International Journal Of

Recent Scientific Research

ISSN: 0976-3031

Volume: 7(4) April -2016

FIRST RECORD ON THE AQUATIC INSECT DIVERSITY OF KISHTWAR DISTRICT OF JAMMU & KASHMIR STATE, INDIA

Ruchika Bhutyal and Seema Langer

THE OFFICIAL PUBLICATION OF
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH (IJRSR)
http://www.recentscientific.com/ recentscientific@gmail.com

ISSN: 0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 7, Issue, 4, pp. 10604-10609, April, 2016

International Journal of Recent Scientific Research

Research Article

FIRST RECORD ON THE AQUATIC INSECT DIVERSITY OF KISHTWAR DISTRICT OF JAMMU & KASHMIR STATE, INDIA

Ruchika Bhutyal* and Seema Langer

Department of Zoology, University of Jammu, Jammu

ARTICLE INFO

Article History:

Received 29th January, 2016
Received in revised form
19th February, 2016
Accepted 25th March, 2016
Published online 28th
April, 2016

Keywords:

Entomofauna, Diversity, Kishtwar, odonates.

ABSTRACT

An inventory was carried out to study the aquatic entomofauna in three tehsils of Kishtwar District of Jammu and Kashmir state, from 2013 – 2014. A total of 30 species were collected out of which 18 were identified. The identified species represented 18 genera, 14 families and 5 orders. Insects belonging to Coleoptera (22%), Hemiptera (22%), Odonata (22%), Diptera (22%) showed highest species richness followed by Ephemeroptera (11%). Two species of Odonates namely *Ischnura senegalensis* and *Orthetrum triangulare* have been reported for the first time by the author from Jammu Division.

INTRODUCTION

Aquatic insects are the most diverse group of organisms belonging to phylum Arthropoda and perform vital roles in all ecological systems. Almost every inland water body whether it is a river, stream, seepage or lake supports a biological community within it (Gullan and Cranston, 2000). Insects are now recognized as important components of biodiversity (Kim, 1993; Kremen *et al*., 1993; Oliver & Beatlie, 1996; Yen & Butcher, 1997). They play vital roles in processes such as pollination, soil formation and fertility, plant productivity, organic decomposition and the regulation of populations of other organisms through predation and parasitism (Daily *et al*., 1997; Yen and Butcher, 1997). Insects are also the food source of many vertebrates (Vantomme *et al*., 2012). Some aquatic insects are used as fish bait and some as pollution indicators and environment monitoring agents (Subramanian & Sivaramakrishnan, 2007). The wider acceptance of insects as indispensable components of biodiversity has led to a rapid increase in broad based surveys and greater pressure to provide information and guidelines for insect conservation and monitoring.

Around the world, freshwater habitats are being subjected to increased levels of human disturbance (Saunders *et. al*., 2002). A recent assessment of the status of inland water ecosystems shows that globally most threatened river catchments are to be found in the Indian subcontinent (WCMC, 2000). A study based on 195 animal species of inland water ecosystems indicate that on average monitored populations have declined by 54% during 1970- 2000. This compares with a decline over the same period of some 35% in 217 marine and coastal species, 15% in 282 terrestrial species. Though, not conclusive, these provide strong indications that inland water ecosystem are suffering the greatest negative impact from human activities at present (WWF 2002 & WCMC, 2000).

In the recent years, there have been a number of limnological investigations on the various wetlands of Jammu (Malhotra *et al*., 1990; Salaria, 1992; Thakur, 2003, Ayri, 2007, Tara *et al*., 2012) but little work has been done on the aquatic insects of Kishtwar District of Jammu Division. Keeping in view the important role biodiversity plays in the maintenance of any region the present study is aimed at compiling the first ever inventorisation of the aquatic insect diversity of Kishtwar district of Jammu Division.

MATERIAL AND METHODS

Study area

Kishtwar district is situated in the north – east corner of Jammu region in the outer Himalayan range in J&K State. It is positioned at an altitude of 5374 feet above the sea level. It is situated on a central plateau set amidst sylvan surroundings.

Corresponding author:* ***Ruchika Bhutyal*
Department of Zoology, University of Jammu, Jammu

This part of Jammu region encompasses extraordinary biotic communities which is attracting people from different regions and is being promoted as a tourist destination. This fragile Himalayan ecosystem has witnessed intentional or unintentional introduction of varying faunal and floral elements from different regions over the time. Such anthropogenic influences along with wanton axing of forests, unregulated grazing, pollution, climate change etc, have promoted invasion by nonnative species. The influence of the monsoon is weak. Mean annual rainfall is 827 mm, precipitation is maximal and in excess of 100 mm per month in March and April and again in July and August. Snowfall occurs in December, January and February when the whole area becomes snowbound. Mean maximun and minimum temperatures recorded are 13º C and -7 ºC in January and 35 ºC and 11 ºC in July respectively.

METHOD

The survey and data collection on the insect diversity of Kishtwar district was carried out from 2011 to 2012. The study followed a random sampling method so that no bias is introduced. The survey areas were selected at different tehsils of Kishtwar district. During the work the selected study sites were visited, samples were collected and systematically preserved for identification. Existing literature and information from web based data, online identification system and ISSG database were used to identify the species

RESULTS AND DISCUSSION

The survey revealed 30 species. Of 30 insects, 18 have been identified and are listed below in Table-1. Maximum number of species was from the order Coleoptera, Hemiptera, Odonata, Diptera followed by others (%age shown in the pie-1 below).

Table 1 Showing the list of species

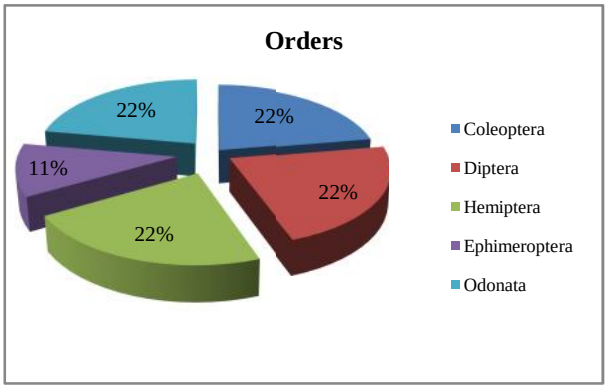
S.No	Species	Family
1.	*Laccophilus chinensis*	Coleoptera
2.	*Berosus indicus*	Coleoptera
3.	*Peadrus fuscipennis*	Coleoptera
4.	*Dysticus*	Coleoptera
5.	*Gerris spinolae*	Hemiptera
6.	*Laccotrephes maculates*	Hemiptera
7.	*Ranatra elongate*	Hemiptera
8.	*Enithares indicus*	Hemiptera
9.	*Caenis sp.*	Ephimeroptera
10.	*Baetis sp.*	Ephimeroptera
11.	*Ischnura senegalensis*	Odonata
12.	*Orthetrum triangulare*	Odonata
13.	*Crocothemis servile*	Odonata
14.	*Orthetrum pruinosum neglectum*	Odonata
15.	*Cranefly larvae*	Diptera
16.	*Eristalis tenax*	Diptera
17.	*Mosquito larvae*	Diptera
18.	*Chironomous larvae*	Diptera

Observations

***Laccophilus chinensis* Aube**
Taxonomic position: Coleoptera: Dytiscidae
Common Name: Water beetle.

Distribution in the World: Recorded from Burma, Ceylon and Pakistan, Bangladesh, Bhutan, Myanmar, Nepal, China, Hong Kong, Japan, Laos, Iran, Iraq, Taiwan, Thailand, Vietnam, Egypt and Benin.

Distribution in India: In India it has been reported from Assam, Bihar, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Uttar Pradesh, West Bengal and Himachal Pradesh Andaman and Nicobar Islands, Meghalaya, Sikkim and Nagaland.



Pie 1 Showing the dominance percentage of orders

Distribution in J&K: Jammu, Samba, Kathua.

Distribution in area under investigation: Kishtwar, Marwah.
Diagnostic features: Body brownish yellow, ovate, nearly elliptical but narrowed posteriorly. Head slightly convex above, subrounded and gently sloping in front. Antennae filamentous, 11 segmented. Maxillary palps shorter than antennae. Pronotum very short. Scutellum small, triangular. Elytra punctured by small dark brownish holes and sculptured with black markings. Fore legs short, three basal tarsal segments with adhesive suckers on ventral side. Meso-thoracic legs longer than forelegs. Hind legs longer than both, with tarsi having dense long hairs.

Berosus indicus

Common Name: Water deer
Taxonomic position: Coleoptera: Hydrophilidae
Distribution in the World: Widely distributed in Ceylon, India, Burma, China, Formosa, Siam, Cambodia, Sumatra, Java, Philippines, Arkansas, Japan, Srilanka, U.S.A., Kenya, Laos, Turkey, UAE and Uzbekistan.
Distribution in India: In India it is reported from Rajasthan and Uttar Pradesh.
Distribution in J&K: Trikuta Hills Gharana wetland, Paloura pond, Mearth pond and Panderar pond.
Distribution in area under investigation: Kishtwar tehsil.

Diagnostic features: Head black, triangular, base wide, apex narrower and straight, surface punctuate; compound eyes oval when seen from dorsal side. Maxillary palps smaller than antennae and four segmented. Antennae with three club segments which are pubescent. Pronotum transverse, wider than long with dark brownish black mark in mid-dorsal area. Scutellum small, triangular with broad base and pointed tip. Elytra brown with black dots, well chitinised, meeting along mid-dorsal line, sculptured with parallel rows of punctured black dots. Wings membranous, attached close to the articulation of elytra and hinged with the metathorax on either side. Coxa of all the legs globular, with a spine like process at the base; trochanter small, triangular; femur flattened, broad at base and gradually narrowing towards apex; tibia long, flattened, narrow at base and gradually broadening towards the

apex, covered with two long spines at terminus; tarsi five segmented with long hairs and two simple claws. Abdomen with six visible segments.

Paederus fuscipennis

Common Name: Rove beetles.
Taxonomic position: Coleoptera: Staphylinidae
Distribution in the World: Pakistan, Iran, Malaysia, North America, Portugal, Britain, East Malaysia and Berlin.
Distribution in India: Karnataka, Madhya Pradesh, Gujrat and Tamil Nadu.
Distribution in J&K: Trikuta Hills, Lake Mansar, Gharana wetland, Paloura pond, Mearth pond and Panderar pond.
Distribution in the area under investigation: Kishtwar tehsil, Marwah, Kalnai.

Diagnostic features: Body long, slender and hairy. Head triangular, broader in the centre but tapering at the ends; attached to the prothorax by a narrow constriction; eyes oval, mid-dorsolaterally bulging out in lateral position. Antennae long, filamentous, 11 segmented. Head covered with bristles and black hair. Mesothorax larger somewhat rectangular divided by middle line, richly covered with black bristles. Elytra bluish black, truncate exposing most of the abdomen. Legs long, slender and clawed; fringed with hairs. Abdomen hairy, five segmented, last segment forms pygidium, triangular with pointed tip. Basal four segments of abdomen orange and remaining segments bluish black. This genus is found in all types of environment especially in decaying vegetation, dead leaves etc. They are active insects, run or fly rapidly, when running they frequently raise the tip of abdomen much as do scorpions.

***Dytiscus* sp.**

Common Name:
Taxonomic position: Coleoptera: Dytiscidae
Distribution in the World: *This* genus is widely distributed in Nova Scotia, Canada, U.S.A, North Asia, Britain, Japan, Italy**,** China, Mongolia, Russia, Afghanistan, Tajikistan, Iran, Turkey, Uzbekistan, Europe, Montenegro, Lithuania, Egypt and.

Distribution in India: In India it has been reported from Bengaluru, Jammu & Kashmir.
Distribution in J&K: Recorded from Kashmir, Jammu region.
Distribution in the area under investigation: Kishtwar tehsil.
Diagnostic features: Total body length ranges from 9-10 mm. Head triangular, brownish black. Eyes large, brownish black. Antennae long, filamentous, 10-12 segmented. Pronotum brownish black, longer than broad. Elytra dark brown with black dots. Fore legs and middle legs originate closely and almost of equal length. Tibia of fore legs in case of males are provided with adhesive discs and large hairs. Hind legs longer than fore and middle legs, fringed with long hairs and spines. Eight abdominal segments visible dorsally after removal of elytra but only six abdominal sterna visible ventrally.

***Gerris spinolae* (Severin)**

Common Name: Pond skater or water strider
Taxonomic position: Hemiptera: Gerridae
Distribution in the World: Philippines, Japan, Thailand, Italy, Burma, Arkansas and Myanmar.
Distribution in India: Maharashtra, West Bengal, Kerala, Andhra Pradesh**,** Uttar Pradesh, Tamilnadu and Bihar.
Distribution in J&K: Kashmir, Lake Mansar, Gharana wetland, Paloura pond, Mearth pond and Panderar pond.
Distribution in the area under investigation: Kishtwar tehsil, Marwah.
Diagnostic features: Head small, triangular, broader at base, produced to form rostrum. Eyes large, globular present at posterolateral margin of head. Antennae long, four segmented. Thorax longer than broad with parallel lateral edges. Hemielytra brown, long with distinct venation covering abdomen just prior to apical tip of abdomen. Forelegs raptorial used for catching prey. Abdomen cylindrical tapering at apex.

***Laccotrephes maculates* Fabr.**

Common Name: Water Scorpion
Taxonomic position: Hemiptera: Nepidae
Distribution in the World: Widely distributed in Japan, China, Srilanka, Malaysia, Myanmar, Japan, Nepal, Pakistan, Taiwan, Thailand, Philippines, Kenya, Sumatra and U.S.A.
Distribution in India: Andhra Pradesh , Assam, Orissa, Uttar Pradesh, Madhya Pradesh, Tamil Nadu, Maharashtra, Jammu and Kashmir, West Bengal and Assam.
Distribution in J&K: Jammu region, Lake Mansar, Gharana wetland, Paloura pond, Mearth pond and Panderar pond.
Distribution in the area under investigation: Kishtwar tehsil, Marwah.

Diagnostic features: Head small, triangular, broadest in the middle, produced in front forming rostrum. Eyes oval, prominent antero laterally present in the middle of head. Antennae not visible dorsally, placed ventrally near the inner edge of each eye; 3 segmented, lamellate type. Hemielytra well developed; veins and membrane distinct. Abdominal appendages shorter than the body length. Apically respiratory siphons are present for breathing formed by the cerci.

***Ranatra elongata* Fabr**

Common Name: Water Stick Insect
Taxonomic position: Hemiptera: Nepidae
Distribution in the World: Japan, China, Srilanka, Thailand, Australia, Indonesia, Malaysia, Myanmar, Taiwan, Nepal, Pakistan, Philippines, Kenya and U.S.A.
Distribution in India: Widely distributed in Andhra Pradesh, Delhi, Kerala, Assam, Madhya Pradesh, Maharashtra, Uttar Pradesh, Madras, Jammu and Kashmir, West Bengal, Bihar and Orissa.

Distribution in J&K: Kashmir, Jammu region.
Distribution in the area under investigation: Marwah.
Diagnostic features: Total body length 42 mm. Length of abdominal appendages 52 mm. Head yellowish brown, triangular, produced forming rostrum. Head including eyes broader than anterior margin of pronotum. Eyes blackish brown, prominent. Antennae short, three segmented. Abdomen pale with paired respiratory siphons present at the tip of abdomen, longer than body.

***Enithares indica* Fabr.**

Taxonomic position: Hemiptera: Notonectidae
Distribution in the World: Java, Thailand, Kenya, Sumatra, Philippines , U.S.A. and China.

Distribution in India: Maharashtra, Ceylon, Siamese Malay States and Rajasthan.
Distribution in J&K: Kashmir, Jammu region, Trikuta Hills.
Distribution in the area under investigation: Marwah.
Diagnostic features: Head triangular, ochraceous with eyes black, touching the anterior margin of pronotum. Antennae pale, four segmented. Abdomen covered with hemielytra dorsally, four segments visible, ventrally beset with long thin hair.

***Caenis* sp.**

Common name: Small Squaregills
Taxonomic position: Ephemeroptera: Caenidae
Distribution in the area under investigation: Lake Mansar, Gharana wetland, Mearth pond and Panderar pond.
Diagnostic features: The most obvious feature of the *Caenis* larvae are their square shaped operculate gills on abdominal segment two. The inner edges of these gills meet or almost meet medially. They have a robust thorax with the notum fused between forewing pads for at least half length of pads. They do not have long setae on fore legs.These are generally small, 2-8 mm excluding rails when mature. Hind wing pads are absent. Operculate gills are not fused but do overlap each other slightly. Three tails are present.

***Baetis* sp.**

Common name: Small minnow mayflies
Taxonomic position: Ephemeroptera: Baetidae
Distribution in the area under investigation: Lake Mansar
Diagnostic features: They are small, streamlined larvae with head vertically oriented and long antennae which are usually two or three times longer than the head width. Their hind wing pads are sometimes absent or minute. Oval or heart-shaped gills are present on abdomen. Posterior abdominal segments usually lack spines pointing backwards with 3 tails.

Ischnura senegalensis:

Common name: Common bluetail, marsh bluetail, Senegal golden dartlet.
Taxonomic position: Odonata: Coenagrionidae
Distribution in world: Native from Africa through the Middle East throughout southern and eastern Asia.
Distribution in India: Found throughout india mainly in Maharashtra, Kerela, Western Ghats, Manipur, Tamil Nadu, West Bengal, Jammu and Kashmir.
Distribution in area under investigation: This is the first ever record of this species from Kishtwar district as well as from Jammu division.

Diagnostic features: Eyes: Upper side black; underside pale green to yellow. Two bright blue spots present behind the eyes. Thorax: Bronze backed with pale green sides and yellow underside. Narrow stripe on sides is pale green to bright yellow bordered by a broad black band. Legs: Black, with yellow or pale green outer surface. The legs are covered with short black spines. Wings: Transparent. Wing spot: Diamond shaped and black in forewing and dull white in the hindwing. Abdomen: The first segment is pale green and the second is azure blue with steel blue black on upper side. The segments 3-7 are bright yellow with black upper side. The eighth and ninth segments are azure blue with black upper side. The last segment has black upper side and yellow on sides. Female: Less brightly coloured than the male. The eyes and spots behind the head are paler. The thorax has pale green stripe and brown band instead of yellow stripe and black band of male. The legs and abdomen are pale brown with black stripes. The abdomen lacks blue markings found in males. Seen perched on low herbage or flying in spurts; voracious predator in its size, often preying on other smaller odonates.

***Orthetrum triangulare* Selys, 1878**

Common name: Blue-tailed Forest Hawk
Taxonomic position: Odonata: Libellulidae
Distribution in the World: **widely distributed in asia.** Afghanistan; Bhutan, China, Hong Kong, Indonesia, Lao People's Democratic Republic, Malaysia (Peninsular Malaysia); Myanmar, Nepal, Pakistan, Sri Lanka, Taiwan, Thailand, Vietnam.

Distribution in India: Arunachal Pradesh, Bihar, Haryana, Himachal Pradesh, Jammu-Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal.

Distribution in the area under investigation: Kishtwar tehsil, Kandni, Kalnai.

Diagnostic features: *Orthetrum triangulare* is an Asian freshwater dragon fly species. It is usually found in hilly and montane areas, and breeds in small ponds and marshy areas, and is tolerant of disturbance. The male is easy to recognise as it has a large blue section to the abdomen and the rest of it is completely black. They like to hang right over the water's edge on branches and twigs. The females are light brown with a light greenish thorax. The male guards the female while she is ovipositing.

***Crocothemis servilea servilea (*Drury)**

Taxonomic position: Odonata: Libellulidae
Common Name: Ruddy Marsh Skimmer, Oriental Scarlet, Crimson Darter, Greater Red Skimmer.
Distribution in the World: Reported from China, Australia, Bhutan and Cambodia.
Distribution in India: Widely distributed in India and recorded from Uttar Pradesh, Tamilnadu, Rajasthan, Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Himachal Pradesh, Karnataka, Kerala, Meghalaya, Manipur, Mizoram, Maharashtra, Madhya Pradesh, Nagaland, Orissa, Punjab, Rajasthan, Uttar Pradesh and West Bengal.
Distribution in J&K: Jammu region.

Distribution in the area under investigation: Kishtwar tehsil.
Diagnostic features: Head subrounded brownish yellow, broader than long. Head and body with dark longitudinal line along the back of the abdomen and brown line along the sides. Eyes large touching over the head and covering whole of head. Antennae short concealed under the head. Thorax yellowish brown, longer than broad. Wings membranous with peripheral thickening at the upper corners and amber patches at base. Hind wings broader than fore wings. Pterostigma yellowish brown. Legs pale yellow; long and slender with spines on femur and tibia; tarsus ending in two equal claws. Abdomen

seven segmented; yellowish brown, tapering towards lower side.

***Orthetrum pruinosum neglectum* (Rambur)**

Taxonomic position: Odonata: Libellulidae
Distribution in the World: China, Srilanka, Cambodia, Australia and Bhutan.
Distribution in India: Widely distributed in India and recorded from Uttar Pradesh, Tamilnadu, Bengaluru, Karnataka, Kerala, Rajasthan, Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Goa, Himachal Pradesh, Meghalaya, Punjab, Tripura, Uttar Pradesh, West Bengal, Manipur, Maharashtra, Madhya Pradesh, Orissa and Sikkim.

Distribution in J&K: Jammu region.
Distribution in the area under investigation: Kishtwar tehsil.
Diagnostic features: Head rounded; brownish black. Eyes black, large, covering whole of head. Antennae short, concealed under the head. Thorax shining black; longer than broad. Wings hyaline and membranous; blackish. Pterostigma black, forewings longer than hind wings whereas hind wings broader than forewings. A dark yellow marking present at the base of hind wings. Legs brownish black; long and slender with blackish spines and bristles on femur, tibia and tarsus of all the legs and tarsus ending in two equal claws. Abdomen reddish and 7-8 segemented.

***Tipula* sp.**

Common name: Crane flies
Taxonomic position: Diptera: Tipulidae
Distribution in the World: Easter United States, South Eastern and South central Canada, Florida, England, Europe, Asia, Korea, Taiwan.
Distribution in India: Areas of Western ghats, Jammu and Kashmir.
Distribution in J&K: Jammu region, District Kathua
Distribution in the area under investigation: Kishtwar tehsil.

Diagnostic features: The larval forms of crane flies are grey-brown cylindrical larvae which may bear fleshy lobes on the (posterior) end. Occasionally, the segments towards the end of the body can be greatly expanded. The crane fly larvae are segmented, worm-like and plump with no legs and small tentacles at one end. The head of Crane fly larva is usually partially retracted into thorax . The most distinctive feature of the larvae is the spiracular disc found at the end of the abdomen which is surrounded by 1-3 or 5-7 variously developed lobes, which are often fringed with hairs. They can be found in a large variety of colors, including white, brown, green and some are almost translucent. These larvae have a soft, fleshy appearance and very short tentacles (small "arms" or projections) at one end.

Eristalis tenax

Common name: Rat tailed maggot:
Taxonomic position: Diptera: Syrphidae
Distribution in the World: The rat-tailed maggot is cosmopolitan, occurring on every continent except Antarctica and ranges to the highest latitudes in the North (Metcalf 1913). It is absent in the extreme southern latitudes and in arid areas of Europe, Asia, and Africa**.**
Distribution in India: Throughout**.**
Distribution in J&K: Jammu region.
Distribution in the area under investigation: Marwah.
Diagnostic features: The aquatic larva has a cylindrical shape with patches of horizontal folds dividing the body into segments, between which the cuticle is smooth. The larva has a highly specialized organ on the posterior end (siphon) that acts as a respiratory appendage and also looks like a tail, thus giving them their nickname "rat-tailed maggot." The siphon can be several times the length of the body. Drone fly larvae are aquatic (Metcalf 1913), but sufficient solid food must be present to complete development, which is why they are found in water with high levels of organic matter (Day 2008). The respiratory appendage located posteriorly remains at the surface of the water while the larva moves through the water at various depths, allowing it to search for food without having to return to the surface to breathe (Metcalf 1913).The pupa looks very similar to the larva but is shorter and thicker (Gilbert 1986). However, unlike the larva the pupa has two pairs of cornua, or horn-like bumps, located on the thorax (Metcalf 1913). The siphon remains present in the pupa but generally locks in a curved position over the back (Metcalf 1913). The adult body is dark brown to black in color, with yellow-orange marks on the side of the second abdominal segment while a narrow yellow-orange band crosses the third abdominal segment.

Mosquito larvae

Common name: Wigglers" or "Wrigglers"
Taxonomic position: Diptera: Culicidae
Distribution in the World: Europe, Middle East, Africa, Western Asia, Southern Asia, U.S.A.
Distribution in India: Throughout.
Distribution in J&K: Kashmir region, Jammu region
Distribution in the area under investigation: Kishtwar tehsil, kalnai, marwah.

Diagnostic features: The mosquito larva has a well-developed head with mouth brushes used for feeding, a large thorax with no legs, and a segmented abdomen. Larvae breathe through spiracles located on their eighth abdominal segments, or through a siphon, so must come to the surface frequently. The larvae spend most of their time feeding on algae, bacteria, and other microbes in the surface microlaver. They dive below the surface only when disturbed. Larvae swim either through propulsion with their mouth brushes, or by jerky movements of their entire

***Chironomous* sp.**

Common name: Non- biting midges
Taxonomic position: Diptera: Chironomidae
Distribution in the World: Distributed worldwide.
Distribution in India: Throughout India.
Distribution in J&K: widespread.
Distribution in the area under investigation: Kishtwar tehsil, Marwah, Kalnai.

Diagnostic features: Larval Chironomidae are the most abundant Dipterans in aquatic ecosystems and often dominate the invertebrate fauna. Their occurrence in a wide range of ecological conditions has led to their use as indicator organisms in classifying lakes, river zonation, water quality, etc. This has led to an intense study of the immature stages of Chironomidae

in recent years. Chironomid larvae are a major source of food for freshwater fish and may constitute as much as 80% of their total food requirements.

The larvae of *Chironomous* sp. are red in colour, due to the presence of haemoglobin which assists survival in low oxygen concentrations. They live in tubes of mud or vegetable debris.

CONCLUSION AND RECOMMENDATIONS

Insects play vital roles in processes such as pollination, soil formation and fertility, plant productivity, organic decomposition and the regulation of populations of other organisms through predation and parasitism (Daily *et al*., 1997; Yen and Butcher, 1997). They are also the food source of many vertebrates (Vantomme *et al*. 2012). Some aquatic insects are used as fish bait and some as pollution indicators and environment monitoring agents (Subramanian & Sivaramakrishnan, 2007). The wider acceptance of insects as indispensable components of biodiversity has led to a rapid increase in broad based surveys and greater pressure to provide information and guidelines for insect conservation and monitoring.

Keeping in view, the results of current study, it is concluded that there is a lot of potential to explore the aquatic entomofauna of this District. However, due to rapid increase in urbanization, suitable habitats for these insects are disappearing at an alarming rate. Further surveys and necessary conservation measures like awareness to local public through electronic and print media to prevent it from injudicious use of pesticides in fields is therefore suggested.

Acknowledgements

The authors are grateful to the Head of Department (Zoology) University of Jammu, for the necessary support during the study period. The insectarium is submitted to the Department of Zoology, University of Jammu, J&K, India.

References

Ayri, S. 2007. Diversity and population dymnamics of hemipteran and coleopteran insects of lake Mansar, Jammu. M. Phil dissertation, University of Jammu, Jammu.

Daily ,G.C., Alexander, S., Ehrlich, P.R., Goulder, L.S., Schneider, S.H., Tilman, D., Wood well, G.M. 1997. Ecosystem services: benefits supplied to human societies by natural ecosystems. Issues in Ecology 2: 1-16.

Day, E.R. 2008. Livestock area fly control. Virginia Tech Extension. https://ext.vt.edu/pubs/pmg/fc/LivestockAreaFlyControl.pdf (5th February, 2009).

Gilbert, F.S. 1986. Hoverflies. Cambridge University Press, Cambridge, England.

Gullan, P.J. and Cranston, P.S. 2000. The insects: An outline of entomology (ed: 2). Blackwell science 215- 237pp.

Kim, K.E.C. 1993. Biodiversity, conservation and inventory: why insects matter. Biodiversity and conservation 2: 191-214.

Kremen, C., Colwell, R.K., Erwin,T.L., Murphy, D.D., Noss, R.F. and Sanjayan, M.A.1993. Terrestrial arthropod assemblages: their use in conservation planning. Conservation biology 7: 796- 808.

Malhotra, Y.R. and Gupta, A. 1990. Seasonal fluctuations in the food and feeding of Puntius conchonius inhabiting Lake Mansar, Jammu. *Journal on freshwater biology* 2(2): 147- 151

Metcalf, C.L. 1913. The Syrphidae of Ohio. Ohio State University Bulletin 17: 1-123.

Milne, L.and Milne, M. 1980. The Audubon Society field guide to North American insects and spiders. Alfred A. Knopf, Inc., New York, NY.

Oliver, I. and Beatlie, A.J. 1996. Designing a cost effective invertebrate survey: a test of methods for rapid assessment of biodiversity. Ecological applications 6: 594-607.

Salaria, R. 1992. Taxonomic survey of aquatic hemipterans of Jammu region of J&K state. M.Phil dissertation, University of Jammu, Jammu.

Saunders, D.L., Meeuwig, J.J and Vincent, A.C.J. 2002. Freshwater protected areas: Strategies for Conservation. *Cons.Biol*. 16 (1): 30-41.

Subramanian, K.A. and Sivaramakrishnan, K.G. 2007. Aquatic insects for biomonitoring freshwater ecosystems a methodology manual. Asoka trust for research in ecology and environment (ATREE), Bangalore, India.

Thakur, S. 2003. Survey of coleoptera and hemiptera inhabiting water bodies around Trikuta hills. M.Phil dissertation, University of Jammu, Jammu.

Vantomme, P., Mertens, E., Huis, A. and Klunder, H. 2012. Assessing the potential of insects as food and feed in assuring food security. Technical consultation meeting, Rome 1- 27 pp.

World Conservation Monitoring Centre (WCMC). 2000.Global Biodiversity: Earth's living resources in the 21st century. By: Groombridge, B. and Jenkins, M.D. *World Conservation Press*, Cambridge, UK.

World Wide Fund for Nature, (WWF). 2002. Living Planet Report. *WWF International*, Switzerland. 35pp.

Yen, A.L. and Butcher, R.J. 1997. An overview of the conservation of non- marine invertebrates in Australia. Environment Australia, Canberra, Australia.

****

How to cite this article:

Ruchika Bhutyal and Seema Langer.2016, First Record on the Aquatic Insect Diversity of Kishtwar District of Jammu & Kashmir State, India. *Int J Recent Sci Res.* 7(4), pp. 10604-10609.

TSSN 0976-3031