INTRODUCTION

Diaptomid copepods are a major group of planktonic microcrustaceans in freshwater ecosystems, where they play a significant role in the food web and energy flow pathways. As secondary producers they graze upon phytoplankton (i.e. primary producers) and, in turn, form a direct and chief source of food for certain fish and invertebrate predators. Compared with cyclopoid copepods, diaptomids respond to the environmental changes more rapidly, thus acting as valuable indicators of the trophic status of freshwater bodies. Hence they are increasingly used in monitoring and surveillance programmes in freshwater habitats. Free-living copepods, in general, have the potential to be used by man in different ways, and at the beginning of the 19th century, they were already used as a source of food by shipwrecked persons, who needed to feed themselves in situ (see Dussart & Defaye, 2001). Very recently an undescribed species of the genus *Allodiaptomus* Kiefer has reportedly been “the basis of a small local fisheries and is a regular component of human alimentation” (Kottelat, 2007). Certain species can be easily cultivated under laboratory conditions and used as live feed for fish and prawn larvae in aquaculture industry.

Diaptomid copepods belong to the successful and widespread freshwater family of Diaptomidae, which contains 470 species in 59 genera (Dussart & Defaye, 2002). Taxonomic reports on Indian freshwater copepods began to appear mainly from the start of 20th century. Gurney (1906, 1907, and 1931) gave an early account of Indian diaptomids, including four new species from Calcutta and Chotanagpur on the basis of the collections of the Indian Museum, Kolkata (erstwhile Calcutta). Kiefer (1932) evolved a new system of classification for diaptomids, which has been adopted throughout the world, notwithstanding the fact that it is purely typological and not based on phylogeny. Brehm (1950, 1953, and 1963) not only
described several new species and constructed taxonomic keys but also briefly dealt with the intraspecific variations of some species. Sewell’s works of 1924 and 1934 on Chilka Lake and Salt lakes, respectively, also contain some information on diaptomids.


Apart from the aforementioned taxonomic studies on the Indian diaptomids, Heliodiaptomus viduus (Gurney), which is the most common and a fairly large-bodied species in India, has been investigated for its biochemical constituents (Altaff & Chandran, 1988, 1989; Dutta et. al., 2006), food and feeding behaviour (Altaff & Chandran, 1995), remating (Sherief & Altaff, 1993), and oviducal gland (Altaff & Chandran, 1994). Also, Dharani & Altaff (2002) reported on the facultative sex reversal in Sinodiaptomus (Rhinediaptomus) indicus Kiefer. The genital structures in Paradiaptomus greeni have been depicted by Defaye et. al. (2000). Ram Kumar (2003) studied in detail the effect of different food types on the postembryonic developmental rates and demographic parameters of Phyllodiaptomus blanci.

To date, 45 diaptomid species in 13 genera are known in India. The present study (2002-2011) mostly covering peninsular India, has yielded 26 species belonging to 10 genera, together
with three new species the genus *Tropodiaptomus* Kiefer 1932: *T. keralaensis* n. sp., *T. venkataramani* n. sp., and *T. raoi* n. sp. In addition, a fourth new species of *Tropodiaptomus*, i.e. *T. defayae* n. sp., which was collected from Nepal, is being described in this thesis. The diagnostic morphological characters of all the 26 species encountered in the present study are given along with freshly made line drawings. The drawings of all these species are also supplemented with light microscope digital images of habitus and/or appendages. Dichotomous keys are constructed for the identification of the species belonging to seven genera viz., *Heliodiaptomus* Kiefer, 1932, *Allodiaptomus* Kiefer, 1936, *Neodiaptomus* Kiefer, 1932, *Phyllodiaptomus* Kiefer, 1936, *Tropodiaptomus* Kiefer, 1932, *Sinodiaptomus* (*Rhinediaptomus*) Kiefer 1936, *Megadiaptomus* Kiefer, 1936. To project the complete picture of Indian Diaptomidae, the diagnostic characters and figures or SEM pictures of other Indian species, unmet in this study, have been taken from the published literature. The morpho-taxonomic characters and their varied states among the Indian taxa are reviewed. Biogeographic and ecological distribution of all the known Indian species is briefly discussed and mapped.

This study has brought to light several hitherto undocumented morphological features. For example, in *Tropodiaptomus orientalis* (Brady, 1886), the fourth seta (counted from outside) on leg 4 in both sexes is extraordinarily long and highly characteristic. The male antennule of *Paradiaptomus greeni* (Gurney, 1906) has four instead of three post-geniculate segments. Similarly, the ornamentation of the male right caudal ramus in *Heliodiaptomus pulcher* (Gurney) and of the body in *Heliodiaptomus viduus* (Gurney), etc. are being depicted for the first time. Biogeographically, the Indian diaptomid fauna presents a mix of Oriental, Pleistocene and Gondwanan elements besides only a few endemics. The origin of these elements and their distribution patterns within the Oriental Realm are discussed from the standpoint of historical
biogeography. How the formation of the Assam-gateway as a vital biogeographic corridor has contributed to the highest species richness observed at the northeastern region of India is also discussed.

Finally, based on the present data together with the already published distribution records of all the valid Indian diaptomids, the current conservation status of each species is evaluated, following the IUCN criteria. Accordingly, *Spicodiaptomus chelospinus*, *Keraladiaptomus rangareddyi*, *Megadiaptomus pseudohebes* and *Heliodiaptomus kolleruensis* are placed in the Critically Endangered category (CR A-E). Eight species, viz. *Tropodiaptomus euchaetus*, *T. defayae* n. sp., *T. venkataramani* n. sp., *T. raoi* n. sp., *T. keraliensis* n. sp., *Phyllodiaptomus wellekensae*, *P. sasikumari* and *Sinodiaptomus mahanandiensis* are categorized as belonging to the Vulnerable category (VU D2), whereas the remainder to the Lower Risk (LR) category. The rationale behind this decision is elucidated.

All in all, the thesis is an update on the morphology, taxonomy, biogeography, and conservation status of Indian Diaptomidae.