

Ann. Naturhist. Mus. Wien	108 B	57 - 66	Wien, Mai 2007
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Lectotype designation and redescription of *Megastigmus synophri* MAYR, 1874 (Insecta: Hymenoptera: Torymidae)

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Abstract

A lectotype of *Megastigmus synophri* MAYR, 1874 is here designated. The redescription is based on Mayr's collection and additional material from Bulgaria. Comments on closely related species are given, as well as a key to *Megastigmus* associated to cynipid galls in the West Palaearctic.

Key words: Hymenoptera, Torymidae, *Megastigmus synophri*, lectotype designation, redescription, taxonomy, key, Bulgaria.

Zusammenfassung

Ein Lectotypus von *Megastigmus synophri* MAYR, 1874 wird designiert. Die Neubeschreibung wird anhand der Mayr-Sammlung sowie weiteren Materials aus Bulgarien vorgenommen. Kommentare zu nah verwandten Arten werden gegeben, sowie ein Schlüssel zu *Megastigmus* in Verbindung zu den Cynipidae-Gallen in der westlichen Palaearctis erstellt.

Introduction

Megastigmus synophri MAYR, 1874 is a parasitic wasp developing in oak galls of some cynipids (Hymenoptera: Cynipidae). MAYR (1874) reared it from *Synophrus politus* HARTIG, 1843 (Cynipidae) galls. WALL (1984) recorded rearing of the species from *Andricus glutinosus* (GIRAUD, 1859) (Cynipidae) galls. Later, MELIKA & al. (2002) and STOJANOVA (2006) confirmed Mayr's report about *S. politus* as a host of *M. synophri*.

Megastigmus synophri is a rare species, known only from Austria, Hungary and Bulgaria (NOYES 2003). However, the wide area of *S. politus* (from Central and Eastern Europe and North Africa to Asia Minor: PUJADE-VILLAR & al. 2003) gives ground to presume a wider distribution of *M. synophri* in the Palaearctics.

Mayr didn't designate a holotype for *M. synophri* in the original description. All the specimens are syn- or cotypes and marked only with "Type". Since designation of the type material is very important for taxonomic studies, a lectotype for *M. synophri* is herein designated.

Mayr has not commented on some specific characteristics of *M. synophri* and, thus, a redescription and notes on closely related species are presented below.

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Material and methods

Mayr's collection of *M. synophri* preserved in the Natural History Museum in Vienna (NHMW), Austria, and one female originating from the same series deposited in the National Museum of Natural History, Smithsonian Institution (USNM), Washington DC, USA, were examined in 2005 - 2006.

Additional material from the entomological collection at the Institute of Zoology, Bulgarian Academy of Science (IZ, BAS), has been used for redescription of the species as well.

Material from Bulgaria: 27.V.1973, Sinemorets village, 6 km S Ahtopol, 25 m a. s. l., (coll. L. Vassileva), 1 ♀, 1 ♂; 17.IV.1975, Sredets, 100 m (coll. P. Genov), 2 ♀♀, 1 ♂ emerged 29.V.1975; 17.IV.1975, Gradevo village, 9 km E Simitli, 500 m, (coll. L. Vassileva), 1 ♀, 1 ♂ emerged 6.VI.1975 (♂ det. C. Thuroczy); 3 ♂♂ emerged 20.V.1975; 10.V.1981, Svetlina village, 9 km NW Sredets, 100 m, (coll. L. Vassileva), 3 ♂♂ emerged I.1982; 24.V.1981, Sredets (coll. P. Genov), 3 ♀♀, 3 ♂♂ emerged 17.VI.1981; 11-12.I.1983, Sredets (coll. P. Genov), 2 ♀♀ emerged III.1983; 3.X.1981, Lyulin Mt., chalet Bonsovi polyani, 950 m, (coll. L. Vassileva), 1 ♀ emerged 23.XII.1981.

All specimens were reared from galls of *S. politus* on *Quercus cerris* L. Host determinations have been made by Dr. L. Vassileva-Samnalieva.

Specimens used for SEM were dissected and glued with conductive paste LEIT-C. They were coated with a 150-200 Å gold layer and photographed using a Philips-515 SEM (25 kV; secondary electrons-mode).

Terminology and abbreviations follow GRISSELL (1995) and GRAHAM & GIJSWIJT (1998).

Results

1. Designation

Megastigmus synophri MAYR, 1874

Megastigmus synophri MAYR, 1874: 129.

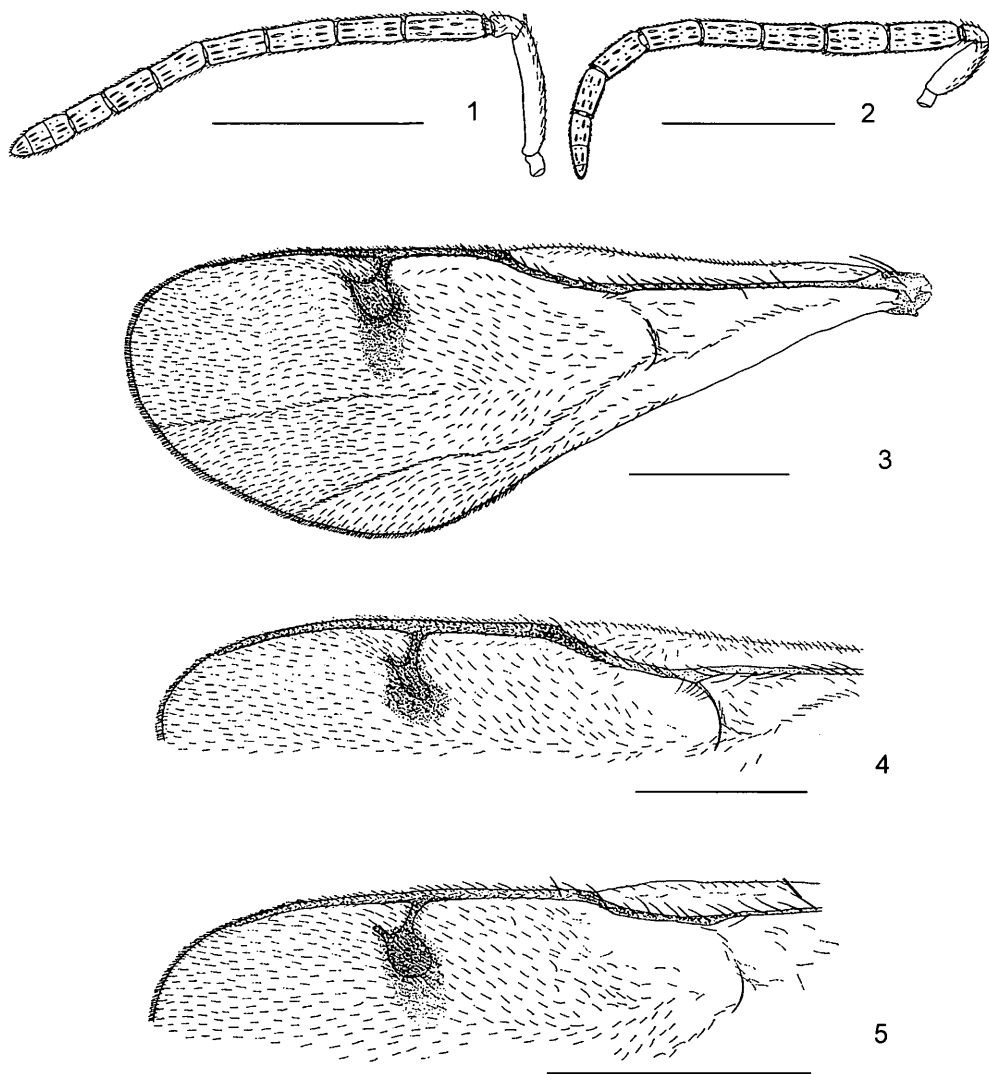
One female labelled: "Collect. G. Mayr", "Type", "Meg. Synophri [handwriting] G. Mayr, Type", "Meg. Synophri [handwriting]" is here designated as **lectotype**. Another 11 specimens (6 ♀♀ and 5 ♂♂) of the same series are designated as **paralectotypes**. Type locality unknown.

4 specimens (3 ♀♀, 1 ♂) from the same collection, with identical labels ("Collect. G. Mayr", "Meg. Synophri [handwriting] G. Mayr, Type") belong to *Megastigmus dorsalis* (FABRICIUS, 1798).

The female from USNM labelled: "polit. E. /S. [handwriting]", "Collect. G. Mayr", "Meg. Synophri [handwriting] G. Mayr, Type", "Mus Acc No 114749 Gahan 1927", "Cotype No. 44196 U.S.N.M.", belongs to *M. dorsalis* too.

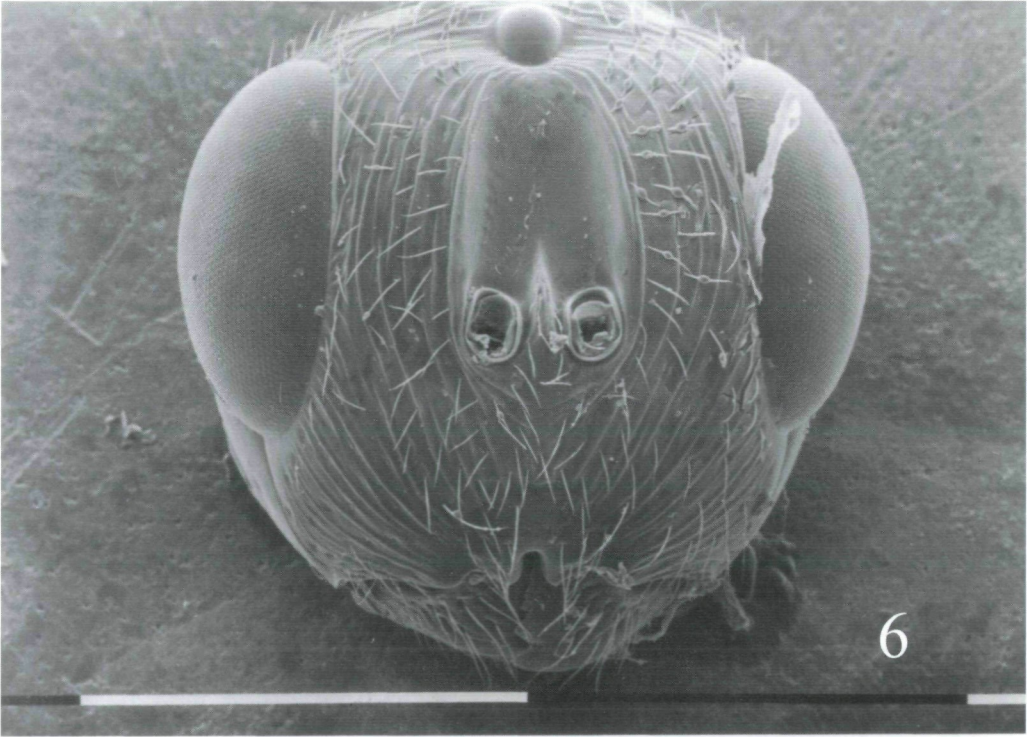
2. Redescription

Lectotype female: Morphology: head about 1.6 times as broad as long in dorsal view, temples 0.5 length of eye; POL 1.2 times OOL, OOL 1.5 times OD. Vertex flattened,



Figs. 1 - 5: *Megastigmus synophri*, *M. stigmatizans*, *M. dorsalis* (1, 3 - 5: ♀, 2: ♂): (1) *M. synophri*: antenna; (2) *M. synophri*: antenna; (3) *M. synophri*: fore wing; (4) *M. stigmatizans*: fore wing venation; (5) *M. dorsalis*: fore wing venation. Scale bars = 1 mm.

with cross-striation and scattered dark hairs; frons convex; lower face with conspicuous striae radiating from the mouth margin and white pubescence. In frontal view (Fig. 6) head slightly transverse about 1.3 times as wide as high; malar space 0.48 times length of eye. Antennae with toruli (Fig. 6) well above lower eyeline; scape (Fig. 1) about 5.5 times as long as broad, reaching lower edge of anterior ocellus; pedicellus plus flagellum 1.5 times as long as breadth of head; pedicellus 1.5 times as long as broad; anellus transverse; all funicle segments elongate, with gradually decreasing length; F1 3.4 times



as long as broad, F7 1.7 times as long as broad; clava 2.8 times as long as broad. Sensilla numerous. Flagellum clothed with short, adpressed hairs.

Mesosoma in lateral view about 1.85 times as long as the maximum width; pronotum and mid lobe of mesoscutum with coarse cross-striation and scattered hairs. Scutellum (Fig. 7) 1.1 times as long as broad, anterior part with arcuate to transverse striae and distinct longitudinal groove in middle; the frenal area shining, nearly smooth, with some weak longitudinal furrows on the sides. Propodeum with two short, distinctly protruding transverse edges on the sides of anterior half, and with carinae enclosing irregular shaped areas between the edges and the propodeal foramen. Pubescence of mesosoma consists of scattered hairs. Fore wing (Fig. 3) 2.7 times as long as broad; basal cell closed by complete cubital and basal hair lines; marginal vein 0.7 times as long as post-marginal vein; stigma slightly oblique, short-oval, 1.1 times as broad as high.

Gaster shining with faint alutaceous sculpture, 0.8 times the length of mesosoma. The exerted part of the ovipositor 0.8 times as long as mesosoma plus gaster; ovipositor index (length of the exerted part of the ovipositor: length of hind tibia) 2.15.

Length: 5.5 mm.

Colour: Head and mesosoma amber, with bright metallic green and brown markings.

Bright metallic greens are: spot with irregular shape on the vertex (including the ocelli); posterior half of mid lobe of mesoscutum; frenal area, as well as anterior part of scutellum; spots on axillae.

Browns are: occiput dark brown; light brown longitudinal stripe and two elongate spots laterally on pronotum; transverse stripe on anterior part of the mid lobe of mesoscutum; mesepisternum frontally behind fore coxa brownish black; longitudinal stripe on inner side of callus; hind coxa (except for amber stripe laterally).

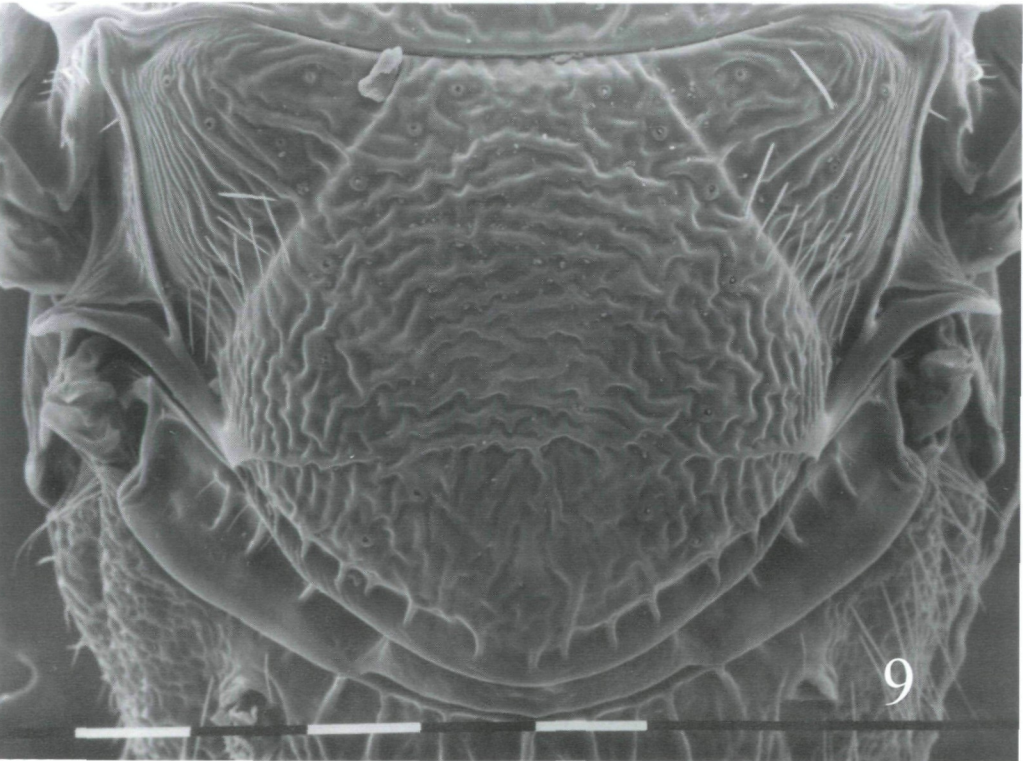
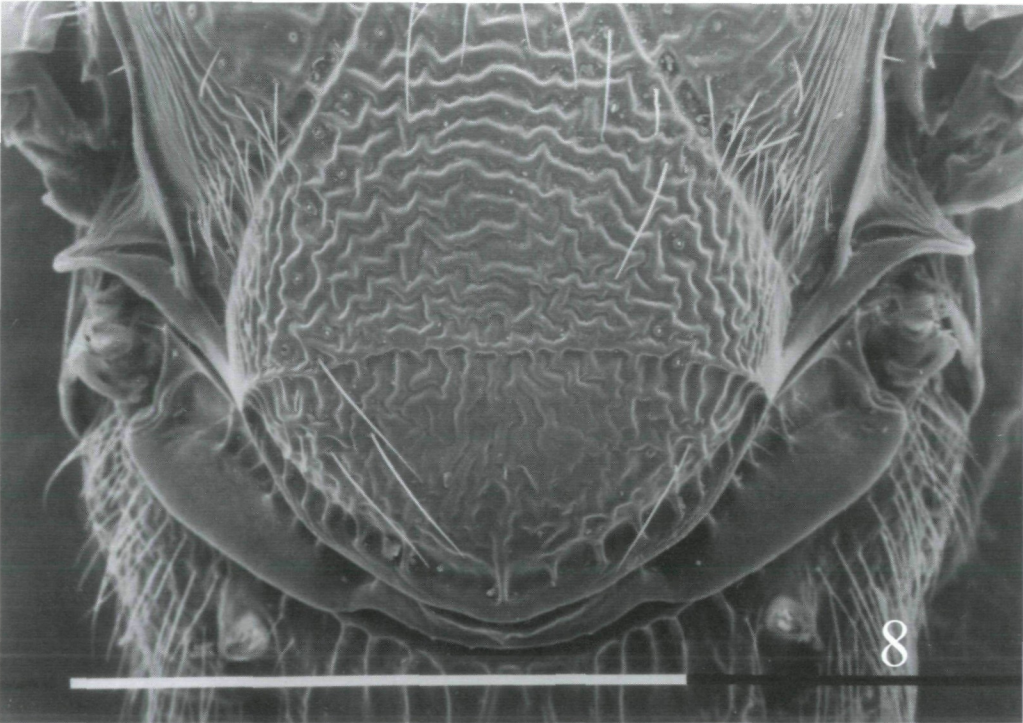
Metanotum pale yellow. Antenna amber. Fore and mid coxae, femora (except for hind femur externally with a brownish stripe), tibiae and tarsi pale yellow. Gaster yellowish brown, ovipositor sheaths dark brown with yellow basal band. Wings subhyaline, venation brown; fore wing stigma surrounded with an infuscation, which extends up to the middle of the wing.

Variation: The variation of females paralectotypes and additional specimens from Bulgaria involves some morphological characters and especially the colouration.

Morphology: POL 1.2 - 1.5 times OOL, OOL 1.5 - 1.6 times OD; malar space 0.4 - 0.5 times length of eye; pedicellus plus flagellum 1.5 - 1.6 times as long as breadth of head; all funicle segments elongate, with gradually decreasing length, F1 3.3 - 3.7 times as long as broad, F7 1.7 - 1.8 times as long as broad. Scutellum is 1.1 - 1.2 times as long as broad. Gaster is 0.7 - 0.9 times the length of mesosoma. The exerted part of the ovipositor 0.7 - 0.9 times as long as mesosoma plus gaster. Ovipositor index varies 2.15 - 2.8.

Length: 4.5 - 6.0 mm.

Figs. 6 - 7: *Megastigmus synophri* (♀): (6) head, frontal view (50×); (7) scutellum (70×). Scale bars = 1 mm.



Colour: Head and mesosoma are mainly amber, but the range of bright metallic green and brown markings varies greatly.

Green markings on the vertex varying from little spots around the ocelli to big one almost reaching to the eyes dorsally. Pronotum in brighter forms is entirely amber, whereas in darker forms, it is with brown or green elongate longitudinal stripes. In the darker forms green and brown markings on the body dorsally are bigger and darker, while in brighter forms some structures are amber (eg. side lobes of mesoscutum, axillae, middle part of propodeum).

Antenna yellow to amber, sometimes scape and pedicellus infusate dorsally. Gaster yellowish brown to brown. The infuscation around the fore wing stigma always present, but sometimes it is paler and does not extend up to the middle of the wing.

Male: Differs from female as follows:

Morphology: antenna (Fig. 2): scape 2.8 times as long as broad, slightly longer than F1; pedicellus about one third the length of scape; anellus transverse; funicular segments elongate, with gradually decreasing length; F1 2.6 times as long as broad, F7 2.3 times as long as broad; clava 3.2 times as long as broad; sensilla numerous. Flagellum clothed with short adpressed hairs. Gaster elongate, narrower than mesosoma in dorsal view and 0.7 - 0.9 times as long as the latter. Fore wing stigma short-oval, 1.1 - 1.4 times as wide as high.

Sculpture as those of female, but frenal area almost smooth, with only traces of longitudinal furrows. Pubescence consists of dense pale hairs.

Length: 3.5 - 5.9 mm.

Colour: The following structures pale yellow: face, lower parts of frons, genae, lateral parts of pronotum, side lobes of mesoscutum (except for stripes outside of notauli), mesopleuron (except for mesepisternum frontally behind fore coxa brownish black), metapleuron, callus, legs (except for hind coxa dark brown with yellow lateral stripe and hind femur with brown stripe externally).

Bright metallic greens are: pronotum and mesoscutum dorsally, axillae, scutellum; the spot on vertex is wider than those of female and extending up to the eyes laterally and to the half of scrobal depression frontally.

Propodeum (except for callus) dark brown. Gaster dark amber to brown. Fore wing subhyaline, stigma surrounded by narrow infuscation.

3. Comments

In the predominantly phytophagous genus *Megastigmus*, five species, *M. almusiensis* DOĞANLAR, 1989, *M. dorsalis* (FABRICIUS, 1798), *M. dunicola* BOUČEK, 1982, *M. stigmatizans* (FABRICIUS, 1798) and *M. synophri*, are known to develop parasitically in galls of cynipids (Hymenoptera: Cynipidae) on oaks in the West Palaearctic region (GRISSELL 1999, ROQUES & SKRZYPCZYNSKA 2003).

Figs. 8 - 9: *Megastigmus stigmatizans*, *M. dorsalis* (♀): (8) *M. stigmatizans*: scutellum (70×); (9) *M. dorsalis*: scutellum (130×). Scale bars = 1 mm for Fig. 8; 0.1 mm for Fig. 9.

Megastigmus almusiensis and *M. dunicola* are rare species, recorded only from Turkey, France and Spain respectively (NOYES 2003). DOĞANLAR (1989) reared *M. almusiensis* from galls of *Neuroterus macropterus* (HARTIG, 1843) (Cynipidae) and pointed out the differences in the morphology of *M. almusiensis* and its nearest species of the genus, *M. dorsalis*. *Megastigmus dunicola* can be easily distinguished from the others mentioned above, in having a clearly petiolate gaster (BOUČEK 1982); it was reared from *Plagiotrochus kiefferianus* TAVARES, 1901 (Cynipidae) galls (ASKEW & NIEVES-ALDREY 1988).

Megastigmus dorsalis and *M. stigmatizans* otherwise are known from many countries in the Palaearctics as parasitoids of various cynipids on oak (NOYES 2003).

The females of *M. synophri* are most closely related to those of *M. dorsalis* and *M. stigmatizans* regarding the shape of funicular segments (elongate with gradually decreasing length), the shape of the body and colouration. The sculpture of scutellum and especially of the frenal area is the most reliable morphological characteristic to distinguish them. The scutellum of *M. synophri* (Fig. 7) is 1.1 - 1.2 times as long as broad, its anterior part has transverse superficial striae and a distinct longitudinal groove in middle; the frenal area is shining, nearly smooth, with some weak longitudinal furrows on the sides. The scutellum of *M. stigmatizans* (Fig. 8) is also 1.1 - 1.2 times as long as broad, but the sculpture is of distinct broken transverse striae on the anterior part and longitudinal striae on the frenal area. The scutellum of *M. dorsalis* (Fig. 9) is barely longer than broad and with a similar sculpture to those of *M. stigmatizans*.

Additional characteristics are the venation and shape of the stigma of fore wings. *Megastigmus synophri* has a marginal vein 0.7 times as long as its postmarginal vein and stigma slightly oblique, short-oval, 1.1 times as broad as high (Fig. 3). *Megastigmus stigmatizans* has a marginal vein 0.7 times as long as its postmarginal vein, but stigma is distinct elongate, about 2 times as high as broad (Fig. 4). *Megastigmus dorsalis* has marginal and postmarginal veins almost equal in length; stigma is oval, 1.4 - 1.5 times as high as broad (Fig. 5).

On the other hand, the length of the exerted part of the ovipositors can be used to distinguish *M. synophri* from *M. stigmatizans* (*M. synophri* has exerted part of the ovipositor shorter than its mesosoma plus gaster (0.7 - 0.9 times), whilst it is longer than the body in *stigmatizans* (1.1 - 1.6 times)).

Key to females of *Megastigmus* associated to cynipid galls in the West Palaearctic

- 1 Gaster with very conspicuous petiolus, nearly half as long as propodeum length. Colour: red brown with metallic tint on scutellum. – France, Spain. From galls of *Plagiotrochus kiefferianus* (Cynipidae). *M. dunicola* BOUČEK
- Gaster not petiolate. 2
- 2 Exerted part of ovipositor longer than mesosoma plus gaster (1.1 - 1.6 times). Marginal vein 0.7 times as long as postmarginal vein; stigma distinct elongate, about 2 times as high as broad. Colour: yellow with green metallic spots on head and mesosoma dorsally. Length 4.5 - 7.5 mm. – Europe. From various cynipid galls. *M. stigmatizans* (FABRICIUS)
- Exerted part of ovipositor shorter than mesosoma plus gaster (max. 0.9 times). 3

- 3 Frenal area shining, nearly smooth, with some weak longitudinal furrows on sides. Marginal vein 0.7 times as long as postmarginal vein; stigma short oval, 1.1 times as broad as high. Colour: head and mesosoma amber, with bright metallic green and brown markings; gaster brown. Length 4.5 - 6.0 mm. – Austria, Hungary, Bulgaria. From galls of *Synophrus politus* (Cynipidae). *M. synophri* MAYR
- Frenal area sculptured with longitudinal striae. 4
- 4 Mid lobe of mesoscutum with dense transverse striae; pronotum with 16 rows of hairs or more. Colour: pale yellow with metallic green spots on head and mesosoma dorsally; gaster infuscate dorsally. [Marginal and postmarginal veins almost equal in length]. Length 2.5 - 3 mm. – Turkey. From galls of *Neuroterus macropterus* (Cynipidae). *M. almusiensis* DOĞANLAR
- Mid lobe of mesoscutum finely rugose; pronotum with 8 rows of hairs. Forewing stigma oval, 1.4 - 1.5 times as high as broad. Colour: pale yellow to red yellow with green metallic spots on head and mesosoma dorsally. [Marginal and postmarginal veins almost equal in length]. Length 1.5 - 4.2 mm. – Palaearctic, Oriental: India. From various cynipid galls. *M. dorsalis* (FABRICIUS)

Key to males of *Megastigmus* associated to cynipid galls in the West Palaearctic

- 1 Frenal area shining, nearly smooth, with some weak longitudinal furrows sides. Marginal vein 0.7 times as long as postmarginal vein. Colour: pale yellow with green metallic and brown spots on mesosoma dorsally; gaster dark amber to brown. Length 3.5 - 5.9 mm. – Austria, Hungary, Bulgaria. From galls of *Synophrus politus* (Cynipidae). *M. synophri* MAYR
- Frenal area sculptured with longitudinal striae. 2
- 2 Forewing stigma distinct elongate, about 2 times as high as broad. Marginal vein 0.7 times as long as postmarginal vein. Colour: yellow with green metallic spots on body dorsally. Length 3.5 - 5.5 mm. – Europe. From various cynipid galls. *M. stigmatizans* (FABRICIUS)
- Forewing stigma oval, 1.4 - 1.5 times as high as broad. 3
- 3 Mid lobe of mesoscutum with dense transverse striae; pronotum with 16 rows of hairs or more. Colour: pale yellow with metallic green spots on head and mesosoma dorsally; gaster brownish dorsally. [Marginal and postmarginal veins almost equal in length]. Length 1.5 - 2.6 mm. – Turkey. From galls of *Neuroterus macropterus* (Cynipidae). *M. almusiensis* DOĞANLAR
- Mid lobe of mesoscutum finely rugose; pronotum with 8 rows of hairs. Colour: yellow with green metallic spots on body dorsally. [Marginal and postmarginal veins almost equal in length]. Length 1.5 - 4 mm. – Palaearctic, Oriental: India. From various cynipid galls. *M. dorsalis* (FABRICIUS)

Acknowledgements

I am greatly indebted to Dr. H. Zettel (NHMW, Vienna, Austria) and Dr. E. Grissell (USNM, Washington DC, USA) for their help in allowing me to examine type material. I would like to thank Dr. T. Ljubomirov (IZ, BAS, Bulgaria) for the loan of valuable material, J. Dawson for a linguistic revision of the manuscript, and an anonymous reviewer for his comments improving this paper.

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Zeitschrift/Journal: [Annalen des Naturhistorischen Museums in Wien](#)

Jahr/Year: 2007

Band/Volume: [108B](#)

Autor(en)/Author(s): Stojanova Anelia

Artikel/Article: [Lectotype designation and redescription of *Megastigmus synophri* MAYR, 1874 \(Insecta: Hymenoptera: Torymidae\). 57-66](#)