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First records of the genus *Myathropa* Rondani, 1845 (Diptera, Syrphidae) from India with new distributional and taxonomic notes for *Myathropa semenovi* (Smirnov, 1925)

Amir Maqbool[1], Shahid Ali Akbar[2] & Aijaz Ahmad Wachkoo[3*]

[1] Department of Zoology, School of Bioengineering & Biosciences, Lovely Professional University, Jalander, Punjab — 144411 India (himalayanbiologist@gmail.com) https://orcid.org/0000-0003-4659-4775
[2] Central Institute of Temperate Horticulture, Srinagar, Jammu and Kashmir—191132, India (kingakbarali@gmail.com) https://orcid.org/0000-0002-0284-136X
[3] Department of Zoology, Imtiyaz Memorial Govt. Degree College, Shopian, Jammu and Kashmir — 192303 India (*corresponding author: aijaz_shoorida@yahoo.co.in) https://orcid.org/0000-0003-2506-9840

*corresponding author

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Abstract. We report *Myathropa semenovi* (Smirnov, 1925) for the first time from India. This species was previously known from Central Asia and adjacent parts of Siberia. Recently collected specimens from the Kashmir Himalayas of India represent the first reported occurrence of this flower fly genus from India. Images and diagnosis are provided to help with the identification of this species.

Keywords. morphology, India, Kashmir Himalayas, Oriental region, distribution

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Introduction

Myathropa Rondani, 1845 (Diptera, Syrphidae) is a small genus of flower flies native to the Palaearctic Region (Bartsch *et al*. 2009; Reemer *et al*. 2009). *Myathropa* belongs to the subfamily Eristalinae with adults characterized by a pilose postpronotum, the presence of a

patch of black setulae at the base of the femora and male abdomen with four unmodified pregenital segments. The adult *Myathropa* are characterized by pilose eyes, bare arista, wing cell R_1 open, non-metallic body without vittae on the thorax and the abdomen black with yellow markings and metafemur without dens or triangular lamina (van Veen 2004). *Myathropa* also has a strong looped wing vein R_{4+5} which is typically for the tribe Eristalini. However, the most obvious distinguishing feature of this genus is a pattern of grey maculae and fasciae on the scutum; scutum pruinose with two black maculae anteriorly and one large black macula posteriorly that resembles a skull marking, however, the pruinosity on the scutum can be much reduced in dark coloured specimens.

Myathropa are saprophagous flower flies, with aquatic or semi-aquatic larvae inhabiting shallow rot holes, sap runs, under bark, decaying heartwood and decaying vegetation (Stubbs & Falk 1983; Rotheray 1993; van Steenis 2023).

Currently *Myathropa* includes three described species, although there are several cryptic taxa waiting for a revision (van Steenis pers com.). Of the currently described species, *Myathropa usta* (Wollaston, 1858) is endemic for Madeira (Barkemeyer 1999; Smit *et al*. 2004), *Myathropa semenovi* (Smirnov, 1925) is restricted to Central Asia and adjacent parts of Siberia (Smirnov 1925, Barkalov & Mutin 2018) whereas the synanthropic species *Myathropa florea* (Linnaeus, 1758) is widely distributed across Central and Eastern Asia, Europe and North Africa (van Veen 2004; Bartsch *et al*. 2009; Barkalov & Mutin 2018) and is recently introduced to the Pacific Coast of North America (iNaturalistUK 2023).
The syrphid fauna of Indian Himalayas has received some attention during the last ten years (Shah *et al.* 2014; Sengupta *et al.*2016, Wachkoo *et al.* 2019, 2021) and, as a result, three new genus records for India have been reported (Wachkoo *et al.* 2019, 2021). Additional sampling in 2022 resulted in the first report for the genus *Myathropa* from India.

Material and Methods

This study is based on specimens collected in the Kashmir Valley, located in the North-western part of the Indian subcontinent between 33°22′ and 34°50′N latitude and 73°55′ and 73°33′E longitude (Maqbool *et al*. 2018). The specimens were collected in natural vegetation from two mountainous areas in the Baramulla and Kulgam districts supporting meadows and coniferous forests (*Pinus* spp.). The collecting site in Baramulla district is situated on a forested mountain slope of Kitterdajj village and the collecting site in Kulgam district is situated in a coniferous forest close to the Aharbal waterfall.

Global distributional map (Fig. 1A) was prepared using Google maps and Google Earth Pro 7.3.6.9326. To prepare the map of Kashmir Valley showing the sampling sites (Fig. 1B), ArcMap module of the ArcGIS software package ver. 10.1 was used. Geographical coordinates of the sampling sites were imported to mapping software and the sampling site was plotted.

Morphological studies

The morphological study was conducted using a G2Mark stereomicroscope (G2Mark, India). Adult specimens of *Myathropa semenovi* were identified by direct comparison with type specimens deposited at ZMMU. Morphological terminology follows van Steenis *et al.* (2023). Body-length was measured as the outstretched length from base of the antenna to the posterior end of the abdomen, in lateral view. Wing length was measured from the wing base to the wing apex.

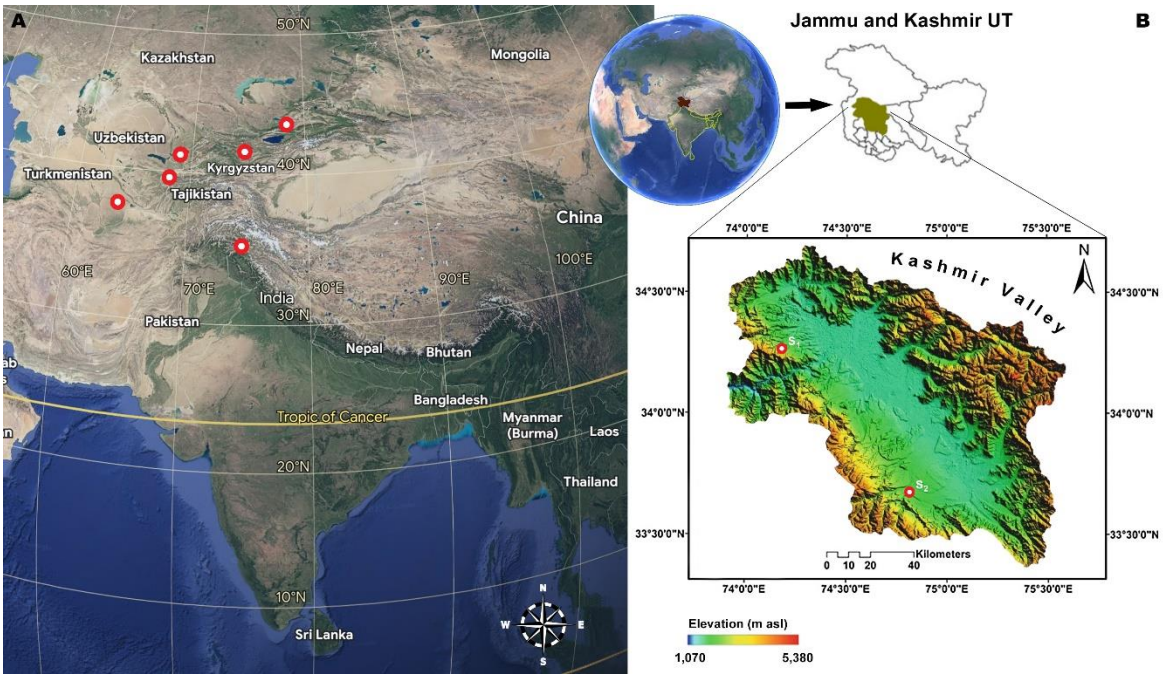

Figure 1. A. Map showing world distribution of *Myathropa semenovi*. **B**. Map of Kashmir valley showing sampling sites of *Myathropa semenovi* (S_1=Baramulla, S_2= Kulgam).

Male terminalia preparation

For the extraction and preparation of male genitalia, the procedure of Wachkoo *et al*. (2021) was followed with a little modification. Terminal abdominal segments along with genital capsule were hooked out with a curved-tip entomological pin and placed in a 10% KOH solution overnight at room temperature to achieve proper transparency. The material was then treated with 100% glacial acetic acid for 10 minutes to neutralise the effect of KOH. Subsequently the material was given a quick dip in 75% ethanol and transferred to a cavity glass slide having glycerol as a temporary mount. The sternites attached to epandrium and genital capsule were detached for better visual analysis. To attain an appropriate angle, water based sterile lubricant transparent gel (K-Y Jelly) was used. A small drop of the gel was placed on the centre of glass slide cavity, with the material to be photographed placed over it, and carefully manipulated with fine tipped forceps to achieve appropriate orientation. A drop of glycerol was added on top of the gel to smoothen the surface and reduce the amount of light reflection.

Images

Images of adult specimens were captured with a mirrorless digital camera (Nikon Z50). To achieve adequate exposure of specimens, a light box was used to produce diffused light (Wachkoo *et al*. 2021). Multiple images were focus stacked in the combine ZP programme to create one final image (Yatoo *et al*. 2022). Final plates were assembled with Adobe Photoshop ® CS4. The above setup was also used for capturing terminalia (submersed in glycerol) microphotographs, with the addition of infinite microscope objectives (Maqbool *et al*. 2021).

Repositories

CUZM	Cluster University Zoological Museum, Srinagar, Jammu and Kashmir, India
ZMMU	Zoological Museum, Moscow State University, Moscow, Russia

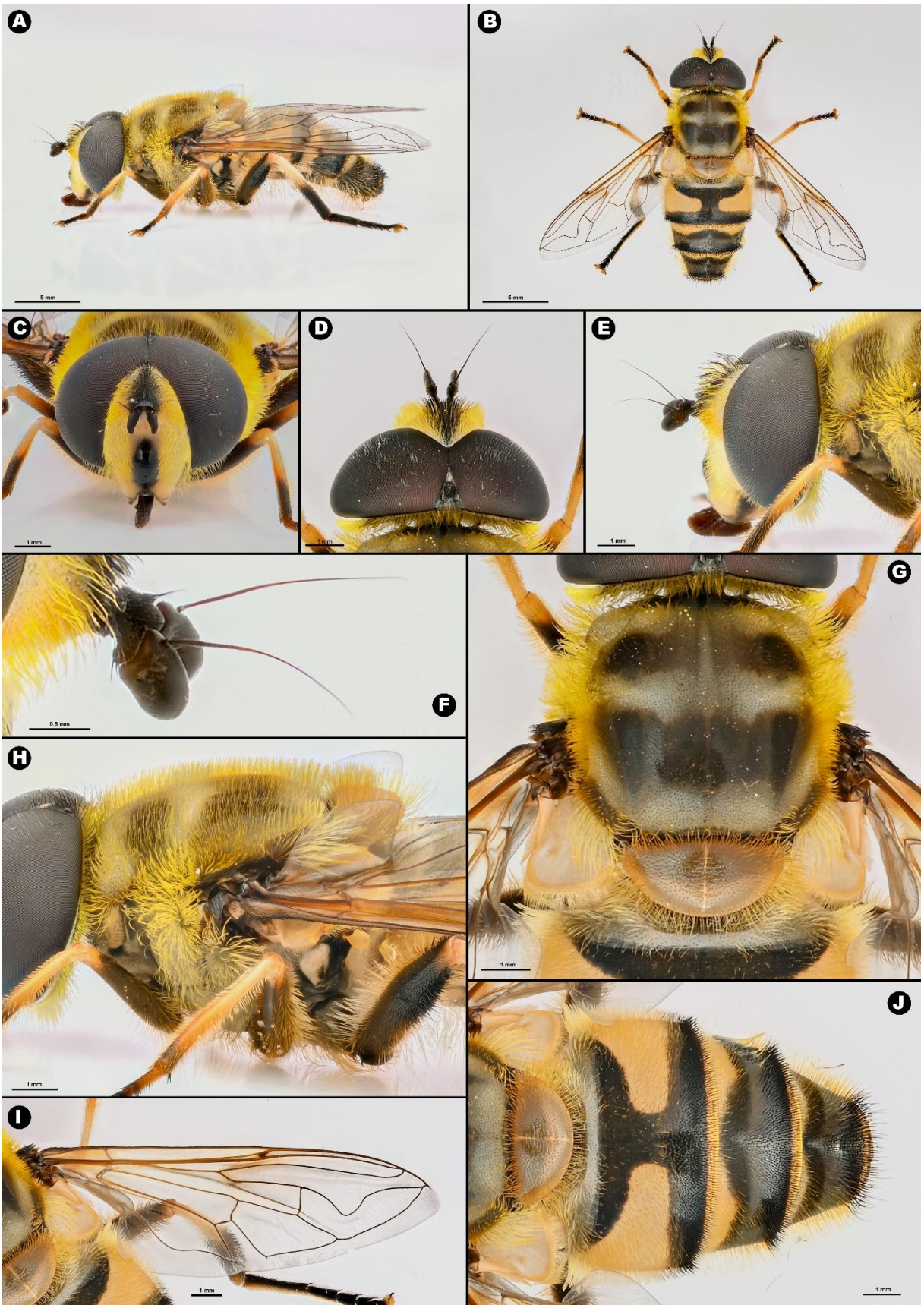

Figure 2. A–J. *Myathropa semenovi* male. **A**. habitus, lateral view. **B**. habitus, dorsal view. **C**. head, frontal view. **D**. head, dorsal view. **E**. head, lateral view. **F**. antenna, lateral view. **G**. thorax, dorsal view. **H**. thorax, lateral view. **I**. wing. **J**. abdomen, dorsal view.

Results

Myathropa semenovi (Smirnov, 1925) (Figs 2–4)

Type material. *Myathropa semenovi* Smirnov, 1925. Type locality: Tashkent: Uzbekistan, Syntype ♂.
Syntypes: Uzbekistan: ♂: "сайлтк. 28.VIII.1922 // Ташкентх.у. // Б. Родендорф", "Syntypus ♂ 1925 // *Myathropa* // *semenovi* Smirnov" [red label]; "*Myathropa* // *semenovi* Smirn. // det. E. Smirnov" (ZMMU); ♀: same label data as male, except: "20.VIII.'22 // Е. Смирнов" (ZMMU).

New records. India: 3 ♂♂, 5 ♀♀, Jammu and Kashmir, Dist. Baramulla, Rafiabad, Kitterdajj, Hamam Forest, 34°09'52.3"N 74°06'48.7"E, 1880 m asl, 10.vii.2022, leg. Amir Maqbool, A_Maqbool00022 to A_Maqbool00029 (CUZM); 5 ♂♂, 4 ♀, Jammu and Kashmir, Dist. Kulgam, Aharbal, 33°38'57.3"N 74°47'00.9"E, 2231 m asl; 5.x.2022, leg. Amir Maqbool, A_Maqbool00030 to A_Maqbool00038 (CUZM).

Diagnosis
Male overall lighter in colour than female with relatively larger yellow maculae on abdomen (Figs 2–3) and female considerably larger in size than male. Male body length 16–18 mm, wing length 12–14 mm (Figs 2A–B); female body length 20–24 mm, wing length 17–21 mm (Figs 3A–B). **Head**. Eyes pilose; facial ground colour yellow with predominantly yellow pile, medially with a broad, black and bare vitta, face baso-posteriorly partly to entirely black including genae; frons with yellow pile or yellow with black pile medially (Figs 2C–E, 3C–E); basoflagellomere black, 1.5 x as long as high, arista bare (Figs 2F, 3F). **Thorax**. Scutum and scutellum entirely yellow pilose, skull marking distinct to weak (Figs 2G–H, 3G–H). **Wing**. Radial vein R_{4+5} with a strong loop, cell R_1 open to the wing margin, pterostigma dark brown slightly longer than high (Figs 2I, 3I). **Legs**. Black and yellow coloured. Femora at least basal ¾ black, tibiae in apical ½ or ¼ dark-brown to black, tarsi black except basitarsus of mesoleg. **Abdomen**. Abdominal tergite II in male with wide, yellow maculae gradually narrowing medially (Fig. 2J); in female maculae on tergite II narrow and sharp pointed medially (Fig. 3J); tergite III in male with narrow maculae meeting medially and forming a continuous fascia; in female the markings on tergite III reduced to two small maculae antero-laterally; tergite IV in male with a pair of basal sub-lateral small pale maculae (Fig. 2J), tergite IV in female without maculae (Fig. 3J); both, male and female have a pruinose fascia on tergites III and IV which is, especially in male, sharp pointed medially; sternites entirely black.

Male genitalia (Fig. 4). Cercus rather squarish with straight dorsal margin and right-angular dorso-ventral margin (Fig. 4B); some pile on medio-basal part of medial lobe; fenestra of hypandrium relatively short, about ¼ of the length of the hypandrium, apex slightly narrowed (Fig. 4B–D); chop-tool shaped part of phallus with rather low and narrow shaft and slightly elongate oval apical part (Fig. 4C).

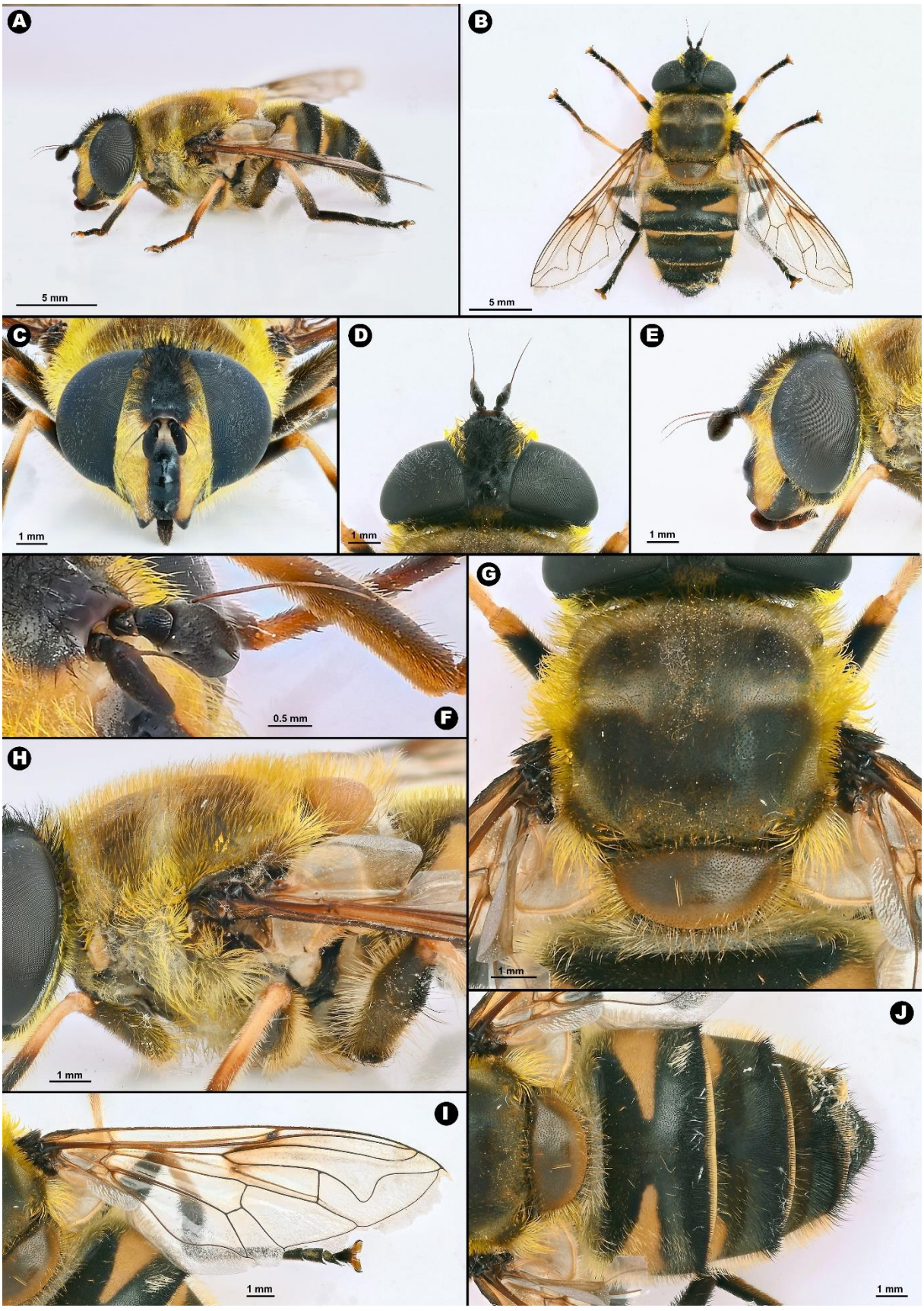

Figure 3. A–J. *Myathropa semenovi* female. **A**. habitus, lateral view. **B**. habitus, dorsal view. **C**. head, frontal view. **D**. head, dorsal view. **E**. head, lateral view. **F**. antenna, lateral view. **G**. thorax, dorsal view. **H**. thorax, lateral view. **I**. wing. **J**. abdomen, dorsal view.

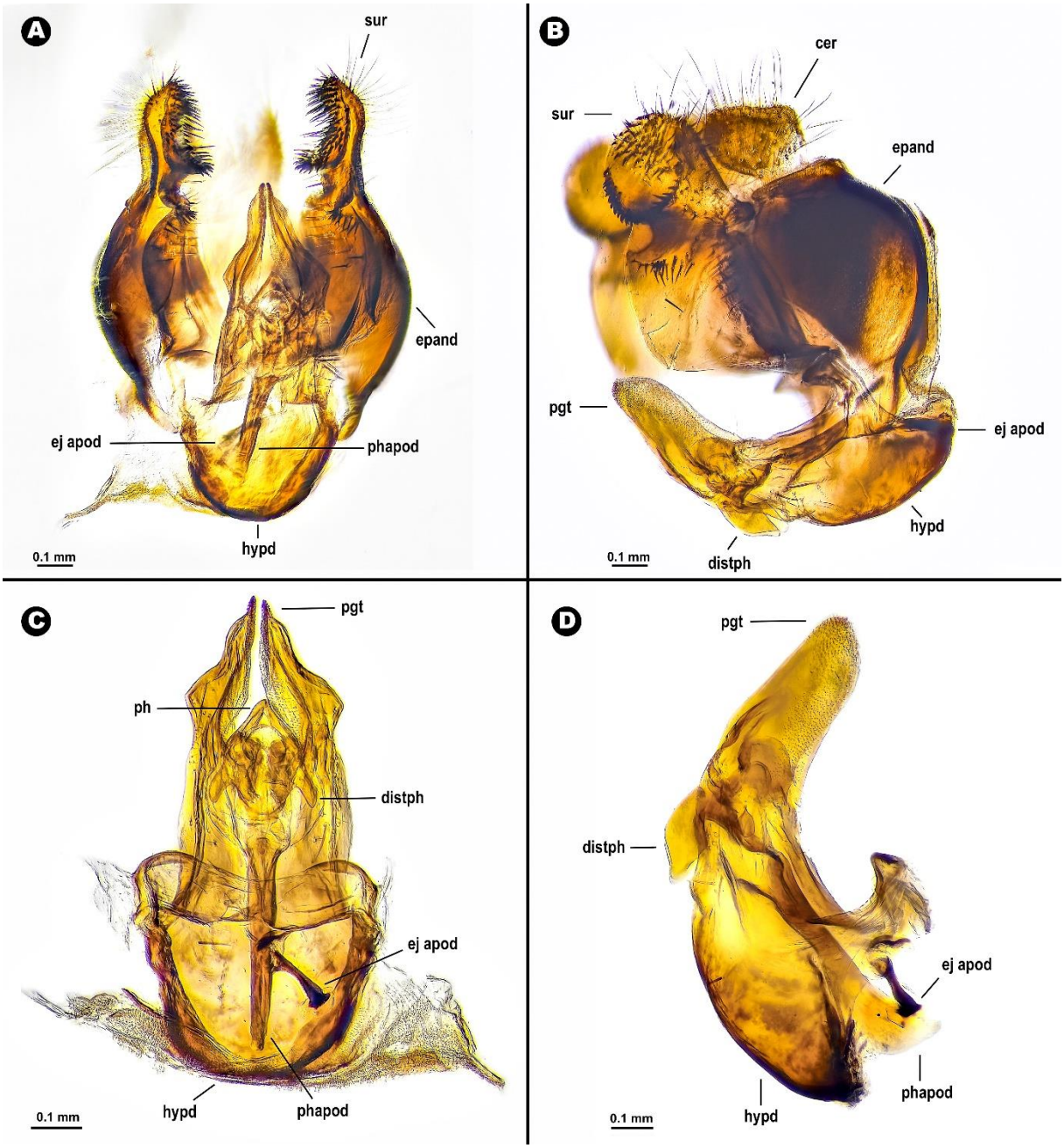

Figure 4. *Myathropa semenovi* male genitalia. **A**. ventral view. **B**. lateral view. **C**. hypandrium, dorsal view. **D**. hypandrium, lateral view. Abbrevation: cer=cercus; distph=distiphallus; ejapod=ejaculatory apodeme; epand=epandrium; hypd=hypandrium; pgt=postgonite; ph=phallus; phapod=phallapodeme; sur=surstylus). Scale 0.5 mm (A–B), 0.1 mm (C–D).

Distribution

Myathropa semenovi occurs in the Tian Shan mountains of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan (Fig. 1A) and here reported from the western Himalayas in India (Fig. 1B). The flight period ranges from the 12th of April to the 10th of October (Barkalov & Mutin 2018, J. van Steenis pers. comm., this study). The specimens from Kashmir Valley were collected in pine forest in mountainous areas.

Comparative features
Myathropa semenovi has entirely yellow pile on scutum and scutellum whereas other *Myathropa* species have at least black pile medially on scutellum. Skull marking on scutum is variable within all *Myathropa* species except for *M. usta* which has hardly any pruinose pattern on scutum. The yellow abdominal maculae of the males and females of *M. semenovi* are reduced in size on tergite III and IV and medially smaller on tergite II compared to the other *Myathropa* species (Fig. 2J, 3J). Female of *M. usta* has also reduced yellow maculae on tergites III and IV, but abdomen has a roundish shape. Also, both, males and females of *M. semenovi* have a pruinose fascia medially on tergites III and IV which is usually not or only partly present in other *Myathropa* species.

Discussion

Our study reports the first records of the genus *Myathropa* and of the species *M. semenovi* from India. Our data extends the known geographical range of this species by more than 2000 km Southeast from the type locality Tashkent in Uzbekistan. The Kashmir Valley represents a transitional zone between Oriental and Palaearctic regions, sharing boundaries with the North-western tip of the Oriental and Mid-South tip of the Palaearctic Region and is characterised by a mixture of Palaearctic and Oriental insect faunal elements (Das 1966; Maqbool *et al*. 2022).

The specimens of *M. semenovi* were collected in mountain pine forests in a temperate-climate ecoregion of the Kashmir Himalayas (Das 1966; Shah *et al.* 2014; Zubair *et al.* 2021). This ecoregion and habitat type is more widespread in India eastwards from Kashmir at the foot of the Himalayas and *M. semenovi* is expected to be present here as well. It is obvious from this study that *M. semenovi* is the first *Myathropa* species that has reached into Oriental Region whereas this species has been only known from Palaearctic Region until now (Bartsch *et al*. 2009; Reemer *et al*. 2009).

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