

Kerala- an abode of taxonomically challenging permanent meiofauna, Gastrotricha

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Abstract

Interstitial faunal survey of the interstices of the sandy beaches of Kerala, India revealed the presence of gastrotrich, an aberrant phyla of invertebrates in large numbers. The paper reports eight species of gastrotrichs, belonging to four macrodasyids and four chaetonotids, the two major orders of the group. Genus *Halichaetonotus* is reported for the first time from the Indian coast. All the eight species reported here are premier records from the coast of Kerala. Distinct discontinuity in occurrence and abundance was a striking feature of these animals.

Keywords: Kerala, meiofauna, Gastrotricha, abundance.

Introduction

The richness of animal resources of India is largely due to its geographical position and the fact that it possesses all possible kinds of ecosystems. Of the various marine ecosystems, the sandy beaches have attracted the attention of numerous marine biologists. By and large, the macroinvertebrates drew the attention of naturalists to this serene environment. Besides macrofauna, sandy beaches are profusely inhabited by microscopic organisms belonging to lower and higher invertebrate taxa. Benthos represents a major component of the marine environment and plays a vital role in the overall

food chain in the sea (Ganesh and Raman, 2007). In order to make a sound estimate of marine benthic diversity and to provide an unbiased comparison with terrestrial diversity, we need to improve our knowledge on the meio- and microfauna of marine sediments (Armoneis and Reise, 2000). Meiofauna is the most scientifically rewarding group, still interstitial faunal studies remain in an infantile stage in India.

Gastrotricha constitutes one of the most interesting and challenging groups of meiobenthic marine invertebrates. The phylum is cosmopolitan and has about 765 species grouped into two orders: Macrodasysida, with 310 strap shaped species and Chaetonotida, with 455 tenpin-shaped species (Hummon and Todaro, 2011). Krishnaswamy (1957) reported for the first time the occurrence of marine gastrotrichs in the Indian coast. Ganapati and Rao (1962) in a pioneering effort reported the occurrence of gastrotrichs from the interstitial meiofauna of Waltair coast. A complete picture of the gastrotrichs recorded from India and the neighbouring islands have been reviewed and illustrated by Naidu and Rao (2004). Apart from the studies done by Govindankutty and Nair (1967; 1972), there is little information on gastrotrich fauna from Kerala. The sporadic distribution of these minute organisms and the great difficulty in handling and identifying them have resulted in scanty information of this phylum from the Indian coasts. During a

survey of interstitial animals along the south-west coast of Kerala, gastrotrichs were obtained in abundant numbers.

Material and methods

Samples of sediments were collected employing a corer of 8 cm inner diameter from the beaches of Cherai (lat.10°09' N; long.76°02'E), Fort Kochi (lat.9°18'N; long.76°05'E), Arthungal (lat.9°10'N; long.76°23'E), Sakhikulangara (lat.8°45'N; long.76°38'E) and Veli (lat. 8°29'N; long.76°59' E) located on the south-west coast of India. The animals were narcotized *in situ* by adding 7% MgCl₂ solution and subsequently fixed

in 5% buffered formalin. After extraction by decantation (Pfanckuche and Thiel, 1988), the specimens of gastrotrichs were dehydrated through graded ethanol series, mounted on slides using glycerol and sealed with a sealant. Specimens were examined under a Magnus 100X oil immersion objective (India) or with Nomarski differential interference contrast optics using an Eclipse 90i Nikon microscope (Italy). During DIC observation, the specimens were photographed with a DS- 5Mc Nikon digital camera. Measurements were taken using an ocular micrometer or derived directly from microphotographs.

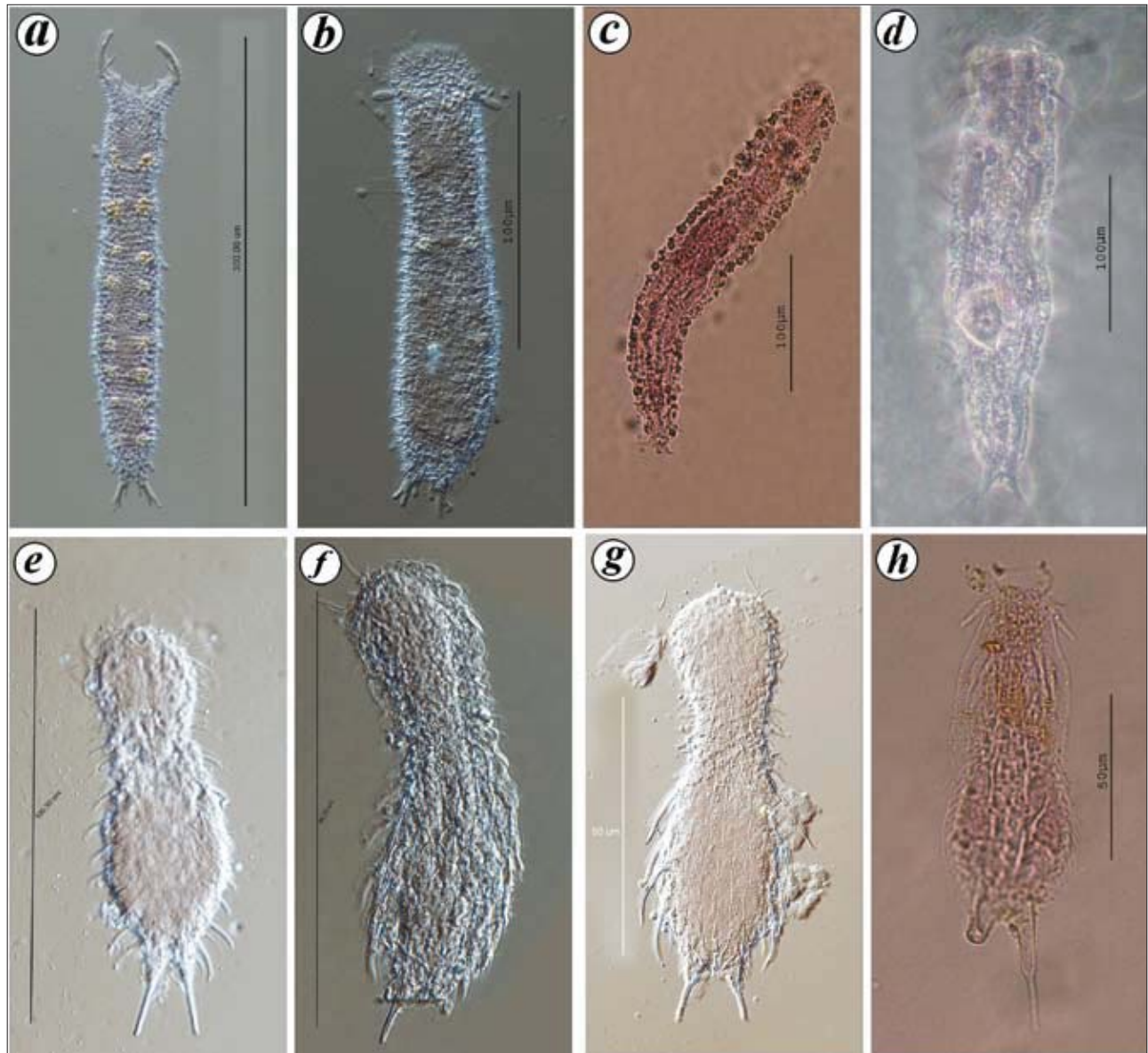


Fig.1. Gastrotricha: a. *Pseudostomella cheraensis* b. *Tetranchyroderma swedmarki* c. *Turbanella lutheri* d. *Paraturbanella* sp. e. *Chaetonotus apolemmus* f. *Halichaetonotus spinosus* g. *Halichaetonotus* sp. h. *Xenotrichula* sp

Results and discussion

The spacial distribution of Gastrotricha in a beach is of great ecological significance. The species composition, density and distribution of Gastrotricha vary considerably from area to area depending on the nature of the substratum. In the present survey, gastrotrichs were well represented in Cherai, Fort-Kochi and Veli beaches. The survey revealed the occurrence of eight gastrotrich species (Fig.1) which include four macrodasyids (*Pseudostomella cheraensis* Priyalakshmi *et al.*, 2007; *Tetranchyroderma swedmarki* Rao and Ganapati, 1968; *Turbanella lutheri* Remane, 1952 and *Paraturbanella* sp.) and four chaetonotids (*Chaetonotus apolemmus* Hummon, Balsamo & Todaro, 1992; *Halichaetonotus euromarinus* Hummon & Todaro, 2010 (= *H. spinosus* Mock, 1979); *Halichaetonotus* sp. and *Xenotrichula* sp.). *Pseudostomella cheraensis* is new to science (Priyalakshmi *et al.*, 2007). All are premier reports from this coast and the Genus *Halichaetonotus* is reported for the first time from Indian waters. Certain degree of habitat related species preference was evident in the distribution of gastrotrichs (Table 1). Discontinuous distribution accompanied by site specific abundance is a cardinal feature of gastrotrichs. A few successful species always dominate in their quantitative abundance, while a majority of the remaining ones occur in small numbers (Naidu and Rao, 2004). This was quite evident in the abundance of *Paraturbanella* sp. at Fort Kochi and *Tetranchyroderma swedmarki* and *Pseudostomella cheraensis* at Cherai. Since gastrotrichs are living in an unstable environment subject to frequent disturbance, they always migrate seeking optimum conditions for existence. The presence of lone species of *Paraturbanella* in large numbers at Fort Kochi was an interesting phenomenon. Gastrotrichs were altogether absent during the monsoon indicating that

all the species recorded now are typically marine and will be either killed or removed during the monsoon months when the surface waters of Kerala coast oscillate between oligohaline and mesohaline conditions. Given the short life cycle, the small number of offspring, the absence of a pelagic larval stage and the comparatively limited swimming ability of the adults, gastrotrich species would be expected to have restricted geographic ranges. Dispersal via long-shore currents over a long geological time combined with oceanic dispersal and continental drift may be invoked to explain biogeographic patterns of Gastrotricha distribution in many marine systems; however indirect dispersal by phoretic, rafting and ballast may play a relevant role too (Hummon & Todaro, 2011).

The significance of gastrotrichs in the animal community needs to be further ascertained. The gastrotrichs, not only play an important role in the food chain of the aquatic ecosystem, but also contribute largely to the recycling or regeneration of nutrients basically required for sustaining life in their environment. This fascinating group of littoral organisms are being extremely employed in various tolerance experiments and interesting ecological investigations (Naidu & Rao, 2004). The adoption of molecular methods will decisively contribute to future development. We should address the importance of global climate change and advocate more strongly than before, the value of using the ubiquitous and speciose meiofauna to assess the health of ecosystems (Giere, 2009). The increase in human population enhances the rate of species extinction and the Indian subcontinent is no exception to this universal phenomenon. When vast stretches of the Indian subcontinent still remains to be studied in detail for this fauna, it is a pity that many of these strange creatures perish undiscovered, undescribed and unknown.

Table1. Relative abundance and distribution of gastrotrichs in five selected sandy beaches

Season	Beach	Density /100 cm ³	<i>Pseudostomella cheraensis</i>	<i>Tetranchyroderma swedmarki</i>	<i>Turbanella lutheri</i>	<i>Paraturbanella</i> sp.	<i>Chaetonotus apolemmus</i>	<i>Halichaetonotus spinosus</i>	<i>Halichaetonotus</i> sp.	<i>Xenotrichula</i> sp.
Pre – monsoon	Cherai	140	R	R						
	Fort Kochi	695				R				
	Arthungal	–								
	Sakthikulangara	–								
	Veli	12		R						
Monsoon						N R				
Post – monsoon	Cherai	586	R	R			R	R	R	
	Fort Kochi	–								
	Arthungal	–								
	Sakthikulangara	–								
	Veli	77		R	R	R	R			R

R: Recorded NR: Not Recorded

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