (MNRJ).

ETYMOLOGY.— The name refers to Celina Carpi, a friend and supporter of the senior author.

DISCUSSION.— In Emden's (1951) key, *H. carpi*, sp. nov. runs to couplet 7, but the colour pattern of the mesonotum, with its dense golden pollinosity does not fit the species in that couplet which, in any case, has subsequently been transferred to the genus *Hebecnema*.

***Helina grisella* Couri, Pont, and Penny, sp. nov.**

TYPE.— **HOLOTYPE:** female, deposited in CAS, labelled: **MADAGASCAR: Toliara Province:** Manderano, elev. 70 m, 23°31'38"S 44°5'15"E, Malaise trap, gallery forest at edge of marsh near road, 22–29 May 2002, Frontier Wilderness Project, collection code: MGF031, CASENT 3009025.

DIAGNOSIS.— Mesonotum brown, grey pollinose, with two faint and less pollinose vittae that are better seen presuturally; presutural acrostichal setulae in 3–4 rows. Abdomen brownish-grey pollinose; tergite 3 with two round brown spots; tergites 4 and 5 with small brown bristle-dots at the bases of the discal and marginal setae.

GENERAL COLOR.— Ground-colour dark brown with grey pollinosity. Head with frons brown; ocellar triangle grey pollinose; fronto-orbital plate dull grey, parafacial and gena more silvery, parafacial with a large matt spot opposite antennal insertion. Antenna and arista dark brown, pedicel somewhat reddish in some specimens. Palpus dark brown, reddish at base. Anterior and posterior spiracles grey pollinose. Mesonotum dark, yellowish-grey pollinose, with two less pollinose and faint vittae that are better seen presuturally. Scutellum, postpronotum and pleura concolorous with dorsum of mesonotum. Calypters whitish. Haltere yellowish-white. Wing clear. Femora and tibiae yellow, all tarsi brown. Abdomen yellowish-grey pollinose; tergite 3 with two round brown spots; tergites 4 and 5 with small brown bristle-dots at the bases of the discal and marginal setae.

FEMALE.— Length. Body: 4.5–5.3 mm, wing: 4.0–4.8 mm.

HEAD.— Interocular space about one-third of head-width at level of anterior ocellus. Inner and outer vertical setae long; ocellar seta long. Frontal row with 4–5 pairs of setae, the longest one close to lunula. Antenna inserted below mid level of eye; flagellomere about twice as long as pedicel. Arista with very long hairs. Gena almost twice as wide as width of flagellomere. Palpus a little compressed.

THORAX.— Acrostichals 0+1; presutural acrostichal setulae in 3–4 rows; dorsocentrals 2+3; 2 postpronotals; 1 presutural; prealar short or even absent; 2 intra-alars, anterior one sometimes absent; 2 supra-alars; 2 postsupra-alars. Notopleuron with two setae, similar in size. Postalar declivity and suprasquamal ridge bare. Scutellum with two pairs of long setae. Anepisternum with a series of 5–6 long setae, and a strong setula in upper anterior corner. Katepisternals 1+2. Anepimeron bare. Meron with 1 or a few short setulae below spiracle. Posterior spiracle with margins bare. Lower calypter about twice as long as upper one. Wings clear, veins bare. Costal spine as long as cross-vein r-m. Fore femur with complete posterodorsal and posteroventral rows of setae; fore tibia with two short anterodorsal setae on middle third; one posterodorsal and one posteroventral preapical setae; mid femur with a row of anterior setae on basal two-thirds; 1–2 posteroventral setae on basal fourth; 1 anterior and 2–3 posterodorsal preapical setae; mid tibia with 2 posterior setae on middle third; long and strong apical setae on anterior, ventral and posteroventral surfaces; hind femur with complete spaced anterodorsal and anteroventral rows of setae, without posteroventrals; 1 dorsal and 1 posterodorsal preapicals; hind tibia with 1 anteroventral submedian seta; 2 anterodorsals on middle third; one dorsal preapical and one ventral apical.

ABDOMEN.— Tergites 4 and 5 with a subbasal and an apical row of setae.

OVIPOSITOR.— Ovipositor and spermathecae as in Figs. 89 and 90.

OTHER MATERIAL EXAMINED.— **PARATYPES: MADAGASCAR: Toliara Province:** Manderano, elev. 70 m, 23°31'38"S 44°5'15"E, Malaise trap, gallery forest at edge of marsh near road, 22–29 May 2002, Frontier Wilderness Project, collection code: MGF031, 1 female, CASENT 3008982; 1 female, CASENT 3009028; 1 female, CASENT 3008986 (BMNH); 1 female, CASENT 3008984 (MNRJ); 1 female, CASENT 3008996 (BMNH); 1 female, CASENT 3009032; 1 female, CASENT 3009009; 1 female, CASENT 3009008; 1 female, CASENT 3009023 (BMNH); 1 female, CASENT 3009030; 1 female, CASENT 3009010; 1 female, CASENT 3009019; 1 female, CASENT 3008998; 1 female, CASENT 3009014; 1 female, CASENT 3009029; 1 female, CASENT 3008983 (MNRJ); 1 female, CASENT 3009012; 1 female, CASENT 3009000; 1 female, CASENT 3009005; 1 female, CASENT 3009011; 1 female, CASENT 3009027; 1 female, CASENT 3009227; 1 female, CASENT 3009026; 23°31'39"S 44°5'18"E, Malaise trap, edge of marsh, 5 m from road, gallery forest, 23 June–28 July 2002, Frontier Wilderness Project, collection code: MGF035, 1 female, CASENT 3009331; 1 female, CASENT 3009325. Sept Lacs, elev. 70 m, 23°31'39"S 44°9'16"E, Malaise trap, gallery forest, 21–26 August 2002, Frontier Wilderness Project, collection code: MGF038, 1 male, CASENT 3009232; 1 female, CASENT 3009238; 1 female, CASENT 30092391; 1 female, CASENT 3009021; 1 female, CASENT 3009231; 1 female, CASENT 3009228. Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 female, CASENT 3009410. **Aldabra Atoll, South Island:** Cinq Cases, 23–29 January 1968, B.H.Cogan & A.M.Hutson, 2 females (one at light), BMNH; Point Hadoul, tidal saline pool, 27 January 1968, B.H.Cogan & A.M.Hutson, 1 female, BMNH; Anse Cèdre, 17–19 January 1968, B.H.Cogan & A.M.Hutson, 1 female, BMNH; Frigate Pool, 20 January 1968, B.H.Cogan & A.M.Hutson, 2 females, BMNH; Takamaka, 23–27 February 1968, B.H.Cogan & A.M.Hutson, 4 females, BMNH; Takamaka Pool, some at light, 1–17 February 1968, B.H.Cogan & A.M.Hutson, 11 females, BMNH (8), NMSA (2), CAS (1). **Astove Atoll:** around coconut plantation, 5 March 1968, B.H.Cogan & A.M.Hutson, 1 female, BMNH.

ETYMOLOGY.— The name comes from the diminutive form of the modern Latin word *griseus*, meaning grey, and refers to the grey pollinosity on the dorsum of the mesonotum that distinguishes this species from *H. corpiae*.

DISCUSSION.— In Emden's (1951) key *H. grisella* runs to *H. juxtamedialis* Emden, known to occur in South Africa, Mozambique and doubtfully in Malawi; but *H. juxtamedialis* has black femora and tibiae, presutural acrostichal setulae arranged in two rows, and abdominal tergite 4 with a pair of black spots.

Hydrotaea Robineau-Desvoidy, 1830

DIAGNOSIS.— Male holoptic; eyes bare; general colour usually black or bluish-black, rarely metallic; arista very short pubescent; gena, in some species, with a strong upcurved seta; female with cruciate interfrontal seta; dorsocentrals 2+4; notopleuron covered with setulae, the two setae similar in size; anepimeron bare; katapisternals 1+1; some males with fore femur on ventral surface with a preapical excavation with 2 toothed processes and fore tibia flattened along basal half or two thirds of ventral surface; M straight; distiphallus with apical part of juxta spinulose; ovipositor long, with narrow tergites.

The larvae are facultative to obligate carnivores, and live in a wide range of decaying organic substances where there is a high rate of bacterial fermentation. They prey on other insect larvae in the substrate, mainly Diptera larvae. Adult females are commonly sweat-flies.

AFROTROPICAL FAUNA.— 21 species are known from the Afrotropical region, but only *H. chalcogaster* (Wiedemann, 1824) has been recorded from Madagascar.

MADAGASCAN FAUNA.— *H. chalcogaster* has not been recognised among the CAS material, but is represented among the NMSA and BMNH material. *H. bella*, sp. nov., a metallic green *Hydrotaea*, is here described.

Key to the Madagascar Species of *Hydrotaea*

1. Ground-colour black; palpus dark brown or black; male with fore tarsomeres yellow on ventral surface; male mid femur on basal half of ventral surface with 2–6 stout setae (sparsely throughout Africa, Madagascar, Mauritius, Réunion, Rodriguez, Seychelles, Oriental Region to Australia, Bermuda, perhaps Chile) *H. chalcogaster* (Wiedemann)
- Ground-colour metallic green/blue; palpus yellow; legs uniformly brown; mid femur on ventral surface with a row of short and strong setae on basal third (Madagascar) *H. bella*, sp. nov.

MATERIAL EXAMINED: KNOWN SPECIES

H. chalcogaster: **MADAGASCAR: Toamasina Province:** dct [District of] Ambatondrazaka, Station Agric. Alaotra, 24 December 1957, 1 male, B.R. Stuckenberg (NMSA). **Antsiranana Province:** Nossi-Bé, Sambirano, Lokobe, 6 m, 9–23 November 1957, 2 males, B.R. Stuckenberg (NMSA, BMNH).

DESCRIPTIONS OF NEW SPECIES OF *HYDROTAEA*

Hydrotaea bella, Couri, Pont, and Penny, sp. nov.

TYPE.— **HOLOTYPE:** male, deposited in CAS, labelled: **MADAGASCAR: Toamasina Province:** Parc Nacional Andasibe (Périnet), 19 km E Moramanga, 1000 m, in forest, E.I. Schlinger, M.E. Irwin and H.H. Rasolondalao, 24 December 1999, collection code: MEI.99-MA-3, CASENT 8018323.

DIAGNOSIS.— General body colour green/blue metallic; fronto-orbital plate and parafacial shining reddish; ocellar triangle in female long and dark metallic; fore femur of male on posteroventral surface with 5 setae on basal fourth, and anteroventral surface with a series of short and strong setae on basal third and another just before the two spined ventral preapical processes; hind tibia in both sexes with 3–4 anteroventral setae on basal half, one short median anterodorsal, and

one inconspicuous posterodorsal, much shorter than the diameter of the tibia.

GENERAL COLOR.— Ground-colour green/blue metallic. Head with frons reddish-brown; ocellar triangle shining black; fronto-orbital plate and parafacial shining reddish; gena reddish-brown. Antenna with pedicel yellowish-brown and flagellomere reddish-brown from certain angles, with intense grey pollinosity; arista dark brown, yellow at base. Palpus yellow. Anterior spiracle dark brown and posterior spiracle brown. Mesonotum metallic green/blue with no trace of vittae. Calypters yellowish, with brown margins in male. Haltere yellow with dark brown knob. Wing clear. Legs uniformly brown, pulvilli white. Abdomen metallic green/blue, concolorous with thorax, with no trace of vittae or spots.

MALE.— Length. Body: 6.5–8.2 mm, wing: 6.5–8.0 mm.

HEAD.— Eyes very well developed and very close together, separated at vertex only by the diameter of the slender ocellar triangle, inner margins touching almost to lunula. Fronto-orbital plate slender. Vertical setae very short. Ocellar triangle short, with a pair of long ocellar seta. Frontal row with 4–5 fine pairs of setae close to lunula. Antenna inserted below mid level of eye; flagellomere about twice as long as pedicel. Arista very short pubescent. Gena slender, similar to width of flagellomere. Palpus slightly flattened.

THORAX.— Acrostichals 0+1; dorsocentrals 2+4, the first two postsutural setae short and the last two long; 2–3 postpronotals; 1 presutural; 2 intra-alars; 1 supra-alar; pre-alar absent; 2 post-supra-alars. Notopleuron with two setae, similar in size, the disc without setulae. Postalar declivity and suprasquamal ridge bare. Scutellum with two pairs of setae, the basal pair a little longer and stronger than the apical pair. Anepisternum with a series of 4–5 long and strong setae and with some fine setae among them. Katepisternals 1+1, the posterior one longer; disc of katepisternum with some setulae, those close to posterior seta longer. Anepimeron and meron bare. Posterior spiracle with margins bare. Lower calypter about twice as long as upper one. Wing veins bare. Fore femur with a complete row of posterodorsal and dorsal setae; posteroventral surface with 5 setae on basal fourth; anteroventral surface with a series of short and strong setae on basal third and another series just before the two spined ventral preapical processes; fore tibia with several series of short posteroventral setae in apical half; one dorsal preapical; mid femur with about 4 long anterior to anterodorsal setae on basal fourth; posteroventral surface with a row of short and strong setae on basal third; anteroventral surface with a row of fine and short setae, more visible on basal third; 2 preapical dorsal setae; mid tibia with 2 posterior setae on middle third; anterior to anterodorsal surfaces with rows of fine erect ground-setulae; apical setae on anterodorsal, posteroventral and dorsal surfaces; hind femur with a complete anterodorsal row of setae, longer on basal third; about 6 anteroventrals on apical half, and a row of short fine posteroventrals in basal two-thirds, culminating in a longer seta one-third from apex of femur; hind tibia with 3–4 anteroventral setae on basal half; one short median anterodorsal and one inconspicuous posterodorsal, much shorter than the diameter of the tibia; one dorsal and one anterodorsal preapical and one ventral apical.

ABDOMEN.— Covering setae moderately long and dense, especially at sides, with some longer ones on margin of tergites 4 and 5 and on disc of tergite 5.

TERMINALIA.— Sternite 5 longer than wide (Fig. 91); cercal plate and long surstyli as in Figs. 92 and 93. Aedeagus as in Fig. 94.

FEMALE.— Length. Body: 5.5–6.0 mm, wing: 5.8–6.2 mm.

Differs from male as follows: Interocular space about 0.4 of head-width of anterior ocellus. Ocellar triangle long, extending beyond middle of frons; cruciate interfrontal setae present and inserted closer to the distal end of the ocellar triangle. Frontal row with seven long setae; vertical setae developed; fore femur with no preapical ventral process and only with posteroventral, dorsal and posterodorsal rows of fine setae.

OVIPOSITOR.— Ovipositor long, tergites long and thin, apical part of tergite 8 with 3 strong setae (Figs. 95–97). Spermathecae as in Fig. 97.

OTHER MATERIAL EXAMINED.— **PARATYPES:** **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1110 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 26–31 March 2002, R. Harin'Hala, collection code: MA-02-09A-22, 1 male, CASENT 3009406 (MNRJ); 1 female, CASENT 3009390; 6–15 December 2001, 1 female, CASENT 3010014 (BMNH). **Toamasina Province:** Monamizana, 150 km E of Antananarivo, 26–31 December 1993, S. Shinonaga, 1 male (BMNH).

ETYMOLOGY.— The name comes from the Latin word *bellus*, meaning beautiful, and refers to the metallic green/blue colour of this species.

DISCUSSION.— *H. bella* differs from all the known species of *Hydrotaea* by its metallic green/blue colour. From other Afrotropical species it differs by the long and metallic ocellar triangle and by the chaetotaxy of the hind tibia; males can also be distinguished by the chaetotaxy of the fore femur.

Limnophora Robineau-Desvoidy, 1830

DIAGNOSIS.— Eyes usually bare; prestomal teeth developed; prealar seta absent; lower proepimeral seta upcurved; prosternum with lateral setulae; postsutural dorsocentral setae 3 or 4; vein M slightly curved forwards just before apex; wing with setulae at the base of vein R₄₊₅ on dorsal and ventral surfaces; sternite 1 bare; female ovipositor with segment 8 directed upwards and with small spicules; hypoproct elongated and with spinules. (Couri and Carvalho 2002). [REF. Emden 1951].

The larvae are obligate carnivores. Many are aquatic and live in running water where they prey on oligochaetes and small insect larvae. Others are terrestrial and breed in dung or decaying organic matter. Adults are also carnivorous, taking other small soft-bodied insects as prey.

AFROTROPICAL FAUNA.— There are 74 species of *Limnophora*, known from all parts of the Afrotropical Region, including the Cape Verde Is., Madagascar, Mauritius, Réunion, Socotra and South Yemen.

MADAGASCAN FAUNA.— The following species have been recorded from Madagascar: *L. conversa* Stein, 1918; *L. exigua* (Wiedemann, 1830); *L. obsignata* Rondani, 1866; *L. quaterna* (Loew, 1852); *L. rossi* Zielke, 1974; *L. setalis* Emden, 1951; *L. stragula* (Séguy, 1950). All but the first one have been recognised in our material. Two new species are described: *L. triangularis*, sp. nov. and *L. mesovittata*, sp. nov.

Key to the Madagascar Species of *Limnophora*

1. Postsutural dorsocentrals 3 2
 Postsutural dorsocentrals 4 6
2. Postsutural transverse brown band extending medially as a brown vitta that reaches scutellum, the width of this vitta slightly wider than the pale spot around the posterior dorsocentral seta (Madagascar) *L. mesovittata*, sp. nov.
 Postsutural transverse brown band, when present, not extending medially as a brown vitta that reaches scutellum 3
3. Mesonotum black, silver only on notopleural and postpronotal areas 4
 Mesonotum not entirely black, usually with grey pollinosity and with or without a transverse brown band behind the suture. 5
4. Fore tibia without a posterior seta; katapisternal seta 1+1; male hind femur without posteroventral setae (Cameroon, Niger, Tanzania, Uganda, Madagascar) *L. stragula* (Séguy)

- Fore tibia with a median posterior seta; katapisternal seta 1+2; male hind femur before apex with 4–5 posteroventral setae in a close set group and perpendicular to the femoral shaft, preceded (as far as middle of femur) by rather dense fine posteroventral hairs (Madagascar)
..... *L. conversa* Stein
5. Mesonotal pattern in female: a pair of presutural spots running along the dorsocentral row of setae and reaching the second pair of presutural dorsocentrals; postsutural transverse band from suture to approximately the level of the second pair of dorsocentrals; scutellum with a dark band on basal two-fifths; abdomen with one pair of more or less round dark lateral spots on tergites 3 and 4, and a median vitta on tergite 4; male unknown (Madagascar)
..... *L. triangularis*, sp. nov.
Mesonotal pattern different in male and female. Male: a pair of presutural spots running along the dorsocentral row of setae and reaching suture; postsutural transverse band reaching beyond the level of the second pair of dorsocentrals; scutellum with a large dark band, only apex with grey pollinosity; Female: mesonotum with grey pollinosity and with 2 brown postsutural vittae reaching the level of the second dorsocentrals; abdomen with a pair of more or less round dark lateral spots on tergites 1+2–3 and no median vitta on tergite 4 (widespread in the Afrotropical Region, including Cape Verde Is., Madagascar, Réunion, Socotra, South Yemen; Canary Is., Egypt, Israel)..... *L. quaterna* (Loew)
6. Mid tibia with only one posterior seta (Madagascar, Tanzania, Uganda), arista almost bare
..... *L. setalis* Emden
Mid tibia with 2–3 posterior setae; arista plumose 7
7. Postsutural transverse brown band extending medially as a thin brown vitta and reaching scutellum (Madagascar) *L. rossi* Zielke
Postsutural transverse brown band not extending medially as a brown vitta that reaches scutellum 8
8. Arista with hairs longer than width of flagellomere; scutellum pale dusted at apex; male holoptic (Afrotropical region including Madagascar, Socotra; Mediterranean, from Canary Is. and Malta to Iran) *L. obsignata* Rondani
Arista with hairs shorter than described above; scutellum entirely black with brown dust; male dichoptic (Ghana, Liberia, Tanzania, Uganda, D.R. Congo, Cape Verde Is., Aldabra, Astove, Mauritius, Madagascar; Egypt, Oriental Region, New Guinea) . . *L. exigua* (Wiedemann, 1830)

MATERIAL EXAMINED: KNOWN SPECIES

L. exigua: **MADAGASCAR: Antsiranana Province:** Sambirano, Lokobe, Nossi-Bé, 6 m, 9–23 November 1957, 1 female, B.R. Stuckenberg (NMSA). **Fianarantsoa Province:** Ranohira, 860 m, 26 January–4 February 1958, 1 female, B.R. Stuckenberg (BMNH). **Toamasina Province:** dct [District of] Maroantsetra, Sahasoa Fampanambo, 8 m, 26–29 March 1958, 1 male, B.R. Stuckenberg (NMSA). dct [District of] Maroantsetra, Navana-Antongil, 6 m, 20–25 March 1958, 1 female, B.R. Stuckenberg (NMSA).

L. obsignata: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 15–21 December 2001, R. Harin'Hala, collection code: MA-02-09B-07, 1 female, CASENT 3009931 (MNRJ); 1 female, CASENT 3009929; 1 female, CASENT 3009927; 1 female, CASENT 3010054. Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09C-12, 1 female, CASENT 3009819; 1 male, CASENT 3009831; 1 female, CASENT 3009847. JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev. 690 m, 10–14 January 2002, R. Harin'Hala, collection code: MA-02-09D-11, 1 male, CASENT 3009935; 1 female, CASENT 3009973; 1 female, CASENT 3009936; 1 female, CASENT 3009979; 1 female, CASENT 3009949; 1 female, CASENT 3009951; 1 female, CASENT 3009961; 1 male, CASENT 3009964; 1 female, CASENT 3009980;

1 female, CASENT 3009971; 1 female, CASENT 3009970; 1 female, CASENT 3009976; 1 female, CASENT 3009716; 15–21 December 2001, 1 female, CASENT 3010500. Vohiparara, at broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 6–15 December 2001, R. Harin'Hala, collection code: MA-02-09A-06, 1 female, CASENT 3010007; 19–26 February 2002, 1 female, CASENT 3010457 (MNRJ). Rivière Zomandoa, Andringitra Ambalavao, Antanifotsy village, 1650 m, 10 January 1958, 1 male 5 females, B.R. Stuckenberg (NMSA, BMNH). Vakoana, Andringitra Ambalavao, 1520 m, 21–24 January 1958, 2 females, B.R. Stuckenberg (NMSA). Ranohira, 860 m, 26 January–4 February 1958, 1 female, B.R. Stuckenberg (NMSA). **Toamasina Province:** dct [District of] Moramanga, Route d'Anosibe, 840 m, 18–24 December 1957, 2 females, B.R. Stuckenberg (NMSA, BMNH). Sandrangato, 2 males (NMSA). Ranomafana, Ifanadiana, 1 male 1 female (NMSA). **Antananarivo Province:** Tsimbazaza, lake shore, 28 October 1948, 1 female J.R. (NMSA). **Antsiranana Province:** dct [District of] Diégo Suarez, Montagne d'Ambre, 1000 m, 23 November–4 December 1957, 1 male, B.R. Stuckenberg (NMSA).

L. quaterna: **MADAGASCAR: Toliara Province:** Manderano, elev. 70 m, 23°31'38"S 44°5'15"E, Malaise trap, gallery forest at edge of marsh near road, 22–29 May 2002, Frontier Wilderness Project, collection code: MGF031, 1 female, CASENT 3009031; 1 female, CASENT 3009020; 1 male, CASENT 3008985; 23°31'39"S 44°5'18"E, Malaise trap, edge of marsh, 5 m from road, gallery forest, 23 June–28 July 2002, Frontier Wilderness Project, collection code: MGF035, 1 male, CASENT 3009329. Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 male, CASENT 3009671; 1 male, CASENT 3009428; 1 male, CASENT 3009579; 1 male, CASENT 3009423; 1 male, CASENT 3009414; 1 male, CASENT 3009440; 1 male, CASENT 3009471; 1 male, CASENT 3009643; 1 male, CASENT 3009680; 1 male, CASENT 3009455; 1 male, CASENT 3009494; 1 male, CASENT 3009457; 1 male, CASENT 3009676; 1 male, CASENT 3009646; 1 male, CASENT 3009608; 1 male, CASENT 3009654. Sept Lacs, elev. 70 m, 23°31'39"S 44°9'16"E, Malaise trap, gallery forest, 9–12 March 2002, collection code: MGF025, 1 male, CASENT 3008896; 1 male, CASENT 3008895; elev. 120 m, 23°31'65"S 44°9'35"E, Malaise trap, gallery forest, 21–26 August 2002, Frontier Wilderness Project, collection code: MGF038, 1 male, CASENT 3009234. Fiherenana, elev. 100 m, 23°10'37"S 43°57'39"E, Malaise trap, in gallery forest, 22–28 October 2002, Frontier Wilderness Project, collection code: MGF041, 1 male, CASENT 3009214; 1 male, CASENT 3009224. Mikea Forest, NW of Manombo, elev. 30 m; 22°54.22'S 43°28.53'E, Malaise trap—in deciduous forest, 21–31 August 2003, R. Harin'Hala, collection code: MA-02-18A-66, 1 female, CASENT 3010295. Parc National d'Andohahela, Tsimelahy, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 10–21 September 2003, M. Irwin, F. Parker, R. Harin'Hala, collection code: MA-02-20-39, 1 female, CASENT 3010863; 1 female, CASENT 3010884; 1 female, CASENT 3010867; 1 female, CASENT 3010874; 1 female, CASENT 3010881; 1 female, CASENT 3010871; June–10 July 2003, collection code: MA-02-20-31, 1 female, CASENT 2070608; 1 female, CASENT 2070609; 1 female, CASENT 2070605; 1 female, CASENT 2070604; 28 January–28 February 2204, collection code: MA-02-20-53, 1 female, CASENT 8078185; 1 female, CASENT 8078183 (MNRJ); 1 female, CASENT 8078184; 1 male, CASENT 8078043; 1 male, CASENT 8078047; 1 male, CASENT 8078049 (MNRJ); 1 male, CASENT 8078052; 1 female, CASENT 8078051; 1 female, CASENT 8078055; 1 female, CASENT 8078054; 6–18 March 2004, collection code: MA-02-20-56, 1 female, CASENT 8078010; 15–28 January 2004, collection code: MA-02-20-52, 1 male, CASENT 8078031 (MNRJ); 1 female, CASENT 8078033; 1 female, CASENT 8078032; 9–16 December 2002, collection code: MA-02-20-08, 1 male, CASENT 3010430; 30 October–9 November 2003, collection code: MA-02-20-44, 1 male, CASENT 3010975; 1 male, CASENT 3010960; 1 male, CASENT 3010965; 1 male, CASENT 3010972; 1 male, CASENT 3010952; 1 female, CASENT 3010958; 1 female, CASENT 3010979; 1 female, CASENT 3010988 (MNRJ); 1 female, CASENT 3010990; 1 female, CASENT 3010954; 28 March–8 April 2003, collection code: MA-02-20-20, 1 male, CASENT 2070535; 1 male CASENT 2070571; 17–24 August 2003, collection code: MA-02-20-36, 1 male, CASENT 3010565; 11–19 October 2003, collection code: MA-02-20-42, 1 male, CASENT 3010833. Fort Dauphin, 1 female, R. Paulian (NMSA). **Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 6–15 December 2001, R. Harin'Hala, collection code: MA-02-09A-06, 1 female, CASENT 3010053. Radio tower, elev. 1130 m; 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 26–31 March 2002, collection code: MA-02-09B-22, 1 male, CASENT 3010677.

L. rossi: **MADAGASCAR**: Ankasoka (Périnet to Lakato), 1300 m, 8 November 1959, E.S. Ross, Holotypus *Limnophora rossi*, E. Zielke det 1972, *Limnophora* sp. female, AC Pont det 1976. Type no. CAS 11883.

L. setalis: **Fianarantsoa Province**: JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev 690 m, 10–14 January 2002, R. Harin'Hala, collection code: MA-02-09D-11, 1 female, CASENT 3009943 (MNRJ); 1 female, CASENT 3009943. Parc National Ranomafana, Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09C-12, 1 female, CASENT 3009850; MA-02-09C-04, 1 female, CASENT 3009752; 1 male, CASENT 3009824. Vohiparara, at broken bridge, elev. 1110 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 26–31 March 2002, R. Harin'Hala, collection code: MA-02-09A-22, 1 female, CASENT 3009397. Talatakely, trail P-350, elev. 990 m, 11 November 1998, V.F. Lee, K.J. Ribardo, 1 female, CASENT 8019837; 1 female, CASENT 8019838. Trail FF, elev. 915–1000 m; 4–20 November 1998, V.F. Lee, K.J. Ribardo, 1 female, CASENT 8019615. Namorona River foot bridge, 850 m, Malaise, 11 April 1998, M.E. Irwin and E.I. Schlinger, Schlinger Foundation Madagascar Expedition, collection code: 98-MAD-2, 1 female, CASENT 8021138. **Toliara Province**: Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap, deciduous dry forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 female, CASENT 3010116; 1 female, CASENT 3010111; 1 female, CASENT 3010102; 1 female, CASENT 3010096 (MNRJ).

L. stragula: **MADAGASCAR**: **Fianarantsoa Province**: Talatakely, trail P-350, elev. 990 m, 11 November 1998, V.F. Lee, K.J. Ribardo, 1 female, CASENT 8019836. Parc National Ranomafana, Belle Vue Trail, elev. 1000 m; 21°15.6'S 47°25.6'E, tropical forest, 21 December 1999, M.E. Irwin and E.I. Schlinger, collection code: MEI.99-MA-7, 1 female, CASENT 8018265. Rivière Zomandoa, Andringitra Ambalavao, 1650 m, 10 January 1956, 1 male, B.R. Stuckenberg (NMSA). Vakoana, Andringitra Ambalavao, 21–24 January 1958, 2 females, B.R. Stuckenberg (NMSA, BMNH). Ranohira, 860 m, 26 January–4 February 1958, 1 female, B.R. Stuckenberg (BMNH). **Toamasina Province**: Moramanga, Route d'Anosibe, 840 m, 18–24 December 1957, 2 females, B.R. Stuckenberg (NMSA, BMNH). Ranomafana, Ifanadiana, 1 female (NMSA). **Antananarivo Province**: La Mandraka, December 1953, 2 males, N.H.L. Krauss (BMNH). Ankaratra massif, Manjakatempo forest station, i.1956, 1 female, B.R. Stuckenberg (NMSA). det [District of] Ambatolampy, Lac Froid, 1620 m, 11–15 December 1957, 1 male 1 female, B.R. Stuckenberg (NMSA, BMNH). **Antsiranana Province**: Nossi-Bé, Sambirano, Lokobe, 6 m, 9–23 November 1957, 1 female, B.R. Stuckenberg (NMSA). det [District of] Diégo-Suarez, Montagne d'Ambra, 1000 m, 23 November–4 December 1958, 1 male, B.R. Stuckenberg (NMSA).

DESCRIPTIONS OF NEW SPECIES OF *LIMNOPHORA*

Limnophora mesovittata Couri, Pont, and Penny, sp. nov.

TYPE.— **HOLOTYPE**: female, deposited in CAS, labelled: **MADAGASCAR**: **Fianarantsoa Province**: Parc National Ranomafana, Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 22–28 November 2001, R. Harin'Hala, collection code: MA-02-09C-04, CASENT 3009729.

DIAGNOSIS.— Mesonotum with postsutural transverse brown band extending medially as a brown vitta and reaching scutellum, the width of this vitta slightly wider than the pale spot around the posterior dorsocentral seta; mid femur with 2 posterior to posterodorsal preapical setae; abdomen with pale dusting between and outside the black brown spots, and the spots therefore indistinct.

GENERAL COLOR.— Ground-colour brown with grey pollinosity. Head with frons brown; parafacial and gena silver pollinose. Antenna, arista and palpus brown. Anterior spiracle light brown. Mesonotum with postsutural transverse brown band extending medially as a brown vitta and reaching scutellum, the width of this vitta slightly wider than the pale spot around the posterior dorsocentral seta. Scutellum with a transverse brown band on basal two-thirds. Calypters whitish. Haltere whitish-yellow. Wing clear. Legs brown with grey pollinosity. Abdomen with pale dusting between and outside the blackish-brown spots, and the spots therefore indistinct.

FEMALE.— Length. Body: 4.2 mm, wing: 4.3 mm.

HEAD.— Interocular space about one-third of head-width at level of anterior ocellus. Inner vertical setae longer than outer. Ocellar triangle short. Frontal row with 6 pairs of setae, and 1 pair of reclinate orbitals. Antenna inserted at mid level of eye; flagellomere about 2.5 times as long as pedicel. Arista short haired. Gena a little wider than the width of flagellomere. Palpus filiform.

THORAX.— Acrostichals 0+1; dorsocentrals 2+3; 2 postpronotals; 1 presutural; 2 intra-alars; 2 supra-alars; 2 postsupra-alars. Notopleuron with two setae, similar in size. Scutellum with two pairs of long setae, one basal and one apical, similar in size. Anepisternum with a series of 5 long setae. Katepisternals 1+2. Anepimeron bare. Lower calypter about twice as long as upper one. Base of R_{4+5} with 1–2 short setulae on both wing surfaces. Cell r5 at wing tip more than twice as wide as length of cross-vein r-m. Fore femur with complete rows of posterodorsal, dorsal and posteroventral setae; fore tibia with one dorsal preapical seta; mid femur with 1 median anterior seta and 2 posterior preapicals; mid tibia with 2 posterior setae on middle third; 1 preapical dorsal, and apical setae on anteroventral and ventral surfaces, the latter longer; hind femur with a complete anterodorsal row of setae; 2 anteroventrals on apical third; hind tibia with one median anterodorsal seta and one submedian anteroventral; one preapical dorsal and one apical ventral.

ABDOMEN.— Tergite 5 with a subbasal and an apical row of setae.

OVIPOSITOR.— Ovipositor and spermathecae as in Fig. 98.

MALE.— Unknown.

OTHER MATERIAL EXAMINED.— PARATYPES: Same data as holotype; 1 female, CASENT 3009741. Radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 15–21 December 2001, R. Harin'Hala, collection code: MA-02-09B-07, 1 female, CASENT 3010858.

ETYMOLOGY.— The name comes from the Greek prefix *meso*, meaning middle, and the Latin word *vitta*, meaning ribbon or band, and refers to the transverse brown band of the mesonotum.

DISCUSSION.— *L. mesovittata*, sp. nov. is morphologically close to *L. perfidodes* Emden, 1951, which is recorded from Burundi, Ethiopia, Kenya, Rwanda, Uganda and D.R. Congo. The following key couplet will separate them:

1. Arista with short hairs, shorter than the width of antennal flagellomere; calypter yellow; cell r5 at wing tip more than twice as wide as length of cross-vein r-m; pale dust on abdomen between and outside the black brown spots, the spots therefore indistinct. *L. mesovittata*, sp. nov.
Arista with the longest hairs equal to the width of antennal flagellomere; calypter creamy; cell r5 at wing tip about twice as wide as length of cross-vein r-m; pale dust on abdomen grey, the black spots very distinct and well-defined. *L. perfidodes* Emden

***Limnophora triangularis* Couri, Pont, and Penny, sp. nov.**

TYPE.— HOLOTYPE: female, deposited in CAS, labelled: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 26 February–4 March 2002, R. Harin'Hala, collection code: MA-02-09C-18, CASENT 3010601.

DIAGNOSIS.— Ocellar triangle cut off abruptly, not extending far down frons; fronto-orbital plate brown on over upper half; mesonotum with a pair of presutural spots running along the dorsocentral row of setae and reaching the second pair of presutural dorsocentrals; postsutural transverse band extends from suture about to level of second pair of dorsocentrals; scutellum black along sides as well as along base; mid femur with 2 posterior preapical setae; black abdominal spots large, those on tergites 3 and 4 reaching fore margin of the tergites.

GENERAL COLOR.— Ground-colour brown with grey pollinosity. Head with frons brown; ocellar triangle grey pollinose; fronto-orbital plate brown on over upper half; gena silver pollinose from

certain angles. Antenna, arista and palpus brown. Anterior spiracle pale yellow, posterior spiracle grey pollinose. Mesonotum with a pair of presutural spots running along dorsocentral row of setae and reaching second pair of presutural dorsocentrals; postsutural transverse band extending from suture about to level of second pair of dorsocentrals; scutellum black along sides as well as along base. Calypters whitish. Haltere whitish-yellow. Wing clear. Legs brown with grey pollinosity. Abdomen with brown spots on tergites 3 and 4, reaching fore margin of the tergites.

FEMALE.— Length. Body: 4.0–4.3 mm, wing: 4.0–4.5 mm.

HEAD.— Interocular space about one-third of head-width at level of anterior ocellus. Inner vertical setae longer than outer. Ocellar triangle short, cut off abruptly and with a pair of long ocellar setae. Frontal row with 6 pairs of setae, and 1 pair of reclinate orbitals. Antenna inserted at mid level of eye; flagellomere about 2.3 times as long as pedicel. Arista short haired. Gena a little wider than width of flagellomere. Palpus filiform.

THORAX.— Acrostichals 0+1; dorsocentrals 2+3; 2 postpronotals; 1 presutural; 2 intra-alars; 2 supra-alars; 2 postsupra-alars. Notopleuron with two setae, similar in size. Scutellum with two pairs of long setae, one basal and one apical, similar in size. Anepisternum with a series of 5 long setae. Katepisternals 1+2. Anepimeron bare. Lower calypter about twice as long as upper one. Base of R_{4+5} with 1–2 short setulae on both wing surfaces. Fore femur with complete rows of posterodorsal, dorsal and posteroventral setae; fore tibia with one dorsal preapical seta; mid femur with 2–4 anterior setae on middle third; 2 posterior preapical setae; mid tibia with 2 posterior setae on middle third; 1 preapical dorsal and apical setae on anteroventral and posteroventral surfaces; hind femur with a complete anterodorsal row of setae; 2 anteroventrals on apical third; hind tibia with one anteroventral and one median anterodorsal seta; one preapical dorsal and one apical ventral.

ABDOMEN.— Tergite 5 with a subbasal and an apical row of setae.

OVIPOSITOR.— Ovipositor and spermathecae as in Fig. 99.

MALE.— Unknown.

OTHER MATERIAL EXAMINED.— PARATYPES: **MADAGASCAR: Toliara Province:** Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 female, CASENT 3009675; 1 female, CASENT 3009489 (BMNH); 1 female, CASENT 3009422; 1 female, CASENT 3009468; 1 female, CASENT 3009662; 1 female, CASENT 3009495; 1 female, CASENT 3009464; 1 female, CASENT 3009434; 1 female, CASENT 3009503 (MNRJ); 1 female, CASENT 30096451; 1 female, CASENT 3009655; Manderano, elev. 70 m, 23°31'39"S 44°5'18"E, Malaise trap, edge of marsh, 5 m from road, gallery forest, 23 June–28 July 2002, Frontier Wilderness Project, collection code: MGF035, 1 female, CASENT 3009333 (BMNH); 23°31'38"S 44°5'15"E, Malaise trap at edge of marsh near road, 22–29 May 2002, Frontier Wilderness Project, collection code: MGF031, 1 female, CASENT 3009002; 1 female, CASENT 3009007. Parc National d'Andohahela, Tsimelaha, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 10–21 September 2003, M. Irwin, F. Parker, R. Harin'Hala, collection code: MA-02-20-39, 1 female, CASENT 3010869; 28 January–12 February 2004, collection code: MA-02-20-53, 1 female, CASENT 8078050; 1 female, CASENT 8078046; 1 female, CASENT 8078045; 1 female, CASENT 8078048 (MNRJ); 1 female, CASENT 8078044; 6–18 March 2004, collection code: MA-02-20-56, 1 female, CASENT 8078011. Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap—in deciduous forest, 21–31 August 2003, R. Harin'Hala, collection code: MA-02-18A-66, 1 female, CASENT 3010296.

ETYMOLOGY.— The name comes from the Latin word *triangulus*, meaning triangle, and refers to the distinctive shape of the ocellar triangle.

DISCUSSION.— *L. triangularis*, sp. nov. is morphologically close to *L. excisa* Emden, 1951, which is recorded from South Africa. The following key couplet will separate them:

1. Ocellar triangle cut off abruptly, not extending far down frons; fronto-orbital plate brown on over upper half; mid femur with 2 posterior preapical setae; scutellum black along sides as well as along base; black abdom-

inal spots larger, those on tergites 3 and 4 reaching fore margin of the tergites. . . . *L. triangularis*, sp. nov. Ocellar triangle normal, reaching at least halfway from front ocellus to lunula; fronto-orbital plate silvery, brownish only around middle; mid femur with one preapical posterior seta; scutellum black only along base, grey on sides; black abdominal spots smaller, those on tergites 3 and 4 not reaching fore margins of the tergites *L. excisa* Emden

Lispacoenosia Snyder, 1949

DIAGNOSIS.— Frons about one third of head-width in both sexes; parafacialia with fine hairs along their entire length; palpi moderately dilated at apex; postpronotals 1; dorsocentrals 0+1; katapisternals 1:1:1, arranged in an equilateral triangle; anepimeron bare.

AFROTROPICAL FAUNA.— Only one species is known and is confined to the Afrotropical region (Ghana, Nigeria, Tanzania, D.R. Congo, Madagascar).

MADAGASCAN FAUNA.— Only one specimen of *L. fulvitorsus* Snyder, 1949 was found in the material studied. The species can be recognized by the shining black mesonotum, with a median anterior silver spot presuturally and two silver small areas on notopleuron; ocellar triangle shining black, long, reaching lunula; antenna brownish-black; calypters white, halteres fulvous; legs mainly black with some parts of tibiae and tarsi yellowish; head shape as in Fig. 100; hind tibia with one each anterodorsal, posterodorsal and anteroventral submedian setae.

MATERIAL EXAMINED: KNOWN SPECIES

L. fulvitorsus: **MADAGASCAR: Toliara Province:** Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 female, CASENT 3009609. **Toamasina Province:** dct [District of] Ambatondrazaka, Station Agric. Alaotra, 800 m, 24 December 1957, 2 males, B.R. Stuckenberg (NMSA, BMNH).

Lispe Latreille, 1796

DIAGNOSIS.— Male dichoptic; palpus enlarged apically, spatulate; prestomal teeth strongly developed; without interfrontal or proclinate orbital setae; parafacial setulose; dorsocentral setae 0–2+2–4; prealar seta absent; anepimeron setulose in centre; lower proepimeral seta upcurved; katapisternals 1+2; sternite 1 setulose; male: gonopod absent; female: ovipositor with segment 8 directed upwards and with spinules; hypoproct elongated and with spines (Couri and Carvalho, 2002, modified).

The larvae are obligate carnivores, and live in wet sand or mud with a high organic content. Adults are voracious and aggressive predators, mainly of the immature stages of Culicidae and Chironomidae.

AFROTROPICAL FAUNA.— Forty nine species of *Lispe* are present in the Afrotropical region.

MADAGASCAN FAUNA.— Thirteen *Lispe* species have been recorded from Madagascar, 8 of which are endemic: *L. bengalensis* (Robineau-Desvoidy, 1830), *L. desjardinsii* Macquart, 1851, *L. dictaeta* Stein, 1913, *L. frontalis* Zielke, 1972, *L. keiseri* Zielke, 1972, *L. leucosticta* Stein, 1918, *L. madagascariensis* Zielke, 1972, *L. nuba* Wiedemann, 1830, *L. paraneo* Zielke, 1972, *L. paraspila* Zielke, 1972, *L. pennitarsis* Stein, 1918, *L. sexnotata* Macquart, 1843, and *L. stuckenbergi* Zielke, 1970. Large series of specimens of *L. paraspila* and *L. pennitarsis* have been found in our material. *L. niveimaculata* Stein, 1906, previously recorded as widespread throughout mainland Africa, is recorded for the first time from Madagascar. One new species was also found among our material and is here described.

Key to the Madagascar Species of *Lispe*

1. Presutural dorsocentral setae absent 2
 Presutural dorsocentral setae present 3
2. Only a single distinct dorsocentral seta, which is in front of scutellum; only the posterior katepisternal present; fore femur with 3–4 strong ventral setae on apical third (widespread on mainland Africa, Madagascar) *L. niveimaculata* Stein
 Dorsocentrals 0+2, the first shorter than the second (but lengths different in the series); all 3 katepisternals present; fore femur without 3–4 strong ventral setae on apical third (Madagascar, Réunion) *L. sexnotata* Macquart
3. Fore femur with numerous short spinulose setae on ventral surface in addition to the normal setae and hairs; hind tibia without a posterodorsal seta (most of Africa, Madagascar, Aldabra, South Yemen, Egypt, Oriental Region, Australia, Pacific Is.) *L. bengalensis* (Robineau-Desvoidy)
 Fore femur without numerous short spinulose setae on ventral surface; hind tibia with or without a posterodorsal seta 4
4. 1 presutural dorsocentral seta 5
 2 presutural dorsocentral setae 8
5. 3 postsutural dorsocentral setae; hind tibia without posterodorsal seta; male hind tibia with long posteroventral hairs on apical half (Madagascar) *L. paraspila* Zielke
 2 postsutural dorsocentral setae; hind tibia with or without posterodorsal seta; male hind tibia without long posteroventral hairs on apical half 6
6. Fore tibia brown, mid and hind tibia with some reddish areas (Madagascar) *L. leucosticta* Stein
 All tibiae yellow 7
7. Fronto-orbital plate without 1–3 strong setae at lower end; male mid coxa with 3–4 posterior short and strong spines; mesothorax brown, grey pollinose, with one median vitta (Madagascar) *L. stuckenbergi* Zielke
 Fronto-orbital plate with 1–3 strong setae at lower end; male mid coxa without posterior short and strong spines; mesothorax yellowish with grey pollinosity, with fine vittae (widespread east to southern Africa, Nigeria, D.R. Congo, Madagascar, Mauritius) *L. dichaeeta* Stein
8. 2 postsutural dorsocentral setae (Madagascar) *L. madagascariensis* Zielke
 3 or 4 postsutural dorsocentral setae 9
9. 3 postsutural dorsocentral setae 10
 4 postsutural dorsocentral setae 13
10. Palpi strongly silver pollinose at apex; fore tibia with a long dorsal seta at apical fourth; male first hind tarsomere larger than the others and with a tuft of strong setae (Madagascar) *L. argentata*, sp. nov.
 With a different combination of characters 11
11. Hind tibia without an anteroventral seta (Madagascar) *L. keiseri* Zielke
 Hind tibia with one anteroventral seta 12
12. Fore tarsus of male with an apical flattened and dilated seta (Fig. 101); mid and fore tibiae yellow; hind tibia with one posterodorsal, one anterodorsal and one anteroventral setae on middle third (Annobon, Ghana, Liberia, Nigeria, Mauritius, Madagascar) *L. desjardinsii* Macquart
 Fore tarsus of male without flattened setae; mid and hind tibiae only partially yellow; hind tibia with only two setae on middle third (Madagascar) *L. pennitarsis* Stein
13. Head with the face strongly silvery-white pollinose; antennal flagellomere shorter than usual *L. frontalis* Zielke

- Head with the face not strongly silvery-white pollinose; antennal flagellomere not shortened
 14
14. Mid tibia with only one posterodorsal or one posteroventral seta; vein M strongly curved forwards at apex (widespread east to southern Africa, Nigeria, Madagascar, Socotra, Tunisia, Egypt)
 *L. nuba* Wiedemann
- Mid tibia with one posterodorsal and one posteroventral seta; vein M straight (Madagascar)
 *L. paraneo* Zielke

MATERIAL EXAMINED: KNOWN SPECIES

L. dichæta: **MADAGASCAR: Antananarivo Province:** Imerintsiatosika, January 1953, 1 female, R.Paulian (NMSA).

L. keiseri: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Vohiapara at broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 25 May–4 June 2001, Harin'Hala, collection code: MA-02-09A-30, 1 female, CASENT 3010558. JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev 690 m, 16 October–8 November 2001, R. Harin'Hala, collection code: MA-02-09D-01, 1 female, CASENT 3010414; 1 female, CASENT 3010421; 1 female, CASENT 3010426 (MNRJ); 1 male, CASENT 3010418.

L. niveimaculata: **MADAGASCAR: Toliara Province:** Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 female, CASENT 3009478; 1 male, CASENT 3009522; elev. 55 m, 23°28'43"S 44°3'51"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF003, 1 male, CASENT 3009706. **Mahajanga Province:** Parc National d'Ampijoroa, 160 km N of Maevatanana on RN 04, elev. 43 m, 16°19.16'S 46°48.80'E, Malaise trap, in deciduous forest, 24–31 August 2003, R. Harin'Hala, collection code: MA-25-12, 1 male, CASENT 3010714; 5–12 October 2003, 1 male, CASENT 3010342; 1 male, CASENT 3010339; 1 male, CASENT 3010330 (MNRJ); 1 male, CASENT 3010345; 1 male, CASENT 3010347; 1 male, CASENT 3010352; 1 female, CASENT 3010351; 1 female, CASENT 3010339; 1 female, CASENT 3010337; 1 female, CASENT 3010344; 14–22 September 2003, collection code: MA-25-15, 1 male, CASENT 3010726; 28 September–5 October 2003, collection code: MA-25-17, 1 male, CASENT 3010462; 1 female, CASENT 3010466; 1 female, CASENT 3010464 (MNRJ); 1 female, CASENT 3010463; 5–12 October 2003, collection code: MA-25-18, 1 female, CASENT 3010342. **Fianarantsoa Province:** Vohi-parara, at broken bridge, elev. 1110 m; 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 31 March–8 April 2002, R. Harin'Hala, collection code: MA-02-09A-23, 1 female, CASENT 3010589.

L. paraspila: **MADAGASCAR: Toliara Province:** Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 male, CASENT 3009605; 1 male, CASENT 3009587; 1 male, CASENT 3009590; 1 male, CASENT 3009600; 1 male, CASENT 3009599; 1 male, CASENT 3009439; 1 male, CASENT 3009510; 1 male, CASENT 3009493; 1 male, CASENT 3009488; 1 male, CASENT 3009501; 1 male, CASENT 3009411; 1 male, CASENT 3009435; 1 male, CASENT 3009470; 1 male, CASENT 3009442; 1 male, CASENT 3009450; 1 male, CASENT 3009430; 1 male, CASENT 3009429; 1 male, CASENT 3009458; 1 male, CASENT 3009469; 1 male, CASENT 3009452; 1 male, CASENT 3009605; 1 female, CASENT 3009446; 1 female, CASENT 3009465; 1 female, CASENT 3009424; 1 female, CASENT 3009437; 1 female, CASENT 3009606; 1 female, CASENT 3009507; 1 female, CASENT 3009589; 1 female, CASENT 3009456; 1 female, CASENT 3009445; 1 female, CASENT 3009594; 1 male, CASENT 3009420; 1 male, CASENT 3009498; 1 male, CASENT 3009438; 1 male, CASENT 3009642; 1 male, CASENT 3009663; 1 male, CASENT 3009650; 1 male, CASENT 3009651; 1 male, CASENT 3009413; 1 male, CASENT 3009658; 1 male, CASENT 3009657; 1 male, CASENT 3009647; 1 male, CASENT 3009652; 1 male, CASENT 3009656; 1 male, CASENT 3009666; 1 male, CASENT 3009668; 1 male, CASENT 3009670; 1 male, CASENT 3009437; 1 male, CASENT 3009487; 1 male, CASENT 3009447; 1 male, CASENT 3009686; 1 female, CASENT 3009638; 1 female, CASENT 3009669; 1 female, CASENT 3009665; 1 female, CASENT 3009603; 1 female, CASENT 3009459; 1 female, CASENT 3009443; 1 female, CASENT 3009433; 1 female, CASENT 3009649; 1 female, CASENT

3009444; 1 female, CASENT 3009660; 1 male, CASENT 3009672; 1 male, CASENT 3009685; 1 male, CASENT 3009688; 1 male, CASENT 3009475; 1 male, CASENT 3009497; 1 male, CASENT 3009491; 1 male, CASENT 3009673; 1 female, CASENT 3009677; 1 female, CASENT 3009684; 1 female, CASENT 3009653; 1 female, CASENT 3009490; 1 female, CASENT 3009678; 1 female, CASENT 3009648; 1 female, CASENT 3009453; 1 female, CASENT 3009496; 1 female, CASENT 3009415. Manderano, elev. 70 m, 23°31'38"S 44°5'15"E, Malaise trap, gallery forest at edge of marsh near road, 22–29 May 2002, Frontier Wilderness Project, collection code: MGF031, 1 male, CASENT 3009006; 1 female, CASENT 3009017. Parc National d'Andohahela, Tsimelahy, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 28 January–12 February 2004, M. Irwin, F. Parker, R. Harin Hala, collection code: MA-02-20-53, 1 female, CASENT 8078149 (MNRJ); 1 female, CASENT 8078069 (MNRJ); 1 female, CASENT 8078071; 1 female, CASENT 8078072; 1 female, CASENT 8078073; 1 female, CASENT 8078074; 1 female, CASENT 8078104; 1 female, CASENT 8078099; 1 female, CASENT 8078087; 1 female, CASENT 8078075; 1 female, CASENT 8078078; 1 female, CASENT 8078084; 1 female, CASENT 8078081; 1 female, CASENT 8078091; 1 female, CASENT 8078088; 1 female, CASENT 8078106; 1 female, CASENT 8078108; 1 female, CASENT 8078118; 1 female, CASENT 8078119; 1 female, CASENT 8078116; 1 female, CASENT 8078115; 1 female, CASENT 8078129; 1 female, CASENT 8078127; 1 female, CASENT 8078125; 1 female, CASENT 8078126; 1 female, CASENT 8078124; 1 female, CASENT 8078122; 1 female, CASENT 8078135; 1 female, CASENT 8078136; 1 female, CASENT 8078138; 1 female, CASENT 8078151; 1 female, CASENT 8078152; 1 female, CASENT 8078134; 1 female, CASENT 8078148; 1 female, CASENT 8078162; 1 female, CASENT 8078101; 1 female, CASENT 8078117; 1 female, CASENT 8078120; 1 female, CASENT 8078123; 1 female, CASENT 8078150; 1 female, CASENT 8078146; 1 female, CASENT 8078153; 1 female, CASENT 8078156; 1 female, CASENT 8078157; 1 female, CASENT 8078158; 1 female, CASENT 8078159; 1 male, CASENT 8078154; 1 male, CASENT 8078128; 1 male, CASENT 8078144; 1 male, CASENT 8078142; 1 male, CASENT 8078155; 1 male, CASENT 8078147; 1 male, CASENT 8078141; 1 male, CASENT 8078139; 1 male, CASENT 8078133; 1 male, CASENT 8078121; 1 male, CASENT 8078130; 1 male, CASENT 8078110; 1 male, CASENT 8078154; 1 male, CASENT 8078111; 1 male, CASENT 8078113; 1 male, CASENT 8078154; 1 male, CASENT 8078076; 1 male, CASENT 8078077; 1 male, CASENT 8078080; 1 male, CASENT 8078085 (MNRJ); 1 male, CASENT 8078086; 1 male, CASENT 8078096; 1 male, CASENT 8078095; 1 male, CASENT 8078094; 1 male, CASENT 8078093; 1 male, CASENT 8078092; 1 male, CASENT 8078098; 1 male, CASENT 8078102; 1 male, CASENT 8078100; 1 female, CASENT 8078171; 1 female, CASENT 8078172; 1 female, CASENT 8078174; 1 male, CASENT 8078173; 1 male, CASENT 8078179; 1 female, CASENT 8078163; 1 female, CASENT 8078164; 1 female, CASENT 8078165; 1 female, CASENT 8078167; 1 female, CASENT 8078168; 1 female, CASENT 8078169; 1 female, CASENT 8078170; 1 female, CASENT 8078166; 15–28 January 2004, collection code: MA-02-20-52, 1 male, CASENT 8078039; 1 female, CASENT 8078040; 1 female, CASENT 8078041; 6–18 March 2004, collection code: MA-02-20-56, 1 female, CASENT 2070642; 1 female, CASENT 2070643; 1 female, CASENT 2070644; 1 female, CASENT 2070645; 1 female, CASENT 2070646; 1 female, CASENT 2070647; 1 female, CASENT 2070648; 1 female, CASENT 2070649; 1 female, CASENT 8078004; 1 female, CASENT 8078005; 1 female, CASENT 8078006; 1 female, CASENT 8078007; 1 female, CASENT 8078008; 1 female, CASENT 8078000; 1 male, CASENT 8078003; 1 male, CASENT 8078004; 10–21 September 2003, collection code: MA-02-20-39, 1 male, CASENT 3010875; 1 female, CASENT 3010880; 1 female, CASENT 3010836; 1 female, CASENT 3010834; 1 female, CASENT 3010870; 1 female, CASENT 3010872; 1 female, CASENT 3010873; 1 female, CASENT 3010876; 1 female, CASENT 3010877; 1 female, CASENT 3010878; 28 March–8 April 2003, collection code: MA-02-20-20, 1 female, CASENT 2070513; 1 female, CASENT 2070529; 1 female, CASENT 2070559; 1 female, CASENT 2070562; 29 June–10 July 2003, collection code: MA-02-20-31, 1 female, CASENT 2070601; 1 female, CASENT 2070576; 1 female, CASENT 2070607; 1 female, CASENT 2070592; 1 female, CASENT 2070593; 1 male, CASENT 2070591; 1 male, CASENT 2070590; 8–18 March 2003, collection code: MA-02-20-18, 1 female, CASENT 3010916; 1 female, CASENT 3010903; 16–17 December 2002, collection code: MA-02-20-09, 1 female, CASENT 3010886; 1 female, CASENT 3010887; 1 female, CASENT 3010890; 1 female, CASENT 3010891; 9–16 December 2002, collection code: MA-02-20-08; 1 female, CASENT 3010431; 1 female, CASENT 3010432; 1 female, CASENT 3010433; 1 female, CASENT 3010434; 1 female, CASENT 3010435; 1 female, CASENT 3010436; 1 female, CASENT 3010437; 1 female, CASENT 3010439;

30 October–9 November 2003, collection code: MA-02-20-44; 1 female, CASENT 3010978; 1 female, CASENT 3010973; 1 female, CASENT 3010976; 1 female, CASENT 3010968; 1 female, CASENT 3010955; 1 female, CASENT 3010956; 1 female, CASENT 3010966. **Fianarantsoa Province:** Parc National Ranomafana, radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 16 October–8 November 2001, R. Harin'Hala, collection code: MA-02-09B-01, 1 female, CASENT 3009722. JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev 690 m, 10–14 January 2002, R. Harin'Hala, collection code: MA-02-09D-11, 1 female, CASENT 3009972, 1 male. CASENT 3009967.

L. pennitarsis: **MADAGASCAR: Toliara Province:** Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 male, CASENT 3009701; 1 male, CASENT 3009617; 1 male, CASENT 3009622; 1 male, CASENT 3009697; 1 male, CASENT 3009692; 1 male, CASENT 3009628; 1 female, CASENT 3009618; 1 male, CASENT 3009619; 1 male, CASENT 3009624; 1 male, CASENT 3009476; 1 male, CASENT 3009508; 1 male, CASENT 3009511; 1 male, CASENT 3009466; 1 male, CASENT 3009448; 1 male, CASENT 3009492; 1 male, CASENT 3009504; 1 male, CASENT 3009474; 1 male, CASENT 3009441; 1 female, CASENT 3009463; 1 female, CASENT 3009467; 1 female, CASENT 3009436; 1 female, CASENT 3009432; 1 male, CASENT 3009472; 1 male, CASENT 3010105; 1 male, CASENT 3009698; 1 male, CASENT 3009694; 1 male, CASENT 3009588; 1 female, CASENT 3009541; 1 male, CASENT 3009593; 1 female, CASENT 3009535; 1 female, CASENT 3009515; 1 female, CASENT 3009519; 1 male, CASENT 3009604; 1 male, CASENT 3009512; 1 male, CASENT 3009514; 1 male, CASENT 3009516; 1 male, CASENT 3009520; 1 male, CASENT 3009517; 1 male, CASENT 3009702; 1 male, CASENT 3009700; 1 male, CASENT 3009690; 1 male, CASENT 3009699; 1 male, CASENT 3009705; 1 male, CASENT 3009693; 1 female, CASENT 3009691; 1 male, CASENT 3009704; 1 male, CASENT 3009518; 1 male, CASENT 3009513; 1 male, CASENT 3009523; 1 male, CASENT 3009525; 1 female, CASENT 3009527; 1 female, CASENT 3009614; 1 female, CASENT 3009524; 1 male, CASENT 3009526; 1 male, CASENT 3009529; 1 female, CASENT 3009521; 1 female, CASENT 3009530; 1 male, CASENT 3009531; 1 female, CASENT 3009542 (MNRJ); 1 male, CASENT 3009540; 1 male, CASENT 3009532; 1 male, CASENT 3009533; 1 male, CASENT 3009623; 1 male, CASENT 3009536; 1 female, CASENT 3009537; 1 female, CASENT 3009534; 1 female, CASENT 3009543; 1 female, CASENT 3009538; 1 female, CASENT 3009539; 1 male, CASENT 3009544; 1 male, CASENT 3009545; 1 male, CASENT 3009546; 1 male, CASENT 3009547; 1 male, CASENT 3009550; 1 male, CASENT 3009551; 1 female, CASENT 3009553; 1 female, CASENT 3009552; 1 female, CASENT 3009549 (MNRJ); 1 female, CASENT 3009695; 1 female, CASENT 3009548; 1 female, CASENT 3009630; 1 female, CASENT 3009556; 1 male, CASENT 3009557; 1 female, CASENT 3009558; 1 male, CASENT 3009559; 1 male, CASENT 3009626; 1 male, CASENT 3009563; 1 male, CASENT 3009564; 1 male, CASENT 3009574; 1 male, CASENT 3009573; 1 male, CASENT 3009565; 1 male, CASENT 3009567; 1 male, CASENT 3009569; 1 male, CASENT 3009571; 1 female, CASENT 3009568; 1 female, CASENT 3009570; 1 female, CASENT 3009515; 1 female, CASENT 3009562; 1 female, CASENT 3009560 (MNRJ); 1 female, CASENT 3009580; 1 male, CASENT 3009575; 1 male, CASENT 3009576; 1 male, CASENT 3009577; 1 male, CASENT 3009579; 1 male, CASENT 3009561; 1 male, CASENT 3009581; 1 male, CASENT 3009582; 1 male, CASENT 3009583; 1 male, CASENT 3009585; 1 male, CASENT 3009616; 1 male, CASENT 3009621; 1 male, CASENT 3009625 (MNRJ); 1 male, CASENT 3009528; 1 male, CASENT 3009592; 1 male, CASENT 3009620; 1 male, CASENT 3009632; 1 male, CASENT 3009634; 1 male, CASENT 3009635; 1 male, CASENT 3009636; 1 male, CASENT 3009637; 1 male, CASENT 3009661; 1 male, CASENT 3009555; 1 female, CASENT 3009554; 1 female, CASENT 3009627; 1 female, CASENT 3009696; 1 female, CASENT 3009633; 1 female, CASENT 3009308; 1 female, CASENT 3009584; 1 female, CASENT 3009578; 1 female, CASENT 3009631; 1 female, CASENT 3009629. Manderano, elev. 70 m, 23°31'38"S 44°5'15"E, Malaise trap, gallery forest at edge of marsh near road, 22–29 May 2002, Frontier Wilderness Project, collection code: MGF031, 1 male, CASENT 3008987; 23°31'39"S 44°5'18"E, Malaise trap, edge of marsh, 5 m from road, gallery forest, 23 June–28 July 2002, Frontier Wilderness Project, collection code: MGF035, 1 female, CASENT 3009310; 1 male, CASENT 3009309; 1 female, CASENT 3009307. Sept Lacs, elev. 65 m, 23°31'36"S 44°9'19"E, Malaise trap, gallery forest, 9–12 March 2002, Frontier Wilderness Project, collection code: MGF026, 1 female, CASENT 3009272; elev. 70 m, 23°31'39"S

44°9'16"E, Malaise trap, gallery forest, 9–12 March 2002, collection code: MGF025, 1 female, CASENT 3008898. Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap, deciduous dry forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 female, CASENT 3010104; 1 male, CASENT 3010108.

L. sexnotata: **MADAGASCAR: Toliara Province:** Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 male, CASENT 3009500. Fiherenana, 23°10.619'S 43°57.685'E, Malaise trap, in small undisturbed riparian forest valley, 18–22 August 2003, Frontier Wilderness Project, collection code: MGF078, 1 female, CASENT 3009254; 1 female, CASENT 3009253. Parc National d'Andohahela, Tsimelaha, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 28 March–8 April 2003, M. Irwin, F. Parker, R. Harin'Hala, collection code: MA-02-20-20, 1 female, CASENT 2070516; 1 female, CASENT 2070504. **Antsiranana Province:** Forêt d'Ampondrabe, elev. 175 m, 26.3 km 10° NNE Daraina; 12°58'12"S 49°42'00"E, Malaise trap—tropical dry forest, 10 December 2003, B.L. Fisher, collection code: BLF9976, 1 male, CASENT 3010258. **Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1100 m, 21°13.57'S 47°22.19'E, Malaise trap, in high altitude rainforest, 12–19 March 2002, R. Harin'Hala, collection code: MA-02-09A-20, 1 female, CASENT 30010568; 16 October–8 November 2001, collection code: MA-02-09A-01, 1 male, CASENT 3010416; 1 male, CASENT 3010422; 19–26 February 2002, collection code: MA-02-09A-17, 1 female, CASENT 3010459 (MNRJ). JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev. 690 m, 15–21 December 2001, R. Harin'Hala, collection code: MA-02-09D-07, 1 female, CASENT 3010496 (MNRJ).

DESCRIPTIONS OF NEW SPECIES OF *LISPE*

Lispe argentata Couri, Pont, and Penny, sp. nov.

TYPE.—**HOLOTYPE:** male, deposited in CAS, labelled: **MADAGASCAR: Toliara Province:** Ifaty, near Hotel Paradisia, in coastal dunes, elev. 9 m, 23°10.78'S 43°37.01'E, Malaise trap, vegetation in sand area, 13 October–12 November 2001, R. Harin'Hala, collection code: MA-02-16-01, 1 male, CASENT 3009995.

DIAGNOSIS.— The intense silver pollinosity on the head and at the tip of the palpus makes it easy to recognise this species. Males can also be distinguished by the enlarged first hind tarsomere with differentiated ventral setae that form a dense tuft.

GENERAL COLOR.— Ground-colour brown with grey pollinosity. Head with frons, fronto-orbital plate, face, parafacial, gena and antenna with an intense silver pollinosity. Arista brown. Palpus yellow, strongly silver pollinose at apex. Anterior spiracle pale yellow. Mesonotum dark brown with some grey pollinosity presuturally. Sides of mesonotum and pleura grey pollinose. Calypters white; haltere yellow. Wing clear. Legs brown with grey pollinosity, femoro-tibial joints yellow. Abdominal tergites 3 and 4 with triangular brown lateral paired marks on apical half, touching posterior margins.

MALE.— Length. Body: 6.8 mm, wing: 6.4 mm.

HEAD.— Dichoptic; interocular space about one-third of head-width at level of anterior ocellus. Frontal row with 5 pairs of long setae. Ocellar triangle long, reaching lunula; ocellar setae long. Antenna inserted at mid level of eye; flagellomere short, about 1.5 times as long as length of pedicel. Arista with short hairs. Gena high and wide. Palpus strongly spatulate at apex.

THORAX.— Acrostichals 0+1; dorsocentrals 2+3; 2 postpronotals; 1 presutural; 1 prealar; 2 intra-alars; 2 supra-alars; 2 postsupra-alars. Notopleuron with two setae. Postalar declivity and suprasquamal ridge bare. Scutellum with two pairs of long setae. Anepisternum with a series of 5 long setae. Katepisternals 1+2. Anepimeron setulose. Posterior spiracle with margins bare. Lower calypter enlarged, about 2.4 times as long as upper. Wing veins bare. Fore femur with a complete row of posterodorsal setae and a row of fine anteroventral setae; posteroventral, ventral and anteroventral surfaces with 4–5 irregular series of short setae; fore tibia with a long dorsal seta at

apical fourth; anterodorsal and posterodorsal surfaces with a preapical seta; mid femur with one supramedian anterior seta; a row of fine and spaced anteroventral setae on basal half; anteroventral and posteroventral surfaces with a row of short and stiff setae; posterodorsal surface with two preapical setae on apical fourth; mid tibia with 2 strong anterodorsals on apical third; one long posterodorsal median; one dorsal preapical and strong apical setae on anteroventral and posteroventral surfaces; hind femur with a complete anterodorsal row of setae; 3 anteroventrals on apical half; hind tibia with 1 submedian anteroventral and one dorsal preapical; first hind tarsomere enlarged, with a median ventral tuft of strong setae.

ABDOMEN.— Tergite 5 with one basal and one apical row of strong setae, close to their respective margins. Sternite 5 as in Fig. 102.

TERMINALIA.— Cercal plate, surstyli and aedeagus as in Figs. 103 and 104.

FEMALE.— Length. Body: 7.0 mm, wing: 6.8 mm.

Differs from male as follows.— Fore femur broken; first hind tarsomere not enlarged and without differentiated setae.

OVIPOSITOR.— Ovipositor as in Fig. 105.

ETYMOLOGY.— The name comes from the Latin word *argentum*, meaning silver, and refers to the silvery pollinosity of the outer apical surface of the palpus.

DISCUSSION.— *L. argentata*, sp. nov. runs in the key to *L. frontalis*, as both species have a very short antenna and a silvery pollinose head, but the new species has the outer apical surface of the palpus strongly silvery pollinose; fore tibia with a long dorsal seta at apical fourth (and not at middle as in *L. frontalis*); the male has a tuft of differentiated setae on first hind tarsomere and abdominal tergites 3 and 4 with triangular brown lateral paired marks on apical half, touching their posterior margins.

OTHER MATERIAL EXAMINED.— Paratype, labelled: same data as holotype: 1 female, CASENT 3009996.

Lispocephala Pokorny, 1893

DIAGNOSIS.— Two pairs of reclinate orbital setae; arista with more or less short hairs, bare on ventral surface in some males; prestomal teeth developed; dorsocentrals 2+3, the anterior presutural sometimes reduced; prealar seta absent; katapisternals 1:1:1; scutellum with basal and apical pair of setae developed; fore tibia without a median posterior seta; hind tibia with at least one seta on posterodorsal surface.

The few known larvae are aquatic. Adults are predaceous.

AFROTROPICAL FAUNA.— Six species of *Lispocephala* have been recorded from the Afrotropical region. Emden (1940, under *Lispocephala* and *Pectiniseta* Stein) gave a key for their separation. The species are: *L. africana* Malloch, 1935, *L. equisetata* (Snyder, 1953), *L. mikii* (Strobl, 1893), *L. obscura* (Emden, 1940), *L. pectinata* (Stein, 1900) and *L. squamifera* Stein, 1913.

MADAGASCAN FAUNA.— Only *L. mikii* (Strobl) has been recorded from Madagascar. The species is widespread from east to southern Africa and has also been recorded from Nigeria, D.R. Congo, and the Palaearctic region. It has not been found in the CAS material, but is represented in NMSA collection. *L. pectinata* (Stein) is a new record from Madagascar, and was represented only by one specimen.

Key to the Madagascar species of *Lispocephala*

1. Legs uniformly yellow; tergite 1+2 and sometimes also tergite 3 translucent yellowish laterally and ventrally; tergites 3 and 4 each with a pair of small and oval spots; arista short-plumose; male

terminalia not shining black (Madagascar, east to southern Africa, Nigeria, Zaire, and Palaearctic region) *L. mikii* (Strobl)
Coxae and femora mostly dark brown; abdomen with a median brown vitta and round lateral brown spots on tergites 1+2 to 4, more distinct in posterior view; arista pectinate in male, long plumose in female; some parts of the male terminalia shining black. (Tanzania, Socotra, Madagascar, Oriental and Australasian regions eastwards to Samoa) *L. pectinata* (Stein)

MATERIAL EXAMINED: KNOWN SPECIES

L. mikii: **MADAGASCAR: Antananarivo Province:** Antananarivo [Tananarive], Tsimbazaza, on rice, February 1949, 1 female, R.Paulian (NMSA). Sabotsy, 10 km north of Antananarivo [Tananarive], 8 January 1948, R.Paulian, 1 female, R.Paulian (NMSA). **Fianarantsoa Province:** Vakoana, Andringitra Ambalavao, 1520 m, 21–24 January 1958, 1 female, B.R. Stuckenberg (NMSA). Plateau Soaindrana, Andringitra Ambalavao, 2060 m, 14–17 January 1958, 1 female, B.R. Stuckenberg (NMSA).

L. pectinata: **MADAGASCAR: Toliara Province:** Parc National d'Andohahela, Tsimelaha, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 28 January–12 February 2004, M. Irwin, F. Parker, R. Harin'Hala, collection code: MA-02-20-53, 1 male, CASENT 8078053.

***Morellia* Robineau Desvoidy, 1830**

DIAGNOSIS.— Vein M strongly curved forwards towards vein R₄₊₅ before apex; suprasquamal ridge bare; anepimeron setulose; katapisternals 1+2; mid tibia without a posteroventral seta. Afrotropical species with mesonotum bluish-black to black, rarely metallic (in some other regions, green metallic *Morellia* are commonly found). [REF. Zielke 1971].

The larvae breed in the dung of ungulates, especially cattle, and are strictly coprophagous.

AFROTROPICAL FAUNA.— Fifteen species have been recorded from the Afrotropical Region.

MADAGASCAN FAUNA.— Two species have been recorded from Madagascar: *M. calyprata* Stein, 1913, which is widespread in east to southern Africa and is also known from Fernando Poó and Principe islands, and *M. nilotica* (Loew, 1856), which is widespread in the Afrotropical region and the Middle East. Only two females of *M. calyprata* were found in our material. Both species lack presutural dorsocentral setae

Key to the Madagascar Species of *Morellia*

1. Cell dm completely covered with microtrichia; thorax, legs and abdomen dark brown; scutum with greyish pollinosity along a median vitta and laterally on postpronotum and notopleuron; 4 postsutural dorsocentrals (widespread in east to southern Africa, Fernando Poó and Principe islands, Madagascar) *M. calyprata* Stein
Cell dm devoid of microtrichia in at least basal part; general colour glossy dark blue, with white dusted dorsal vittae; 2–3 postsutural dorsocentrals, the third very weak (widespread throughout the Afrotropical region including Fernando Poó, São Tomé and Madagascar, North Africa and Middle East) *M. nilotica* (Loew)

MATERIAL EXAMINED: KNOWN SPECIES

M. calyprata: **MADAGASCAR: Toliara Province:** Parc National d'Andohahela, Tsimelaha, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 28 January–12 February 2004, M. Irwin, F. Parker, R. Harin'Hala, collection code: MA-02-20-53, 1 female, CASENT 8078068; 1 female, CASENT 8078066.

***Musca* Linnaeus, 1758**

DIAGNOSIS.— Males holoptic; eyes bare; arista enlarged on basal fourth, long-plumose; presutural acrostichals not developed; dorsocentrals 2+4; katapisternals 1+2; anepimeron setulose; prosternum setulose; lower calypter broad, truncate posteriorly, extending under base of scutellum; mid tibia without ventral seta; vein M with an angular forward bend towards vein R₄₊₅ in apical part. (Carvalho and Couri 2002). [REF. Emden 1939, Zielke 1971].

Most larvae live in dung and are coprophagous, but a few live in a much wider range of substrates. *M. domestica* is omnivorous and breeds in any substrate where there is a high rate of fermentation.

AFROTROPICAL FAUNA.— The genus *Musca* is represented in the Afrotropical region by 39 species which are assigned to 6 subgenera as follows (Pont 1980): *Byomya* Robineau-Desvoidy (21 species), *Eumusca* Townsend (10 species), *Lissosterna* Bezzi (1 species), *Musca* Linnaeus (1 species), *Philaematomyia* Austen (1 species) and *Viviparomusca* Townsend (5 species).

MADAGASCAN FAUNA.— Three subgenera and 4 species have been recorded from Madagascar: *M. (Byomya) confiscata* Speiser, 1924, *M. (Byomya) sorbens* Wiedemann, 1830, *M. (Eumusca) xanthomelaena* Wiedemann, 1824 and *M. (Musca) domestica* Linnaeus, 1758. All of them are present in our material. The subspecies of *M. domestica* (*M. d. domestica* s.str., *M. d. calleva* Walker, *M. d. curviforceps* Saccà & Rivosecchi) have not been distinguished in our material, nor have the individual species within the *M. sorbens* complex (*M. sorbens*, *M. biseta* Hough, *M. vetustissima* Walker).

Key to the Madagascar Species of *Musca*

1. Proepisternal depression setulose (cosmopolitan; widespread in the Afrotropical region, including Aldabra, Astove, Madagascar, Seychelles, Socotra.) *M. domestica* Linnaeus, s.lat.
Proepisternal depression bare 2
2. Anterior spiracle dark brown (widespread east to southern Africa, Ghana, Cape Verde Is., Comoro Is., Madagascar, Aldabra, Mauritius, Réunion, Rodriguez, Seychelles, Socotra, South Yemen, Egypt, Oriental region to Philippines and Ryukyu Is.) *M. confiscata* Speiser
Anterior spiracle yellow 3
3. Mesonotum with four postsutural brown vittae; meron without hairs; sternite 1 setulose; abdominal ground-colour orange and brown in both sexes (widespread east to southern Africa, Zaire, Cape Verde Is., Comoro Is., Madagascar, Mauritius, Réunion, Rodriguez, Oriental region to China and Java). *M. xanthomelaena* Wiedemann
Mesonotum with two postsutural brown vittae; meron haired below spiracle; sternite 1 bare; abdominal ground-colour brown with greyish pollinosity in female and brown and yellow in male (widespread Afrotropical region, Aldabra, Astove, Coetivy, Cosmoledo, Madagascar, Mauritius, Réunion, Seychelles, Socotra; southern Palaearctic and Oriental regions)
. *M. sorbens* Wiedemann s.lat.

MATERIAL EXAMINED: KNOWN SPECIES

M. confiscata: **MADAGASCAR: Toliara Province:** Sept Lacs, elev. 120 m, 23°31'65"S 44°9'35"E, Malaise trap, gallery forest, 21–26 August 2002, Frontier Wilderness Project, collection code: MGF038, 1 female, CASENT 3009198; elev. 130 m, 23°31'65"S 44°9'35"E, Malaise trap, gallery forest trees and mixed scrub on hilltop, 21–26 August 2002, Frontier Wilderness Project, collection code: MGF039, 1 female, CASENT 3009197. Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 female, CASENT 3009505. Ifaty, near Hotel Paradisia, in coastal dunes, elev. 9 m, 23°10.78'S 43°37.01'E, Malaise trap, vegetation in sand area, 13

October–12 November 2001, R. Harin'Hala, collection code: MA-02-16-01, 1 female, CASENT 3009997. Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap, deciduous dry forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 female, CASENT 3010070; 1 female, CASENT 3010071 (MNRJ); 1 female, CASENT 3010073; 1 male, CASENT 3010074; 1 female, CASENT 3010077; 1 female, CASENT 3010084; 1 male, CASENT 3010078; 1 female, CASENT 3010079, 1 female, CASENT 3010069; 21 September–2 October 2003, collection code: MA-02-18A-69, 1 male, CASENT 3010813; 1 male, CASENT 3010809; 1 male, CASENT 3010806; 1 female, CASENT 3010797; 1 female, CASENT 3010800; 1 female, CASENT 301079794; 1 female, CASENT 3010801; 1 female, CASENT 3010803; 1 female, CASENT 3010804; 1 female, CASENT 3010805; 1 female, CASENT 3010807; 1 female, CASENT 3010808; 1 female, CASENT 3010810; 1 female, CASENT 3010811; 1 female, CASENT 3010795; 1 female, CASENT 3010796; 6–16 December 2001, collection code: MA-02-18A-05, 1 male, CASENT 3010819; 1 male, CASENT 3010820; 1 male, CASENT 3010821; 1 male, CASENT 3010822; 1 male, CASENT 3010823; 1 male, CASENT 3010825, 21–31 August 2003, collection code: MA-02-18A-66, 1 female, CASENT 3010294; 27 December–6 January 2002, collection code: MA-02-18A-08, 1 male, CASENT 3010275; 1 female, CASENT 3010276; 1 female, CASENT 3010277; 1 female, CASENT 3010278; 1 female, CASENT 3010279; 1 female, CASENT 3010283; 1 female, CASENT 3010282; 27 April–5 May 2003, collection code: MA-02-18A-53, 1 male, CASENT 3010289; 1 female, CASENT 3010286; 1 female, CASENT 3010290; 1 female, CASENT 3010291; 1 female, CASENT 3010292; 29 May–8 June 2002, collection code: MA-02-18A-24, 1 male, CASENT 3010755; 1 female, CASENT 3010754; 1 female, CASENT 3010756; 1 female, CASENT 3010757; 1 female, CASENT 3010758; 1 female, CASENT 3010759; 1 female, CASENT 3010760; 4–14 December 2003, collection code: MA-02-18A-76, 1 female, CASENT 3010504; 1 female, CASENT 3010507; 1 female, CASENT 3010508, 1 male, CASENT 3010510; 9–10 May 2003, collection code: MA-02-18A-55; 1 male, CASENT 3010763; 1 female, CASENT 3010764; 1 female, CASENT 3010765; 1 female, CASENT 3010766; 1 female, CASENT 3010767; 1 female, CASENT 3010768; 1 female, CASENT 3010769; 28 January–8 February 2002, collection code: MA-02-18A-12, 1 male, CASENT 3010772; 1 female, CASENT 3010776; 1 female, CASENT 3010771; 1 female, CASENT 3010773; 1 female, CASENT 3010774; 1 female, CASENT 3010775. 22 km north of Toliara, 30 m, 23°11'S 43°37'E, 18 April 1998, Malaise trap on beach dunes, M.E. Irwin and E.I. Schlinger, Schlinger Foundation Madagascar Expedition, collection code: 98-MAD-16, 1 female, CASENT 8021288. Parc National d'Andohahela, Tsimelaha, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 30 October–9 November 2003, M. Irwin, F. Parker, R. Harin'Hala, collection code: MA-02-20-44, 1 male, CASENT 3010962 (MNRJ); 19–26 November 2002, collection code: MA-02-20-05, 1 male, CASENT 3010741; 16–17 December 2002, collection code: MA-02-20-09, 1 female, CASENT 3010888; 6–18 March 2004, collection code: MA-02-20-56, 1 female, CASENT 8078016; 28 January–12 February 2004, collection code: MA-02-20-53, 1 female, CASENT 8078067; 15–28 January 2004, collection code: MA-02-20-52, 1 female, CASENT 8078042. **Mahajanga Province:** Parc National d'Ampijoroa, 160 km N of Maevatanana on RN 04, elev. 43 m, 16°19.16'S 46°48.80'E, Malaise trap, in deciduous forest, 19–26 October 2003, R. Harin'Hala, collection code: MA-25-20, 1 female, CASENT 3010366; 1 female, CASENT 3010365; 1 female, CASENT 3010364; 1 female, CASENT 3010363; 1 female, CASENT 3010353; 1 female, CASENT 3010384; 1 female, CASENT 3010358; 1 female, CASENT 3010357; 1 female, CASENT 3010385; 1 female, CASENT 3010370; 1 female, CASENT 3010368; 1 female, CASENT 3010362; 1 female, CASENT 3010356; 1 male, CASENT 3010369; 1 male, CASENT 3010374; 1 male, CASENT 3010379; 1 male, CASENT 3010375; 1 male, CASENT 3010355. 14–22 September 2003, collection code: MA-25-15, 1 female, CASENT 3010728; 1 female, CASENT 3010735; 1 female, CASENT 3010729; 1 female, CASENT 3010731; 1 female, CASENT 3010730; 5–12 October 2003, collection code: MA-25-16, 1 female, CASENT 3010322; 9–20 November 2003, collection code: MA-25-23, 1 male, CASENT 2070622; 1 female, CASENT 2070623; 1 female, CASENT 2070624; 9–20 November 2003, collection code: MA-25-23, 1 male, CASENT 3010788; 1 male, CASENT 3010789; 1 female, CASENT 3010780; 1 female, CASENT 3010781; 1 female, CASENT 3010778; 1 female, CASENT 3010785; 1 female, CASENT 3010784; 1 female, CASENT 3010783; 1 female, CASENT 3010786; 28 September–5 October 2003, collection code: MA-25-17, 1 male, CASENT 2070640; 1 male, CASENT 2070641.

M. domestica s. lat.: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Belle Vue at

Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 28 April–5 May 2002, R. Harin'Hala, collection code: MA-02-09C-27, 1 male, CASENT 3008948. **Antsiranana Province:** Parc National Montagne d'Ambre, elev. 960 m, 12°30'52"S 49°10'53"E, Malaise trap, 11–12 February 2001, Harin'Hala, collection code: MA-01-01A-06, 1 female, CASENT 3008949. Forêt de Binara, elev. 375 m, 7.5 km 230° SW Daraina, 13°15'18"S 49°37'00"E, pitfall trap—tropical dry forest, 1 December 2003, B.L. Fisher, collection code: BLF9558, 1 female, CASENT 3008916. **Toliara Province:** Mahafaly Plateau, 6.2 km, 74° ENE Itampolo, 24° 39'13"S 43°59'48"E, elev. 80 m, pitfall trap—in spiny forest thicket, 21–25 February 2002, Fisher, Griswold *et al.*, collection code: BLF5763, 1 female, CASENT 3008961. **Mahajanga Province:** Parc National d'Ampijoroa, 160 km N of Maevatanana on RN 04, elev. 43 m, 16°19.16'S 46°48.80'E, Malaise trap, in deciduous forest, 9–20 November 2003, R. Harin'Hala, collection code: MA-25-23, 1 female, CASENT 3010790.

M. sorbens s. lat.: **MADAGASCAR: Toliara Province:** Forêt Classée d'Analavelona, 29.2 km 343° NNW Mahaboboka, elev. 1100 m, 22°40'30"S 44°11'24"E, pitfall trap, in montane rainforest, 18–22 February 2003, Fisher, Griswold *et al.*, collection code: BLF7817, 1 female, CASENT 3009178. Manderano, elev. 70 m, 23°31'39"S 44°5'18"E, Malaise trap, edge of marsh, 5 m from road, gallery forest, 23 June–28 July 2002, Frontier Wilderness Project, collection code: MGF035, 1 female CASENT 3009332; 1 male, CASENT 3009326. 22 km north of Toliara, 30 m, 23°11'S 43°37'E, 18 April 1998, Malaise trap on beach dunes, M.E. Irwin and E.I. Schlinger, Schlinger Foundation Madagascar Expedition, collection code: 98-MAD-16, 1 male, CASENT 3010370; 1 female, CASENT 8021267; 1 male, CASENT 8021280; 1 female, CASENT 3010271. 16 km east Sakaraha, Zombitse Nature Reserve, 825 m, 20 April 1998, Malaise trap in tropical forest on sand, M.E. Irwin and E.I. Schlinger, Schlinger Foundation Madagascar Expedition, collection code: 98-MAD-15, 1 male, CASENT 3010272. Ifaty, 18 km N of Toliara, in spiny forest, elev. 20 m, 23.1885°S 43.6239°E, 13 December 1999, M.E. Irwin and E.I. Schlinger, collection code: MEI.99-MA-15, 1 female, CASENT 8018399; 1 female, CASENT 8018405. Parc National d'Andohahela, Tsimelaha, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 11–19 October 2003, M. Irwin, F. Parker, R. Harin'Hala, collection code: MA-02-20-42, 1 female, CASENT 3010832 (MNRJ); 8–18 March 2003, collection code: MA-02-20-18, 1 female, CASENT 3010938; 19–26 November 2002, collection code: MA-02-20-05, 1 female, CASENT 3010744; 1 female, CASENT 3010745. 8–18 March 2003, collection code: MA-02-20-18, 1 female, CASENT 3010917; 28 March–8 April 2003, collection code: MA-02-20-20, 1 female, CASENT 2070520; 1 female, CASENT 3010999; 9–16 December 2002, collection code: MA-02-20-08, 1 female, CASENT 3010441; 1 female, CASENT 3010893; 29 June–10 July 2003, collection code: MA-02-20-31, 1 female, CASENT 2070595. **Antsiranana Province:** Forêt de Bekaraoka, elev. 150 m, 6.8 km 60° NE Daraina; 13°10'00"S 49°42'36"E, Malaise trap—tropical dry forest, 10 December 2003, B.L. Fisher, collection code: BLF9976, 1 female, CASENT 3009055; 1 female, CASENT 3009054; 1 female, CASENT 3009057; 1 male, CASENT 3009056; 1 female, CASENT 3009053; 7 December 2003, collection code: BLF9874, 1 female, CASENT 3008929; 1 female, CASENT 3008928; 1 female, CASENT 3010255; 1 male, CASENT 3010256; 1 female, CASENT 3010253; 1 female, CASENT 3010254; 1 female, CASENT 3010250; 1 female, CASENT 3010257; 1 male, CASENT 3010251. **Fianarantsoa Province:** Parc National d'Isalo, Ambovo Springs, 29.3 km, 4° N Ranohira, elev. 990 m, 22°17'54"S 45°21'06"E, pitfall trap in Uapaca woodland, 9–14 February 2003, Fisher, Griswold *et al.*, collection code: BLF7649, 1 female, CASENT 3009116. **Mahajanga Province:** Parc National d'Ampijoroa, 160 km N of Maevatanana on RN 04, elev. 43 m, 16°19.16'S 46°48.80'E, Malaise trap, in deciduous forest, 9–20 November 2003, R. Harin'Hala, collection code: MA-25-23, 1 female, CASENT 2070625; 1 female, CASENT 2070626; 1 female, CASENT 2070633; 5–12 October 2003, collection code: MA-25-18, 1 female, CASENT 3010332; 1 female, CASENT 3010323; 5–12 October 2003, collection code: MA-25-18, 1 female, CASENT 3010333; 24–31 August 2003, collection code: MA-25-12, 1 female, CASENT 3010707.

M. xanthomelaena: **MADAGASCAR: Toliara Province:** Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap, deciduous dry forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 male, CASENT 3010093; 1 female, CASENT 3010090; 1 female, CASENT 3010087; 1 female, CASENT 3010094; 21 September–2 October 2003, collection code: MA-02-18A-69, 1 female, CASENT 3010814; 1 female, CASENT 3010815; 27 April–5 May 2003, collection code: MA-02-18A-53, 1 female, CASENT 3010288; 6–16 December 2001, collection code: MA-02-18A-05, 1 female,

CASENT 3010826; 21–31 August 2003, collection code: MA-02-18A-66, 1 female, CASENT 3010298; 4–14 December, collection code: MA-02-18A-76, 1 female, CASENT 3010503. 22 km north of Toliara, 30 m, 23°11'S 43°37'E, 18 April 1998, Malaise trap on beach dunes, M.E. Irwin and E.I. Schlinger, Schlinger Foundation Madagascar Expedition, collection code: 98-MAD-16, 1 female, CASENT 8021268. Parc National d'Andohahela, Tsimelahy, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 6–16 December 2002, M. Irwin, F. Parker, R. Harin Hala, collection code: MA-02-20-08, 1 male, CASENT 3010443; 1 male, CASENT 3010429; 1 male, CASENT 3010444; 1 male, CASENT 3010442; 1 male, CASENT 3010440; 1 female, CASENT 3010445; 1 female, CASENT 3010447; 30 October–9 November 2003, collection code: MA-02-20-44, 1 female, CASENT 3010971; 28 March–8 April 2003, collection code: MA-02-20-20, 1 male, CASENT 2070506; 1 male, CASENT 2070551; 1 male, CASENT 2070552; 1 male, CASENT 2070502; 1 male, CASENT 2070503; 1 male, CASENT 2070518; 1 female, CASENT 3010997; 1 female, CASENT 3010998; 1 female, CASENT 2070500; 1 female, CASENT 2070524; 1 female, CASENT 2070521; 1 female, CASENT 2070517; 1 female, CASENT 2070514; 1 female, CASENT 2070507; 1 female, CASENT 2070511; 1 female, CASENT 2070532; 1 female, CASENT 2070531; 1 female, CASENT 2070554; 1 female, CASENT 2070550; 1 female, CASENT 2070548; 1 male, CASENT 3010746; 1 male, CASENT 2070515; 1 male, CASENT 3010740; 1 female, CASENT 2070527; 1 male, CASENT 2070510, 8–18 March 2003, collection code: MA-02-20-18; 1 male, CASENT 3010899; 1 male, CASENT 3010909; 1 male, CASENT 3010921; 1 male, CASENT 3010924; 1 male, CASENT 3010936; 1 male, CASENT 3010949; 1 male, CASENT 3010948; 1 female, CASENT 3010897; 1 female, CASENT 3010901; 1 female, CASENT 3010941; 1 female, CASENT 3010940 (MNRJ); 1 female, CASENT 3010943; 1 female, CASENT 3010944; 1 female, CASENT 3010947; 1 female, CASENT 3010928; 1 female, CASENT 3010905; 1 female, CASENT 3010911; 1 female, CASENT 3010913; 1 female, CASENT 3010933; 1 female, CASENT 2070560; 16–17 December 2002, collection code: MA-02-20-09, 1 female, CASENT 3010897, 1 male, CASENT 3010896; 1 male, CASENT 3010894; 1 female, CASENT 3010892; 1 female, CASENT 3010889; 29 June–10 July 2003, collection code: MA-02-20-31, 1 female, CASENT 2070577; 1 female, CASENT 2070616 (MNRJ); 11–19 October 2003, collection code: MA-02-20-42, 1 female, CASENT 3010838; 1 female, CASENT 3010841; 1 female, CASENT 3010830; 1 female, CASENT 3010837; 1 female, CASENT 3010840; 1 female, CASENT 3010839; 17–24 August 2003, collection code: MA-02-20-36, 1 female, CASENT 3010564; 19–26 November 2002, collection code: MA-02-20-05, 1 female, CASENT 3010742; 28 January–12 February 2004, collection code: MA-02-20-53, 1 female, CASENT 8078186; 1 female, CASENT 8078187; 6–18 March 2004, collection code: MA-02-20-56, 1 female, CASENT 8078009. Lake Ranobe, 23°02.468'S 43°36.607'E, Malaise trap, spiny forest / tamarind forest near lake edge, 25–21 April 2003, Frontier Wilderness Project, collection code: MGF066, 1 female, CASENT 3009283; 1 female, CASENT 3009281. Sept Lacs, elev. 70 m, 23°31'39"S 44°9'16"E, Malaise trap, gallery forest, 7–9 March 2002, Frontier Wilderness Project, collection code: MGF024, 1 male, CASENT 3008902; 1 female, CASENT 3008903; 1 female, CASENT 3008901. Antafoky, elev. 55 m, 23°28'43"S 44°3'51"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF003, 1 female, CASENT 3009712. **Mahajanga Province:** Parc National d'Ampijoroa, 160 km N of Maevatanana on RN 04, elev. 43 m, 16°19.16'S 46°48.80'E, Malaise trap, in deciduous forest, 9–20 November 2003, R. Harin'Hala, collection code: MA-25-23, 1 female, CASENT 2070632; 1 female, CASENT 3010777; 1 female, CASENT 3010789; 19–26 October 2003, collection code: MA-25-18, 1 female, CASENT 3010388; 1 male, CASENT 3010842 (MNRJ); 28 September–5 October 2003, collection code: MA-25-17, 1 female, CASENT 2070635 (MNRJ).

Myospila Rondani, 1856

DIAGNOSIS.— Male holoptic; female with a pair of interfrontal setae; arista thickened in basal third, plumose; intra-alars 2; dorsocentrals 2+4; prealar present but weak; postalar wall; suprasquamal ridge, prosternum, anepimeron and meron bare; katapisternals 1+2 or 2+2; posterior spiracle bare on margins; vein M curved forward towards vein R₄₊₅ before apex; vein R₄₊₅ with a few setulae at base on both surfaces; hind tibia without calcar; sternite 1 bare.

The larvae are obligate carnivores and live in mammal dung, rotting fruit and the diseased parts of plants.

AFROTROPICAL FAUNA.— Eight species are recorded from the Afrotropical Region.

MADAGASCAN FAUNA.— Three *Myospila* species have been recorded from Madagascar: *M. bekilyana* (Séguy, 1938), *M. paradoxalis* (Stein in Becker, 1903) and *M. lenticeps* (Thomson, 1869), the first two of which were found in the CAS material and the last one is represented in NMSA and BMNH collections.

Key to the Madagascar Species of *Myospila*

1. Face long; antennal flagellomere very long, more than four times as long as pedicel and reaching epistoma; facial ridges setulose (Fig. 106) (Egypt, Ghana, Madagascar, Nigeria, South Africa) *M. paradoxalis* (Stein in Becker)
Face not long; antennal flagellomere not more than 3 times as long as pedicel and not reaching epistoma; facial ridges not setulose 2
2. Postpronotum reddish, contrasting with the rest of the mesonotum; abdomen with weak lateral spots; femora yellow (Madagascar) *M. bekilyana* (Séguy)
Postpronotum concolorous with the mesonotum; abdomen with conspicuous dark spots on tergites 3–5; femora dark except at tips (widespread west to east Africa, Principe I., Madagascar, Oriental region) *M. lenticeps* (Thomson)

MATERIAL EXAMINED: KNOWN SPECIES

M. bekilyana: **MADAGASCAR: Toliara Province:** Antafoky, elev. 60 m, 23°29'17"S 44°4'37"E, Malaise trap, gallery forest, 8–10 February 2002, Frontier Wilderness Project, collection code: MGF005, 1 female, CASENT 3009188. Manderano, elev. 70 m, 23°31'38"S 44°5'15"E, Malaise trap, gallery forest at edge of marsh near road, 22–29 May 2002, Frontier Wilderness Project, collection code: MGF031, 1 female, CASENT 3009018 (MNRJ). **Toamasina Province:** Montagne d'Anjanaharibe, 19.5 km 27° NNE Ambinanitelo, elev. 1100 m, 15°10'42"S 49°38'06"E, yellow pan trap in montane rainforest, 12–16 March 2003, B.L. Fisher, C.E. Griswold *et al.*, collection code: BLF8153, 1 female, CASENT 3009193; 1 female, CASENT 3009194. **Fianarantsoa Province:** Parc National Ranomafana, Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 28 January–4 February 2002, R. Harin'Hala, collection code: MA-02-09C-14, 1 male, CASENT 3010476 (MNRJ). Ranohira, 860 m. 26 January–4 February 1958, 5 males 1 female, B.R. Stuckenberg (NMSA, BMNH). **Antsiranana Province:** Parc National de Marojejy, Manantenina River, 28.0 km 38° NE Andapa, 8.2 km 333° NNW Manantenina, elev. 450 m, 14°26'12"S 49°46'30"E, Malaise trap—rain forest, 12–15 November 2003, B.L. Fisher *et al.*, collection code: BLF8723, 1 male, CASENT 3010129. dct [District of] Ambilobe, Anaboromo, reared from larva in ripe fruit of *Dimaka*, emerged 28 July 1951, 1 male, 1 female, R. Paulian (NMSA). Sambirano, Lokobe, Nossi-bé, 6 m, 9–23 November 1957, 1 male 7 females, B.R. Stuckenberg (NMSA, BMNH). Nossi Bé, Héllville, January 1952, 2 males, N.L.H.Krauss (BMNH). **Antananarivo Province:** Antananarivo [Tananarive], December 1955, 1 male, B.R. Stuckenberg (NMSA). Antananarivo [Tananarive], larvae in ripe fruits of *Dimaka anaborans*, emerged 20 June 1951, 1 male 4 females, R. Paulian (NMSA). Tsimbazaza, Laboratoire de Parasitologie, 19 April 1950, 1 female (NMSA). **Toamasina Province:** dct [District of] Mananara, Ivontaka, 15 m, 10–14 March 1958, 2 males 4 females, B.R. Stuckenberg (NMSA, BMNH). dct [District of] Maroantsetra, Sahaso Fampanambo, 80 m, 26–29 March 1958, 2 males, B.R. Stuckenberg (NMSA, BMNH). dct [District of] Maroantsetra, Navana-Antongil, 6 m, 20–25 March 1958, 1 male, B.R. Stuckenberg (NMSA). Montagne d'Anjanaharibe, 19.5 km 27° NNE Ambinanitelo, elev. 1100 m, 15°10'42"S 49°38'06"E, yellow pan trap in montane rainforest, 12–16 March 2003, B.L. Fisher, Griswold *et al.*, collection code: BLF8153, 1 female, CASENT 3009193; 1 female, CASENT 3009194.

M. lenticeps: **MADAGASCAR: Antsiranana Province:** 10 km E of Ambilobe, January 1952, 1 male, N.H.L.Krauss (BMNH). **Mahajanga Province:** Ankarafantsika Forest, Tsaramandrosa, January 1956, 1 male, B.R. Stuckenberg (NMSA). **Toamasina Province:** Antanamba, 8 m, 1 April 1958, 1 male, B.R. Stuckenberg (NMSA).

M. paradoxalis: **MADAGASCAR: Toliara Province:** Sept Lacs, elev. 120 m, 23°31'65"S 44°9'35"E, Malaise trap, gallery forest, 21–26 August 2002, Frontier Wilderness Project, collection code: MGF038, 1 male, CASENT 3009233. Lake Ranobe, elev. 30 m, 23°02.468'S 43°36.607'E, Malaise trap, spiny forest / tamarind forest near lake edge, 25–31 April 2003, Frontier Wilderness Project, collection code: MGF066, 1 female, CASENT 3009282. Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap, deciduous dry forest, 4–14 December, R. Harin'Hala, collection code: MA-02-18A-76, 1 female, CASENT 3010506; 29 May–8 June 2002, collection code: MA-02-18A-24, 1 female, CASENT 3010761. Ifaty, near Hotel Paradisia, in coastal dunes, elev. 9 m, 23°10.78'S 43°37.01'E, Malaise trap, vegetation in sand area, 26 May–5 June 2002, R. Harin'Hala, collection code: MA-02-16-28, 1 female, CASENT 3009798 (MNRJ).

Neomyia Walker, 1859

DIAGNOSIS.—Metallic green to blue or violet flies; suprasquamal ridge setulose (Fig. 2); postalar wall with a fine pile of setulae on posterior half; prosternum setulose; greater ampulla with setulae; lower calypter truncate, of the *Musca*-type; anepimeron setulose, katepisternals usually 1+3; vein M strongly curved forward towards vein R₄₊₅ before apex; subcostal sclerite with short setulae; aedeagus with strong spinules. [REF. Emden 1939, Zielke, 1971]

The larvae live almost exclusively in bovine dung, and are strictly coprophagous.

AFROTROPICAL FAUNA.—Forty three species are known from the Afrotropical region.

MADAGASCAN FAUNA.—Three species have been recorded from Madagascar: *N. albigena* (Stein, 1913), *N. setulosa* (Zielke, 1972) and *N. viridifrons* (Macquart, 1843). *N. setulosa* is endemic to Madagascar. The first two were found in our material.

Key to the Madagascar Species of *Neomyia*

1. Wing membrane uniformly covered with microtrichiae; last abdominal segment undusted, shining green, concolorous with the other abdominal tergites; body length about 8 mm (Madagascar) *N. setulosa* (Zielke)
Wing membrane with at least the basal part of discal cell without microtrichiae; last abdominal segment dusted or not; body length about 6–8 mm 2
2. Two pairs of strong presutural dorsocentral setae; tergite 5 not dusted; body length about 6–8 mm. (widespread in the Afrotropical region, Bioko [Fernando Poó], Madagascar, Socotra, Comoro Is., Mauritius, Réunion, Rodriguez) *N. albigena* (Stein)
Anterior pair of presutural dorsocentral setae hair-like; tergite 5 dusted; body length about 6–7 mm (widespread through Africa, Madagascar, Mauritius, Réunion) . . . *N. viridifrons* (Macquart)

MATERIAL EXAMINED: KNOWN SPECIES

N. albigena: **Madagascar: Fianarantsoa Province:** Parc National Ranomafana, radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 16 October–8 November 2001, R. Harin'Hala, collection code: MA-02-09B-01, 1 female, CASENT 3009720; 25 July–3 August 2002, collection code: MA-02-09B-36, 1 male, CASENT 3010486. **Toliara Province:** Parc National d'Andohahela, Tsimelaha, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 28 January–12 February 2004, M. Irwin, F. Parker, R. Harin'Hala, collection code: MA-02-20-53, 1 male, CASENT 8078192; 15–28 January 2004, collection code: MA-02-20-52, 1 male, CASENT 8078020; 1 male, CASENT 8078021 (MNRJ); 10–21 September 2003, collection code: MA-02-20-39, 1 male, CASENT 3010885; 30 October–9 November 2003, collection code: MA-02-20-44, 1 male, CASENT 3010993. **Antsiranana Province:** Ambohitombo, 1894, 1 female, Forsyth-Major (BMNH).

N. setulosa: **MADAGASCAR: Antsiranana Province:** Parc National de Marojejy, Manantenina River, 28.0 km 38° NE Andapa, 8.2 km 333° NNW Manantenina, elev. 450 m, 14°26'12"S 49°46'30"E, Malaise trap—

rain forest, 12–15 November 2003, B.L. Fisher *et al.*, collection code: BLF8723, 1 female, CASENT 3009073; 1 female, CASENT 3009067; 1 female, CASENT 3009076; 1 male, CASENT 3010136; 1 male, CASENT 3010145; 1 female, CASENT 3010144; 1 female, CASENT 3010143; 1 male, CASENT 3010128; 1 male, CASENT 3009077; 1 male, CASENT 3009078; 1 female, CASENT 3009080; 1 female, CASENT 3009081 (MNRJ); 1 male, CASENT 3009082; 1 female, CASENT 3009083; 1 female, CASENT 3009084; 1 female, CASENT 3009071; 1 female, CASENT 3009070; 1 female, CASENT 3009072; 1 female, CASENT 3009091; 1 female, CASENT 3009068; 1 female, CASENT 3009066; 1 male, CASENT 3009069; 1 male, CASENT 3009085; 1 male, CASENT 3009074 (MNRJ); 1 male, CASENT 3009075; 1 male, CASENT 3010205; 1 male, CASENT 3010204; 1 male, CASENT 3010203; 1 male, CASENT 3009090; 1 male, CASENT 3009079; 1 male, CASENT 3010157; 1 male, CASENT 3010165; 1 male, CASENT 3010172; 1 male, CASENT 3010162; 1 male, CASENT 3010181; 1 male, CASENT 3010169; 1 male, CASENT 3010167; 1 male, CASENT 3010166; 1 female, CASENT 3010158; 1 female, CASENT 3010159; 1 female, CASENT 3010160; 1 female, CASENT 3010180; 1 female, CASENT 3010210; 1 female, CASENT 3010200; 1 female, CASENT 3010187; 1 female, CASENT 3010184; 1 female, CASENT 3010191; 1 male, CASENT 3010173; 1 male, CASENT 3010174; 1 male, CASENT 3010176; 1 male, CASENT 3010178; 1 male, CASENT 3010179 (MNRJ); 1 male, CASENT 3010194; 1 male, CASENT 3010199; 1 male, CASENT 3010201; 1 male, CASENT 3010188; 1 female, CASENT 3010175; 1 female, CASENT 3010177; 1 female, CASENT 3010168; 1 female, CASENT 3010164; 1 female, CASENT 3010163; 1 female, CASENT 3010193 (MNRJ); 1 male, CASENT 3010185; 1 female, CASENT 3010195; 1 female, CASENT 3010189; 1 male, CASENT 3010196; 1 female, CASENT 3010197; 1 female, CASENT 3010198; 1 male, CASENT 3010183; 1 female, CASENT 3010182; 1 male, CASENT 3010192; 1 female, CASENT 3010190; 1 male, CASENT 3010202; 1 male, CASENT 3010207; 1 male, CASENT 3010208; 1 female, CASENT 3009840; 1 female, CASENT 3009841; 1 male, CASENT 3009839; 1 female, CASENT 3009846; 1 male, CASENT 3009839; 1 male, CASENT 3009842. **Fianarantsoa Province:** Parc National Ranomafana, Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 22–28 November 2001, R. Harin'Hala, collection code: MA-02-09C-04, 1 male, CASENT 3009747; 1 female, CASENT 3009746; 1 female, CASENT 3009739. Talatakely, trail FO-300, elev. 1040 m, 8 November 1998, V. F. Lee, K. J. Ribardo, 1 male, CASENT 8019640. Namorona River foot bridge, 850 m, Malaise, 14 April 1998, M.E. Irwin and E.I. Schlinger, Schlinger Foundation Madagascar Expedition, collection code: 98-MAD-9, 1 female, CASENT 8021521. JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev 690 m, 10–14 January 2002, R. Harin'Hala, collection code: MA-02-09D-11, 1 female, CASENT 3009954; 15–21 December 2001, collection code: MA-02-09D-07, 1 female, CASENT 3010495; 1 male, CASENT 3010492. Radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 16 October–8 November 2001, R. Harin'Hala, collection code: MA-02-09B-01, 1 female, CASENT 3009718; 1 male, CASENT 3009714; 26–31 March 2002, collection code: MA-02-09B-22, 1 female, CASENT 3010691; 1 female, CASENT 3010690. Vohiparara, at broken bridge, elev. 1110 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 16 October–8 November 2001, R. Harin'Hala, collection code: MA-02-09A-01, 1 female, CASENT 3010428; 15–25 July 2002, collection code: MA-02-09A-35, 1 female, CASENT 3010749; 1 female, CASENT 3010750. **Toliara Province:** 16 km east Sakaraha, Zombitse Nature Reserve, 825 m, 20 April 1998, Malaise trap in tropical forest on sand, M.E. Irwin and E. I. Schlinger, Schlinger Foundation Madagascar Expedition, collection code: 98-MAD-15, 1 male, CASENT 3010273; 1 male, CASENT 8021696; 1 male, CASENT 3010274; collection code: MEI.99-MA.14, 1 male, CASENT 8018316. Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 male, CASENT 3009482.

Orchisia Rondani, 1877

DIAGNOSIS.— Head with two pairs of reclinate frontal setae; arista with hairs along its entire length; prestomal teeth developed; frontal triangle reaching lunula; dorsocentrals 1+3; prealar absent; katepisternals 1:1:1; scutellum with only the apical pair of setae strong; fore tibia without a median posterior seta; hind tibia with a very small submedian posterodorsal seta.

Biology unknown. Adults are assumed to be predaceous.

AFROTROPICAL FAUNA.— *O. costata* (Meigen, 1826) had been recorded from the Afrotropical region, where it has a widespread distribution, including Madagascar and Mauritius.

MADAGASCAN FAUNA.— *O. costata* can be recognized by the yellow lower third of the frons; the wings brown along costal margin and transparent on the posterior half; tergites 2–4 with a very faint median brown vitta, and a pair of dark brown round spots.

MATERIAL EXAMINED: KNOWN SPECIES

O. costata: **MADAGASCAR: Toliara Province:** Parc National d'Andohahela, Tsimelaha, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 29 June–10 July 2003, M. Irwin, F. Parker, R. Harin Hala, collection code: MA-02-20-31, 1 male, CASENT 2070575. Tolanaro [Fort Dauphin], sea level, 19 April 1968, 1 male, K.M. Guichard (BMNH). **Toamasina Province:** Sandrangato, 2 females (NMSA, BMNH). det [District of] Maroantsetra, Navana-Antongil, 6 m, 20–25 March 1958, 3 males 1 female, B.R. Stuckenberg (NMSA, BMNH). det [District of] Mananara, Ivontaka, 15 m, 10–14 March 1958, 1 female, B.R. Stuckenberg (NMSA). **Antananarivo Province:** Antananarivo [Tanaranive], Tsimbazaza, 12 July 1948, 1 male, P.C. (NMSA).

Phaonia Robineau-Desvoidy, 1830

DIAGNOSIS.— Arista plumose; female frons without proclinate orbital setae; prosternum bare; dorsocentrals 1–2+3–4; posterior notopleural seta weaker than anterior seta; anepimeron bare; lower calypter glossiform; base of R_{4+5} with ventral setulae or bare (setulose in the two Madagascan species); hind tibia with a strong posterodorsal seta (calcar) inserted at apical fourth.

The larvae are obligate carnivores, and live mainly in mosses, humus soil, and the rotten or sickly parts of trees and herbaceous plants.

AFROTROPICAL FAUNA.— Twenty four species have been recorded from the Afrotropical region, most of them keyed by Emden (1943).

MADAGASCAN FAUNA.— The two new species described here are the first species of this genus to be recorded from Madagascar: *P. plurivittata*, sp. nov. and *P. univittata*, sp. nov.

MATERIAL EXAMINED: KNOWN SPECIES

No described species of *Phaonia* was found among the material examined.

Key to the Madagascar Species of *Phaonia*

1. Ground-colour yellow; mesonotum with a median grey pollinose vitta; hind femur with 4–5 anteroventrals on apical half (Madagascar) *P. univittata*, sp. nov.
Ground-colour brown; mesonotum with five grey pollinose vittae along acrostichal, dorsocentral and intra-alar rows of setae; hind femur with 3 anteroventrals on apical half; (Madagascar)
. *P. plurivittata*, sp. nov.

DESCRIPTIONS OF NEW SPECIES OF *PHAONIA*

Phaonia plurivittata Couri, Pont, and Penny, sp. nov.

TYPE.— HOLOTYPE: male, deposited in CAS, labelled: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Belle Vue at Talatakely, elev. 1020 m, 21°15'99"S 47°25'21"E, Malaise trap, secondary tropical forest, 12–19 February 2002, R. Harin'Hala, collection code: MA-02-09C-16, CASENT 3009762.

DIAGNOSIS.— Ground-colour brown; mesonotum with five grey pollinose vittae along acros-

tichal, dorsocentral and intra-alar rows of setae. Abdominal tergite 1+2 yellowish; tergite 5 yellow, except for two basal lateral areas. Hind femur with 3 anteroventrals on apical half.

GENERAL COLOR.— Ground-colour brown; mesonotum with five grey pollinose vittae along acrostichal, dorsocentral and intra-alar rows of setae. Head with frons reddish-brown, ocellar triangle black; fronto-orbital plate silvery pollinose; face silvery-whitish pollinose, parafacial and gena reddish-brown with a little grey pollinosity. Antenna with scape and pedicel yellowish and flagellomere brownish; arista yellowish-brown on basal third and brown on apical two-thirds. Palpus yellow. Both spiracles yellowish. Calypters faintly brownish, with margins darker. Haltere yellow. Wing clear. Legs yellow. Abdomen brown, with tergite 1+2 yellowish and tergite 5 almost entirely yellow, except for two small basal lateral areas.

MALE.— Length. Body: 6.0 mm, wing: 6.2 mm.

HEAD.— Holoptic. Inner and outer vertical setae short. Ocellar seta short. Frontal row with 10 pairs of setae, the pair closest to lunula stronger. Antenna inserted at mid level of eye; flagellomere about 2.8 times as long as pedicel. Arista plumose. Gena slender, similar in width to width of flagellomere. Palpus slightly flattened.

THORAX.— Acrostichals 0+1; dorsocentrals 2+4; 2 postpronotals; 1 presutural; 1 long prealar; 2 intra-alars; 2 supra-alars; 2 postsupra-alars. Notopleuron with two setae, the posterior one a little finer and shorter. Postalar declivity and suprasquamal ridge bare. Scutellum with one basal and one apical pair of setae, both long and similar in size, and a short preapical pair. Anepisternum with a series of about 5 long and strong setae. Katepisternals 1+2, upper posterior one very long, about twice as long as the other two. Anepimeron bare. Posterior spiracle with margins bare. Lower calypter about twice as long as upper one. Wing vein R_{4+5} with ventral setulae on the node at base. Fore femur with complete posterodorsal and posteroventral rows of setae; fore tibia with no median seta; one dorsal and one posterior preapical seta; mid femur with 4 fine ventral setae on basal third; 2 preapical anterodorsal and dorsal setae, 3 preapicals on posterior surface; mid tibia with two posterior setae on basal half, long and strong apical setae on anteroventral, ventral and posteroventral surfaces; hind femur with a complete row of anterodorsal setae; anteroventral surface with fine and spaced setae, except for 3 strong ones on apical third; one dorsal, one posterodorsal and two posterior preapical setae; hind tibia with one median anterodorsal seta; 4 anteroventral setae on basal half; a long posterodorsal seta on apical third; long apicals on anterodorsal, dorsal and anteroventral surfaces.

ABDOMEN.— Tergite 4 with a marginal row of setae and tergite 5 with a discal and a marginal row of setae. Sternite 5 as in Fig. 107.

TERMINALIA.— Cercal plate, surstyli and aedeagus as in Figs. 107–111.

FEMALE.— Length. Body: 6.0 mm, wing: 6.2 mm.

Differs from male as follows: Interocular space about one-third of head-width at level of anterior ocellus; inner and outer vertical setae moderately developed; ocellar setae and first leg broken; hind tibia with 2–3 anteroventral setae on middle third.

OVIPOSITOR.— Ovipositor and spermathecae as in Figs. 112 and 113.

OTHER MATERIAL EXAMINED.— PARATYPES: **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 6–15 December 2001, R. Harin'Hala, collection code: MA-02-09A-06, 1 female, CASENT 3010019.

ETYMOLOGY.— The name comes from the Latin words *pluri*, meaning many, and *vitta*, meaning ribbon or band, and refers to the five grey vittae of the mesonotum of this species.

DISCUSSION.— The leg chaetotaxy is very similar in the two Madagascan species, although the mid femur of *P. plurivittata*, sp. nov. has 3 anteroventrals on apical third and *P. univittata* has 4–5.

The 5 greyish pollinose vittae on the thorax easily separate this species from the other Madagascan *Phaonia*.

***Phaonia univittata* Couri, Pont, and Penny, sp. nov.**

TYPE.— HOLOTYPE: female, deposited in CAS, labelled: **MADAGASCAR: Toliara Province:** Parc National d'Andohahela, Tsimelahy, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 15–28 January 2004, M. Irwin, F. Parker, R. Harin Hala, collection code: MA-02-20-52, CASENT 8078028.

DIAGNOSIS.— General body colour yellow, mesonotum with a median grey pollinose vitta; abdomen entirely yellow; hind femur with 4–5 anteroventral setae on apical third.

GENERAL COLOR.— Ground-colour yellow; mesonotum with a median grey pollinose vitta. Head with frons brown; fronto-orbital plate silvery pollinose; parafacial and gena with silver pollinosity, from certain angles with a brown mark close to base of flagellomere. Antenna with scape and pedicel yellow; flagellomere and arista somewhat brownish-yellow. Palpus yellow to brownish-yellow. Both spiracles yellow. Mesonotum, in addition to the median grey pollinose vitta, with a fine light grey pollinosity on sides and scutellum. Calypters whitish, hyaline. Haltere yellow with knob whitish. Wing clear. Legs yellow. Abdomen yellow, some specimens with a little light grey pollinosity especially on tergites 4 and 5; a very faint and thin brown median vitta on tergites 4 and 5 and very small brown bristle-dots at the base of the marginal setae on tergites 3 and 4 and of the discal setae on tergites 4 and 5.

FEMALE.— Length. Body: 6.0–6.2 mm, wing: 5.8–6.0 mm.

HEAD.— Interocular space about one-third of head-width at level of anterior ocellus. Vertical setae moderately developed. Ocellar setae moderately developed, similar in size to the longer frontals. Frontal row with 8 pairs of setae. Antenna inserted at mid level of eye; flagellomere about three times as long as length. Arista plumose. Gena slender, similar in width to width of flagellomere. Palpus slightly flattened.

THORAX.— Acrostichals 0+1; dorsocentrals 2+4; 2 postpronotals; 1 presutural; 1 long prealar; 2 intra-alars; 2 supra-alar; 2 postsupra-alars. Notopleuron with two setae, the posterior one a little finer and shorter. Postalar declivity and suprasquamal ridge bare. Scutellum with one basal and one apical pair of setae, both long and similar in size, and a short preapical pair. Anepisternum with a series of about 4–5 long and strong setae, with some finer setae among them; behind this row, and close to suture, about 3 setae situated on median third. Katepisternals 1+2. Anepimeron bare. Posterior spiracle with margins bare. Lower calypter about twice as long as upper one. Wing vein R_{4+5} with ventral setulae on the node at base. Fore femur with complete rows of posterodorsal, dorsal and anteroventral setae; fore tibia with no median seta; one dorsal preapical; mid femur with 2 anterodorsal, 1 dorsal and 2 posterodorsal preapical setae; mid tibia with two posterior setae on middle third; long apical setae on ventral, anteroventral and anterodorsal surfaces; hind femur with a complete anterodorsal row of setae and 4–5 anteroventrals on apical half; one dorsal and 2 posterodorsal preapical setae; hind tibia with one median anterodorsal; 2–3 anteroventrals on middle third; a long posterodorsal at apical third; long apicals on anterodorsal, dorsal and posterodorsal surfaces.

ABDOMEN.— Series of longer setae on margins of tergites 4 and 5 and on disc of tergite 5.

OVIPOSITOR.— Very long, tergites 6, 7 and 8 with scattered setulae on almost their full extent (Figs. 114 and 115); spermathecae oblong (Fig. 115).

MALE.— Unknown.

OTHER MATERIAL EXAMINED.— PARATYPES: **MADAGASCAR: Toliara Province:** Ifaty, near Hotel Paradisia, in coastal dunes, elev. 9 m, 23°10.78'S 43°37.01'E, Malaise trap, vegetation in sand area, 26 May–5

June 2002, R. Harin'Hala, collection code: MA-02-16-28, 1 female, CASENT 3009796 (MNRJ); 1 female, CASENT 3009797. Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap, deciduous dry forest, 17–28 January 2002, R. Harin'Hala, collection code: MA-02-18A-11, 1 female, CASENT 3010060; 27 December 2001–6 January 2002, collection code: MA-02-18A-08, 1 female, CASENT 3010280; 9–10 May 2003, collection code: MA-02-18A-55, 1 female, CASENT 3010770 (BMNH); elev. 37 m, 22°54.80'S 43°28.93'E, Malaise trap, spiny forest, 6–16 December 2001, R. Harin'Hala, collection code: MA-02-18B-05, 1 female, CASENT 3010829. Fiherenana, elev. 50 m, 23°14'07"S 43°52'15"E, Malaise trap, in degraded gallery forest, 1–4 December 2002, Frontier Wilderness Project, collection code: MGF049, 1 female, CASENT 3009270.

ETYMOLOGY.— The name comes from the Latin prefix *uni*, meaning one, and the Latin word *vitta*, meaning ribbon or band, and refers to the single grey vitta on the mesonotum of this species.

DISCUSSION.— In Emden's (1943) key, this species runs to *P. rhodesi* Malloch, which is darker in general colour, with flagellomere black and pale only at base, mesonotum with four brownish postsutural vittae, and hind femur with fine posteroventral hairs at base.

Pygophora Schiner, 1868

DIAGNOSIS.— Frons high, much wider at anterior margin than at vertex, two pairs of reclinate orbital setae; each fronto-orbit usually with 4 setae; frontal triangle short; arista with long hairs on basal half (Fig. 6); prestomal teeth developed; dorsocentrals 1+3, the presutural seta sometimes preceded by a short one; prealar seta absent; anepimeron bare; fore tibia with one median seta on posterior surface; hind tibia with one anteroventral, 2 anterodorsal and 2 posterodorsal setae. [REF. Crosskey 1962].

Biology unknown; adults predaceous.

AFROTROPICAL FAUNA.— Six species have been recorded from the Afrotropical region. Emden (1940) gave a key to separate five of them (*P. africana* Crosskey, 1962 not included) and Crosskey (1962) gave a key to the *Pygophora* species of the world.

MADAGASCAN FAUNA.— The only species recorded from Madagascar, and also from the Seychelles and Mauritius, *P. pallipalpis* (Stein, 1910), was found in our material. It can be recognized by the yellow frons and the presence of some setulae on lower fronto-orbital plate, between the frontal setae and the eye margin.

MATERIAL EXAMINED: KNOWN SPECIES

P. pallipalpis: **MADAGASCAR: Toliara Province:** Fiherenana, elev. 100 m, 23°10'37"S 43°57'39"E, Malaise trap, in gallery forest, 22–28 October 2002, Frontier Wilderness Project, collection code: MGF041, 1 female, CASENT 3009225; 1 female, CASENT 3009217; 1 female, CASENT 3009216 (MNRJ); 1 male, CASENT 3009215 (MNRJ); 1 female, CASENT 3009213; 1 male, CASENT 3009220; 1 female, CASENT 3009223; 1 female, CASENT 3009221; 1 female, CASENT 3009217; 1 male, CASENT 3009211; 1 female, CASENT 3009210; 1 male, CASENT 3009219; 1 female, CASENT 3009218; 1 male, CASENT 3009335; 1 female, CASENT 3009212; 1 female, CASENT 30092222. 16 km east Sakaraha, Zombitse Nature Reserve, 825 m, 22°88'23"S 44°70'06"E, 13 December 1999, tropical forest on sand, M.E. Irwin and E I. Schlinger, Schlinger Foundation Madagascar Expedition, collection code: MEI.99-MA.14, 1 female, CASENT 8018317 (MNRJ); 1 female, CASENT 8018314. Parc National d'Andohahela, Tsimelahy, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 30 October–9 November 2003, M. Irwin, F. Parker, R. Harin Hala, collection code: MA-02-20-44, 1 female, CASENT 3010950; 1 female, CASENT 3010959; 1 female, CASENT 3010969 (MNRJ); 1 female, CASENT 3010964; 28 March–8 April 2003, collection code: MA-02-20-20, 1 male, CASENT 2070557; 1 male, CASENT 3010373; 10–21 September 2003, collection code: MA-02-20-39, 1 female, CASENT 3010864; 8–18 March 2003, collection code: MA-02-20-18, 1 male, CASENT 3010934; 15–28 January 2004, collection code: MA-02-20-52, 1 female, CASENT 8078194; 28

January–12 February 2004, collection code: MA-02-20-53, 1 female, CASENT 8078197; 1 female, CASENT 8078195; 1 female, CASENT 8078196. **Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1100 m, 21°13'57"S 47°22'19"E, Malaise trap, in high altitude rainforest, 6–15 December 2001, R. Harin'Hala, collection code: MA-02-09A-06, 1 female, CASENT 3010004; 14–26 June 2002, collection code: MA-02-09A-32, 1 female, CASENT 3010305. Radio tower at forest edge, elev. 1130 m, 21°15.05'S 47°24.43'E, Malaise trap, mixed tropical forest, 26–31 March 2002, R. Harin'Hala, collection code: MA-02-09B-22, 1 female, CASENT 3010686. Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09C-12, 1 female, CASENT 3009833. JIRAMA water works, elev. 690 m, 21°14.91'S 47°27'13"E, Malaise trap near river, 8–15 November 2001, R. Harin'Hala, collection code: MA-02-09D-02, 1 female, CASENT 3010724; 15–21 December 2001, collection code: MA-02-09D-07, 1 female, CASENT 3010498. Ranohira, 860 m, 26 January–4 February 1958, 1 female, B.R. Stuckenberg (NMSA). **Mahajanga Province:** Parc National d'Ampijoroa, 160 km N of Maevatanana on RN 04, elev. 43 m, 16°19.16'S 46°48.80'E, Malaise trap, in deciduous forest, 8–17 December 2003, R. Harin'Hala, collection code: MA-25-26, 1 female, CASENT 3010300; 28 September–5 October 2003, collection code: MA-25-17, 1 male, 3010670. **Toamasina Province:** Maroantetra, at light, 1 male 2 females, J. Vadon (MNHNP, BMNH).

Pyrellia Robineau-Desvoidy, 1830

DIAGNOSIS.—Metallic green, blue or violet flies; suprasquamal ridge and postalar wall bare; anepimeron setulose; dorsocentrals 2+4; katepisternals 1+3; lower calypter of the *Musca*-type, truncated; vein M strongly curved forward towards vein R₄₊₅ before apex. [REF. Zielke 1971].

The larvae live in the dung of ungulates, and are strictly coprophagous.

AFROTROPICAL FAUNA.—Eleven species are recorded from the Afrotropical region. Zielke (1971) gave a key to separate 10 of them.

MADAGASCAN FAUNA.—Only *P. keiseri* Zielke, 1972 is recorded from Madagascar, where it is endemic, and it was found in our material. A new species of *Pyrellia* was also found, represented only by the holotype female.

Key to the Madagascar Species of *Pyrellia*

- Greater ampulla with stiff hairs; 7.5 mm (Madagascar) *P. ampullacea*, sp. nov.
Greater ampulla bare; 6.5 mm (Madagascar) *P. keiseri* Zielke

MATERIAL EXAMINED: KNOWN SPECIES

P. keiseri: **MADAGASCAR: Antsiranana Province:** Parc National de Marojejy, Manantenina River, 28.0 km 38° NE Andapa, 8.2 km 333° NNW Manantenina, elev. 450 m, 14°26'12"S 49°46'30"E, Malaise trap—rain forest, 12–15 November 2003, B.L. Fisher *et al.*, collection code: BLF8723, 1 male, CASENT 3009089; 1 female, CASENT 3009088; 1 female, CASENT 3009086; 1 female CASENT 3009087; 1 female, CASENT 3010161; 1 female, CASENT 3010170; 1 female, CASENT 3010171; 1 female, CASENT 3010209; 1 female, CASENT 3010206; 1 female, CASENT 3010186; 1 male, CASENT 3010130; 1 female, CASENT 3010132. **Toliara Province:** Fiherenana, elev. 65 m, 23°13.351'S 43°52.853'E, Malaise trap, in degraded riparian forest close to water, 5–10 August 2003, Frontier Wilderness Project, collection code: MGF076, 1 male, CASENT 3009191. Sept Lacs, elev. 120 m, 23°31'65"S 44°9'35"E, Malaise trap, gallery forest, 21–26 August 2002, Frontier Wilderness Project, collection code: MGF038, 1 female, CASENT 3009229. Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 female, CASENT 3009454.

DESCRIPTIONS OF NEW SPECIES OF *PYRELLIA**Pyrellia ampullacea* Couri, Pont, and Penny, sp. nov.

TYPE.— HOLOTYPE: female, deposited in CAS, labelled: MADAGASCAR: Toamasina Province: Montagne d'Anjanaharibe, 19.5 km 27° NNE Ambinanitelo, elev. 1100 m, 15°10'42"S 49°38'06"E, pitfall in montane rainforest, 12–16 March 2003, B.L. Fisher, Griswold *et al.*, collection code: BLF8154, 1 female, CASENT 3009146.

DIAGNOSIS.— A large fly, 7.5 mm in length; greater ampulla with numerous hairs.

GENERAL COLOR.— Ground-colour metallic violet. Head with frons dark brown; fronto-orbital plate dark brown, a little shining, grey pollinose close to lunula. Face and parafacial brown, grey pollinose from certain angles; gena reddish-brown. Antenna, arista and palpus dark brown. Anterior and posterior spiracles dark brown. Calypters slightly brownish. Haltere yellow at base and on knob; stalk brown. Wing clear. Legs uniformly dark brown. Abdomen violet metallic, concolorous with mesonotum.

FEMALE.— Length. Body: 7.5 mm, wing: 7.3 mm.

HEAD.— Interocular space about one-third of head-width at level of anterior ocellus. Vertical setae long; ocellar setae short and divergent. Frontal row with about 10 pairs of setae, and a long proclinate orbital. Antenna inserted at mid level of eye; flagellomere about 3.0 times as long as pedicel. Arista with long hairs. Gena about 1.5 times as wide as flagellomere. Palpus filiform.

THORAX.— Acrostichals 0+1; dorsocentrals 2+4, the first two postsutural setae very short; 2 postpronotals; 1 presutural; 2 intra-alars; 1 supra-alar; 2 postsupra-alars. Notopleuron with two setae, similar in size. Postalar declivity and suprasquamal ridge bare. Scutellum with one pair of long basal setae, one preapical and one apical a little shorter and similar in size. Anepisternum with a series of about 10 setae, longer and stronger in upper half. Katepisternals 1+3. Anepimeron setulose posteriorly. Posterior spiracle with margins bare. Greater ampulla with numerous stiff hairs. Vein R₄₊₅ setulose on both wing surfaces from base to cross-vein r-m, the basal node with two ventral setulae. Fore femur with complete posterodorsal and posteroventral rows of long and strong setae; posterior surface with relatively well developed setae along its entire length; fore tibia with no median setae; one preapical dorsal and one apical ventral; mid femur with two ventral setae on middle third; anterior surface with a row of short setae on basal two-thirds; two posterior preapical setae; mid tibia with 4 strong posterior setae along basal two-thirds; one strong ventral submedian; two strong apical ventral setae; hind femur with a complete row of anterodorsal setae; a sparse row on anteroventral surface, longer on apical third; hind tibia with 1 median anteroventral seta and one anterodorsal submedian, both short; one dorsal preapical and one ventral apical.

ABDOMEN.— Tergites without differentiated setae.

OVIPOSITOR.— Long, tergites and sternites very fine and long; basal segment ornamented with folded membrane on both sides (Figs. 116 and 117). Spermathecae as in (Fig. 117).

MALE.— Unknown.

OTHER MATERIAL EXAMINED.— No paratypes.

ETYMOLOGY.— The name comes from the Latin word *ampulla*, meaning flask or bottle, and refers to the stiff hairs on the greater ampulla of this species.

DISCUSSION.— *P. ampullacea*, sp. nov. differs from all other known species of *Pyrellia* by the presence of stiff hairs on the greater ampulla. *P. difficilis* (one specimen in the CAS collection identified by Zielke) also has hairs on the greater ampulla but they are very fine. Additional characters for recognizing the new species are its large size, the absence of an anterodorsal seta on mid tibia, and the dark brown anterior spiracle.

***Spilogona* Schnabl, 1911**

DIAGNOSIS.— Prosternum bare; hind tibia without calcar; prealar absent; prestomal teeth developed; dorsocentrals 2+3–4; katepisternals 1+1–3; mid femur without anterior preapical seta; wing veins bare; ovipositor of the *Mydaea*-type.

The larvae are obligate carnivores, and may be terrestrial (in damp soil and moss cushions) or fully aquatic. Adults are predaceous.

AFROTROPICAL FAUNA.— Seventeen species of *Spilogona* were recorded from the Afrotropical region. Most of them were keyed by Emden (1951), but since then a number have been transferred to the genus *Limnophora* (Pont 1980).

MADAGASCAN FAUNA.— The new species described here is the first record of this genus from Madagascar.

MATERIAL EXAMINED: KNOWN SPECIES

No described species of *Spilogona* was found among the material examined.

DESCRIPTIONS OF NEW SPECIES OF *SPILOGONA****Spilogona fulvipollinosa* Couri, Pont, and Penny, sp. nov.**

TYPE.— HOLOTYPE: female, deposited in CAS, labelled: **MADAGASCAR: Fianarantsoa Province:** Radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 31 March–9 April 2002, R. Harin'Hala, collection code: MA-02-09B-23, CASENT 3010410.

DIAGNOSIS.— Arista plumose; 3 postsutural dorsocentrals; legs reddish-brown; abdomen reddish-brown with a little grey pollinosity, tergite 5 yellowish.

GENERAL COLOR.— Ground-colour brown with grey pollinosity; mesonotum with postpronotum yellow, with a very intensely yellow pollinose median vitta that is slender presuturally and expands after suture towards scutellum, which also has this intense pollinosity. Head with frons reddish; ocellar triangle and fronto-orbital plate brownish with a little grey pollinosity from certain angles; parafacial and gena reddish-brown, silvery pollinose from certain angles. Antenna light brown with grey pollinosity, scape and base of flagellomere somewhat yellow; arista brown. Palpus yellow. Both spiracles yellow. Pleura brown with grey pollinosity. Calypters whitish, hyaline. Haltere yellow with whitish knob. Wing clear. Legs reddish-brown with a little grey pollinosity, fore tibia yellowish. Abdomen reddish-brown with a little grey pollinosity, tergite 5 yellowish.

FEMALE.— Length. Body: 5.8 mm, wing: 6.0 mm.

HEAD.— Interocular space about 2.6 times of head-width at level of anterior ocellus. Vertical setae long. Ocellar seta long, similar in size to the longest frontal. Frontal row with 5 pairs of setae. Antenna inserted at mid level of eye; flagellomere about three times as long as pedicel. Arista plumose. Gena slender, similar in width to that of flagellomere. Palpi filiform.

THORAX.— Acrostichals 0+1; dorsocentrals 2+3; 2 postpronotals; 1 presutural; 1 intra-alar; 1 supra-alar; 2 postsupra-alars. Notopleuron with two setae, similar in size. Postalari declivity and suprasquamal ridge bare. Scutellum with one long basal and one apical pair of setae. Anepisternum with a series of 5 long setae. Katepisternals 1+2. Anepimeron bare. Posterior spiracle with margins bare. Lower calypter about twice as long as upper one. Wing veins bare. Fore femur with a complete row of posterodorsal and posteroventral setae, the latter longer and more sparse; fore tibia with a long median posterior seta; one dorsal preapical, one posterodorsal apical and one posteroventral apical, similar in size; mid femur with 2 posterior preapical setae; mid tibia with two posterior setae on middle third; long apical setae on ventral, posteroventral and anterodorsal surfaces; hind femur with a complete anterodorsal row of setae and 4–5 anteroventrals on apical half; hind tibia with one

median and one suprmedian anterodorsal; 2–3 anteroventrals on middle third; a long posterodorsal on apical third; a long apical on ventral surface.

ABDOMEN.— Marginal row of setae on tergites 4 and 5 and a discal row on tergite 5.

OVIPOSITOR.— Of the *Mydaea*-type, and spermathecae as in Fig. 118.

MALE.— Unknown.

OTHER MATERIAL EXAMINED.— **PARATYPES:** **MADAGASCAR: Fianarantsoa Province:** Parc National Ranomafana, Vohiparara, at broken bridge, elev. 1110 m, 21°13.57'S 47°22.19'E, Malaise trap in high altitude rainforest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09A-12, 1 female, CASENT 3010623; 6–15 December 2001, 1 female, CASENT 3010017.

ETYMOLOGY.— The name comes from the Latin words *fulvus*, meaning tawny or reddish-yellow, and *pollen*, meaning fine flour or dust, and refers to the intense yellow median vitta pollinosity of the postpronotum and mesonotum of this species.

DISCUSSION.— In Emden's (1951) key, the new species runs to couplet 14 but goes no further as it has a different combination of characters.

Stomoxys Geoffroy, 1762

DIAGNOSIS.— General colour brownish-grey to yellowish-brown; head slightly wider than high; vertex about one-fourth of head-width in male and well over one-third in female; arista plumose; palpus slender and short, subcylindrical, and less than half as long as the elongated and non-retractile piercing proboscis; antennal flagellomere about 2.5 times as long as pedicel; prosteronum and proepisternum setulose; prealar seta absent; anterior katepisternal absent. [REF. Emden 1939, Zumpt 1973].

The larvae are usually found in mammalian excrement, but *S. calcitrans* breeds more widely, for example in grass clippings or vegetable compost where there is a high degree of bacterial fermentation. Adults are obligate blood suckers and have a proboscis adapted for piercing skin.

AFROTROPICAL FAUNA.— There are 14 Afrotropical species of the genus *Stomoxys*.

MADAGASCAN FAUNA.— Two species of *Stomoxys* have been recorded from Madagascar, and both have been found in our material: *S. calcitrans* (Linnaeus, 1758) and *S. niger* Macquart, 1851. Zumpt (1973) has given a key to the world species.

Key to the Madagascar Species of *Stomoxys*

1. Frons slightly widening from the vertex towards the lunula; abdomen with dark spots as in Fig. 119; width of male frons at its narrowest part about $\frac{1}{2}$ or more of eye-length; width of female frons at vertex about one-half of eye-length (cosmopolitan, widespread in the Afrotropical region including Cape Verde Is., Madagascar, Mauritius, Réunion, Seychelles, St Helena)
 - *S. calcitrans* (Linnaeus)
 - Frons sub-parallel in posterior half; abdomen with dark transverse bands as in Fig. 120; width of male frons at narrowest point about $\frac{1}{4}$ or less of eye-length; width of female frons less than one-half of eye-length (widespread in the Afrotropical region, including Cape Verde Is., Madagascar, Mauritius, Réunion, Rodriguez, Seychelles, South Yemen,). *S. niger* Macquart

MATERIAL EXAMINED: KNOWN SPECIES

S. calcitrans: **MADAGASCAR: Toliara Province:** Sept Lacs: elev. 120 m, 23°31'65"S 44°9'35"E, Malaise trap, gallery forest, 21–26 August 2002, Frontier Wilderness Project, collection code: MGF038, 1 female CASENT 3009236. **Antsiranana Province:** Forêt d'Ampondrabe, elev. 175 m, 26.3 km 10° NNE Daraina, 12°58'12"S 49°42'00"E, Malaise trap—tropical dry forest, 10 December 2003, B.L. Fisher, collection code:

BLF9976, 1 female, CASENT 3009059; 1 female, CASENT 3009063. **Antananarivo Province:** Antananarivo [Tananarive], 26 November 1933, 3 females, W.A.Lamborn (BMNH). Antananarivo [Tananarive], March 1965, 5 females, G.Uilenberg (BMNH).

S. niger: **MADAGASCAR: Toliara Province:** Manderano, elev. 70 m, 23°31'39"S 44°5'18"E, Malaise trap, edge of marsh, 5 m from road, gallery forest, 23 June–28 July 2002, Frontier Wilderness Project, collection code: MGF035, 1 male, CASENT 3009315; 1 male, CASENT 3009317; 1 female, CASENT 3009316; 1 female, CASENT 3009314; 1 female, CASENT 3009313; 1 female, CASENT 3009312; 1 female, CASENT 3009311. Antafoky, elev. 60 m, 23°28'44"S 44°3'56"E, Malaise trap, gallery forest, 25–28 January 2002, Frontier Wilderness Project, collection code: MGF002, 1 female, CASENT 3009480. Parc National d'Andohahela, Tsimelahy, Parcelle II, elev. 180 m, 24°56.21'S 46°37.60'E, Malaise trap in transitional forest, 29 June–10 July, M. Irwin, F. Parker, R. Harin'Hala, collection code: MA-02-20-31, 1 female, CASENT 2070588; 1 female, CASENT 2070617; 1 female, CASENT 2070610; 1 female, CASENT 2070602; 1 female, CASENT 2070580; 1 female, 2070611; 30 October–9 November 2003, collection code: MA-02-20-44, 1 female, CASENT 3010991; 1 female, CASENT 3010994; 1 female, CASENT 3010980; 1 male, CASENT 3010984; 1 male, CASENT 3010985; 1 male, CASENT 3010983 (MNRJ); 1 male, CASENT 3010953; 1 male, CASENT 3010987 (MNRJ); 10–21 September 2003, collection code: MA-02-20-39, 1 male, CASENT 3010883; 1 female, CASENT 3010862; 11–19 October 2003, collection code: MA-02-20-42, 1 female, CASENT 3010831; 8–18 March 2003, collection code: MA-02-20-18, 1 female, CASENT 3010927; 1 female, CASENT 3010925; 9–16 December 2002, collection code: MA-02-20-08, 1 female, CASENT 3010446; 28 January–12 February 2004, collection code: MA-02-20-53, 1 male, CASENT 8078064; 1 male, CASENT 8078057; 1 male, CASENT 8078058; 1 male, CASENT 8078062; 1 female, CASENT 8078060; 1 female, CASENT 8078061; 1 female, CASENT 8078063; 1 female, CASENT 8078056; 1 female, CASENT 8078065; 1 female, CASENT 8078059; 15–28 January 2004, collection code: MA-02-20-52, 1 male, CASENT 8078022; 1 male, CASENT 8078023; 1 female, CASENT 8078024; 1 female, CASENT 8078025 (MNRJ). Mikea Forest, NW of Manombo, elev. 30 m, 22°54.22'S 43°28.53'E, Malaise trap, deciduous dry forest, 27 December–6 January 2002, R. Harin'Hala, collection code: MA-02-18A-08, 1 female, CASENT 3010284; 21 September–2 October 2003, collection code: MA-02-18A-69, 1 female, CASENT 3010816. **Fianarantsoa Province:** JIRAMA, water works, 21°14.91'S 47°27.13'E, Malaise trap near river, elev. 690 m, 10–14 January 2002, R. Harin'Hala, collection code: MA-02-09D-11, 1 male, CASENT 3009990; 1 male, CASENT 3009981; 1 female, CASENT 3009991; 1 female, CASENT 3009977. Parc National d'Isalo, 9.1 km, 354° N Ranohira, elev. 725 m, 22°28'54"S 45°27'42"E, collected at light gallery forest, 27–31 January 2003, Fisher, Griswold *et al.*, collection code: BLF7304, 1 female, CASENT 3009303. Parc National Ranomafana, radio tower at forest edge, elev. 1130 m, 21°15'05"S 47°24'43"E, Malaise trap, mixed tropical forest, 15–21 December 2001, R. Harin'Hala, collection code: MA-02-09B-07, 1 female, CASENT 3009930; 1 female, CASENT 3010057. Sept Lacs, elev. 120 m, 23°31'65"S 44°9'35"E, Malaise trap, gallery forest, 21–26 August 2002, Frontier Wilderness Project, collection code: MGF038, 1 female, CASENT 3009235. Belle Vue at Talatakely, elev. 1020 m, 21°15.99'S 47°25.21'E, Malaise trap, secondary tropical forest, 14–21 January 2002, R. Harin'Hala, collection code: MA-02-09C-12, 1 female, CASENT 3009836. **Mahajanga Province:** Parc National d'Ampijoroa, 160 km N of Maevatanana on RN 04, elev. 43 m, 16°19.16'S 46°48.80'E, Malaise trap, in deciduous forest, 5–12 October 2003, R. Harin'Hala, collection code: MA-25-18, 1 male, CASENT 3010325; 1 female; CASENT 3010348; 1 female, CASENT 3010327; 1 female, CASENT 3010326; 28 September–5 October 2003, collection code: MA-25-17, 1 male, CASENT 3010474; 1 male, CASENT 3010469; 1 male, CASENT 3010468; 1 female, CASENT 3010475; 7–14 September 2003, collection code: MA-25-14, 1 male, CASENT 3010449. **Antananarivo Province:** Tananarive, March 1965, 4 females, G.Uilenberg (BMNH).

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Illustrations

Figures 1–120

- FIGURE 1. *Atherigona* sp. Head, lateral view (modified from Pont and Magpayo, 1995)
- FIGURE 2. *Neomyia setulosa* (Zielke, 1972). Suprasquamal ridge
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- FIGURE 4. *Musca xanthomelaena* Wiedemann, 1830. Wing
- FIGURE 5. *Morellia calyptrata* Stein, 1913. Wing
- FIGURE 6. *Pygophora pallipalpis* Stein, 1910. Head, lateral view
- FIGURE 7. *Coenosia nitidiventris* Stein, 1906. Head, lateral view
- FIGURE 8. *Anaphalantus longicornis* (Macquart, 1843). Head, lateral view (modified from Couri and Pont, 2000)

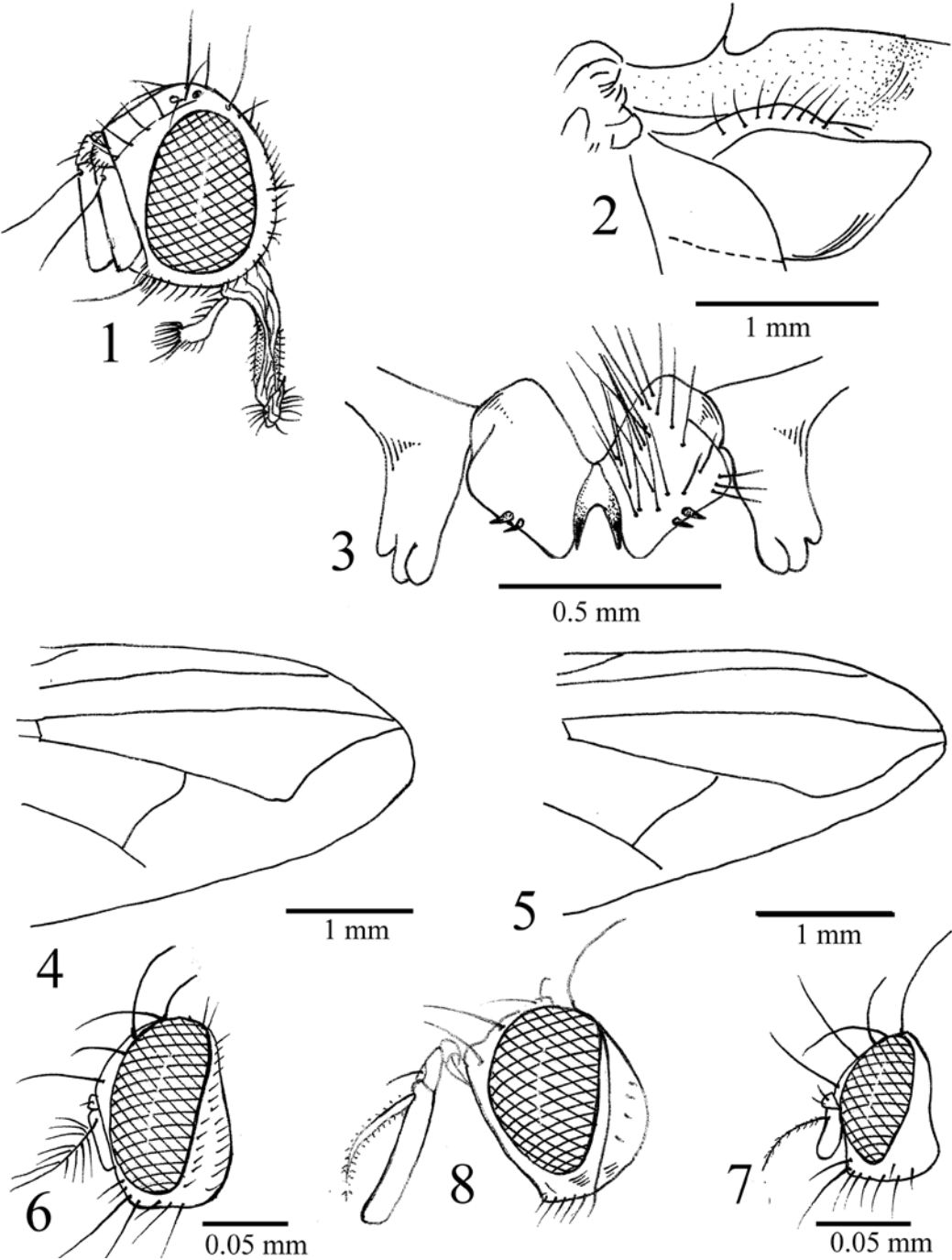


FIGURE 9. *Atherigona (Atherigona) contrastiloba* Deeming, 1987. Male, hypopygial prominence, dorsal view

FIGURE 10. *Atherigona (Atherigona) contrastiloba* Deeming, 1987. Male, hypopygial prominence, lateral view

FIGURE 11. *Atherigona (Atherigona) contrastiloba* Deeming, 1987. Male. Trifoliate process

FIGURE 12. *Atherigona (Atherigona) contrastiloba* Deeming, 1987. Male. Trifoliate process, apex, dorsal view

FIGURE 13. *Atherigona (Atherigona) contrastiloba* Deeming, 1987. Male. Trifoliate process, apex, lateral view

FIGURE 14. *Atherigona (Atherigona) nigradorsalis*, sp. nov. Male, hypopygial prominence, dorsal view

FIGURE 15. *Atherigona (Atherigona) nigradorsalis*, sp. nov. Male, hypopygial prominence, lateral view

FIGURE 16. *Atherigona (Atherigona) nigradorsalis*, sp. nov. Male. Trifoliate process

FIGURE 17. *Atherigona (Atherigona) nigradorsalis*, sp. nov. Male. Trifoliate process, apex, dorsal view

FIGURE 18. *Atherigona (Atherigona) nigradorsalis*, sp. nov. Male. Trifoliate process, apex, lateral view

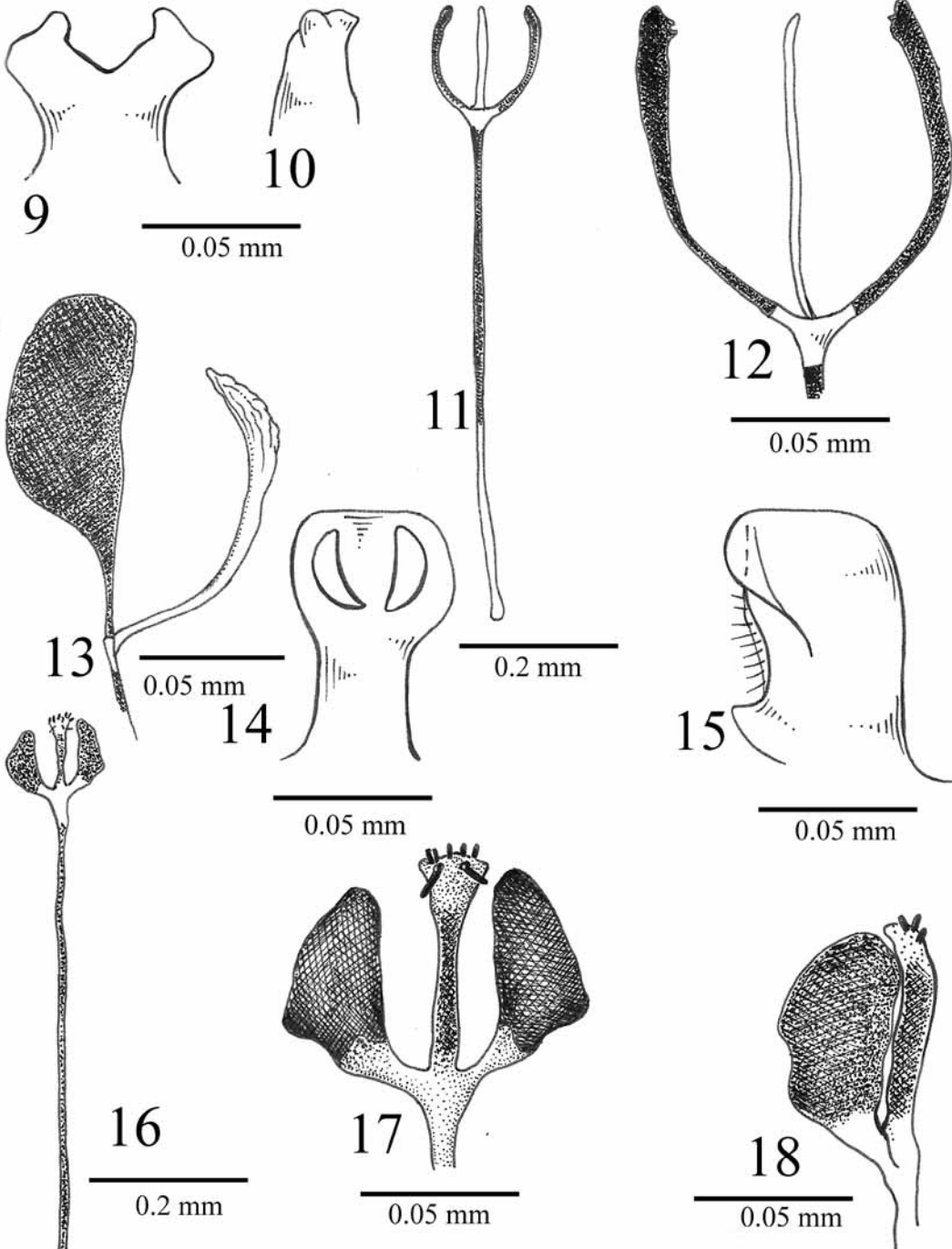


FIGURE 19. *Atherigona (Atherigona) quadriseta*, sp. nov. Male, hypopygial prominence, dorsal view

FIGURE 20. *Atherigona (Atherigona) quadriseta*, sp. nov. Male, hypopygial prominence, lateral view

FIGURE 21. *Atherigona (Atherigona) quadriseta*, sp. nov. Male. Trifoliate process

FIGURE 22. *Atherigona (Atherigona) quadriseta*, sp. nov. Male. Trifoliate process, apex, dorsal view

FIGURE 23. *Atherigona (Atherigona) quadriseta*, sp. nov. Male. Trifoliate process, apex, lateral view

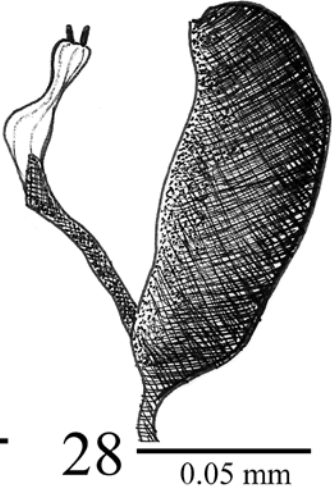
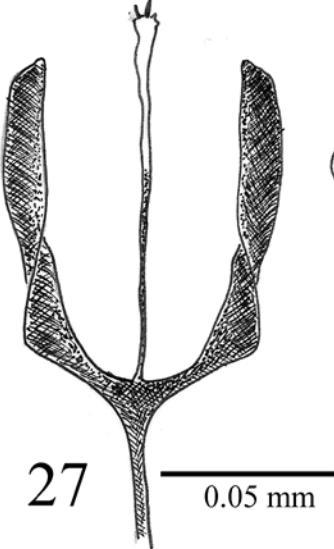
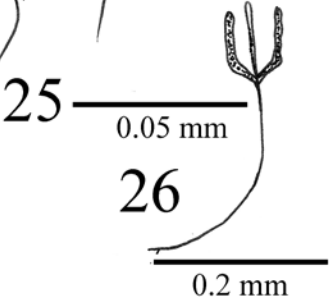
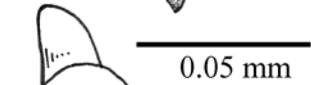
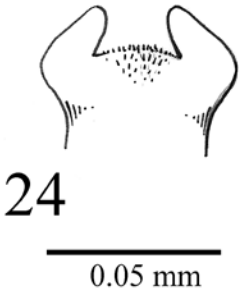
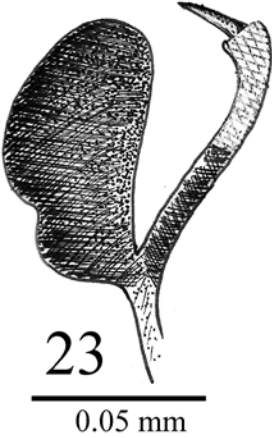
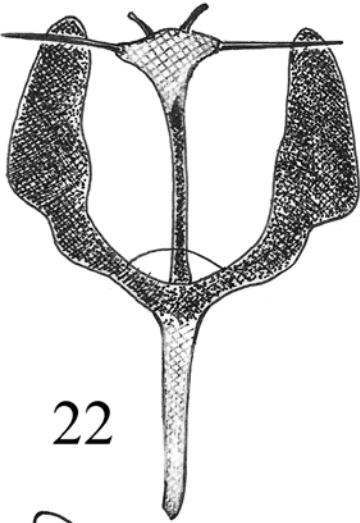
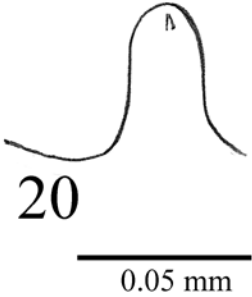
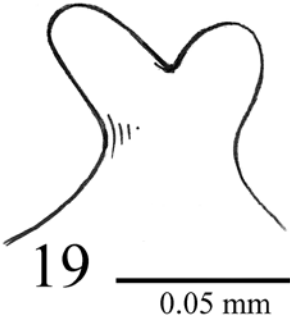
FIGURE 24. *Atherigona (Atherigona) variata*, sp. nov. Male, hypopygial prominence, dorsal view

FIGURE 25. *Atherigona (Atherigona) variata*, sp. nov. Male, hypopygial prominence, lateral view

FIGURE 26. *Atherigona (Atherigona) variata*, sp. nov. Male. Trifoliate process

FIGURE 27. *Atherigona (Atherigona) variata*, sp. nov. Male. Trifoliate process, apex, dorsal view

FIGURE 28. *Atherigona (Atherigona) variata*, sp. nov. Male. Trifoliate process, apex, lateral view



- FIGURE 29. *Brontaea differa*, sp. nov. Male. Sternite 5, dorsal view
FIGURE 30. *Brontaea differa*, sp. nov. Male. Cercal plate and surstyli, dorsal view
FIGURE 31. *Brontaea differa*, sp. nov. Male. Cercal plate and surstyli, lateral view
FIGURE 32. *Brontaea differa*, sp. nov. Male. Aedeagus, dorsal view
FIGURE 33. *Brontaea differa*, sp. nov. Male. Aedeagus, lateral view

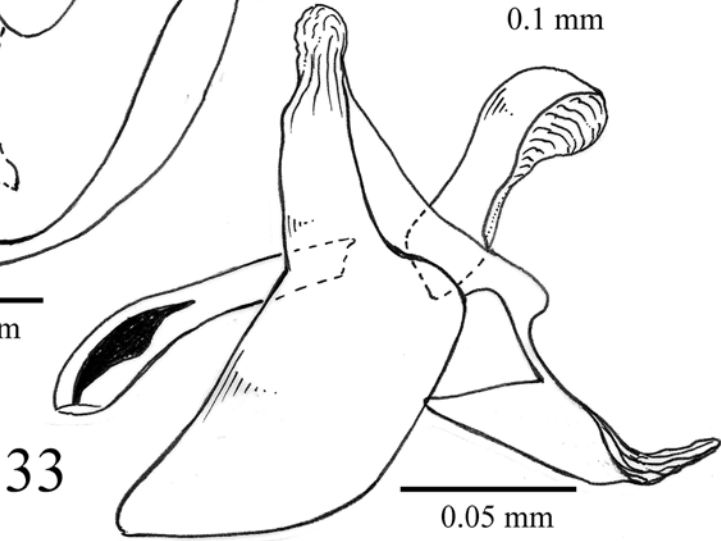
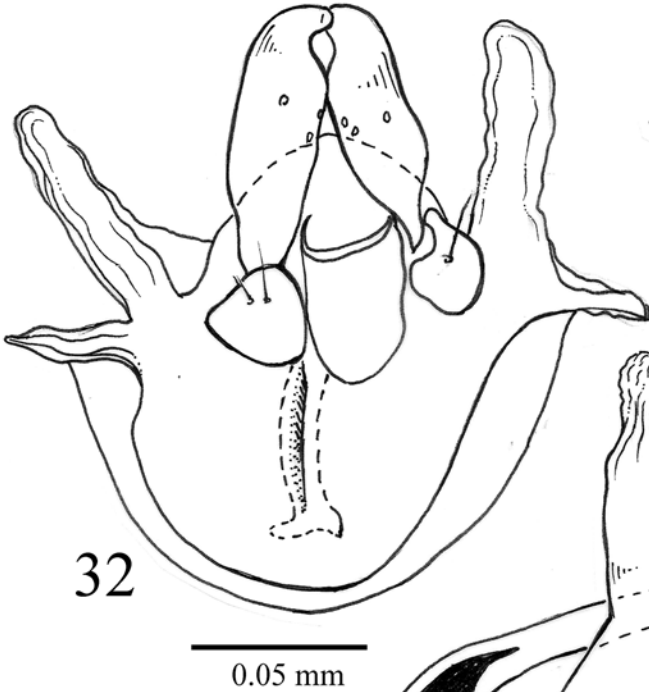
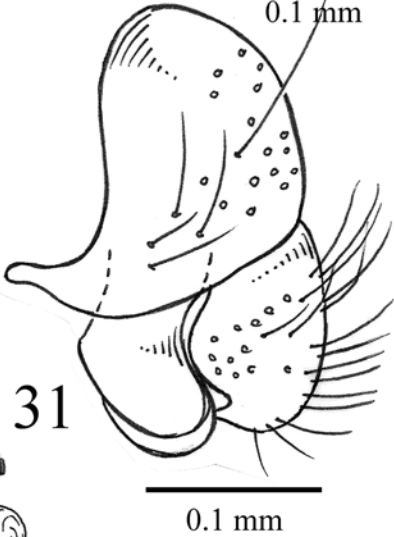
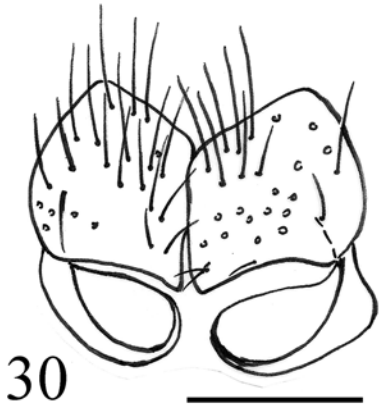
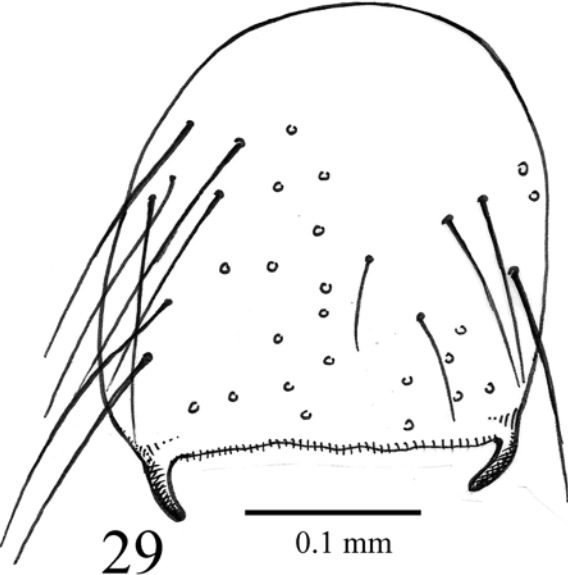


FIGURE 34. *Brontaea differa*, sp. nov. Female. Ovipositor, dorsal view

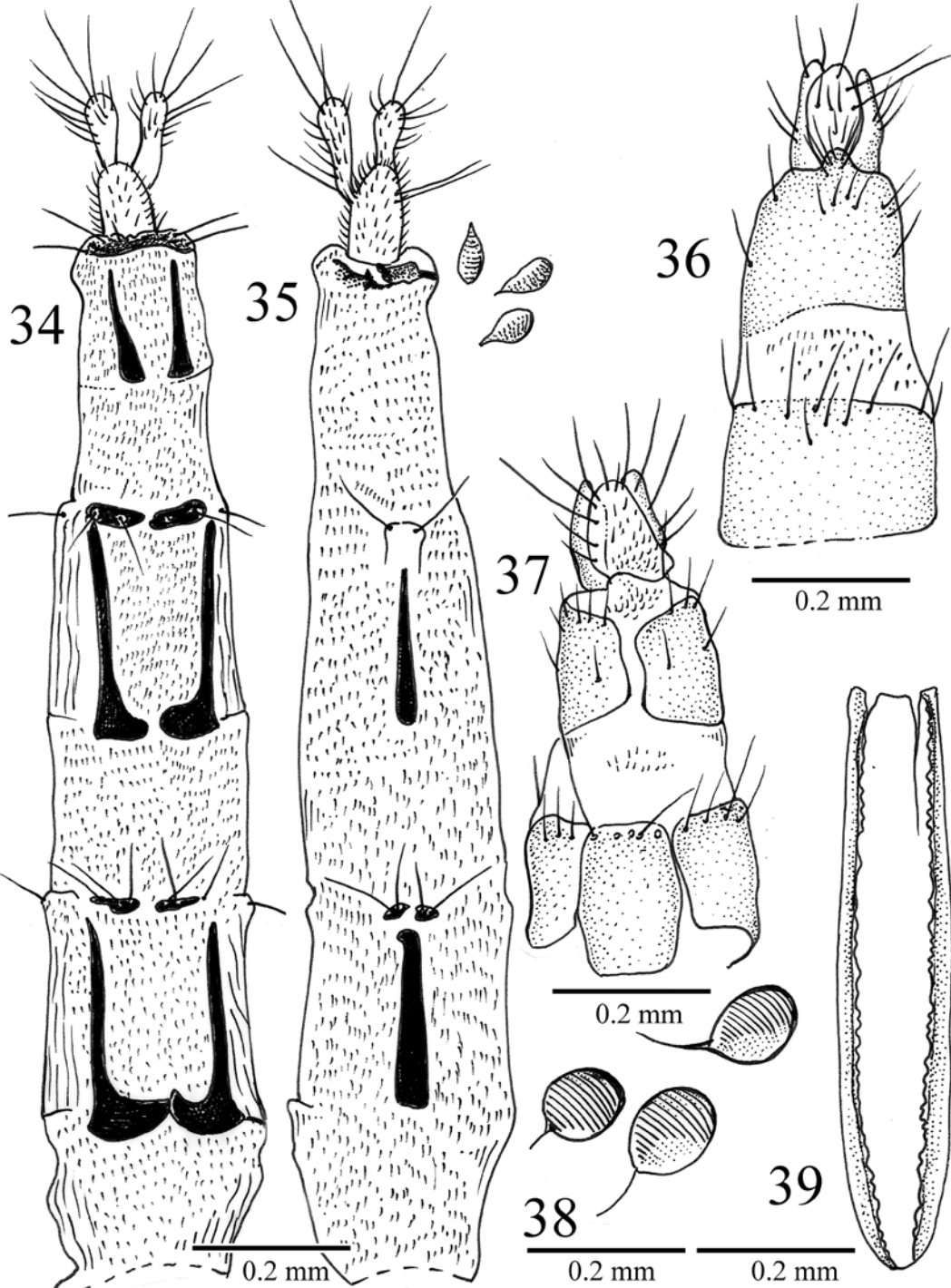
FIGURE 35. *Brontaea differa*, sp. nov. Female. Ovipositor, ventral view and spermathecae

FIGURE 36. *Cephalispa azurea*, sp. nov. Female. Ovipositor, dorsal view

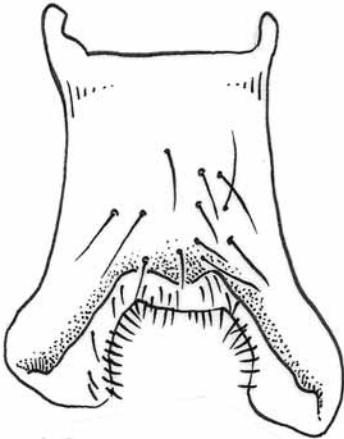
FIGURE 37. *Cephalispa azurea*, sp. nov. Female. Ovipositor, lateral view

FIGURE 38. *Cephalispa azurea*, sp. nov. Female. Spermathecae

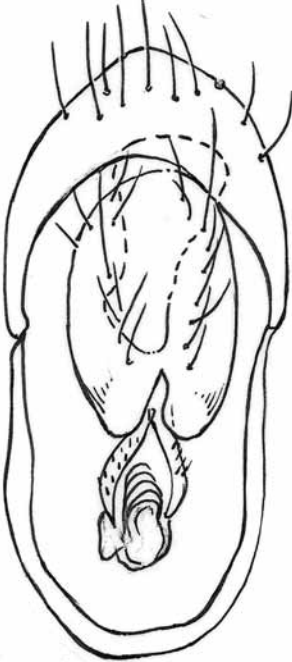
FIGURE 39. *Cephalispa azurea*, sp. nov. Egg, dorsal view



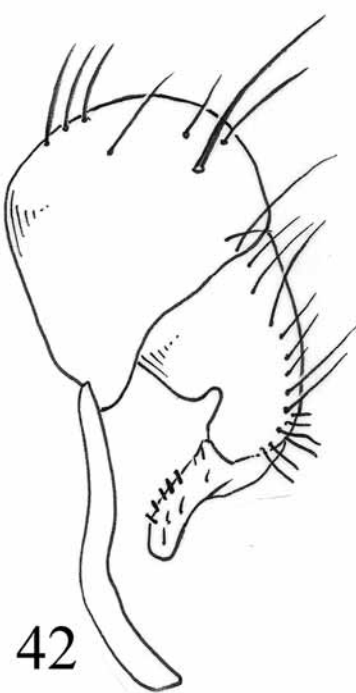
- FIGURE 40. *Cephalispa curta*, sp. nov. Male. Sternite 5, dorsal view
FIGURE 41. *Cephalispa curta*, sp. nov. Male. Epandrium, sternite 6; cercal plate and surstyli, dorsal view
FIGURE 42. *Cephalispa curta*, sp. nov. Male. Epandrium, sternite 6; cercal plate and surstyli, lateral view
FIGURE 43. *Cephalispa curta*, sp. nov. Male. Cercal plate, surstyli, aedeagus, lateral view
FIGURE 44. *Cephalispa curta*, sp. nov. Female. Ovipositor, dorsal view
FIGURE 45. *Cephalispa curta*, sp. nov. Female. Ovipositor, ventral view
FIGURE 46. *Cephalispa curta*, sp. nov. Female. Spermathecae



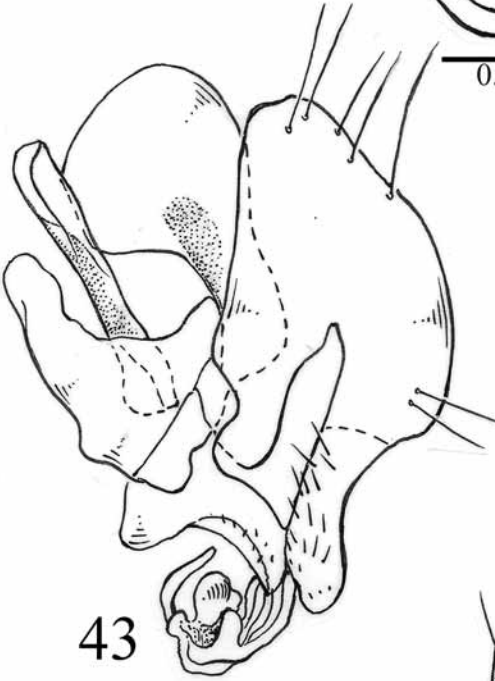
40 0.2 mm



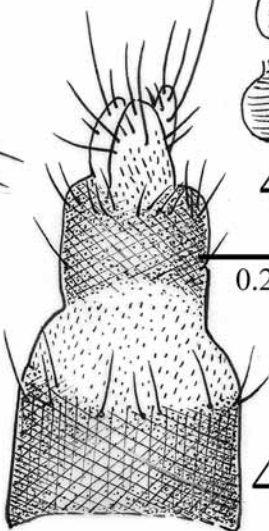
41 0.2 mm



42 0.2 mm



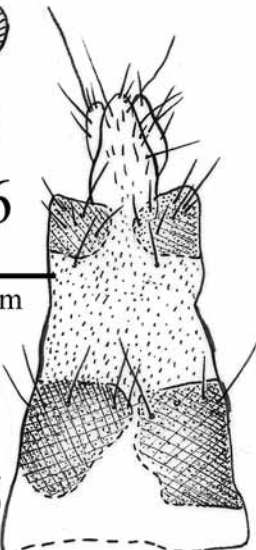
43 0.2 mm



44



46 0.2 mm



45

FIGURE 47. *Coenosia aberrans*, sp. nov. Female. Ovipositor, dorsal view

FIGURE 48. *Coenosia aberrans*, sp. nov. Female. Ovipositor, ventral view and spermathecae

FIGURE 49. *Dichaetomyia (Dichaetomyia) nigra*, sp. nov. Male. Sternite 5, dorsal view

FIGURE 50. *Dichaetomyia (Dichaetomyia) nigra*, sp. nov. Male. Cercal plate and surstyli, dorsal view

FIGURE 51. *Dichaetomyia (Dichaetomyia) nigra*, sp. nov. Male. Cercal plate and surstyli, lateral view

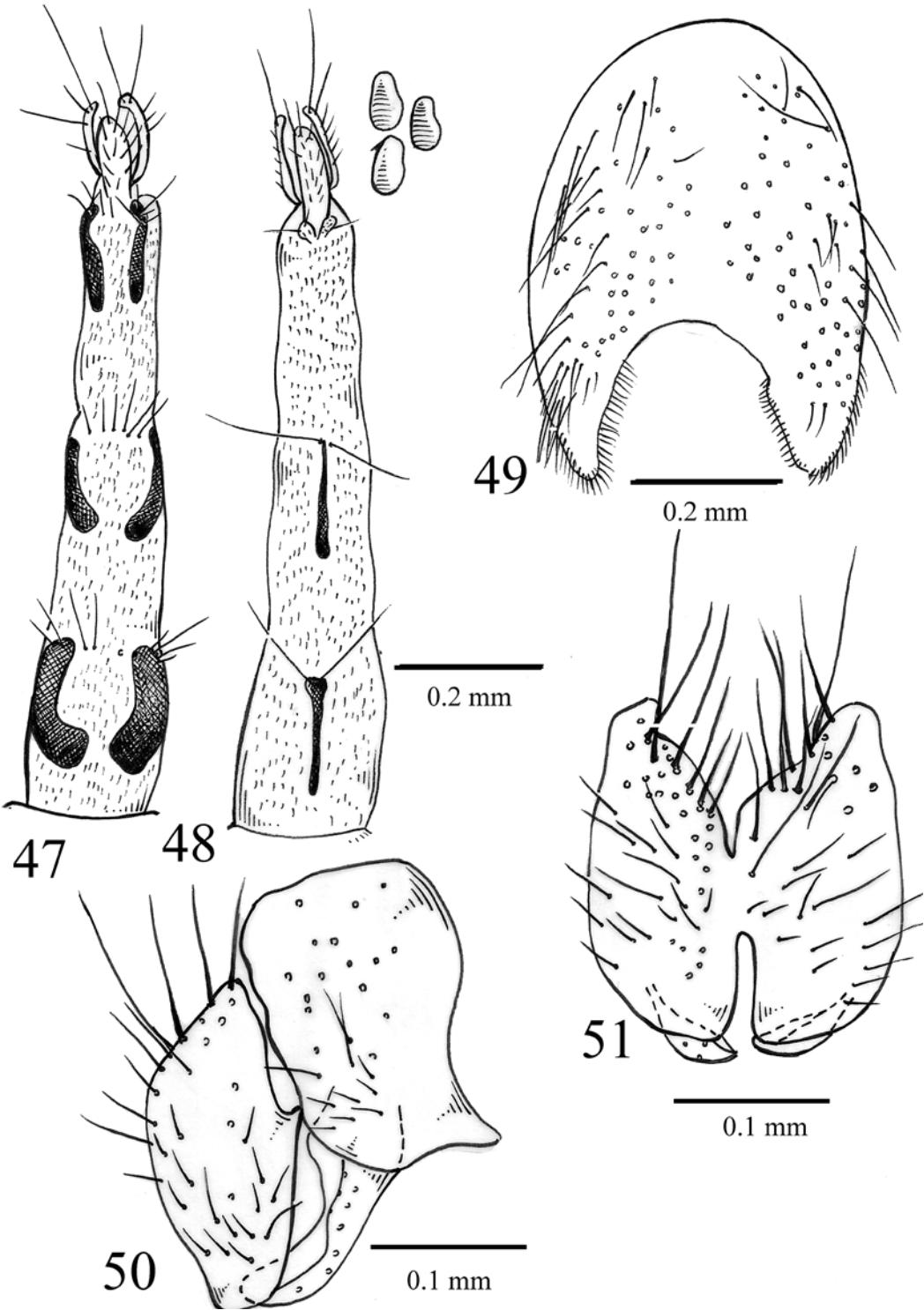


FIGURE 52. *Dichaetomyia (Dichaetomyia) nigra*, sp. nov. Male. Aedeagus, dorsal view

FIGURE 53. *Dichaetomyia (Dichaetomyia) nigra*, sp. nov. Male. Aedeagus, lateral view

FIGURE 54. *Dichaetomyia (Dichaetomyia) nigra*, sp. nov. Female. Ovipositor, dorsal view

FIGURE 55. *Dichaetomyia (Dichaetomyia) nigra*, sp. nov. Female. Ovipositor, ventral view and spermathecae

FIGURE 56. *Dichaetomyia (Dichaetomyia) tricolorata*, sp. nov. Male. Sternite 5, dorsal view

FIGURE 57. *Dichaetomyia (Dichaetomyia) tricolorata*, sp. nov. Male. Cercal plate and surstyli, dorsal view

FIGURE 58. *Dichaetomyia (Dichaetomyia) tricolorata*, sp. nov. Male. Cercal plate and surstyli, lateral view

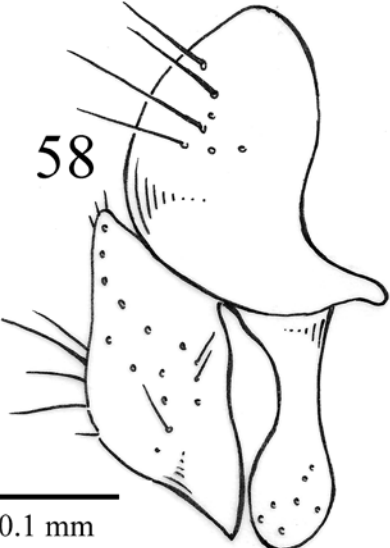
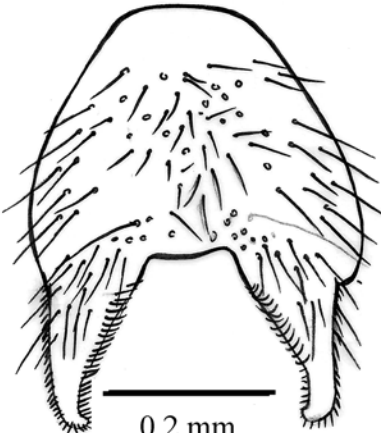
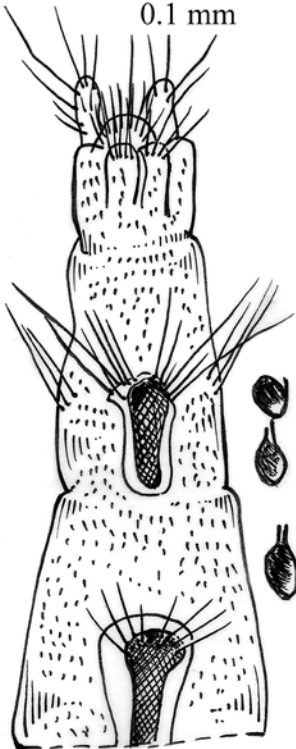
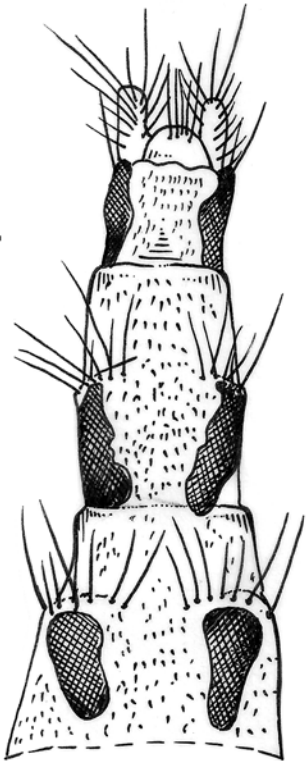
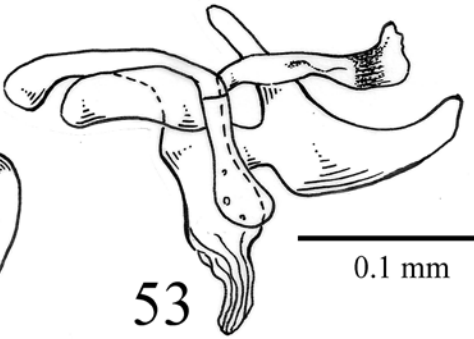
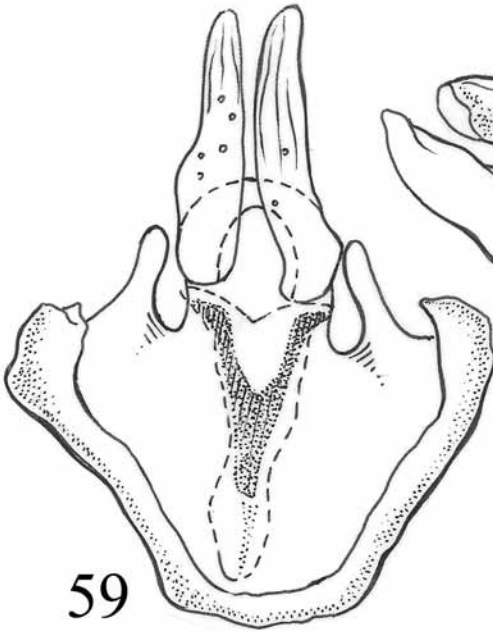


FIGURE 59. *Dichaetomyia (Dichaetomyia) tricolorata*, sp. nov. Male. Aedeagus, dorsal view

FIGURE 60. *Dichaetomyia (Dichaetomyia) tricolorata*, sp. nov. Male. Aedeagus, lateral view

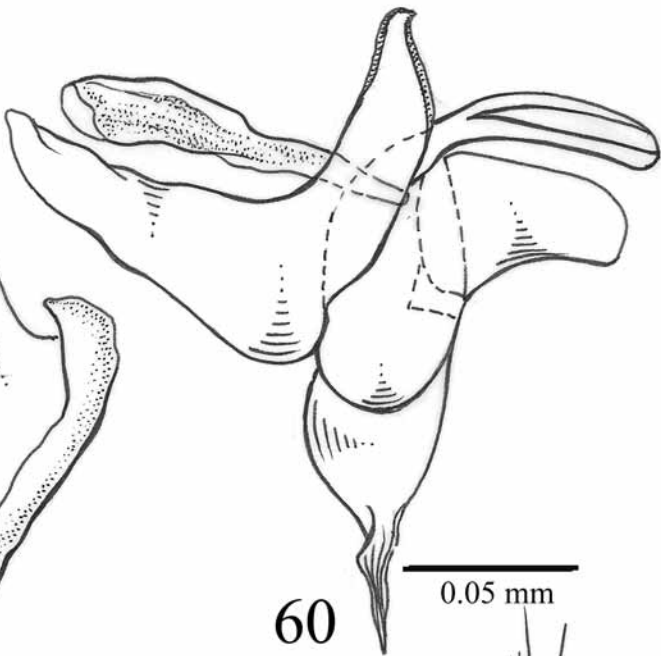
FIGURE 61. *Dichaetomyia (Dichaetomyia) tricolorata*, sp. nov. Female. Ovipositor, dorsal view

FIGURE 62. *Dichaetomyia (Dichaetomyia) tricolorata*, sp. nov. Female. Ovipositor, ventral view and spermathecae



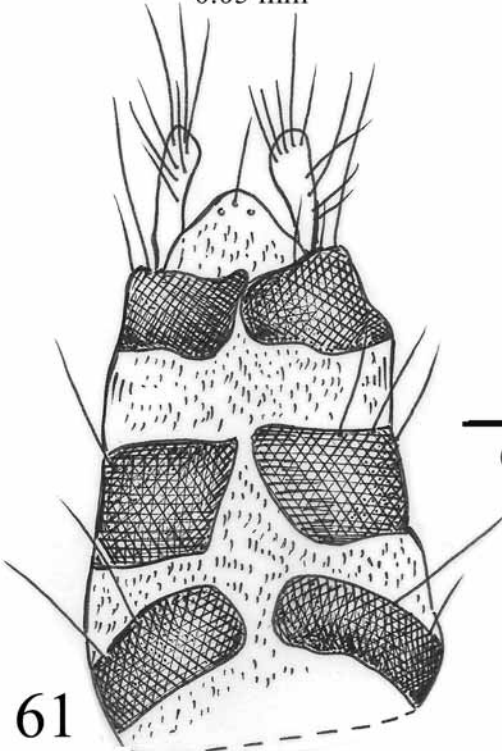
59

0.05 mm



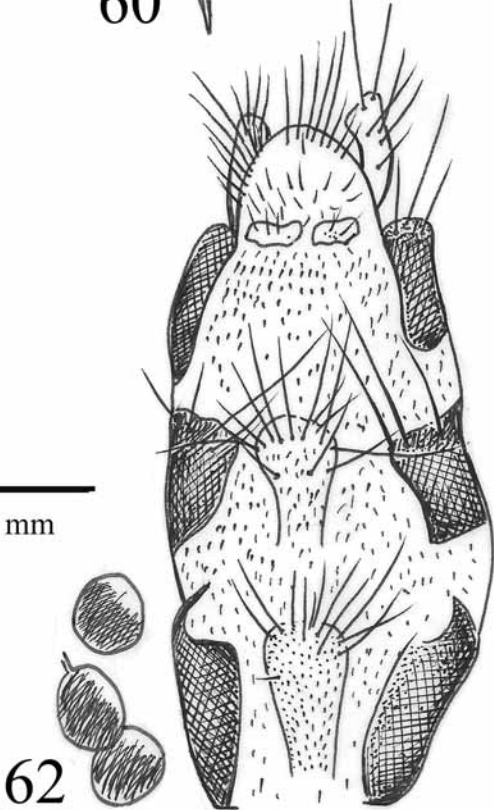
60

0.05 mm



61

0.2 mm



62

0.2 mm

- FIGURE 63. *Dichaetomyia (Panaga) colorata*, sp. nov. Male. Sternite 5, dorsal view
FIGURE 64. *Dichaetomyia (Panaga) colorata*, sp. nov. Male. Cercal plate and surstyli, dorsal view
FIGURE 65. *Dichaetomyia (Panaga) colorata*, sp. nov. Male. Cercal plate and surstyli, lateral view
FIGURE 66. *Dichaetomyia (Panaga) colorata*, sp. nov. Male. Aedeagus, dorsal view
FIGURE 67. *Dichaetomyia (Panaga) colorata*, sp. nov. Male. Aedeagus, lateral view

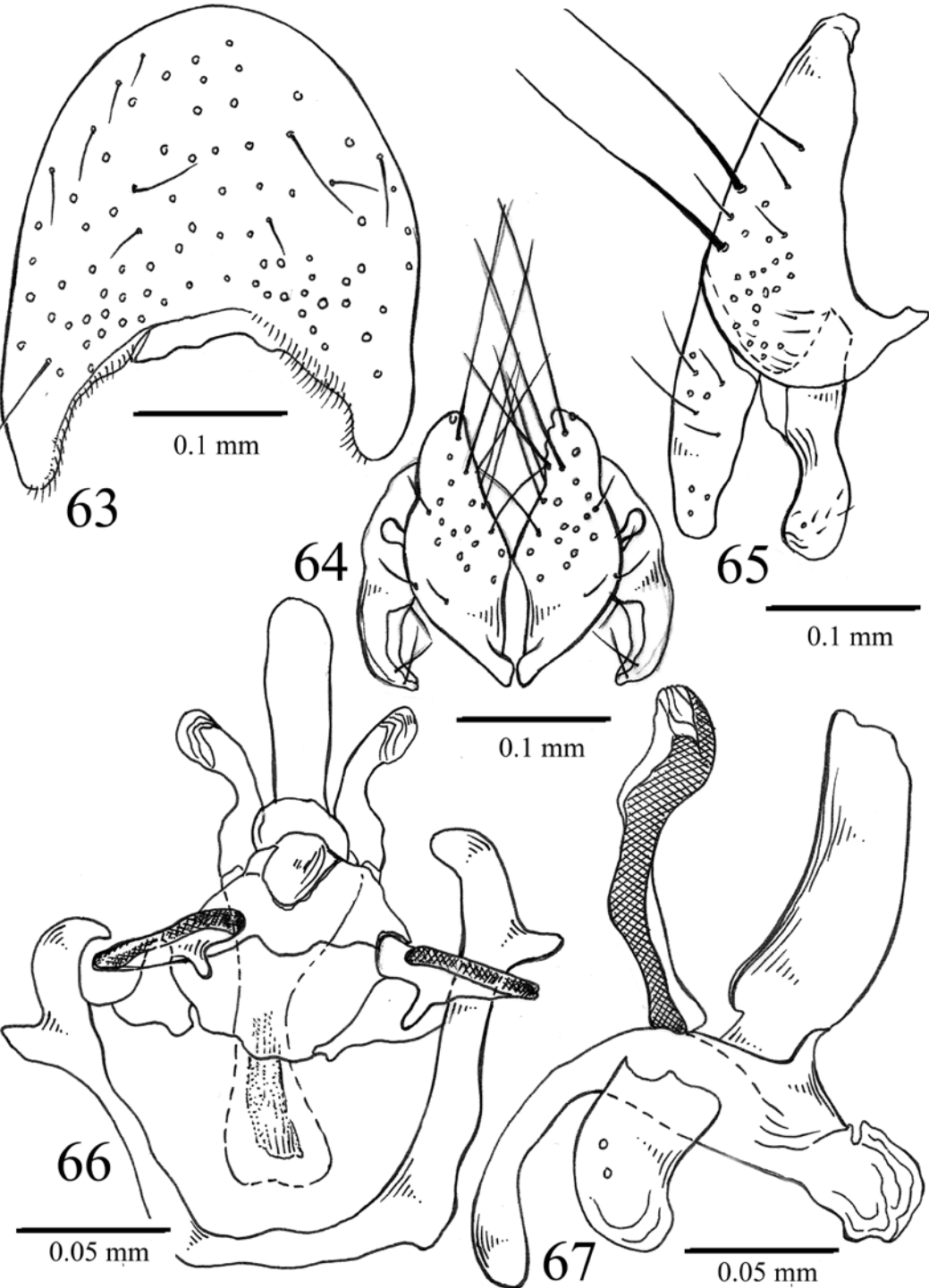


FIGURE 68. *Dichaetomyia (Panaga) colorata*, sp. nov. Female. Ovipositor, dorsal view

FIGURE 69. *Dichaetomyia (Panaga) colorata*, sp. nov. Female. Ovipositor, ventral view and spermathecae

FIGURE 70. *Dichaetomyia (Panaga) flabellifera*, sp. nov. Male. Sternite 5, dorsal view

FIGURE 71. *Dichaetomyia (Panaga) flabellifera*, sp. nov. Male. Cercal plate and surstyli, dorsal view

FIGURE 72. *Dichaetomyia (Panaga) flabellifera*, sp. nov. Male. Cercal plate and surstyli, lateral view

FIGURE 73. *Dichaetomyia (Panaga) flabellifera*, sp. nov. Male. Aedeagus, dorsal view

FIGURE 74. *Dichaetomyia (Panaga) flabellifera*, sp. nov. Male. Aedeagus, lateral view

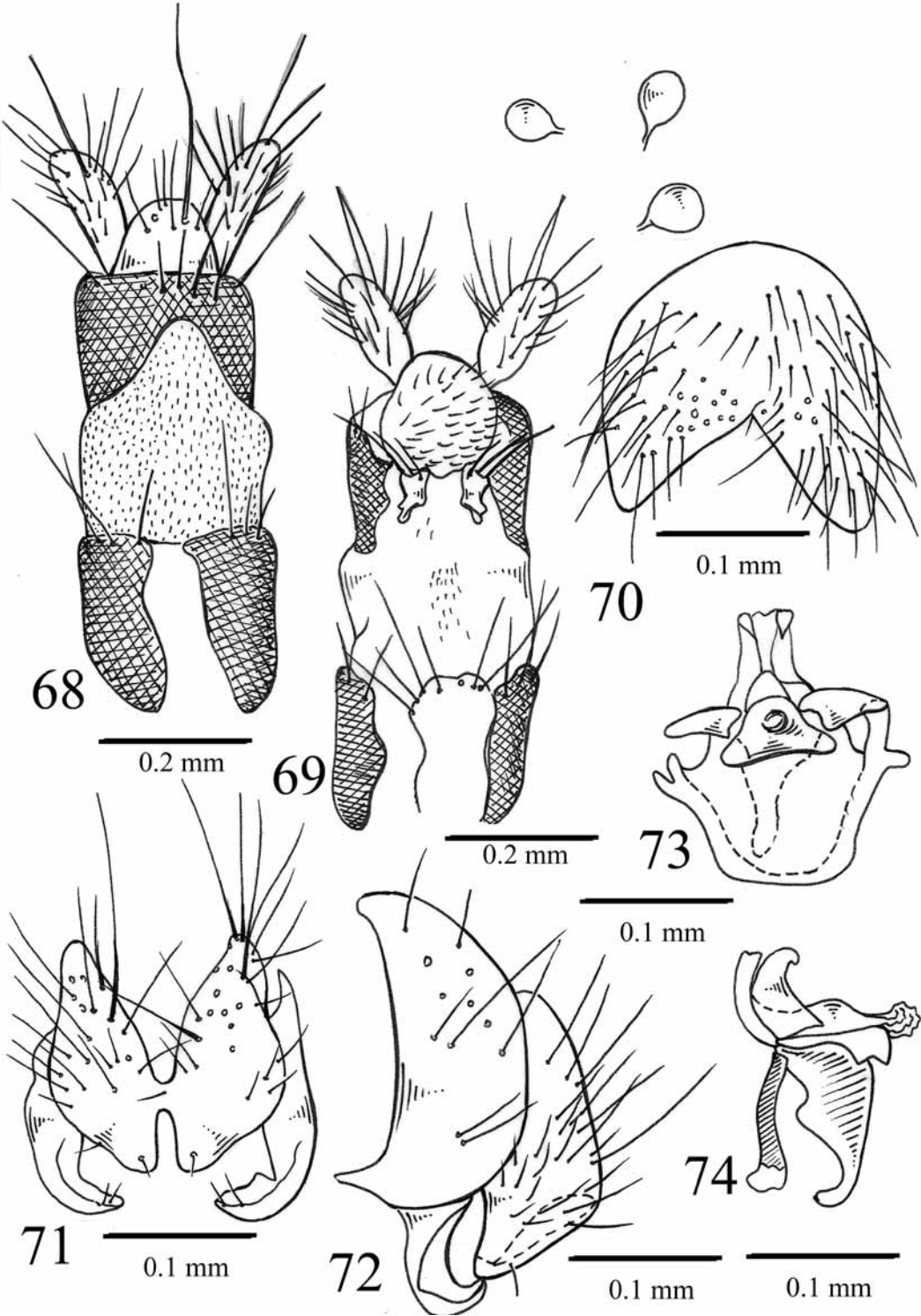
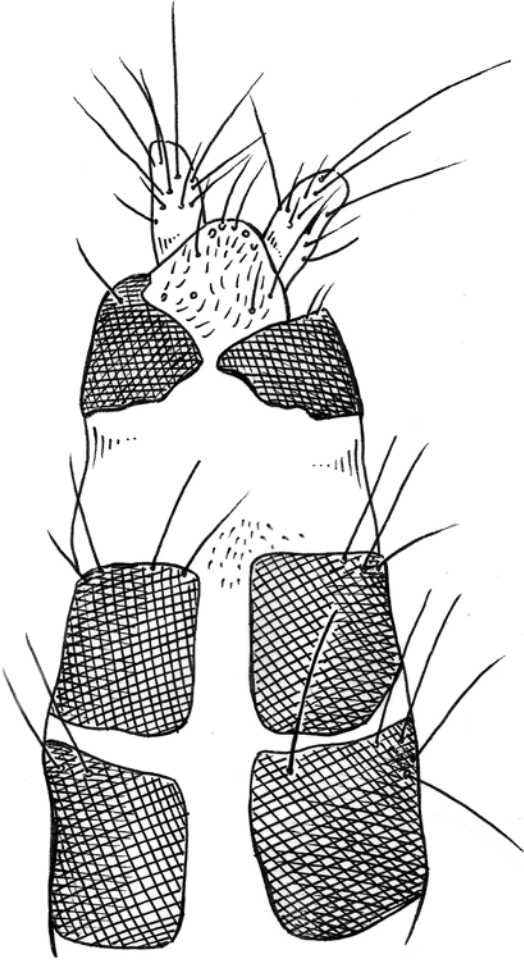


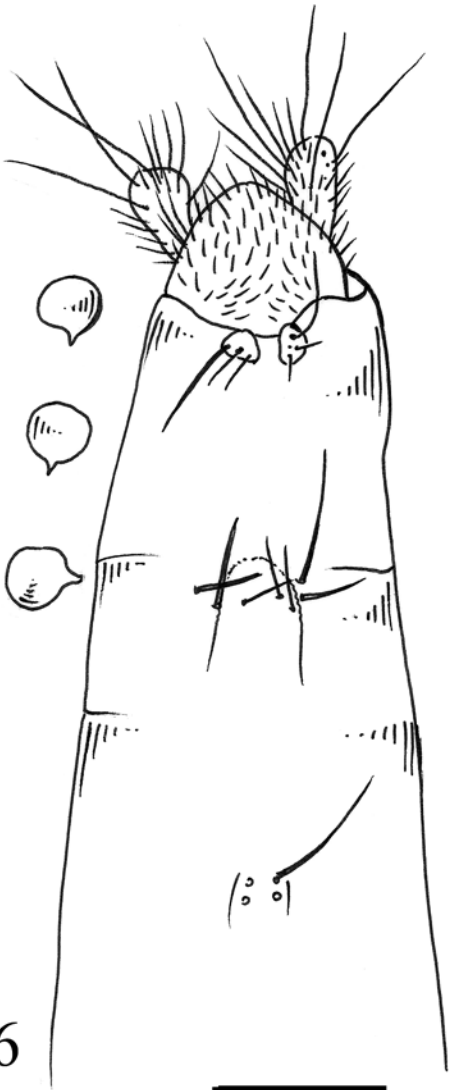
FIGURE 75. *Dichaetomyia (Panaga) flabellifera*, sp. nov. Female. Ovipositor, dorsal view

FIGURE 76. *Dichaetomyia (Panaga) flabellifera*, sp. nov. Female. Ovipositor, ventral view and spermathecae

FIGURE 77. *Hebecnema humeralis*, sp. nov. Female. Ovipositor, lateral view and spermathecae



75 0.2 mm



76 0.2 mm



77 0.1 mm

- FIGURE 78. *Hebecnema humeralis*, sp. nov. Larva, lateral view
FIGURE 79. *Hebecnema humeralis*, sp. nov. Larva, cephalopharyngeal skeleton
FIGURE 80. *Hebecnema humeralis*, sp. nov. Larva, posterior spiracles
FIGURE 81. *Helina flavomaculata*, sp. nov. Female. Ovipositor, dorsal view
FIGURE 82. *Helina flavomaculata*, sp. nov. Female. Ovipositor, ventral view and spermathecae
FIGURE 83. *Helina carpiae*, sp. nov. Male. Sternite 5, dorsal view
FIGURE 84. *Helina carpiae*, sp. nov. Male. Cercal plate and surstyli, dorsal view
FIGURE 85. *Helina carpiae*, sp. nov. Male. Cercal plate and surstyli, lateral view

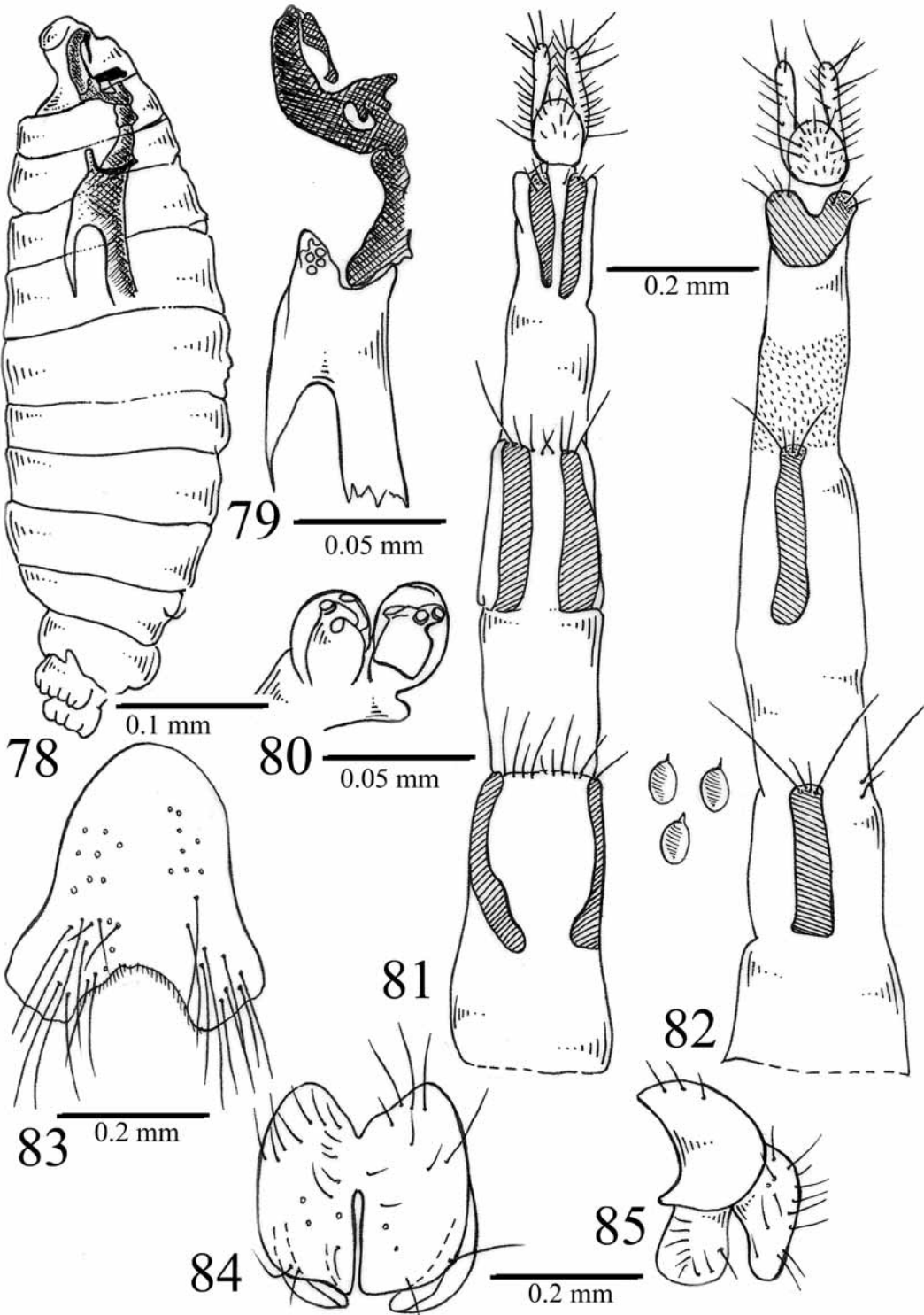


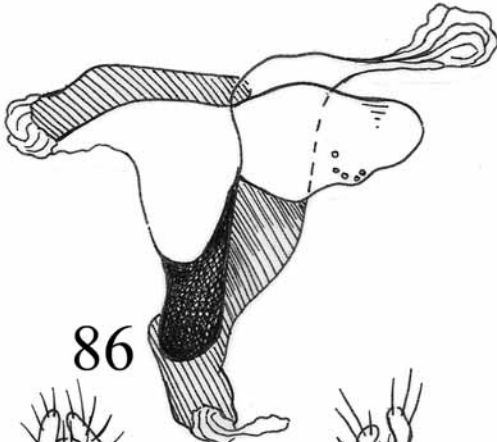
FIGURE 86. *Helina carpia*, sp. nov. Male. Aedeagus, lateral view

FIGURE 87. *Helina carpia*, sp. nov. Female. Ovipositor, dorsal view

FIGURE 88. *Helina carpia*, sp. nov. Female. Ovipositor, ventral view and spermath-
ecae

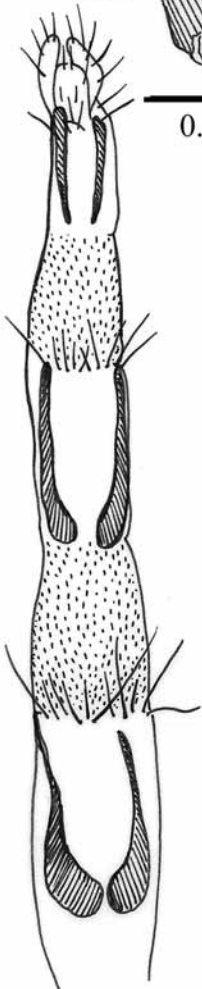
FIGURE 89. *Helina grisella*, sp. nov. Female. Ovipositor, dorsal view

FIGURE 90. *Helina grisella*, sp. nov. Female. Ovipositor, ventral view and spermath-
ecae



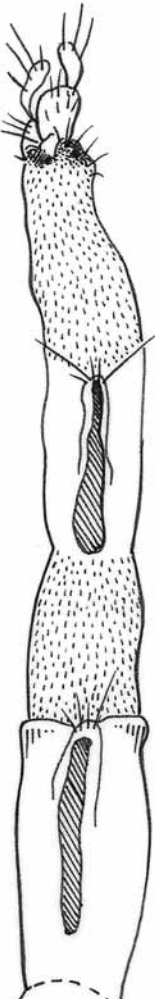
86

0.05 mm

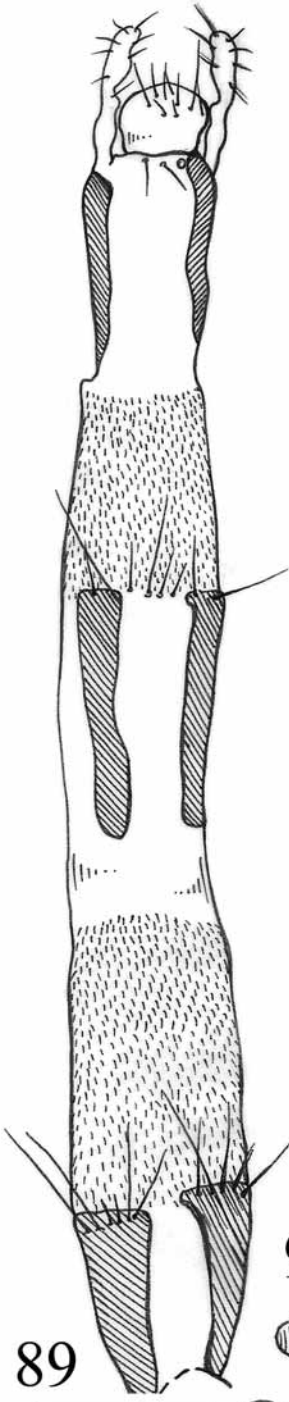


87

0.2 mm

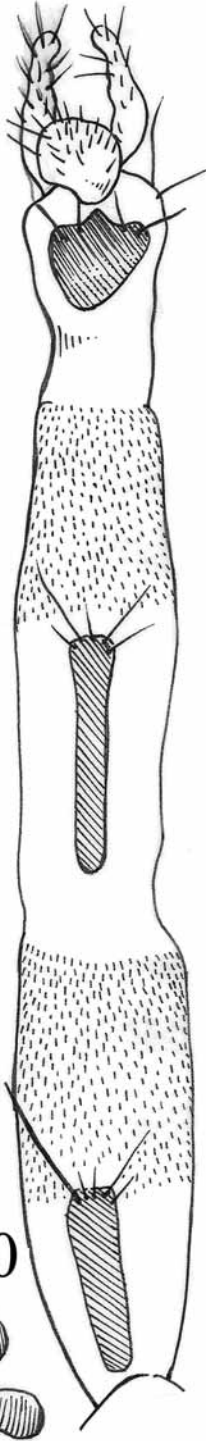


88



89

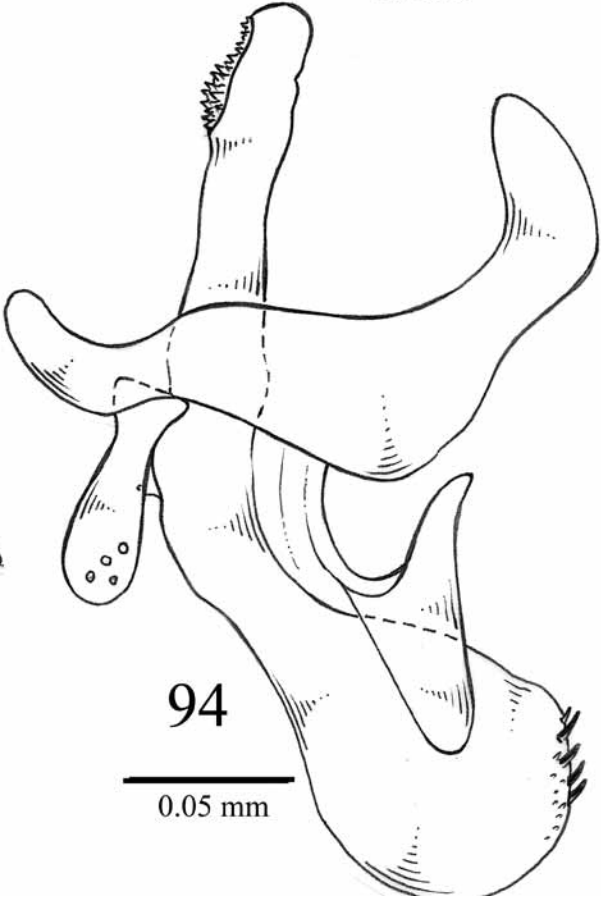
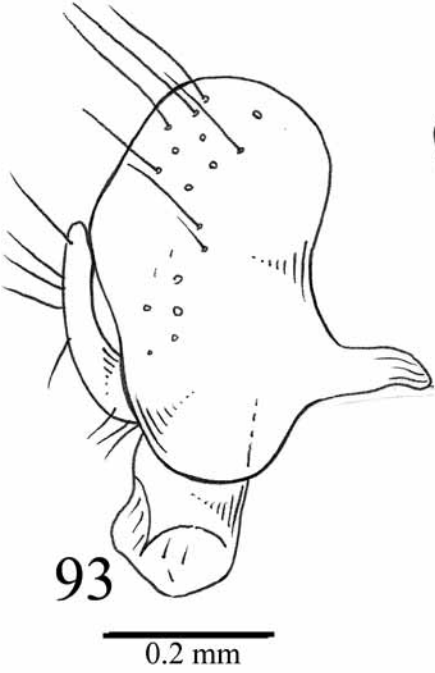
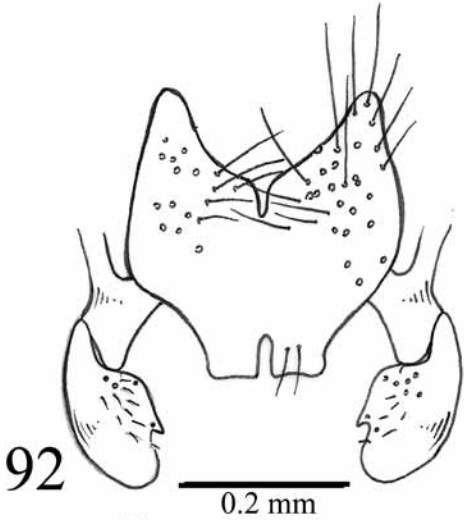
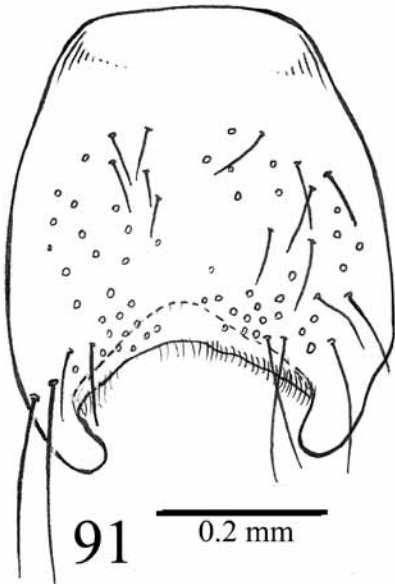
0.2 mm



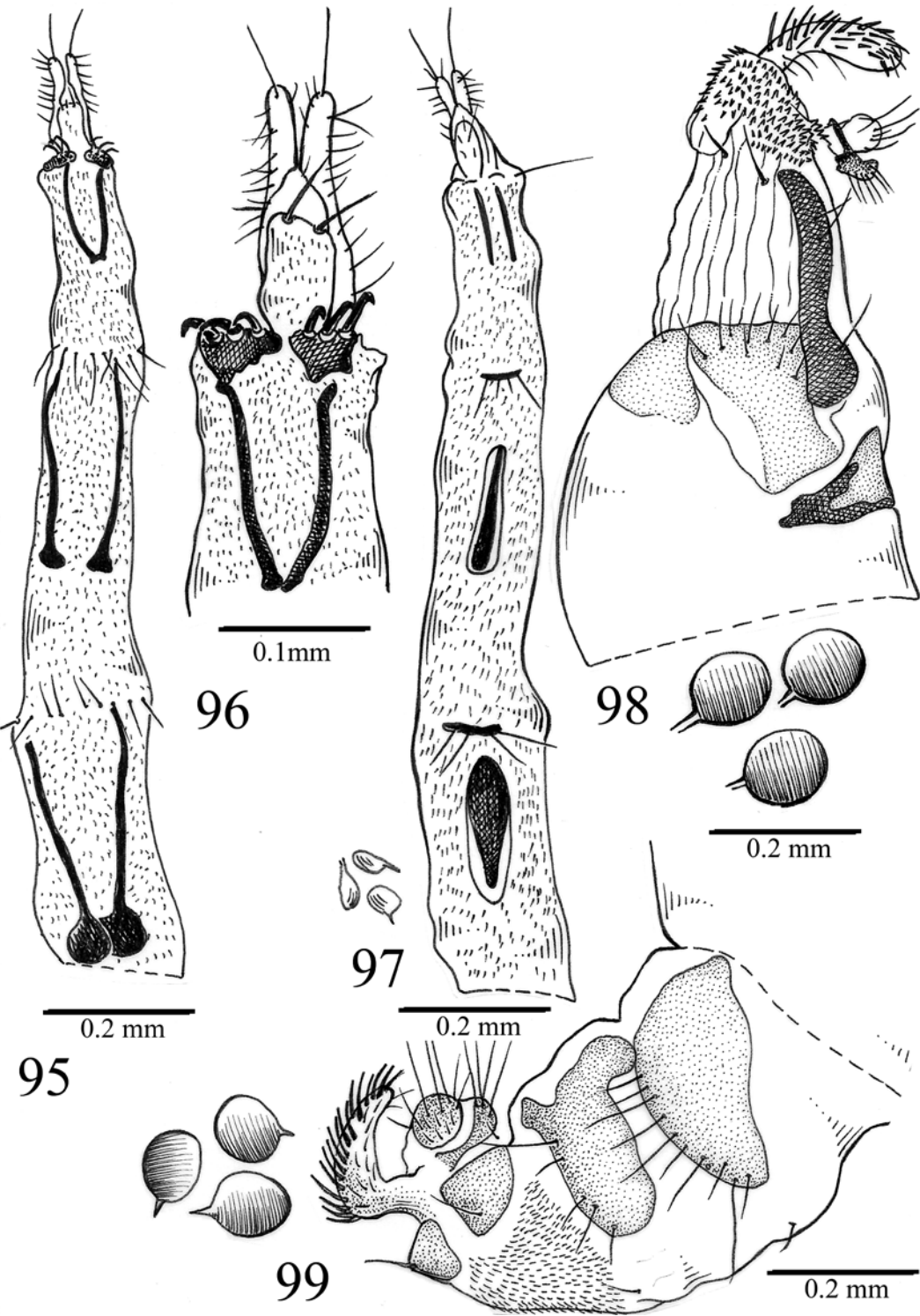
90

0.2 mm

- FIGURE 91. *Hydrotaea bella*, sp. nov. Male. Sternite 5, dorsal view
FIGURE 92. *Hydrotaea bella*, sp. nov. Male. Cercal plate and surstyli, dorsal view
FIGURE 93. *Hydrotaea bella*, sp. nov. Male. Cercal plate and surstyli, lateral view
FIGURE 94. *Hydrotaea bella*, sp. nov. Male. Aedeagus, lateral view



- FIGURE 95. *Hydrotaea bella*, sp. nov. Female. Ovipositor, dorsal view
- FIGURE 96. *Hydrotaea bella*, sp. nov. Female. Ovipositor, dorsal view, detail of apical segment
- FIGURE 97. *Hydrotaea bella*, sp. nov. Female. Ovipositor, ventral view and spermathecae
- FIGURE 98. *Linnophora mesovittata*, sp. nov. Female. Ovipositor, lateral view and spermathecae
- FIGURE 99. *Linnophora triangularis*, sp. nov. Female. Ovipositor, lateral view and spermathecae
- FIGURE 89. spermathecae



- FIGURE 100. *Lispacoenosia fulvitaris* Snyder, 1949. Male, head, lateral view (modified from Snyder, 1949a, FIGURE 3:2)
- FIGURE 101. *Lispe desjardinsii* Macquart, 1851. Male, fore tibia and tarsi (modified from Snyder 1949a, FIGURE 1:2)
- FIGURE 102. *Lispe argentata*, sp. nov. Male. Sternite 5, dorsal view
- FIGURE 103. *Lispe argentata*, sp. nov. Male. Cercal plate, dorsal view
- FIGURE 104. *Lispe argentata*, sp. nov. Male. Cercal plate and aedeagus, lateral view
- FIGURE 105. *Lispe argentata*, sp. nov. Female. Ovipositor, lateral view
- FIGURE 106. *Myospila paradoxalis* (Stein in Becker, 1903). Male, head, frontal view (modified from Snyder 1949b, FIGURE 14:21).
- FIGURE 107. *Phaonia plurivittata*, sp. nov. Male. Sternite 5, dorsal view

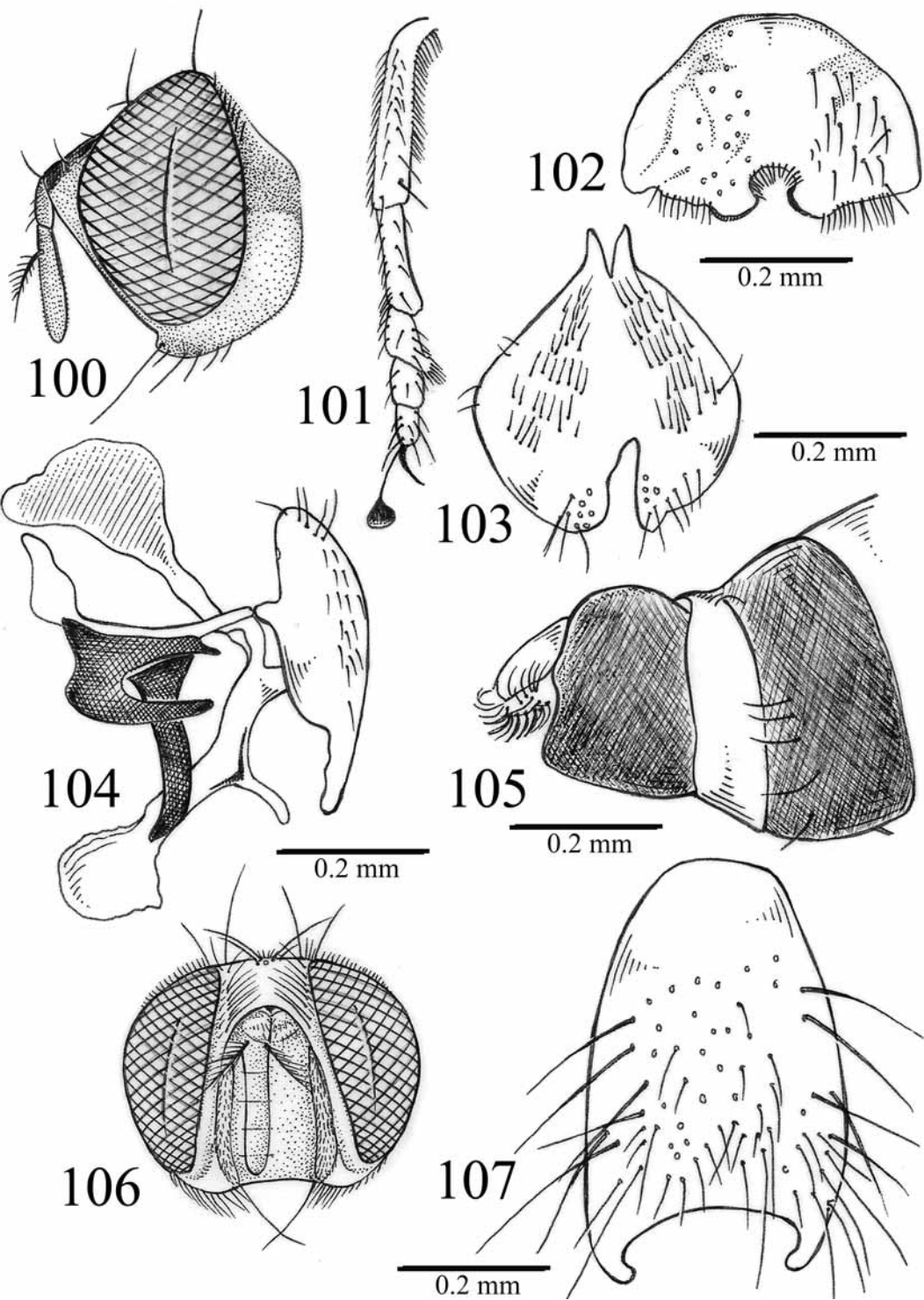


FIGURE 108. *Phaonia plurivittata*, sp. nov. Male. Cercal plate and surstyli, dorsal view

FIGURE 109. *Phaonia plurivittata*, sp. nov. Male. Cercal plate and surstyli, lateral view

FIGURE 110. *Phaonia plurivittata*, sp. nov. Male. Aedeagus, dorsal view

FIGURE 111. *Phaonia plurivittata*, sp. nov. Male. Aedeagus, lateral view

FIGURE 112. *Phaonia plurivittata*, sp. nov. Female. Ovipositor, dorsal view

FIGURE 113. *Phaonia plurivittata*, sp. nov. Female. Ovipositor, ventral view and spermathecae

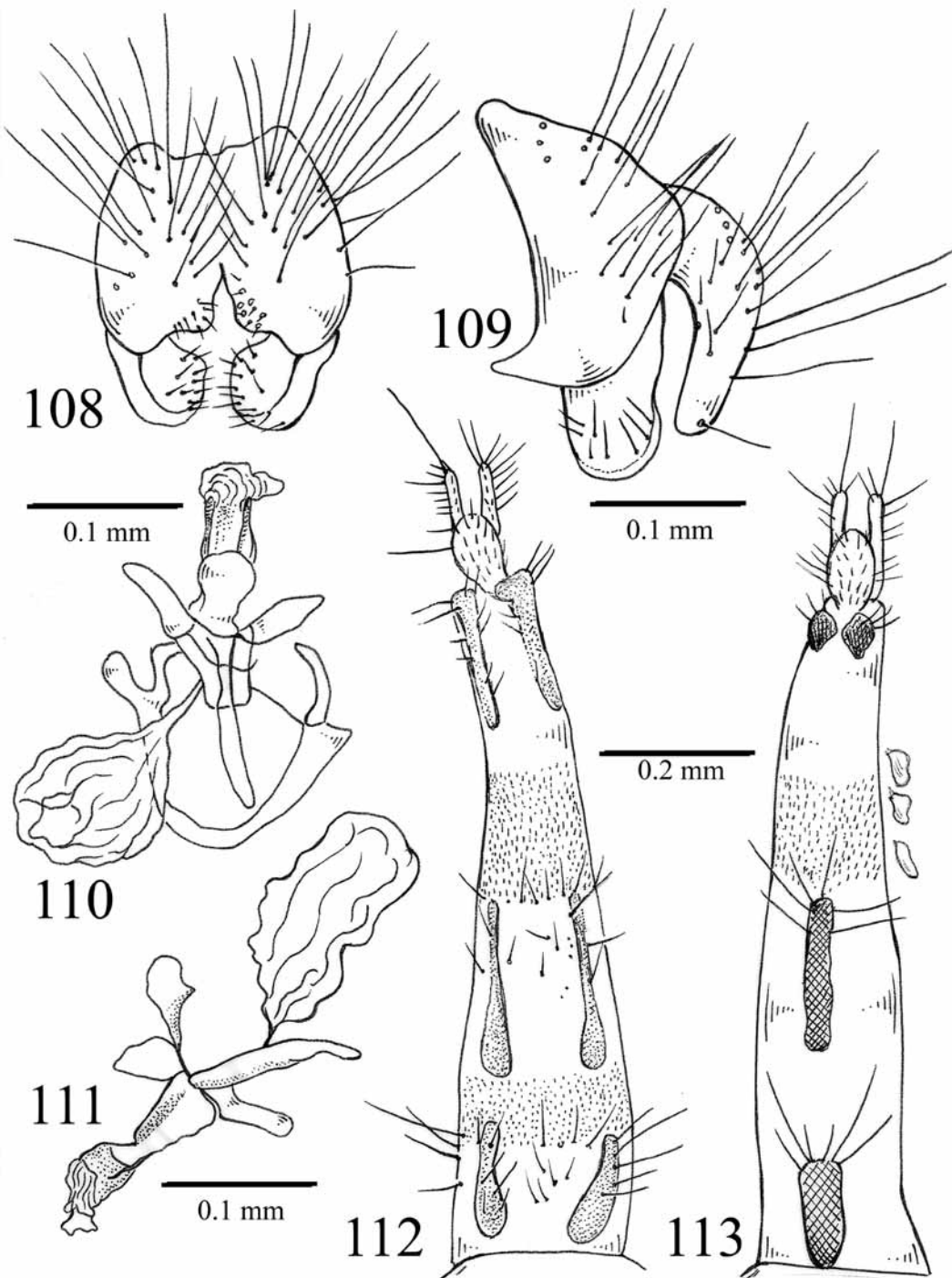


FIGURE 114. *Phaonia univittata*, sp. nov. Female. Ovipositor, dorsal view

FIGURE 115. *Phaonia univittata*, sp. nov. Female. Ovipositor, ventral view and spermathecae

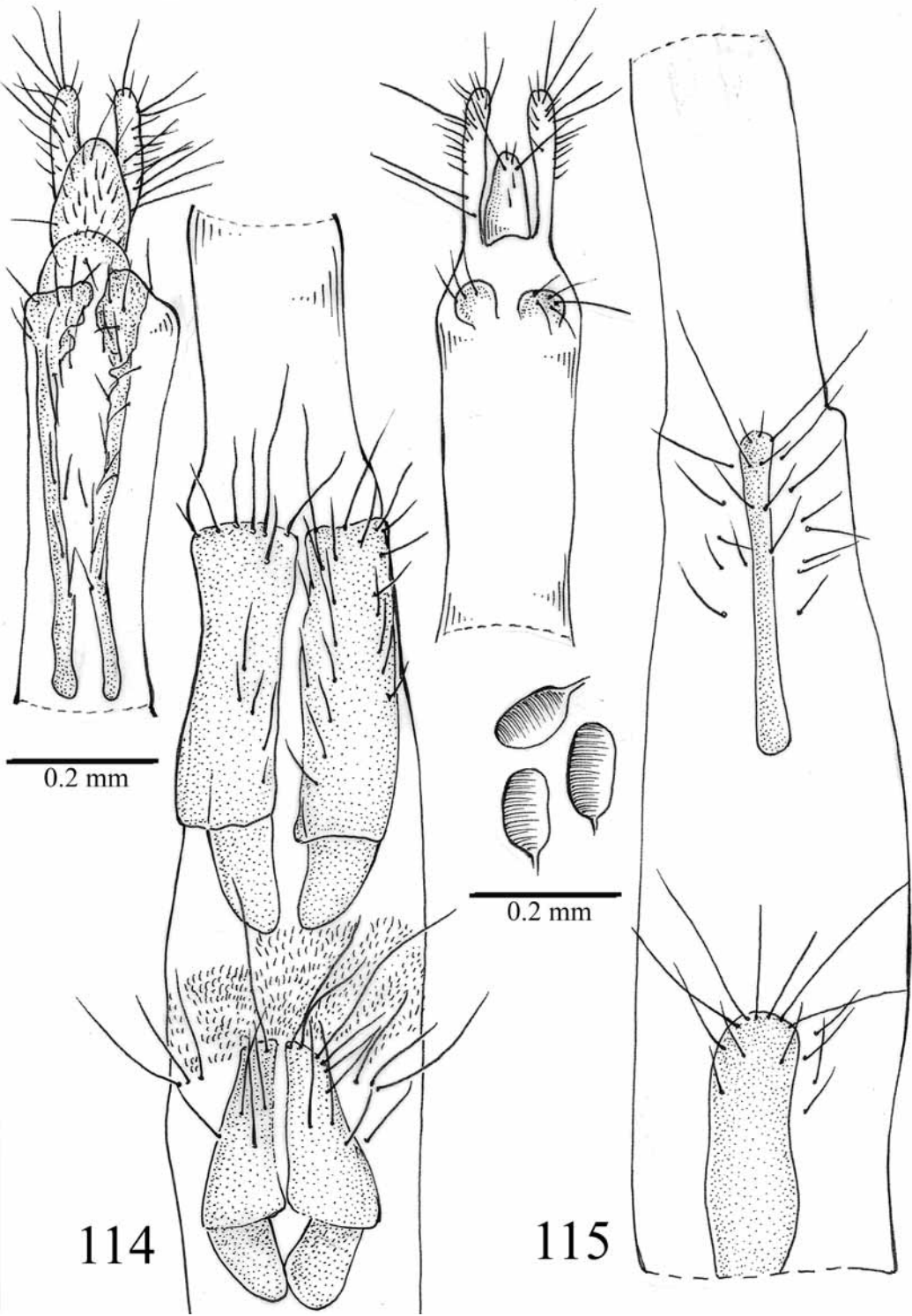


FIGURE 116. *Pyrellia ampullacea*, sp. nov. Female. Ovipositor, dorsal view

FIGURE 117. *Pyrellia ampullacea*, sp. nov. Female. Ovipositor, ventral view and spermathecae

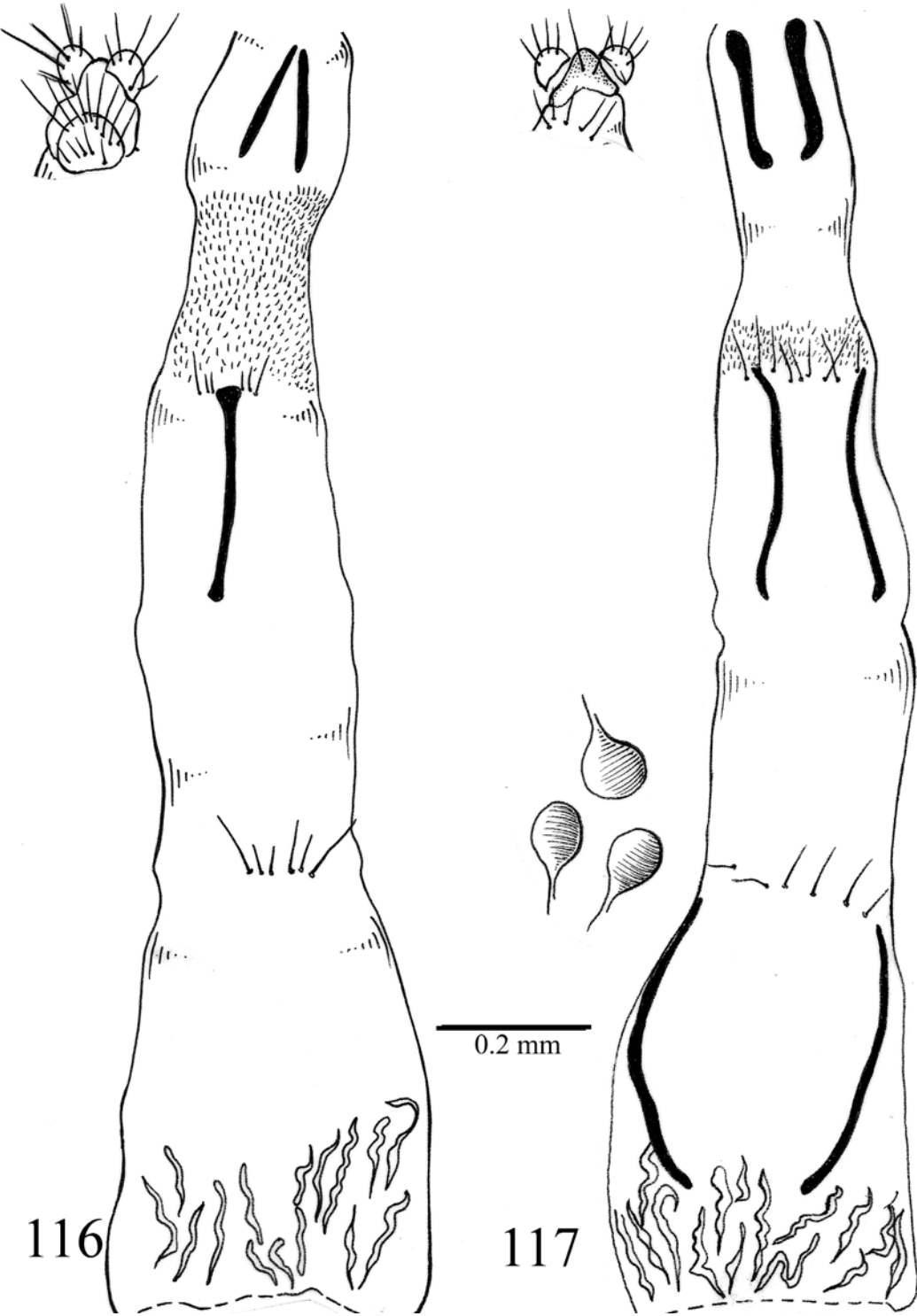


FIGURE 118. *Spilogona fulvipollinosa*, sp. nov. Female. Ovipositor, lateral view and spermathecae

Figure 119. *Stomoxys calcitrans* (Linnaeus, 1758). Abdominal pattern (modified from Zumpt, 1973, fig. 74, I:195)

Figure 120. *Stomoxys niger* Macquart, 1851. Abdominal pattern (modified from Zumpt, 1973, 74, II: 195)

