



Faunal diversity of aquatic insects in Surha Tal of District - Ballia (U. P.), India

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Abstract: Diversity of aquatic insect fauna of Surha Tal, district Ballia (U.P.) was studied during 2006-08. Twenty nine species of aquatic insect were collected. In class insect four orders namely Coleoptera, Hemiptera, Odonata and Diptera belonging to fourteen families Dytiscidae, Gyrinidae, Hydrophilidae Notonectidae, Palaeidae, Nepidae, Belostomatidae, Hydrometridae, Gerridae. Gomphidae, Libellulidae, Coegrionidae. Chironomidae, Culicidae having twenty genera and twenty nine species were identified.

Keywords: Aquatic insects, Faunal diversity, Surha Tal - Ballia

INTRODUCTION

Insects are generally the most conspicuous form of life in the aquatic ecosystem, which in view of their extremely varied habits, wide distribution and countless adaptations have occupied a dominant position as a largest group in the animal kingdom. No other group of animal has invaded the land, air and water to the same proportional degree as insects. Therefore, such a multitude of species has enabled the group of insects to evolve a great diversity of habit and to colonize a wide range of ecological niches. All over the world about 45000 species of insect are known to inhabit diverse freshwater ecosystem (Balaram, 2005). These insect are found in or on the surface of lentic as well as lotic waters.

The aquatic insects are taxonomically diverse and fascinating in structure and biology and some of them have great importance to public health and aquaculture of the inland waters. Thus, among the freshwater animal taxa, the aquatic insect may be considered model organisms in analyzing the structure and function of the inland waters because of their high abundance, high birth rate with short generation time, large biomass and rapid colonization of freshwater habitats. They constitute a dominating group of benthic, limnetic and littoral fauna of aquatic ecosystems. Owing to their large biomass and population density they constitute an integral part of the freshwater biota and play a very significant role in energy transfer in the system. Since, these insect are found associated with water for most part of their life-cycle, any change in their number and composition in the population at a given time and space may indicate a change in the water quality. Consequently many of these insects act as biological indicators of productivity as well as environmental quality. Aquatic insect fauna of this part in India is rather poorly documented and limited

number of studies have been carried out on the ecological aspects of aquatic entomofauna. Some recent works are those by Bhattacharya and Gupta (1991), Sharma and Rai (1991), Biswas and Mukhopadhyay (1995), Sivaramakrishnan *et al.* (1995, 1996, 2000), Choudhury and Chattopadhyay (1997), Thirumalai (1999), Bhattacharya (2000), Pal *et al.* (2000), Khan and Ghosh (2001), Anbalagan *et al.* (2004), Anbalagan and Dinakaran (2006), Dinakaran and Anbalagan (2007) and Saha *et al.* (2007).

MATERIALS AND METHODS

Study area: Surha Tal (Surha lake) is a perennial lake, located about 13 km north of Ballia town and at distance of about 435 km. from Lucknow. It covers an area of about 20 sq. miles i.e. 3432 ha or 9450 acres. In summer, this area shrinks to about 2774 acre. The exposed area of 6676 acre is used for cultivation, during winter and summer of the year. Surha Tal is irregular in shape and many shelve like projections of land can be seen on its east and south banks. The other sides are somewhat regular and round. The Tal receives waters from river Ganges by three small streams i.e. Madhaha, Gararai and Katethar-nala. The Katehar-nala is a very zig-zag water stream of about 15 km in length. It leaves the lake on the eastern side and then curves to south west, passing west to Ballia town and falling into river Ganges a mile below its present confluence with the river Sarju. The Katehar-nala is mostly dry during summer and in the winter months has a sluggish current. However, during the rains, it swells to a large size, either forming an escape for the water of the lake, or else, when the Ganges is high, reversing its action and pouring the water of the river into lake (Singh *et al.*, 2009, Pandey *et al.*, 2010, Sharma and Agrawal, 2011, Singh *et al.*, 2011). The study was carried out during April, 2006 to March, 2008. The Aquatic insects were collected with the help of suitable insects collecting net made of nylon cloth and

in some cases; a drag-type net or light trap was used. They were first killed or narcotized slowly by putting few drop of 5% formaldehyde solution and then preserved either in 70 % alcohol or 5% formalin. Different group of insects were separated and identified to the lowest possible taxa with the help of Distant (1902, 1906, 1910), Lefory (1909), Paiva (1918, 1919), Hucthinson (1940), Hafiz and Pradhan (1947), Brooks (1951), Julka (1965), Kalyanam (1967), Vazirani (1970, 1984), Mandal *et al.* (1974), Thirumalai (1986, 1989 and 1994), Biswas *et al.* (1995 a, b) for Coleoptera, Bal and Basu (1994 a, b) for Hemiptera and Srivastava and Sinha (1995) for Odonata and confirmed by Z. S. I., Kolkata.

RESULTS AND DISCUSSION

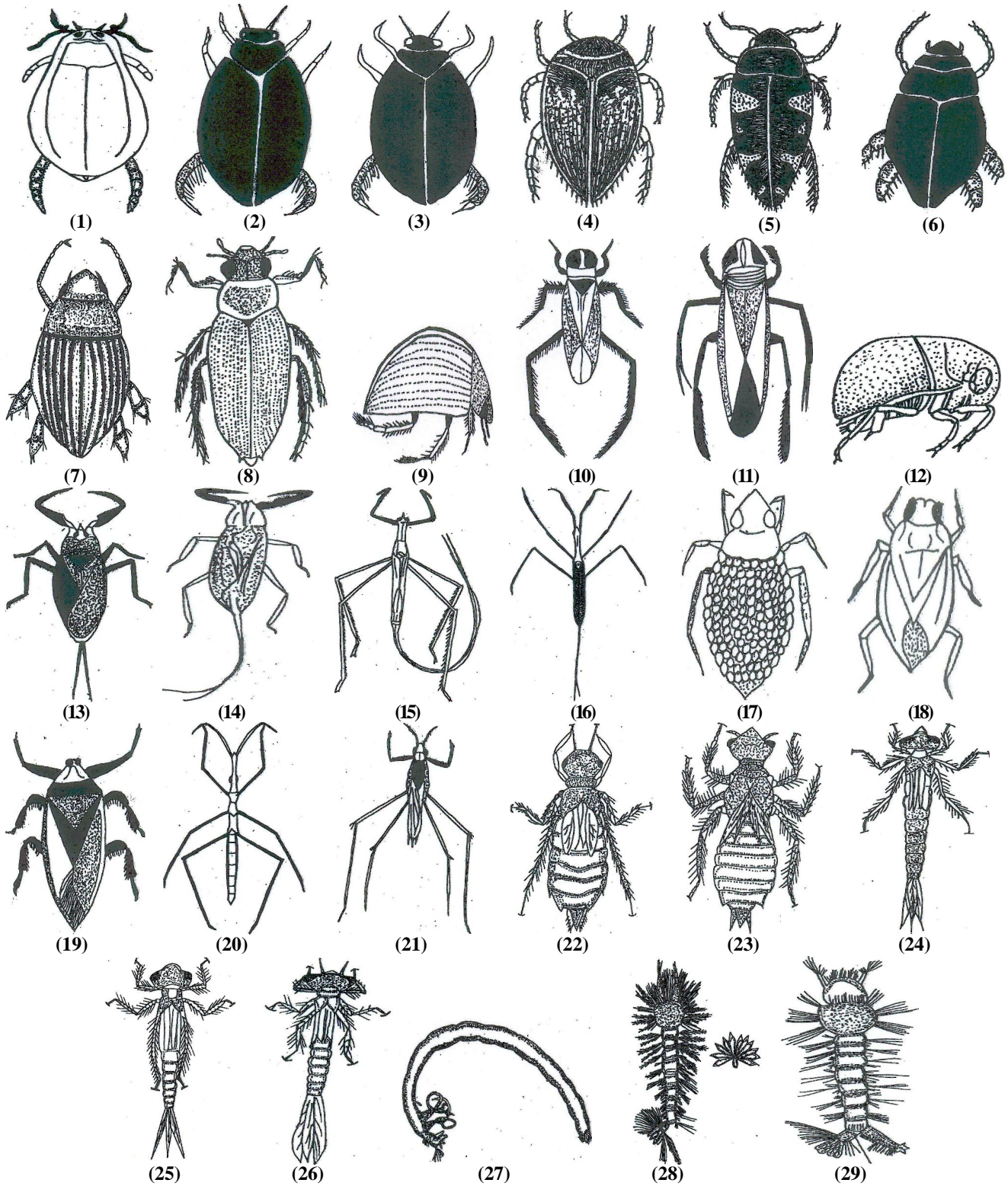
As a result of this study, 29 aquatic insects (Table 1) belonging 20 genera of 14 families were collected from Surha Tal which belonged to four insect orders viz. Coleoptera, Hemiptera, Odonata and Diptera. In the present study, a total of five genera *Cybister* sp., *Laccophilus* sp. (Family-Dytiscidae), *Dineutus* sp. (Family-Gyrinidae), *Berosus* sp., *Regimbertia* sp. (Family- Hydrophilidae) of

order Coleoptera; eight genera (*Anisops* sp. (Family-Notonectidae), *Plea* sp. (Palaeidae), *Laccotrephes* sp., *Ranatra* sp. (Family-Nepidae), *Diplonychus* sp. and *Lethocerus* sp. (Family-Belostomatidae), *Hydrometra* sp. (Family-Hydrometridae), *Gerris* sp. (Family- Gerridae) of order Hemiptera; four genera (*Mesogomphus* sp. (Family-Gomphidae), *Potanarcha* sp. (Family- Libellulidae), *Ischnura* sp. (Family-Coegrinae), *Agriocnemis* sp. (Family-Coegrionidae) of order Odonata and finally three genera *Chironomus* sp. (Family-Chironomidae) *Anopheles* sp. and *Culex* sp. (Family- Culicidae) of Order – Diptera have been reported from Surha Tal.

The seasonal abundance of the insect fauna during different months in Surha Tal reveals that among the members of Coleoptera, *Dineutus spinosus* has higher value. In Hemiptera, *Anisops sardea* is considered to be most abundant aquatic insect species. Among the Odonates, *Ischnura* sp. has the higher values. Among Diptera *Chironomus* larva, *Anopheles* Larva and *Culex* Larva has higher value. The result of monthly percentage abundance of insect species reveals that expect *A. sardea*, no other insect species present throughout the

Table 1. Faunal diversity of aquatic insects in Surha Tal, Balia.

Class	Order	Family	Scientific name	
Insecta	Coleoptera	Dytiscidae	1. <i>Cybister confuses</i> (Sharp, 1882)	
			2. <i>C. limbatus</i> (Fabr, 1775)	
			3. <i>C. tripunctatua asiaticus</i> (Sharp, 1882)	
			4. <i>Laccophilus parvulus</i> (Aube, 1838)	
			5. <i>L. anticatus</i> (Sharp, 1890)	
		Gyrinidae	1. <i>Dineutus spinosus</i> (Fabr. 1781)	
			2. <i>D. indicus</i> (Aude, 1838)	
		Hydrophilidae	1. <i>Berosus indicus</i> (Motschulsky, 1861)	
			2. <i>Regimbertia attenuata</i> (Fabricius, 1801)	
		Hemiptera	Notonectidae	1. <i>Anisops breddini</i> (Kirkaldy, 1901)
				2. <i>A. sardea</i> (Herrich-Shaffer, 1850)
			Pleidae	1. <i>Plea frontalis</i> (Fieber, 1844)
				Nepidae
			2. <i>L. ruber</i> (Linnaeus, 1764)	
	3. <i>Ranatra elongata</i> (Fabricius, 1790)			
	4. <i>R. filliformis</i> (Fabricius, 1790)			
	Odonata		Belostomatidae	1. <i>Diplonychus annulatum</i> (Fabricius, 1803)
		2. <i>D. rusticus</i> (Fabricius, 1794)		
		3. <i>Lethocerus indicus</i> (Lep. and Serville, 1825)		
		Hydrometridae	1. <i>Hydrometra vittata</i> (Stal, 1870)	
Gerridae			1. <i>Gerris spinolae</i> (Lethierry and Severin, 1896)	
			Gomphidae	1. <i>Mesogomphus lineatus</i> (Selys, 1850)
Libellulidae	1. <i>Potamarcha obscura</i> (Rambur, 1842)			
	Coegrinae	1. <i>Ischnura aurora aurora</i> (Brauer, 1858)		
Diptera		Chironomidae (Larvae)	1. <i>Genus- Chironomus</i> (Meigen, 1803)	
	Culicidae (Larvae)		1. <i>Genus- Anopheles Larva</i>	
			2. <i>Genus-Culex Larva</i>	



Figs.1. 1-29 Type of aquatic insects in Surha Tal: 1-Cybister confuses (Sharp, 1882), 2-Cybister limbatus (Fabr, 1775), 3-Cybister tripunctatua asiaticus (Sharp, 1882), 4-Laccophilus parvulus (Aube, 1838), 5-Laccophilus anticatus (Sharp, 1890), 6-Dineutus spinosus (Fabr. 1781), 7-Dineutus indicus (Aude, 1838), 8-Berosus indicus (Motschulsky, 1861), 9-Regimbertia attenuata (Fabricius, 1801), 10-Anisops breddini (Kirkaldy, 1901), 11-Anisops sardea (Herrich-Shaffer, 1850), 12-Plea frontalis (Fieber, 1844), 13-Laccotrephes griseus (Guerin, 1829), 14-Laccotrephes ruber (Linnaeus, 1764), 15-Ranatra elongata (Fabricius, 1790), 16-Ranatra filliformis (Fabricius, 1790), 17-Diplonychus annulatum (Fabricius, 1803), 18-Diplonychus rusticus (Fabricius, 1794), 19-Lethocerus indicus (Lepeletier & Serville, 1825) 20-Hydrometra vittata (Stal, 1870) 21-Gerris spinolae (Lethierry and Severin, 1896), 22-Mesogomphus lineatus (Selys, 1850), 23-Potamarcha obscura (Rambur, 1842), 24-Ischnura aurora aurora (Brauer, 1858), 25-Ischnura senegalensis (Rambur, 1842), 26-Agriocnemis pygmaea (Rambur, 1842), 27-Genus- Chironomus (Meigen, 1803), 28-Anopheles Larva, 29-Culex Larva.

year. It was *Mesogomphus lineatus* (Odonata), which appeared in most of the month except September and October during both two year of study. It has maximum abundance in January. *Cybister confusus*, *C. limbatus* and *Dipolnychus annulatum* were moderately represented in the sample during winter months having higher value in November. *Dipolnychus annulatum* showed higher value in September. *Cybister confusus* and *Dineutus spinosus* are found throughout the winter season having higher value of abundance in December and January. *Diplonychus annulatum* and *Laccotrephes griseus* were also present throughout the winter. *Laccotrephes griseus* has higher value in January and *Dipolnychus annulatum* was present in higher numbers in August-September. Among the Odonata, no single species appeared throughout the year and *Potamarcha obscura* is present consistently throughout the winter months having maximum abundance in November.

The result of dominance of all studied insect species revealed that *Dineutus spinosus* (Coleoptera) has maximum value of dominance followed by *Cybister confusus*. Among the Hemiptera, *A. sardea* and *D. annulatus* have maximum dominance values during two year of study. Among the Odonata, *M. lineatus* has higher value of dominance.

Water bugs (Hemiptera), in general, are effective predators of varied aquatic organisms. Their role in nature may be both beneficial as well as harmful. They are beneficial in predated upon the larvae of noxious insect like mosquitoes, gnats, midges, etc., which are responsible for various kinds of human-diseases. On the other hand, water-bugs cause considerable damage to fish and frog by killing the fishes, tadpoles and even small frogs for their food. Giant water bugs *Lethocerus indicus* (8.5 cms in length) can attack a fish three or four times its own size. Family-Nepedae popularly known as "Water scorpions" attack crap spawn and fry, and cause tremendous damages (Sinha and Roy. 1991, Bouchard, 2004). In addition, they cause direct mortality as these water-bugs compete with the crap-fry for food.

Diversity of adult odonata and abundance of indicate the status of the water body. In the present wetland, distribution of nearly species indicates the health of the water body. The Odonata represented by *Mesogomphus sp.*, *Potamarcha sp.*, *Ischnura sp.*, and *Agriocnemis sp.* occurred sparsely and contributed little to the community of the lake. They were found in winter months, where submerge and emergent aquatic vegetation was abundant. The Diptera represented by Genus *Chironomus larva*, *Anopheles* and *Culex larva* was the dominant form among aquatic insect at all depth in Surha Tal. The maximum population was recorded in winter and the minimum in rainy and summer months. The dipterans population started increasing from mid-November when the progeny

of new hatched ones grow sufficiently. The *Chironomus sp.* was recorded from all the depths but in winter they were abundant in deeper regions and showed a positive correlation with the aquatic organic matter. The maximum of the Dipterans was collected from shallow region and the lowest from the deepest water. Earlier Lakshman Ram (1976) has recorded 12 genus of Aquatic Insect of which 2 genus viz. *Sphaerodema sp.* and *Hydrophilus spp.* which could not be collected by the authors and thus now appear to be absent in Surha Tal. Of above, about dozen aquatic insects can be grouped as weed aquatic insects and are found throughout the year in fairly good number of post monsoon months in greater. They are mostly found in littoral areas of the lake among dense aquatic weeds. Mayflies' larvae and mosquito larva constitute an important food item of certain larvivorous fishes. Most of the fishes are either totally carnivorous or in part of their life depend on insect and insect larvae.

Conclusion

The Present contribution is the result of the extensive and intensive studies on aquatic entomo-fauna carried out during last 2 year (2006-2008) which deals with the diversity and abundance of commonly occurring aquatic insect fauna in large number of Surha Tal, District- Ballia, U. P. India.

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