Taxonomic studies of syrphid fly fauna of district Swabi and Mardan, KP, Pakistan

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Abstract

The current research discusses the taxonomic study of Syrphid family of Districts Mardan and Swabi.The broad field survey was conducted in 2017 for the collection of syrphid fauna of Mardan and Swabi, the Districts of Kp, Pakistan. The examination of more than 300 specimens was conducted. The total genra are 7 and the number of species mounted to 10 classified under the two subfamilies (Syrphinae and Eristalinae) in this research study. The Subfamily 'Syrphinae'comprises genus Ischiodon Sack, Episyrphus Matsumura, Scaeva Fabricius, Eupeodes Osten Sacken, Sphaerophoria Lepeletier as well as Serville while Eristaline consist of Eristalinus Rendani, and Eristalis Latreille. The subfamily Syrphinae include the following species, Episyrphus viridaureus (Wiedemann); Episyrphus balteatus (De Geer); Ischioden scutellaris (Fabricius); Eupeodes (Metasyrphus) bucculatus (Rondani); Eupeodes (Metasyrphus) corollae (Fabricius); Scaeva pyrastri (Linnaeus); Sphaerophoria indiana (Bigot), while subfamily Eristalinae include Eristalinus (Lathyrophthalmus) aeneus (Scopoli); Eristalis (Eoseristalis) arbustorum (Linnaeus) and E. (Eristalis) tenax (Linnaeus). Most of the species are newly discovered and recorded to the said region. The complete details having the illustrated keys have been provided for each species. The distribution, size, economic importance and host range of these syrphids are also given.

Keywords: Taxonomy, Syrphid, Fly Fauna, Swabi, Mardan, Kp, Pakistan.

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Introduction

Syrphid flies are also known as hover flies or flower flies. The name of hover flies is due to hovering character around the flower. The size of hover flies depends on the specie like the members belong to genus Baccha, are very small and slender in shape while on the other hand the member of the genus Criorhina are hairy, large and black to yellowish in colour. Majority of the species produced sound at certain stage during flight [1]. They have the potentialto hold their bodies motionless in air for a long period. The Syrphidis generally mild to huge size having bright color marking bristles.Syrphid flies are considered as important group of insects because of their beneficial aspects. Syrphid flies are very useful for diverse group of Diptera which include the 200 genera and 6000 identified species around the world. Syrphinae and Milesiinae are the two most important sub-families of the family syrphidae. Most of the syrphid flies are important pollinators of the many flowers. Larval stage of the many species of the syrphid flies or hover flies is also predators of the aphid and some other pests. Syrphidae family is known to exhibit cosmopolitan distribution i.e they are reported to occur in most biomes having exception to in deserts and tundra at extremely high altitudes and in Antarctica About 6,008 species under 199 genera of syrphid flies belong to 3 sub-families namely Eristalinae, Micro dontinae and Syrphinae are known worldwide. Among them 352 species of 69 genera are currently recorded in India. Larvae of Syrphid flies have different feeding modes like Saprophagous, Aphidophagus, Zoophagous and Phytophagous. While the adults are the flower visitors, they visit large number of flowers in one day. Adult hover flies feed on plant nectars for energy while the requirement of protein is fulfilled by feeding on pollens. Adult flies are 04 to 25 mm long having yellow and black marks on them or small yellow. They fly hastily and have a tendency to hover over plant life. Larvae are about 12 mm long wrinkled or slug like and tapered to some extent interiorly. They are usually brown or green having whitish vicinity. Eggs are chalky white having faint longitudinal ridges and are laid singly among aphid colonies. Syrphid flies over winter climate as pupae in the soil. Adults used to grow in April and at the same time as aphid population begins off evolved to growth. They lay eggs on leaves and stems of flora infested having aphids and having exceptional suitable prey. Eggs hatch in 3 to 4 days into smooth-bodied maggot larvae. Its life cycle starting from egg to adult takes sixteen to twenty-eight days and bearing a number of 3-7 overlapping generations per year [2]. Larvae feed on smooth-bodied bugs, in particular aphids. As many as 400 aphids may be eaten up by way of one larva for the duration of its developing length. Larva's seize aphids having their mouth hooks and suck out the frame contents. These predators are not unusual in most subject and vegetable vegetation and may be crucial in suppressing aphid populations if useless packages of non-selective pesticides are prevented. There are more than 84 species of syrphid flies are discovered in Pakistan. They are often seen hovering at flowers. The adults of many species feed mainly on nectar and pollen. They are second most important group of pollinators after wild bees. Although hoverflies are often considered to be mainly nonselective pollinators some hoverflies species are highly selective and carry pollen from one plant species. Specific flower preferences differ between

species, but syrphid fly species have repeatedly been shown in different area.

Methods and Materials

The current study was conducted in the different areas of district Mardanand Swabi. The method adopted included the collection of syrphid flies from each locality through the day time specifically sunny day were preferred. The following localities were visited during the study.

- **Swabi:** Yarhussain, Dagai, Chota Lahore, Anbar, Gadoon, Adina, Manerai, Dobyan.
- **Mardan:** Turu, Mayar, Mohib Banda Bashkhalae, Gujar Gari, Rustum, Katlang, Sawaldair.

The following methods of collection will be used.

Insect Hand Net

The hand net method was used to collect the syrphids from fields' crops, flowers, and weeds. The bag is made up of thin cloth which is used to avoid damage of the wings and other body parts of the syrphids.

Pantrap

The bowls traps of florescent blue and yellow as well as white were employed for the gathering of syrphid flies, bowls is probably located in a line having change shades at open seen area. Each pantrap has to be filled having water followed by adding a little amount of surf/detergent or special detergent to it. Then the strainer is used to extract the insects followed by the washing in water. The collected insects are moved to plastic bags which are sealable.

Study of Institutional Collection

During the study, different collections present in the University of Agriculture, Peshawar will also be studied.

Post Collection Process

The techniques for the examining the syrphid flies might be observed from the study. The collected specimen was killed in Etyle acetate bottle and having proper size. The specimen's field data were to be recorded properly. Two methods were used for their pinning. Tiny rectangular pieces of white card were used for small size specimen which were then proped up on a pin of stainless steel while the large specimens were directly pinned in the thorax center toward its right side. After drying,the specimens were placed in the wooden collection box. Nephthalene was placed within the boxes for protection of specimens from dermestic bettle attack and another pest.

Identification

The collected specimens of surphid flies were studied under stereoscope (labomedczmu) having 120 multiply by total magnification. The identification of the specimens of surphid were done up to possible level by using available literature and identification keys and other Different editions of "Fanna of British India" published research papers [3].

Results and Discussion

Differentiating 'Syrphidae' characters

The Syrphidae species include small size to large sized flies, range being 4 to 25 mm and very thin to stout. They bear various colours from black, very frequently having yellow or orange marking over the head and thorax region particularly on abdomen. Matured male is most often holoptic rather some dichoptic containing dichoptic females.

They having three ocelli having short as well as elongate antennae having discrete segment first and second along having basoflagellomere; where the arista exists dorsal to subbasal. Short to long plumula may be absent or present having approximately uniform thorax or variated.Anepisternum, notopleuron, scutum prescutellar area, postalar callus, and scultellar marginmay contain clear spines or bristles.

The wings bearing prominent basal cells which include the bm, Cells r, andcup includes the closed r4 + 5cell. Family may have similar number of legs but genera 1 may be modified in greater form.Variations are found in the abdominal from elongate to slender or oval.

Obvious differences are found in Terminalia providing distinctive taxonomic features as a minimum to tribal stage. Latest taxanomic studiescarried out on syrphid fauna of District Swabi and Mardan regionsindicated variations in body length of the species ranging from 5-14 mm. Yellow to brown spots are dominated having black ground colour.

The most considerable character for identification of upper classification is the variation in the facial structure among different speicies. Three number of ocelli is a speicies characteristiclocated over vertex between two compound eyes in triangular shape. Antenna comprises scape, pedical and basoflagellomere.

Shape of antenna carrying similar color within speicies but is different in genera. It has subdorsal, bare, pilose or plumose Arista. Majority of species carrying Tubercle as generic character but its form is considered as a speicies.Structure of the thorax is uniform.Vena ans spuria are present in several syrphids between median veins and radial sector.

Syrphinae, Microdontinae and Eristalinae are the latest division of syrphidae into subfamilies inspite of fourteen tribes. The lateststudiescategorized 10 species under 7 genera which belong to two subfamilies the Syrphinae and Eristalinae.

Following are the identification key of the above-mentioned species, genera and subfamilies of the respective group[4].

Genus episyrphus matsumura and adachi

1 2 3

Figure 1. *Abdomen with central spot in sterna, ventral view.*

Figure 2. *Dorsal view of Episyrphus balteatus.*

Figure 3. *Head lateral view.*

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Figure 4. *Episyrphus (Episyrphus) viridaureus.*

Figure 5. *Abdomen with complete or incomplete subposterior, transverse black band, ventral view.*

Diagnosis

The minute, sclerotized black dots;katepisternal patches of hair seperated broadly all through; orange-yellow terga 4 and 3 having apical and sub basal black fascia. After described the genus Episyrphus, most succeeding personnels considered Episyrphus, a syrphus synonym which was later regarded as a genus by several authors. It comprises of 2 subgenera, Asiobaccha and Episyrphus by Violovitch, 1976. Recently in 2015 Mengual suggested Asiobaccha to be a valid genus offering molecular evidences.The genus Episyrphus is differentiated from Meliscaeva by Frey in 1946 having the help of pilose metasternum as well as pilose metaepisternum which have a ventral to posteriorly placed spiracle. In contrast in 2004 Van Veen considered Meliscaeva to be a Episyrphus subgenus.The colour variability within species madeis marked as a restriction in subgenus Episurphis (E).

Head: Head broader as thorax; bared eye; yellow densely face, white pollinose or dull yellow; the slight darkening below or shining of facial tubercle; Oval basoflagellomere.

Thorax: Black mesonotum having grayish or greenish over disc as well as lateral yellow pollinose; dull yellow scutellum; black pleura which has diverse coloration on different pleura portions; dense long fringe subscutellar; Anepisternum normally extensively pilose having anterior placement, Katepisternal patches of pile are generally separated; metathoraic episternum bearing pile tuft under the spiracle; haired metasternum.

Wing: R4 + 5 vein in wing not dipped in r4+5cell; the posterior intense wing marging bear a series of minute and black sclerotized dots.

Leg: vaguely simple and pubescent.

Abdomen: Narrowly ovate abdomen, wider at the tergum 2 end orhaving a rarely parallel side or a slight constriction observed on basal half while widest at tergum 3 end; Abdomengenerally unmargined; orange-yellow terga 3 and 4 having apical and subbasal black fasciae; sternites venter yellow that consist ofbrownish stripe or spot shaped like diamond.

6 7 8

Figure 6. *Basoflagellomere elongate as compared to other species.*

Figure 7. *Male habitus, dorsal view.*

Figure 8. *Male Metatrochanter blackish.*

Diagnosis: Yellow lunule having spot dark brownish over the base of antenna pilose black scutellum other than around the margin ; pile occipital fringe in male pile 1/4 yellow dorsal having black pile row; black female frons up to 2/3rd dorsal, having spots dusting , and having yellow sternum 5 having a spot black in the median; almost complete Alula having microtrichose.

Length: 7-11mm.

Head: Bare Eye; vertical black triangle, mostly pilose grayish, pile of posteriorly few black; yellow orange ocelli; grayish yellow occiput pollinose, occipital fringe pile one-fourth dorsal yellow pile, black piles row; yellowish brown lunule having two dark brownish spots over the bases of antenna almost distinct yellow frontal triangle, pilose black yellow face, facial tubercle having slightly under brownish black antennae; pilose yellow; grayish yellow gena; narrow mouth having the upper border anteriorly black; brownish black antenna having exception to orangish under the basoflagellomere which is less than one-third; brown arista.

Thorax: Greenish black scutum laterally having exception to from notopleuron to brownish scutellum, pilose pale yellow; yellow scutellum, pilose has medial black disc, lateral and anterior pilose is yellow pleura aeneous moderately.

Wing: Basal half bare cell bm, hyaline; almost completely alula having microtrichose or a bare small area at basal part in center.

Leg: Orange brown coxae, pilose yellow; brownish black trochanters, pilose yellow; black femora 2 and 1 on1/3-1/4 basal; black femure 3 having exception to yellow on half to three forth apical, pilose black; black pilose femure 1 black distal, having exception to basal pale pilose.

Abdomen: Confluent spots on center of terga 3 and 4; touched nearly but without reaching the margin lateral for the most part; the black spot medium on tergum 5, entirely yellow lateral margin. dark spot sternal rounded mostly.

Eupeodes (Maetasyrphus) corollae

9 10 11

Figure 9. *Male habitus large terminalia,dorsal view.*

Figure 10. *Head leteral view.*

Figure 11. *Lateral view.*

12 13 14

Figure 12. *Scutellum medially black pilose.*

Figure 13. *Female habitus darsal view.*

Figure 14. *Head Darsal view.*

Diagnosis: Obvious yellow spots onTergum 2 ½-3/4 brownish black femur 3 black wholly gena large male termanalia dorsal frons of female frons having black 1/2 or less , less or absence of dust spot not to a finger oblique both sides and medium in each other well separated.

Length: 7- 10 mm.

Head: Meeting of eyes at a shorter distance, contiguity of eyes is less than total vertical triangle length; anterior black vertical triangle, pilose posterior grayish narrowly, grayish and black; yellowish grey occiput pollinose, pilose pale yellow; yellow lunule; frontal yellow triangle, pilose black; yellow face, pilose yellow, having brownish black tubercle facial; black wholly gena; anterior brownish black mouth border; brownish black antenna having having exception toion to the brown basoflagellomere on 1/3 ventral; black arista.

Thorax: Greenish black mesonotum, pilose pale yellow; lateral dull yellowish margin on the mesonotal; dull yellow shinning scutellum,black, translucent medial pilose and narrow pilose yellowish on anterior and posterior margins; aeneous gray moderately pleura; lower and upper hair patches on katepisternal having posterior separation; haired metasternum.

Wing: Hyline wings, yellowish stigma;yellowish orange halters.

Leg: Black coxae having white pilose; brownish black trochanter, pilose white and black; black 1 and 1 femora on half basal, three-forth apical brown; black 3- femure four-fifth on basal, Apex yellow brownish on extreme; dark indistinct tibia 3.

Abdomen: Aeneous shining tergum 1; black aenous tergum 2 having a large oval pair of spots yellow extending to margin lateral, well separated spots from the tergum 2 middle ; tergum 4 and tergum 3 each have spots pair extended to margins laterally; these narrowly joined spots at the median line; orange tergum 5, center is blackish indistinctly[5].

Distribution: The USSR and Europe is completely spread having the migratory habit; Japan.

15 16 17

Figure 15. *Male habits, tergum 2 with lunulate pale spot, tergum 3 and tergum 4 light yellow sports whose ending for spatulate, dasal view.*

Figure 16. *Femal abdomen with characteristic spot, darsal view.*

Figure 17. *head lateral view.*

Diagnosis: The Scaeva genus can be identified by the following feature combination: pilose eye, upper half of the eye covered having obvious large facets; regularly undulated and wide membrane of the wing;largely reduced wing microtrichia, half base as well as alula having no pile at all, R4+5 vein immersed in ther4+5 cell very feebly but clearly lunulate or oblique.pale pair of spotstergum 3 and tergum 4 ; very swollen frons of male; medium to large,slender to robust, species.

Head: Densely haired eye, mostly bare or sometimes female eye posterior half covered; upper part of male eye having distinctly enlarged facets on extensive .area; greatly enlarged frons of male, swollen strongly, having pile of dense erect; moderate to strongely swollen face in both male and female, pale yellow to bright face, having narrow black to brown median stripe usually always endingjust over the tubercle.

Thorax: Black shinning scutum, pilose pale always., laterally very vague yellow usually, well-defined rare, margin lateral, entirely pale yellow;dark yellow narrow row to entirely dull yellow disc scutellum or,narrow hind margin to opaque broadly as well as lightly pale; black pleura,haired.pale heavily,

moderate shinning to less pollinose, distinctly yellowish corner of anepisternum posterodorsal sometimes; nonpilose metasternum; lower and upper hair patches on katepisternal broad to narrow connected posterior and narrow rare connected on the anterior, otherwise separated narrowly.

Wing: Greatly reduced Wing microtrichia, half.basal and bare alula nearly; mostly a few scattered, erect, short, microtrichia.located near the margin of the lower wing; R4+5 vein immersed in ther4+5 cell weakly but quite.clearly.

Leg: Yellow generally leg black ¾ femur 3, yellow apex extreme.

Abdomen: Elongated abdomen, broadly to narrowly oval, black, flattened, having yellow irregular or semi-circular 3 pairs of.rectangular maculae; margined to tergum 5 apex from tergum 2 base; pair of lunulate or oblique pale spots on terga 4 and. terga 3; colour variable sterna.

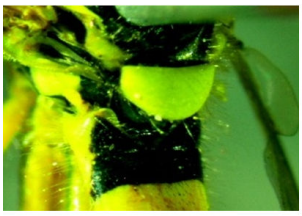

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Figure18: *Scutellum with yellow hairs.*

Figure19: *Legs with black hair.*

Diagnosis: Black haired almost completed Scutellum.; Slender and lunulate spots of light yellow color on tergum 2; spots of light-yellow colour on tergum 3 and tergum .4 lunulate with spatulate endings; fascia marginal not wavy yellow on the posterior tergum 5.

Length: 10-15 mm.

Head: Eye pilose dense, having distinct area on upper area on enlarged facets,contiguity eyes having larger vertical triangle length, black vertical triangle, yellow grayish pilose; yellow orangish ocelli;.white silvery occiput pollinose, pile ofwhite yellowish occipital fringe; lateral brownish lunule over the antenna bases, medial slightly yellow; lateral yellow frontal triangle, medially darker slightly upto contiguity of the eye, pilose black;yellow face, mostly pilose black., having a fewyellow intermixed pili tubercle from anterolateral; black brownish slightly tubercle on the facial .; black brownish gena, pilose pale yellow; black brownish proboscis; narrow mouth with black upper border anterolaterally; blackish antenna, brownish scape, having short thick pile dorsal to the apical; black pedical, similar to pilose, mostly complete black basoflagellomere.dorsal and pale yellow minute pilose on the upper area; brownish arista.

Thorax: Black shining scutum having an exception to yellow dull broad lateral, having pale pilose mostly an exception to pilose black near the suture; darkish scutellum, pilose black have an exception to lateral and anterior margin.

Yellowish pile of subscutellar fringe; black aeneous pleuron, yellow grayish pilose; bare metasternum.

Wing: Hyaline wing; R4+5 vein immersed into r4+5cell; yellow halters.

Leg: Brownish-black coxae, pilose pale yellow; black trochanter, pilose pale yellow; half black basal on femur 2 and 1 black, apically yellow, pilose black and pale; four fifth black basal femur 3, apically yellow, yellow pale and black pilose; half basal yellow on tibiae 1 and 2, apical dark ring slightly distinct,.pilose yellow; 1/3 basal yellow tibia 3, apically slightly brown in colour, pilose yellow; dark, orangish tarsai; pilose pale yellow.

Abdomen: Oval abdomen, marginate, 2-4 terga overall bm lack having white spots, those on tergum 2 are very narrow, center yet behind the tergum, the slightly curved.margin anterior; lunulate having pale spots on terga 4 and 3 , their ends shaped like a spoon; posterior marginal fascia yellow tergum 5 not sinuate .

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Figure20: *Male head compound eye with spot, anterior view of head.*

Figure21: *Male habitus dorsal view.*

Diagnosis: More slender and smaller; thorax, abdomen,.and head have bright color having having exception toion to be completely black sometime; completely not margined Abdomen; scutellar fringe ventrally absent or laterally present; .bright yellow coloured mesonotum, differentiated clearly from dorsum darker male abdomen in.cylindrical and elongated, longer then the wings; male broad tergum 9 of abdomen;.hemispherical and large male termanalia.

Head: Bare eye, holoptic male while dichoptic female; mostly yellow face.having median black vitta; pilose yellow frons; bare and dorsal arista.

Thorax: Bare Postpronotum, black having faint to obvious grayish vittae on thoracic dorsum, lateral margin mesonotum yellow to suture to scutellum; yellow scutellum having mixed or yellow black pile, scutellar.fringe ventral absent or present laterally; metasternum bare or slightly pilose.

Wing: Hyaline infuscated wing from uniform to slight; clearly cross vein anterior before discal cell center; moderate sized calypter.

Legs: Usually yellow legs, entirely black or sometime.brownish; black haired and sparsely yellow femure 2.

Abdomen: Elongated cylindrical abdomen..and abdomen pattern is un margined variable having yellow and black markings; abdomen of male lateral rolled under while there is no female lateral rolling; pattern colour.of terga abdominal variable; Either yellowish Sterna or without any kind of marking possessing dense to slight pale whitish.

Biology: Most of the species produced numerous generation every year . The larvae of diapausing in the two species at overwinter . Development of Larvae Ist (18 days) , 2nd (18 days) and 3rd (20 days) instar noted for the 3 species.while Sphaerophoria menthastri (L) takes 25 days .

Distribution: Northern Afrotrophical, Oriental,.Australian, Holarctic, (Vockeroth, 1969); 9 species in Nearctic, 28 .species in Palaearctic, which have climbed to 33; Indian subcontinent has a checklist of 12 species.

Sphaerophoria Indiana Bigot

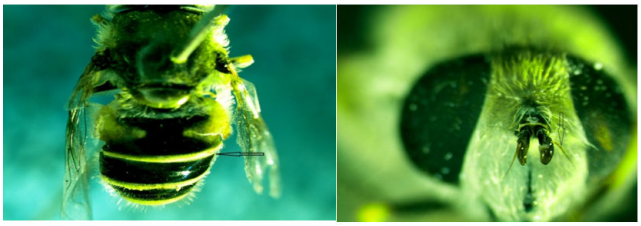

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Figure22: *Tergum 2 with pale lines upto lateral side, male darsal view.*

Figure23: *Arista orange and half plumose basally inerior view of head.*

Diagnosis: femur 1 of male 1/2 lessor more black wholly pilose anteriorly; complete yellow face having exception toion brownish dark faint median tubercle facial yellow scutellum pilose at least.1/4.

Length: 6-8 mm.

Head: Eyes nearly ½ contiguity of the triangle vertical, vertical black triangle, pilose pale yellow; ocellar black triangle., mainly pilose black; yellow orange ocelli; grayish yellow occiput pollinose, pile of occipital.fringe 1/2 dorsal pale yellow, yellowish remaining silvery;.yellow entirely lunule; frontal yellow triangle, pilose yellow; yellow face, pilose yellow, having median.dark brownish facial tubercle grayish yellow gena; mouth narrow.upper anteriorly black border;yellow antenna, distally segment 1 having setae minute lateral and dorsal; similarity of segment 1 to segment 2,brownish.basoflagellomere dorsal; blackish brown arista.

Thorax: yellow postpronotum; yellow black proepisternum., yellow proepimeron, pilose yellow; aeneus black scutum having exception to broad lateral yellow, pilose pale yellow; post orange yellow alar callus, pilose yellow; lateral complete mesonotal yellow vitta; yellow scutellum, black pilose laterally ½ and 1/3 medially., remaining pilose yellow; greenish black pleuron having exception to, posterior.yellow anepisternum on ¾ posterior, ½ dorsal katepisternum nearly yellow, dorsal whole on anterior.anepimeron; dorsomedial yellow anepimeron and 5/6 dorsal yellow katatergum; metaepisternum; yellow metasternum pilose yellow.

Wing: Hyaline, pale brownish stigmatal area; basal yellow halters, orange apically,

Leg: Legs all yellow nearly; yellow coxae, long pilose pale. yellow having exception coxa 3 and 2 having few black thick scattered pile; yellow trochanter.; black pilose femur 1 on ½ anterior; dorsal black pilose femur 2, with.scattered yellow pile in basal between both femur 3 and femur 2 are similar having having exception toion with.dense pile entirely on femur, black tibia 2 having sparsly pale pilose; dense black, yellow.brown, and pale pilose tibia 3; dorsal dark brown meta tarsai having pilose black.

Abdomen: Narrow black tergum 1 black having yellow sides; Black tergum 2 having yellow median fescia of varying constant breadth; black mainly tergum 3 having a vitta narrow on the left side; yellow fascia tergum 4 having a border.black on posterior; yellow tergum 5 having irregular brownish black and yellow.

Subfamily Eristalinae

The identification characters of Eristalinae are its head which is strongly convex towards the back showing postpronotum exposure, which is non-pilose usually while the male possess the least four segment pregenital. The fused lobe is superior having hypandrium in Eristalinae while Syrphinae is articulated. Pollinators are usually adults, however their larvae may be mycophagous, saprophagous, phytophagous, and immature Volucella feed on bee and.wasp brood, while predators are pipizine of Aphidoidae. The larval filter Eristalines are feeders in different.aquatic medium which help in microorganism filtering . The Eristalinae.ispresented by3 species and 2 genra our present study.

Genus Eristalinus Rondani

24 25

Figure24: *Eristalis (Eristalis) tenax male, Bare arista, anterior view of head .*

Figure25: *Mail darsal, First Abdomenal segment with H or black triangular markings.*

Diagnosis: The Eristalinus genus is.diffentiated from the relative genus Erisalis by various features: dark vittae or maculae bearing eyes: katepimeron without pile; posterior.and triangular portion of haired anepimeron and without hair arista.

Head: Eyes bare only rarely or above pilose, clothed having brown or dark spots or stripes, male eyes have brown spots, separated and bare, hairy and contiguous male striped eyes.

Thorax: Black scutum aeneus, moderate pilose and pollinose; transparent, only blackened or yellow, or scutellum.to the base, atleast or entirely clothed entirely having yellow hair at the hind border.

Wing: Hyline wing, without microtrichia; vena spuria weak; R1 petiolate and closed; brownish.yellow pale stigma; whitish calypter.

Legs: black brown or mainly blackish legs having exception toion to the yellow joints of femoral-tibia.

Abdomen: Usually black; similar to the thorax in width; variability in pilosity and pollinosity.

Eristalinus (Lathyrophthalmus).aeneus

Diagnosis: The following combination of characters differentiate the species from the relative members of the Lathyrophthalmus; completely shiny terga 2.and.3; grayish.pollinose vittae on the mesonotum (lighter in the older specimens) Eyes of male meet on frons, pilose yellowish grey on the upper part Eyes of female upper half bare.

Length: 9-11.7 mm.

Head: Holoptic male, contiguity of eyes smaller than 1/2 distance from the vertex to the frons, upper part eyes having pilose yellowish grey.; vertical black triangle, pilose yellowish grey; yellowish grey frons pollinose, long nearly silvery-grey pilose; yellowish grey face pollinose, piloase of moderate silvery.grey, black facial tubercle, non pilose Shining brown tubercle on the antenna; reddish brown basoflagellomere, black dorsal; bare reddish brown arista; dark grey pollinose occiput dorsal but having grey only on the lower side.

Thorax: Brownish-black mesonotum, having slightly five grayish.pollinose having discernable vittae, whereas other specimens.are obvious having pilose yellowish brown; callus postalar having pilose yellow tuft; brassy scutellum .brassy having pilose yellowish brown; ash-gray rather dark pleura, having white, pale yellowish.pilose.

Wing: Weak Vena spuria; hyline wing; brownish yellow bare stigma; half brownish anterior; yellowish halters; whitish calypter.

Legs: Black predominant; black coxa; black femora having orange apex, pilose yellowish; half yellowish tibiae on the basal, blackish brown remainder, pilose yellow pilose; blackish brown tarsi having having exception toion to the meso and pro leg 2 tarsal joints first having dorsal brownish orange.

Abdomen: Mostly shining black, having olive green or greenish bronze reflection, punctate minutely, mostly pilose.brownish, lateral whitish pilose on tergum 2; black shining sterna, having pilose whitish; whitish margins sterna posterior; black genitalia.

Comments: Described Lathyrophthalmus aeneus, as Conops aeneus which was later named as Lathyrophthalnus aeneus. The species locality type is Idria (Yugoslavia). The species can be described having the following diagnostic characters; shiny complete terga 2 and 3; 5 greyish pollinose vittae on mesonotum. (lighter in the older specimens); eyes of male meets at the frons, pilose of yellowish grey on the.upper part; bare female eyes at the lower half. Few of the female specimen possess obvious mesonotum. vittae E. Sepulchralis as well as the olive green reflection.present on th latter character as per the Violovitsch key for the .species whereas all the other characters are as per the description.

Larvae of Lathyrophthalmus aeneus was termed was also discussed and noted biologically about larvae of Lathyrophthalmus aeneus reports that their larvae saprophagous was observed in pools causing the sea woods to decay in August and September, while the adults were seen to seek places for hibernation in the buildings and overwintering takes place as adult. Only bivoltine in the summer. Reported an alongated anal segment of the larvae which live inside the semi-aquatic habitat. Its filtering a huge amount of orgaince media a dbacteria. Perez-male Male reproductive organ and their larve were described. Lathyrophthalmus aeneus was also collected from various regions of world indicating it as a cosmopoliata speicies. The species described was collected having the insect net help for very first time from Swabi Adina, Kalu khan, and Shewa in the current research.

Genus Eristalis Latreille

Diagnosis: Pilose eyes, no unicolorous..having a dark.macule pilose arista; pilose Katepimeron; posteroventrally non pilose meron; presence of no pile ventral or anterior or to spiracle metathoracic.

Head: Broader, produced narrowly frons; semi-circular; lateral pollinose and piles on face, normally hairless and shiny medial, pollinose wholly sometime, central distinct prominence and production anterior narrowly at pits of antenna; holoptic male, pilose eye; short antenna, quadrate segment 3 antennal, broad than longer narrowly; pilose arista.

Thorax: Quadrate, a little longer than broader, having pile longe; bare anpisternum anterior; lower and upper. Katpisternum margin having pile continuous; posterior dorsomedial anepimeron .and bare anepimeron; larger spiracle metatoraic than segment 3 antennal; pleuron metathoraic without pile; scutellum translucent or yellowish.having pile dense.

Wing: Having venation normal, bare; petiolate and r1 closer; long petiole on r4+5 having the length equivalent to humeral cross vein.

Legs: The third femur.is not swollen, simple

Abdomen: Is wide as thorax and Oval, less conical or elongated, abdominal spots of pale yellowish colour normally, marking or fascia.

Biology: Eristalis prefer mud and manure places for the oviposition.Larvae of the adult pollinators filter the ponds .

Distribution: Present in Oriental, Afrotropical, and Palaearctic; presented 2 species.

Eristalis (Eoseristalis) arbustorum

Diagnosis: This specie is different from other Eoseristalismembers due to the following features/ characteristics: nearly complete face, pollinose yellowish gray; contiguity of eyes.greater than. the distance.amongst the posterior and. anterior ocelli; basally half arista setose, 4-5 times setae longer.compared to the thickness of the basal arista; light grayish-yellow dust on mesonotum ; distinctly darkened tibia 2.tip.

Length: 9- 10.7 mm.

Head: Holoptic male, face and frons pollinose yellowish-grey; face pilose pale yellow; deeper yellow frons having pilose; blackish vertex,.Pilose black, pilos eyellow posterior; black antenna, orange arista , half basal pilose; pale grey ociput, lateral margins silvery-white, anterior yellow pilose, posteriorly whitish.

Thorax: Brownish-black mesonotum with.pollinose of colour light grayish-yellow; brownish orange scutellum with.pilose brownish yellow.

Wing: Nearly hyline wing, without microtrichia; little yellowish front and base; brownish tiny stigma; yellow calypter and halters.

Legs: Femoral tips,black, basal tibia 1 2/3, tibia 3 half nearly basal orange; distinctly dark apically tibia 2; yellowish pile, tibia 3 apically half pilose black.

Abdomen: Black; triangular tergum 2 having macula orange yellow on lateromedially each having triangle tip.directed .to middle of tergum; black shining terga 4, 5 having yellow narrowly on margin posteriorly; mostly pale yellow pile somewhat long and dense and long, palar to the tips.

Eristalis (Eristalis) tenax

Diagnosis: Combination of characters may differeintiate the speices from the related members; face having medial broad.black vitta; two denser eyes dark hair vertical vittae; Short arista nearly bare pilose;. Katepimeron pile present on black meso and pro tarsi; broad abdomen.

Length: 13-15 mm.

Head: Holoptic male, contiguity eyes almost as long as ocelli. Eyes having two vertical denser dark hairs vittae; black head; triangle frontal, Black pilose color then apically, dust grayish yellow and.lateral pilose yellow; yellowish grey face, exclusive of shiny.black medial.vitta,, pilose yellow; black gena., pilose yellow; dark brown antenna, bare arista, brown; dull black vertical triangle, pilose black.

Thorax: Brownish- black mesonotum.having pollinose yellowish gray, pilose yellow; callus postalar having yellow pilose tuft; brownish.yellow scutellum having pilose yellow; spiricular brownish yellow fringes.

Wing: hyline wing, without microtrichia; half brownish anterior; yellow dull brownish halters; yellowish dull calypter.

Legs: Black legs exclusive of tibial.joints orange femoral and third basal femur 1, half basal tibia 2, yellow; femur 3 with.pilose black, dense on posterior edge apicoventrally, posterior black pilose tibia 3.

Abdomen: Black tergum. 1, brownish yellow; black tergum 2 excluding apical margin orange yellow having lateromedial large macula occupying lateral full width, medial extending 1/3; black tergum 3 apically orange, broader orange anterior margin having exception to.¼ medial, and wide mediolateral orange.fascia basolaterally connected to upper pale margin, black tergum 4; dusted grey sternum 1; yellowish sternum 2 while.black largely sterna. 4 and 3; black genitalia.

Episyrphus (Episyrphus) balteatus

Diagnosis: The center presence of black spot in each sternum, either or immaculate having absence of anterior mesonotal collar hairs.

Head: the yellow pollinose, yellow,and yellow pilose face; Each antennal basess of the lunule have two dark spot only placed dorsal; the yellow frontal triangle, black and yellowpilose; bare eye; vertical black pilose or grayish black triangle; the orange-yellow antenna having dorsally darkerbasoflagellomere.

Thorax: The absence of anterior mesonotal hair collar; Scutum aeneous bearst wodorsomedial narrow and sub medial broad silvery pollinose vittae, theanterior pilose area to ailvery scutellum; yellow nonpilose postpronotum; yellow heavily polinose notopleuron; yellow scutellum,having black posterior and pilose, lateral and yellow anterior and pilose;complete yellowish-white hair ventroscutellar fringe; black aeneouspleuron, yellow pilose; pilose metasternum.

Wing: Hyaline membraned wing; the apically microtrichose, baredbm cell, microtrichoise 1/4 apically; broad alula, microtrichose; yellow spiracular fringes; yellow calypter; yellow halter.

Leg: Nearlyand entirely yellow having brownish coxa bearing medially dark brown femur 3 having dorsally darker tibiae 3 and yellowish at basal extreme.

Abdomen: Linear, yellow; anteromedially black, yellow tergum 1, yellow pilose; yellow tergum 2 having fascia black on the lower margin as well as black fasciate medial macula that touches having the upper margin in addition to theupper half black vitta, pilose yellow having exception to 1/5 posterior; yellow tergum 3having lower margin black fascia and black fascia medial bent slightly in the center, black pilose other than 1/5 anterolateral; similarity to tergum 3 other than the lower half covered having black fascia but not at the lower margin; yellow tergum 5 having a small spot black indistinct and situated over the middle each sterna having spot black immaculate or in the center.

Distribution: Found in Australia, palaerctic and Oriental regions.It is also found to exist inisolated subcontinent likeIndia and Pakistan recorded a single species of female discovered in 1913 by Howlett from Peshawer, Pakistan. Other researches show, the reported species collected from the Mardan District (Mayar, Mohibbanda Bashkhalae, Gujar Gari, Rustum, Katlang, Sawaldair), Swabi (Yarhussain, Dagai, Chota Lahore, Anbar, Gadoon, Adina, Manerai, Dobyan)

Episyrphus (Episyrphus) Viridaureus

Wing: hyaline wings; brownish grey stigma; yellow halter

Leg: yellow legs; slightly darkish trochanter at the basal, black coxae, typically yellow: slightly darker tibiae 3 on one third apical; tarsi 3 apically turning brownish; the all yellow fine pile; tibia, tarsus and femur having ventrally thick yellow pile on its surface.

Abdomen: Additional than half median black segment 1; Yellow broad fascia tergum 2 , divided medially by the black vitta reaching less or more to tergum 2 middle; tergum 3 and 4 is typically yellow having anterior black fascia bent over slightly forward in their middle, and having posterior located black broad, arched fascia; typically yellow tergum 5; the sterna 2 and 3, at least having incomplete or complete transverse subposterior, black band .

Genus Ischiodon Sack

Diagnosis: These species are recognizable due to the following character combination: bare eye; elongated basoflagellomere ; distinct but slightly margined abdomen having a light dorsal convex; anterior bare anepisternum; patches of katepisternum pile seperated broadly and posteriorly ; yellow clear spots exist on the katepisternum upper margin ; male metatrochanter having process like ventral spine female tergum 8 well-developed.

Head: Bare eye; Non pilose yellow face; very short segment 2 antennal, very large basoflagellomere, two times longer and broader like the benting to rounded sharpely apex, shorter arista than basoflagellomere.

Thorax: Black shining mesonotum having lateral yellow margin mesonotal, yellow scutellum, vaguely normal brownish near the disc; black shining pleura, patches of Katepisternum hair posteriorly separated; bare metasternum.

Wing: wing apex before theR4+5 ending, its apical portion clearly bent forward. Mostlybasel half wing without microtrichia though present sparsely on the wing elsewhere.

Legs: mostly yellow leg; ventral surface of malemetatrochanter having moderately stout or slender, distally sharp, cylindrical process of variable length

Abdomen: Elongated abdomen having flattened above, parallel sided, tergum2 center to tergum 5 end having a strong margin; confluent or separate yellow fascia pair tergum 2; the slight presence of yellow fascia arcuate both tergum 3 and 4; the abdomen apical portionhaving black areas which isalmost reddish creating an unclear pattern; presence of central dark fascia or spot on the yellow sternite.

Biology: The immature stages biology has been studied by Mishra and Singh in 1988 while many others illustrated the immature stage. Larvae of Ischiodon feed on aphids and are predatory even on the larvae of Lepidopterous which has been recorded.

Genus Ischiodon scutellaris

Head: Contiguity of eyes equivalent to distance nearly from lunule to vertical triangle tip;Bare eyes, holoptic,; Black occiput,pollinsoe white, pale pilose; Shiny, black vertical triangle, grayish pilose; frontal yellow triangle, pilose yellow; facial tubercle on face, pilose pale yellow; yellow gena, yellow sulphur lunule; very brownish, small epistome; yellow-brownish orange antennae; relatively long length pedicel, sharp-slight apex curved basoflagellomere tappering,elongated,having a long length than pedicel and scape together;shorter arista as well as basoflagellomere, yellowish arista,

Thorax: Black shining scutum other than yellow lateral vitta, pilose yellow, bare, black postpronotum; notopleura,light yellow postalar black callus ; yellow scutellum, pilose yellow, normally vague brownish colour on the disc; black shining pleura, other than posterior part of yellow anepisternum on half posterior, pilose yellow, and yellow dorsal macula on katepisternum, pilose yellow; bare metasternum.

Wing: Hyaline membrane wing; bare mostly; wing bare having half basal without microtrichia though present sparsely on wing elsewhere; broad allula sparse, microtrichose, sparse; R4+5 end of wing vein before apex of wing; R2+3 or reaching tip R1of costa; well-developed vein spurrous, reaching hardely the discal cell apex.

Leg: Reddish-yellow, leg of moderate length, yellowish femure-3 further than half, almost one or black 1/3; extreme femure 3 yellowish apex; blackish brown metatibia ring; yellow, metabasotarsomere, 3rd, 4th, 5th, of the dorsal blackish metatarsomere; male metatrochanter having calcar ventral.

Abdomen: Flat Abdomen or lightly dorsally convex, margined 3-5 terga, almost sided parallelly; mostly dorsum pilose black having exception to for tergum 2 and tergum 1half anterior; black tergum 2 having seperatemaculae pair in yellow colour; black terga 3 and 4 having light curving, instead of a yellow fascia rather broad emarginated (brownish on tergum 4) posterior margin; brownish tergum 5.

Genus Eupeodes Osten Sack

Diagnosis: rarely haired or bared eye; sub shining otherwise shining thorax, flattened normally. oval; patches of katepisternal hair having posterior separation; haired metasternum; mesonotal dark marginif yellowish rather being dull laterally; dark pleuron having no areas yellow.

Head: Usually bare eye or having really short hardly scattered distinguishable hairs. yellow narrow face having clearly cut stripe brown or brown median.

Thorax: black shining mesonotum; yellow dull yet shining scutellum, translucent; patches of lower and upper Katepisternal pile narrowly joined or moderately separated posterior, joined nearly anteriorly having the lower patch broadening; dark pleura, not having any areas yellow; mesonotal lateral dark margin, if dull then yellowish but cannot be distinguished clearly from the dark dorsum; haired metasternum.

Wing: The membrane of the wing is almost generally entire trichose having a small basal bare area; almost straight R4+5 vein mostly straight.

Legs: slender legs, unarmed femur 3, tibia 3 and simple tarsus 3.

Abdomen: Oval abdomen, moderately broad to slender, strong marginate from tergum 2 center to tergum 5 end; yellow spot on tergum 2 while being generally and narrowly separated but merging broadly in some of the species; pair of spots or yellow single band on tergum 4 and 3; yellow sterna, the least sternum 3 and 2, and in general sterna is completely dark brown median to the black spot or fasciae.

Biology: The species have aphidiphagous larvae;E. (M.) corollae European syrphids are the special migrant species, the Larvae feed on aphids .The larva of Eupeodes resemble the Metasyrphus americanus .

Key to the species of genus Eupeodes Osten Sacken

Completely almost Alula or microtrichose; yellow lunule having dark brownish spot over the bases of antenna; pile black on scutellum having exception to margin along pile of occipital fringe on male at yellow dorsal 1/4 having black pile row; black female frons dorsal upto 2/3 dorsal, having spots dusting and yellow sternum 5 having a black median spot .

Tergum 2 has spots obviously yellow the third femur is ½ to ¾ brownish black; black wholly gena; large male terminalia; frons of female having ½ dorsal or a little black, having spot dust absent or less to a finger oblique on both sides as well as completely separate from other in the middle.

Conclusion

All the above information shows that Districts Swabi and mardan has a unique fauna and flora and no comprehensive study has been conducted on syrphidae family in the above region. So therefore, the present work was planned to explore the syrphid fauna with objectives.

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