

Parasitic Occurrence in the Giant Fresh water prawn *Macrobrachium Rosenbergii* from Coastal Karachi, Pakistan

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ABSTRACT

In recent years culture of *Macrobrachium rosenbergii* is expanding in Pakistan Coastal Areas of Karachi in particular due to its relatively fast growth rate, high market price and export demand. However, the detail study on parasitic diseases has received less attention on cultivable *M. rosenbergii* in compared to the penaeid prawns. The present parasitic survey on *M. rosenbergii* from coastal areas of Karachi encountered 14 species of parasites. Among the protozoan parasites, *Zoothamnium* sp., *Amphileptus* sp., *Dileptus* sp., *Chilodonella* sp., *Balladyna* sp., *Epistylis* sp., *Vorticella* sp. and *Gregarina* sp. were recovered; of which 4 were ecto-commensals and other 4 were endo-commensals. Metazoan parasites represented by *Myxobolus* sp., *Rhabdochona* sp., *Indocucullanus* sp., *Procamallanus* sp., *Cucullanus* sp. and *Acanthogyrus* sp; of which 1 were ecto-commensals and other 5 were endocommensals. In Karachi coastal areas, inland culture and capture based fishery activities mainly rural based and operated by poor farmers. Developing right kind of intervention.

Keywords: *Macrobrachium rosenbergii*, epibionts, parasites

INTRODUCTION

The giant freshwater prawn *Macrobrachium rosenbergii* has a wide distribution throughout the Indo-Pacific region and most favoured for farming in tropical and subtropical areas of the world (New, 2005). In India its culture was developed few decades ago as an alternative to the *Penaeus monodon* and to compensate for the substantial losses due to the epidemics of white spot syndrome in penaeid shrimp farming, hypothesizing that *M. rosenbergii* is resistance to white spot disease (Sahul Hameed *et al.*, 2000). This freshwater palaemonid prawn is popularly known as 'scampi' in Indian trade, farmed chiefly in small to medium-sized earthen ponds in the states of West Bengal, Andhra Pradesh, Tamil Nadu and Kerala states in India (Nair and Salin, 2012).

In its culture and natural settings, crustaceans serve as hosts for a wide range of protozoan and metazoan parasites, some of them cause considerable pathogenicity by affecting the growth and reproductive performance of the hosts (Jayasree *et al.*, 2001). In Asia, the viral, bacterial and parasitic

infections of *M. rosenbergii* were found to be important causes of significant pond production losses (Chu *et al.*, 2011). However, the study on parasites and diseases has received considerable attention on cultivable penaeid prawns and *Penaeus monodon* in particular, but non-penaeid prawns have received less attention in this regard.

Viral diseases of the *M. rosenbergii* were extensively reviewed by Bonami and Widada (2011). Studies on protozoans and metazoans parasites from *M. rosenbergii* were carried out from various parts of the world (Beck, 1980; Schuldt and Rodrigues-Capitulo, 1985; Areerat, 1988; Nash, 1989; Johnson, 1995; Johnson and Bueno, 2000; Rodriguez *et al.*, 2001; Montoya, 2003) but majorities were focused either individuals or groups of parasites. In India, some parasitological studies on *M. rosenbergii* were also reported (Santhakumari and Gopalan, 1980; Sankoli *et al.*, 1982; Saha *et al.*, 1988; Shanvas *et al.*, 1989, Jayasree *et al.*, 2001, Mariappan *et al.*, 2003).

In recent years cultures *M. rosenbergii* is expanding in India due to its relatively fast growth rate, high market price and export value. The total scampi production from India in 2010-2011 was about 8778 metric tons and the West Bengal state was the leading producer with a production of 2906 metric tons (MPEDA, 2011). In the year 2011-12, India exported 2723 metric tons *M. rosenbergii* with an increase of 31.61% in quantity than the previous years (MPEDA, 2011). In view of the facts, information on parasites is essential to prevent any disease outbreak in culture setting and to draw sustainable management plan. In continuation to the

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fact, an investigation of the parasites from farmed *M. rosenbergii* was undertaken from two major prawn producing districts of West Bengal state in India.

MATERIALS AND METHODS

The present study was done during the period of May to July 2014. Live *M. rosenbergii* (n=75) was randomly sampled from different freshwater as well as brackishwater impoundments of South and North areas of Karachi and were brought to laboratory in oxygenated polythene bags for detail investigations. All prawns were dissected, and scrapings from cuticles, appendages, gills, digestive tracts, intestine and hepatopancreas were taken on clean slides with saline solution (0.75% NaCl) and examined. The smeared slides were air dried, fixed in acetone free methanol and stained with Giemsa (HiMedia, Mumbai). Standard methods were employed for fixation and staining of parasites. The prepared slides were examined under Carlzeiss stereomicroscope using 10x, 40x and 100x objectives. The identification of parasites was done based on Couch (1983), Kabata (1985), Lightner (1996) and Mehlhorn (2008). After that the slides were deposited at the Laboratory of Aquaculture Management and Technology.

RESULTS AND DISCUSSION

During the present investigation, a total 14 species of parasites were recorded from different organs of *M. rosenbergii* (Table 1; Plate 1 and 2). Protozoans belonging to two groups were mainly encountered, namely the epibiotic ciliates and the gut dwelling gregarines (Chakraborti and Bandyopadhyay, 2011). Among the 7 ciliates, peritrichous ciliates belonging to the genera *Zoothamnium*, *Epistylis* and *Vorticella* were found to predominant in pleopods, uropods, gills and intestine. 1 species of gregarines were found to restrict in intestine. Among the observed protozoan parasites, 4 were ecto-commensals and other 4 were endo-commensals. Among the 6 metazoan parasites, 4 species belonging to phylum nematode those were predominant only in digestive tracts. 1 species cnidarian ecto-commensal and acanthocephalan endo-commensal respectively were also encountered during present parasitic survey.

A wide variety of epicomensal have been reported from the gills and external surfaces in postlarval and adult freshwater prawn (Johnson and Bueno, 2000). Ciliate infections, in particular *Zoothamnium*, *Epistylis* and *Vorticella* were recorded earlier from penaeid as well as non-penaeid prawns and from several geographical regimes (Brock, 1983; Colorni, 1985). In consistent with the present findings, several authors reported peritrichous ciliates from India dealing with their occurrence,

pathogenicity and epizootiology (Rajendran et al., 1982; Felix et al., 1994; Nandi and Das, 1995). The heavy infections of ectosymbionts peritrichous ciliates ultimately causing death to the host was discussed by Overstreet (1973). The seasonal incidence of *Zoothamnium* infections and their relation with salinity and rainfall was also discussed by Jayasree et al. (2001). Gut dwelling gregarine parasites are all pathogenic to the decapods crustaceans and may lead to reduced absorption of food or occasional intestinal blockage and possibly mortality of their host (Sprague and Couchi, 1971). The infection rate with gregarinids is high in summer than winter (Timofeev, 2001). In India, Jayasree et al. (2001) reported two species of gregarines from *Metapenaeus dobsoni* but those were completely absent in *M. rosenbergii*. Nematode infection recorded rarely from *M. rosenbergii* (Nash, 1989). It is contacted through foraging on infected copepods that serve as intermediate hosts for these helminths. There is thus every potential for some human helminth infections to be carried through freshwater prawns.

Table 1: The detail lists of parasites recovered from *Macrobrachium rosenbergii* and their site of infection

Groups	Parasites	Organ specificity
Protozoan		
Ciliates	<i>Zoothamnium</i> sp.	Gill, appendage
	<i>Amphileptus</i> sp.	Gill
	<i>Dileptus</i> sp.	Intestine
	<i>Chilodonella</i> sp.	Gill, appendage
	<i>Balladyna</i> sp.	Gill, appendage
	<i>Epistylis</i> sp.	Intestine
Gregarines	<i>Vorticella</i> sp.	Intestine
	<i>Gregarina</i> sp.	Intestine
Metazoan		
Myxosporadials	<i>Myxobolus</i> sp.	Gill
Nematodes	<i>Rhabdochona</i> sp.	Intestine
	<i>Indocucullanus</i> sp.	Intestine
	<i>Procammallanus</i> sp.	Intestine
	<i>Cucullanus</i> sp.	Intestine
Acanthocephalan	<i>Acanthogyryus</i> sp.	Intestine

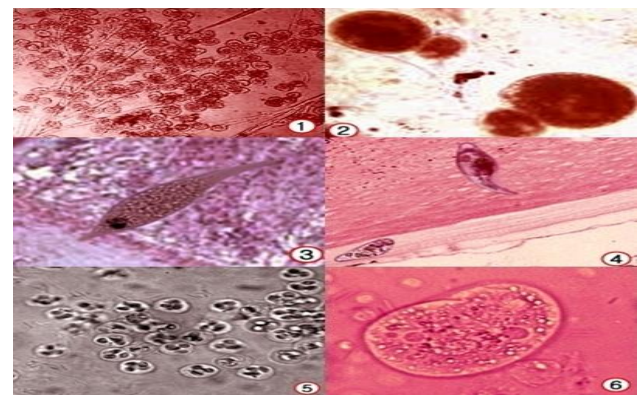


Plate 1:

1. Colonies of *Zoothamnium* sp. attached to the gills, 150X
2. *Gregarina* sp. attached in the intestine, 150X
3. *Amphileptus* sp. attached in the gill, 150X
4. *Dileptus* sp. attached in the intestine, 150X
5. *Myxobolus* sp. attached in gill, 150X
6. *Chilodonella* sp. attached to the appendages, 150X

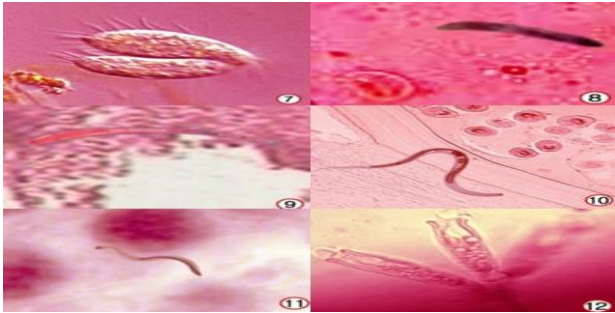


Plate 2:

1. Colonies of *Balladyna* sp. attached to the appendages, 100X
2. *Rhabdochona* sp. attached in the intestine, 100X
3. *Indocucullanus* sp. attached in the intestine, 150X
4. *Procammallanus* sp. attached in the intestine, 150X
5. *Cucullanus* sp. attached in intestine, 150X
6. *Epistylis* sp. attached to the intestine, 150X

CONCLUSION

The present study demonstrated that the giant freshwater prawn *Macrobrachium rosenbergii* serve as hosts for a wide range of epibionts and parasites. Diseases are the most serious limiting factors in fishery sector and prime cause for chronic mortalities and poor growth which affects yield and marketability of aquatic animals. The flood plain wetlands in West Bengal are mostly eutrophicated and clogged with aquatic vegetation resulting sub-optimal water quality, which ultimately affected the general health condition of the aquatic animals. However, the finding of the present study will be serve as a baseline for designing parasite specific extensive study in future. In Karachi, inland culture and capture based fishery activities mainly rural based and operated by poor farmers. Developing right kind of intervention and managemnt practice can prevent advaerse impact of diseases and assist poor farmers for sustainable production.

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