



## STUDIES ON THE CADDIS FLY LARVAE (INSECTA TRICHOPTERA) OF GREAT NICOBAR BIOSPHERE RESERVE, NICOBAR ISLANDS, INDIA

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### INTRODUCTION

Trichoptera are holometabolous insects with aquatic immature stages. They are moth-like insects with wings covered by hairs, not scales as in Lepidoptera. Trichoptera are grouped among the most useful and important aquatic insects, which are diverse in terms of the micro habitats and the richness of the trophics they occupy. Trichopterans in conjunction with other aquatic insect orders like Ephemeroptera, Plecoptera, Odonata, Coleoptera, Diptera and Lepidoptera serve as very good bioindicators to assess aquatic biodiversity, habitat diversity in which they live (Hannaford and Resh, 1995, and deMoor, 2002, Jehamalar *et al.*, 2008, Anbalagan and Dinakaran, 2006; Subramanian and Sivaramakrishnan, 2005; Anbalagan *et al.*, 2004). Trichoptera larvae are probably best known for the transportable cases and fixed shelters, though not all species construct. Trichopteran larvae possess specializations that permit life in flowing water, including attachment devices such as claws and anal prolegs. Anthropogenic disturbances are rapidly altering the global environment (Vitousek *et al.*, 1997), resulting in a loss of diversity at an unprecedented rate (Pimm *et al.*, 1995 and Chapin *et al.*, 1997). Jehamalar *et al.*, (2010) studied the bioindicator potential of Trichoptera larvae of Southern Western Ghats. In India the study of Trichoptera started a little before the middle of the 19<sup>th</sup> century (Ghosh, 1991). Subsequently, Indian authors like Ghosh, 1991., Ghosh and Chaudhury

1987, 1992, 1995, 1998, 2000, Majumdar, 2003, 2004., Hafiz, 1937., Pandher and Saini, 2011., Saini *et al.*, (2001, 2010, 2011), Saini and Parey, 2011, Sharma and Chandra (2009) and Saini and Kaur (2012) worked on Trichoptera of Indian subcontinent. However, the Trichoptera of Andaman and Nicobar Islands was studied by Starmühlner (1978) and Malicky (1979, 1984). Malicky (1997, 2005) described two species of Trichoptera namely *Chimarra ariadne* Malicky, 1997 and *Oecetis philoktetes* Malicky, 2005 from Great Nicobar Islands. According to Starmühlner (1986), 19 species of Trichoptera have been recorded as endemic from Andaman Islands. Chandra (1999) has reported 20 species of Trichoptera belonging to 12 genera and 7 families from Andaman and Nicobar Islands. The present study was carried out on the Trichoptera of the head water streams of Great Nicobar Biosphere Reserve. These larvae were collected and identified up to genus level.

Based on the taxa's tolerance to organic pollution the tolerance values were developed by aquatic biologists. Tolerance values are mostly used in the calculation of the Hilsenhoff species-level Biotic Index and the Family Biotic Index. Tolerance values range from 0 for organisms very intolerant of organic wastes to 10 for organisms very tolerant of organic wastes. In the present study the tolerance values for the Trichoptera were taken from Wiggins *et al.*, 1994.

## MATERIALS AND METHODS

### Study area

Great Nicobar Island is the southern-most island of the Andaman and Nicobar Islands which is only about 80 nautical miles from Sumatra. The total forests cover of Andaman and Nicobar islands is more than 92% out of which about 84% is the reserved and protected forest. The total forest cover of Nicobar islands is 1,364 km<sup>2</sup> (very dense forest accounts for 787 km<sup>2</sup>, Moderate dense forest accounts for 461 km<sup>2</sup> and open forest accounts for 116 km<sup>2</sup>).

### Collection, Preservation and identification

Trichoptera larvae were collected by hand picking directly from stones by using fine tipped forceps and also by D-frame aquatic net. Larvae were preserved in 75 % alcohol. Identification was made by using the keys suggested by Wiggins *et al.*, (1994). Trichoptera larvae were identified up to genus level and confirmed by Dr. John C. Morse, Emeritus Professor and Emeritus Director, Clemson University Arthropod Collection, South Carolina, USA.

## RESULTS

The Trichoptera larvae collected from GNBR and its tolerance values are presented in Table - 1. In the present study five genera viz., *Anisocentropus*, *Cheumatopsyche*, *Hydropsyche*, *Lepidostoma* and *Leptocerus* of Trichoptera larvae from four families namely Calamoceratidae, Hydropsychidae, Lepidostomatidae and Leptoceridae belongs to 3 suborders namely

Annulipalpia, Integripalpia and Spicipalpia were observed. Hydropsychidae contributes maximum i.e., two genera with 10 individuals out of the total 15 individuals collected from GNBR and all other families with only one genus in the present survey. The genus *Leptocerus* was the least in the survey. *Anisocentropus*, *cheumatopsyche*, and *Lepidostoma* were collected uniformly from the habitats.

## DISCUSSION

Altogether 27 species belonging to 17 genera and 12 families were recorded from Andaman and Nicobar Islands. All these species were described by Malicky (1984, 1997, 2005). Malicky (1984) associated the larvae, pupae and adults of few species of trichopterans. Although several authors have attempted to study caddisfly larvae, progress has been hindered by the lack of knowledge on larval taxonomy and the difficulty in associating larvae with adults (Thamsenanupap *et al.*, 2003). Morse (2012) has provided information about the Trichoptera of Andaman and Nicobar Islands. Of the total 17 genera recorded from the Andaman and Nicobar Islands, the present study records only 5 genera from the Great Nicobar Biosphere Reserve. The genus *Anisocentropus* of the family Calamoceratidae is new record to Andaman and Nicobar Islands. Based on their resistance to pollution, tolerance values were fixed to Trichoptera by the ecologists. Tolerance values for some species of Trichoptera were not yet fixed. Increase in the tolerance value of the trichopteran

**Table -1** : Number of examples of Trichoptera larvae and their tolerance value recorded from Great Nicobar Biosphere Reserve

S. No.	Family	Genera	Tolerance value	No. of exs collected
1.	Calamoceratidae	<i>Anisocentropus</i> sp.	0.8	2
2.	Hydropsychidae	<i>Cheumatopsyche</i> sp.	6.6	2
3.	Hydropsychidae	<i>Hydropsyche</i> sp.	0.0 - 8.1	8
4.	Lepidostomatidae	<i>Lepidostoma</i> sp.	1.0	2
5.	Leptoceridae	<i>Leptocerus</i> sp.	-	1
			<b>Total</b>	<b>15</b>



*Anisocentropus* sp.



*Cheumatopsyche* sp.



*Hydropsyche* sp.



*Lepidostoma* sp.



*Leptocerus* sp.

larvae increases the resistance to pollution. Of the taxa collected from GNBR, *Lepidostoma* sp. having tolerance value (1.0) and *Hydropsyche* sp. tolerance value ranges from 0.0 to 8.1, so the taxa were found both in unpolluted and polluted sites. In the present study the *Hydropsyche* sp. were collected from a 3<sup>rd</sup> order stream devoid of human influences. *Cheumatopsyche* sp. having high tolerance value (6.6), as its tolerance value, the taxa was collected from lentic water body with anthropogenic activity. The presence of *Cheumatopsyche* and *Hydropsyche* (Hydropsychidae) in large numbers is probably due to the fact that these retreat-makers are able to colonize a variety of substrates found in flowing waters. Wiggins (1977) mentioned that the families Leptoceridae and Hydropsychidae are widely distributed and having the species adapted to cool lotic and warm lentic habitats. In addition they are able to subsist on many different nutrient resources including diatoms and other algae, invertebrates, and

detritus, utilizing them in differing proportions, depending on the season (Wiggins, 1977 and 1984). According to the census 2001 the population of Andaman and Nicobar Islands is 0.37 million. Of these 88% inhabits Andaman Islands and only the remaining 12% inhabits the Nicobar Islands. So the influence of anthropogenic activities on GNBR water bodies is scarce.

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