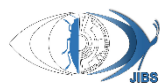


Original Article 

A preliminary taxonomic study of hoverflies (Diptera: Syrphidae) from the Pothwar Region of Punjab, Pakistan

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ABSTRACT. The family Syrphidae (Diptera) is among the well-explored and taxonomically up-to-date dipteran families in Pakistan, with over 100 species documented to date. In this study, nine tribes, 26 genera, and 46 syrphid species were recorded from the Pothwar region of Punjab, Pakistan. Of these, three genera, *Didea* Macquart, 1834, *Melangyna* Verrall, 1901, and *Parasyrphus* Matsumura, 1917, along with seven species, including *Allobaccha apicalis* (Loew, 1858), *Asarkina bhima* Ghorpadé, 1994, *Didea vockerothi* Ghorpadé, 1994, *Eristalinus tristriatus* (Meijere, 1911), *Melangyna remota* (Brunetti, 1923), *Parasyrphus thompsoni* Ghorpadé, 1994, and *Rhingia laticincta* Brunetti, 1907, are newly recorded from Pakistan. The majority of these species were collected from forest areas, particularly near standing water or under pine tree canopies. Sixteen species were also observed on the invasive plant *Parthenium hysterophorus* in the region. This study provides a preliminary checklist of 46 species from the Pothwar region, including their current distribution in Pakistan, habitat information, and digital photographs of each species. In terms of regional species richness, Punjab province contained the largest number of species (44 species: 95.6%) in Pakistan, followed by Azad Kashmir (31 species: 67.3%), Islamabad Capital Territory (28 species: 60.8%), Khyber Pakhtunkhwa (20 species: 56.5%), Sindh (11 species: 23.9%), Balochistan (10 species: 21.7%), and Gilgit-Baltistan (7 species: 15.2%).

KEYWORDS: Checklist, Distribution, Eristalinae, Flower flies, New records, Syrphinae

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INTRODUCTION

The Syrphidae family, commonly known as syrphid flies, hoverflies, or flower flies, represents one of the most diverse and ecologically significant families of Diptera, with more than 6,300 described species worldwide (Skevington et al. 2019; Mengual et al. 2023). Currently, the family is divided into four subfamilies: Eristalinae, Microdontinae, Pipizinae, and Syrphinae (Mengual et al. 2015). Adult hoverflies feed on nectar and pollen, whereas their larvae exhibit diverse feeding habits and inhabit various ecological niches. Most species in the Syrphinae are zoophagous, with some being phytophagous; Pipizinae are also zoophagous; Eristalinae are saprophagous; and Microdontinae are myrmecophilous (Reemer 2003; Rojo et al. 2003; Mengual et al. 2015).

Unlike other dipteran families, the taxonomy of Pakistani Syrphidae is well documented, with approximately 100 species currently known from the region (Hassan et al. 2021, 2022; Fazal et al. 2025; Hassan & Hussain 2024; Vujić et al. 2021, 2023, 2024).

Taxonomic studies on this family in Pakistan date back over a century, starting with Enrico Brunetti's (1907a, 1907b, 1908, 1915) series of publications on the hoverfly fauna of the Indian subcontinent. In a subsequent landmark publication, he documented 245 species belonging to 51 genera from the Indian subcontinent, including 22 species reported from the present territory of Pakistan (Brunetti 1923). Subsequently, Knutson et al. (1975) published a comprehensive catalogue of the Oriental hoverfly fauna, which extended the checklist to 312 species under 71 genera, which included 12 species recorded from Pakistan (as West Pakistan). Alam et al. (1969) conducted the first taxonomic study on hoverflies from Pakistan and reported 17 species. Later, Aslamkhan et al. (1997) provided a list of 39 species, including 22 previously known and 17 newly recorded species for Pakistan. Subsequent studies on the Syrphidae of Pakistan were carried out by several researchers, including Arif et al. (2001, 2002), Saleem et al. (2001), Sajjad & Saeed (2010), Saeed et al. (2012), Ali et al. (2013, 2018), Ghorpade & Shehzad (2013), Arif et al. (2014), Turk et al. (2014, 2015), Khan et al. (2015), Haq et al. (2016), Hassan et al. (2017, 2018a, 2018b, 2019a, 2019b, 2020a, 2020b, 2022), and Hassan & Hussain (2024). Among these, Ghorpade & Shehzad (2013) presented an annotated checklist of the Syrphidae of Pakistan, along with the adjacent regions such as Jammu and Kashmir, India, and parts of Afghanistan. They documented 84 species under 42 genera from Pakistan and over 153 species. More recently, Shehzad et al. (2017) provided an updated checklist of 71 species from 40 genera, based on countrywide surveys, museum collections, and previously published records from Pakistan. Over the past seven years, more than 30 species have been added to the hoverfly fauna of Pakistan (Hassan et al. 2017, 2018a, 2018b, 2019a, 2019b, 2020a, 2020b, 2022; Hassan & Hussain 2024; Vujić et al. 2021, 2023, 2024).

The primary aim of this study was to explore the hoverfly fauna of the Pothwar region in Punjab, Pakistan, and to identify new country records. Our survey documents 46 species and 26 genera, including three genera and seven species that are newly recorded from Pakistan.

MATERIAL AND METHODS

The Pothwar region is located in the north of the Punjab province, west of Azad Kashmir, and extends into the southwestern areas of Khyber Pakhtunkhwa (Fig. 1). It comprises four districts: Attock, Chakwal, Jhelum, and Rawalpindi, and is situated between the Indus and Jhelum Rivers. Adult hover flies were collected from various habitats, including marshy areas, dumpsites, flowers of ornamental and wild plants, forested areas, parks, and various crops such as wheat, onion, chili, and brassica by aerial net and colored pan traps (white, green, blue, yellow, and red) throughout the Pothwar region of Punjab Province, Pakistan. Both adult and immature hover flies, along with their associated aphid species, were collected from various localities across the Pothwar region.

The immature stages (larvae) of hover flies and their associated aphid prey were collected by hand-picking from host plants within the study areas. These larvae were subsequently reared under controlled laboratory conditions ($25 \pm 2^\circ\text{C}$; >60% Relative humidity, and a 12L: 12D photoperiod) at the Department of Entomology, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan, during 2016–2018. Larvae of eight aphidophagous hover fly species were reared successfully on 13 different aphid species until adult emergence (Hassan et al. 2024). Newly emerged adults were fed a sugar or honey solution for 2–3 days to allow full development of their morphological characteristics, aiding in their taxonomic identification. Adult hover flies were identified using the available literature, including Brunetti (1923), Thompson & Ghorpadé (1992), Ghorpadé (1994, 2015), Claussen & Weipert (2003), van Veen (2010), Hassan et al. (2018a, 2018b, 2020a, 2020b, 2024), and Ka-Lun (2024). The terminology used for adult morphology follows van Steenis et al. (2023). Illustrations were prepared using a Nikon Digital Sight DS-Fi1 camera attached to a Nikon SMZ1500 stereomicroscope. The photographs were further improved by using Adobe Photoshop CS6. The identified specimens were deposited in the Laboratory of Biosystematics, Department of Entomology, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan.

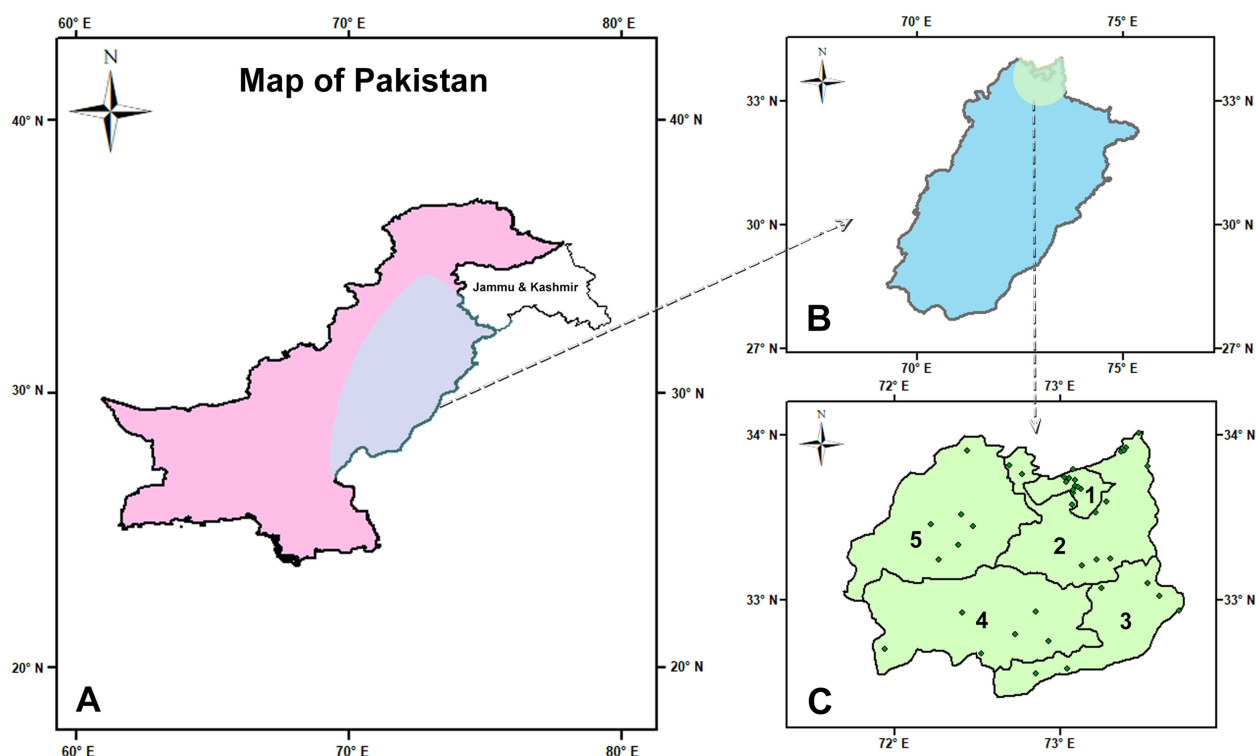


Figure 1. Geographical location of the study area. **A.** Map of Pakistan; **B.** Map of Punjab province and Islamabad Capital Territory; **C.** Study area: Map of Pothwar region: **1.** Islamabad Capital Territory; **2.** District Rawalpindi; **3.** District Jhelum; **4.** District Chakwal; **5.** District Attock.

RESULTS

In this study, we documented nine tribes, 26 genera, and 46 species from two subfamilies of the family Syrphidae in the Pothwar region of Punjab, Pakistan. Among these, three genera, *Didea* Macquart, 1834, *Melangyna* Verrall, 1901, and *Parasyrphus* Matsumura, 1917, and seven species, including *Allobaccha apicalis* (Loew, 1858), *Asarkina bhima* Ghorpadé, 1994, *Didea vockerothi* Ghorpadé, 1994, *Eristalinus tristriatus* (Meijere, 1911), *Melangyna remota* (Brunetti, 1923), and *Parasyrphus thompsoni* Ghorpadé, 1994, and *Rhingia laticincta* Brunetti, 1907, are newly recorded for Pakistan. A comprehensive updated checklist of hoverfly species from the Pothwar region is provided, including individual photographs of each species.

Order Diptera Linnaeus, 1758

Family Syrphidae Latreille, 1802

Subfamily Eristalinae Newman, 1834

Tribe Cerioidini Wahlgren, 1909

Genus *Ceriana* Rafinesque, 1815

Ceriana ornatifrons (Brunetti, 1915) (Fig. 2A)

Material examined. Islamabad Capital Territory. Margalla Hills (Trail-5), 1540 m a.s.l, 33°44'37.68"N, 73°1'19.2"E, 1♂, 14.x.2017, leg. M.A. Hassan.

Distribution. Pakistan: Islamabad Capital Territory. Margalla Hills (Trail-5) (Hassan et al. 2019a; Hassan & Hussain 2024).

Biogeographical distribution. Oriental: India, Nepal, Pakistan, Sri Lanka (Brunetti 1923; Ghorpadé 2014, 2015; Dyola et al. 2024).

Remarks. This species was collected from standing water habitats within the dense pine forests of Margalla Hills, Islamabad Capital Territory, Pakistan (Hassan et al. 2019a).

Tribe Eristalini Newman, 1834

Genus *Eristalis* Latreille, 1804

Subgenus *Eoseristalis* Kanervo, 1939

Eristalis cerealis (Fabricius, 1805) (Fig. 2B)

Material examined. Islamabad Capital Territory. Daman-e-Koh, 740 m a.s.l, 33°44'22.1994"N, 73°3'19.44"E, 3♂♂, 4♀♀, 4.iii.2017; Punjab Province. District Rawalpindi, Kahuta, 1829 m a.s.l, 33°12'36"N, 73°8'2.4"E, 3♂♂, 2♀♀, 22.ix.2017, PMAS-Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 2♂♂, 2♀♀, 09.ii.2017; Murree, Charra Pani, 1356 m a.s.l, 33°54'14.4"N, 73°23'24"E, 2♂♂, 2♀♀, 4.v.2017, Kuldana, 1928 m a.s.l, 33°55'26.3994"N, 73°23'56.4"E, 23♂♂, 17♀♀, 15.vii.2017, 23♂♂, 1♀, 10.x.2017, 2♂♂, 2♀♀, 3.iv.2018, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 2♂♂, 2♀♀, 3.iv.2018; District Jhelum, Dina, 276 m a.s.l, 33°1'40.7994"N, 73°36'3.5994"E, 1♀, 10.x.2017, Jhelum City, 235 m a.s.l, 32°56'0.6"N, 73°43'12.72"E, 2♀♀, 3.iv.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Islamabad Capital Territory, Daman-e-Koh; Khyber Pakhtunkhwa, Haripur, Hazara, Mansehra, Upper Dir; Punjab, Chakwal, Jhelum, Khushab, Rahim Yar Khan, Rawalpindi (Arif et al. 2014; Khan et al. 2015; Shehzad et al. 2017; Hassan et al. 2018a).

Biogeographical distribution. **Oriental:** China, India, Pakistan, Nepal, Sri Lanka; **Palaeartic:** China, Japan, Korea (Ghorpadé 2014; Yang et al. 2020; Dyola et al. 2024).

Remarks. This species was collected while hovering around the following host plants: *Brassica campestris*, *Calendula officinalis*, *Parthenium hysterophorus*, *Triticum aestivum*, *Tulipa* sp., as well as various grasses and wildflowers.

Subgenus *Eristalis* Latreille, 1804

Eristalis tenax (Linnaeus, 1758) (Fig. 2C)

Material examined. Islamabad Capital Territory. Daman-e-Koh, 740 m a.s.l, 33°44'22.1994"N, 73°3'19.44"E, 2♂♂, 4.iii.2017, Lack View Park, 550 m a.s.l, 33°42'41.9"N, 73°08'03.77"E, 9♂♂, 11♀♀, 7.ix.2016, 1♀, 5.iv.2018, Shahdara Valley, 730 m a.s.l, 33°43'45.8394"N, 73°5'35.16"E, 6♂♂, 7♀♀, 7.xi.2016; Punjab, District Rawalpindi, PMAS-Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♀, 28.x.2016, 2♂♂, Gujar Khan, 457 m a.s.l, 33°15'10.8"N, 73°18'14.4"E, Jinnah Park, 183 m, 33°34'47.9994"N, 73°4'24.24"E, 2♀♀, 10.iv.2018, Kahuta, 1829 m a.s.l, 33°12'36"N, 73°8'2.4"E, 3♂♂, 2♀♀, 22.ix.2017, Kallar Sayyedan, 520 m a.s.l, 33°14'41.9994"N, 73°13'26.4"E, 2♀♀, 15.iv.2018; Murree, Charra Pani, 1356 m a.s.l, 33°54'14.4"N, 73°23'24"E, 2♂♂, 4.v.2017, Ghora Gali, 2320 m a.s.l, 33°53'54.24"N, 73°22'14.1594"E, 2♂♂, 22.v.2017, Kuldana, 1928 m a.s.l, 33°55'26.3994"N, 73°23'56.4"E, 11♂♂, 9♀♀, 15.vii.2017, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 2♀♀, 3.iv.2018, Upper Dewal, 1829 m a.s.l, 34°0'43.5594"N, 73°28'47.2794"E, 2♀♀, 12.v.2018; District Chakwal, Sehgal Farm, 720 m a.s.l, 32°47'44.721"N, 72°43'46.9986"E, 1♀, 11.ii.2018, Kalarkahar Lake, 640 m a.s.l, 32°38'27.5994"N, 72°28'15.6"E, 1♀, 17.iv.2018, Talagang, 457 m a.s.l, 32°55'33.6"N, 72°24'28.8"E, 2♂♂, 1♀, 11.ii.2018, Chakwal City, 497 m a.s.l, 32°33'17.9994"N, 72°51'20.1594"E, 2♂♂, 1♀, 17.iv.2018; District Jhelum, Dina, 276 m a.s.l, 33°1'40.7994"N, 73°36'3.5994"E, 1♂, 1♀, 12.x.2018, Jhelum City, 235 m a.s.l, 32°56'0.6"N, 73°43'12.72"E, 2♂♂, 2♀♀, 12.iii.2017, Pind Dadan Khan, 205 m a.s.l, 32°34'58.7994"N, 73°2'35.88"E, 1♂, 12.x.2017, 1♂, 2♀♀, 22.iv.2018, Sohawa, 439 m a.s.l, 33°4'33.6"N, 73°15'3.6"E, 2♀♀, 3.v.2018, Lahri National Park, 560 m a.s.l, 33°6'11.8794"N, 73°31'51.9594"E, 1♀, 7.ix.2016, 2♂♂, 1♀, 12.iii.2017, 12♂♂, 1♀, 12.v.2018; District Attock, Attock City, 541 m a.s.l, 33°27'36"N, 72°13'11.9994"E, 2♀♀, 7.iii.2017, Hassan Abdal, 115 m a.s.l, 30°25'59.99"N, 72°42'0.00"E, 2♂♂, 3♀♀, 7.iii.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Balochistan, Sibi, Ziarat; Gilgit-Baltistan, Astore, Hunza, Skardu; Khyber Pakhtunkhwa, Hazara, Peshawar, Punjab, Faisalabad, Lahore, Multan (Sajjad & Saeed 2010; Arif et al. 2014; Shehzad et al. 2017; Hassan et al. 2017, 2018a; Khan et al. 2024).

Biogeographical distribution. Cosmopolitan (van Veen 2010; Ghorpadé 2014; Mengual et al. 2020; Dousti 2023; Dyola et al. 2024).

Remarks. *Eristalis tenax* is a cosmopolitan species within the genus *Eristalis* and is also widespread in Pakistan. During the present study, this species was frequently collected around contaminated water, as its larvae are saprophagous in nature. The adults were also observed on flowers, serving as pollinators for species such as *Brassica campestris*, *Calendula officinalis*, *Coriandrum sativum*, *Parthenium hysterophorus*, *Tulipa* sp., as well as grasses and various wildflowers.

Genus *Eristalinus* Rondani, 1845

Subgenus *Eristalodes* Mik, 1897

Eristalinus taeniops (Wiedemann, 1818) (Fig. 2K)

Material examined. Islamabad Capital Territory. Daman-e-Koh, 740 m a.s.l, 33°44'22.1994"N, 73°3'19.44"E, 2♀♀, 4.iii.2017, NARC, 455 m a.s.l, 33°40'12.3594"N, 73°7'33.9594"E, 2♀♀, 11.iii.2018; Punjab, District Chakwal, Kalarahr Lake, 640 m a.s.l, 32°38'27.5994"N, 72°28'15.6"E, 2♀♀, 12.iii.2018, Sehgal Farm, 720 m a.s.l, 32°47'44.721"N, 72°43'46.9986"E, 2♀♀, 12.iii.2018; District Attock, Wah Cantonment, 460 m a.s.l, 33°45'49.68"N, 72°46'8.7594"E, 2♀♀, 15.iii.2018, Hazro, 310 m a.s.l, 33°54'26.9994"N, 72°26'13.9992"E, 2♀♀, 12.iii.2018, Taxila, 534 m a.s.l, 33°26'42"N, 72°28'19.1994"E, 2♀♀, 10.iv.2018; District Jhelum, Jhelum City, 235 m a.s.l, 32°56'0.6"N, 73°43'12.72"E, 2♀♀, 1.iii.2018, Lahri National Park, 560 m a.s.l, 33°6'11.8794"N, 73°31'51.9594"E, 2♀♀, 1.iii.2018, Pind Dadan Khan, 205 m a.s.l, 32°34'58.7994"N, 73°2'35.88"E, 2♀♀, 1.ii.2018, 1♀, 12.iv.2018; District Rawalpindi, PMAS-Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 3♀♀, 19.iii.2018, 3♀♀, 2.iv.2018, 2♂♂, 10.iv.2018; Murree, Charra Pani, 1356 m a.s.l, 33°54'14.4"N, 73°23'24"E, 4♂♂, 4.v.2017, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 2♂♂, 4.v.2017, Ausia, 1712 m a.s.l, 33°35'38.4"N, 73°16'55.1994"E, 2♂♂, 4.v.2017, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Balochistan, Pishin, Quetta, Khyber Pakhtunkhwa, Chitral, Hazara, Upper Dir; Punjab, Chakwal, Faisalabad, Jhang, Khanewal, Khushab, Multan, Muzafargarh, Rawalpindi, Rahim Yar Khan (Sajjad & Saeed 2010; Khan et al. 2015; Shehzad et al. 2017; Hassan et al. 2017, 2018a).

Biogeographical distribution. **Afrotropical:** Africa; **Neotropical:** Argentina, Bolivia, Brazil, Chile, Peru, Colombia, Ecuador, Costa Rica, Mexico, Paraguay, Uruguay, South America; **Nearctic:** Florida; **Oriental:** India, Nepal, Pakistan; **Palearctic:** Georgia, Iran (Ghorpadé 2014, 2015; Mengual et al. 2020; Rossi Rotondi et al. 2020; Dousti 2023; Dyola et al. 2024).

Remarks. Although this species was collected from the same habitat as *Eristalis tenax*, it was also found abundantly on the flowers of *Calendula officinalis* near standing water.

Subgenus *Lathyrophthalmus* Mik, 1897

Eristalinus aeneus (Scopoli, 1763) (Fig. 2D)

Material examined. Islamabad Capital Territory. Daman-e-Koh, 740 m a.s.l, 33°44'22.1994"N, 73°3'19.44"E, 2♂♂, 2♀♀, 4.iii.2017, Margalla Hills (Trail-5), 1540 m a.s.l, 33°44'37.68"N, 73°1'19.2"E, 2♀♀, 14.x.2017; Punjab Province. District Rawalpindi, Nawaz Sharif Park, 230 m a.s.l, 33°38'54.24"N, 73°4'37.56"E, 1♀, 14.iv.2018; District Jhelum, Dina, 276 m a.s.l, 33°1'40.7994"N, 73°36'3.5994"E, 1♀, 12.ix.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Balochistan, Panjgur, Quetta, Ziarat; Khyber Pakhtunkhwa, Chitral, Peshawar; Punjab, Bahawalpur, Chakwal, Dera Ghazi Khan, Faisalabad, Jhelum, Khanewal, Lahore, Multan, Muzafargarh, Rahim Yar Khan, Rawalpindi; Sindh, Karachi, Khairpur (Saleem et al. 2001; Saeed et al. 2012; Ghorpadé & Shehzad 2013; Khan et al. 2015; Shehzad et al. 2017; Hassan et al. 2017, 2018a; Kanher et al. 2022).

Biogeographical distribution. Cosmopolitan (van Veen 2010; Ghorpadé 2014, 2015; Mengual et al. 2020; Dousti 2023; Dyola et al. 2024).

Remarks. This species was collected from a standing water area in the forest at Margalla Hills (Trail-5), Islamabad.

Eristalinus arvorum (Fabricius, 1787) (Fig. 2E)

Material examined. Islamabad Capital Territory. Lack View Park, 550 m a.s.l, 33°42'41.9"N, 73°08'03.77"E, 550 m a.s.l, 33°42'41.9"N, 73°08'03.77"E, 5♂♂, 8♀♀, 7.ix.2016, Shahdara Valley, 730 m a.s.l, 33°43'45.8394"N, 73°5'35.16"E, 3♂♂, 2♀♀, 7.xi.2016, Shakarparian National Park, 550 m a.s.l, 33°41'6.3594"N, 73°6'22.32"E, 1♂, 1♀, 15.x.2016, Margalla Hills (Trail-5), 1540 m a.s.l, 33°44'37.68"N, 73°1'19.2"E, 3♂♂, 2♀♀, 14.x.2017; Punjab Province. District Rawalpindi, Ayub National Park, 505 m a.s.l, 33°47'23.9994"N, 73°4'47.9994"E, 6♀♀, 10.x.2016, Kahuta, 1829 m a.s.l, 33°12'36"N, 73°8'2.4"E, 3♂♂, 2♀♀, 22.ix.2017, Dhok Kala Khan, 460 m a.s.l, 33°41'23.9994"N, 73°5'24"E, 3♂♂, 2♀♀, 22.vi.2017, PMAS-Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♂, 2♀♀, 22.x.2016, 3♂♂, 7♀♀, 29.x.2016, 2♂♂, 2.iv.2018; District Attock, Attock City, 541 m a.s.l, 33°27'36"N, 72°13'11.9994"E, 1♂, 12.ix.2017, 1♂, 15.v.2018; District Chakwal, Koont Farm, 162 m a.s.l, 32°55'58.2954"N, 72°51'14.1834"E, 3♂♂, 2♀♀, 28.ix.2017, Kalarkahar Lake, 640 m a.s.l, 32°38'27.5994"N, 72°28'15.6"E, 3♂♂, 2.iv.2018, Talagang, 457 m a.s.l, 32°55'33.6"N, 72°24'28.8"E, 1♂, 3♀♀, 2.iv.2018, Choa Saidan Shah, 677 m a.s.l, 32°45'0"N, 72°55'48"E, 1♂, 1♀, 2.iv.2018; District Jhelum, Dina, 276 m a.s.l, 33°1'40.7994"N, 73°36'3.5994"E, 5♂♂, 6♀♀, 2.iv.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Islamabad Capital Territory, Chak Shehzad; Khyber Pakhtunkhwa, Haripur; Punjab, Khanewal, Khushab, Lahore, Multan, Muzafargarh; Sind: Dadu, Karachi (Aslamkhan et al. 1997; Ali et al. 2013; Ghorpadé & Shehzad 2013; Ghorpadé 2014; Hassan et al. 2017, 2018a; Shehzad et al. 2017).

Biogeographical distribution. **Afrotropical:** Africa; **Australasian:** Australia (Queensland), USA (Hawaiian Is.); **Oriental:** China (Hong Kong), India, Nepal, Laos, Pakistan; **Palaeartic:** China, Japan (Ghorpadé 2015; Ka-Lun 2022; Dyola et al. 2024).

Remarks. This species was collected from areas with standing water in forest, *Parthenium hysterophorus*, and grasses. It was observed in greater abundance than other hoverflies during the flowering of *Eriobotrya japonica*.

Eristalinus megacephalus (Rossi, 1794) (Fig. 2F)

Material examined. Islamabad Capital Territory. Lack View Park, 550 m a.s.l, 33°42'41.9"N, 73°08'03.77"E, 4♂♂, 4♀♀, 7.ix.2016, Shahdara Valley, 730 m a.s.l, 33°43'45.8394"N, 73°5'35.16"E, 1♂, 3♀♀, 7.xi.2016; Punjab Province. District Rawalpindi, Ayub National Park, 505 m a.s.l, 33°47'23.9994"N, 73°4'47.9994"E, 3♂♂, 10.x.2016, Dhok Kala Khan, 460 m a.s.l, 33°41'23.9994"N, 73°5'24"E, 3♂♂, 2♀♀, 22.vi.2017, 2♂♂, 2♀♀, 25.vi.2017, 1♂♂, 2♀♀, 30.vi.2017, 11♂♂, 12♀♀, 1.vii.2017, Kahuta, 1829 m a.s.l, 33°12'36"N, 73°8'2.4"E, 3♂♂, 2♀♀, 22.ix.2017, PMAS-Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♂, 2♀♀, 22.x.2016; Murree, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 1♂, 3♀♀, 22.iv.2018; District Chakwal, Koont Farm, 162 m a.s.l, 32°55'58.2954"N, 72°51'14.1834"E, 3♂♂, 2♀♀, 28.ix.2017; District Jhelum, Dina, 276 m a.s.l, 33°1'40.7994"N, 73°36'3.5994"E, 2♂♂, 3♀♀, 12.v.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Balochistan, Quetta, Ziarat; Islamabad Capital Territory, Chak Shehzad; Khyber Pakhtunkhwa, Peshawar; Punjab, Dera Ghazi Khan, Khushab; Sindh, Khairpur (Ghorpadé & Shehzad 2013; Irshad 2014; Hassan et al. 2018a; Shehzad et al. 2017; Kanher et al. 2022).

Biogeographical distribution. **Afrotropical:** Egypt, South Africa; **Oriental:** China (Hong Kong, Taiwan), Nepal, Pakistan, Sri Lanka, Indonesia (Java), India; **Palaeartic:** Corsica, Cyprus, Greece, Iran, Iraq, Italy, Malta, Türkiye, Spain (Ghorpadé 2014, 2015; Mengual et al. 2020; Dousti 2023; Dyola et al. 2024; Ka-Lun, 2024).

Remarks. This species was collected from areas with standing water, *Parthenium hysterophorus*, and grasses.

Eristalinus obliquus (Wiedemann, 1824) (Fig. 2G)

Material examined. Islamabad Capital Territory. Shakarparian National Park, 550 m a.s.l, 33°41'6.3594"N, 73°6'22.32"E, 2♂♂, 1♀, 7.ix.2016, 1♀, 10.ix.2016, 1♂, 2♀♀, 12.x.2017; Punjab Province. District Rawalpindi,

Ayub National Park, 505 m a.s.l, 33°47'23.9994"N, 73°4'47.9994"E, 2♂♂, 28.x.2016, Dhok Kala Khan, 460 m a.s.l, 33°41'23.9994"N, 73°5'24"E, 2♂♂, 2♀♀, 12.ix.2017, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♂, 2♀♀, 11.x.2017, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch (Hassan et al. 2017, 2018a).

Biogeographical distribution. **Oriental:** India, Nepal, Pakistan, Sri Lanka (Ghorpadé 2014, 2015; Dyola et al. 2024).

Remarks. This species was collected from areas with standing water and *Parthenium hysterophorus*.

Eristalinus sepulchralis (Linnaeus, 1758) (Fig. 2H)

Material examined. Punjab Province. District Rawalpindi, PMAS-Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 4♂♂, 3♀♀, 29.iii.2018, 3♀♀, 2.iv.2018; Murree, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 2♂♂, 2♀♀, 22.iv.2018; District Chakwal, Koont Farm, 162 m a.s.l, 32°55'58.2954"N, 72°51'14.1834"E, 3♂♂, 2♀♀, 28.ix.2017; District Attock, Hassan Abdal, 115 m a.s.l, 30°25'59.99"N, 72°42'0.00"E, 1♂, 22.iii.2018; District Jhelum, Dina, 276 m a.s.l, 33°1'40.7994"N, 73°36'3.5994"E, 2♂♂, 22.ix.2017, 2♂♂, 1♀, 12.iv.2018, Pind Dadan Khan, 205 m a.s.l, 32°34'58.7994"N, 73°2'35.88"E, 2♂♂, 12.v.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Balochistan, Panjgur, Quetta; Islamabad Capital Territory, Chak Shehzad; Khyber Pakhtunkhwa, Peshawar: Punjab, Chakwal, Jhelum (Saleem et al. 2001; Arif et al. 2014; Khan et al. 2015; Shehzad et al. 2017; Hassan et al. 2018a).

Biogeographical distribution. **Afrotropical:** North Africa; **Oriental:** China, India, Nepal, Pakistan; **Palearctic:** Georgia, Iran, Estonia (van Veen 2010; Ghorpadé 2014; Mengual et al. 2020; Dousti 2023; Dyola et al. 2024; Ka-Lun, 2024).

Remarks. This species was collected from areas with standing water, *Parthenium hysterophorus*, and *Brassica campestris*.

Eristalinus tarsalis (Macquart, 1855) (Fig. 2I)

Material examined. Islamabad Capital Territory. Daman-e-Koh, 740 m a.s.l, 33°44'22.1994"N, 73°3'19.44"E, 2♂♂, 2♀♀, 4.iii.2017; Punjab Province. District Rawalpindi, Dhok Kala Khan, 460 m a.s.l, 33°41'23.9994"N, 73°5'24"E, 3♂♂, 2♀♀, 1.vii.2017, PMAS-Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 2♂♂, 28.x.2016, 1♂, 2.vi.2017, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch (Hassan et al. 2018a).

Biogeographical distribution. **Oriental:** China (Taiwan), India, Nepal, Pakistan; **Palearctic.** Japan (Ghorpadé 2014, 2015; Ka-Lun 2022; Dyola et al. 2024).

Remarks. This species was collected from standing water areas and *Parthenium hysterophorus*.

Eristalinus tristriatus (Meijere, 1911) (Fig. 2J)

Material examined. Punjab Province. District Rawalpindi, Dhok Kala Khan, 460 m a.s.l, 33°41'23.9994"N, 73°5'24"E, 3♂♂, 2♀♀, 22.vi.2017, 2♂♂, 2♀♀, 27.vi.2017, 1♂, 3♀♀, 30.vi.2017, 1♂, 1♀, 1.vii.2017, leg. M.A. Hassan.

Diagnosis. This species can be distinguished by the following characteristics: face with central black shining strips, bare, lateral sides grayish with short yellowish hairs; mid tibia entirely yellow; abdominal terga broadly yellow with sides black; tergum 1 with an oblong yellowish line on the anterior side, a quadrate yellowish spot on each lateral side; tergum 2 yellowish, with a narrow central black stripe; terga 3 and 4 yellow, sides black; tergum 5 with basal half D-shape grayish, remaining area black.

Distribution. **Pakistan:** New country record.

Biogeographical distribution. **Oriental:** India, China (Hong Kong), Indonesia (Java), Philippines (Negros Is.) (Ghorpadé 2014; Ka-Lun, 2024); **Palearctic:** Pakistan (current study).

Remarks. This species was collected from standing water areas and *Parthenium hysterophorus*.

Genus *Mesembrius* Rondani, 1857

Subgenus *Mesembrius* Rondani, 1857

Mesembrius bengalensis (Wiedemann, 1819) (Fig. 2L)

Material examined. Islamabad Capital Territory. Shakarparian National Park, 550 m a.s.l, 33°41'6.3594"N, 73°6'22.32"E, 1♂, 15.x.2016, leg. M.A. Hassan.

Distribution. **Pakistan:** Punjab, Dera Ghazi Khan, Khanewal, Multan, Muzafargarh; Sindh, Khairpur (Sajjad & Saeed 2010; Shehzad et al. 2017; Kanher et al. 2022).

Biogeographical distribution. **Oriental:** India, Nepal, Pakistan (Ghorpadé 2015; Dyola et al. 2024).

Remarks. This species was collected from the *Cucumis sativus*.

Tribe Merodontini (Edwards, 1915)

Genus *Eumerus* Meigen, 1822

Eumerus aurifrons (Wiedemann, 1824) (Fig. 2M)

Distribution. Islamabad Capital Territory, Kachnar Park, Margalla Hills (Trail-5); Khyber Pakhtunkhwa, Peshawar; Punjab, Rawalpindi (Shehzad et al. 2017).

Biogeographical distribution. Cosmopolitan (Ghorpadé 2015; Hassan et al. 2022).

Remarks. This species was found hovering near the stems of *Bauhinia variegata* (Kachnar) and *Acacia nilotica* (Kikar).

Eumerus vestitus Bezzi, 1912 (Fig. 2N)

Distribution. **Pakistan:** Punjab, Khanewal, Rawalpindi (Shehzad et al. 2017; Hassan et al. 2022).

Biogeographical distribution. **Afrotropical:** Egypt, Saudi Arabia, UAE, West Africa, Yemen; **Oriental:** Pakistan, India; **Palearctic:** Greece, Syria (Ghorpadé 2015; Anooj et al. 2020; Hassan et al. 2022).

Remarks. This species was collected from a chili field (Hassan et al. 2022).

Tribe Milesiini Rondani, 1845

Genus *Syritta* Lepeletier & Serville, 1828

Syritta pipiens (Linnaeus, 1758) (Fig. 2O)

Material examined. Islamabad Capital Territory. Shahdara Valley, 730 m a.s.l, 33°43'45.8394"N, 73°5'35.16"E, 2♂♂, 3♀♀, 7.xi.2016, Lack View Park, 550 m a.s.l, 33°42'41.9"N, 73°08'03.77"E, 550 m a.s.l, 33°42'41.9"N, 73°08'03.77"E, 1♂, 4♀♀, 7.ix.2016; Punjab Province. District Rawalpindi, Dhok Kala Khan, 460 m a.s.l, 33°41'23.9994"N, 73°5'24"E, 1♂, 1.vii.2017, Nawaz Sharif Park, 3♀♀, 230 m a.s.l, 33°38'54.24"N, 73°4'37.56"E, 22.x.2016, PMAS-Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 3♀♀, 22.x.2016, 1♀, 29.x.2016, 1♀, 2.iv.2018, 1♀, 8.iv.2018, 2♂♂, 3♀♀, 10.iv.2018; Murree, Kuldana, 1928 m a.s.l, 33°55'26.3994"N, 73°23'56.4"E, 5♂♂, 7♀♀, 15.vii.2017, 1♂, 2♀♀, 3.iv.2018; District Jhelum, Dina, 276 m a.s.l, 33°1'40.7994"N, 73°36'3.5994"E, 1♂, 4♀♀, 12.iv.2018, Jhelum City, 235 m a.s.l, 32°56'0.6"N, 73°43'12.72"E, 1♂, 2♀♀, 12.iv.2018, Pind Dadan Khan, 205 m a.s.l, 32°34'58.7994"N, 73°2'35.88"E, 4♂♂, 3♀♀, 22.v.2018, Sohawa, 439 m a.s.l, 33°4'33.6"N, 73°15'3.6"E, 1♂, 1♀, 22.v.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Khyber Pakhtunkhwa, Abbottabad, Banu, Batagram, Chitral, Hangu, Mansehra; Punjab, Khanewal, Khushab, Multan, Murree, Muzafargarh; Sindh, Khairpur (Sajjad & Saeed 2010; Ghorpadé & Shehzad 2013; Hassan et al. 2017, 2018a; Shehzad et al. 2017; Kanher et al. 2022).

Biogeographical distribution. Cosmopolitan (Ghorpadé 2014, 2015; Dousti 2023; Dyola et al. 2024).

Remarks. This species was collected from *Parthenium hysterophorus* and *Tulip* sp., showing a preference for grasses in low vegetation areas. Most adult specimens were observed hovering over the cow dung.

Tribe Rhingiini Meigen, 1822

Genus *Rhingia* Scopoli, 1763

Subgenus *Rhingia* Scopoli, 1763

Rhingia laticincta Brunetti, 1907 (Fig. 2P)

Material examined. Punjab Province. District Rawalpindi, Murree, Charra Pani, 1356 m a.s.l, 33°54'14.4"N, 73°23'24"E, 2♀, 4.v.2017, 1♀, 22.iv.2018, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 1♀, 22.iv.2018, leg. M.A. Hassan.

Diagnosis. This species can be easily identified by the distinctive abdominal markings, terga 2 to 4 reddish yellow with broad black posterior margins that are excavated medially, with a more or less complete median black stripe.

Distribution. Pakistan: New country record.

Biogeographical distribution. Oriental: India, Nepal (Claussen & Weipert 2003; Ghorpadé 2015; Dyola et al. 2024); **Palearctic.** Pakistan (current study).

Remarks. This species was collected while hovering over grasses in a dense forest of *Pinus wallichiana* at Murree. Hassan et al. (2018a) remarked that species belonging to this genus typically prefer to hover in pastures within dense forests containing *Pinus wallichiana* trees.

Rhingia siwalikensis Nayar, 1968 (Fig. 2Q)

Material examined. Punjab Province. District Rawalpindi, Murree, Charra Pani, 1356 m a.s.l, 33°54'14.4"N, 73°23'24"E, 2♀, 4.v.2017, 1♀, 23.iv.2017, Ausia, 1712 m a.s.l, 33°35'38.4"N, 73°16'55.1994"E, 1♀, 11.xi.2016, 1♀, 21.x.2017, 1♀, 22.iv.2018, leg. M.A. Hassan.

Distribution. Pakistan: Azad Kashmir, Poonch (Hassan et al. 2018a).

Biogeographical distribution. Oriental: India, Nepal; **Palearctic.** Pakistan (Claussen & Weipert 2003; Ghorpadé 2014, 2015; Hassan et al. 2018a; Dyola et al. 2024).

Remarks. Hassan et al. (2018a) remarked that this species usually preferred to hover in pasture within dense forests dominated by *Pinus wallichiana* and was collected using yellow pan traps. We observed this species in the same habitat at Murree during various months of the year.

Tribe Volucellini (Newman, 1834)

Genus *Graptomyza* Wiedemann, 1830

Graptomyza brevirostris Wiedemann, 1820 (Fig. 2R)

Material examined. Islamabad Capital Territory. Shahdara Valley, 730 m a.s.l, 33°43'45.8394"N, 73°5'35.16"E, 2♀, 7.xi.2016, leg. M.A. Hassan.

Distribution. Pakistan: Islamabad Capital Territory, Shahdara Valley (Hassan et al. 2020a).

Biogeographical distribution. Oriental: India, Indonesia, Nepal, Pakistan, Sri Lanka (Ghorpadé 2015; Hassan et al. 2020a; Dyola et al. 2024).

Remarks. This species was collected from *Parthenium hysterophorus*.

Genus *Volucella* Geoffroy, 1762

Volucella peleterii (Macquart, 1834) (Fig. 2S)

Material examined. Punjab Province. District Rawalpindi, PMAS-Arid Agriculture University, 511 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♂, 16.vii.2016, leg. M.A. Hassan.

Distribution. Pakistan: Azad Kashmir, Muzaffarabad; Gilgit-Baltistan, Gilgit; Punjab, Rawalpindi: Arid Agriculture University; Murree, Kuldana (Shehzad et al. 2017; Hassan et al. 2020b).

Biogeographical distribution. Oriental: India, Indonesia, Pakistan; **Palearctic.** Pakistan (Ghorpadé 2015; Hassan et al. 2020b).

Remarks. This species was collected from the flowers of *Cucumis sativus*.

Subfamily Syrphinae Latreille, 1802

Tribe Bacchini Williston, 1885

Genus *Baccha* Fabricius, 1805

Baccha maculata Walker, 1852 (Fig. 2T)

Material examined. Punjab Province. District Rawalpindi, Murree, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 3♂♂, 6♀♀, 4.v.2017, leg. M.A. Hassan; Kuldana, 1928 m a.s.l, 33°55'26.3994"N, 73°23'56.4"E, 1♂, 3♀♀, 12.v.2017, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Punjab, Rawalpindi, Murree (Hassan et al. 2018a, 2019b).

Biogeographical distribution. **Oriental:** India, Indonesia, Nepal, Pakistan; **Palaeartic.** China, Pakistan (Ghorpadé 2015; Hassan et al. 2018a; Dyola et al. 2024).

Remarks. This species usually prefers dense vegetation under the shade of pine trees (*Pinus wallichiana*) (Hassan et al. 2018a). We collected it from the *Barleria cristata* infested with *Aphis gossypii* in Murree, Punjab, Pakistan.

Genus *Melanostoma* Schiner, 1860

Melanostoma orientale (Wiedemann, 1824) (Fig. 2U)

Material examined. Islamabad Capital Territory. Daman-e-Koh, 1♂, 740 m a.s.l, 33°44'22.1994"N, 73°3'19.44"E, 4.iii.2017, Shahdara Valley, 730 m a.s.l, 33°43'45.8394"N, 73°5'35.16"E, 1♀, 7.xi.2016, 4♀♀, 12.x.2017; Punjab Province. District Chakwal, Sehgal Farm, 720 m a.s.l, 32°47'44.721"N, 72°43'46.9986"E, 2♂♂, 3♀♀, 17.iv.2018, Lawa, 421 m a.s.l, 32°42'14.4"N, 71°56'13.1994"E, 2♂♂, 12♀♀, 17.v.2018, Kalarkahar Lake, 640 m a.s.l, 32°38'27.5994"N, 72°28'15.6"E, 2♂♂, 3♀♀, 17.iv.2018, Koont Farm, 162 m a.s.l, 32°55'58.2954"N, 72°51'14.1834"E, 2♂♂, 3♀♀, 17.iv.2018; District Attock, Hassan Abdal, 115 m a.s.l, 30°25'59.99"N, 72°42'0.00"E, 2♂♂, 1♀, 11.iv.2018; District Jhelum, Dina, 276 m a.s.l, 33°1'40.7994"N, 73°36'3.5994"E, 2♂♂, 11♀♀, 22.iv.2018, Jhelum City, 235 m a.s.l, 32°56'0.6"N, 73°43'12.72"E, 12♂♂, 8♀♀, 22.iv.2018, Pind Dadan Khan, 205 m a.s.l, 32°34'58.7994"N, 73°2'35.88"E, 11♂♂, 2♀♀, 25.iv.2018, Sohawa, 439 m a.s.l, 33°4'33.6"N, 73°15'3.6"E, 3♂♂, 4♀♀, 25.iv.2018; District Rawalpindi, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♂, 22.x.2016, 12♂♂, 27.iii.2017, 22♂♂, 2♀♀, 10.iv.2018, Murree, Kuldana, 1928 m a.s.l, 33°55'26.3994"N, 73°23'56.4"E, 22♂♂, 11♀♀, 3.iv.2018, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 22♂♂, 11♀♀, 3.iv.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Khyber Pakhtunkhwa, Dir Upper, Peshawar; Punjab, Khanewal, Lahore, Multan, Muzafargarh, Rawalpindi (Shehzad et al. 2017).

Biogeographical distribution. **Oriental:** Bhutan, China, India, Nepal, Pakistan, Sri Lanka (Ghorpadé 2015; Dyola et al. 2024); **Palaeartic.** Pakistan (current study).

Remarks. This species usually preferred low vegetation and grasses in plains, but also found in dense vegetation under the shade of pine trees at higher elevations. It is typically found at high and northern latitude in Pakistan.

Tribe Paragini Goffe, 1952

Genus *Paragus* Latreille, 1804

Subgenus *Pandasyopthalmus* Stuckenberg, 1954

Paragus annandalei Ghorpadé, 1992 (Fig. 2V)

Material examined. Punjab Province. District Rawalpindi, Murree, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 3♂♂, 4♀♀, 24.ix.2017, 1♂, 1♀, 3.iv.2018, Ausia, 1712 m a.s.l, 33°35'38.4"N, 73°16'55.1994"E, 1♂, 3.iv.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch (Hassan et al. 2018a, 2018b).

Biogeographical distribution. **Oriental:** India; **Palaeartic:** Pakistan (Thompson & Ghorpadé 1992).

Remarks. This species was collected from dense vegetation under the shade of pine trees (*Pinus wallichiana*) and from *Barleria cristata* infested with *Aphis gossypii* in Murree (Hassan et al. 2018b).

Paragus haemorrhous Meigen, 1822 (Fig. 2W)

Material examined. Islamabad Capital Territory. Shakarparian National Park, 550 m a.s.l, 33°41'6.3594"N, 73°6'22.32"E, 2♂♂, 15.x.2016; Punjab Province. District Jhelum, Dina, 276 m a.s.l, 33°1'40.7994"N, 73°36'3.5994"E, 1♂, 22.v.2018; District Rawalpindi, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♂, 22.iv.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Balochistan, Quetta; Islamabad Capital Territory, Shakarparia (Turk et al. 2014; Hassan et al. 2018b).

Biogeographical distribution. **Afrotropical:** Africa; **Nearctic:** California; **Neotropical:** Colombia; **Oriental:** India, Pakistan; **Palaeartic:** Austria, Afghanistan, China, England, Georgia, Iran, Japan, Korea, Russia, Sweden (Sorokina & Cheng 2007; Sorokina 2009; Khaghaninia & Hosseini 2013; Mengual et al. 2020; Ghorpadé 2015).

Remarks. This species is very common in Pakistan and is commonly found in regions with low vegetation, grasses, and wildflowers. Hassan et al. (2018b) reported this species from dense vegetation, grass, and *Solanum nigrum*.

Paragus politus (Wiedemann, 1830) (Fig. 2X)

Material examined. Islamabad Capital Territory. Quaid-e-Azam University, 582 m a.s.l, 33°43'0.12"N, 73°2'10.1754"E, 1♂, 23.x.2016, Shakarparian National Park, 550 m a.s.l, 33°41'6.3594"N, 73°6'22.32"E, 2♂♂, 15.x.2016; Punjab Province. District Rawalpindi, Kahuta, 1829 m a.s.l, 33°12'36"N, 73°8'2.4"E, 3♂♂, 2♀♀, 22.ix.2017, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♂, 22.x.2016, 1♂, 28.x.2016, 1♂, 2.iv.2018, 4♂♂, 2♀♀, 10.iv.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Balochistan, Quetta; Khyber Pakhtunkhwa, Kohat, Mansehra, Swat; Punjab, Rawalpindi, Murree (Ghorpadé & Shehzad 2013; Hassan et al. 2018b).

Biogeographical distribution. **Oriental:** India, Indonesia, Nepal, Pakistan, Sri Lanka; **Palaeartic.** China (Ghorpadé 2015; Dyola et al. 2024).

Remarks. Hassan et al. (2018b) reported this species from dense vegetation, grasses, and *Solanum nigrum*.

Subgenus *Serratoparagus* Vujić & Radenković, 2008

Paragus serratus (Fabricius, 1805) (Fig. 3A)

Material examined. Islamabad Capital Territory. Shakarparian National Park, 550 m a.s.l, 33°41'6.3594"N, 73°6'22.32"E, 2♂♂, 15.x.2016; Punjab Province. District Chakwal, Choa Saidan Shah, 677 m a.s.l, 32°45'0"N, 72°55'48"E, 3♀♀, 22.x.2017, Kalarkahar Lake, 640 m a.s.l, 32°38'27.5994"N, 72°28'15.6"E, 1♂, 28.ix.2017, Sehgal Farm, 720 m a.s.l, 32°47'44.721"N, 72°43'46.9986"E, 2♂♂, 15.iii.2018, 1♂, 17.iv.2018; District Attock, Attock City, 541 m a.s.l, 33°27'36"N, 72°13'11.9994"E, 3♂♂, 22.ix.2017, 4♂♂, 2♀♀, 23.iii.2018, Hassan Abdal, 115 m a.s.l, 30°25'59.99"N, 72°42'0.00"E, 1♂, 2♀♀, 6.v.2018, Hazro, 310 m a.s.l, 33°54'26.9994"N, 72°26'13.9992"E, 2♀♀, 12.ix.2017, 3♂♂, 1♀, 12.v.2018, Pindigheb, 315 m a.s.l, 33.2451°N, 72.2659°E, 2♂♂, 3♀♀, 12.v.2018; District Jhelum, Dina, 276 m a.s.l, 33°1'40.7994"N, 73°36'3.5994"E, 2♂♂, 3♀♀, 12.v.2018, Jhelum City, 235 m a.s.l, 32°56'0.6"N, 73°43'12.72"E, 2♂♂, 12.v.2017, 1♂, 2♀♀, 16.iv.2018, Pind Dadan Khan, 205 m a.s.l, 32°34'58.7994"N, 73°2'35.88"E, 2♂♂, 2♀♀, 22.v.2018, Sohawa, 439 m a.s.l, 33°4'33.6"N, 73°15'3.6"E, 2♂♂, 2♀♀, 22.v.2018, Lahri National Park, 560 m a.s.l, 33°6'11.8794"N, 73°31'51.9594"E, 3♂♂, 4♀♀, 22.v.2018; District Rawalpindi, Ayub National Park, 505 m a.s.l, 33°47'23.9994"N, 73°4'47.9994"E, 1♀, 10.x.2016, Kahuta, 1829 m a.s.l, 33°12'36"N, 73°8'2.4"E, 3♂♂, 2♀♀, 22.ix.2017, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♂, 1♀, 6.iv.2018, 2♂♂, 10.iv.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Khyber Pakhtunkhwa, Kurram, Malakand, Swat, Upper Dir; Punjab, Khanewal, Lahore, Multan, Muzafargarh; Sindh, Karachi (Ghorpadé & Shehzad 2013; Shehzad et al. 2017; Hassan et al. 2017, 2018b).

Biogeographical distribution. **Oriental:** India, Pakistan; **Palaeartic:** Afghanistan, China, Iran (Thompson & Ghorpadé 1992; Ghorpadé 2015; Dousti 2023).

Remarks. Hassan et al. (2018b) reported this species from the flowers of *Brassica campestris*. In the current study, we collected a large number of specimens from dense vegetation, grasses, and *Solanum nigrum*.

Tribe Syrphini Latreille, 1802

Genus *Allobaccha* Curran, 1928

Subgenus *Allobaccha* Curran, 1928

Allobaccha apicalis (Loew, 1858) (Fig. 3B)

Material examined. Punjab Province. District Rawalpindi, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♂, 1♀, 22.x.2017, leg. M.A. Hassan.

Diagnosis. Face black with at least lateral margins partially yellow; scutellum black; humerus haired; wings with a dark apical spot wider than the marginal cell; female with triangular pollinose spots on the frons, male with pale hairs on frons longer than black hairs on lunular callus; abdomen elongated.

Distribution. Pakistan: New country record.

Biogeographical distribution. Oriental: India, Sri Lanka, Indonesia (Java), Myanmar, Philippines; **Palearctic:** China, Japan (Ghorpadé 2015; Dyola et al. 2024; Roy et al. 2024, 2025), Pakistan (current study).

Remarks. This species was collected from red silk cotton (*Bombax ceiba*) trees infested with a psyllid species. Bhatia & Shaffi (1933) described and illustrated this species as *Baccha pulchrifrons* on the psyllid species on the red silk cotton tree (*Bombax malabaricum* = *Bombax ceiba*) at Pusa in Bihar, India.

Genus *Asarkina* Macquart, 1834

Subgenus *Asarkina* Macquart, 1834

Asarkina bhima Ghorpadé, 1994 (Fig. 3D)

Material examined. Punjab Province. District Rawalpindi, Murree, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 1♀, 12.x.2017, leg. M.A. Hassan.

Diagnosis. This species is generally larger in body size, with a prominent facial tubercle covered with black hairs; face, scutellum, and fore and hind femora with black hairs; face weakly produced, central tubercle distinct.

Distribution. Pakistan: New country record.

Biogeographical distribution. Oriental: Bhutan, India, Nepal (Ghorpadé 2015; Dyola et al. 2024); **Palearctic:** Pakistan (current study).

Remarks. This species was collected from dense vegetation under the shade of pine trees (*Pinus wallichiana*) in Murree.

Asarkina porcina (Coquillett, 1898) (Fig. 3C)

Distribution. Pakistan: Azad Kashmir, Poonch; Punjab, Rawalpindi, Murree, Numb Behra Mall (Fazal et al. 2026 – in press).

Biogeographical distribution. Oriental: India, Nepal, Sri Lanka; **Palearctic:** China, Japan (Ghorpadé 2015; Dyola et al. 2024), Pakistan (current study).

Remarks. This species was collected from dense vegetation under the shade of pine trees (*Pinus wallichiana*) in Murree. It has a wide distribution at high elevations in the Himalayas, extending eastward through China to Japan (Ghorpadé 2015; Dyola et al. 2024).

Genus *Betasyrphus* Matsumura, 1917

Betasyrphus aeneifrons (Brunetti, 1913) (Fig. 3E)

Material examined. Islamabad Capital Territory. Quaid-e-Azam University, 582 m a.s.l, 33°43'0.12"N, 73°2'10.1754"E, 1♂, 22.x.2016, Margalla Hills (Trail-5), 1540 m a.s.l, 33°44'37.68"N, 73°1'19.2"E, 2♂♂, 26.x.2017; Punjab Province. District Rawalpindi, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♂, 4.iv.2018, Kotli Sattian, 2145 m a.s.l, 33°49'12"N, 73°31'48"E, 2♂♂, 13.v.2018; Murree, Ausia, 1712 m a.s.l, 33°35'38.4"N, 73°16'55.1994"E, 1♀, 11.xi.2016, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Punjab, Rawalpindi, Murree (Hassan et al. 2018a).

Biogeographical distribution. **Oriental:** India, Nepal, Pakistan; **Palaeartic:** Pakistan (Ghorpadé 2015; Hassan et al. 2018a; Dyola et al. 2024).

Remarks. This species was collected from dense vegetation under the shade of pine trees (*Pinus wallichiana*) in Murree, and from *Parthenium hysterophorus* and *Calendula officinalis* in Islamabad, Punjab.

***Betasyrphus isaaci* (Bhatia, 1933) (Fig. 3F)**

Material examined. Islamabad Capital Territory. Daman-e-Koh, 740 m a.s.l, 33°44'22.1994"N, 73°3'19.44"E, 1♂, 1♀, 4.iii.2017, Margalla Hills (Trail-5), 1540 m a.s.l, 33°44'37.68"N, 73°1'19.2"E, 2♂♂, 3♀♀, 14.iv.2018; Punjab Province. District Rawalpindi, Murree, Charra Pani, 1356 m a.s.l, 33°54'14.4"N, 73°23'24"E, 1♀, 4.v.2017, 1♀, 6.v.2017, 1♀, 12.vi.2017, Ausia, 1712 m a.s.l, 33°35'38.4"N, 73°16'55.1994"E, 2♂♂, 11.xi.2016, 3♂♂, 4.vii.2017, 1♂, 12.iv.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Gilgit-Baltistan, Kharmang; Islamabad Capital Territory, Chak Shehzad, Daman-e-Koh; Khyber Pakhtunkhwa, Haripur; Punjab, Rawalpindi (Murree), Narowal (Shehzad et al. 2017; Hassan et al. 2017, 2018a; Hassan & Hussain 2024).

Biogeographical distribution. **Oriental:** India, Nepal, Pakistan; **Palaeartic:** Pakistan (Ghorpadé 2015; Dyola et al. 2024; Hassan & Hussain 2024).

Remarks. This species was collected from dense vegetation under the shade of pine trees (*Pinus wallichiana*) in Murree, and from *Parthenium hysterophorus* and *Calendula officinalis* in Islamabad, Punjab.

Genus *Chrysotoxum* Meigen, 1803

***Chrysotoxum baphyrum* Walker, 1849 (Fig. 3G)**

Material examined. Islamabad Capital Territory. Daman-e-Koh, 740 m a.s.l, 33°44'22.1994"N, 73°3'19.44"E, 1♀, 4.iii.2017, Quaid-e-Azam University, 582 m a.s.l, 33°43'0.12"N, 73°2'10.1754"E, 1♀, 22.x.2016, Margalla Hills (Trail-5), 1540 m a.s.l, 33°44'37.68"N, 73°1'19.2"E, 1♀, 14.x.2017; Punjab Province. District Rawalpindi, Ayub National Park, 505 m a.s.l, 33°47'23.9994"N, 73°4'47.9994"E, 1♂, 1♀, 2.vii.2017, Kahuta, 1829 m a.s.l, 33°12'36"N, 73°8'2.4"E, 3♂♂, 3♀♀, 22.iv.2018, Kotli Sattian, 2145 m a.s.l, 33.82°N, 73. 53°E, 3♂♂, 4♀♀, 22.iv.2018; Murree, Ausia, 1712 m a.s.l, 33°35'38.4"N, 73°16'55.1994"E, 1♂, 3♀♀, 22.iv.2018, Kuldana, 1928 m a.s.l, 33°55'26.3994"N, 73°23'56.4"E, 2♂♂, 2♀♀, 3.iv.2018, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 2♂♂, 2♀♀, 3.iv.2018; District Jhelum, Dina, 276 m a.s.l, 33°1'40.7994"N, 73°36'3.5994"E, 1♂, 1♀, 22.iv.2018, Jhelum City, 235 m a.s.l, 32°56'0.6"N, 73°43'12.72"E, 2♂♂, 3♀♀, 22.iv.2018, Pind Dadan Khan, 205 m a.s.l, 32°34'58.7994"N, 73°2'35.88"E, 2♀♀, 23.iv.2018, Sohawa, 439 m a.s.l, 33°4'33.6"N, 73°15'3.6"E, 3♂♂, 2♀♀, 23.iv.2018, Lahri National Park, 560 m a.s.l, 33°6'11.8794"N, 73°31'51.9594"E, 4♀♀, 23.iv.2018, 2♀♀, 12.v.2018, 2♀♀, 22.v.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch, Muzafarabad; Islamabad Capital Territory, Chak Shehzad; Khyber Pakhtunkhwa, Peshawar; Punjab, Rawalpindi (Murree) (Shehzad et al. 2017; Hassan et al. 2018a).

Biogeographical distribution. **Oriental:** India, Nepal, Pakistan, Sri Lanka; **Palaeartic:** China, Iran (Ghorpadé 2015; Dousti 2023; Dyola et al. 2024).

Remarks. This species was collected from dry *Parthenium hysterophorus* and was abundant in the forest areas of Murree and Kotli Sayyida. It was commonly found in April, under the shade of dense pine trees. Ghorpadé (2012) remarked that *Chrysotoxum baphyrum* is a highly variable species, exhibiting extreme variations in the abdominal and facial markings, wing infuscation, and antennal length.

Genus *Dasysyrphus* Enderlein, 1938

***Dasysyrphus orsua* (Walker, 1852) (Fig. 3H)**

Diagnosis. This species can be easily recognized by the following characteristics: eyes densely covered with brown pile; face pale yellow with distinct median dark vitta on facial tubercle, covered with black

pale, sometimes mixed with light and dark pile; genae yellow with light pile; abdomen narrow to oval, terga dark with light maculae, maculae on tergum 2 separated, while maculae on tergum 3 oblique, straight in tergum 4; posterior margin of tergum 4 and 5 with yellow bands; antero-lateral margin of tergum 4 in the female with yellow spots.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Islamabad Capital Territory, Daman-e-Koh; Punjab Province, Rawalpindi, Murree, Charra Pani, Numb Behra Mall (Fazal et al. 2026 – in press).

Biogeographical distribution. **Oriental:** India, Nepal, Sri Lanka (Ghorpadé 2015; Dyola et al. 2024); **Palaeartic:** Pakistan (current study).

Remarks. This species was collected from dense vegetation under the shade of pine trees (*Pinus wallichiana*) in Murree and near standing water bodies at Daman-e-Koh, Islamabad. We observed its abundance in April at high elevation in Pakistan. Ghorpadé (2015) remarked that it is apparently common in the Himalayas, particularly at higher elevations.

Genus *Didea* Macquart, 1834

Didea vockerothi Ghorpadé, 1994 (Fig. 3I)

Material examined. Punjab Province. District Rawalpindi, Murree, Charra Pani, 1356 m a.s.l, 33°54'14.4"N, 73°23'24"E, 1♂, 4.v.2017, Z. Iqbal.

Diagnosis. This species is similar to *D. intermedia* and *D. alneti*; however, it can be easily distinguished by the following morphological characteristics: face usually with a narrow black median vitta; frons slightly produced; scutum and scutellum covered with yellow hairs; pleuron with distinctly yellowish hairs; fore and mid tibia completely yellow, while hind tibia black with basal 1/3rd yellow; abdominal sternite 4 black.

Distribution. **Pakistan:** New country record.

Biogeographical distribution. **Oriental:** India (Ghorpadé 2015); **Palaeartic:** Pakistan (current study).

Remarks. The genus *Didea*, including *D. vockerothi*, is recorded for the first time from Pakistan. This species was collected from dense vegetation in the shade of pine trees (*Pinus wallichiana*) in Murree.

Genus *Episyrphus* Matsumura & Adachi 1917

Subgenus *Episyrphus* Matsumura & Adachi 1917

Episyrphus balteatus (De Geer, 1776) (Fig. 3J)

Material examined. Islamabad Capital Territory. Daman-e-Koh, 740 m a.s.l, 33°44'22.1994"N, 73°3'19.44"E, 2♂♂, 1♀, 04.iii.2017, Kachnar Park, 545 m a.s.l, 33°40'12.3594"N, 73°4'54.1194"E, 5♂♂, 6♀♀, 6.iii.2017, 5♂♂, 6♀♀, 22.iii.2018, NARC, 455 m a.s.l, 33°40'12.3594"N, 73°7'33.9594"E, 5♂♂, 6♀♀, 30.iii.2017; Punjab Province. District Chakwal, Sehgal Farm, 720 m a.s.l, 32°47'44.721"N, 72°43'46.9986"E, 2♂♂, 3♀♀, 12.ix.2016, 11♂♂, 2♀♀, 12.iii.2017, 5♂♂, 7♀♀, 6.iv.2018, 3♂♂, 3♀♀, 17.iv.2018, Kalarkahar Lake, 640 m a.s.l, 32°38'27.5994"N, 72°28'15.6"E, 3♂♂, 4♀♀, 21.ix.2017, 3♂♂, 3♀♀, 17.iv.2018, Koont Farm, 162 m a.s.l, 32°55'58.2954"N, 72°51'14.1834"E, 3♀♀, 22.xii.2017, 3♂♂, 3♀♀, 17.iv.2018; District Attock, Attock City, 541 m a.s.l, 33°27'36"N, 72°13'11.9994"E, 22♂♂, 2♀♀, 22.iii.2017, 12♂♂, 21.iv.2018, Hassan Abdal, 115 m a.s.l, 30°25'59.99"N, 72°42'0.00"E, 1♂, 5♀♀, 2.xii.2017, Hazro, 310 m a.s.l, 33°54'26.9994"N, 72°26'13.9992"E, 11♂♂, 15♀♀, 2.xii.2017, 11♂♂, 2♀♀, 22.iii.2018, Wah Cantonment, 460 m a.s.l, 33°45'49.68"N, 72°46'8.7594"E, 12♂♂, 4♀♀, 2.i.2018, District Jhelum, Jhelum City, 235 m a.s.l, 32°56'0.6"N, 73°43'12.72"E, 2♂♂, 3♀♀, 1.iv.2018, Pind Dadan Khan, 205 m a.s.l, 32°34'58.7994"N, 73°2'35.88"E, 2♂♂, 1.iv.2018, Lahri National Park, 560 m a.s.l, 33°6'11.8794"N, 73°31'51.9594"E, 2♂♂, 3♀♀, 1.iv.2018; District Rawalpindi, Kahuta, 1829 m a.s.l, 33°12'36"N, 73°8'2.4"E, 3♂♂, 2♀♀, 22.ix.2017, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♀, 22.x.2016, 5♂♂, 12♀♀, 22.iii.2018, 6♂♂, 6♀♀, 10.iv.2018; Murree, Charra Pani, 1356 m a.s.l, 33°54'14.4"N, 73°23'24"E, 2♂♂, 4.v.2017, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 1♀, 12.x.2017, 11♂♂, 22♀♀, 4.iv.2018, Ausia, 1712 m a.s.l, 33°35'38.4"N, 73°16'55.1994"E, 2♀♀, 11.xi.2016, 5♂♂, 6♀♀, 4.iv.2018, Sunny Bank, 1970 m a.s.l, 33.907°N, 73.39°E, 12♀, 12.x.2017, 11♂♂, 22♀♀, 4.iv.2018, leg. M.A. Hassan.

Distribution. Pakistan: Azad Kashmir, Muzafarabad, Poonch; Balochistan, Kharan, Makran; Gilgit-Baltistan, Ghizar; Islamabad Capital Territory, Chak Shehzad; Khyber Pakhtunkhwa, Abbottabad, Charsadda, Dir, Hangu, Haripur, Kohat, Kurram, Malakand, Mansehra, Nowshera, Peshawa, Swat; Punjab, Faisalabad, Jhelum, Khanewal, Multan, Muzafargarh, Rawalpindi, Sialkot; Sindh, Khairpur (Saleem et al. 2001; Sajjad & Saeed 2010; Ali et al. 2013; Arif et al. 2014; Hassan et al. 2017, 2018a; Kanher et al. 2022; Hassan & Hussain 2024).

Biogeographical distribution. Cosmopolitan (Ghorpadé 2015; Dyola et al. 2024).

Remarks. This cosmopolitan species is widely distributed throughout Pakistan. In the present study, it was collected from various host plants, including *Parthenium hysterophorus*, *Calendula officinalis*, *Rosa indica*, *Hibiscus rosa-sinensis*, *Eriobotrya japonica*, *Triticum aestivum*, *Rumex dentatus*, *Solanum nigrum*, *Thuja occidentalis*, *Brassica campestris*, *Brassica napus*, *Prunus persica*, and *Salix acmophylla*. A significant number of adult specimens were observed in dense vegetation under the shade of *Pinus wallichiana* in Murree, particularly at higher elevations.

Episyrphus viridaureus (Wiedemann, 1824) (Fig. 3K)

Material examined. Islamabad Capital Territory. Daman-e-Koh, 740 m a.s.l, 33°44'22.1994"N, 73°3'19.44"E, 1♂, 1♀, 4.iii.2017, Kachnar Park, 545 m a.s.l, 33°40'12.3594"N, 73°4'54.1194"E, 2♀♀, 6.iii.2017, Lack View Park, 550 m a.s.l, 33°42'41.9"N, 73°08'03.77"E, 550 m a.s.l, 33°42'41.9"N, 73°08'03.77"E, 1♀, 7.ix.2016, 12♂♂, 3♀♀, 4.iv.2018, National Agricultural Research Centre (NARC), 455 m a.s.l, 33°40'12.3594"N, 73°7'33.9594"E, 5♂♂, 6♀♀, 30.iii.2017, 2♂♂, 1♀, 1.iv.2018, Shakarparian National Park, 550 m a.s.l, 33°41'6.3594"N, 73°6'22.32"E, 1♂, 15.x.2016, Shahdara Valley, 730 m a.s.l, 33°43'45.8394"N, 73°5'35.16"E, 2♀♀, 7.xi.2016; Punjab Province. District Chakwal, Sehgal Farm, 720 m a.s.l, 32°47'44.721"N, 72°43'46.9986"E, 1♀, 12.ix.2017, 2♂♂, 4.iv.2018, 3♂♂, 17.iv.2018, Koont Farm, 162 m a.s.l, 32°55'58.2954"N, 72°51'14.1834"E, 12♂♂, 4♀♀, 13.ix.2017, 2♂♂, 1♀, 4.iv.2018, 3♀♀, 17.iv.2018; District Attock, Hassan Abdal, 115 m a.s.l, 30°25'59.99"N, 72°42'0.00"E, 2♀♀, 10.iv.2018, Wah Cantonment, 460 m a.s.l, 33°45'49.68"N, 72°46'8.7594"E, 4♀♀, 1.iv.2018; District Jhelum, Lahri National Park, 560 m a.s.l, 33°6'11.8794"N, 73°31'51.9594"E, 4♂♂, 3♀♀, 1.iv.2018, Pind Dadan Khan, 205 m a.s.l, 32°34'58.7994"N, 73°2'35.88"E, 2♂♂, 1.iv.2018; Rawalpindi: Kahuta, 1829 m a.s.l, 33°12'36"N, 73°8'2.4"E, 3♂♂, 2♀♀, 22.ix.2017, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 3♀♀, 22.xi.2016, 1♂, 2♀, 12.xi.2017, 5♂♂, 3♀, 22.iii.2018, 2♂♂, 3♀♀, 4.iv.2018, 2♂♂, 2♀♀, 10.iv.2018, 5♂♂, 5♀♀, 11.iv.2018; Murree, Charra Pani, 1356 m a.s.l, 33°54'14.4"N, 73°23'24"E, 2♂♂, 4.v.2017, Kuldana, 1928 m a.s.l, 33°55'26.3994"N, 73°23'56.4"E, 3♂♂, 7♀♀, 15.vii.2017, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 1♀, 12.x.2107, leg. M.A. Hassan.

Distribution. Pakistan: Azad Kashmir, Poonch; Khyber Pakhtunkhwa, Peshawar, Swat; Punjab, Lahore (Ghorpadé & Shehzad 2013; Hassan et al. 2017, 2018a; Hassan et al. 2024).

Biogeographical distribution. Oriental: India, Indonesia, Nepal, Pakistan; **Palearctic.** Afghanistan, China (Ghorpadé 2015; Dyola et al. 2024).

Remarks. Similar to *Episyrphus balteatus*, this species has been collected from a wide range of host plants, including *Parthenium hysterophorus*, *Calendula officinalis*, *Rosa indica*, *Hibiscus rosa-sinensis*, *Eriobotrya japonica*, *Triticum aestivum*, *Rumex dentatus*, *Solanum nigrum*, *Thuja occidentalis*, *Brassica campestris*, *campestris napus*, *Prunus persica*, and *Salix acmophylla*. A significant number of adult specimens were observed on olive and dense vegetation under the shade of the pine trees (*Pinus wallichiana*).

Genus *Eupeodes* Osten Sacken, 1877

Subgenus *Eupeodes* Osten Sacken, 1877

Eupeodes bucculatus (Rondani, 1857) (Fig. 3L)

Material examined. Islamabad Capital Territory. Daman-e-Koh, 740 m a.s.l, 33°44'22.1994"N, 73°3'19.44"E, 8♂♂, 5♀♀, 4.iii.2017, Margalla Hills (Trail-5), 1540 m a.s.l, 33°44'37.68"N, 73°1'19.2"E, 1♂, 3♀♀, 4.v.2018, NARC, 455 m a.s.l, 33°40'12.3594"N, 73°7'33.9594"E, 5♂♂, 30.iii.2017, 1♂, 26.iv.2018; Punjab Province. District Rawalpindi, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♀, 29.x.2016; Murree, Charra Pani, 1356 m a.s.l, 33°54'14.4"N, 73°23'24"E, 2♂♂ 3♀♀, 4.v.2017, 2♂♂,

14.iii.2018, Kuldana, 1928 m a.s.l, 33°55'26.3994"N, 73°23'56.4"E, 2♂♂, 1♀, 12.x.2017, 1♂, 14.iii.2018, Ausia, 1712 m a.s.l, 33°35'38.4"N, 73°16'55.1994"E, 4♀♀, 11.xi.2016, 2♂♂, 14.iii.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Gilgit-Baltistan, Ghanche; Islamabad Capital Territory, Daman-e-Koh, NARC; Punjab, Narowal (Ghorpadé & Shehzad 2013; Hassan et al. 2017, 2018a; Hassan & Hussain 2024).

Biogeographical distribution. **Oriental:** Bhutan, India, Pakistan; **Palearctic:** Afghanistan, China, Georgia, Iran, Italy, Japan (Ghorpadé 2014, 2015; Mengual et al. 2020; Dousti 2023; Dyola et al. 2024).

Remarks. This species was collected from *Calendula officinalis*, grasses, and forest areas.

Eupeodes corollae (Fabricius, 1794) (Fig. 3M)

Material examined. Punjab Province. District Chakwal, Sehgal Farm, 720 m a.s.l, 32°47'44.721"N, 72°43'46.9986"E, 1♂, 17.iv.2018, Kalarkahar Lake, 640 m a.s.l, 32°38'27.5994"N, 72°28'15.6"E, 1♀, 22.iv.2018, Talagang, 457 m a.s.l, 32°55'33.6"N, 72°24'28.8"E, 2♂♂, 2♀♀, 22.iv.2018; District Jhelum, Pind Dadan Khan, 205 m a.s.l, 32°34'58.7994"N, 73°2'35.88"E, 2♂♂, 2♀♀, 22.iv.2018, Lahri National Park, 560 m a.s.l, 33°6'11.8794"N, 73°31'51.9594"E, 1♂, 3♀♀, 22.iv.2018; District Rawalpindi, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♀, 29.x.2016, 2♂♂, 1♀, 4.iii.2018, 1♂, 2♀♀, 8.iii.2018, 1♂, 4♀♀, 22.iii.2018, 2♂♂, 2.iv.2018, 8♂♂, 5♀♀, 6.iv.2018, 8♂♂, 5♀♀, 8.iv.2018; Murree, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 1♂, 1♀, 3.iv.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Balochistan, Quetta, Ziatar; Khyber Pakhtunkhwa, Dir, Hangu, Peshawar; Punjab, Khanewal, Lahore, Multan, Muzafargarh, Rawalpindi; Sindh, Khairpur (Ghorpadé & Shehzad 2013; Turk et al. 2015; Hassan et al. 2017, 2018a; Shehzad et al. 2017; Kanher et al. 2022; Khan et al. 2024).

Biogeographical distribution. Cosmopolitan (Ghorpadé 2014, 2015; Dyola et al. 2024).

Remarks. This species was collected from *Calendula officinalis*, grasses, and forest areas.

Eupeodes latifasciatus (Macquart, 1829) (Fig. 3N)

Material examined. Punjab Province. District Rawalpindi, Murree, Kuldana, 1928 m a.s.l, 33°55'26.3994"N, 73°23'56.4"E, 2♂♂, 1♀, 12.x.2017, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Balochistan, Makran, Quetta; Punjab, Khanewal, Lahore (Turk et al. 2015; Hassan et al. 2017, 2018a; Shehzad et al. 2017).

Biogeographical distribution. **Nearctic.** Canada; **Oriental:** India, Pakistan; **Palearctic.** Afghanistan, China, Finland, France, Georgia, Iran, Italy, Mongolia, Poland, Syria, Sweden (Ghorpadé 2014, 2015; Mengual et al. 2020; Dousti 2023; Dyola et al. 2024).

Remarks. This species was collected from *Calendula officinalis*, grasses, and forest areas.

Genus *Ischiodon* Sack, 1913

Ischiodon scutellaris (Fabricius, 1805) (Fig. 3O)

Material examined. Islamabad Capital Territory. Daman-e-Koh, 740 m a.s.l, 33°44'22.1994"N, 73°3'19.44"E, 2♂♂, 4.iii.2017, NARC, 455 m a.s.l, 33°40'12.3594"N, 73°7'33.9594"E, 30.iii.2017, 4♂♂, 2♀♀; Punjab Province. District Chakwal, Sehgal Farm, 720 m a.s.l, 32°47'44.721"N, 72°43'46.9986"E, 3♂♂, 2♀♀, 28.ix.2017, 3♂♂, 3♀♀, 17.iv.2018, Kalarkahar Lake, 640 m a.s.l, 32°38'27.5994"N, 72°28'15.6"E, 3♂♂, 3♀♀, 17.iv.2018; District Attock, Wah Cantonment, 460 m a.s.l, 33°45'49.68"N, 72°46'8.7594"E, 3♂♂, 2♀♀, 25.iii.2018; District Rawalpindi, Kahuta, 1829 m a.s.l, 33°12'36"N, 73°8'2.4"E, 3♂♂, 2♀♀, 22.ix.2017, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 8♂♂, 7♀♀, 22.iii.2018, 2♂♂, 4♀♀, 26.iii.2018, 4♂♂, 2♀♀, 2.iv.2018, 5♂♂, 5♀♀, 8.iv.2018, 4♂♂, 6♀♀, 10.iv.2018; Murree, Charra Pani, 1356 m a.s.l, 33°54'14.4"N, 73°23'24"E, 2♂♂, 4.v.2017, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 1♀, 4.iv.2018, Ausia, 1712 m a.s.l, 33°35'38.4"N, 73°16'55.1994"E, 1♀, 4.iv.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Islamabad Capital Territory, Chak Shehzad; Khyber Pakhtunkhwa, Chakdara, Dir, Haripur, Malakand, Mansehra, Peshawar, Swat; Punjab, Faisalabad,

Khanewal, Lahore, Multan, Rawalpindi (Murree); Sindh, Khairpur (Sajjad & Saleem 2010; Ali et al. 2013; Hassan et al. 2017, 2018a, 2024; Kanher et al. 2022).

Biogeographical distribution. Cosmopolitan (Ghorpadé 2015; Mengual et al. 2020; Dousti 2023; Dyola et al. 2024).

Remarks. This species was predominantly found on host plants infested with aphids, including *Trifolium alexandrinum*, *Eruca sativa*, *Parthenium hysterophorus*, *Calendula officinalis*, *Rosa indica*, *Hibiscus rosa-sinensis*, *Eriobotrya japonica*, *Triticum aestivum*, *Rumex dentatus*, *Solanum nigrum*, *Thuja occidentalis*, *Brassica campestris*, *Brassica napus*, *Prunus persica*, and *Salix acmophylla*.

Genus *Melangyna* Verrall, 1901

Subgenus *Melangyna* Verrall, 1901

Melangyna remota (Brunetti, 1923) (Fig. 3P)

Material examined. Punjab Province. District Rawalpindi, Murree, Charra Pani, 1356 m a.s.l, 33°54'14.4"N, 73°23'24"E, 1♀, 4.v.2017, leg. M.A. Hassan.

Diagnosis. This species can be distinguished by the following morphological characteristics: eyes with obvious scattered hairs; face yellowish white with a narrow dark median vittae that does not extend to the base of the antennae; frons yellowish, with the apical 1/3rd black; scutum dark; scutellum yellow, covered with yellow hairs; abdomen unmarginated, with spots on terga 2 to 4 always separated, and the posterior margins of terga 4 and 5 narrowly yellow.

Distribution. **Pakistan:** New country record.

Biogeographical distribution. **Oriental:** India, Nepal (Ghorpadé 2015; Dyola et al. 2024); **Palearctic:** Pakistan (current study).

Remarks. The genus *Melangyna*, including *Melangyna remota*, is recorded for the first time in Pakistan. This species was collected from the dense vegetation under the shade of *Pinus wallichiana* in Murree.

Genus *Parasyrphus* Matsumura, 1917

Parasyrphus thompsoni Ghorpadé, 1994 (Fig. 3Q)

Material examined. Punjab Province. District Rawalpindi, Murree, Charra Pani, 1356 m a.s.l, 33°54'14.4"N, 73°23'24"E, 1♀, 4.v.2017, leg. M.A. Hassan.

Diagnosis. This species can be distinguished by its yellow face with a distinct median knob and indistinct median vitta, along with yellow oral margins and brownish lower side of the face with black hairs; fore and mid tibia yellow; abdomen unmarginated, with a pair of separated median yellow spots on tergum 2, and the proximal half of terga 3 to 5 with complete yellow fasciae; sternum 3 with long black and yellow hairs.

Distribution. **Pakistan:** New country record.

Biogeographical distribution. **Oriental:** India (Ghorpadé 2015); **Palearctic:** Pakistan (current study).

Remarks. The genus *Parasyrphus*, including *Parasyrphus thompsoni*, is recorded for the first time in Pakistan. Previously, this species was only known from India. In this study, we collected a single female specimen from dense vegetation under the shade of *Pinus wallichiana* in Murree.

Genus *Scaeva* Fabricius, 1805

Subgenus *Scaeva* Fabricius, 1805

Scaeva latimaculata (Brunetti, 1923) (Fig. 3R)

Material examined. Punjab Province. District Rawalpindi, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♀, 29.x.2016; District Attock, Wah Cantonment, 460 m a.s.l, 33°45'49.68"N, 72°46'8.7594"E, 1♂, 28.iii.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Gilgit-Baltistan, Astore, Gilgit, Ghizar, Naltar, Skardu; Khyber Pakhtunkhwa, Abbottabad, Peshawar; Punjab, Khanewal; Sindh, Sukkur (Ghorpadé & Shehzad 2013; Hassan et al. 2017, 2018a; Shehzad et al. 2017).

Biogeographical distribution. **Oriental:** India, Nepal, Pakistan; **Palaeartic:** Afghanistan, China, Iran (Ghorpadé 2014, 2015; Dousti 2023; Dyola et al. 2024).

Remarks. This species was mostly collected from *Brassica campestris*, *Coriandrum sativum*, *Salix acmophylla*, and *Thuja occidentalis*. It was also common in forest areas with dense vegetation under pine trees in Murree.

Scaeva pyrastris (Linnaeus, 1758) (Fig. 3S)

Material examined. Islamabad Capital Territory. Daman-e-Koh, 740 m a.s.l, 33°44'22.1994"N, 73°3'19.44"E, 1♀, 4.iii.2017, Margalla Hills (Trail-5), 1540 m a.s.l, 33°44'37.68"N, 73°1'19.2"E, 1♀, 4.iii.2017, NARC, 455 m a.s.l, 33°40'12.3594"N, 73°7'33.9594"E, 1♂, 30.iii.2017; Punjab Province. District Rawalpindi, Kahuta, 1829 m a.s.l, 33°12'36"N, 73°8'2.4"E, 3♂♂, 2♀♀, 22.ix.2017, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♀, 4.iii.2018; Murree, Numb Behra Mall, 2100 m a.s.l, 33°31'51.5994"N, 73°12'50.3994"E, 1♀, 3.iv.2018, 2♀♀, 26.iv.2018, Ausia, 1712 m a.s.l, 33°35'38.4"N, 73°16'55.1994"E, 1♂, 3.iv.2018, 1♀, 3.iv.2018; District Attock, Wah Cantonment, 460 m a.s.l, 33°45'49.68"N, 72°46'8.7594"E, 1♂, 28.iii.2018; District Chakwal, Talagang, 457 m a.s.l, 32°55'33.6"N, 72°24'28.8"E, 1♂, 23.iv.2018; District Jhelum, Lahri National Park, 560 m a.s.l, 33°6'11.8794"N, 73°31'51.9594"E, 2♂♂, 2♀♀, 23.iv.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Khyber Pakhtunkhwa, Abbottabad, Dir, Kurram, Peshawar, Swat; Punjab, Rawalpindi (Ghorpadé & Shehzad 2013; Hassan et al. 2018a; Shehzad et al. 2017).

Biogeographical distribution. **Afrotropical:** Africa; **Oriental:** India, Nepal, Pakistan; **Palaeartic:** Iran, Georgia (Ghorpadé 2014, 2015; Mengual et al. 2020; Dousti 2023; Dyola et al. 2024).

Remarks. This species shared the same host plants and habitat as *Scaeva latimaculata*.

Genus *Sphaerophoria* Lepeletier & Serville, 1828

Subgenus *Sphaerophoria* Le Peletier & Serville, 1828

Sphaerophoria bengalensis Macquart, 1842 (Fig. 3T)

Material examined. Punjab Province. District Rawalpindi, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♂, 2♀♀, 18.v.2017, 2♀♀, 25.v.2017, 2♂♂, 6.iv.2017, 3♂♂, 3♀♀, 8.iv.2018, 3♂♂, 3♀♀, 10.iv.2018; District Attock, Hassan Abdal, 115 m a.s.l, 30°25'59.99"N, 72°42'0.00"E, 4♂♂, 4♀♀, 11.iv.2018, 1♂, 2♀♀, 12.iv.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Punjab, Khanewal, Multan, Muzafargarh (Ghorpadé & Shehzad 2013; Hassan et al. 2018a).

Biogeographical distribution. **Oriental:** Bangladesh, Pakistan, India, Nepal; **Palaeartic:** Afghanistan, Georgia, China, Iran (Ghorpadé 2015; Mengual et al. 2020; Dousti 2023; Dyola et al. 2024).

Remarks. This species was collected from various host plants, including *Rosa indica*, *Brassica campestris*, *Thuja occidentalis*, and *Triticum aestivum*, and was mostly found in low vegetation where wildflowers are present.

Sphaerophoria scripta (Linnaeus, 1758) (Fig. 3U)

Material examined. Islamabad Capital Territory. NARC, 455 m a.s.l, 33°40'12.3594"N, 73°7'33.9594"E, 2♂♂, 2♀♀, 30.iii.2017; Punjab Province. District Rawalpindi, Arid Agriculture University, 663 m a.s.l, 33°38'49.56"N, 73°4'49.0794"E, 1♀, 22.x.2016, 4♂♂, 4♀♀, 10.iv.2018, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Poonch; Gilgit-Baltistan, Ghanche; Khyber Pakhtunkhwa, Dir, Hangu, Peshawar, Swat; Punjab, Multan, Narowal; Sindh, Khairpur (Ghorpadé & Shehzad 2013; Hassan et al. 2017, 2018a; Shehzad et al. 2017; Kanher et al. 2022; Hassan & Hussain 2024).

Biogeographical distribution. Cosmopolitan (Ghorpadé 2014, 2015; Mengual et al. 2020; Dousti 2023; Dyola et al. 2024).

Remarks. This species was collected from *Triticum aestivum*, *Calendula officinalis*, and grasses.



Figure 2. Adult habitus, dorsal view. A. *Ceriana ornatifrons* (male); B. *Eristalis cerealis* (male); C. *Eristalis tenax* (male); D. *Eristalinus aeneus* (male); E. *Eristalinus arvorum* (male); F. *Eristalinus megacephalus* (male); G. *Eristalinus obliquus* (female); H. *Eristalinus sepulchralis* (female); I. *Eristalinus tarsalis* (female); J. *Eristalinus tristriatus* (male); K. *Eristalinus taeniops* (male); L. *Mesembrius bengalensis* (male); M. *Eumerus aurifrons* (male); N. *Eumerus vestitus* (male); O. *Syrirta pipiens* (male); P. *Rhingia laticincta* (female); Q. *Rhingia siwalikensis* (female); R. *Graptomyza brevirostris* (female); S. *Volucella peleterii* (male); T. *Baccha maculata* (male); U. *Melanostoma orientale* (female); V. *Paragus annandalei* (male); W. *Paragus haemorrhous* (female); X. *Paragus politus* (male).

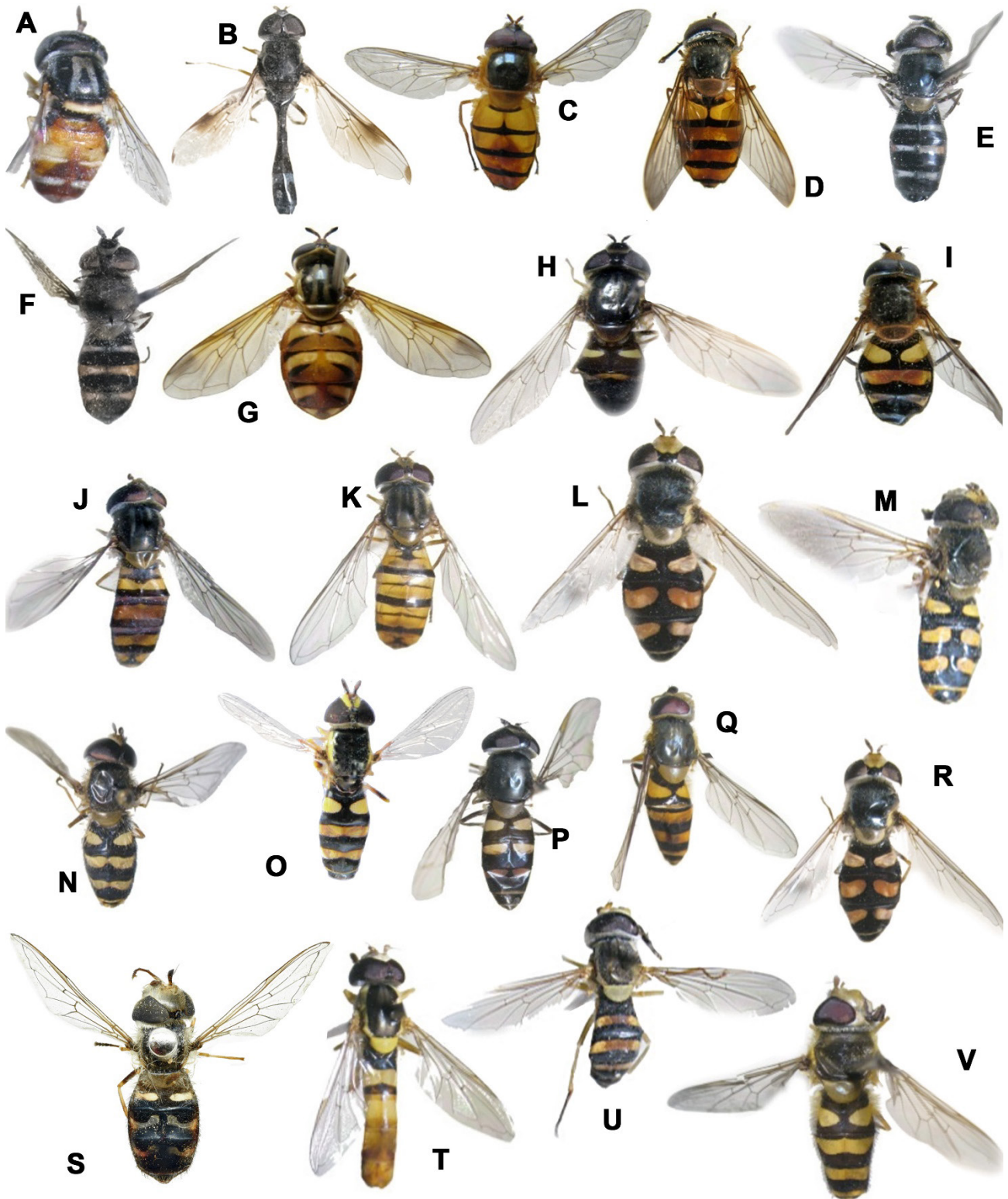


Figure 3. Adult habitus, dorsal view. **A.** *Paragus serratus* (male); **B.** *Allobaccha apicalis* (male); **C.** *Asarkina porcina* (male); **D.** *Asarkina bhima* (female); **E.** *Betasyrphus aeneifrons* (female); **F.** *Betasyrphus isaaci* (female); **G.** *Chrysotoxum baphyrum* (female); **H.** *Dasysyrphus orsua* (female); **I.** *Didea vockerothi* (male); **J.** *Episyrphus balteatus* (male); **K.** *Episyrphus viridaureus* (female); **L.** *Eupeodes bucculatus* (male); **M.** *Eupeodes corollae* (female); **N.** *Eupeodes latifasciatus* (male); **O.** *Ischiodon scutellaris* (male); **P.** *Melangyna remota* (female); **Q.** *Parasyrphus thompsoni* (female); **R.** *Scaeva latimaculata* (female); **S.** *Scaeva pyrastris* (female); **T.** *Sphaerophoria bengalensis* (male); **U.** *Sphaerophoria scripta* (female); **V.** *Syrphus dalhousiae* (female).

Genus *Syrphus* Fabricius, 1775

Syrphus dalhousiae Ghorpadé, 1994 (Fig. 3V)

Material examined. Punjab Province. District Rawalpindi, Murree, Ausia, 1712 m a.s.l, 33°35'38.4"N, 73°16'55.1994"E, 1 ♀, 11.xi.2016, leg. M.A. Hassan.

Distribution. **Pakistan:** Azad Kashmir, Rawalakot (Hassan et al. 2018a).

Biogeographical distribution. **Oriental:** India, Nepal, Pakistan; **Palearctic:** Pakistan (Ghorpadé 2014, 2015; Dyola et al. 2024).

Remarks. This species was collected from forest areas with dense vegetation under pine trees at high elevations.

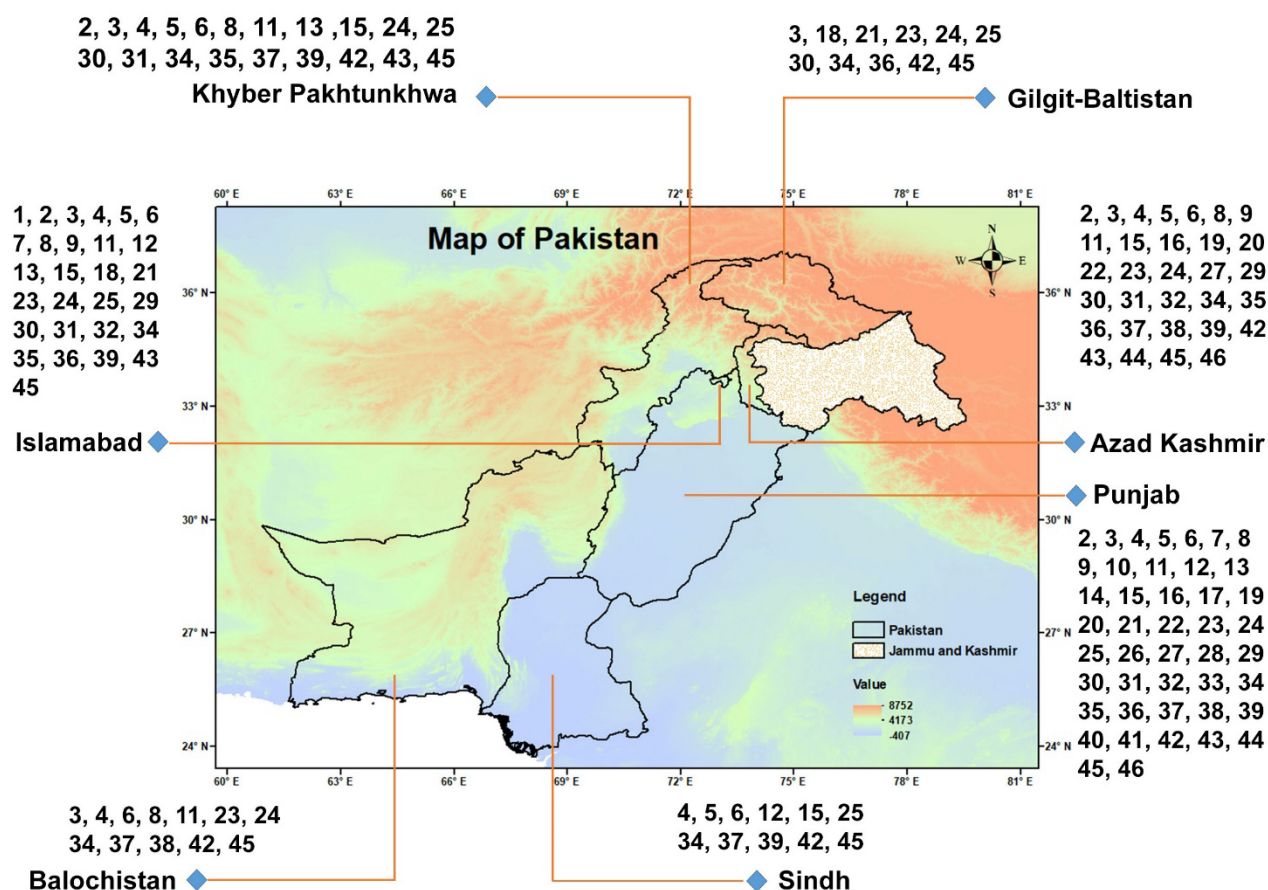
DISCUSSION

So far, over 100 species of hover flies have been documented from Pakistan (Hassan et al. 2021, 2022; Hassan & Hussain 2024; Vujić et al. 2021, 2023, 2024; Fazal et al. 2025). In this study, we recorded 46 species under 29 genera belonging to two subfamilies of Syrphidae from the Pothwar region of Punjab, Pakistan. Of these documented species, three genera and seven species are newly recorded from Pakistan. The species composition revealed distinct distribution patterns of several species recorded from the Pothwar region. *Ceriana ornatifrons* and *Graptomyza brevirostris* were restricted to the Islamabad Capital Territory, whereas species such as *Allobaccha apicalis*, *Asarkina bhima*, *Didea vockerothi*, *Eristalinus tristriatus*, *Eumerus vestitus*, and *Melangyna remota* were recorded only in Punjab. The widespread distribution of *Episyrphus balteatus* across Pakistan suggests its adaptability to diverse habitats (Jamali et al. 2025), indicating its role as a potential generalist aphidophagous hoverfly species (Irshad 2014). Species collected in the current study were predominantly associated in forest areas near stagnant water bodies. Additionally, the presence of 16 species on the invasive plant *Parthenium hysterophorus* aligns with the findings of Dyola et al. (2023).

The Pothwar region of Punjab exhibited the highest species richness with 44 species (95.6%), making it a significant biodiversity hotspot for hover fly studies in Pakistan. This high richness is likely due to its diverse habitats and floral resources, which create a range of supportive microhabitats (Hassan et al. 2019a, 2019b, 2022). Following this, Azad Kashmir with 31 species, this region benefits from rich forest ecosystems and a relatively stable climate, creating favorable conditions for various insect species. The Islamabad Capital Territory has urban green spaces and surrounding natural areas provide a mix habitat that attract 28 species of Syrphidae. The proximity of urban and natural environments facilitates species movement and access to diverse resources thereby enhancing biodiversity (Schirmel et al. 2018). In contrast, the most topographically diverse Khyber Pakhtunkhwa hosts a moderate number of 20 species, and lowest in arid and high altitude regions: Sindh and Balochistan, characterized by arid and semi arid conditions, supported only 11 and 10 species respectively, while the harsh high-altitude climate of Gilgit-Baltistan yielded only 7 species.

The lack of suitable habitats and floral resources decreases the abundance of Syrphidae fauna (Sutherland et al. 2001). However, the low species richness in Gilgit-Baltistan is likely reflects sampling bias or due to a lack of exploration rather than its actual biodiversity potential, indicating that more fieldwork is needed to explore its hoverfly fauna. In contrast, southern and southwestern provinces such as Sindh and Balochistan are characterized by arid and semi-arid conditions, which could limit hoverfly species (Ansari & Memon 2017; Khan et al. 2024). However, this assumption may not be entirely accurate, as these regions have historically been poorly explored for hoverfly in Pakistan. The limited number of species recorded from these regions suggests that their true species richness may be underestimated, underscoring the importance of future studies to fully understand the distribution and diversity of hoverflies in these regions.

The Biogeographical distribution of hoverfly species documented in this study is predominantly Oriental, with all 46 species (100%) reported from this region (Fig. 4). The second most significant biogeographical region for species in Pakistan is the Palearctic region with 42 species, representing 91.3% of the known species in this region.



1 <i>Ceriana ornatifrons</i>	17 <i>Rhingia laticincta</i> ★	33 <i>Didea vockerothi</i> ★
2 <i>Eristalis cerealis</i>	18 <i>Graptomyza brevirostris</i>	34 <i>Episyrphus balteatus</i>
3 <i>Eristalis tenax</i>	19 <i>Volucella peleterii</i>	35 <i>Episyrphus viridaureus</i>
4 <i>Eristalinus aeneus</i>	20 <i>Baccha maculata</i>	36 <i>Eupeodes bucculatus</i>
5 <i>Eristalinus arvorum</i>	21 <i>Melanostoma orientale</i>	37 <i>Eupeodes corollae</i>
6 <i>Eristalinus megacephalus</i>	22 <i>Paragus annandalei</i>	38 <i>Eupeodes latifasciatus</i>
7 <i>Eristalinus obliquus</i>	23 <i>Paragus haemorrhous</i>	39 <i>Ischiodon scutellaris</i>
8 <i>Eristalinus sepulchralis</i>	24 <i>Paragus politus</i>	40 <i>Melangyna remota</i> ★
9 <i>Eristalinus tarsalis</i>	25 <i>Paragus serratus</i>	41 <i>Parasyrphus thompsoni</i> ★
10 <i>Eristalinus tristriatus</i> ★	26 <i>Allobaccha apicalis</i> ★	42 <i>Scaeva latimaculata</i>
11 <i>Eristalinus taeniops</i>	27 <i>Asarkina porcina</i>	43 <i>Scaeva pyrastris</i>
12 <i>Mesembrius bengalensis</i>	28 <i>Asarkina bhima</i> ★	44 <i>Sphaerophoria bengalensis</i>
13 <i>Eumerus aurifrons</i>	29 <i>Betasyrphus aeneifrons</i>	45 <i>Sphaerophoria scripta</i>
14 <i>Eumerus vestitus</i>	30 <i>Betasyrphus isaaci</i>	46 <i>Syrphus dalhousiae</i>
15 <i>Syrretta pipiens</i>	31 <i>Chrysotoxum baphyrum</i>	
16 <i>Rhingia siwalikensis</i>	32 <i>Dasysyrphus orsua</i>	

Figure 4. Species recorded from the Pothwar region of Punjab, Pakistan, including their regional distribution. Red stars represent species newly recorded from Pakistan.

These findings truly reflect the significant influence of the Oriental and Palearctic regions in northern Pakistan. Additionally, the following geographical regions also represent less than 25% of species, like Afrotropical (14 species, 30.43%), Nearctic (10 species, 21.7%), Australasian (9 species, 19.6%), and Neotropical regions (9 species, 19.6%). Moreover, the cosmopolitan species recorded in the Pothwar region further underscore the diversity and ecological adaptability of these species. This study presents a

preliminary checklist with digital photographs of 46 species from the Pothwar region, which will be helpful for future biodiversity and conservation efforts in Pakistan. The identification of newly recorded genera and species significantly updates the known hoverfly fauna of Pakistan. Furthermore, the detailed notes on the habitat preferences of these species will contribute to a better understanding of the distribution and ecology of these species in the future. Future research should focus on the under-explored regions, such as Gilgit-Baltistan, Sindh, and Balochistan, to explore the true hoverfly in these regions.

AUTHOR'S CONTRIBUTION

The authors confirm their contribution to the paper as follows: M.A. Hassan, I. Bodlah: Conceptualized the MS; I. Bodlah, A. Shehzad: Supervised the word; A. Shehzad, M.A. Hassan: helped in photography; M. Ali, N. Khatak: checked the validity of records, revised the manuscript; M.H. Shehbaz, Z. Maryam: compiled the literature, revised the manuscript, helped in photography; U. Dyola: compiled the literature, revised the manuscript. The authors read and approved the final version of the manuscript.

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AVAILABILITY OF DATA AND MATERIAL

The specimens listed in this study are deposited in the Laboratory of Biosystematics, Department of Entomology, Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan, and are available from the curator upon request.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study only included arthropod material, and all required ethical guidelines for the treatment and use of animals were strictly adhered to in accordance with international, national, and institutional regulations. No human participants were involved in any studies conducted by the authors for this article.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

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مطالعه تاکسونومیک مقدماتی مگس‌های گل (Diptera: Syrphidae) در منطقه پوتوار پنجاب، پاکستان

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چکیده: دوبالان متعلق به خانواده (Diptera) Syrphidae در پاکستان به خوبی مطالعه شده و اطلاعات تاکسونومیک در مورد آنها به‌روزرسانی شده و تا به امروز شامل بیش از ۱۰۰ گونه می‌باشد. در این تحقیق، نه قبیله، ۲۶ جنس و ۴۶ گونه از مگس‌های گل از منطقه پوتوار پنجاب، پاکستان ثبت گردید. از این تعداد، سه جنس *Didea* Macquart, 1834، *Allobaccha apicalis* Melangyna Verrall, 1901 و *Parasyrphus* Matsumura, 1917 به همراه هفت گونه شامل *Eristalinus* *Didea vockerothi* Ghorpadé, 1994، *Asarkina bhima* Ghorpadé, 1994 (Loew, 1858)، *Parasyrphus thompsoni* Ghorpadé, 1994، *Melangyna remota* (Brunetti, 1923) *aristriatus* (Meijere, 1911) و *Rhingia laticincta* Brunetti, 1907 برای اولین بار از پاکستان گزارش شدند. اکثریت این گونه‌ها از مناطق جنگلی، به ویژه نزدیک آب‌های راکد یا زیر سایه درختان کاج جمع‌آوری شدند. همچنین ۱۶ گونه روی گیاه مهاجم *Parthenium hysterophorus* در منطقه مشاهده شدند. این مطالعه یک فهرست مقدماتی از ۴۶ گونه از منطقه پوتوار ارائه می‌دهد که شامل توزیع کنونی آنها در پاکستان، اطلاعات زیستگاه و تصاویر هر گونه می‌باشد. از نظر غنای گونه‌ای منطقه‌ای، استان پنجاب در برگیرنده بیشترین تعداد گونه‌ها (۴۴ گونه: ۹۵٫۶٪)، در پاکستان بوده و پس از آن کشمیر آزاد (۳۱ گونه: ۶۷٫۳٪)، اسلام‌آباد (۲۸ گونه: ۶۰٫۸٪)، خیبر پختونخوا (۲۰ گونه: ۵۶٫۵٪)، سند (۱۱ گونه: ۲۳٫۹٪)، بلوچستان (۱۰ گونه: ۲۱٫۷٪) و گلگت-بلتستان (۷ گونه: ۱۵٫۲٪) قرار دارند.

واژگان کلیدی: فهرست، انتشار، Eristalinae، مگس‌های گل، گزارش جدید، Syrphina