© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

Entomofauna

ZEITSCHRIFT FÜR ENTOMOLOGIE

Band 36, Heft 43: 561-580 ISSN 0250-4413 Ansfelden, 2. Januar 2015

Diagnosis of *Megastigmus* spp. (Hymenoptera: Torymidae) reared from galls of *Leptocybe invasa* FISHER & LASALLE, 2004, (Hymenoptera: Eulophidae) on *Eucalyptus* spp. (Myrtaceae), with description of a new species from South Africa

Mikdat DOĞANLAR

Abstract

Eleven species of *Megastigmus* DALMAN, 1820 (Hymenoptera: Torymidae) as parasitoids or gall associates of *Leptocybe invasa* FISHER & LASALLE, 2004 (Hymenoptera: Eulophidae) of *Eucalyptus* spp. (Myrtaceae) were obtained from several parts of the world. The species are: *M. leptocybus* DOĞANLAR & HASSAN, 2013 from the Western Palearctic; *M. zwimendeli* DOĞANLAR & HASSAN, 2010 from Australia, and Israel and Turkey (introduced to both country); *M. pretorianensis* nov.sp. and *M. zebrinus* GIRISSELL from Pretoria, South Africa; *M. thailandiensis* DOĞANLAR & HASSAN, 2013 and *M. thitipornae* DOĞANLAR & HASSAN, 2013 and *M. zebrinus* GRISSELL, 2006 from Thailand; *M. judikingae* DOĞANLAR & HASSAN, 2010, *M. erolhassani* DOĞANLAR & HASSAN, 2010, *M. lawsoni* DOĞANLAR & HASSAN, 2010, *M. flavivariegatus* GIRAULT, 1915 (as reared from woody galls of *Eucalyptus camadulensis and E. grandis)* from Australia; *M. brasiliensis* DOĞANLAR, ZACHE & WILCKEN, 2013 from Brasil. The identification keys based on several characters of the species were provided.

Key words: Taxonomy, Torymidae, *Megastigmus*, new species, worldwide.

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

Zusammenfassung

Elf Arten von *Megastigmus* DALMAN 1820 (Hymenoptera: Torymidae) als Parasitoide oder Gallengemeinschaften von *Leptocybe invasa* FISHER & LASALLE 2004 (Hymenoptera: Eulophidae) von *Eucalyptus* spp. (Myrtaceae) wurden aus verschiedenen Teilen der Welt erhalten. Die Arten sind: *M. leptocybus* DOĞANLAR & HASSAN 2013 aus der Westpaläarktis; *M. zwimendeli* DOĞANLAR & HASSAN 2010 aus Australien, Israel und der Türkei (in beiden Ländern eingeführt); *M. pretorianensis* nov.sp. und *M. zebrinus* GIRISSELL von Pretoria, Südafrika; *M. thailandiensis* DOĞANLAR & HASSAN 2013, *M. thitipornae* DOĞANLAR & HASSAN 2013, *M. zebrinus* GIRISSELL 2006 aus Thailand; *M. judikingae* DOĞANLAR & HASSAN 2010, *M erolhassani* DOĞANLAR & HASSAN 2010, *M. lawsoni* DOĞANLAR & HASSAN 2010, *M. flavivariegatus* GIRAULT 1915 (gezogen aus Holzgallen von *Eucalyptus camadulensis* und *E. grandis*) aus Australien; *M. brasiliensis* DOĞANLAR, ZACHE & WILCKEN 2013 aus Brasilien. Die beigefügten Bestimmungsschlüssel basieren auf mehreren Artmerkmalen.

Introduction

Megastigmus DALMAN, 1820 (Hymenoptera: Chalcidoidea: Torymidae) was described by DALMAN (1820) as the subgenus *Torymus* DALMAN with its type species being *Pteromalus bipunctatus* SWEDERUS, 1795. BOUCEK (1988) keyed out *Megastigmus* in the Subfamily Megastigminae, and provided the diagnostic characters of the genus, stated that the genus contains 44 species in Australia, 35 spp. from Holarctic region in America south only to Mexico, but about 3 spp. are present in the Old World in eastern and southern Africa, while South Asia has at least 15 spp., and 1 species is found on Fiji. GRISSEL (1999) listed 133 world species, gave their synonyms, distributions and literature references.

ROQUES & SKRZPCZYNSKA (2003) studied the native and introduced species of the European phytophagous *Megastigmus*, and provided an identification key to the species. GRISSELL (2006) described a new species, *Megastigmus zebrinus* GISSELL, that galls seed capsules of *Eucalyptus camaldulensis* DEHNHARDT (Myrtales: Myrtaceae) from South Africa and Australia. DOĞANLAR & HASSAN (2010) studied the species of *Megastigmus* related with *Eucalyptus* from all over the world, described some new species from the Palearctic region and Australia, and provided an identification key for the species of *Megastigmus* associated with *Eucalyptus*. NOYES (2014) listed 144 world species of *Megastigmus* and gave their synonyms, distributions and literature lists.

Up to now, the genus *Megastigmus* represented in Africa by 4 species (NOYES 2014), viz. *M. transvaalensis* (HUSSEY, 1956) and *M. thomseni* (HUSSEY, 1956) from seeds of Anacardiaceae (GRISSEL & HOBBS 2000; GRISSEL & PRINSLOO 2001; SCHEFFER & GRISSELL 2003), *M. aculeatus* (SWEDERUS, 1795) from seeds of *Rosa* spp. (BOUCEK 1954, 1971, 1988; ROQUES & SKRZPCZYNSKA 2003) and *M. ZEBRINUS* GRISSELL, 2006, galling seed capsules of *E. camaldulensis* (GRISSELL, 2006).

Some *Megastigmus* species from different countries were locally reared from galls of *L. invasa* in the last five years. During this period the author requested specimens from other countries for identification, and some local new species were described and there

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

are some more species to be described, too. These research studies identified the need to develop better identification characteristics relating to the *Megastigmus* complex, reared from galls of L. invasa from all over the world, including South America and South Africa.

The present research study focuses on world-wide species of *Megastigmus* associated with galls of *L. invasa*, originated from several parts of the world, and includes descriptions of a new species from the South Africa. It also provides more informative and comprehensive identification keys needed to be developed to better identify the *Megastigmus* complex associated with galls of *L. invasa*.

Material and methods

The specimens of *Megastigmus* species were obtained from ANIC, QMB, MKUT, (IMRSBC) Insect Museum of Research Station of Biological Control Yüreğir, Adana, Turkey. All of the specimens were reared from mature galls of *L. invasa* on *E. camaldulensis* leaves and stems, which were collected from several parts of the world by some researchers. Such as: the materials of the new species from Pretoria, South Africa by Dr. Neser, and others were recorded in the text.

Morphological terminology follows ROQUES & SKRZPCZYNSKA (2003) and DOĞANLAR & HASSAN (2010).

One of the male and female paratypes of the new species was slide-mounted in Canada balsam. The examined specimens were deposited in the museums recorded above, and the types of the new species were deposited in (SANC) South African National Collection of Insects, ARC- Plant Protection Research Institute, Pretoria, South Africa, and in the (IMRSBC) Insect Museum of Research Station of Biological Control Yüreğir, Adana, Turkey.

Photographs of diagnostic characters of the new species were taken by using a stereo-microscope (LEIKA GM 500, Germany) with a digital camera (LEIKA ICC50 HD) attached to it.

Terminology and abbreviations

MOL: distance between median and dorsal ocelli; OOL: distance between eye margin and posterior ocelli;, POL: distance between posterior ocelli; Odia: diameter of ocelli; TO: distance between ventral margin of toruli and median ocelli; TCly: distance between ventral margin of toruli and margin of clypeus; F1-F7: flagellar segments; C1-C3: claval segments.

Megastigmus DALMAN, 1820 (Figs 1-7)

Megastigmus DALMAN, 1820: 178. (as subgenus of *Torymus* DALMAN 1820), Type species: *Pteromalus bipunctatus* SWEDERUS, 1795 (designated by DAHMS 1986: 155).

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

Detailed diagnosis for the genus and its redescription was given by DOĞANLAR & HASSAN (2010). Some of new diagnostic characters are as follows:

Body 1.0-5.0 mm in length (including ovipositor). In the subfamily Megastigminae the genus has the following characters: body without any metallic colour; lower clypeal margin with deep median incision, hence appearing 2-toothed; scape in female not exceeding median ocellus; in male antenna normal, similar to that of female; thorax either rather shiny or, if sculptured, then at least on scutum with transverse striae, scutellum only rarely engraved-reticulate; usually with frenal cross-line, with 1-3 pairs of setae; forewing rarely darkened at stigma, then cloud vaguely delimited; thorax pilosity usually conspicuous, at least in yellowish species, and midlobe of mesonotum with one pair of rows of setae longitudinally along notauli.

B i o l o g y : GRISSELL (2006) summarized behaviour of the species of the genus as follows:

1) Strict phytophagy within the seeds of a number of plant families;

2) Facultative parasitoid that requires a gall-former but feeds on plant tissue within the gall as well;

3) Obligate egg-larval endoparasitoids of gall-forming Hymenoptera;

4) Gall-former – YATES (1986) listed *Megastigmus* DALMAN 1820 species associated with the following families: Anacardiaceae, Aquifoliaceae, Cupressaceae, Fabaceae, Pinaceae, Hammalidaceae, Rosaceae, Taxodiaceae, and Myrtaceae.

D i s t r i b u t i o n : Worldwide.

By the work the eleven species, including a new species of *Megastigmus* DALMAN 1820 were studied and the identification key based on body characters (except those of forewing) and the key based on forewing characters were provided for the parasitoid species of *L. invasa* and of one species reared from the woody galls like that of *L. invasa* of *Eucalytus* spp. from several parts of the world.

Key to the species of *Megastigmus* DALMAN, 1820 reared from galls *of Leptocybe invasa* FISHER & LASALLE, 2004 based on the characters of body, except forewing

1	Females	2
-	Males	12
2(1)	Scutellum with 1-2 pairs of setae (Figs 1a-b); body with pale setae; funicular segments with one row of linear sensillae	3
-	Scutellum with 3 pairs of setae (Fig. 1c); body with black setae; other characters variable	6
3(2)	Scutellum with 1 pair of setae (Fig. 1a); ovipositor 2.5x as long as hind tibia; metasoma as long as mesosoma; mesoscutum 2.1x as long as width; antenna (Fig. 2a) with F1 1.33x as long as width; following segments gradually shortening and widening F7 1.27x as wide as length, 1.8x broder than F1; club twice as long as width, and as long as 5 preceding segments combined	*M. lawsoni* DOĞANLAR & HASSAN

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

- Scutellum with 2 pairs of setae (Fig. 1b); ovipositor at least 2.86x as long as hind tibia; F1 about 1.5x as long as width; other characters variable 4

4(3) Body mostly black (Fig. 7a,b,g,h);; ovipositor 2.86x as long as hind tibia; mesosoma 1.4x as long as width; antenna (Fig. 2b, 7d) with pedicellus 2.12x as long as width; F7 1.7x as wide as length, 2.4x broder than F1; club 1.75x as long as width, and as long as 3 preceding segments combined .....*M. pretorianensis* nov.sp.

- Body yellow, ovipositor 3.1x as long as hind tibia; mesosoma at least 1.5x as long as width; club twice as long as width; other characters variable 5

5(4) Mesosoma 1.5x as long as width; ovipositor 1.7x as long as metasoma; antenna antenna (Fig. 2c) with pedicellus 1.66x as long as width; F7 1.75x broder than F1, 1.16x as wide as length; metasoma as long as mesosoma; club as long as 4 preceding segments combined..... *M. zvimendeli* DOĞANLAR & HASSAN

- Mesosoma twice as long as broad; ovipositor 1.3x as long as metasoma; antenna (Fig. 2d) with pedicellus 2.33x as long as width; F7 1.92x broder than F1, 1.6x as broad as length; metasoma 1.3xas long as mesosoma; club as long as 3 preceding segments combined ..... *M. judikingae* DOĞANLAR & HASSAN

Fig. 1: Scutellum of *Megastigmus* spp. (**a**) *M. lawsoni* DOĞANLAR & HASSAN; (**b**) *M. zwimendeli* DOĞANLAR & HASSAN; (**c**) *M. zebrinus* GRISSELL.

6(2) Ovipositor at least 1.8x as long as metasoma, 0.5x as long as body, 2.5x as long as hind tibia; propodeum with distinct median carina; antenna (Fig. 2e) with funicular segments long, F1-F4 longer than width, others quadrate to transverse, with 2 rows of linear sensillae; club about twice as long as width, as long as 2.5 preceding segments together ..... *M. flavivariegatus* GIRAULT

- Ovipositor at most 1.5x as long as metasoma, funicular segments with 1 row of linear sensillae; other characters variable 7

7(6) Ovipositor at least 3.3x as long as hind tibia; pedicellus plus flagellum at least 3.4x as long as transverse diameter of eye; other characters variable 8

- Ovipositor at most 2.7x as long as hind tibia; pedicellus plus flagellum at most 2.9x as long as transverse diameter of eye; other characters variable 9

8(7) Ovipositor 0.74x as long as body, 1.5x as long as metasoma, 3.3x as long as hind tibia; propodeum with distinct median carina; metasoma as long as mesosoma; antenna (Fig. 2f) with funicular segments with 2 rows of linear sensillae; pedicel+flagellum 1.23x width of head, and 3.4x as long as transverse diameter of eye ..... *M. viggiani* NARENDRAN & SURESHAN

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

- Ovipositor 0.62x as long as body, 1.3x as long as metasoma, 3.5x as long as hind tibia; propodeum without median carina; metasoma 1.4x as long as mesosoma; antenna (Fig. 2g) with funicular segments with 1 row of linear sensillae; pedicel+flagellum 1.7x width of head, and 4.4x as long as transverse diameter of eye ..... *M. thailandiensis* DOĞANLAR & HASSAN

9(7) Metasoma 0.7x as long as mesosoma; antenna (Fig. 2h) with F1 almost quadrate; F7 1.3x as wide as long; pedicel+flagellum 1.23x width of head, and 2.9x as long as transverse diameter of eye ;pedicel 1.9x as long as width; club as long as slightly more than 3 preceding segments combined .... *M. thitipornae* DOĞANLAR & HASSAN

- Metasoma as long as to slightly longer than mesosoma; F1 at least 1.25x as long as width; F7 at least 1.66x as wide as long; club almost twice as long as width; other characters variable 10

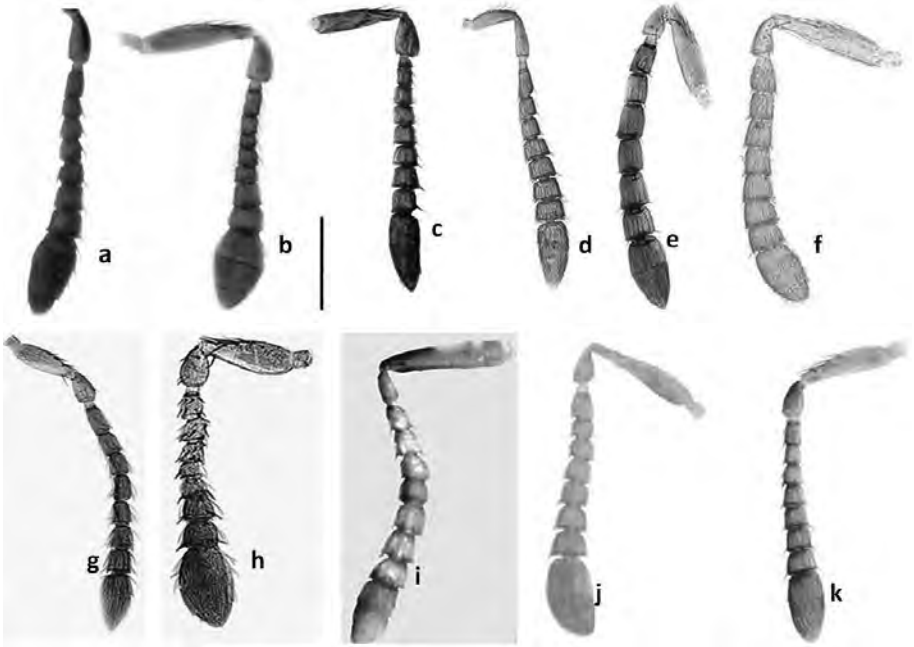

Fig. 2: *Megastigmus* spp., Female antennae: (**a**) *M. lawsoni* DOĞANLAR & HASSAN; (**b**) M. *pretorianensis* nov.sp.; (**c**) *M. zvimendeli* DOĞANLAR & HASSAN; (**d**) *M. judikingae* DOĞANLAR & HASSAN; (**e**) *M. flavivariegatus* GIRAULT; (**f**) *M. viggiani* NARENDRAN & SURESHAN; (**g**) *M. thailandiensis* DOĞANLAR & HASSAN; (**h**) *M. thitipornae* DOĞANLAR & HASSAN; (**i**) *M. zebrinus* Grissell; (**j**) *M. brasiliensis* DOĞANLAR, ZACHE & WILCKEN, (**k**) *M. leptocybus* DOĞANLAR & HASSAN.

10(9) Ovipositor 0.55x as long as body; antenna (Fig. 2i) with club as long as 3 preceding segments together; pedicel+flagellum 1.2x width of head, and 2.8x as long as transverse diameter of eye; F1 1.25x as long as width; pedicel twice as long as width; F7 1.75x as wide as long ..... *M. zebrinus* GRISSELL

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

- Ovipositor 0.66x as long as body; antenna (Fig. 2j,k) with club as long as 4 preceding segments together; F1 1.33x as long as width; pedicel+flagellum at most 1.05x width of head; other characters variable 11

11(10) Antenna (Fig. 2j) with pedicel+flagellum 1.05x width of head, and 2.6x as long as transverse diameter of eye; pedicel 1.5x as long as width; F7 twice as wide as long.....*M. brasiliensis* DOĞANLAR, ZACHE & WILCKEN

- Antenna (Fig. 2k) with pedicel+flagellum 0.85x width of head, and 2.1x as long as transverse diameter of eye; pedicel twice as long as width; F7 1.66x as wide as long..... *M. leptocybus* DOĞANLAR & HASSAN

12(1) Scutellum with 1-2 pairs of setae; pilosity of body pale; funicular segments with one row of linear sensillae..... 13

- Scutellum with 3 pairs of setae; pilosity of body black; other character variable 16

13(12) Scutellum with one pair of setae(Fig. 1a) ; metasoma 0.7x as long as mesosoma, and 1.3x as long as metatibia; median carina in basal half developed..... .....*M. lawsoni* DOĞANLAR & HASSAN

- Scutellum with two pairs of setae (Fig. 1b); metasoma at least 0.88x as long as mesosoma, and at least 1.6x as long as metatibia; median carina absent 14

14(13) Metasoma 2.2x as long as metatibia; head 1.53x as wide as long; scape (Fig. 3c) as long as transverse diameter of eye ..... *M. judikingae* DOĞANLAR & HASSAN

- Metasoma at most 1.9x as long as metatibia; other characters variable 15

15(14) Body black (Fig. 6g,h); metasoma 1.6x as long as metatibia; head 1.72x as wide as long; scape (Fig. 3a) 0.9x as long as transverse diameter of eye..... .....*M. pretorianensis* nov.sp.

- Body yellow; metasoma 1.9x as long as metatibia; head 1. 41x as wide as long; scape (Fig. 3b) 1.16x as long as transverse diameter of eye..... ..... *M. zvimendeli* DOĞANLAR & HASSAN

16(12) Antenna (Fig. 3d) with funicular segments longer than width, with two rows of linear sensillae; body about 2 mm in length; pedicel+flagellum at most 1.23x width of head; head at most 1.66x as wide as long; median carina absent; scape 0.7x as long as transverse diameter of eye; metasoma 0.9x as long as mesosoma, and 1.5x as long as metatibia.....*M. flavivariegatus* GIRAULT

- Funicular segments mostly quadrate to transverse, with one row of linear sensillae; other characters variable 17

17(16) Metasoma at most as long as mesosoma, twice as long as metatibia; pedicel+flagellum 1.32x width of head; F7 at most 1.5x wider than F1 18

- Metasoma 1.2x as long as mesosoma, 1.4 as long as metatibia; pedicel+flagellum at most 1.1x width of head; F7 about 1.6x wider than F1 19

18(17) Metasoma as long as mesosoma; head 1.41x as wide as long; antenna (Fig. 3g) with funicular segments almost equal in length, slightly widening towards tip, F1 1.33x as long as width, F2 quadrate, F7 as long as F1, and 1.22x as wide as F3; F7 1.5x wider than F1.....*M. zebrinus* GRISSELL

- Metasoma 0.7x as long as mesosoma, ; head twice as wide as long; antenna (Fig. 3h) with funicular segments distinctly shortening and widening towards tip, F1 1.6x, and F2 1.33x as long as width, F7 0.77x as long as F1, and 1.66x as wide as F3; F7 1.33x wider than F1 ..... *M. brasiliensis* DOĞANLAR, ZACHE & WILCKEN

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

19(17) Antenna (Fig. 3f) with pedicel twice as long as F1; scape 2.64x as long as width, 1.3x as long as transverse diameter of eye; club 2.1x as long as width and almost 3 preceding segments combined ..... *M. thitipornae* DOĞANLAR & HASSAN

- Antenna (Fig. 3i) with pedicel 1.43x as long as F1; scape 4.38x as long as width, 0.9x as long as transverse diameter of eye; club 2.4x as long as width and almost 4 preceding segments combined ..... *M. leptocybus* DOĞANLAR & HASSAN

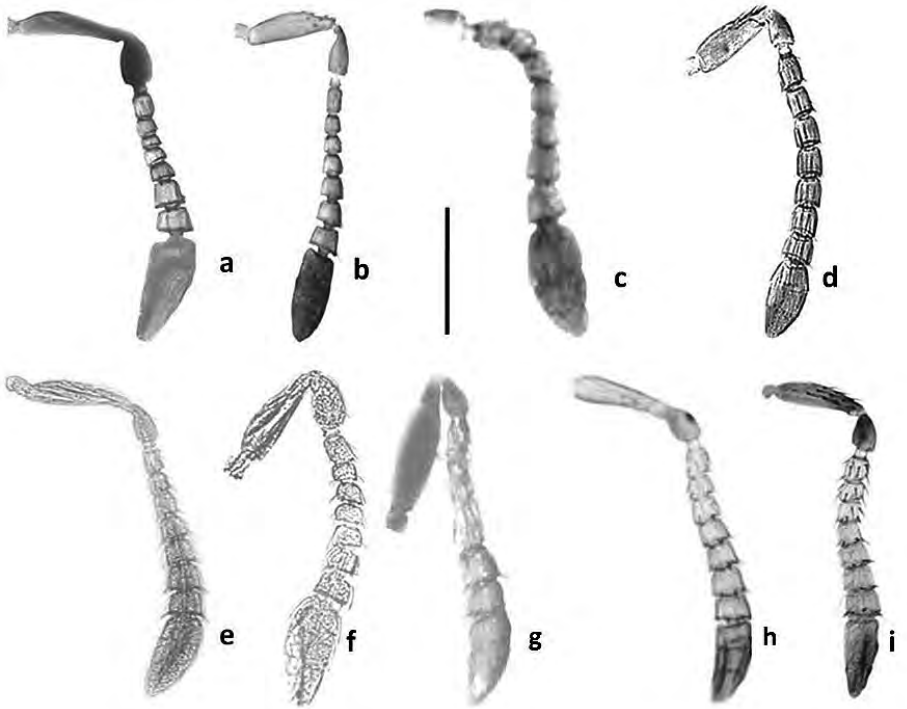

Fig. 3: *Megastigmus* spp., Male antennae: (**a**) *M. pretorianensis* nov.sp.; (**b**) *M. zvimendeli* DOĞANLAR & HASSAN; (**c**) *M. judikingae* DOĞANLAR & HASSAN; (**d**) *M. flavivariegatus* GIRAULT; (**e**) *M. thailandiensis* DOĞANLAR & HASSAN; (**f**) *M. thitipornae* DOĞANLAR & HASSAN; (**g**) *M. zebrinus* GRISSELL; (**h**) *M. brasiliensis* DOĞANLAR, ZACHE & WILCKEN; (**i**) *M. leptocybus* DOĞANLAR & HASSAN.

Key based on forewing characters for the species of *Megastigmus* reared from *Leptocybe invasa* galls

1 Females 2

- Males 12

2(1) Shape of stigma oblong, at least 1.7x as long as width (Figs 4k,m,o,q) 3

- Shape of stigma semicircular, or circular, at most 1.63x as long as width (Figs 4a,c,e,g,i) 6

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

3(2) Stigma at most 1.75x as long as width; parastigma 0.6x as long as marginal vein; area between postmarginal vein and uncus with a few setae on under side..... 4

- Stigma at least 1.92x as long as width..... 5

4(3) Stigma 1.75x as long as width; stigmal vein 0.21x as long as length of stigma (Fig. 4q); costal cell 12.4x as long as its maximum width; basal cell closed by sparse setae; speculum closed, narrow; area below marginal vein narrow on under side; area between postmarginal vein and uncus narrow, bare on upper side (Figs 4q-r).....*M. zebrinus* GRISSELL

- Stigma at most 1.72x as long as width; stigmal vein 3.5x as long as length of stigma (Fig. 4k); costal cell at most 8.6x as long as its maximum width; basal cell open; speculum open, broad; area between postmarginal vein and uncus broad, bare on upper side (Fig. 4k-l) .....*M. viggiani* NARENDRAN & SURESHAN

5(3) Stigma 1.92x as long as width; costal cell 8x as long as its maximum width, with two rows of setae on upper side and one row of setae on under side; basal cell closed by sparse setae on basal vein; parastigma 0.52x as long as marginal vein; speculum closed, narrow .....*M. thailandiensis* DOĞANLAR & HASSAN

- Stigma 2.1x as long as width; costal cell 9.66x as long as its maximum width (Fig. 4u); basal cell open in basal half, with some fine setae medially; parastigma 0.66x as long as marginal vein; speculum narrowly open, broad (Fig. 4u-v)..... .....*M. leptocybus* DOĞANLAR & HASSAN

6(2) Stigma at least 1.45x as long as width..... 7

- Stigma at most 1.32x as long as width 10

7(6) Stigmal vein at most 2.5x as long as width; at least 0.23x as long as length of stigma 8

- Stigmal vein at least 2.66x as long as width; at most 0.21x as long as length of stigma 9

8(7) Stigma about 1.54x as long as width; stigmal vein almost quadrate, 0.23x as long as length of stigma (Fig. 4o); basal cell closed, by sparse setae, speculum open, broad on upper side, narrow on under side; area below marginal vein broad on under side (Fig. 4o-p) ..... *M. thitipornae* DOĞANLAR & HASSAN

- Stigma about 1.45x as long as width; stigmal vein 2.5x as long as width, 0.33x as long as length of stigma (Fig. 4s); Basal cell open on 2/3 of basal part; speculum narrowly open, broad on both sides; area below marginal vein narrow on under side (Fig. 4s-t) .....*M. brasilinensis* DOĞANLAR, ZACHE & WILCKEN

9(7) Stigmal vein 2.66x as long as width, 0.17x as long as length of stigma (Fig. 4a); basal cell open 3/5 basally, with some fine setae medially; parastigma 0.71x as long as marginal vein; area below marginal vein moderately broad on upper side, narrow on under side; area between post marginal vein and uncus narrow on upper side, one row of setae on under side (Fig. 4a-b)..... .....*M. lawsoni* DOĞANLAR & HASSAN

- Stigmal vein 3.0x as long as width, 0.21x as long as length of stigma (Fig. 4g); basal cell open in basal half, bare; parastigma 0.59x as long as marginal vein; area below marginal vein broad on both side; area between post marginal vein and uncus with a few setae on both side (Fig. 4g-h) .... *M. judikingae* DOĞANLAR & HASSAN

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

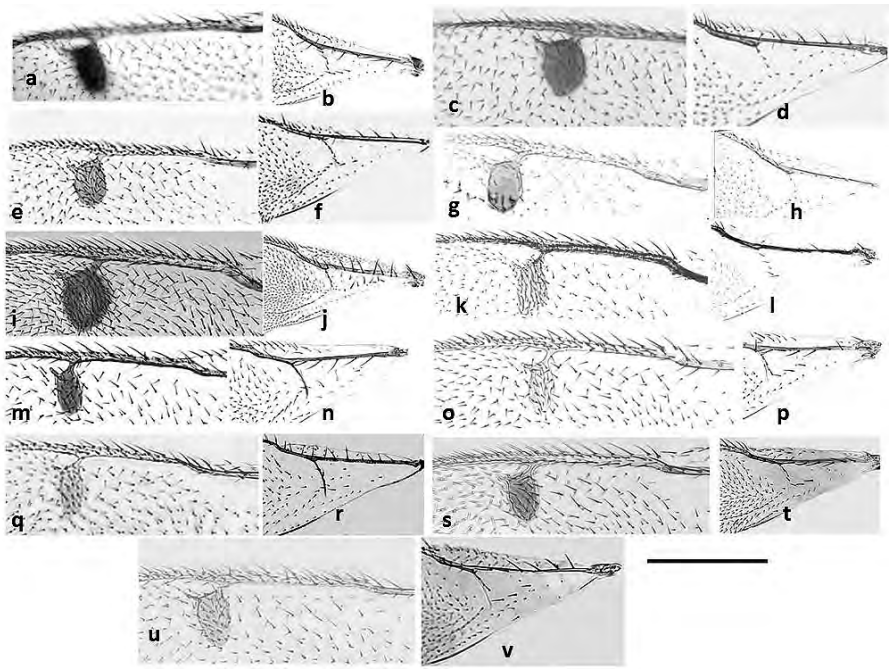

Fig. 4: *Megastigmus* spp., Female forewing, a, c, e, g, i, k, m, o, q, s, u. area below marginal vein; b, d, f, h, j, l, n, p, r, t, v. basal part: (**a-b**) *M. lawsoni* DOĞANLAR & HASSAN; (**c-d**) M. *pretorianensis* nov.sp.; (**e-f**) *M. zvimendeli* DOĞANLAR & HASSAN; (**g-h**) *M. judikingae* DOĞANLAR & HASSAN; (**i-j**) *M. flavivariegatus* GIRAULT; (**k-l**) *M. viggiani* NARENDRAN & SURESHAN; (**m-n**) *M. thailandiensis* DOĞANLAR & HASSAN; (**o-p**) *M. thitipornae* DOĞANLAR & HASSAN; (**q-r**) *M. zebrinus* GRISSELL; (**s-t**) *M. brasiliensis* DOĞANLAR, ZACHE & WILCKEN; (**u-v**) *M. leptocybus* DOĞANLAR & HASSAN.

10(6) Costal cell with many setae on both sides, 7.7x as long as its maximum width; basal cell closed, with 4 strong setae medially (Fig. 4j); stigmal vein 0.14x as long as length of stigma; area between postmarginal vein and uncus almost nil on both sides (Fig. 4i)..... *M. flavivariegatus* GIRAULT

\- Costal cell at most in apical half with some setae, basal cell open in 2/3 of basal part; other characters variable 11

11(10) Stigmal vein 0.19x as long as length of stigma (Fig. 4e); costal cell 7.0x as long as its maximum width, basal cell with 3 setae medially (Fig. 4f); parastigma 0.66x as long as marginal vein; area below marginal vein narrow on both sides, with one row of admarginal setae; area between postmarginal vein and uncus narrow, with two setae on upper side, bare on under side (Fig. 4e)..... ..... *M. zvimendeli* DOĞANLAR & HASSAN

\- Stigmal vein 0.14x as long as length of stigma (Fig. 4c); costal cell 9.6x as long as its maximum width, basal cell with two setae medially near basal vein and one row near submarginal vein (Fig. 4d); parastigma 0.5x as long as marginal vein; area below marginal vein broad on upper side, narrow on under side, without admarginal setae; area between postmarginal vein and uncus broad, with two rows of setae on both sides (Fig. 4c) ..... *M. pretorianensis* nov.sp.

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

12(1) Stigma at least 1.51x as long as width 13

- Stigma at most 1.4x as long as width 15

13(12) Stigma 1.64x as long as width; basal cell bare; speculum closed (Fig. 5f,g) ..... *M. judikingae* DOĞANLAR & HASSAN

- Stigma at most 1.56x as long as width; basal cell with some setae; speculum narrowly open 14

14(13) Stigma 1.56x as long as width; 1.33x as long as width, 0.22x as long as length of stigma (Fig. 5n,o); basal cell closed, with some fine setae; parastigma 0.75x as long as marginal vein ..... *M. thitipornae* DOĞANLAR & HASSAN

- Stigma 1.51x as long as width; stigmal vein as long as width, 0.12x as long as length of stigma (Fig. 5l,m); basal cell open in 2/3 basal part, 5 long setae; parastigma 0.61x as long as marginal vein..... *M. thailandiensis* DOĞANLAR & HASSAN

15(12) Stigma 1.3x as long as width; basal cell closed; speculum closed, narrow; parastigma 0.6x as long as marginal vein; area below marginal vein broad on upper side, narrow on under side 16

- Stigma almost circular, at most 1.17x as long as width; basal cell open about in 3/5 basal part; other characters variable 17

16(15) Costal cell 10.4x as long as its maximum width, in apical half few setae on both sides; stigmal vein short, 1.5x as long as width, 0.17x as long as length of stigma (Fig. 5p,q); basal cell bare; area between post marginal vein and uncus as long as width of stigma on upper side, closed by hairs originated from uncus on under side ..... *M. zebrinus* GRISSELL

- Costal cell about 9x as long as its maximum width, in apical 2/3 with many setae on both sides; stigmal vein long, 3.0x as long as width, and about 0.2x as long as length of stigma (Fig. 5h,i); basal cell with 3 setae medially; area between postmarginal vein and uncus closed by hair lines near uncus, 1.5x width of stigma, one row of setae on upper side, bare area narrow, twice width of stigma bare area broad, a few hairs near stigmal vein on under side ..... *M. flavivariegatus* GIRAULT

17(15) Stigmal vein twice as long as width, and 0.24x as long as length of stigma (Fig. 5a); costal cell about 13x as long as its maximum width, in apical half with one row of setae on upper side, 2-3 rows on under side; basal cell open about in 3/5 basal part; parastigma 0.71x as long as marginal vein; area below marginal vein moderately broad on upper side, narrow on under side; area between postmarginal vein and uncus narrow on upper side, about 1.5x as long as width of stigma, one row of setae on under side ..... *M. lawsoni* DOĞANLAR & HASSAN

- Stigmal vein at most quadrate, about 0.10-0.15x as long as length of stigma; basal cell open in 2/3 basal part; area below marginal vein broad on upper side; length of parastigma variable 18

18(17) Stigmal vein transverse (Fig. 5b,c); costal cell about 14x as long as its maximum width, apical 1/3 with one row setae on upper side, 2 rows of setae on under side; basal cell with two setae medially near basal vein and one row near submarginal vein; parastigma 0.5x as long as marginal vein; speculum closed broad; area below marginal vein broad on upper side, narrow on under side, without admarginal setae; area between postmarginal vein and uncus narrow, almost bare, 2 setae on upper side, as long as width of stigma, bare on under side ..... *M. pretorianensis* nov.sp.

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

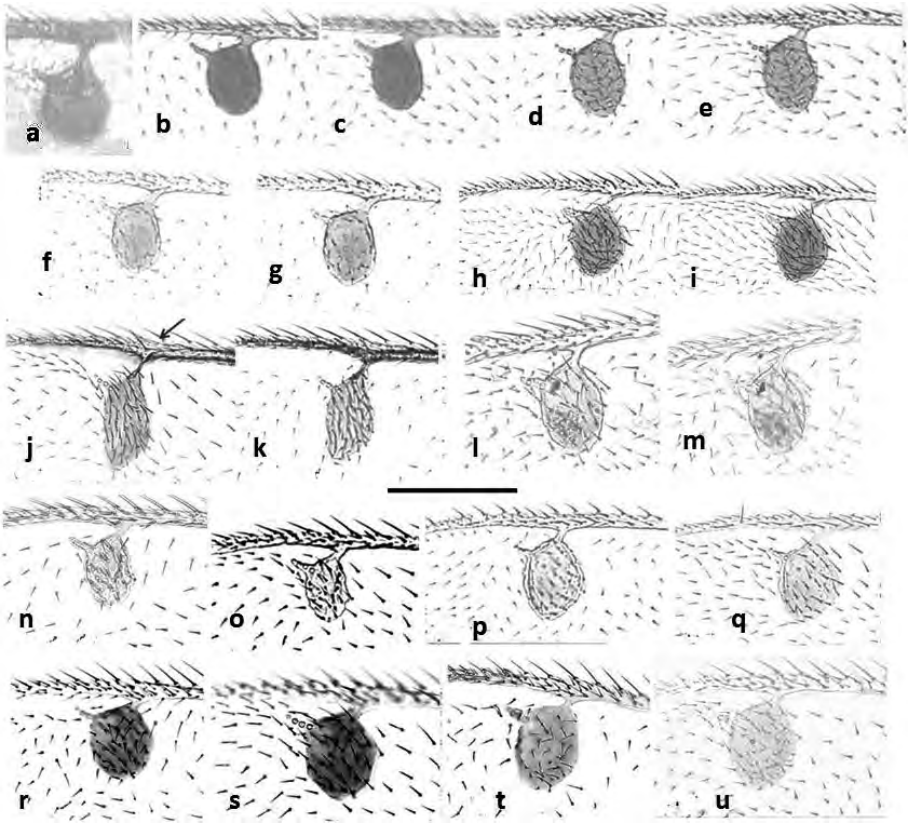

Fig. 5: *Megastigmus* spp., Male forewing, stigmal areae. b, d, f, h, j, l, o, q, s, u. upper side; a, c, e, g, i, k, m, n, p, r, t. under side: (**a**) *M. lawsoni* DOĞANLAR & HASSAN; (**b-c**) *M. pretorianensis* nov.sp.; (**d-e**) *M. zvimendeli* DOĞANLAR & HASSAN; (**f-g**) *M. judikingae* DOĞANLAR & HASSAN; (**h-i**) *M. flavivariegatus* GIRAULT; (**j-k**) *M. viggiani* NARENDRAN & SURESHAN; (**l-m**) *M. thailandiensis* DOĞANLAR & HASSAN; (**n-o**) *M. thitipornae* DOĞANLAR & HASSAN; (**p-q**) *M. zebrinus* GRISSELL; (**r-s**) *M. brasiliensis* DOĞANLAR, ZACHE & WILCKEN; (**t-u**) *M. leptocybus* DOĞANLAR & HASSAN.

- Stigmal vein quadrate (Fig. 5d,e); costal cell at most 11x as long as its maximum width; basal cell with some setae medially 19

19(18) Forewing (Fig. 6a) with costal cell about 11x as long as its maximum width, apical 1/3 with one row setae on upper side, 2 rows of setae on under side; parastigma 0.55x as long as marginal vein; speculum closed, broad; area below marginal vein moderately broad, with one row of admarginal setae on under side; area between postmarginal vein and uncus bare, 1.66x as long as width of stigma on upper side, bare and broad on under side ..... *M. zvimendeli* DOĞANLAR & HASSAN

- Costal cell at most 9.3x as long as its maximum width; parastigma at least 0.64 as long as marginal vein; speculum narrowly open, broad on upper side 20

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

20(19) Forewing (Fig. 6b) with costal cell with many setae on both side in whole length; parastigma 0.7x as long as marginal vein; speculum narrow on under side; area below marginal vein broad on upper side, narrow, without ad marginal setae on under site; uncus as long as stigmal vein; area between postmarginal vein and uncus semi open, with some hairs around uncus, bare area broad on upper side, open, bare, with two seta near uncus on under side; bare area distinctly longer than width of stigma ..... *M. leptocybus* DOĞANLAR & HASSAN

- Forewing (Fig. 6c) with costal cell with many setae on both side only in apical 1/3; parastigma 0.64 as long as marginal vein; speculum broad on under side; area below marginal vein broad on upper side, modarately open , one row of admarginal on under side; uncus longer than stigmal vein; area between postmarginal vein and uncus bare on both sides, bare area 0.75x as long as width of stigma ..... *M. brasilinensis* DOĞANLAR, ZACHE & WILCKEN

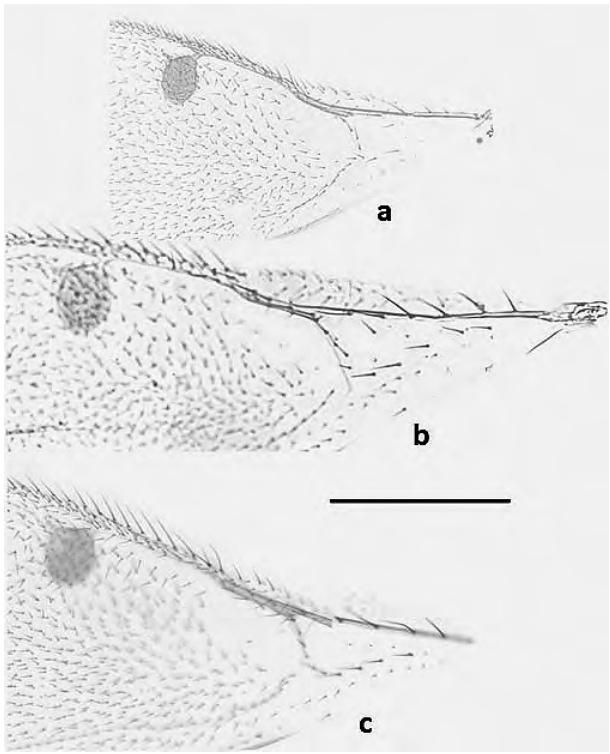

Fig. 6: *Megastigmus* spp., Male forewing, basal half. (**a**) *M. zvimendeli* DOĞANLAR & HASSAN; (**b**) *M. leptocybus* DOĞANLAR & HASSAN; (**c**) *M. brasiliensis* DOĞANLAR, ZACHE & WILCKEN.

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

Species of Megastigmus

Megastigmus lawsoni DOĞANLAR & HASSAN, 2010 (Figs 1a; 2a, 4a,b; 5a)

Megastigmus lawsoni DOĞANLAR & HASSAN, 2010: 5064, 5065, 5087, Holotype, female, ANIC, Australia, New South Wales

D i s t r i b u t i o n : Australia, New South Wales

H o s t : *Leptocybe invasa* FISHER & LASALLE, 2004

Megastigmus pretorinensis nov.sp. (Figs 2b; 3a, 4c,d; 5b,c; 7a-i)

M a t e r i a l e x a m i n e d : HOLOTYPE: female, South Africa: Pretoria, 09-III-2013, leg. Dr. Neser. The holotype and 4 females and 5 males (paratypes) are deposited in (SANC) South African National Collection of Insects, ARC- Plant Protection Research Institute, Pretoria, South Africa., and 2 females and 2 males (paratypes) slide mounted are deposited in the (IMRSBC) Insect Museum of Research Station of Biological Control Yüreğir, Adana, Turkey.

F e m a l e

Length (body + ovipositor): 1.3 + 0.8 mm. Body (Fig. 7a,b) black, except pale brown area: head below frontal suture, including a narrow band around eyes, genea and postgenea, posterior half and side of pronotum, side lobes of mesoscutum and axillae, hind femora and syntergum of metasoma dorsally and laterally; yellow area: antennae with scape and pedicel laterally, flagellar segments in apical half, legs except coxae and pretarsi black. Wigs hyaline, veins, stigma and pilosity dark brown. Pilosity of body yellow.

Head with fine longitudinal striae, face smooth. Antennae inserted slightly above lower ocular line (Fig. 7a,c); Relative measurements: head width 52, height 40, dorsal length 32, frons width 30; eye in frontal view 12; MOL 8; OOL 5, POL 16, Odia 4, eye 24: 21, malar space 8; TO 20, TCly 12; temple 5, eye in dorsal view 13; flagellum with pedicel 55.

Antennae (Figs 2b, 7c,d) clavate, flagellar segments distinctly widening towards clava, 7th 2.4x broader than F1; flagellum with pedicellus slightly longer than width of head and 2.6 × transverse diameter of eye. Scape with 2 rows of setae dorsally, nearly cylindrical, tapering towards apical, 3.8 × as long as broad, and slightly shorter than transverse diameter of eye (18:21). Relative measurements of antenna (l:w): scape 38: 10, pedicel 17: 8, anellus 3: 4, F1 8: 5; F2 5: 6; F3 5:3.5; F4 5.3: 6; F5 5.3: 7; F6 7: 9; F7 7: 12, clava 28: 16 (C1 11, C2 10, C3 7). Sensillae on flagellum long and sparse, F1-F5 with 1-2 longitudinal sensilla, F6 - F7 3-4 linear sensillae in a row. Clava almost as long as 3 preceding segments combined, 1.7 × as long as broad, ventrally with narrow micropilosity on C2 and C3.

Mesosoma (Fig. 7a) 1.9 × as long as mesoscutum broad, slightly broader than height (32:30); pronotum about 0.33 × as long as broad; mesonotum about 1.4 × as broad as long, with fine transverse striae, 3 pairs of setae, along deep notauli; scutellum as long as broad, with fine transverse striae, frenal groove indistinct, indicated laterally, frenum almost smooth, scutellum (Fig. 2b) with 2 pairs of setae on each sides. Forewing (Fig.

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

7e) 2.4 × as long as broad, costal cell bare in basal half, apically with one row of hairs, speculum broad, closed below, basal and cubital veins with 3-4 hairs, basal cell with one row fine hairs, closed by a second row of cubital hair line. Relative measurements of forewing (Figs. 4c,d, 5b,c, 7e): costal cell 53: 4; parastigma 16, marginal vein 30, post marginal vein 25, stigmal vein 3, stigma (l:w) 12: 10, uncus 4. Hind wing 5 × as long as broad. Hind coxae dorsally bare.

Propodeum (Fig. 7f) 0.4 × as long as scutellum, 0.5 × as long as distance between inner edges of spiracles, median carina and plicae absent, and finely reticulated between spiracles, the latter about far from posterior margin of metanotum by own diameter, paraspiracular sulcus deep, with paraspiracular carina sharp, callus with 6 setae.

Metasoma (Fig. 7b) laterally compressed, 1.3x as long as mesosoma, 2.6 × as long as broad, its dorsal surface finely striated. Ovipositor sheath 1.67 × as long as metasoma, 2.86 × as long as hind tibia.

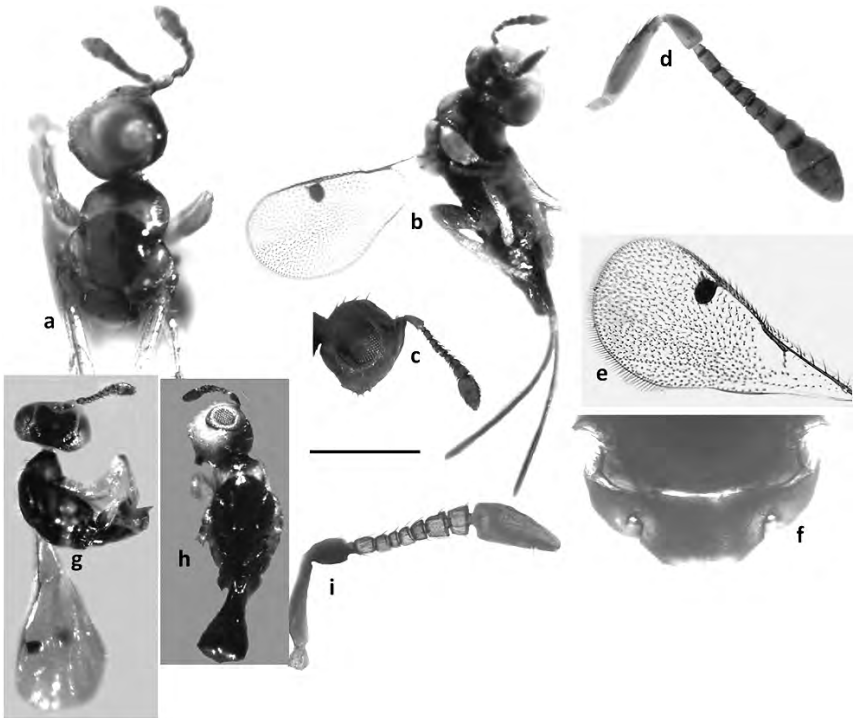

Fig. 7: *Megastigmus pretorianensis* nov.sp., a-f. female: (**a**) body, in dorsal view; (**b**) body, in lateral view (**c**) head and antenna, in lateral view; (**d**) antenna; (**e**) forewing; (**f**) propodeum; g-i: male. (**g**) body, in lateral view; (**h**) body, in dorsal view; (i) antenna.

M a l e

Similar to female except as follows: body (Fig. 7g,h) with yellow area: head mostly yellow except vertex, and basal 2/3 of scape black; sides and a narrow area of pronotum,

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

propleura, lower sides of axillae, tegulae, fore and mid coxae, and basal half of hind coxae, ventral half of hind femora, dorsellum, metasoma (Fig. 7h) 3rd and sixth tergites and all of sternites.

Relative measurements: head width 41, height 38, dorsal length 25, frons width 20; eye in frontal view 9; MOL 6; OOL 7, POL 15, Odia 4, eye 26: 23, malar space 13; temple 4, eye in dorsal view 12; flagellum with pedicel 63. Antenna (Fig. 3a, 6i) filiform, having pedicellus with flagellum as long as wide of head. Relative measurements of antenna (l:w): scape 38: 9, pedicel 16: 6, anellus 2: 5; F1 7: 6; F2 4:7; F3 3: 7; F4 4: 8; F5 5: 8; F6 7: 10, F7 8: 12: clava 37: 16 (C1 10, C2 12, C3 15). Clava with ventrally with broad micropilosity on C2 and C3. Forewing with basal half and stigma as seen Fig. 5b,c and Fig. 6c.

Metasoma: 1st segment narrow, like petiole in some specimens, in others gradually widening apically, distinctly shorter and narrower than mesosoma, 0.88x as long as mesosoma; metasoma 1.52x hind tibia.

H o s t : *Megastigmus pretorianensis* emerged from galls of *L. invasa* as noted by Dr. S. Neser.

Comments

Megastigmus pretorinensis is similar to the South African species, *M. transvaalensis* and *M. brachyscelidis* ASHEAD, 1900 in having thoracic dorsum showing some brown or black areas, but it differs from *M. brachyscelidis* by the following characters: pedicel plus flagellum 1.1 × as long as width of head, 2.6x transverse diameter of eye, scape 3.8x longer than width, F7 2.4x as wide as F1, costal cell 13x as long as maximum width, stigma 1.2x as long as width, ovipositor 1.7x as long as metasoma (in *M. brachyscelidis* pedicel plus flagellum 1.4 × as long as width of head, 3.2x transverse diameter of eye, scape 4.75x longer than width, F7 1.6x as wide as F1, costal cell 7.7x as long as maximum width, stigma 1.43x as long as width, ovipositor 1.4x as long as metasoma). *Megastigmus pretorinensis* differs from *M. transvaalensis* by the following characters: funicular segments transverse, except F1 longer than broad, with one row of longitudinal sensilla, clava as long as 3 preceding segments together, forewing with basal cell closed (in *M. transvaalensis* funicular segments distinctly longer than broad, with two rows of longitudinal sensilla, clava as long as 2 preceding segments, forewing with basal cell open below (ROQUES & SKRZPCZYNSKA 2003). However, *M. pretorianensis* has apparently parasitic behavior, because the adults were obtained only in stems and leaves of *E. camaldulensis* from in large galls infested by *L. invasa*. Insects of this species were not collected in healthy plant material of trees in the same area, but *M. transvaalensis* is phytophagous species in seeds of *Rhus* spp. (Anacardiaceae) (GRISSELL & PRINSLOO 2001).

Megastigmus zwimendeli DOĞANLAR & HASSAN, 2010 (Figs 1b, 2c, 3b, 4e,f; 5d,e; 6a)

Megastigmus zwimendeli DOĞANLAR & HASSAN, 2010: 5064, 5065, 5115, Holotype Female, INIC, Australia, Queensland.

D i s t r i b u t i o n : Australia, Queensland; Israel (introduced); Turkey, Hatay (introduced).

H o s t : *Leptocybe invasa* FISHER & LASALLE, 2004

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

***Megastigmus judikingae* DOĞANLAR & HASSAN, 2010 (Figs 2d, 3c, 4g,h; 5f,g)**

Megastigmus judikingae DOĞANLAR & HASSAN, 2010: 5064, 5065, 5086, Holotype female, ANIC, Australia, Queensland.

D i s t r i b u t i o n : Australia, Queensland

H o s t : *Leptocybe invasa* FISHER & LASALLE, 2004

***Megastigmus flavivariegatus* GIRAULT 1915 (Figs 2e, 3d, 4i,j; 5h,i)**

Megastigmus flavivariegatus GIRAULT 1915: 300, Holotype female, QMB, Australia, Queensland.

D i s t r i b u t i o n : Australia, Queensland

H o s t : galls of *Eucalyptus grandis* & *E. camaldulensis*

***Megastigmus viggiani* NARENDRAN & SURESHAN, 1988 (Figs 2f, 4k,l; 5j,k)**

Megastigmus viggiani NARENDRAN & SURESHAN, 1988: 38-41. Holotype female, QMB,

D i s t r i b u t i o n : India, Kerala (NARENDRAN & SURESHAN 1988).

H o s t : *Leptocybe invasa* FISHER & LASALLE, 2004 (GUPTA & POORANI 2008).

***Megastigmus thailandiensis* DOĞANLAR & HASSAN, 2013 (Figs 2g, 3e, 4m,n; 5l,m)**

Megastigmus thailandiensis DOĞANLAR & HASSAN, 2013: 505, Holotype female, ICRSB, Thailand.

Megastigmus thailandiensis DOĞANLAR & HASSAN, 2010: 5063, 5108. Unavailable name (pages 5063,5108) [The species name is unavailable because it is not accompanied by a specified depository for the primary type (see ICZN, 2000. Article 16.4.2).]

D i s t r i b u t i o n : Thailand.

H o s t : *Leptocybe invasa* FISHER & LASALLE, 2004

***Megastigmus thitipornae* DOĞANLAR & HASSAN, 2013 (Figs 2h, 3f, 4o,p, 5n,o)**

Megastigmus thitipornae DOĞANLAR & HASSAN, 2013: 506, Holotype female, ICRSB, Thailand.

Megastigmus thitipornae DOĞANLAR & HASSAN, 2010: 5065, 5109-5011, Unavailable name (pages 5063, 5108) [The species name is unavailable because it is not accompanied by a specified depository for the primary type (see ICZN, 2000. Article 16.4.2).]

D i s t r i b u t i o n : Thailand.

H o s t : *Leptocybe invasa* FISHER & LASALLE, 2004

***Megastigmus zebrinus* GRISSELL, 2006 (Figs 1c, 2i, 3g, 4q,r, 5p,q)**

Megastigmus zebrinus GRISSELL, 2006: 88-92, Holotype female, SAMC, South Africa

D i s t r i b u t i o n : South Africa (GRISSELL 2006); Thailand (DOĞANLAR & HASSAN 2010).

H o s t : *Leptocybe invasa* FISHER & LASALLE, 2004

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

Megastigmus brasiliensis DOĞANLAR, ZACHE & WILCKEN, 2013 (Figs 2j, 3h, 4s,t, 5r,s)

Megastigmus brasiliensis DOĞANLAR, ZACHE & WILCKEN, 2013: 197-198, Holotype female, SPSU, Brazil, Sao Paulo

D i s t r i b u t i o n : Brazil, Sao Paulo (DOĞANLAR, ZACHE & WILCKEN 2013)

H o s t : *Leptocybe invasa* FISHER & LASALLE, 2004

Megastigmus leptocybus DOĞANLAR & HASSAN, 2013 (Figs 2k, 3i; 4u,v; 5t,u, 6b)

Megastigmus leptocybus DOĞANLAR & HASSAN, 2013: 505, Holotype Female, ICRSB, Israel.
Megastigmus leptocybus DOĞANLAR & HASSAN, 2010: 5065, 5109-5011, Unavailable name (pages 5063, 5108) [The species name is unavailable because it is not accompanied by a specified depository for the primary type (see ICZN, 2000. Article 16.4.2).]

D i s t r i b u t i o n : Israel, Turkey, Italy.

H o s t : *Leptocybe invasa* FISHER & LASALLE, 2004

Literature

BOUCEK Z. (1954): Chalcidologické poznámky I, Torymidae (Hym., Chalcidoidea). – Acta Societatis Entomologicae Cechoslovenicae **51**: 58-63.

BOUCEK Z. (1971): A new species of *Megastigmus* DALMAN, 1820 (Hym., Torymidae) on rose seeds from central Europe. – Entomologist's Gazette **22**: 45-48.

BOUCEK Z. (1988): Australasian Chalcidoidea (Hymenoptera). A biosystematic revision of genera of fourteen families, with a reclassification of species. – CAB International, Wallingford, Oxon, U.K., Cambrian News Ltd; Aberystwyth, Wales. 832 pp.

DAHMS E.C. (1986): A checklist of the types of Australian Hymenoptera described by Alexandre Arsene Girault: IV. Chalcidoidea species N-Z and genera with advisory notes plus addenda and corrigenda. – Memoirs of the Queensland Museum **22** (3): 1-387.

DALMAN J.W. (1820): Försök till Uppställning af Insect-familjen Pteromalini, i synnerhet med afseen de på de i Sverige funne Arter. – Kungliga Svenska Vetenskapsakademiens Handlingar **41** (1): 178.

DOĞANLAR M. & E. HASSAN (2010): Review Of Australian Species of *Megastigmus* DALMAN 1820 Hymenoptera: Torymidae) Associated with Eucalyptus, with Descriptions of New Species. – Australian J. Basic Appl. Sci. **4** (10): 5059-5120.

DOĞANLAR M. & E. HASSAN (2013): Availability and type depository of four species of *Megastigmus* DALMAN 1820 (Hymenoptera: Torymidae). – Munis Entomology & Zoology **8** (1): 505-506.

DOĞANLAR M., ZACHE B. & C.F. WILCKEN (2013): A new species of *Megastigmus* DALMAN 1820 (Hymenoptera: Torymidae: Megastigminae) from Brazil. – Florida Entomologist **96** (1):197-198.

GRISSEL E.E. (1999): An annotated catalog of World Megastigminae (Hymenoptera: Chalcidoidea: Torymidae). – Contrib. American Entomol. Inst. **31** (4): 1-92.

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

GRISSEL E.E. (2006): A new species of *Megastigmus* DALMAN, 1820 (Hymenoptera: Torymidae), galling seed capsules of *Eucalyptus camaldulensis* DEHNHARDT (Myrtaceae) in South Africa and Australia. – African Entomology **14** (1): 87-94.

GRISSELL E.E. & K. HOBBS (2000): *Megastigmus transvaalensis* (HUSSEY 1956) (Hymenoptera: Torymidae) in California: methods of introducing and evidence of host shifting, pp. 267. – In AUSTIN A.D. & M. DOWTON [eds], Hymenoptera Evolution, Biodiversity and Biological Control CSIRO Publishing, Collingwood, Australia.

GRISSELL E.E. & G.L. PRINSLOO (2001): Seed-feeding species of *Megastigmus* DALMAN 1820 (Hymenoptera: Torymidae) associated with Anacardiaceae. – J. Hymenoptera Res. **10** (2): 271-279.

GUPTA A. & J. POORANI (2008): New distribution and host records of Chalcidoidea (Insecta: Hymenoptera) from various parts of India. – Check List **4** (4):412-413.

KULKARNI H., KAVITHA-KUMARI N., VASTRAD A.S. & K. BASAVANAGOUD (2010): Release and recovery of parasitoids in eucalyptus against gall wasp, *Leptocybe invasa* (Hymenoptera: Eulophidae) under green house. – Karnataka J. Agric. Sci. **23** (1): 91-92.

NARENDRAN T.C. & P.M. SURESHAN (1988): A contribution to our knowledge of Torymidae of India (Hymenoptera: Chalcidoidea) – Bollettino del Laboratorio di Entomologia Agraria 'Filippo Silvestri', Portici **45**: 37-47.

NOYES J. (2014): The Natural History Museum. Universal Chalcidoidea Database. – http://www.nhm.ac.uk/ research-curation /research/ projects /chalcidoids/database.

ROQUES A. & M. SKRZYPCZYNSKA (2003): Seed-infesting chalcids of the genus *Megastigmus* DALMAN, 1820 (Hymenoptera: Torymidae) native and introduced to the west Palaearctic region: taxonomy, host specificity and distribution. – Journal of Natural History **37**: 215.

SCHEFFER S.J. & E.E. GRISSELL (2003): Tracing the geographical origin of *Megastigmus transvaalensis* (HUSSEY 1956) (Hymenoptera: Torymidae): an African wasp feeding on a South American plant in North America. – Mol. Ecol. **12** (2): 417.

YATES H.O. (1986): Checklist of insects and mate species attacking cones and seeds of world Conifers. – Journal of Entomological Science **21**: 142-168.

Author's address:

Mikdat DOĞANLAR

Honorary Professor, Research Station of Biological Control

TR-Yüreğir, Adana, Turkey

E-mail: mikdoganlar@yahoo.com.tr

© Entomofauna Ansfelden/Austria; download unter www.zobodat.at

Druck, Eigentümer, Herausgeber, Verleger und für den Inhalt verantwortlich:
Maximilian SCHWARZ, Konsulent f. Wissenschaft der Oberösterreichischen Landesregierung, Eibenweg 6, A-4052 Ansfelden, E-Mail: maximilian.schwarz@liwest.at.

Redaktion: Erich DILLER, ZSM, Münchhausenstraße 21, D-81247 München;
Roland GERSTMEIER, Lehrstuhl f. Tierökologie, H.-C.-v.-Carlowitz-Pl. 2, D-85350 Freising
Fritz GUSENLEITNER, Lungitzerstr. 51, A-4222 St. Georgen/Gusen;
Wolfgang SPEIDEL, MWM, Tengstraße 33, D-80796 München;
Thomas WITT, Tengstraße 33, D-80796 München.

Adresse: Entomofauna, Redaktion und Schriftentausch c/o Museum Witt, Tengstr. 33, 80796 München, Deutschland, E-Mail: thomas@witt-thomas.com; Entomofauna, Redaktion c/o Fritz Gusenleitner, Lungitzerstr. 51, 4222 St. Georgen/Gusen, Austria, E-Mail: f.gusenleitner@landesmuseum.at

ZOBODAT - www.zobodat.at

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: Entomofauna

Jahr/Year: 2015

Band/Volume: 0036

Autor(en)/Author(s): Doganlar Miktat

Artikel/Article: Diagnosis of Megastigmus spp. (Hymenoptera: Torymidae) reared from galls of Leptocybe invasa FISHER & LASALLE, 2004, (Hymenoptera: Eulophidae) on Eucalyptus spp. (Myrtaceae), with description of a new species from South Africa 561-580