A Catalogue of Dryinidae, Embolemidae and Sclerogibbidae of Kenya and Burundi, with Descriptions of New Species (Hymenoptera: Chrysidoidea)

Authors: Olmi, Massimo, and Copeland, Robert S.

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A catalogue of Dryinidae, Embolemidae and Sclerogibbidae of Kenya and Burundi, with descriptions of new species (Hymenoptera: Chrysidoidea)

Massimo Olmi[1] and **Robert S. Copeland**[2]

[1]Department of Plant Protection, University of Tuscia, Viterbo, 01100 Italy; olmi@unitus.it
[2]International Centre of Insect Physiology and Ecology (ICIPE), P.O. Box 30772, Nairobi, 00100 Kenya; rcopeland@icipe.org; hunteriazeylanica@yahoo.com

ABSTRACT

The following new species of Dryinidae are described from Kenya: Anteoninae: *Anteon bytebieri, A. copelandi, A. shimbanum, A. whartoni*; Dryininae: *Dryinus copelandi, D. shimbanus*; Gonatopodinae: *Gonatopus baginei*. The following new species of Embolemidae are described: *Ampulicomorpha nzigidaherai*, from Burundi and Kenya; *Embolemus burundensis*, from Burundi. Updated checklists of Dryinidae, Embolemidae and Sclerogibbidae of Kenya and Burundi are presented. Embolemidae are recorded for the first time in Kenya and Burundi. With the above new records, 39 species of Dryinidae, four species of Embolemidae and 12 species of Sclerogibbidae are now known from Kenya, and two species of Dryinidae, three species of Embolemidae and one species of Sclerogibbidae are known from Burundi.

KEY WORDS: Dryinidae, Embolemidae, Sclerogibbidae, Afrotropical, Kenya, Burundi, new species, checklist.

INTRODUCTION

The Dryinidae and Embolemidae (Hymenoptera: Chrysidoidea) are parasitoids of Auchenorrhyncha (Homoptera) (Guglielmino & Olmi 1997, 2006, 2007; Olmi 1996). The Sclerogibbidae (Hymenoptera: Chrysidoidea) are parasitoids of Embiidina (Olmi 2005*a*).

Dryinidae were first collected in Kenya in 1945 by the Italian Marquis Saverio Patrizi. His specimens were studied by Benoit (1951*b*), who described three new species (*Neodryinus cerrutii*, *Platygonatopus luteipes* and *Gonatopus patrizii*) and recorded *Platygonatopus ugandanus* Benoit, 1951*a*, for the first time in Kenya.

In the monograph of Olmi (1984) only the following nine species of Dryinidae were listed in Kenya: *Anteon gutturnium* (Benoit, 1951); *Thaumatodryinus townesi* Olmi, 1984; *Dryinus spangleri* Olmi, 1984; *Tridryinus ampuliciformis* (Turner, 1928); *Adryinus cerrutii* (Benoit, 1951); *Acrodontochelys ugandanus* (Benoit, 1951); *Gonatopus luteipes* (Benoit, 1951); *Gonatopus taylori* Olmi, 1984; *Gonatopus patrizii* Benoit, 1951.

There are no published records of Embolemidae from Kenya. In contrast, the first Sclerogibbidae were collected and reared in Kenya by Edward S. Ross as early as 1957. Olmi (2005*a*) studied Ross's specimens and listed the following five species from Kenya: *Caenosclerogibba probethyloides* Olmi, 2005, *Sclerogibba madegassa* Benoit, 1952, *Sclerogibba rapax* Olmi, 2005, *Sclerogibba turneri* Richards, 1939, and *Sclerogibba vagabunda* (Bridwell, 1919).

Burundi is a small country with a poorly known insect fauna. In his revision of world Dryinidae, Olmi (1984) listed a single species from Burundi, *Dryinus undulatus* (Benoit, 1950). As in Kenya, Embolemidae have not yet been recorded from Burundi. The first specimens of Sclerogibbidae were collected in Burundi in 1958 by Edward S. Ross. They were identified by Olmi (2005*a*) as *Sclerogibba vagabunda* (Bridwell, 1919).

In more recent years, occasional collecting by a few researchers in eastern Africa has slowly added to the availability of specimens from these three uncommonly collected families. A large proportion of these specimens came from a programme of Malaise-trapping run by one of us (RSC) between 1998 and 2010 in diverse habitats in Kenya and Burundi. The study of this material has resulted in the discovery of the nine new species described herein and has provided the opportunity to compose a checklist of dryinids, embolemids and sclerogibbids known from Kenya and Burundi.

MATERIAL AND METHODS

Townes-style Malaise traps were run in 44 different locations in Kenya (1998–2008), and four sites in Burundi (2009–2010). Generally, traps were maintained in the field for about 6–12 months, with collection bottles changed every two weeks. Specimens were preserved in 75% ethanol. Additionally, we examined Malaise trap collections made by the Taita Biodiversity Project in 11 forests in the Taita Hills, Kenya (1997–1999). Traps in these locations were run for two weeks at a time, or less.

Species descriptions follow the terminology used by Olmi (1984, 1994*a*, 1996, 1999, 2005*a*). The measurements reported are relative, except for the total length (head to abdominal tip, without the antennae), which is expressed in millimetres.

In the descriptions POL is the distance between the inner edges of the two lateral ocelli, OL – between the inner edges of a lateral ocellus and the median ocellus, OOL is the distance from the outer edge of a lateral ocellus to the compound eye; OPL – from the posterior edge of a lateral ocellus to the occipital carina, and TL is the distance from the posterior edge of the eye to the occipital carina.

In the figures of male genitalia the right half is not included.

The material studied in this paper is deposited in the following collections:

AEIC – American Entomological Institute, Gainesville, Florida, USA;
AMNH – American Museum of Natural History, New York, USA;
BMNH – British Museum of Natural History, London, UK;
CASC – California Academy of Sciences, San Francisco, USA;
DEUW – Department of Entomology, University of Wageningen, The Netherlands;
EMUS – Department of Biology, Utah State University, Logan, Utah, USA;
FAG – Faculté des Sciences Agronomiques de l'État, Gembloux, Belgium;
INECN – Institut National pour l'Environment et la Conservation de la Nature, Bujumbura, Burundi;
IRSN – Institut Royal de Sciences Naturelles de Belgique, Bruxelles, Belgium;
MCZ – Museum of Comparative Zoology, Harvard University, Cambridge, USA;
MRAC – Musée Royal Museum de l'Afrique Centrale, Tervuren, Belgium;
MRSN – Museo Regionale di Scienze Naturali, Torino, Italy;
MTC – Michael von Tschirnhaus's collection, c/o Falkultät Biologie, Universität Bielefeld, Bielefeld, Germany (now partly deposited in Zoologische Staatssamlung, München, Germany);
NMKE – National Museums of Kenya, Nairobi, Kenya;
NMSA – KwaZulu-Natal Museum, Pietermaritzburg, South Africa;
OLM – Massimo Olmi's collection, c/o Department of Plant Protection, University of Tuscia, Viterbo, Italy;

RSC – Robert Copeland's collection;
SANC – National Collection of Insects, Pretoria, South Africa;
TAMU – Department of Entomology, Texas A. & M. University, College Station, Texas, USA;
UCRC – Department of Entomology, University of California, Riverside, California, USA;
USNM – National Museum of Natural History, Washington, DC, USA.

Achterberg and Kats (2000) considered *Ampulicomorpha* Ashmead, 1893, and *Embolemus* Westwood, 1833 (Embolemidae), synonyms. We agree that it is sometimes difficult to assign a male to *Ampulicomorpha* or *Embolemus*, because the length and the pigmentation of the veins enclosing the 1SDC cell (and mainly the posterior vein, near 1A vein) are sometimes variable (1SDC closed or open is the only character used for separating the males of the two above genera). However, females are not a problem, because they are apterous or micropterous in *Embolemus* and macropterous in *Ampulicomorpha*. For the present, we prefer to continue to consider both genera valid, because in most cases they are easily separated. We agree with Achterberg and Kats (2000) that "certainty about this problem will be gained after a thorough analysis of both sexes of the species involved, preferably including DNA analysis".

TAXONOMY

Family Dryinidae Haliday, 1833

Subfamily Anteoninae Perkins, 1912

Genus *Anteon* Jurine, 1807

Anteon copelandi Olmi, sp. n.

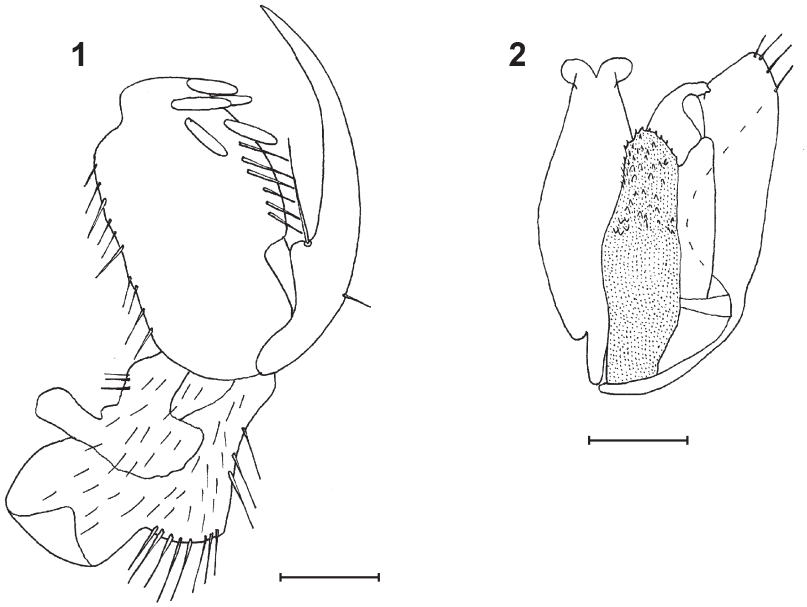
Fig. 1

Etymology: This species is named after Dr Robert S. Copeland.

Description:

Female.

Fully winged; length 2.5 mm. Head black, except mandibles testaceous; antennae testaceous, except segments 7–10 brown; mesosoma black; gaster brown; legs testaceous, except stalks of hind femora darkened. Antennal segments in following proportions: 13:6:7:4:5:6:6:6:6:7. Head shiny, reticulate rugose; frontal line complete; face with two lateral longitudinal keels around orbits directed towards antennal toruli; occipital carina complete; POL = 7; OL = 6; OOL = 4.5; OPL = 7; TL = 3; greatest breadth of posterior ocelli about as long as TL. Pronotum shiny, rugose; posterior surface very short, shorter than scutum (6:17); pronotal tubercles reaching tegulae. Scutum shiny, reticulate rugose. Notauli absent. Scutellum partly smooth, punctate, without sculpture among punctures, with some areolae. Metanotum shiny, smooth, without sculpture. Propodeum with a strong transverse keel between dorsal and posterior surface; dorsal surface reticulate rugose; posterior surface reticulate rugose, without longitudinal keels, with areolae about as large as those of dorsal surface. Forewing hyaline, without dark transverse bands or spots; distal part of stigmal vein much shorter than proximal part (3:11). Fore tarsal segments in following proportions: 10:2:2:3:12. Basal part of segment 5 of fore tarsus much longer than distal part (10:2). Arolium very large, slightly shorter than basal part of segment 5 of fore tarsus (8:10). Enlarged claw (Fig. 1) with



Figs 1, 2. (1) Chela of holotype of *Anteon copelandi* Olmi, sp. n. (scale bar = 0.08 mm); (2) genital armature of male holotype of *Anteon whartoni* Olmi, sp. n. (scale bar = 0.09 mm).

proximal prominence bearing one long bristle. Segment 5 of fore tarsus (Fig. 1) with six proximal and medial bristles; distal apex with group of about five lamellae. Tibial spurs 1, 1, 2.

Male. Unknown.

Holotype: ♀ "KENYA: *Coast*, Arabuko – Sokoke Forest, 03°25.21'S 39°53.81'E, 29.x-5.xi.1999, Malaise trap, R. Copeland"; [red] "*Anteon copelandi* sp. n. M. Olmi det. 2010 ♀" (NMKE).

Hosts: Unknown.

Comments: The female of *A. copelandi* is similar to that of *A. natalense* Olmi, 1984. The main differences concern the arolium (very large, slightly shorter than segment 5 of fore tarsus (Fig. 1) in *A. copelandi*; smaller and much shorter than segment 5 of fore tarsus (fig. 240 in Olmi 1984) in *A. natalense*) and the sculpture of the posterior surface of the propodeum (areolae about as large as those of dorsal surface in *A. copelandi*, smaller than those of dorsal surface in *A. natalense*). The new species was compared with the holotype of *A. natalense* from South Africa, Van Reenen (BMNH).

Anteon whartoni Olmi, sp. n.

Fig. 2

Etymology: This species is named after Dr Robert A. Wharton.

Description:

Male.

Fully winged; length 2.18 mm. Head black, except mandibles testaceous; antennae testaceous; mesosoma black; gaster brown; legs testaceous, except hind coxae and

clubs of hind femora partly darkened. Antennae filiform, with hairs longer than breadth of antennal segments; antennal segments in following proportions: 10:7:7.5:7:7:7:7: 7:6.5:10. Head dull, granulated and reticulate rugose; frontal line absent; occipital carina complete; POL = 6; OL = 3; OOL = 4; OPL = 2.5; TL = 3; greatest breadth of posterior ocelli about as long as OL. Scutum shiny, finely punctate, without sculpture among punctures, with surface near anterior margin weakly rugose. Notauli incomplete, reaching about 0.25 length of scutum. Scutellum and metanotum shiny, smooth, without sculpture. Propodeum with a transverse keel between dorsal and posterior surface; dorsal surface reticulate rugose; posterior surface completely reticulate rugose, with left longitudinal keel hardly visible; right longitudinal keel absent. Forewing hyaline, without dark transverse bands or spots; distal part of stigmal vein much shorter than proximal part (3:10). Parameres (Fig. 2) with distal inner rounded process; dorsal membranous process with distal area hairy (Fig. 2). Tibial spurs 1, 1, 2.

Female. Unknown.

Holotype: ♂ "KENYA: *Western*, Kakamega Forest, 00°14.13'N 34°51.87'E, 4.iii.1999, R. Wharton"; [red] "*Anteon whartoni* sp. n. M. Olmi det. 2010 ♂" (TAMU, to be deposited in USNM).

Hosts: Unknown.

Comments: The male of *A. whartoni* is similar to that of *A. cautum* Olmi, 1994. The main difference concerns the dorsal membranous process of parameres: hairy (Fig. 2) in *A. whartoni*, hairless (figs 4, 5 in Olmi 1994*b*) in *A. cautum*. The new species was compared with the holotype of *A. cautum* from Madagascar, Berenty (BMNH).

Anteon bytebieri Olmi, sp. n.

Fig. 3

Etymology: This species is named after Dr Benny Bytebier, who directed the Taita Biodiversity Project.

Description:

Female.

Fully winged; length 3.12 mm. Head black, except mandibles testaceous; antennae testaceous; mesosoma black; gaster brown; tegulae testaceous; legs testaceous. Antennae clavate; antennal segments in the following proportions: 13:8:6:5:4.5:6:6:6:6:8. Head dull, strongly reticulate rugose; frontal line present; face without lateral keels; occipital carina complete; POL = 7.5; OL = 4; OOL = 6; OPL = 6; TL = 5; greatest breadth of posterior ocelli shorter than OPL (3:6). Pronotum rugose, with posterior surface shiny and almost completely smooth; posterior surface shorter than scutum (5:18). Scutum shiny, smooth, very weakly granulated. Notauli very short, reaching about 0.25 length of scutum. Scutellum and metanotum shiny, smooth, without sculpture. Mesopleura proximally reticulate rugose, distally smooth, without sculpture. Metapleura rugose, sculptured by many transverse keels. Propodeum with strong transverse keel between dorsal and posterior surface; dorsal surface reticulate rugose; posterior surface reticulate rugose, with two longitudinal keels and with median area sculptured by areolae smaller than those of lateral areas. Forewing hyaline, without dark transverse bands; distal part of stigmal vein much shorter than proximal part (4:9). Fore tarsal segments in following proportions: 8:2:3:4:15. Segments 2 and 3 of fore tarsi produced into

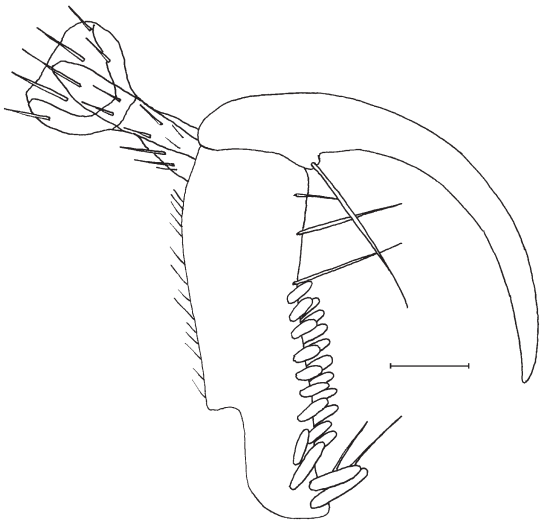


Fig. 3. Chela of holotype of *Anteon bytebieri* Olmi, sp. n. (scale bar = 0.12 mm).

a hook. Segment 4 of fore tarsus much shorter than basal part of segment 5 (5:11). Enlarged claw (Fig. 3) with proximal prominence bearing one long bristle. Segment 5 of fore tarsus (Fig. 3) with two rows of 8+9 proximal and medial lamellae; distal apex with group of 4 lamellae. Tibial spurs 1, 1, 2.

Male. Unknown.

Holotype: ♀ "KENYA: *Coast*, Taita Hills, Mbololo Forest, 03°20.00'S 38°26.85'E, 1550 m, Malaise trap, 5-13.iv.1999, Taita Biodiversity project"; [red] "*Anteon bytebieri* sp. n. M. Olmi det. 2010 ♀" (NMKE).

Hosts: Unknown.

Comments: The female of *A. bytebieri* is similar to that of *A. inflatrix* Benoit, 1951. The main differences concern the shape of segment 5 of the fore tarsus (with many proximal and medial bristles, without lamellae or at most with one lamella, in *A. inflatrix* (fig. 249 in Olmi 1984); with many proximal and medial lamellae in *A. bytebieri* (Fig. 3)) and the sculpture of the median area of the posterior surface of the propodeum (with areolae as large as those of lateral areas, in *A. inflatrix*; with areolae smaller than those of lateral areas in *A. bytebieri*). The new species was compared with the holotype of *A. inflatrix* from South Africa, Port St Johns (BMNH).

Anteon shimbanum Olmi, sp. n.

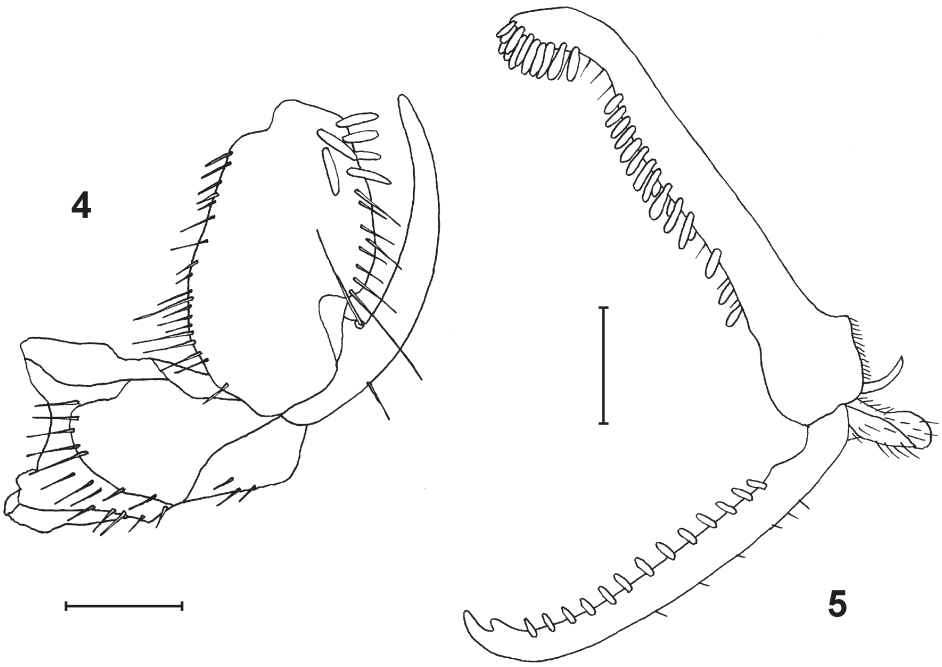
Fig. 4

Etymology: This species is named after the type locality, Shimba Hills National Park.

Description:

Female.

Fully winged; length 4.31 mm. Head black, except mandibles testaceous; antennae testaceous, except segments 6–10 brown; mesosoma black; gaster brown; tegulae testaceous; legs testaceous. Antennal segments in following proportions: 15:6:8:5.5:



Figs 4, 5. (4) Chelae of holotype of *Anteon shimbanum* Olmi, sp. n. (scale bar = 0.12 mm) and (5) *Dryinus shimbanus* Olmi, sp. n. (scale bar = 0.21 mm).

6:6:6:6:6:7. Head dull, completely reticulate rugose; frontal line complete; occipital carina complete; POL = 9; OL = 6; OOL = 5; OPL = 8; TL = 3; greatest breadth of posterior ocelli longer than TL (4:3). Pronotum shiny, reticulate rugose, except posterior margin smooth; posterior surface shorter than scutum (9:22); pronotal tubercles reaching tegulae. Scutum dull, granulated and reticulate rugose. Notauli absent. Scutellum shiny, sculptured by large punctures. Metanotum sculptured by large punctures, without sculpture among punctures. Propodeum with a strong transverse keel between dorsal and posterior surface; dorsal surface reticulate rugose; posterior surface reticulate rugose, with two longitudinal keels and median area as rugose as lateral areas. Forewing with a dark transverse band beneath pterostigma; distal part of stigmal vein much shorter than proximal part (3:11). Fore tarsal segments in following proportions: 12:2.5:3:5:13; segment 4 of fore tarsus approximately 0.5 as long as basal part of segment 5 (5:11) and produced into a hook. Enlarged claw (Fig. 4) very long, slightly longer than segment 5, with proximal prominence bearing one long bristle. Segment 5 of fore tarsus (Fig. 4) with basal part much longer than apical part (11:2), with some bristles and six distal lamellae. Arolium very large, about as large as segment 5 of fore tarsus. Tibial spurs 1, 1, 2.

Male. Unknown.

Holotype: ♀ "KENYA: *Coast*, Shimba Hills National Park, near artificial pond, 04.22752°S:39.43197°E, 335 m, Malaise trap, mixed grassland – shrubland, 27.xii.2005 – 10.i.2006, R. Copeland"; [red] "*Anteon shimbanum* sp. n. M. Olmi det. 2010 ♀" (NMKE).

Hosts: Unknown.

Comments: The female of *A. shimbanum* is similar to that of *A. rufonigrum* Olmi, 1984. The main differences concern the sculpture of the metanotum (sculptured by broad punctures and without sculpture among punctures in *A. shimbanum*; reticulate rugose in *A. rufonigrum*) and the colour of the head and mesosoma (black in *A. shimbanum*; mostly reddish in *A. rufonigrum*). The new species was compared with the holotype of *A. rufonigrum* from South Africa, Port St Johns (BMNH).

Subfamily Dryininae Haliday, 1833
Genus *Dryinus* Latreille, 1804
Dryinus shimbanus Olmi, sp. n.

Fig. 5

Etymology: This species is named after the type locality, Shimba Hills National Park.

Description:

Female.

Fully winged; length 6.28 mm. Head black, with mandibles testaceous and clypeus brown, except margins testaceous; antennae brown, except segments 1–2 partly testaceous and 8–10 whitish; mesosoma black; gaster brown; legs black, except distal extremity of coxae, proximal half of trochanters, proximal extremity of mid and hind tibiae, segment 2 and part of segment 1 of hind tarsi whitish; chelae, segment 2 and part of segment 1 of mid and hind tarsi testaceous. Antennae clavate; antennal segments in following proportions: 15:7:47:29:22:16:13:12:9:12. Rhinaria present in antennal segments 6–10. Head flat, dull, granulated and sculptured by small areolae and irregular keels; frontal line complete; occipital carina incomplete, only present behind and on sides of posterior ocelli, laterally not reaching eyes; posterior ocelli situated in front of virtual straight line joining posterior edges of eyes; posterior margin of vertex weakly excavated; POL = 3.5; OL = 4; OOL = 10; OPL = 1; temples absent; greatest breadth of posterior ocelli longer than OPL (3.5:1). Pronotum crossed by a strong anterior transverse impression and a strong posterior transverse furrow; disc humped; posterior collar very short; pronotum granulated and sculptured by numerous longitudinal keels and striae; pronotal tubercles not reaching tegulae. Scutum shiny, completely sculptured by numerous irregular, parallel and longitudinal keels. Notauli apparently complete and posteriorly separated, hardly visible among longitudinal keels. Scutellum and metanotum shiny, smooth, punctate, without sculpture among punctures. Propodeum dull, without transverse keels, with dorsal surface reticulate rugose and sculptured by few longitudinal keels; posterior surface reticulate rugose, without longitudinal keels; dorsal surface of propodeum slightly longer than posterior surface (15:10). Forewing with two dark transverse bands; distal part of stigmal vein longer than proximal part (22:14). Fore tarsal segments in following proportions: 28:5:8:23:37. Enlarged claw (Fig. 5) with large subdistal tooth and one row of 13 lamellae. Segment 5 of fore tarsus (Fig. 5) with two rows of 6+12 lamellae; distal apex with group of at least 20 lamellae. Tibial spurs 1, 1, 2.

Male. Unknown.

Holotype: ♀ "KENYA: *Coast*, Shimba Hills National Park, near artificial pond, 04.22752°S:39.43197°E, 335 m, Malaise trap, mixed grassland – shrubland, 6-20.vi.2006, R. Copeland"; [red] "*Dryinus shimbanus* sp. n. M. Olmi det. 2010 ♀" (NMKE).

Hosts: Unknown.

Comments: The female of *D. shimbanus* is similar to those of *D. paulyi* Olmi, 1991, *grossus* Olmi, 2004, *orophilus* (Benoit, 1950), *daviesi* Olmi, 2009, *yemenensis* Olmi & Van Harten, 2006, and *erraticus* (Turner, 1928). The main difference concerns the occipital carina: incomplete in *D. shimbanus*, complete in all other species. The new species was compared with the holotypes of the above closest species: *D. paulyi* from Gabon, Kango (FAG); *D. grossus* from Madagascar, 18°28.24'S:47°57.36'E (CASC); *D. orophilus* from Congo, Rutshuru (MRAC); *D. daviesi* from South Africa, Ngoye Forest (NMSA); *D. yemenensis* from Yemen, Al Lahima (OLM); *D. erraticus* from South Africa, Mossel Bay (BMNH).

Dryinus copelandi Olmi, sp. n.

Fig. 6

Etymology: This species is named after Dr Robert S. Copeland.

Description:

Female.

Fully winged; length 5.25 mm. Head black, with mandibles, clypeus and part of genae brown; antennae brown, except segments 7–10 testaceous whitish; mesosoma black; gaster and legs brown. Antennae clavate; antennal segments in following proportions: 11:5:25:9:6:6:6:6:5:9. Head dull, granulated; face sculptured by some irregular keels; occipital carina complete; occiput concave; temples prominent; frontal line complete; POL = 6; OL = 4; OOL = 8; OPL = 2; TL = 1; greatest breadth of posterior ocelli longer than OPL. Pronotum dull, crossed by two weak transverse impressions; anterior collar granulated; lateral regions granulated and partly reticulate rugose; disc granulated;

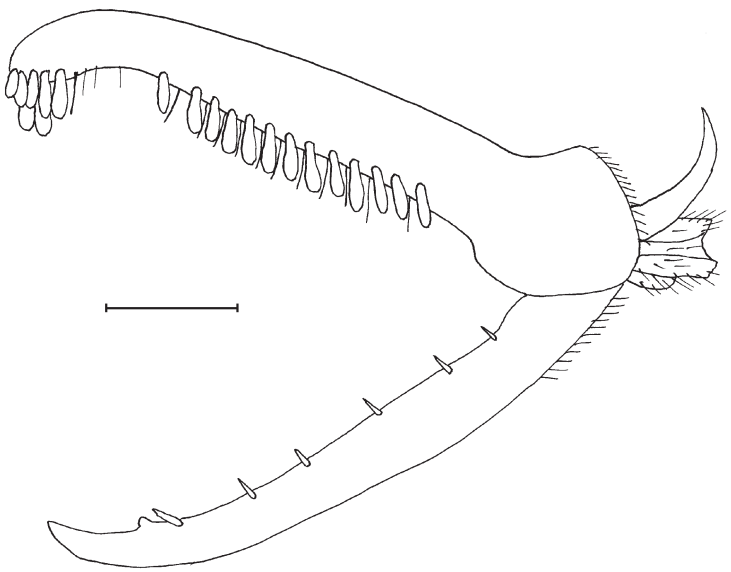


Fig. 6. Chela of holotype of *Dryinus copelandi* Olmi, sp. n. (scale bar = 0.12 mm).

posterior collar very short. Scutum dull, granulated and reticulate rugose. Notauli complete, posteriorly separated; minimum distance between notauli longer than antennal segment 2 (7:5). Scutellum dull, granulated. Metanotum shiny, granulated. Propodeum dull, reticulate rugose, with dorsal surface slightly longer than posterior surface (22:20), without transverse or longitudinal keels. Forewing with two dark transverse bands; distal part of stigmal vein longer than proximal part (17:11). Fore tarsal segments in following proportions: 18:3:5:15:24. Enlarged claw (Fig. 6) with small subdistal tooth and one row of six peg-like hairs. Segment 5 of fore tarsus (Fig. 6) with a row of 13 lamellae; distal apex with group of about 10 lamellae. Tibial spurs 1, 1, 2.

Male. Unknown.

Holotype: ♀ "KENYA: *Coast*, Arabuko – Sokoke Forest, 03°25.21'S 39°53.81'E, 25-29.vi.1999, Malaise trap, R. Copeland"; [red] "*Dryinus copelandi* sp. n. M. Olmi det. 2010 ♀" (NMKE).

Hosts: Unknown.

Comments: The female of *D. copelandi* is similar to that of *D. hararianus* Olmi, 1987. The main differences concern the temples (shorter than OPL in *D. copelandi*, longer than OPL in *D. hararianus*), the notauli (complete in *D. copelandi*, incomplete and reaching about 0.5–0.6 length of scutum in *D. hararianus*) and the forewing (with two dark transverse bands in *D. copelandi*, with three dark transverse bands in *D. hararianus*). The new species was compared with the holotype of *D. hararianus* from Zimbabwe, Harare (MCZ).

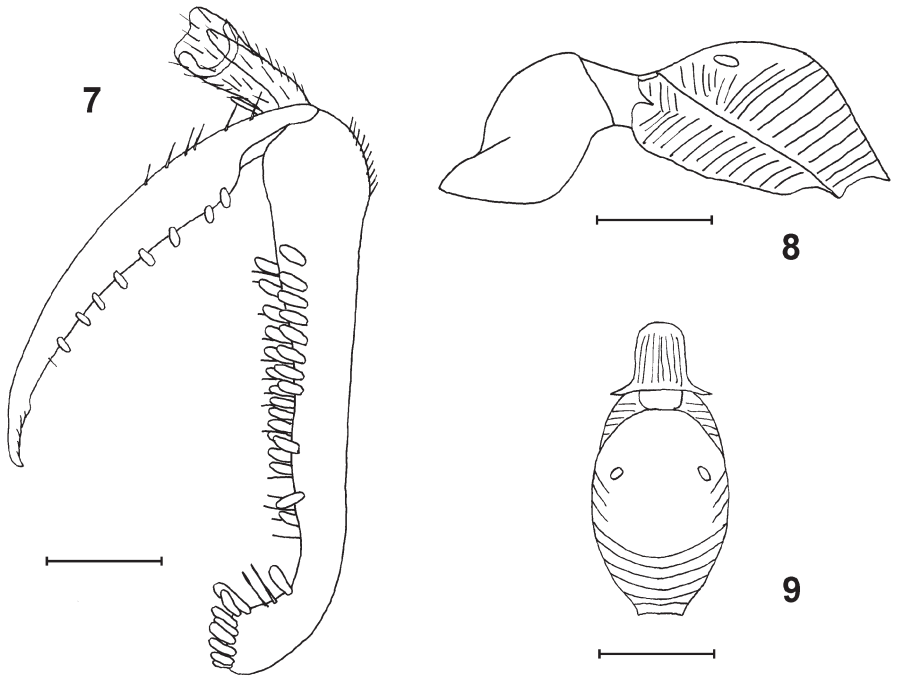
Subfamily Gonatopodinae Kieffer, 1906
Genus *Gonatopus* Ljungh, 1810
Gonatopus baginei Olmi, sp. n.
Figs 7–9

Etymology: This species is named after Dr Richard Bagine.

Description:

Female.

Apterous; length 4.62 mm. Head black, except mandibles, clypeus, part of genae and anterior margin of face testaceous; antennae brown, except segment 1 testaceous; mesosoma and gaster black; legs brown, except trochanters, fore tibiae and part of tarsi testaceous reddish. Antennae clavate; antennal segments in following proportions: 10:6:22:12:10:10:9:8:7:12. Head excavated, dull, granulated, with face and vertex rugose; occiput dull, granulated and sculptured by many irregular longitudinal striae; frontal line complete; occipital carina absent; POL = 2; OL = 3; OOL = 13. Palpal formula: 6/3. Pronotum shiny, smooth, without sculpture, crossed by a strong transverse impression. Scutum about twice as long as broad, dull, rugose, with two lateral pointed apophyses situated on the sides of scutellum (Fig. 9). Scutellum shiny, smooth, without sculpture, inclined. Metanotum rugose, not hollow behind scutellum (Fig. 8). Metathorax + propodeum shiny, with track of median longitudinal furrow, with disc and anterior surface partly smooth and partly rugose; posterior surface strongly transversely striate. Mesopleura and metapleura rugose. Meso-metapleural suture thin, distinct and complete. Fore tarsal segments in following proportions: 18:4:6:20:34. Enlarged claw (Fig. 7) with small subapical tooth and one row of eight lamellae in ad-



Figs 7–9. Holotype of *Gonatopus baginei* Olmi, sp. n.: (7) chela (scale bar = 0.17 mm); (8) mesosoma in lateral view (scale bar = 0.58 mm); (9) scutum, scutellum and metathorax + propodeum in dorsal view (scale bar = 0.67 mm).

dition to one hair. Segment 5 of fore tarsus (Fig. 7) with two rows of approximately 22 lamellae; distal apex with group of at least 20 lamellae. Tibial spurs 1, 0, 1.

Male. Unknown.

Holotype: ♀ "KENYA: *Nyanza*, Ungoye Field Station, 00°36.91'S 34°05.52'E, 1147 m, 15-29.i.2005, Malaise trap [Fig. 13], R.S. Copeland"; [red] "*Gonatopus baginei* sp. n. M. Olmi det. 2010 ♀" (NMKE).

Hosts: Unknown.

Comments: The female of *G. baginei* is similar to that of *G. sensitivus* Olmi, 1993. The main differences concern the enlarged claw (with subapical tooth close to distal apex (Fig. 7) in *G. baginei*, with subapical tooth farther from distal apex (fig. 11 in Olmi 1993) in *G. sensitivus*) and lateral pointed apophyses of scutum (situated on sides of scutellum (Fig. 9) in *G. baginei*, situated between scutellum and anterior margin of scutum (fig. 10 in Olmi 1993) in *G. sensitivus*). The new species was compared with the holotype of *G. sensitivus* from Madagascar, 7 km SW Ranomafana (USNM).

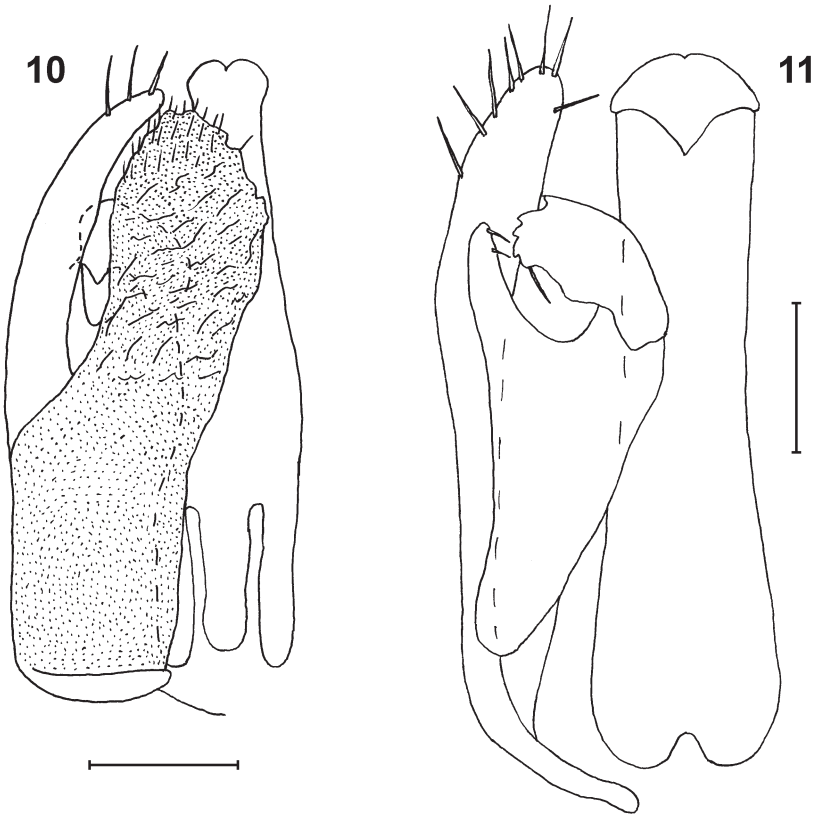
Family Embolemidae Westwood, 1833
Genus *Embolemus* Westwood, 1833
Embolemus burundensis Olmi, sp. n.
Fig. 10

Etymology: This species is named after Burundi.

Description:

Male.

Fully winged; length 2.06–3.00 mm (holotype 2.06 mm). Holotype with head black, except mouthparts testaceous; antennae brown; mesosoma brown, except prothorax and metanotum testaceous-darkened; gaster brown; petiole and legs testaceous. Paratype with mesosoma black, except prothorax, metanotum and anterior surface of propodeum testaceous-darkened; rest of propodeum and gaster brown. Antennae filiform, not distally thickened; antennal segments in following proportions: 11:3:19:20:18:18:15:15:14:17. Head shiny, convex, finely hairy, without sculpture, smooth; occipital carina complete; frontal line absent; POL = 1; OL = 2; OOL = 6; OPL = 3; TL = 6; greatest breadth of posterior ocelli longer than POL (3:1). Eyes small, much shorter than head (10:19). Palpal formula: 6/2; third segment of maxillary palpi slender. Pronotum very short, much shorter than scutum (3:17). Scutum shiny, smooth, finely hairy, without sculpture. Notauli very short, hardly visible near anterior margin of scutum. Scutellum shiny, smooth, hairless, without sculpture. Metanotum very short, rugose. Propodeum dull, reticulate rugose, without longitudinal keels; surface near anterior



Figs 10, 11. Male genital armatures of (10) holotype of *Embolemus burundensis* Olmi, sp. n. (scale bar = 0.06 mm) and (11) paratype of *Ampulicomorpha nzigidaherai* Olmi, sp. n., from Macha Forest (scale bar = 0.05 mm) (right half removed).

margin smooth, not rugose; dorsal surface with median longitudinal furrow. Fore wing hyaline, not darkened; distal part of stigmal vein longer than proximal part (29:15); first discal cell (1DC) distinctly enclosed by pigmented veins; 1SDC not completely enclosed by pigmented veins; posterior vein of 1SDC absent. Dorsal membranous process of parameres long, without scales, with hairy (in holotype) or almost hairless (in paratype) distal apex, sculptured by numerous short transverse folds (Fig. 10). Distivolsella with very short distal apex without teeth. Tibial spurs 1, 2, 2.

Female: Unknown.

Holotype: ♂ "BURUNDI: Kibira National Park, 02.93315°S:29.50583°E, 2177 m, Malaise trap, edge of mixed forest/bamboo, near meadow [Fig. 12], 1-15.i.2010, R. Copeland"; [red] "*Embolemus burundensis* sp. n. M. Olmi det. 2010 ♂" (MRAC).

Paratypes: 1♂ same data as the holotype, 18.xii.2009–1.i.2010 (INECN); 1♂ same data as the holotype, 9–23.iv.2010 (OLM).

Hosts: Unknown.

Comments: The male of *E. burundensis* is similar to those of *E. africanus* (Risbec, 1957) and *E. capensis* Olmi, 1997. The main difference concerns the proximal membranous process of the parameres: sculptured by numerous short transverse folds and occasionally with distal margin hairy (Fig. 10) in *E. burundensis*, not sculptured by numerous short transverse folds and with distal margin hairless (fig. 23 B in Olmi 1996; fig. 14 in Olmi 1997) in *E. africanus* and *E. capensis*. The new species was compared with the holotypes of the closest species: *E. africanus* from Rwanda, Rugege Forest (MRAC), and *E. capensis* from South Africa, Diepwalle (CNC).

Genus *Ampulicomorpha* Ashmead, 1893

Ampulicomorpha nzigidaherai Olmi, sp. n.

Figs 11, 15

Etymology: This species is named after Mr Benoit Nzigidahera.

Description:

Female.

Macropterous (Fig. 15); length 3.62–4.68 mm (holotype 4.31 mm). Holotype with head black, except mandibles brown; mouthparts testaceous; antennae brown; mesosoma black; gaster and legs brown. Paratypes with head and mesosoma brown. Antennae filiform, not distally thickened, without rhinaria; antennal segments in following proportions: 50:8:16:16:15:14:14:12:12:17; antennae shorter than body, articulated to two strong frontal processes; antennal toruli very far from upper margin of clypeus. Head pyriform, dull, granulated, covered with dense short hairs; occipital carina complete; ocelli distinct; holotype with POL = 2; OL = 4; OOL = 10; OPL = 4; TL = 14; eyes very small, approximately 0.33× as long as head (10:30); region of frons from clypeus to antennal toruli with two longitudinal and median sutures very convergent, complete and much nearer at antennal toruli than at clypeus; region from anterior ocellus to frontal processes flat, with incomplete frontal line visible near antennal toruli. Paratypes with OL slightly longer than POL (4:3). Palpal formula: 5/2. Third segment of maxillary palpi broadened. Pronotum dull, granulated, covered with dense short hairs, with strong complete median longitudinal furrow; posterior surface of pronotum shorter than scutum (9:23); pronotal tubercles reaching tegulae. Scutum dull, granulated, covered

with dense short hairs. Notauli very short, approximately 0.15× length of scutum. Parapsidal furrows distinct. Scutellum dull, granulated, covered with dense, short, fine hairs. Metanotum very reduced, short, transverse, without sculpture. Mesopleura and metapleura dull, granulated. Meso-metapleural suture complete. Propodeum reticulate-rugose, with strong transverse keel between dorsal and posterior surface; dorsal surface of propodeum granulated, with some areolae and irregular keels, with two median longitudinal subparallel keels not forming basal areola at anterior margin of propodeum; posterior surface of propodeum with tracks of two longitudinal keels, with lateral areas reticulate rugose and median area granulated and weakly rugose. Forewing completely darkened, with marginal cell open; distal part of stigmal vein longer than proximal part (26:19); 1DC cell completely enclosed by pigmented veins; 1SDC cell not completely enclosed by pigmented veins; posterior vein of 1SDC cell incomplete. Hind wing completely developed, hyaline. Petiole much shorter than gaster (2:75) and shorter than hind trochanter (2:7). Tibial spurs 1, 2, 2.

Male.

Fully winged; length 2.62–2.81 mm. Head brown, except mandibles and mouthparts testaceous; antennae testaceous-darkened; mesosoma brown, except prothorax testaceous; gaster brown; legs testaceous. Antennae filiform, not distally thickened; antennal segments in following proportions: 13:4:13:13:13:13:12:12:12:15. Head dull, granulated, convex, covered with fine short hairs; occipital carina complete; frontal line absent; POL = 2; OL = 2; OOL = 6; OPL = 4; TL = 5; greatest breadth of posterior ocelli slightly longer than POL (2.5:2); region from anterior ocellus to frontal processes with a short median furrow located near antennal toruli; region of face from clypeus to antennal toruli with two median longitudinal sutures very convergent and nearer at antennal toruli than at clypeus; eyes small, shorter than head (8:18). Palpal formula: 5/2. Pronotum dull, granulated, covered with fine short hairs, with complete median longitudinal furrow; pronotum very short, much shorter than scutum (6:15). Scutum dull, granulated; notauli incomplete, very short and hardly visible near anterior margin of scutum, about 0.15× length of scutum. Scutellum dull, granulated. Metanotum very short, transverse, without sculpture. Propodeum dull, reticulate rugose, with strong transverse keel between dorsal and posterior surface; dorsal surface of propodeum with two subparallel median longitudinal keels forming basal rectangular areola; posterior surface of propodeum reticulate rugose, with two longitudinal keels. Forewing completely darkened; marginal cell open; distal part of stigmal vein slightly longer than proximal part (19:16); 1DC cell completely enclosed by pigmented veins; 1SDC cell not completely enclosed by pigmented veins; posterior vein of 1SDC cell obsolete. Petiole very short, much shorter than gaster (2:44) and hind trochanter (2:5). Parameres without proximal membranous process (Fig. 11). Tibial spurs 1, 2, 2.

Holotype: ♀ "BURUNDI: Kibira National Park, 02.93315°S:29.50583°E, 2177 m, Malaise trap, edge of mixed forest/bamboo, meadow [Fig. 12], 1-15.i.2010, R. Copeland"; [red] "*Ampulicomorpha nzigidaherai* sp. n. M. Olmi det. 2010 ♀" (MRAC).

Paratypes: KENYA: *Coast*: 1♀ Taita Hills, Mbololo Forest, 03°20.00'S:38°26.85'E, 1550 m, Malaise trap, 2–9.ix.1998, Taita Biodiversity Project (NMKE); 1♀ Fururu Forest, 03°25.78'S:38°20.30'E, 1680 m, Malaise trap, 24–30.viii.1999, Taita Biodiversity Project (RSC); 1♀ Ngangao Forest, 03°21.239'S:38°17.985'E, 1780 m, Malaise trap, 1–5.ii.1998, Taita Biodiversity Project (OLM); 1♂ Macha Forest, 03°26.81'S:38°21.76'E, 1520 m, Malaise trap, 21–28.iii.1999, Taita Biodiversity Project (RSC); 2♂ Sagalla Forest, 03°30'S:38°35'E, 1500 m, Malaise trap, 10–15.X.1999, Taita Biodiversity Project (NMKE, OLM).

Figs 12, 13. Collecting habitats: (12) Malaise trap in Burundi, Kibira National Park, the type locality of *Ampulicomorpha nzigidaherai* Olmi, sp. n. and *Embolemus burundensis* Olmi, sp. n.; (13) Malaise trap in low canopy forest, Kenya, Ungoye, the type locality of *Gonatopus baginei* Olmi, sp. n.

Hosts: Unknown.

Comments: The female of *A. nzigidaherai* is similar to that of *A. forestalis* Olmi, 2010. The main difference concerns the sculpture of the dorsal surface of the propodeum: granulated and with some areolae and irregular keels in *A. nzigidaherai*, strongly reticulate rugose in *A. forestalis*. The male of *A. nzigidaherai* is similar to that of *A. madecassa* Olmi, 1999. The main difference concerns the posterior surface of the propodeum: with two longitudinal keels in *A. nzigidaherai*, without longitudinal keels in *A. madecassa*. The new species was compared with the female holotype of *A. forestalis* from Madagascar, 21°13.57'S:47°22.19'E (CASC) and with a male paratype of *A. madecassa* from Madagascar, 15°10.42'S:49°38.06'E (OLM).

CHECKLIST OF DRYINIDAE, EMBOLEMIDAE AND SCLEROGIBBIDAE OF KENYA

An asterisk indicates that specimens are known only from Kenya. Provinces are in italics.

Family Dryinidae
Subfamily Aphelopinae

Genus *Aphelopus* Dalman, 1823: 8

Type species: *Dryinus atratus* Dalman, 1823, by subsequent designation (Westwood 1840).

Aphelopus himyarita Olmi & Harten, 2006: 312

Distribution: *Nyanza*: Ungoye Field Station, 00°36.91'S:34°05.52'E, 1147 m, 21.iv–5.v.2005, Malaise trap, R.S. Copeland (NMKE). *Western*: Kakamega District, Kakamega Forest North, Calebs Campground, about 17 km NE Kakamega, 00°22.175'N:34°53.297'E, 5400 ft [1645.92 m], xi.2001, Manfred Kraemer & Co. (MTC).

Recorded from Yemen (Olmi & Harten 2006), Cameroon, Madagascar, Nigeria and South Africa (new records).

Aphelopus incisus Olmi, 1984: 64

Distribution: *Central*: Mt Kenya, Ragati, 6800 ft [2072.64 m] (AMNH).

Recorded from Nigeria (Olmi 1984) and South Africa (new record).

Aphelopus mediocarinatus (Benoit, 1951*b*: 23)

Distribution: *Western*: Kakamega District, Kakamega Forest, Kisere Forest Reserve, 00°23.730'N:34°53.165'E, 5400 ft [1645.92 m], xi.2001, Manfred Kraemer & Co. (MTC).

Recorded from many Afrotropical countries, including Madagascar (Olmi 1984), in addition to Yemen (Olmi & Harten 2006).

Aphelopus wittei Benoit, 1951*b*: 16

Distribution: *Nyanza*: nr Victoria Lake, 15 mls NE of Kisumu (BMNH). *Rift Valley*: Molo, Turi, 25.x.1998, A. Polaszek (BMNH). *Western*: Kakamega District, Kakamega Forest, Kisere Forest Reserve, 00°23.73'N: 34°53.165'E, 5400 ft [1645.92 m], xi.2001, Manfred Kraemer & Co. (MTC); Kakamega Forest, 00°14.13'N: 34°51.87'E, 4.iii.1999, R. Wharton (TAMU); Kakamega District, Kakamega Forest (EMUS); Kakamega District, Isecheno Nat. Res., Isecheno, 00°24'N:34°87'E, 1800 m, Malaise trap, R.R. Snelling (UCRC, OLM); 27 mi. NE of Kisumu, Kaimosi Mission, 1650 m (CASC).

Recorded from many Afrotropical countries, including Madagascar (Olmi 1984), in addition to Yemen (Olmi & Harten 2000).

Subfamily Anteoninae

Genus *Anteon* Jurine, 1807: 302

Type species: *Anteon jurineanum* Latreille, 1809, by monotypy.

Anteon agile Olmi, 1984: 354

Distribution: *Western*: 27 mi. NE Kisumu, Kaimosi Mission, 1650 m (CASC).

Recorded from Cameroon, Congo and South Africa (Olmi 1984).

Anteon bytebieri Olmi, sp. n.*

Distribution: *Coast*: Taita Hills, Mbololo Forest, 03°20.00'S 38°26.85'E, 1550 m, Malaise trap, 5–13.iv.1999, R. Copeland coll., Taita Biodiversity project (NMKE).

Anteon copelandi Olmi, sp. n.*

Distribution: *Coast*: Arabuko–Sokoke Forest, 03°25.21'S:39°53.81'E, 29.x–5.xi.1999, Malaise trap, R. Copeland (NMKE).

Anteon fiorii Olmi, 1984: 362

Distribution: *Eastern*: Tsavo East National Park, near Athi R., 02°38.51'S:38°21.98'E, 28.xii.1998–1.i.1999, Malaise trap, R. Copeland (NMKE).

Recorded from South Africa (Olmi 1984) and Botswana (new record).

Anteon gutturnium (Benoit, 1951*c*: 162)

Distribution: *Coast*: Diani Beach, viii.1951, N.L.H. Krauss (BMNH).

Recorded from Congo, South Africa and Uganda (Olmi 1984); known also from Madagascar, Senegal and Tanzania (new records).

Anteon kenyanum Olmi, 1991: 159

Distribution: *Western*: 27 mi. NE Kisumu, Kaimosi Mission, 1650 m, 29.xi.1957, E.S. Ross & R. E. Leech (CASC).

Recorded also from Ethiopia (new record).

Anteon ngoyense Olmi, 2009: 451

Distribution: *Rift Valley*: Mount Elgon National Park, Top of Endebess Bluff, 01.06117°N:34.75383°E, 2630 m, Malaise trap, forest edge near small stream, 16–30.i.2006, R. Copeland (NMKE).

Recorded from South Africa (Olmi 2009).

Anteon shimbanum Olmi, sp. n.*

Distribution: *Coast*: Shimba Hills National Park, near artificial pond, 04.22752°S:39.43197°E, 335 m, Malaise trap, mixed grassland – shrubland, 27.xii.2005–10.i.2006, R. Copeland (NMKE).

Anteon whartoni Olmi, sp. n.*

Distribution: *Western*: Kakamega Forest, 00°14.13'N:34°51.87'E, 4.iii.1999, R. Wharton (TAMU, to be deposited in USNM).

Anteon zairense Benoit, 1951*b*: 21

Distribution: *Western*: Kakamega District, Kakamega Forest, Kisere Forest Reserve, 00°23.730'N:34°53.165'E, 5400 ft [1645.92 m], xi.2001, Manfred Kraemer & Co. (MTC).

Recorded from Congo, South Africa (Olmi 1984); also from Gabon, Madagascar, Zimbabwe (new records).

Subfamily Bocchinae

Genus *Bocchus* Ashmead, 1893: 91

Type species: *Bocchus flavicollis* Ashmead, 1893, by original designation.

Bocchus simoni Olmi, 2005*b*: 238

Distribution: *Nyanza*: Ruma National Park, near Kamato Gate, 00.64725°S:34.33595°E, 1264 m, Malaise trap in open grassland–woodland, 4–18.iii.2006, R. Copeland (NMKE). *Rift Valley*: Nguruman, near Sampu R., 01.90103°S:36.04804°E, 753 m, Malaise trap, base of Nguruman Escarpment, 8–22.xii.2007, R. Copeland (RSC).

Recorded from Tanzania (Olmi 2005*b*).

Subfamily Dryininae

Genus *Thaumatodryinus* Perkins, 1905: 58

Type species: *Thaumatodryinus koebelei* Perkins, 1905, by original designation.

Thaumatodryinus sokokensis Olmi, 2007: 213*
Thaumatodryinus townesi Olmi, 1984, partim (only male): 692.

Distribution: *Coast*: Sokoke Forest, 8.v.1976, Ian Bampton (AEIC).

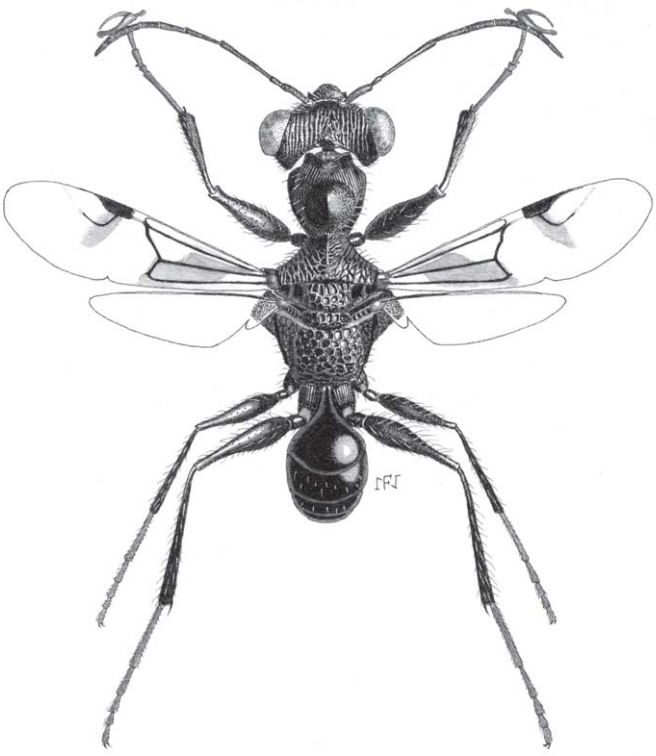


Fig. 14. *Dryinus aethiopicus* Olmi, female (from Olmi 1984). Length 5.31 mm.

Genus *Dryinus* Latreille, 1804: 176

Type species: *Dryinus formicarius* Latreille, 1804, by subsequent monotypy (Latreille 1805).

Dryinus aethiopicus (Olmi, 1984: 1008) (Fig. 14)

Distribution: *Nyanza*: Ungoye, ICIPE Field Station, 00.61517°S:34.09200°E, 1147 m, Malaise trap, inside seasonally swampy forest, 25.v–8.vi.2006, R. Copeland (NMKE).

Recorded from Central African Republic and Sierra Leone (Olmi 1984).

Dryinus ampuliciformis Turner, 1928: 148

Tridryinus ampuliciformis (Turner): Olmi, 1984: 937.

Distribution: *Central*: Nairobi, Karen (AEIC, AMNH). *Eastern*: At Athi R., 02°38.51'S:38°21.98'E, 19–24.vii.1999, Malaise trap, R. Copeland (NMKE); Samburu National Reserve, near Ewaso Ng'iro R., 00.56797°N:37.53563°E, 874 m, 10–24.vii.2007, Malaise trap, riverine forest, next to headquarters, R. Copeland (NMKE, OLM, RSC).

Recorded from Botswana, Congo, Namibia, Nigeria, Somalia, South Africa and Uganda (Olmi 1984); known also from Tanzania and Zimbabwe (new records).

Dryinus botswanensis (Olmi, 1991: 284)

Distribution: *Coast*: Shimba Hills National Park, 04.23783°S:39.39567°E, 436 m, Malaise trap, just inside Makadara Forest, 22.x–5.xi.2008, R. Copeland (NMKE).

Recorded from Botswana (Olmi 1991).

Dryinus copelandi Olmi sp. n.*

Distribution: *Coast*: Arabuko – Sokoke Forest, 03°25.21'S:39°53.81'E, 25–29.vi.1999, Malaise trap, R. Copeland (NMKE).

Dryinus hova (Ceballos, 1936: 53)

Distribution: *Eastern*: Tsavo National Park, Nutter's Farm, near Athi R., 02°38.51'S:38°21.98'E, 1–4.ii.1999, Malaise trap, R. Copeland (NMKE).

Recorded from Madagascar (Ceballos 1936).

Dryinus orophilus (Benoit, 1950: 226)

Distribution: *Coast*: Shimba Hills National Park, 04.23456°S:39.41687°E, 389 m, Malaise trap, just inside Longomwagandi Forest, 24.ix–8.x.2008, R. Copeland (NMKE). *Eastern*: Umani Springs camp, nr Chyulu Hills, 02°27.97'S:37°54.80'E, 21–25.xii.1998, Malaise trap, R. Copeland (NMKE); Njuki-ini Forest, nr Forest Station, 00.51660°S:37.41843°E, 1455 m, 4.iv–2.v.2007, Malaise trap, just inside indigenous forest, R. Copeland (OLM); Samburu National Reserve, nr Ewaso Ng'iro R., 00.56797°N:37.53563°E, 874 m, 12–26. vi.2007, Malaise trap, riverine forest, next to headquarters, R. Copeland (RSC). *Nyanza*: Ungoye, ICIPE Field Station, 00.61517°S:34.09200°E, 1147 m, 12–26.ii.2005, Malaise trap, inside seasonally swampy forest, R. Copeland (OLM). *Rift Valley*: Masai Mara National Reserve, 01.54638°S:35.30672°E, 1756 m, Malaise trap, riverine forest, nr KWS Research Station, 25.vii–8.viii.2008, R. Copeland (RSC); Marich Pass field station, 01.53633°N:35.45800°E, 917 m, Malaise trap, low canopy riverine forest, 18.iv–2.v.2005, R. Copeland (NMKE).

Recorded from Yemen and many Afrotropical countries (Olmi & Harten 2006), in addition to Oman (new record). Not collected in Madagascar.

Dryinus shimbanus Olmi, sp. n.*

Distribution: *Coast*: Shimba Hills National Park, near artificial pond, 04.22752°S:39.43197°E, 335 m, Malaise trap, mixed grassland – shrubland, 6–20.vi.2006, R. Copeland (NMKE).

Dryinus spangleri Olmi, 1984: 762

Distribution: *Coast*: Mombasa (USNM).

Recorded from Guinea-Bissau, Mozambique, Namibia, South Africa, Tanzania and Zimbabwe (Olmi 2004).

Dryinus undulatus (Benoit, 1950: 226)

Distribution: *Rift Valley*: Ol Pejeta Conservancy, 00.04364°N:36.97554°E, 1825 m, Malaise trap, near Pelican Hse, next to *Euclea* stand, 13–27.i.2006, R. Copeland (NMKE).

Recorded also from Burundi, Congo, Mozambique and Uganda (Olmi 2004).

Subfamily Gonatopodinae

Genus *Adryinus* Olmi, 1984: 1126

Type species: *Neodryinus cerrutii* Benoit, 1951, by original designation.

Adryinus cerrutii (Benoit, 1951*b*: 17)

Distribution: *Central*: Nairobi, iii.1945, S. Patrizi (MRAC).

Recorded from Zimbabwe (Olmi 1984).

Genus *Gonatopus* Ljungh, 1810: 161

Type species: *Gonatopus formicarius* Ljungh, 1810, by monotypy.

Gonatopus acuminatus Olmi, 1984: 1324

Distribution: *Coast*: Shimba Hills National Park, 04.23456°S:39.41687°E, 389 m, Malaise trap, just inside Longomwagandi Forest, 19.xi–3.xii.2008, R. Copeland (NMKE).

Recorded from Congo (Olmi 1984).

Gonatopus baginei Olmi, sp. n.*

Distribution: *Nyanza*: Ungoye Field Station, 00°36.91'S:34°05.52'E, 1147 m, 15–29.i.2005, Malaise trap, R. Copeland (NMKE).

Gonatopus bekilyanus (Benoit, 1953: 394)

Distribution: *Central*: Mt Kenya (DEUW).

Recorded from Madagascar, Mozambique and South Africa (Olmi 2004).

Gonatopus communis Olmi, 1984: 1610

Distribution: Western: Kakamega District, Kakamega Forest, 00°22.12'N:34°51.48'E, 628 m, 5.v.2006, Manfred Kraemer & Co. (MTC).

Recorded from Congo, Ethiopia, Madagascar, Mozambique, South Africa and Tanzania (Olmi 2004).

Gonatopus hyalinus Olmi, 1984: 1607

Distribution: *Central*: Nairobi, Embakasi Forest, 24.ii.1975, W.R.B. Hynd (BMNH).

Recorded from South Africa (Olmi 1984).

Gonatopus luteipes (Benoit, 1951*b*: 19)
Platygonatopus luteipes Benoit, 1951*b*: 19.

Distribution: *Rift Valley*: Olgasalic (= Olorgesailie), iv.1945, S. Patrizi (MRAC).

Recorded from Namibia (Olmi 1984).

Gonatopus meridionalis (Benoit, 1953: 391)

Distribution: *Central*: Gatamayu Forest, 00°58.68'S:36°41.62'E, near fishing camp, 20–30.i.1999, Malaise trap, R. Copeland (NMKE); Nairobi, ICIPE Research Station, 01°17'S:36°49'E, 24.v.2001, sweeping tall grass, M. Stiller (SANC).

Recorded from Congo, Ethiopia, Madagascar, Rwanda and South Africa (Ponomarenko & Olmi 2006).

Gonatopus nearcticus (Fenton, 1927: 6)
Platygonatopus ugandanus Benoit, 1951*a*: 300.
Acrodontochelys ugandanus (Benoit): Olmi 1984: 1174.

Distribution: *Central*: Nairobi (MRSN); Nanyuki, Mount Kenya Safari Club (EMUS). *Rift Valley*: Subukia, 00°0.429'N:36°14.523'E, 24.iii–11.iv.2010, Dupont & Braet (FAG); Olgasalic (= Olorgesailie) (MRAC).

Recorded from many countries of the Palaearctic, Afrotropical and Nearctic regions (Olmi 1999). Not collected in Madagascar.

Gonatopus patrizii Benoit, 1951*b*: 20

Distribution: *Central*: Nairobi, iv.1945, S. Patrizi (MRAC). *Eastern*: Kirimiri Hill, 00°25.45'S:37°32.71'E, 1745 m, 16–29.iii.2005, Malaise trap, R. Copeland (NMKE).

Recorded from South Africa (Olmi 1984).

Gonatopus similis Brues, 1906: 107

Distribution: *Rift Valley*: Nguruman, Oloibortoto River irrigation scheme, 01°48'S:36°04'E, 12–16.vi.1999, Malaise trap, R. Copeland (NMKE).

Recorded from The Gambia, Réunion, Lesotho, Mauritius, Mozambique and South Africa (Olmi 1998).

Gonatopus somerseti (Olmi, 1984: 1345)

Distribution: *North Eastern*: Kora (AMNH).

Recorded from South Africa (Olmi 1984).

Gonatopus taylori Olmi, 1984: 1628

Distribution: *Eastern*: Kilbwezi (CASC).

Recorded from Botswana, Ethiopia, South Africa and Uganda (Ponomarenko and Olmi 2006).

Gonatopus upembanus Olmi, 1984: 1628

Distribution: *Eastern*: near Ewaso Ngiro R. opposite Archer's Post, 00°38.1'N:37°40.4'E, 2xii.2002, W.J. Pulawski (CASC).

Recorded from Congo (Olmi 1984).

Family Embolemidae

Genus *Ampulicomorpha* Ashmead, 1893: 79

Type species: *Ampulicomorpha confusa* Ashmead, 1893, by original designation.

Ampulicomorpha magna Olmi, 1996: 102

Distribution: *Central*: Nairobi, NMK compound, 9–17.ix.1992, Malaise trap, Ali Ibrahim (BMNH).

Recorded from South Africa, Zambia and Zimbabwe (Olmi 1996); known also from Gabon and Malawi (new records).

Fig. 15. *Ampulicomorpha nzigidaherai* Olmi, sp. n., female holotype. Length 4.31 mm.

Ampulicomorpha nzigidaherai Olmi, sp. n. (Fig. 15)

Distribution: *Coast*: Taita Hills, Mbololo Forest, 03°20.00'S:38°26.85'E, 1550 m, Malaise trap, 2–9.ix.1998, Taita Biodiversity Project (NMKE); Taita Hills, Fururu Forest, 03°25.78'S:38°20.30'E, 1680 m, Malaise trap, 24–30.viii.1999, Taita Biodiversity Project (RSC); Taita Hills, Ngangao Forest, 03°21.239'S: 38°17.985'E, 1780 m, Malaise trap, 1–5.ii.1998, Taita Biodiversity Project (OLM); Taita Hills, Macha Forest, 03°26.81'S:38°21.76'E, 1520 m, Malaise trap, 21–28.iii.1999, Taita Biodiversity Project (RSC); Taita Hills, Sagalla Forest, 03°30'S:38°35'E, 1500 m, Malaise trap, 10–15.x.1999, Taita Biodiversity Project (NMKE, OLM).

Recorded also from Burundi.

Genus *Embolemus* Westwood, 1833: 444

Type species: *Embolemus ruddii* Westwood, 1833, by monotypy.

Embolemus capensis Olmi, 1997: 141

Distribution: *Central*: Gatamayu Forest, 00°58.68'S:36°41.62'E, near fishing camp, 20–30.i.1999, Malaise trap, R. Copeland (NMKE); Nairobi, Kitisuru Road, 6–14.xii.1998, gallery forest, Malaise trap, R. Copeland (NMKE, RSC); Runda Estate, 13.xi.1997, Malaise trap, Overholt (TAMU). *Rift Valley*: Saiwa Swamp National Park, near campsite, 01.09417°N:35.11833°E, 1882 m, Malaise trap, next to upland swamp, 21.v–4.vi.2006, R. Copeland (NMKE, OLM).

Recorded from South Africa (Olmi 1997); known also from Burundi, Madagascar, São Tomé and Principe (new records).

Embolemus harteni Olmi, 1997: 137

Distribution: *Nyanza*: Ungoye Field Station, 00°36.91'S:34°05.52'E, 1147 m, 21.iv–5.v.2005, Malaise trap, R.S. Copeland (NMKE, OLM); Gwasi Hill, Ungoye side, 00°61.67'S:34°10.17'E, c. 1500 m, Malaise trap,

near hilltop next to indigenous forest, 20.x–3.xi.2005, R. Copeland (NMKE, RSC); *Rift Valley*: Nguruman, near Sampu R., 01.90103°S:36.04804°E, 753 m, Malaise trap, near base of Nguruman escarpment, 4–18.viii.2007, R. Copeland (NMKE).

Recorded from Yemen (Olmi 1997).

Family Sclerogibbidae

Genus *Caenosclerogibba* Yasumatsu, 1958: 21

Type species: *Caenosclerogibba japonica* Yasumatsu, 1958, by monotypy and original designation.

Caenosclerogibba probethyloides Olmi, 2005*a*: 87

Distribution: *Coast*: 10 mi. NW Mombasa, 24.xi.1957, 3.xii.1957, ex *Oligotoma saundersii* (Westwood), E.S. Ross (CASC).

Hosts in Kenya: *Oligotoma saundersii* (Westwood) (Olmi 2005*a*).

Recorded from many Afrotropical countries, in addition to Yemen (Olmi 2005*a*).

Genus *Probethylus* Ashmead, 1902: 270

Type species: *Probethylus schwarzi* Ashmead, 1902, by monotypy and original designation.

Probethylus callani Richards, 1939: 95

Distribution: *Rift Valley*: Nguruman, Oloibortoto R. irrigation scheme, S. Pukare farm, 11–29.ii.1999, Malaise trap, R. Copeland (NMKE).

Recorded from many Nearctic, Neotropical and Afrotropical countries (Olmi 2005*a*).

Genus *Sclerogibba* Riggio & De Stefani-Perez, 1888: 19

Type species: *Sclerogibba crassifemorata* Riggio & De Stefani-Perez, 1888, by monotypy.

Sclerogibba berlandi Benoit, 1963: 83

Distribution: *Eastern*: at Athi R., 02°38.51'S:38°21.98'E, 24–27.v.1999, Malaise trap, R. Copeland (NMKE).

Recorded from many Palaearctic, Afrotropical and Oriental countries (Olmi 2005*a*).

Sclerogibba crassifemorata Riggio & De Stefani-Perez, 1888: 146

Distribution: *Eastern*: Tsavo National Park, Nutter's Farm, near Athi R., 02°38.51'S:38°21.98'E, 4–8.i.1999, 18–21.i.1999, 29.iii–1.iv.1999, 24–27.v.1999, 26–29.vi.1999, 16–23.viii.1999, Malaise trap, R. Copeland (NMKE, OLM, RSC); Samburu Nat. Res., near Ewaso Ng'iro R., 00.56797°N:37.53563°E, 874 m, 7–21.viii.2007, riverine forest, near Hdqtrs., Malaise trap, R. Copeland (NMKE). *Nyanza*: Gembe Hills, 00.4893°S:34.2433°E, 1362 m, 12–26.ii.2005, 23.v–6.vi.2005, Malaise trap, near riverine woodland remnant, R. Copeland (NMKE, RSC); Ruma National Park, near Kamato Gate, 00.64725°S:34.33595°E, 1264 m, 4–18.ii.2006, Malaise trap, in open grassland/woodland, R. Copeland (NMKE, OLM, RSC). *Rift Valley*: Marich Pass, 01°32.18'N:35°27.48'E, 917 m, 23.i–6.ii.2005, 6–20.ii.2005, 20.ii–6.iii.2005, 6–20.iii.2005, 20.iii–4.iv.2005, 4–18.iv.2005, 18.iv–2.v.2005, 2–16.v.2005, 30.v–12.vi.2005, 26.vi–10.vii.2005, 24.vii–7.viii.2005, 7–21.viii.2005, 21.viii–4.ix.2005, Malaise trap, low canopy riverine forest, R. Copeland (NMKE, OLM, RSC); Chyulu Hills, Ol Donyo Wuas, 02°50.222'S:37°75.343'E, 1200 m, 10–17.vi.2006, 17–24.vi.2006, 15–22.vii.2006, Malaise trap in *Acacia tortilis* woodland, R. Copeland (NMKE, OLM, RSC); Tsavo West National Park, 02.99615°S:38.45988°E, 464 m, 12–26.viii.2008, 7–21.x.2008, 4–18.xi.2008, Malaise trap, bank of Tsavo R., riverine woodland, R. Copeland (NMKE, OLM, RSC).

Recorded from many Palaearctic and Afrotropical countries (Olmi 2005*a*).

Sclerogibba impressa Olmi, 2005*a*: 149

Distribution: *Eastern*: Tsavo East National Park, near Athi R., Nutter's Farm, 02°38.51'S:38°21.98'E, 4–8.i.1999, Malaise trap, R. Copeland (NMKE).

Recorded from many Afrotropical and Oriental countries (Olmi 2005*a*).

Sclerogibba madegassa Benoit, 1952: 181

Distribution: *Eastern*: Marsabit, Matured 24.i.1970. Ex Terat., E.S. Ross (CASC). *Nyanza*: Gembe Hills, 00°29.36'S:34°14.60'E, 22–29.i.2005, 12–26.ii.2005, 28.iii–11.iv.2005, 11–25.iv.2005, Malaise trap, R. Copeland (NMKE, OLM, RSC).

Hosts in Kenya: unidentified Teratembiidae (Olmi 2005*a*).

Recorded from many Afrotropical and Oriental countries (Olmi 2005*a*).

Sclerogibba magrettii (Kieffer, 1913: 107) (Figs 16, 17)

Distribution: *Nyanza*: Got Rabour, foothills of Gembe Hills, 00.49298°S:34.18918°E, 1361 m, Malaise trap, mixed grassland/woodland, 27.iv–11.v.2006, 11–25.v.2006, 6–20.vii.2006, R. Copeland (NMKE, OLM). *Rift Valley*: Tsavo West National Park, 02.99615°S:38.45988°E, 464 m, 9–23.ix.2008, 2–16.xii.2008, Malaise trap, bank of Tsavo R., riverine woodland, R. Copeland (NMKE, RSC); Chyulu Hills, Ol Donyo Wuas, 02.50222°S:37.75343°E, 1200 m, 24.vi–1.vii.2006, 1–8.vii.2006, 8–15.vii.2006, 15–22.vii.2006, Malaise trap in *Acacia tortilis* woodland, R. Copeland (NMKE, OLM, RSC).

Recorded from many Palaearctic, Afrotropical and Oriental countries (Olmi 2005*a*).

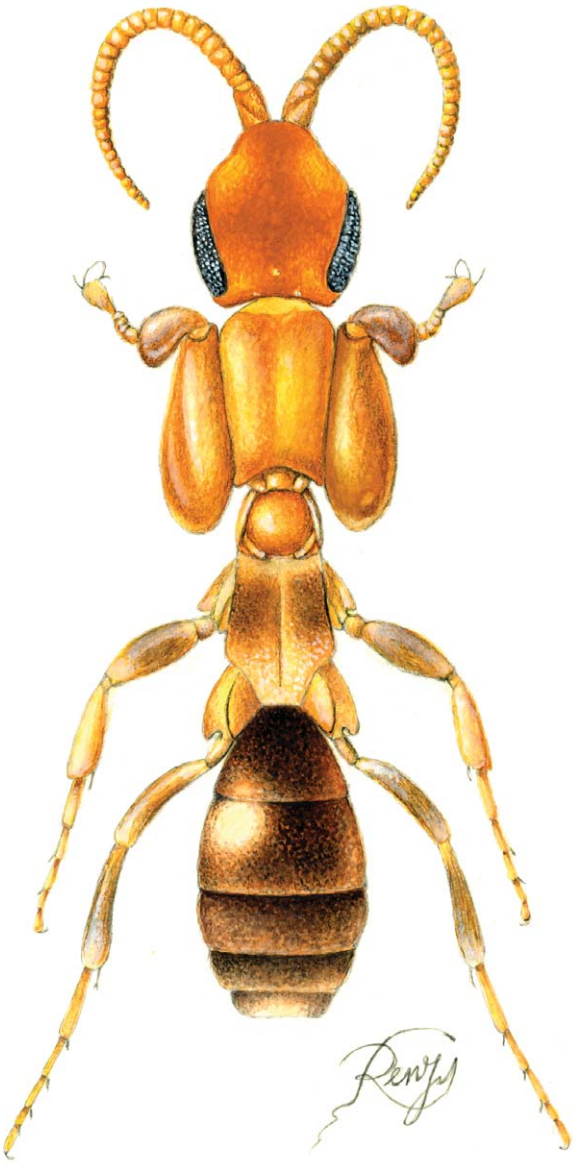


Fig. 16. *Sclerogibba magrettii* Kieffer, female (from Olmi 2005). Length 3.45 mm.

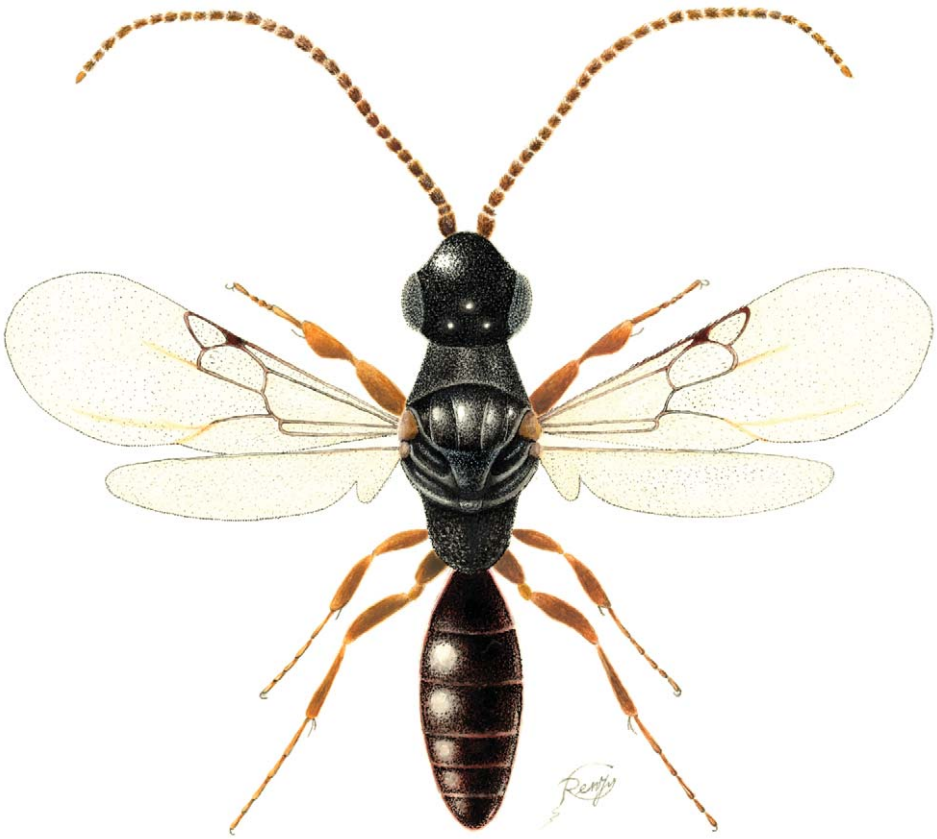


Fig. 17. *Sclerogibba magrettii* Kieffer, male (from Olmi 2005). Length 3.87 mm.

Sclerogibba rapax Olmi, 2005*a*: 160

Distribution: *Coast*: 10 mi. S Maktau, 28.xii.1957, Ex "*Dictyoploca" burensis*, E.S. Ross (CASC). *Nyanza*: Gembe Hills, 00.4893°S:34.2433°E, 1362 m, 5–12.ii.2005, 6–20.vi.2005, Malaise trap, near riverine woodland remnant, R. Copeland (NMKE, RSC).

Hosts in Kenya: *Dictyoploca burensis* (Olmi 2005*a*).

Recorded from many Afrotropical and Oriental countries (Olmi 2005*a*).

Sclerogibba rufithorax (Cameron, 1904: 141)

Distribution: *Eastern*: Tsavo National Park, near Athi R., Nutter's Farm, 02°38.51'S:38°21.98'E, 4–8.i.1999, 29.iii–1.iv.1999, Malaise trap, R. Copeland (NMKE, RSC).

Recorded from many Afrotropical, Oriental and Australian countries (Olmi 2005a).

Sclerogibba talpiformis Benoit, 1950: 133

Distribution: *Nyanza*: Got Rabour, foothills of Gembe Hills, 00.49298°S:34.18918°E, 1361 m, Malaise trap, mixed grassland/woodland, 27.iv–11.v.2006, 11–25.v.2006, 25.v–8.vi.2006, 6–20.vii.2006, R. Copeland (NMKE, OLM, RSC). *Rift Valley*: Lake Nakuru National Park, 00.47203°S:36.06388°E, 1908 m, 6–20.i.2006, Malaise trap, mixed *Olea*, *Cussonia*, *Vepris*, R. Copeland (NMKE, OLM); Marich Pass field station, 01.53633°N:35.45800°E, 917 m, 20.iii–4.iv.2005, 4–18.iv.2005, 18.iv–2.v.2005, 30.v–12.vi.2005, 26.vi–10.vii.2005, 24.vii–7.viii.2005, 7–21.viii.2005, 21.viii–4.ix.2005, Malaise trap, low canopy riverine forest, R. Copeland (NMKE, OLM, RSC).

Recorded also from many countries of the world, excluding the Australian region (Olmi 2005*a*).

Sclerogibba turneri Richards, 1939: 222

Distribution: *Coast*: 9 mi. E Tävetä, Matured 17.xii.1957, ex *Cephalembia sjostedti*, E.S. Ross (CASC); Kwale, 2.xii.1957, 6.ii.1958, ex *Rhagadochir vosseleri*, E.S. Ross. (CASC); Kwale, Cha Shimba Forest, matured 23.xi.1957, ex *Rhagadochir*, E.S. Ross (CASC); same locality label, 27.xi.1957, ex *Rhagadochir vosseleri*, E.S. Ross (CASC). *Rift Valley*: 23 mi. E Namanga, 3700' [1126.76 m], 10.i.1970, ex culture of adult *Cephalembia* female, 16.iii.1970 at S. F., E.S. Ross (CASC).

Hosts in Kenya: *Cephalembia sjostedti*, *Rhagadochir vosseleri* (Enderlein) (Olmi 2005*a*).

Recorded from Angola, Botswana and South Africa (Olmi 2005*a*).

Sclerogibba vagabunda (Bridwell, 1919: 36)

Distribution: *Coast*: 10 mi. S Maktau, 27.xii.1957, ex *Cephalembia*, E.S. Ross (CASC). *Eastern*: Tsavo East National Park, Nutter's Farm, nr Athi R., 02°38.51'S:38°21.98'E, 7–11.xii.1998, 28.xii.1998–1.i.1999, Malaise trap, R. Copeland (BMNH); same locality, 7–11.xii.1998, 18–21.i.1999 (NMKE, OLM); 10 mi. N Laisamis, 1750' [533.4 m], matured 14.i.1970, ex small, pale *Chirembia* n. sp., E.S. Ross (CASC); 5 mi. S Isiolo, 1200 m, 28.i.1958, ex *Gnathembia* n. sp., E.S. Ross (CASC); same locality label, 16.i.1958, ex *Navasiella*, E.S. Ross (CASC); same locality, matured 1.ii.1958, ex *Chirembia,* E.S. Ross (CASC); 7 mi. S Isiolo, matured 26.i.1958, ex *Chirembia*, E.S. Ross (CASC). *Nyanza*: Gembe Hills, 00°29.36'S:34°14.60'E, 29.i–5.ii.2005, 12–26.ii.2005, 28.iii–11.iv.2005, 11–25.iv.2005, Malaise trap, R. Copeland (NMKE, OLM, RSC).

Hosts in Kenya: *Chirembia* sp., *Gnathembia* sp., *Navasiella* sp., *Cephalembia* sp. (Olmi 2005*a*).

Recorded from many countries of the world, excluding the Neotropical Region (Olmi 2005*a*).

CHECKLIST OF DRYINIDAE, EMBOLEMIDAE AND SCLEROGIBBIDAE OF BURUNDI

Asterisk indicates that specimens are known only from Burundi.

Family Dryinidae
Subfamily Aphelopinae

Genus *Aphelopus* Dalman, 1823: 8

Type species: *Dryinus atratus* Dalman, 1823, by subsequent designation (Westwood 1840).

Aphelopus wittei Benoit, 1951*b*: 16

Distribution: Muyange, 2100 m, 11.viii.1948 (IRSN).

Recorded from many Afrotropical countries (Olmi 1984), in addition to Yemen (Olmi & Harten 2000).

Subfamily Dryininae

Genus *Dryinus* Latreille, 1804: 176

Type species: *Dryinus formicarius* Latreille, 1804, by subsequent monotypy (Latreille 1805).

Dryinus undulatus (Benoit, 1950: 226)

Distribution: Bururi (CASC).

Recorded from Congo, Kenya, Mozambique and Uganda (Olmi 2004).

Family Embolemidae

Genus *Ampulicomorpha* Ashmead, 1893: 79

Type species: *Ampulicomorpha confusa* Ashmead, 1893, by original designation.

Ampulicomorpha nzigidaherai Olmi, sp. n.

Distribution: Kibira National Park, 02.93315°S:29.50583°E, 2177 m, Malaise trap, edge of mixed forest/bamboo, meadow, 1–15.i.2010, R. Copeland (MRAC).

Recorded also from Kenya.

Genus *Embolemus* Westwood, 1833: 444

Type species: *Embolemus ruddii* Westwood, 1833, by monotypy.

Embolemus burundensis Olmi, sp. n.*

Distribution: Kibira National Park, 02.93315°S:29.50583°E, 2177 m, Malaise trap, edge of mixed forest/bamboo, near meadow, 1–15.i.2010, R. Copeland (MRAC); same locality label, 18.xii.2009–1.i.2010 (INECN); same locality label, 9–23.iv.2010 (OLM).

Embolemus capensis Olmi, 1997: 141

Distribution: Kibira National Park, 02.93315°S:29.50583°E, 2177 m, Malaise trap, edge of mixed forest/ bamboo, near meadow, 15–29.i.2010, R. Copeland (NMKE).

Recorded from South Africa (Olmi 1997); known also from Kenya, Madagascar, São Tomé and Principe (new records).

Family Sclerogibbidae

Genus *Sclerogibba* Riggio & De Stefani-Perez, 1888: 19

Type species: *Sclerogibba crassifemorata* Riggio & De Stefani-Perez, 1888, by monotypy.

Sclerogibba vagabunda (Bridwell, 1919: 36)

Distribution: Urundi, 13 mi. SE Bururi, 1850 m, matured 20.ii.1958, 24.v.1958, ex Teratembiidae, E.S. Ross (CASC).

Hosts in Burundi: Teratembiidae (Olmi 2005*a*).

Recorded from many countries of the world, excluding the Neotropical Region (Olmi 2005*a*).

DISCUSSION

The checklists of the Dryinidae, Embolemidae and Sclerogibbidae of Kenya and Burundi presented in this paper include 39 species of Dryinidae, four species of Embolemidae and 12 species of Sclerogibbidae known from Kenya; two species of Dryinidae, three species of Embolemidae and one species of Sclerogibbidae known from Burundi. Embolemidae are recorded for the first time from Kenya and Burundi. Seven new species of Dryinidae and two new species of Embolemidae are described.

Table 1 summarizes data on the geographic distribution of currently known Kenyan species of Dryinidae, Embolemidae and Sclerogibbidae. Ten (26%) of the Kenyan dryinid species are restricted to Eastern Africa, all but two of these Kenyan endemics. Outside eastern Africa, the Kenyan fauna has its closest affinity with that of southern Africa, with 10 (26%) species known elsewhere on the continent only from that region, and a further 16 (41%) known from there and other areas. A single species represents a new continental record, being previously known only from Madagascar. Nine other species with large continental distributions have also been collected on Madagascar (8) or other Indian Ocean islands (1): they were excluded from table 1. African Embolemidae are too rarely collected to say much about. Two Kenyan species occur in southern Africa and one of these is also found in Madagascar. One species was formerly

TABLE 1

Geographic distribution of Kenyan Dryinidae, Embolemidae and Sclerogibbidae.

Family	Known no. of species	Widespread Afrotropical	African distribution of species							Madagascar and Kenya only	Yemen and Kenya only
			East	Central	Southern	West	Central and West	Central and southern	West and southern		
Dryinidae	39	7	10	2	10	0	1	5	3	1	0
Embolemidae	4	0	1	0	1	0	0	1	0	0	1
Sclerogibbidae	12	11	0	0	0	0	0	1	0	0	0
Total	55	18	11	2	11	0	1	7	3	1	1

TABLE 2

Within-country distribution of newly described species and species previously collected in Kenya.[1]

Province	Malaise-trap sampling			Dryinidae		Embolemidae		Sclerogibbidae	
	No. of sampling months	No. of major sites	No. of within-site locations	No. previously collected	No. newly described	No. previously known	No. newly described	No. previously known	No. newly described
Central	29	6	6	7	0	2	0	0	0
Coast	34	4	16[2]	3	5	0	1	0	0
Eastern	34	5	5	2	0	0	0	6	0
Northeastern	0	0	0	1	0	0	0	0	0
Nyanza	63	6	10	1	1	1	0	6	0
Rift Valley	64	7	13	4	0	2	0	4	0
Western	25	2	6	7	1[3]	0	0	0	0

[1] Includes 13 dryinid species collected by others and not reported in Olmi (1984) and unpublished records of two species of Embolemidae.
[2] Includes Malaise trap samples from 11 locations in Taita Hills (1997–1999), collected by the Taita Biodiversity project. Traps in these locations were run for two weeks at a time, or less.
[3] The only new species not collected in Malaise traps.

known only from Yemen. The sclerogibbid species are widespread, virtually all of them being found throughout continental Africa and one extending into western Asia.

Table 2 presents the distribution of species previously recorded from Kenya and of new species reported in this paper. Previously reported dryinid species were distributed relatively evenly across provinces. However, new species were disproportionally sampled in traps set in Coast Province sites. All Malaise trap in Coast Province were in, or alongside, low altitude indigenous forests on the Kenyan coast or in the Eastern Arc Mountains of the Taita Hills, and all were within biodiversity hotspot areas; either the Coastal Forests of Eastern Africa or the Eastern Afromontane hotspots (Conservation International 2007). Of the new dryinid species from Malaise traps, five (87%) were from traps set in the Coast Province. In addition, the single new species of Embolemidae was also collected there. Coast Province sites accounted for about 14% (n=249 sampling months) of Malaise trap sampling effort, while providing 86% (n=7) of undescribed species from Malaise traps and 75% (8) of new species overall (Table 2). These data suggest that for these two families, at least, and probably for other forest-dependent species, Coast Province forests have been under-sampled. A more rigorous survey in this region, particularly in the Taita Hills, would probably reward the effort.

In contrast with the Dryinidae, the Sclerogibbidae were concentrated in the drier habitats of the Eastern, Rift Valley and Nyanza Provinces and were absent from collections in the Central, Coast and Western Provinces, where traps were set primarily in wet forest habitat. Interestingly, four of the five sclerogibbid species known previously from Kenya had been reared from Embiidina collected in Coast Province (and

TABLE 3
Generic summary of Kenyan Dryinidae, Embolemidae, and Sclerogibbidae.

Family	Subfamily	Genus	Currently recognized species	Previously recorded[1]	New species described in this paper	New records of previously described species	Known prevously and recollected in Malaise traps (%)
Dryinidae	Aphelopinae	*Aphelopus*	4	4	0	0	2 (50)
	Anteoninae	*Anteon*	10	4	4	2	0 (0)
	Bochinae	*Bocchus*	1	0	0	1	N/A
	Dryininae	*Thaumatodryinus*	1	1	0	0	0 (0)
	Gonatopodinae	*Dryinus*	9	2	2	5[2]	1 (5)
		Adryinus	1	1	0	0	0 (0)
		Gonatopus	13	10	1	2	2 (20)
		subtotal	39	22	7	10	5 (23)
Embolemidae		*Ampulicomorpha*	2	1	1	0	0 (0)
		Embolemus	2	1	0	1[3]	1 (100)
		subtotal	4	1	1	1	1 (50)
Sclerogibbidae		*Caenosclerogibba*	1	1	0	0	0 (0)
		Probethylus	1	0	0	1	N/A
		Sclerogibba	10	4	0	6	3 (75)
		subtotal	12	5	0	7	3 (60)
		Grand total	55	28	8	18	9 (32)

[1] Includes 13 dryinid species collected by others and not reported in Olmi (1984) and unpublished records of two species of Embolemidae.
[2] Includes one new continental Africa record for *Dryinus hova*, previously known from Madagascar.
[3] Includes one new continental Africa record for *Embolemus harteni*, previously known from Yemen.

elsewhere). However, only one of these species, *Sclerogibba turneri*, appears to have been collected in a wet, forested area.

Malaise trapping had a marked effect on our knowledge of the Kenyan fauna, both in terms of the geographic distribution of previously known species and in the collection of previously undescribed species. Including newly described species, Malaise trap specimens were responsible for a 73% increase in the number of dryinid species and a 100% increase in embolemids recorded from Kenya (Table 3). Knowledge of the dryinid genera *Anteon* and *Dryinus* and the sclerogibbid genus *Sclerogibba* was particularly impacted by Malaise trapping. Overall, our recent Malaise trap collections are responsible for 47% of the 55 species of Dryinidae, Embolemidae and Sclerogibbidae currently known from Kenya.

Although Malaise trapping was an important method for the discovery of new species and for generating biogeographical data on wasps, it should be noted that this collection method had mixed success in recollecting species previously recorded from

Kenya (Table 3). While 60% of sclerogibbid species were recollected, only 23% of the previously known 22 dryinid species turned up in our Malaise samples. This might reflect the fact that most of our trapping sites were located outside forested areas. Nonetheless, our data suggest that for the Dryinidae, at least, thorough surveying will require multiple sampling techniques.

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REFERENCES

Achterberg, C., van & Kats, R.J.M., van. 2000. Revision of the Palaearctic Embolemidae (Hymenoptera). *Zoologische Mededelingen Leiden* **74**: 251–269.

Ashmead, W.H. 1893. Monograph of the North American Proctotrypidae. *Bulletin of the United States National Museum* **45**: 1–472.

———1902. Classification of the fossorial, predaceous and parasitic wasps, or the superfamily Vespoidea. *The Canadian Entomologist* **34**: 287–291.

Benoit, P.L.G. 1950. Nouveaux Dryinidae du Congo belge. *Revue de Zoologie et de Botanique Africaines* **43**: 222–227.

———1951*a*. Nouveaux Dryinidae (Hym.) du continent africain. *Annali del Museo Civico di Storia Naturale di Genova* **64**: 298–302.

———1951*b*. Nouveaux Dryinidae d'Afrique centrale (Hymenoptera Aculeata). *Rivista di Biologia Coloniale* **11**: 17–24.

———1951*c*. Nouveaux Dryinidae (Hym.) éthiopiens. *Revue de Zoologie et de Botanique Africaines* **44**: 157–164.

———1952. Les Sclerogibbidae (Hym.), famille nouvelle pour la faune de Madagascar. *Mémoires de l'Institut Scientifique de Madagascar*, Série E **1** (1): 181–182.

———1953. Deux nouveaux Dryinidae du Congo belge (Hym.-Acul.). *Revue de Zoologie et de Botanique Africaines* **47**: 142–144.

———1963. Bethylides nord-africains recoltès par M.L. Berland. *Bulletin du Muséum national d'Histoire naturelle*, 2° Série **35**: 82–84.

Bridwell, J.C. 1919. Some Notes on Hawaiian and Other Bethylidae (Hymenoptera) with Descriptions of New Species. *Proceedings of the Hawaiian Entomological Society* **4** (1): 21–38.

Brues, C.T. 1906. Descriptions of parasitic Hymenoptera from Cape Colony. *Bulletin of the Wisconsin Natural History Society* **4**: 103–112.

Cameron, P. 1904. On the Hymenoptera of the Albany Museum, Grahamstown (Second paper). *Records of the Albany Museum* **1**: 135–244.

Ceballos, G. 1936. Estudios sobre Anteoninae de Madagascar (Hym., Bethyl.). *EOS* **12**: 43–64.

Conservation International. 2007. http://www.biodiversityhotspots.org/Pages/default.aspx (accessed Nov. 10, 2010).

Dalman, J.W. 1823. *Analecta entomologica*. Holmiae: Typis Lindhianis.

Fenton, F.A. 1927. New parasitic Hymenoptera of the subfamily Anteoninae from the Americas. *Proceedings of the Unites States National Museum* **72**: 1–6.

Guglielmino, A. & Olmi, M. 1997. A host-parasite catalog of world Dryinidae (Hymenoptera: Chrysidoidea). *Contributions on Entomology, International* **2** (2): 165–298.

———2006. A host-parasite catalog of world Dryinidae (Hymenoptera: Chrysidoidea): first supplement. *Zootaxa* **1139**: 35–62.
———2007. A host-parasite catalog of world Dryinidae (Hymenoptera: Chrysidoidea): second supplement. *Bollettino di Zoologia Agraria e di Bachicoltura,* Ser. II, **39** (2): 121–129.
Jurine, L. 1807. *Nouvelle méthode de classer les Hyménoptères et les Diptères, 1. Hyménoptères*. Genève: Paschoud.
Kieffer, J.-J. 1913. Nouveaux Microhyménoptéres de l'Afrique equatoriale. *Bollettino del Laboratorio di Zoologia generale e agraria di Portici* **7**: 105–112.
Latreille, P.A. 1804. Tableau méthodique des insectes. *In*: Société de Naturalistes et d'Agriculteurs, ed., *Nouvelle dictionnaire d'Histoire naturelle*, 24. Paris: F. Dufart.
———1805. *Histoire naturelle generale et particulière des crustacés et des insectes*, 13. Paris: F. Dufart.
Ljungh, S.J. 1810. *Gonatopus*, novum insectorum genus. *Beiträge zur Naturkunde* **2**: 161–163.
Olmi, M. 1984. A revision of the Dryinidae (Hymenoptera). *Memoirs of the American Entomological Institute* **37**: I–XXXI+1–1913.
———1991. Supplement to the revision of the world Dryinidae (Hymenoptera Chrysidoidea). *Frustula entomologica* (1989), N.S. **XII** (XXV): 109–395.
———1993. A new generic classification for Thaumatodryininae, Dryininae and Gonatopodinae, with descriptions of new species (Hymenoptera Dryinidae). *Bollettino di Zoologia Agraria e di Bachicoltura*, Ser. II **25**: 57–89.
———1994*a*. The Dryinidae and Embolemidae (Hymenoptera: Chrysidoidea) of Fennoscandia and Denmark. *Fauna Entomologica Scandinavica* **30**: 1–100.
———1994*b*. New species of Dryinidae from Madagascar (Hymenoptera Chrysidoidea). *Frustula entomologica* (1994), N.S. **17** (30): 1–12.
———1996. A revision of the world Embolemidae (Hymenoptera Chrysidoidea). *Frustula entomologica* (1995), N.S. **18** (31): 85–146.
———1997. A contribution to the knowledge of the Embolemidae and Dryinidae (Hymenoptera Chrysidoidea). *Bollettino di Zoologia Agraria e di Bachicoltura,* Ser. II **29** (2): 125–150.
———1998. A contribution to the knowledge of Dryinidae (Hymenoptera: Chrysidoidea) and Strepsiptera of Mozambique. *Oriental Insects* **32**: 59–78.
———1999. Hymenoptera Dryinidae – Embolemidae. *Fauna d'Italia* **37**: 1–425.
———2004. New species of Dryinidae and Embolemidae from Madagascar (Hymenoptera Chrysidoidea). *Frustula entomologica* (2002), N.S. **25** (38): 86–109.
———2005*a*. A revision of the world Sclerogibbidae (Hymenoptera Chrysidoidea). *Frustula entomologica*, N. S. **26**–**27** (39–40): 46–193.
———2005*b*. A contribution to the knowledge of Afrotropical Dryinidae (Hymenoptera: Chrysidoidea). *Entomologist's Monthly Magazine* **141**: 233–247.
———2007. New species of Afrotropical Dryinidae (Hymenoptera: Chrysidoidea), with description of a new genus and a new subfamily. *African Invertebrates* **48** (2): 199–232.
———2009. New species of South African Dryinidae (Hymenoptera: Chrysidoidea). *African Invertebrates* **50** (2): 447–460.
Olmi, M. & Harten, A., van. 2000. Notes on Dryinidae, Embolemidae and Sclerogibbidae (Hymenoptera: Chrysidoidea) of Yemen, with keys to the species of the Arabian Peninsula. *Fauna of Arabia* **18**: 253–271.
———2006. Dryinidae, Sclerogibbidae and Embolemidae (Hymenoptera: Chrysidoidea) of Yemen, with revised keys to the species of the Arabian peninsula. *Fauna of Arabia* **21**: 307–337.
Perkins, R.C.L. 1905. Leafhoppers and their natural enemies (Pt. I. Dryinidae). *Report of Work of the Experiment Station of the Hawaiian Sugar Planters' Association, Division of Entomology, Bulletin* **1** (I): 1–69.
Ponomarenko, N.G. & Olmi, M. 2006. Dryinidae (Hym.) collected in Ethiopia by Dr Alexander F. Emelyanov, with descriptions of two new species. *Entomologist's Monthly Magazine* **142**: 7–10.
Richards, O.W. 1939. The Bethylidae subfamily Sclerogibbinae (Hymenoptera). *Proceedings of the Royal Entomological Society of London (B)* **8**: 211–223.
Riggio, G. & De Stefani-Perez, T. 1888. Sopra alcuni imenotteri dell'Isola di Ustica. *Il Naturalista Siciliano* **7**: 145–150.
Turner, R.E. 1928. New Hymenoptera of the family Bethylidae. *The Annals and Magazine of Natural History, Tenth Series* **I**: 129–152.
Westwood, J.O. 1833. Descriptions of several new British forms amongst the parasitic hymenopterous insects. *Magazine of Natural History and Journal of Zoology, Botany, Mineralogy, Geology and Meteorology* **2**: 443–445.
———1840. *An Introduction to the Modern Classification of Insects, 2*. London: Longman, Orme, Brown, Green and Longmans.
Yasumatsu, K. 1958. A new addition to the genera of the Sclerogibbidae (Hymenoptera). *Kontyû* **26**: 20–24.