



Two species of *Megastigmus* Dalman associated with wild rose, *Rosa webbiana* (Rosaceae) from Ladakh, India with a key to the oriental species (Hymenoptera: Chalcidoidea: Torymidae)

P.M. Sureshan

Zoological Survey of India, Gangetic Plains Regional Station,
Rajendra Nagar, Patna, Bihar 800016, India
Email: samanyu2003@yahoo.com

Abbreviations: F1-Funicular segment 1; MV- Marginal vein; OOL-Ocellular distance; PMV- Postmarginal vein; POL- Postocellar distance; SMV- Submarginal vein; STV- Stigmal vein ; T1-T3-Gastral tergites 1 to 3.

The genus *Megastigmus* Dalman belongs to the subfamily Megastigminae of the family Torymidae. It is represented by 132 species worldwide. Seven species of *Megastigmus* are reported from the Oriental region, of which five are known from India. *Megastigmus* species are generally phytophagous, feeding on the seeds of Gymnosperms and Angiosperms; some develop inside figs and are believed to be gall formers (on *Eucalyptus* and *Acacia*). Twelve species are reported to be associated with Rosaceae, four reported from *Rosa* species either as phytophagous or parasitic on associated hosts. They also develop as parasites in galls of cynipoidea and other insects. (Narendran 1994; Grissell 1995; Narendran et al. 2003; Noyes 2003). Among the Indian species *M. dorsalis* (Fabricius) and *M. karnatakensis* Narendran are parasitic. Boucek (1988) mentioned that in Europe parasitic species differ from phytophagous in having metallic gloss on the body. During

the faunal exploration surveys conducted by the Zoological Survey of India in the cold desert of Ladakh several specimens of *Megastigmus* belonging to two species were collected by sweeping over the wild Rose plant *Rosa webbiana*, which is common in the valleys of Ladakh range. In detailed studies one group of specimens proved to belong to an undescribed species and the other group of specimens could not be identified due to the non-availability of female specimens. A new species of *Megastigmus* is described here. A key to the Oriental species of *Megastigmus* is also provided, modified from Narendran et al. (2003).

The type specimens are kept in the collections of Zoological Survey of the India, Gangetic Plains Regional Station, Patna, Bihar (ZSIP) and eventually will be deposited in the National Zoological collections of Zoological Survey of India, Kolkata (ZSIC) .

Megastigmus kashmiricus sp. nov. (Figures 1-5; Image 1)

Material examined:

Holotype: Female (on card), 15.vii.2008, 34°06'18.8"N & 77°12'58.3"E, Alt. 3214m, Sumda do, (before chilling), Ladakh, Jammu & Kashmir, India, coll. P.M. Sureshan, A.1201 (ZSIP)

Paratypes: 18 females, 1 male, (in alcohol) (Reg.No. A.1202), 1 Female, 1 Male (on card) (Reg.No.A.1203) other data same as holotype; 2 females (on card), Leh, Hemis National Park, 4km before Hemis gompa, 5.vii.2008, 33°54'51.8"N & 77°42'46.4"E, Alt. 3568m, (Reg.No. A.1204); 2 males (in alcohol), Leh, Ganglas, 11.vii.2008, 34°11'37.6"N & 77°36'04.9"E, Alt. 3609m, (Reg.No. A.1205); 1 male (in alcohol), Chanthang valley, Skidmang, 13.vii.2008, 33°22'47.7"N & 78°16'14.3"E, Alt. 4041m, (A.1206) coll. P.M. Sureshan(ZSIP).

Etymology

The species name is derived from the name of the Indian state where the specimens were collected.

Description:

Female: Length 2.1-3.64mm, ovipositor 1.6-2.1mm (Holotype 2.84mm, Ovipositor 1.8mm).

Colour: Body testaceous, brownish black patches on ventral side of thorax, tegula concolorous with thorax; gaster with brownish cross bands dorsally, sides mainly yellowish, ovipositor sheath brownish black, brownish spot below antenna on lower face. Antenna brown with scape and pedicel yellowish beneath. Eye brownish red. Ocelli pink. Wing hyaline with veins and pubescence brown, stigma blackish brown, uncus transparent, very narrow brown infumation around stigma. Legs concolorous with body except hind femora, tibiae and tarsi brown.

Head: (Fig. 3) In dorsal view head width 1.6 x length , about 1.23x as long as pronotal collar, moderately long, brown and sparse bristles on vertex, occiput, and upper face up to level of antenna, lower face clothed with pale hairs of medium length; temple somewhat straight, slightly longer than half length of eye; vertex with oblique rugae on either side of median ocellus, rest of the area finely cross striate reticulate;

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occipital carina weak, but distinct; POL 2.3x OOL. In front view head 1.2x as broad as high; face below antenna with moderately distinct longitudinal rugae, other area finely striate reticulate; gena smooth and shiny; malar space half as long as eye; malar grooves distinct; eye weakly protruded, length 1.3x width; scrobe deep and shiny, reaching front ocellus; clypeus with two distinct teeth. Antenna (Fig. 1) inserted almost in centre of face, scape exceeds level of vertex, pedicellus plus flagellum 3.4x as long as scape, pedicel slightly longer than F1, anellus elongated, terminal funicular segments a little shorter, others are of equal length, with a single row of long sensillae, clava 2.3x as long as preceding segment.

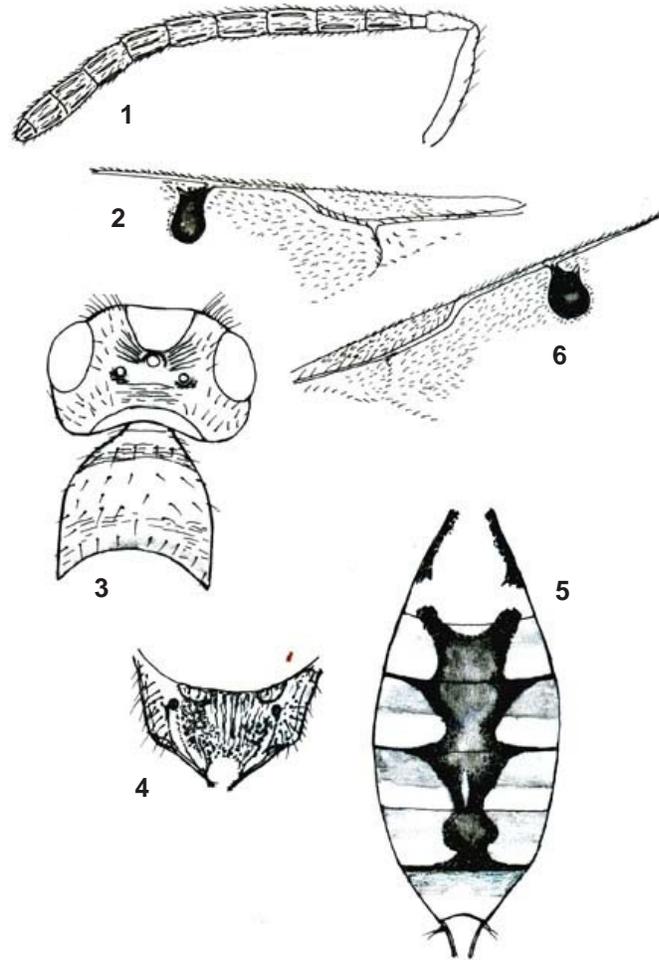
Thorax: with rather weak cross striations except on pronotal collar and mid lobe of mesoscutum a little coarser, with brown bristles. Pronotal collar as broad as long and a little shorter than mid lobe of mesoscutum. Mesoscutum 1.5x as broad as long, notauli complete. Scutellum slightly shorter than mesoscutum medially, 1.2x as long as broad, weakly striate reticulate on anterior three-fifths; frenum nearly smooth, reticulation much obliterated, frenal furrow vaguely indicated. Dorsellum smooth. Propodeum (Fig.4) medially 0.61x as long as scutellum, median area irregularly and finely reticulate, sides almost shiny, otherwise with some irregular rugae which tend to be longitudinal near anterior margin, median carina faintly indicated, callus with dense white hairs, base of each hair with reddish brown spot, spiracles oval, separated by 1.5x their own diameter from hind margin of metanotum post spiracular sulcus distinct. Prepectus broad, triangular, finely reticulate. Mesopleuron finely striate reticulate. Metapleuron distinctly reticulate. Forewing 2.31x as long as broad; basal vein distinct, running obliquely to SMV, almost half as long as MV; MV half as long as costal cell; basal cell partly closed; cubital hair line incomplete; disc with 4-7 scattered hairs towards tip; costal cell hairy in distal three-fourth area, speculum very narrow, almost absent, closed below; stigma conspicuous with uncus distinct, stigma 1.5x as long as broad (minus uncus). Relative lengths SMV 49, MV 21, PMV 21, STV 11. Hind coxa dorsally hairy. Relative lengths: hind coxa, femur, tibia and tarsus 17, 32, 34, 26.

Gaster: Sessile, smooth, 1.7x as long as hind tibia, 0.9x as long as thorax and 0.65x as long as ovipositor sheath laterally; ovipositor sheath 1.5x as long as gaster, and 2.3x as long as hind tibia; posterior margin of T1-T3 incised in the middle.

Male: Length 2.3 - 2.7mm. Resembles female but differs in having propodeum with median area with a few longitudinal ridges, one very distinct in the form of a median carina, remaining area finely reticulate; gaster with basal tergite produced in the form of a stalk, rest of gaster very short; ocelli larger and more pigmented; antennae with funicular segments shorter.

Biology: Unknown. Associated with wild rose, *Rosa webbiana* (Rosaceae), probably phytophagous, larvae feeding on the seeds.

Remarks: This species closely resembles *M. rosae* Boucek in general morphology and structure but differs from it in having different body colour pattern which is mainly yellowish, antennae with pedicel only slightly longer than F1 and 3.2x as long as broad, forewing rather sparsely hairy with stigma less round (1.5x as long as broad), basal cell partly closed, cubital hairline incomplete, disc with 4-7 hairs. (In *rosae* body with more brownish black markings on head and thorax, antennae with pedicel 1.8-1.9x as long as broad, distinctly longer than



Figures 1-5. *Megastigmus kashmiricus* sp. nov. (Female)
1 - antenna; 2 - forewing venation; 3 - Head and pronotum dorsal view; 4 - Propodeum dorsal view; 5 - gaster (without ovipositor) dorsal view; 6 - *Megastigmus* sp. (Male) forewing venation.

F1, forewing rather densely hairy, basal cell closed by complete cubital and basal hairlines, disc with 7-10 isolated hairs, stigma more rounded, (1.1-1.2x as long as broad). In the key to the West European *Megastigmus* by Boucek (1970) the species will run into couplet 6 and *Megastigmus pictus* (Forster) but it differs from the new species in having forewing extensively hairy including disc of basal cell, stigmal knob much elongate and narrow, mid lobe of mesoscutum brownish black in both sexes. *M. pictus* breed in seeds of coniferous plants. *M. aculeatus* (Swederus) and *M. nigrovariegatus* Ashmead, both species breed in seeds of various *Rosa* sp. also have large stigmal knob, body colouration as in the new species but *M. aculeatus* differs from the new species in having longer ovipositor which is about as long as or even longer than the body, rather stronger cross-striae on shiny pronotum and mesoscutum. In the shape of forewing stigma, general body coloration and other morphological characters the new species resembles the Japanese species *M. chamaecyparidis* Kamijo, *M. pourthiaee* Kamijo, *M. firmae* Kamijo, *M. thuyopsis* Yano and *M. tsugaphilus* Kamijo but differs from all the above species as follows. In *M. chamaecyparidis* thorax is weakly convex in lateral aspect, scutellum with only 3 pairs of bristles and pedicel almost as long as F1 and speculum of forewing large (in the new species



Image 1. *Megastigmus kashmiricus* sp.nov.

thorax highly convex, scutellum with more bristles (seven pairs), pedicel little longer than F1 and speculum reduced). *M. pourthiaee* differs from the new species in having ovipositor sheath about half as long as gaster, occiput slightly emarginated, mesoscutum with dense long hairs, scutellum more hairy and pedicel shorter than F1 (in the new species ovipositor sheath 1.5x as long as gaster, occiput strongly emarginated, pedicel slightly longer than F1, mesoscutum with scattered hairs and scutellum less hairy). *M. firmae* has a long ovipositor which is much longer than the body and MV of forewing distinctly shorter than PMV, whereas in the new species the ovipositor is only 0.7x as long as the body and the MV as long as PMV. *M. thuyopsis* differs from the new species in having three pairs of bristles posteriorly on the mesoscutum, and scutellum, propodeum with a transverse carina and spiracles separated by two times their own length from posterior margin of metanotum, ovipositor sheath distinctly shorter than gaster and half of thorax combined (in the new species mesoscutum and scutellum with more than three pairs of bristles, propodeum with no transverse carina and spiracles separated by 1.5x their own length from posterior margin of metanotum, ovipositor

sheath almost as long as gaster and half of thorax combined. *M. tsugaphilus* differs from the new species in having an arched transverse depression medially on the propodeum, forewing with more hairs on the basal half (basal cell) and scutellum with only four or five bristles on each side (in the new species propodeum without an arched depression medially, forewing less hairy (basal cell) and scutellum with more bristles (seven pairs). *M. cryptomeriae* Yano differs from the new species in having antenna with F1 more than 2x as long as wide and longer than F2, occiput shallowly emarginated, thorax weakly convex, propodeum with an arched transverse carina, gaster about as long as thorax, ovipositor sheath as long as gaster and thorax combined (in the new species F1 almost twice as long as wide and as long as F1, occiput strongly emarginated, thorax strongly convex in lateral view, propodeum without transverse carina, gaster shorter than thorax, ovipositor sheath only 0.7x as long as head plus thorax combined). The North American *M. nigrovariegatus* differs from the new species in having the forewing distinctly clouded near the stigma. Among the Indian species it resembles *M. viggianii* Narendran & Sureshan and *M. albizziae* Mukerji but differs from these species by characters given in the key.

2. *Megastigmus* sp. (Fig. 6)

Male: Length 2.9-3.2mm. Colour mainly brownish black, including antenna, and thorax completely, gaster yellowish brown. 8 specimens out of 22 with dorsal part of thorax partly and gaster mainly yellowish. General morphology and structure similar to *M. kashmiricus* sp. nov. except for the following. Head with coarse longitudinal rugae on face completely, vertex with transverse striae in the form of rugae. Thorax with transverse striae coarser in the form of rugae on pronotal collar and mesoscutum completely. Scutellum with

Key to the oriental species of *Megastigmus* Dalman females (Modified from Narendran et al. 2003)

1. F1 distinctly longer than combined length of pedicel and ring segment2
- F1 shorter than (or at the most equal to) combined length of pedicel and ring segment3
2. Length of ovipositor 1.25x combined length of thorax and gaster; body yellow. Philippines
.....*M. immaculatus* Ashmead
- Length of ovipositor 1.09x combined length of thorax and gaster; body yellow with dark tinge or patches on some parts of thorax and gaster. Host: Fruits of *Dalbergia sericea*. Indonesia: Java.....*M. leeuweni* Ferriere
3. Thorax dorsally metallic green; F1 equal to pedicel and ring segment combined. Host: parasitic on cynipidae on *Quercus*: Europe; India: Uttar Pradesh.*M. dorsalis* (Fabricius)
- Thorax dorsally yellowish brown; F1 shorter than pedicel and ring segment combined.....4
4. Ring segment of antenna about half as long as pedicel; forewing with stigmal lobe narrow and elongate, basal vein weakly distinct. Host: seeds of *Cupressus torulosa*. India: Himachal Pradesh.....*M. cupressi* Mathur
- Ring segment distinctly shorter than half of pedicel; forewing with stigmal lobe not as above, mostly oval or semicircular; basal vein clearly distinct.....5
5. Ovipositor more than 2x longer than gaster.....6
- Ovipositor 1.3-1.5x as long as gaster7
6. Frenum nearly smooth; lower clypeal margin not distinctly bilobed or incised at middle; ovipositor 2.2x as long as gaster; F1 longer than F2; MV about 2.5x as long as STV; POL nearly twice OOL. Host: bud galls of *Calycopterys floribunda* India: Kerala*M. viggianii* Narendran & Sureshan
- Frenum longitudinally rugose; lower clypeal margin incised in the middle; ovipositor 2.7x as long as gaster; F1 shorter than F2; MV about 3x as long as STV; POL 2.3x OOL; Hosts: *Psychid* (*Pteroma* sp.) from *Rhizopora mucronata* and parasitic on borers of *Sonneratia* seeds. India: Karnataka.....*M. karnatakensis* Narendran
6. POL as long as OOL; SMV about 7x MV; STV about as long as MV; antennal club about 1.7x preceding segment., scape 3.75x pedicel. Host: Pods of *Albizzia*. India: Delhi*M. albizziae* Mukerji
- POL 2.3x OOL; SMV little longer than double MV; STV about half as long as MV; club 2.2x as long as preceding segment, scape 2.6x pedicel. Host: Associated with wild rose *Rosa webbiana*. India: Jammu & Kashmir.....
.....*M. kashmiricus* sp.nov.

reticulation coarse, frenal groove distinct. Propodeum with moderate uniform reticulation, longitudinal rugae irregular, median carina broken due to some irregular transverse rugae. Forewing more densely hairy with basal cell completely closed by cubital and basal hair line, disc with 10-12 isolated hairs, costal cell almost completely hairy, stigma more rounded about 1.1x as long as broad (without uncus).

Material examined: 22 Males (3 on card, 19 in alcohol), Ganglas, Leh, Jammu & Kashmir, India, 11.vii.2008, 34°11'37.6"N & 77°36'04.9"E, Alt. 3609m, (Reg.No. A.1207) (ZSIP)

Remarks: The specimens appear almost similar to *M. rosae* in general morphology and structure especially of the antenna and forewing, but differ from it in having body almost completely brownish black (except in some specimens thorax partly and gaster mainly yellowish), pronotum and mesoscutum with rather coarse striation in the form of rugae, scutellum including frenal furrow with coarser reticulation, frenal furrow more clear, propodeum with some transverse rugae which cut median carina. The identity of the species can only be fixed after the examination of female specimens which are not collected in the present study. This species also breeds in the wild rose

plant along with *M.kashmiricus* but only collected from one locality.

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