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## ***Afromosia*, a new robber fly genus from Cameroon (Diptera: Asilidae: Laphriinae: Atomosiini)**

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### ABSTRACT

*Afromosia*, a new monotypic genus of Afrotropical Asilidae (Laphriinae; Atomosiini), is described, illustrated and discussed. The type species, *A. barkemeyeri* sp. n., is recorded only for the West African country of Cameroon. The new taxa are discussed and a key for the separation of Afrotropical Atomosiini is provided.

**KEY WORDS:** Afrotropical Asilidae, Cameroon, Laphriinae, Atomosiini, *Afromosia*, robber flies, new genus, new species.

### INTRODUCTION

The asilid tribe Atomosiini (subfamily Laphriinae), which has also been treated as a subfamily (Atomosiinae), is relatively poorly represented in the Afrotropics. Londt (1982) revised the Afrotropical representatives, reporting only nine described species in three genera. Although the tribe is best represented in the Neotropical Region, where more than 140 species, in over 20 genera, have been catalogued (Martin & Papavero 1970), it has known representatives in all major regions: (18 species (10 genera) were catalogued for the Australasian and Oceanian Regions (Daniels 1989); 16 species (4 genera) have been catalogued for the Nearctic Region (Fisher & Wilcox 1997); 6 species (6 genera) were catalogued for the Oriental Region (Oldroyd 1975); 3 species (2 genera) have been catalogued for the Palearctic Region (Lehr 1988)).

A brief taxonomic overview of the tribe, in an Afrotropical context, is as follows:

Hermann (1907) – Described *Atomosia argenteoviridis* from South Africa.

De Meijere (1914) – Described the genus *Dichaetothyrea* from the Oriental Region (Java).

Hermann (1912) – Described *Goneccalypsis*, with his *Atomosia argenteoviridis* as type species, and *Loewinella* (as *Löwinella*) with *Atomosia virescens* Loew, 1871 (a Palearctic species) as type species.

Curran (1927) – Described *Atractia arcuata* from ‘Stanleyville’ (= Kisangani), DR Congo.

Engel (1929) – Described *Loewinella virescens* var. *nigripes* from ‘Saw Mills’, Zimbabwe.

Séguy (1950) – Described *Loewinella aphaea* from Niger.

Oldroyd (1980) – Catalogued the then known Afrotropical taxa including *Goneccalypsis argenteoviridis* and 3 species of *Loewinella* (*aphaea*, *arcuata*, *nigripes*).

Londt (1982) – Reviewed the tribe. *Dichaetothyrea calvifrons* was described from Madagascar. Two species of *Goneccalypsis* were treated, *argenteoviridis* (from South Africa and Malawi) and the newly described *montanus* (from Lesotho and South Africa). All previously described species of *Loewinella* were treated and keyed,

including *aphaea* (Niger), *arcuata* (DR Congo) and *nigripes* (Mozambique, South Africa, Zimbabwe, Madagascar) as well as *nitidicollis* and *virescens* (both Palearctic species). Four new *Loewinella* species were described: *deemingi* (Nigeria), *eburacta* (Ivory Coast), *flavipes* (Namibia), and *lehri* (a Palearctic species from Pakistan). Keys were provided for all species handled.

Dikow (2009) – Undertook a phylogenetic study of world Asilidae in which he included African species *Goneccalypsis argentioviridis* and *Loewinella nigripes*. His study suggested the inclusion of *Orthogonis* Hermann, 1914 and *Smeryngolaphria* Hermann, 1912 in the Atomosiini.

Although Dikow's (2009) phylogenetic study has pointed to the inclusion of *Orthogonis* and *Smeryngolaphria* in the Atomosiini, his material (*O. scapularis* (Wiedemann, 1828) and *S. numitor* (Osten-Sacken, 1877)) was not of Afrotropical origin. While a single *Orthogonis* (*O. madagascarensis* Bromley, 1942) and two species of *Smeryngolaphria* (*S. pallida* Bromley, 1935 and *S. bromleyi* Londt, 1989) are known from the afrotropics, these species do not appear to conform well to the type species, and so I believe that further research is required before their inclusion in the Atomosiini can be confirmed. Certainly, Londt's (1989) study of Afrotropical *Smeryngolaphria* does not support its inclusion in the tribe. With these reservations, I reiterate that at the commencement of this study there were, as stated above, only nine Afrotropical species in the tribe – a single species of *Dichaetothyrea*, two species of *Goneccalypsis* and six species of *Loewinella*.

It was with considerable interest that I learned of interesting material collected in the West African country of Cameroon that appeared to represent an undescribed species, belonging to an undescribed genus. This belief can now be confirmed, and this paper contains the description of this interesting new taxon and provides a new key for the separation of the four genera of Atomosiini now recognised from the Afrotropical Region.

#### MATERIAL AND METHODS

Specimens from Cameroon recorded in this study were sent to me by two North American institutions, one of which has allowed a specimen to be retained by me to be housed in the KwaZulu-Natal Museum. Institutional abbreviations used in this paper are as follows (together with the names of colleagues at these institutions that have assisted me):

- EMF – Personal collection of E.M. Fisher, Sacramento, USA (E. Fisher);
- NMSA – KwaZulu-Natal Museum, Pietermaritzburg, South Africa (B. Muller);
- USNM – National Museum of Natural History, Smithsonian Institution, Washington, DC, USA. (T. Dikow).

All the material was double mounted using minuten pins and preserved dry. Wings and genitalia were removed for photography and illustration. Male terminalia were macerated in dilute KOH before being drawn with the aid of a drawing tube and then stored in vials containing a mixture of ethanol and glycerine which were attached to the pins. Female terminalia were not dissected.

#### TAXONOMY

The Tribe Atomosiini is a relatively poorly defined tribe of the subfamily Laphriinae. These flies are known for their small size and dark pigmentation. Although the most

important defining character appears to be a completely sclerotised postmetacoxal bridge, the somewhat larger representatives of two Madagascan genera, the monotypic *Katharma* Oldroyd, 1960 and *Katharmacercus* Tomasovic, 2014 with two species, share this character. In addition many species have a distinctive wing venation where the base of vein  $M_2$  lies nearly parallel to  $M_3$  and often abutting it, or almost so. This character is also found in some genera not believed to belong to the Atomosiini (e.g. *Orthogonis*).

*Afromosia* gen. n.

**Etymology:** A combination of the words ‘Afrotropical’ (the region from which the genus is described) and ‘Atomosia’ (a widespread and well known Nearctic and Neotropical genus belonging to the tribe).

**Type species:** *Afromosia barkemeyeri* sp. n. by present designation and monotypy.

**Diagnosis:** Tiny atomosiine Asilidae (wing length < 7 mm) with the following combination of characters: *Head:* Antennal postpedicel well-developed, terminal style reduced to a seta-like sensory element situated just beyond mid-length on dorsal surface (Fig. 3). *Thorax:* Mesonotum lacking a pair of small macrosetae on anterior margin; anepisternum with a single well-developed macroseta on posterior margin; scutellum with an apical tubercular projection (Fig. 4); anatergite asetose; postmetacoxal area strongly sclerotised; wing with base of vein  $M_2$  lying nearly parallel to  $M_3$ , but displaced from it (Fig. 5). *Abdomen:* Terga strongly sclerotised, T8 greatly reduced such that only seven terga are clearly visible; sterna weakly sclerotised; ♂ terminalia rotated through 180°.

*Afromosia barkemeyeri* sp. n.

Figs 1–10

**Etymology:** Named in honour of Dr Werner Barkemeyer, who has contributed greatly to the knowledge of Afrotropical Diptera through his extensive fieldwork.

**Description:**

Based on all available material (note: 1♂ 2♀ from Limbe are paler — see notes after main description). No obvious sexual dimorphism, apart from genital morphology, is evident. *Head* (Fig. 1): Black, partly silver pruinose, black, white and pale yellow setose. *Antenna* (Fig. 2) black; segmental length ratios (scape=1) 1:0.77:4.2; postpedicel more than twice the length of scape and pedicel combined; scape and pedicel entirely black setose (setae generally longer ventrally); postpedicel lacking major setae, uniformly covered by tiny microtrichia and with what is believed to be a subterminal seta-like sensory element situated dorsally at just beyond midlength. *Face* (Fig. 1) rather narrow (face:eye width ratio 1:2.5); black, extensively silver pruinose, especially laterally and along epistomal margin. *Mystax* poorly developed, composed of 2 vertical rows of widely separated black setae and a small group of shorter pale yellow and white setae in ventral region. *Frons* and *vertex* black, uniformly fine silver pruinose. *Ocellar tubercle* well developed; *ocelli* yellowish; a pair of well-developed, long, divergent ocellar macrosetae present. *Occiput* uniformly silver pruinose with 8 or 9 short black setae dorsally behind each eye. *Proboscis* short, dark red-brown, cylindrical, bearing c. 6 longish red-brown macrosetae anteroventrally. *Palpi* pale brown, minute, apparently single segmented, fine yellowish setose.

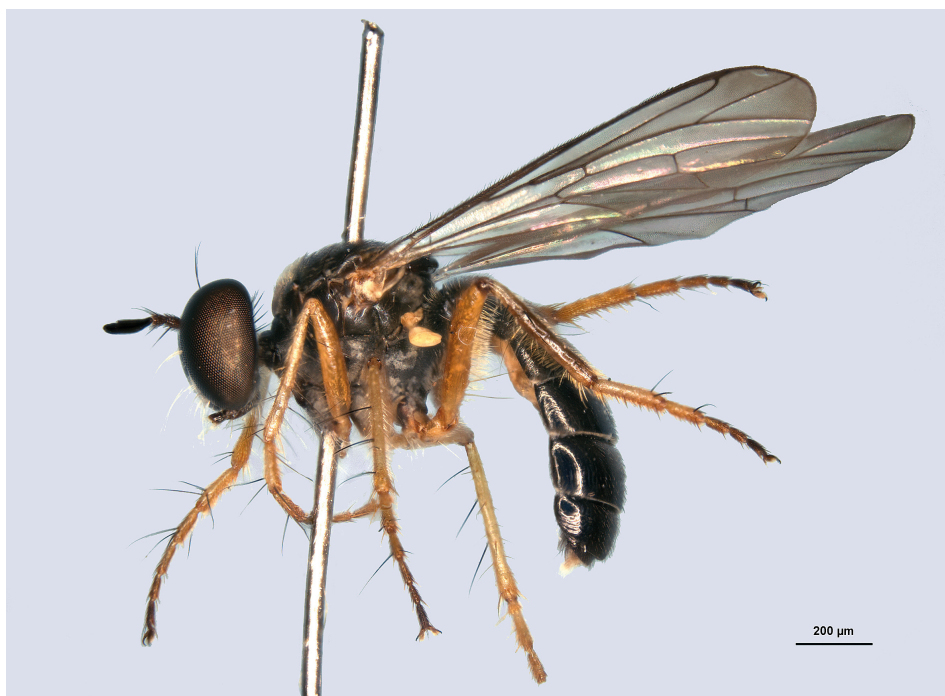
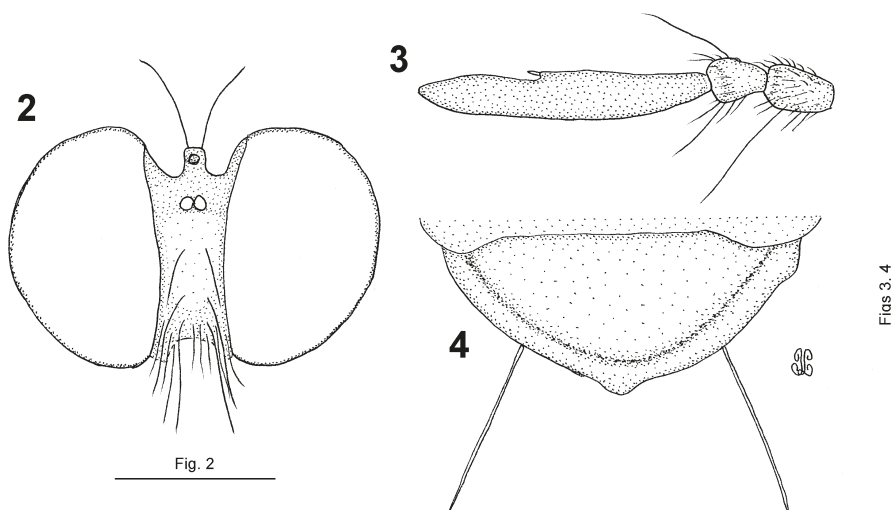


Fig. 1. *Afromosia barkemeyeri* gen. n. et sp. n. entire paratype female from Limbe (Note: Pale legs are atypical).



Figs 2–4. *Afromosia barkemeyeri* gen. n. et sp. n.: (2) head, anterior aspect; (3) antenna, left, lateral aspect; (4) scutellum, dorsal aspect. Scale bars = 1 mm.

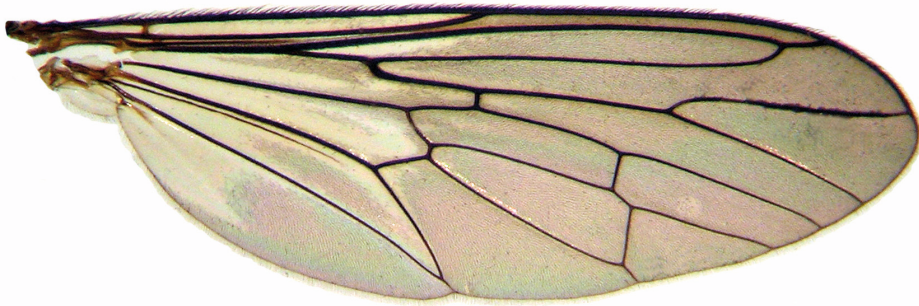


Fig. 5. *Afromosia barkemeyeri* gen. n. et sp. n. wing.

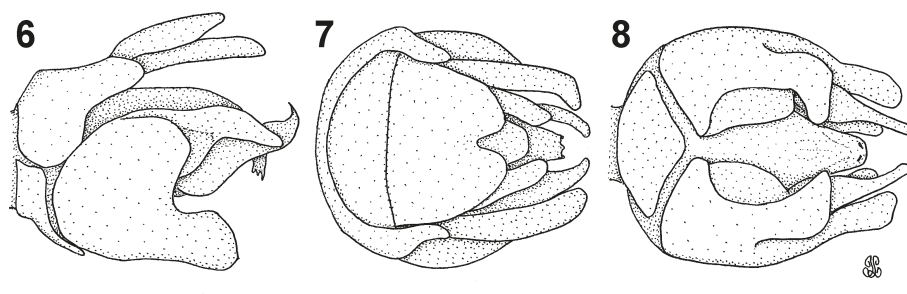
**Thorax:** Shiny black except for orange-brown postpronotal lobes, extensively silver pruinose, macrosetae black and yellowish, minor setulae yellow-white. Mesonotum extensively covered with fine pale yellow setulae. Mesonotal macrosetae black (1 pre-sutural, 1 supra-alar, 1 postalar). Scutellum black, apruinose, disc fine white setose, margin with 2 well-developed, black apical macrosetae, posterior margin diagnostically shaped (Fig. 4) with small tubercular projection apically. Pleura black, extensively silver pruinose except for central parts of anepisternum and katepisternum. Anepisternum with single well-developed black macroseta on posterior margin. Katatergal setae long, mostly black except for a few smaller pale yellowish setae dorsally. Anatergites and mediotergite black, finely silver pruinose, asetose. Legs: Coxae black, fine silver pruinose. Femora dark red-brown to black, mostly pale yellowish setose (long ventrally) but may have a few well-developed black setae dorsodistally. Tibiae mostly pale yellow-brown, darker red-brown distally. Tarsi pale red-brown. Claws and pulvilli moderately well developed. Wings (Fig. 5): Length: ♂ 4.4–5.1 mm (mean 4.8 mm), ♀ 4.7–6.0 mm (mean 5.4 mm); veins dark red-brown, membrane extensively microtrichose except for parts of basal cells. Cells  $r_1$ ,  $m_3$  and  $cua$  closed and stalked. Base of vein  $M_2$  nearly parallel to  $M_3$ , but displaced from it.

**Abdomen:** Terga (7 visible), shiny black, covered with fine white setulae, short medially, longer laterally. Macrosetae confined to 4–5 pale yellow setae laterally on T1. Sterna red-brown, weakly sclerotised and sparsely setose.

♂ genitalia (Figs 6–8): Rotated through 180°. Epandrium poorly developed, half length of gonocoxite in lateral view, deeply incised medially, horseshoe-shaped in dorsal view, terminal ends of lobes strongly black setose (setae not illustrated). Proctiger broad in dorsal view, well developed, projecting well beyond epandrial lobes, ventral lamellae separated, clearly longer than dorsal lamellae. Hypandrium poorly developed, broader than long, subtriangular in ventral view. Gonocoxites large, well-developed, with prominent distal lobes both dorsally and laterally; distal ends of dorsal lobes converge in ventral view; lateral lobes long, relatively weakly sclerotised basally, with slightly converging, rounded apices. Aedeagus well-developed, basally broad, ventrally curved with short terminal prongs.

♀ genitalia (Figs 9): Simple (not dissected), terminal segments not extended to form an obvious ovipositor.





Figs 6–8. *Afromosia barkemeyeri* gen. n. et sp. n. male genitalia (rotated through 180°): (6) lateral view; (7) dorsal view; (8) ventral view. Scale bar = 1 mm.



Fig. 9. *Afromosia barkemeyeri* gen. n. et sp. n. female terminalia.

Variation: The ♂ and 2♀ from Limbe are distinctly paler than other specimens (Fig. 1). However, an examination of the ♂ terminalia confirm that this material is conspecific. The following discrepancies are common to all three Limbe specimens. *Head*: Dark red-brown, mystax entirely pale yellow, 5 occipital macrosetae behind each eye. *Thorax*: Dark red-brown, katatergal macrosetae entirely yellowish. Femora, tibiae and tarsi uniformly brown-yellow.

Holotype: 1♂ 'W-Africa: Cameroon: / 50 km S' Yaounde: → / Mbalmayo [c. 3°31'00"N 11°30'00"E 730 m]: 4–5 km S': / Réserve Forestière M. / Barkemeyer 7.3.1984', 'USNM00802743' (USNM).

Paratypes: 1♀ same data as holotype (USNMENT00802744); 1♀ 'W-Africa: Cameroon: / 85 km WSW' Yaounde: / Eseka [c. 3°39'00"N 10°46'00"E 245 m]; 1 km SSW' 1: / Barkemeyer 12.3.1984', 'USNMENT00802738' (NMSA); 1♂ 2♀ 'W-Africa: Cameroon: / Limbe (Victoria [c. 4°00'35"N 9°13'14"E 20 m]); / Mündung Dockyard / Creek – Mitondo (SE1). / Barkemeyer 20.3.1984' (♂ USNMENT00802742 ♀ USNMENT00802741 USNM, ♀ USNMENT00802740 NMSA); 3♀ 'Cameroun. / 30 km. W. Bertoua [c. 4°35'00"N 13°41'00"E 670 m] / iv-18/23-1972 / J/A. Gruwell, coll.', 'Atomosiinae / Genus ? / det. EM Fisher 74' (EMF).

Distribution, phenology and biology: The genus and species is known only from Cameroon where it has been collected during March and April. Dr Werner Barkemeyer (pers. comm.) kindly provided additional information about the localities where he collected specimens. The type locality (Réserve Forestière) is described as 'Woodland with some human impact (i.e. some banana trees, tree felling etc.)'. The habitat of the Eseka material is described as 'a strip between a roadside and a small stream; wet in parts with some old, rotten tree stumps'. The Limbe (= Victoria) locality is described as 'a hilly area with some small streams and patches of woodland. There were several Manioc, Banana and Mango trees. Apparently an old forest, but now partly cleared for farming'. Although it appears that the species may be associated with woodland it may, like many other Afrotropical Atomosiini, inhabit long grass. Like many grass inhabiting asilids the female has simple terminalia suggesting that eggs are merely allowed to drop to the ground and that no specialised oviposition behaviour exists.

#### Key to the genera of Afrotropical Atomosiini

Adapted from Londt (1982)

- 1 Antennal postpedicel with a terminal style and lacking a dorsally situated seta-like sensory element situated just beyond half length; mesonotum with a pair of small macrosetae on anterior margin; scutellum smoothly rounded apically; anatergite setose .....2
- Antennal postpedicel lacking a terminal style and equipped with a dorsally situated seta-like sensory element situated just beyond half length; mesonotum lacking a pair of small macrosetae on anterior margin; scutellum with a tubercular projection apically; anatergite asetose .....*Afromosia* gen. n.
- 2 Antennal style longer than scape; occipital macrosetae poorly developed .....*Dichaetothyrea* de Meijere
- Antennal style shorter than scape; occipital macrosetae well-developed .....3
- 3 Ratio of width of one eye (in anterior view) : width of face > 1.5; mesonotum punctate; mystax of both sexes lacking dorsoventrally flattened, 'scale-like' setae .....*Loewinella* Hermann
- Ratio of width of one eye : width of face < 1.5; mesonotum shiny, smooth, with at most a few shallow punctations; mystax of males with shiny, dorsoventrally flattened, setae .....*Goneccalypsis* Hermann

#### New records for Afrotropical Atomosiini

In order to plot all available data relating to Afrotropical Atomosiini (Fig.10) the following previously unpublished records for two species are provided:

*Goneccalypsis argenteoviridis* (Hermann, 1907): SOUTH AFRICA: 1♀ 'Sth Africa Cape Prov / 35km W of Kimberley [c. 28°43'S 24°25'E] / 2824CB 17.iii.1982 / J. Londt & L. Schoeman / Acacias/grass/sand' (NMSA); 1♀ 'South Africa KZ-Natal / Ukulinga Research Farm / University of KwaZulu-Ntl . 29°40'S



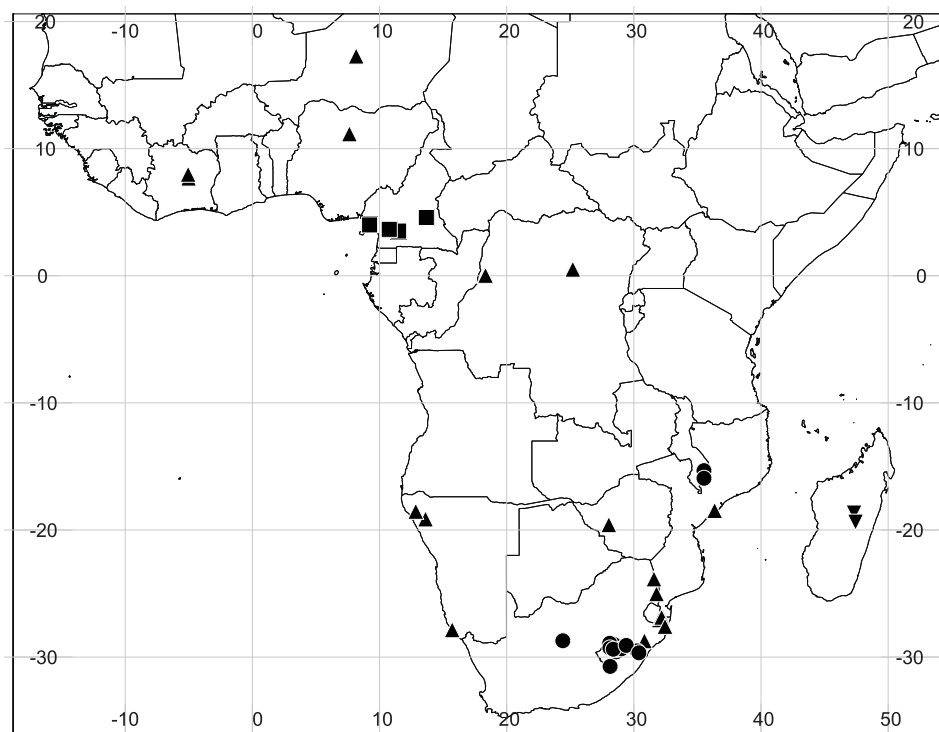


Fig. 10. The distribution of Afrotropical Atomosiini: *Afromosia* (■), *Dichaeothyrea* (▼), *Goneccalypsis* (●), *Loewinella* (▲).

30°24'E, grassy, / damp drainage line / 25.ii.2009, G.B.P. Davies' (NMSA); 1♂ 2♀ 'So. Africa: Univ. Natal. / Ukulinga Res. Frm. 10km / SE Pietermaritzburg / 27.xii.1985 Grassland / R.M. Miller + P.A. Stabbins' (NMSA).

*Loewinella nigripes* Engel, 1929: SOUTH AFRICA: 7♂ 11♀ 'S. Africa: KwaZulu-Natal / Ndumo Game Reserve / 26°52'29"S 32°11'25"E / 18.ii.2011 JGH Londt / 40m NRC picnic area / Mixed *Acacia* woodland' (NMSA); 1♂ 'Mkuzi FT3 27/i/2005 / °S 27.59076 °E 32.23027 [c. 27°35'S 32°27'E] / Fever Tree Forest / Pan trap 4 Yellow / Earthwatch Team 10 / d1290' (NMSA).

#### DISCUSSION

*Afromosia* is a distinctive element of the Afrotropical asilid fauna. Dikow (2009), in his phylogenetic study of the Asilidae, was able to highlight a clade formed by the two dominant African genera, *Goneccalypsis* + *Loewinella*, characterised by three autapomorphies. *Afromosia* does not belong to this clade. Although the genus differs in a number of respects from the three other Afrotropical genera, especially with respect to antennal form, it should be noted that the absence of a terminal style, and possession of a subterminal seta-like sensory element, as seen in Fig. 3, is not unusual within the tribe. If comparisons are made with the antennal illustrations provided by Hull (1962), it is obvious that *Afromosia* resembles all of the following genera (Hull's figure numbers are provided in brackets for easy reference) – *Cerotainia* (216), *Hybozelodes* (217), *Atomosia* (223, 229), *Paratractia* (228), *Othoniomyia* (249), *Adelodus* (254), *Bromotheres* (255), *Opocapsis* (258), *Epaphroditus* (261), *Anoplothyrea* (265), *Clariola* (270), *Protichisma*

(278), *Lycosimyia* (286), *Hodites* (286), *Aphestia* (292). It is significant that all these genera are Neotropical, and so it is tempting to suggest that *Afromosia* is likely to be more closely allied to Neotropical taxa than to other Afrotropical ones. It should be noted, however, that while a subapical seta-like sensory element may be most commonly encountered in the Atomosiini, it is not unknown in other subfamilies and tribes (see for example Hull's (1962) illustrations of *Taracticus* (177) and *Cyrtophrys* (180)). Londt (1999) described a species of *Afroscleropogon* (Stenopogoninae) with a similarly situated sensory structure (i.e. *A. bullingtoni* Londt, 1999).

Of interest is the wide distribution of Afrotropical Atomosiini (Fig. 10). Although sampling of these tiny flies has by no means been adequate, *Goneccalypsis* appears to be restricted to montane grasslands in southern and south-eastern Africa. *Loewinella*, on the other hand, has a much wider distribution and is found in a variety of different habitats where it is also associated with vegetation dominated by grass. Little is known of the habitat occupied by Madagascan *Dichaetothyrea*, but both known localities appear to be dominated by high altitude savannah, suggesting a more likely association with grassland rather than with forest. *Afromosia* has been collected in woodland and semi-developed rural settings where it may well inhabit grass.

#### ACKNOWLEDGEMENTS

Dr Eric Fisher (Research Associate, California State Collection of Arthropods) was first to alert me to the existence of this interesting new genus, suggested its name, and provided the photograph of the female terminalia. Dr Torsten Dikow (National Museum of Natural History, Washington) sent me material and provided useful comment on the manuscript. Dr Werner Barkemeyer (Museumsberg, Flensburg, Germany) kindly contributed additional information relating to material he had collected. The University of KwaZulu-Natal allocated funding in support of my research, as did the National Research Foundation (NRF) of South Africa, for which I am grateful. The KwaZulu-Natal Museum continued to provide various services and Mr Burgert Muller, in particular, is thanked for his contribution in supplying a photograph and the distribution map. Finally, my wife Ann is thanked for her assistance and support.

#### REFERENCES

- CURRAN, C.H. 1927. Undescribed Asilidae from the Belgian Congo. *American Museum Novitates* **272**: 1–18.
- DANIELS, G. 1989. 37. Family Asilidae. In: *Catalog of the Diptera of the Australasian and Oceanian Regions*, ed., Evenhuis, N.L. Bishop Museum Special Publication **86**. (Asilidae: pp 326–349).
- DE MAIJERE, J.C.H. 1914. Studien über südostasiatische Dipteren IX. *Tijdschrift voor Entomologie* **57**: 137–275.
- DIKOW, T. 2009. Phylogeny of Asilidae inferred from morphological characters of imagines (Insecta: Diptera: Brachycera: Asiloidea). *Bulletin of the American Museum of Natural History* No. 319, 175 pp., 131 figs, 8 tables.
- ENGEL, E.O. 1929. New or little known Asilidae from South Africa. *Annals of the Transvaal Museum* **13**: 154–171.
- FISHER, E.M. & WILCOX, J. 1997. Catalog of the Robber Flies (Diptera: Asilidae) of the Nearctic Region. Unpublished preliminary draft distributed by senior author of Californian Department of Food and Agriculture. April, 1997.
- HERMANN, F. 1907. Beitrag zur Kenntnis der Asiliden (III). (Dipt.). *Zeitschrift für Hymenopterologie und Dipterologie* **7**: 1–16, 65–78.
- 1912. Beiträge zur Kenntnis der südamerikanischen Dipteren-fauna auf Grund der Sammel-ergebnisse einer Reise in Chile, Peru und Bolivia, ausgeführt in den Jahren 1902–1904 von W. Schnuse. Fam. Asilidae. *Nova Acta. Abhandlungen Der Kaiserlichen Leopoldinisch–Carolinischen Deutschen Akademie der Naturforscher*. **XCVI** (1): 1–275 + Tabs. I–V.
- HULL, F.M. 1962. Robber flies of the World. The genera of the family Asilidae. *Bulletin of the United States National Museum* **224** (1): 1–430, (2): 431–907.
- LEHR, P.A. 1988. Family Asilidae. In: Soos, A. & Papp, L., eds, *Catalogue of Palaearctic Diptera*. Vol. 5. Amsterdam: Elsevier, pp. 197–326.

- LONDI, J.G.H. 1982. Afrotropical Asilidae (Diptera) 6. The tribe Atomosiini (Laphriinae). *Annals of the Natal Museum* **25** (1): 221–240.
- 1989. Afrotropical Asilidae (Diptera) 18. The genus *Smeryngolaphria* Hermann, 1912 (Laphriinae). *Annals of the Natal Museum* **30**: 147–157.
- 1999. Afrotropical Asilidae (Diptera) 31. A review of the genera *Stenopogon* Loew, 1847 and *Rhacholaemus* Hermann, 1907 with the description of new genera and species (Stenopogoninae). *Annals of the Natal Museum* **40**: 47–82.
- MARTIN, C.H. & PAPAVERO, N. 1970. Family Asilidae. In: *A catalogue of the Diptera of the Americas south of the United States*. Museu de Zoologia, Universidade de Sao Paulo. (Asilidae pp 1–139).
- OLDROYD, H. 1975. Family Asilidae. In: Delfinado, M.D. & Hardy, D.E., eds, *A catalog of the Diptera of the Oriental region*. Honolulu: University Press of Hawaii. **2**: 99–156.
- 1980. Family Asilidae. In: Crosskey, R.W., ed., *Catalogue of the Diptera of the Afrotropical Region*. London: British Museum (Natural History), pp. 334–373, 1218, 1226, 1229.
- SÉGUY, E. 1950. Contribution à l'étude de l'Air (Mission L. Chopard et A. Villiers). Diptères. *Mémoires de l'Institut Français Afrique Noire*. **10**: 272–282.