



First report and redescription of five species of genus *Myrmeleon* (Neuroptera: Myrmeleontidae) from Pakistan

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Article published on July 30, 2018

Key words: Antlions, *Myrmeleon*, Myrmeleontidae, Neuroptera, Taxonomy.

Abstract

The antlion species diversity belonging to genus *Myrmeleon* was studied during 2011 to 2014. Total 703 antlion specimens were collected. Morphological analysis, following standard taxonomic protocols, revealed the presence of six species of genus *Myrmeleon* in this collection. Out of six, only one species, *Myrmeleon assamensis* has been previously reported while five species, *Myrmeleon bore*, *Myrmeleon hyalinus*, *Myrmeleon inconspicuus*, *Myrmeleon noacki*, and *Myrmeleon trivialis* are the first records in Pakistan.

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Introduction

Family Myrmeleontidae (antlions) is a highly diverse and widely distributed family of Neuroptera. Antlions are often confused with dragonflies the members of order Odonata but they have very distinct morphology and biology.

Antlions have been a subject of considerable taxonomic research. There are more than 2000 described species of antlions worldwide with around 1600 valid species. From interior Asia (i.e. Arabia, Iran, Afghanistan, West- Pakistan, Turkey and the adjacent parts of Kazakhstan more than 250 species are known (Hölzel, 1972).

To date taxonomic studies performed in family Myrmeleontinae are based on morphological characters. The main characters considered for morphological identification include wing venation, body colour, wing markings pattern, number and type of setae on various body parts and shape of different parts of male and female genitalia morphology. Most developed identification keys and literature is based on male morphological characters. The larval stage also has specific species based differences and can be identified on the basis of shape of jaws and their setae (on jaws, body and posterior digging setae). There are still improvements required for establishing comprehensive knowledge about antlions morphological taxonomy (Mansell, 1992).

Genus *Myrmeleon* is also most spacious genus of its family with 176 recorded species to date (Stange, 2004). Individuals of genus *Myrmeleon* can be found in much diverse climatic conditions ranging from deserts to rain forests and even some snow fall areas. Their adaptability to diverse climatic conditions ensures their diversity (Abrahám, 2003). The members of genus *Myrmeleon* have been studied extensively in Europe and other parts of the world (Stange, 2004).

Previously on the basis of work on African and Indian faunas Banks (1913) predicted *Myrmeleon clothilde* presence in Pakistan. Later Hölzel (1972) reported one species *Myrmeleon paghmanus* in Pakistan.

While Ghosh (1984) in his work from India also predicted *Myrmeleon assamensis* expected in Pakistan. While Iqbal and Yousuf (1991) described two species *Myrmeleon clothilde* and *Myrmeleon assamensis* from Pakistan. So genus is poorly studied in Pakistan. A significant amount of literature has covered the behavior, pit building, predation and biology of this group of insects. The current studies were designed to analyze the antlion fauna of Pakistan, a country known for species richness. These studies revealed the presence of six species in Pakistan.

Materials and methods

Country wide surveys were conducted to collect antlions during 2011 to 2014. Adult antlions were collected during summer seasons using various techniques while larvae were also collected and then reared to adult stage for identification. The detailed protocols are described below.

Light trapping

Adult specimens were collected using light traps preferably during dark nights. The light trap consisted of white sheet (3×3 meter) supported by metal rods and mercury vapor light bulb 160 Watts (W)/ 170 W (General Electronics USA) or 200, 100 watt Incandescent tungsten bulb (Philips Pakistan) or 18 Watt tube black light white (GE, USA). All light sources were run by electrical ballast except tungsten. Power source used was petrol operated 850W generator or vehicle battery attachable 1200 watt; 12 volts DC to 220-240 volts AC converter. Light trap collection was started after sun set till 23:55 hours. Collection was also made from lights at various public places, streets, cafes, hotels and petrol pump stations. During the day time a hand net (15" diameter and 72" handle) was used for collection of adult antlions. Net sweeping aided by disturbing flora was done during day and also with the help of hand held light source during the night. Net sweeping was made over the grasses to extract antlions hidden under the cover. While at night, grasses and shrubs were shaken to make antlions fly in front of search light for hand net collection.

Larval collection and rearing

All the specimens analyzed in this study were collected from different geographic regions of Pakistan during 2011 - 2014. Larvae were collected by excavating them from their pits using steel spoon. The pit building material was scooped and filtered to reveal larvae. Larvae were handled by using feather light forceps (Bio-Equip, USA) to avoid physical damage and stress on them. Then larvae were transferred to a glass vial with screen lit to transfer to the laboratory for rearing. The larvae were reared in the laboratory at a temperature $27 \pm 3^\circ\text{C}$. The larvae were reared in glass vials of size $2.54\text{cm} \times 6.3\text{cm}$ and capped with a rubber loose cap. Antlion larvae were fed with their natural prey ants, aphids and sometime termites collected from field. Ants collection was done by using aspirator (locally made manual and motorized). Single ant was offered to larvae every day once. Only third instar larvae were fed twice a day. Once they stopped feeding for three days, prey offering was stopped. They were left for one week and then pupae were extracted and transferred to plastic cups of size 5.0cm (bottom) \times 7.62cm (top) \times 7.62cm (deep). A fine stick wrapped in tissue paper was placed in jar to make adults grip easy and let them expand their wings. The pupae were placed in a cage to avoid escape of emerging adults. The pupae were kept for imago emergence at $27 \pm 3^\circ\text{C}$.

Killing and mounting

Antlion were killed using killing jars containing ethyl acetate or potassium cyanide (Srivastava, 1996). The dead specimens were either field pinned or after killing the specimens were paper-wrapped singly. The lab reared adults and field collected adults were processed in laboratory for curation. Specimens desiccated or hardened during transport (from field to laboratory) were softened by placing specimens in a glass container with moist sand in the bottom. The specimens were kept till they were soft enough to work with. Antlions were pinned by using different size entomological pins ranging 00, 0, 1, and 2 according to the body size of the specimens. The specimens were spread on setting board and dried for three days in summer.

While during winter season one week drying was done. All the collections were labeled following standard entomological procedures. Label information contained locality, GPS coordinates, date of collection, collector name and collection method. The specimens were stored in custom made boxes with dimensions $33.02\text{cm} \times 38.1\text{cm} \times 7.62\text{cm}$. The boxes were treated with insect repellents and stored in custom made shelves with supply of Phenolphthalein pellets to save the specimens from predatory insects.

Geographic data recording and imaging

Geographic information of collection sites was obtained by hand held GPS device (Garmin model Etrax 150) and photographs of locations were taken by Olympus Coolpix $\mu 9000$ and Cannon Power Shot SX 150IS. The micro photographs were taken by using a China made small camera attached with microscope.

Dissection and identification

Some insect body parts, especially terminalia, desiccate and shrink and require special treatment for analyzing their morphological features. The specimens were handled in a dissecting tray and abdominal terminal part (6th or 7th segment) was removed by using Micro Scissors (eye surgical scissors, Sialkot, Pakistan) and feather light forceps (BioEquip, USA). For maceration, terminalia were kept in 10% potassium hydroxide (KOH) solution for 3 to 12 hours depending upon condition of the specimen. Tissues were extracted from macerating solution and then flushed by using ethyl alcohol (EtOH) or diluted acetic acid to remove any debris or macerated stuff. The terminalia were stained by using Chlorazol Black E (Merck, Inc.) for 1 - 2min. After colouring once again tissue were rinsed with 70% EtOH to remove extra colour. Caution was taken to avoid extra staining which could hinder the observation of complex exoskeletal structures. The structures were suspended in glycerin by gently teasing with special needle (micro pin mounted on fine bamboo stick) and observed under a microscope. Structures were saved in Polyethylene Genitalia Vials #1133C (BioEquip, Inc, USA).

Morphological characters of antlions were studied using stereo microscopes models Olympus Stereomicroscope, Labomed, Trinocular Microscope and an eyepiece mountable microscope camera (China). The measurements were recorded by using ocular micrometer fitted in microscope eyepiece. While for measuring wing and body length; digital vernier calipers were used.

The terminology used was based on details presented by Stange (1970) and Krivokhatsky (2002). Morphological identification of antlion specimens was carried out at the National Insect Museum (NIM), NARC, Islamabad during 2011 through 2014 and Texas A & M University, USA (6 months during 2011-2012).

Results and discussion

Antlions collected directly as adults and those emerging from lab reared larvae counted to 80 specimens belonging to genus *Myrmeleon*. These specimens were identified to six species. Species collected in this study include *Myrmeleon assamensis*, *Myrmeleon bore*, *Myrmeleon hyalinus*, *Myrmeleon inconspicuus*, *Myrmeleon noacki*, and *Myrmeleon trivialis*. Out of six species being presented in the current study, included five species that are new records from Pakistan.

Genus Myrmeleon Linnaeus, 1767

Myrmeleon assamensis Ghosh, 1984 (Fig. 1)

Diagnosis

Medium sized antlion with brownish black colour. Two black stripes on pronotum are distinctive character. Black circles in apical part of hind femora, while fore femora with blackish tibiae. Pilula axillaris present.

Re-description

Head. Black with clypeus yellow, ocular rim creamy yellow, gena, inter-antennal mark shiny black, scape and pedicel black, antennae black colour becomes lighter and dilated in apical region. Vertex black with two yellow marks. **Thorax.** Pronotum yellowish with distinctive two broad black lines and covered with thin brown setae. Meso and meta thorax black. Lateral sides of thorax black. **Legs.** Yellowish, with fore-tibia blackish and on hind femora apical region black round spots.

Femoral sense hair present on fore and meso legs. Tibial spurs present and equal to first tarsal segment in all legs. **Wings.** Hyaline, longer and narrower in shape. Pterostigma indistinct, veins yellow only in fore-wing cross veins bases have brown spot. Venations with small setae. Radial sector starts after seven to eight cross veins in fore-wing divided into 11 branches. While in hind-wing, radial sector starts after four cross veins and divided into 13-14 branches. Pilula axillaris present on the base of hind wing. **Abdomen.** Abdomen elongate slender and chocolate brown in colour. Abdomen covered with fine yellowish brown setae. Males have ectoproct well developed but not elongated.

Material Examined

2♂, 1♀: Chak Shahzad, Islamabad (33.672100°, 73.116870°) 14-iv-2010 Saleem Akhtar, 1♂, 3♀: Dhoke Masyal, Jhelum (32.946497°, 73.619731°) 15-iii-2010 Saleem Akhtar, 2♀: Koral Islamabad (33.597504°, 73.150861°) 26-viii-2010 Saleem Akhtar.

Body measurements (mm)

Forewing: ♂ 27-28mm, ♀ 24.5-25mm; hind-wing: ♂ 26-27mm, ♀ 24-25mm; body length: ♂ 25-26mm, ♀ 23-24mm.

Remarks

The species description is similar to the Ghosh (1990), Ghosh (1984) and Iqbal and Yousuf (1997). Previously species was reported from Khanewal Punjab (Iqbal and Yousuf 1997), while current study reports presence of species from new locations from upper Punjab high land areas.

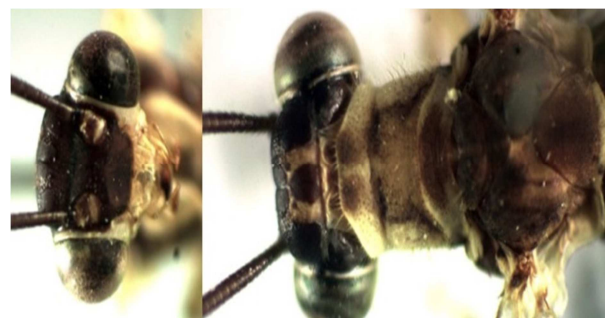


Fig. 1(a). *Myrmeleon asiamances* pronotum and face.



Fig. 1(b). Male genitalia different aspects.
Myrmeleon bore Tjeder, 1941 (Fig. 2)

Diagnosis

Face brown, clypeus brown and labrum brownish yellow. Clypeus with four black setae and labrum has a row of setae on lower border. Antennal socket yellow, scape brown on anterior side and yellow posterior side. Pedicel brown and flagellomere black in colour.

Re-description

Head. Face brown, clypeus brown and labrum brownish yellow. Clypeus has four black setae and labrum has a row of setae on lower border. Antennal socket yellow scape brown on anterior side and yellow on posterior side, pedicel brown and flagellomere black in colour. Three dark lines in face one central and two on lateral sides. Inter-antennal mark brown and epicranial mark dark brown with a transverse black line. Vertex raised brown spots on anterior and posterior row of vertex. The marks similar to *Myrmeleon hyalinus*. **Thorax.** Pronotum brown and anterior margin lined with white colour. Pronotum has two clusters of long setae on either side of the middle line. Pronotum has long black setae and small brown setae. Meso and meta thorax uniformly brown without any mark or spot. Black setae tufts on prescutum. Fine yellow setae on disc endings of scutum and scutellum. **Wings.** Wings long narrow and acute at ends. Wing margins have fringes of setae. Wing venation colour clear with patches of brown colour. Forewing has 7 cross veins before Radial sector and RS divided into 7 branches. Hind wing has 5 cross veins before RS divided into 7 branches up to hypostigmatic cell. Posterior Banksian line very clear in both wings formed by lower arm of cubitus. **Abdomen.** Dark brown in colour abdomen has small black setae which turn thick and long from apex of sixth segment to abdomen tip.

Posterior gonapophysis elongated and very fine cylindrical with setae on apex. Setae longer than length of gonapophysis itself. Ectoproct well-built and have small stout digging setae.

Material examined

1♂, 2♀, Dhoke Masyal, Jhelum (32.946497°, 73.619731°) 15-iii-2010 Saleem Akhtar, larvae collected at 26-vii-2010, 1♂, 2♀: Darya Khan (31.786860°, 71.091173°) 10-viii-2010 Saleem Akhtar, 2♀ Harappa Sahiwal (30.594944°, 72.914663°) 05-iv-2010 Saleem Akhtar.

Body measurements (mm)

Forewing: ♂ 25-26mm, ♀ 24 mm; hind wing: ♂24-25mm, ♀ 24-25mm; body length: ♂ 23mm, ♀ 21mm.

Remarks

The species descriptions are similar to Monserrat and Acevedo (2013) and Ábrahám and Papp (1991) except little size difference and the specimen presented in current study have shown little light colour that may be due to collection and killing of newly emerged adult specimens. The species occurs over wide area of globe. Species have been reported from all continents (Stange, 2004). However, the current study has recorded this species in Pakistan from multiple localities for the first time.



Fig. 2 (a). *Myrmeleon bore* face and pronotum.



Fig. 2 (b). *Myrmeleon bore* female genitalia.

Myrmeleon hyalinus Olivier, 1811 (Fig. 3)

Diagnosis

More yellowish pronotum with brown groves. Marks on the vertex are also bright yellow as compared to other species. Male have small pilula axillaris.

Re-description

Head. Face black and yellow lower margin. Clypeus yellow and have two to four black setae. Labrum yellow and have setae on lower border. Palpi basal segment yellowish and distal segment shining black well swollen. Sensory spot in apical region. Apex pointed ant tip have two lobes. Antennal sclerite yellow, scape yellowish brown, pedicel black antennae black only a mild yellowish appearance in apical part. Inter-antennal and epicarinal mark black. Vertex raised. Frontal row black and middle row yellow but has a black spot in the middle. Anterior and posterior row field yellow area has black setae. Posterior row has 3 blackish brown spots. Two lateral spots on posterior row get triangular shape by expansion as they proceed toward occiput. **Thorax.** Pronotum yellow base with brown colour spread starts from posterior margin and narrows down into a line beyond frontal furrow. Colour expands in groves of furrow but not in middle forming concave blank areas. Ultimately pattern looks like flying squirrel/fox shape. Pronotum has pale setae on it absent in furrows. Strong setae present on lateral sides: Meso and Meta thorax dominated with brown colour except some yellow spots along central row on discs. Bright orange yellow spot on Meta scutum discs prominent in males. **Wings.** Wings narrow, hyaline and subacute at the apex. Wing venation pale yellow only little dark appearance in subcostal vein. Forewing has 9 cross veins before radial sector and radial sector divided into 9 branches. Hind wing has 5 cross veins before radial sector and RS divided into 9 branches. Veins and cross veins have hair like black and white setae. Pilula axillaris small and white in colour. **Legs.** Prolegs swollen as compared to others. Coxae brown at base and yellow beyond half. Fore coxa have black stout setae on inner face. Femora yellowish at base and epically brown. Pro tibia much brown while Meso and Meta tibia on ventral side have brown tint while dorsal side yellow.

Tibial spurs brown and do not reach the apex of first tarsal segment. The apical tarsal segment much enlarged. **Abdomen.** Dark brown in both male and female. Tergites and sternites have yellow hair like setae on them. Setae longer on first two segments. Apex of sternites and tergites yellow transversely. In female posterior gonapophysis small cylindrical and thin. Anterior gonapophysis thick and pointed. Ecoproct well-built. The lower lobe of ectoproct and lateral gonapophysis have digging setae. In males epical abdominal segments yellow in colour. Male ectoproct rectangular shape. Pregonital plate elongated and pointed and have long hair like setae.



Fig. 3 (a). *Myrmeleon hyalinus* face and pronotum.



Fig. 3 (b). *Myrmeleon hyalinus* male genitalia.

Material examined

2♂, 3♀: Chak Talpur, Dera Ghazi Khan (29.789165°, 70.347203°) 24-v-2010 Saleem Akhtar, 2♂, 6♀: Darya Khan (31.786860°, 71.091173°) 19-iv-2010 Saleem Akhtar, 4♂, 6♀: Darya Khan (31.786860°, 71.091173°) 05-iii-2010 Saleem Akhtar, 1♂, 6♀: Darya Khan (31.786860°, 71.091173°) 19-iv-2010 Saleem Akhtar, 2♂: Darya Khan (31.786860°, 71.091173°) 03-v-2010 Saleem Akhtar, 1♂, 1♀: Darya Khan (31.786860°, 71.091173°) 26-vii-2010 Saleem Akhtar, 1♀: PARAS,

Faisalabad (31.394628°, 73.017714°) 02-vii-2010 Saleem Akhtar, 4♂,6♀: Mithi (24.733806°, 69.820181°) 02-vii-2010 Saleem Akhtar, 2♂,2♀: Chakwal (32.916258°, 72.870799°) 12-vii-2011 Saleem Akhtar, 4♂,16♀: Lal Sunahara National Park (29.366839°, 71.965912°) 07-v-2012 Saleem Akhtar, 2♂,2♀: Chak 160 Sadiqabad (28.166594°, 70.191645°) 07-v-2012 Saleem Akhtar.

Body measurements (mm)

Forewing: ♂ 18mm, ♀ 21.5 mm; hind wing: ♂16.5 mm, ♀ 19mm; body length: ♂ 20.5 mm, ♀ 19mm.

Remarks

The species has been described under many subspecies by various authors (Stange, 2004). The species description is similar to Abraham (2010), Holzel (1986), Banks (1913), and Devetak *et al.*, (2013). The species has some variation in case of pronotum marking. The species has little variation in case of some subspecies its little lighter. While specimens included in current study show little darker mark on pronotum.

Myrmeleon inconspicuus Rambur, 1842 (Fig. 4)

Diagnosis

Face black with round yellow spot in middle. Clypeus yellow with two blackish brown spots in lower area containing one black setae.

Re-description

Head. Face black with round yellow spot in middle. Clypeus yellow with two blackish brown spots in lower area containing one black setae. Labrum yellow lined with yellowish brown setae. Palpi yellow basal segment but distal segment shiny black with round sensory spot in apical portion and ends into bifurcated tip. Antennal sclerite yellow. Scape brownish black on front side while yellow on back side. Antennae have yellowish appearance on anterior and posterior side. **Thorax.** Pronotum dark blackish brown predominantly and along anterior border have two yellow spots. Pronotum have setae all over it. Setal bases brown and little raised. Borders of pronotum lined with setae. Meso and Meta thorax dark brown in colour with few erect setae on prescutum.

The colour gets lighter on discs. Meta scutum discs have prominent orange yellow spot on them. Pilula axillaris present and white at base with golden brown brush towards apex. **Wings.** Wings narrow littler longer abdomen. The wing venation have white colour with few splashing of brownish black colour. Colouring much prominent in subcostal and cubitus. Pterostigma blackish at base and end part white. In hind wing an indistinct white stigma present. Forewing has 7 cross veins before RS, and RS divided into 7 branches. The hind wing has 5 cross veins before RS and divided into 9 branches. **Legs.** Procoxa yellow with outer yellowish brown spot. While meso and Meta coxae blackish brown with silvery appearance. Pro and meso tibia with irregular brown and yellow. Meta femur basal half yellow and apical half black. Tibia variant colour; inner side blackish and outer side whitish distinctive in hind tibia. Tibial spurs brown and equal to first tarsal segment while little smaller in hind tibia. Last tarsal segment too much long and black. **Abdomen.** Dark brown in colour with fine white setae on it. In females, cylindrical small posterior gonapophysis and well developed ectoproct. The lower end of ectoproct have digging setae. In males ectoproct broad with long apical setae. Pregenital plate elongated.

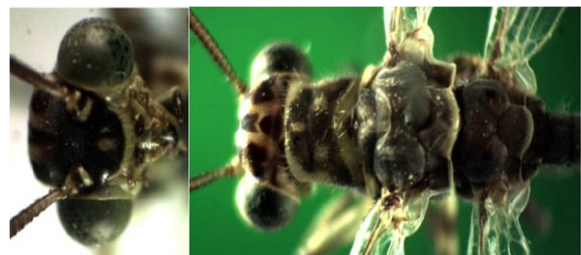


Fig. 4 (a). *Myrmeleon inconspicuus* face and pronotum.



Fig. 4 (b). *Myrmeleon inconspicuus* male genitalia.

Material examined

1♂: Chak Talpur, Dera Ghazi Khan (29.789165°, 70.347203°) 24-v-2010 Saleem Akhtar, 3♀: Darya Khan (31.786860°, 71.091173°) 19-iv-2010 Saleem Akhtar, 1♂,6♀: Mithi (24.733806°, 69.820181°) 02-vii-2010 Saleem Akhtar, 1♂,1♀: Lal Sunahara National Park (29.366839°, 71.965912°) 07-v-2012 Saleem Akhtar, 2♂,2♀ Harappa Sahiwal (30.594944°,72.914663°) 05-iv-2010 Saleem Akhtar.

Body measurements (mm)

Forewing: ♂ 18mm, ♀ 20 mm; hind wing: ♂17 mm, ♀ 18mm; body length: ♂ 18 mm, ♀ 21mm.

Remarks

The species descriptions are similar to the Krivokhatsky, 2011 and Monserrat & Acevedo 2013. The species does occur in wide range in world (Stange, 2004). The species is first time recorded from Pakistan.

*Myrmeleon noacki Ohm, 1965 (Fig. 5)**Diagnosis*

Bright yellow ring formation around eyes with black frons and inter-antennal and epicarinal mark. Fine yellow line in middle of pronotum and sides yellow.

Re-description

Head. Face black with lower border yellowish. Clypeus yellow with two large black spots containing one seta. Labrum yellow with setae on lower border. Labial palpi basal segment yellowish and apical segment shining brownish black. Sensory slit present in apical area of dilated part. Antennal sclerite yellow, scape brownish black, flagellomeres brownish to black in colour and dialed apically. Inter-antennal mark and epicarinal mark black. Vertex raised and black. **Thorax.** Dark colour in males and light colour in females. Pronotum dark brown with one light colour median strip centrally dilated. Lateral sides of pronotum also light yellowish in colour. Pronotum border lined with setae. Lateral sides have strong thick 4-5 setae. Meso and Meta thorax dark brown in colour. Prescutum has erect setae rest thorax have few scattered fine setae. Lateral sides also brown in colour.

Wings. Wings narrow, pointed at apex and elongate. Wings little longer than abdomen. Black and brown patches on the veins. Venation much darker in males as compared to females. Pterostigma brownish at base and white at apex. Forewing has 10 cross veins before Radial sector and RS divided into 10 branches. Hind wing has 5 cross veins before radial sector and radial sector divided into 10 branches. **Legs.** Coxae blackish brown. Femora, tibia, tibial spurs all yellowish brown except hind tibia with inner side brown and outer whitish. Coxae have small fine yellow setae. Femora and tibia have strong setae. Tibial spurs almost equal to first segment length. Last segment of tarsi much enlarged as compared to basal segments. **Abdomen.** Brown colour dark in males and light in females. In males stout setae while in female little small and fine setae present on abdomen. Setae colour much darker in males. Females have a well-built ectoproct and very small thick gonapophysis.



Fig. 5 (a). *Myrmeleon noacki* pronotum and face.



Fig. 5 (b). *Myrmeleon noacki* male genitalia and wings.

Material examined

1♂: Bagh (33.972641°, 73.746316°) 12-vii-2012 Saleem Akhtar, 1♂: Gilgit (35.891839°,74.344930°) 20-vi-2013 Saleem Akhtar.

Body measurements (mm)

Forewing: ♂ 28.5mm, ♀ 28mm; hind wing: ♂26.5 mm, ♀ 27mm; body length: ♂ 26mm, ♀ 25.5mm.

Remarks

The species descriptions are similar to that of Ohm (1965). The species has been reported from parts of the Europe and turkey. The species is first time recorded from Pakistan.

Myrmeleon trivialis Gerstaecker, 1885 (Fig. 6)

Myrmeleon zanganus Yang, 1987

Diagnosis

Larger species. Yellow line in middle of pronotum which disappears before hind margin. Sides of pronotum much yellowish and have black setae.

Re-description

Head. Face black, clypeus upper half blackish brown with two long setae one on each side. Labrum brownish yellow with setae on lower border. Labial palpi yellow with distal end swollen at the base and pointed at the apex. Sensory spot beyond 1/3 of palmicula and circular. Inter-antennal sclerite yellow. Scape black on front and posterior yellow. Flagellomers, inter-antennal mark and epicarinal mark all black. **Thorax.** Pronotum blackish brown and have one central yellowish line. Lateral sides yellow. Pronotum has fine scattered yellow setae all over it and 4-6 long thick black setae on lateral sides. Prescutum black has erect setae. Discs of meso and meta thorax have fine yellow setae. Sides along the wing bases yellow. **Wings.** Wings elongate with acute at ends. Wing venation yellow and pterostigma white. Forewing uniformly convex and hind wing little concaved inward in apical 1/4. Fore wing has 7-8 cross veins before radial sector and RS divided into 13 branches. Hind wing has 5 cross veins before RS and RS divided into 11 branches. Male has small pilula axillaris. **Legs.** Basal part of coxae brown rest yellow, femora, tibia and tarsi all yellow except pilula axillaris apex of tibia and tarsi black. Tibial spurs present in pro and meso leg tibial spur longer than first tarsal segment and in hind tibia almost equal to basal tarsal segment. **Abdomen.** Abdomen brown in males with fine brown setae. Last two segments have apical part yellow in colour. While ectoproct and pregenital plate yellow. In female, abdomen much darker and have black and yellow setae.

While on 7th and 8th segment there are only stout black setae. Posterior gonapophysis cylindrical and reduced. Ectoproct well developed and have digging setae.



Fig. 6 (a). *Myrmeleon trivialis* pronotum and face.

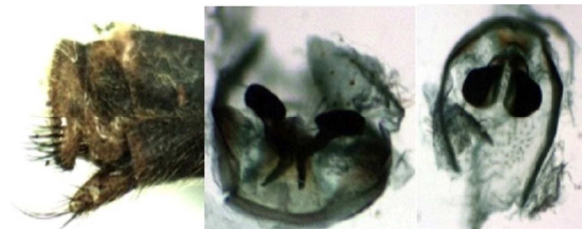


Fig. 6 (b). *Myrmeleon trivialis* male genitalia.

Material Examined

1♂: Garhi Habib Ullah (34.395034°, 73.383961°) 02-viii-2010 Saleem Akhtar, 1♂, 1♀: Pir Chanasi (34.380603°, 73.531099°) 30-vii-2010 Saleem Akhtar. 1♀: Murree (33.902634°, 73.382596°) 01-viii-2012 Saleem Akhtar.

Body measurements (mm)

Forewing: ♂ 36mm, ♀ 40mm; hind wing: ♂ 34 mm, ♀ 38mm; body length: ♂ 30mm, ♀ 32mm.

Remarks

The species descriptions are similar to those of Yang (1987) and Zhan *et al.*, (2011). Yang described the species as *Myrmeleon zanganus* new species however Zhan *et al.*, (2011) described in detail and reinstated its original name *Myrmeleon trivialis* Gerstaecker, 1885. Species is well distributed through Himalayan stretch and is recorded first time from Pakistan. The species remains restricted to high mountain areas of Pakistan.

Acknowledgement

We are thankful to Higher Education Commission Pakistan for providing funding under IRSIP and

Indigenous Scholarship Program. Dr. John Oswald Department of Entomology for six month training of Saleem Akhter, helping in taxonomy and unlimited access to literature, Dr. Levente Ábrahám (Somogy Museum, Natural history Department, H-7400 Kaposvár), Dr. Victor Kirvokhatsky (Zoological Institute, Russian Academy of Sciences, St. Petersburg, 199034 Russia) and Dr. Lionel Stange (Florida Department of Consumer and Agricultural Services Division of Plant Industry Gainesville USA) and Dr. Imran Bodla (Department of Entomology, PMAS-AAUR, Pakistan for their help in identification and species confirmation. We also thankful to Mr. Qamar Abbas (National Institute for Biotechnology and Genetic Engineering, Faisalabad, Pakistan) for his devoted help during collection exhibitions.

Contribution of Author

1) All authors contributed equally the manuscript is part of Ph.D. thesis of Mr. Saleem Akhtar submitted to The Agriculture University, Peshawar, Pakistan.

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