Atypical Chytridiomyces Fungal Infection in Cultured Macrobrachium rosenbergii in India

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Abstract

In the present study we report ectoparasite infection in pond-cultured Macrobrachium rosenbergii from southeast coast of Tamilnadu, India. The symptoms included a thick layer of whitish hair covering the entire body, sluggish movement, decrease of food intake and abnormal migration to the pond corners. Laboratorial analysis identified fungi from the genus Chytridiomycetes, which have been associated to mortalities during freshwater prawn culture in India.

Keywords: Macrobrachium rosenbergii; Chytrid fungus; Infection; Pond culture

Case Report

Freshwater aquaculture has expanded rapidly in the Asia-Pacific region over the past three decades. For instance, the culture of giant freshwater prawn Macrobrachium rosenbergii in India reached 42,820 tonnes due to increased domestic consumption and exports [6]. However, freshwater prawn culture around the world has been challenged by the emergence of disease outbreaks. Particularly, attention has been paid to pond-cultured M. rosenbergii in India.

In the present study we describe a new disease outbreak in pond-cultured Macrobrachium rorenbergii from southeast coast of Tamilnadu, India. Diseased M. rosenbergii (n = 525) were collected in 32 ponds around Chennai area (13º01’ N; 80º16’ E) from June to October 2005. The affected prawns were found with their carapace and abdomen covered by a thick layer of whitish hair (Figure 1A). Further, these prawns showed sluggish movement, decreased food intake and abnormal migration to the pond corners. These clinical signs appeared after 3 to 4 months of juvenile stocking and were more pronounced in animals above 30 g of body weight. The external parasites were removed from the infected portions of the animals and stained with cotton blue and lactophenol. The identification procedures of isolates followed standard manuals [1,2,11,10] and revealed a fungal species of the class Chytridiomycetes. However, identification to the species level using usual techniques was unsuccessful until now, suggesting it could be a new fungal species.

The class Chytridiomycetes was predominant (78%) in the infected animals. Pot-shaped chytrid fungus show branching filamentous mycelium and measure around 45 ± 2 μm (Figure 1B and 1C). Their hyphae are stout, slender, crooked, sympodially branched and septated, measuring 12 to 85 μm in diameter at base, basal joints with 50 to 450 μm long and central joints up to 750 μm long. It is believed that this chytrid fungus can cause severe injuries to the animal by penetrating into the tissue resulting in high mortality. The first indication of the fungal infection is usually the dullness of the body colour and eye. The infected area can be easily distinguished from the surrounding tissue by the abnormal protrusion of the body surface even before the appearance of the fungus. Later, the fungus appears as a small tuft growing in the centre of this region and the affected area increases in size as the fungus spreads.

Fungal diseases are more prevalent in crustaceans than in any other marine invertebrates [16]. Previous studies have shown that most of fungal pathogens identified in aquaculture ecosystems are Phycomycetes [17,14]. Although, fungi with affinities to protistan groups such as Thraustochytrids and Labyrinthulids have been related to shellfish diseases, taxonomic misunderstandings are claimed by Phycologists and Aquaculturists alike.

Figure 1: Chytridiomycetes fungal infection in pond-cultured Macrobrachium rosenbergii. Fungal colonization covering the entire body of the prawn (A). Microscopic view of the chytrid fungus at the magnification of 100x (C) and 400x (B).

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mycologists and protozoologists [14]. In the present study we faced a similar problem, as some of the protozoans and chytrid fungus occurred together and resembled each other morphologically. Nevertheless, the ecological relationship between fungus and protozoan appear to be as predator and prey, respectively [15]. Several flagellate groups are reported to be attacked by chytrid fungi, which penetrate the flagellate cells or produce a root like hyphae withdrawing their contents [15].

At least two decapod crustaceans, the Pendulous shrimp *Dichelopandalus leptoceros* and the American lobster *Homarus americanus*, showed diseases attributed to chytrid fungi [19,9]. In addition, chytrid fungi were found to parasitise the eggs of the prawn *Alpheus saulcyi* [18]. Accordingly, in the present study we suggest that a chytrid fungus was responsible for mortalities observed in pond culture of *M. rosenbergii*. A few reports sustain that fungi infections are related to disturbance of physicochemical parameters in aquaculture ecosystems, such as water temperature, pH, transparency, as well as the host density [20,12,3,4,13,7]. Our data have shown high values of alkalinity, hardness and ammonia concentration in the water of infected ponds (Table 1). Furthermore, the culture cycles were mostly practiced on a continuous basis without intermittent drying of the pond. Taken these data together, it is possible that a combination of factors might have created a suitable environment for Chytridiomycetes to affect the prawns to pathogens.

This is the first report of chytrid fungal infection in *M. rosenbergii*, but further studies on the ultrastructural, molecular, geographical and diagnostic aspects of this emerging fungal disease in India could provide valuable information for its control during freshwater prawn culture.

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