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Short communication

Shedding of gill epithelia by grey mullets (Family Mugilidae) in Negombo Estuary, Sri Lanka

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Abstract

The grey mullets (Family: Mugilidae) have been described as plankton feeders, herbivores, omnivores, slime feeders, foul feeders, bottom feeders, etc. In general, grey mullets are known to be benthic feeders. During a comprehensive trophic ecological study of fish assemblages in brush-parks in the Negombo estuary, Sri Lanka, carried out from 2014 to 2016, a food item that was not found in the aquatic environment, such as zooplankton, phytoplankton, macrophyte or detritus, was observed in the gut contents of mugilids. In this communication, the authors report that the frequency of occurrence of these peculiar items in the gut contents were shedded gill epithelia. Even though shedded gill epithelia were not considered as a food item, they were the most common item in the stomach contents contributing to 49.9% of the mean volume of stomach contents.

Keywords: food and feeding; gill epithelia; Mugilidae; trophic ecology.

The mullets (Family: Mugilidae) are widely distributed in the coastal waters, estuaries and even in freshwater in the tropical and subtropical regions of the world (Wijeyaratne and Costa 1986; Koutrakis et al. 1994; Blay 1995). Many biological aspects of mullets including food and feeding habits, growth, migration pattern, spawning and reproduction have been studied (Odum 1968; Marais and Erasmus 1977; De Silva and Silva 1979a; Wijeyaratne and Costa 1986; Blay 1995; Fatema et al. 2013).

The mullets have been identified as an important group of fish in the subsistence fisheries in the coastal lagoons of Sri Lanka. Fifteen species of grey

mullets have been recorded in lagoons and estuaries in Sri Lanka (De Silva and Silva 1979b; Wijeyaratne 1984 Wijeyaratne and Costa 1987a).

Studies on the food and feeding habits of grey mullets were investigated by several authors in different parts of the world (Pillay 1953; Luther 1962; Thompson 1966; Berdugo and Kimor 1974; Kurian 1975; Wijeyaratne and Costa 1986, 1987a, 1987b, 1990; Rao and Babu 2013). The grey mullets have also been described as plankton feeders, herbivores, omnivores, slime feeders, foul feeders, bottom feeders, etc. (Luther 1962; Das 1979).

In estuarine waters, grey mullet (*Mugil cephalus*) mainly feeds on detritus, diatoms, algae and microscopic invertebrates (McDonough and Wenner 2003). They commonly feed either by sucking up the surface layer of the mud and sand through their mouth and gills or by grazing on epiphytes and epifauna from sea grasses and other submerged surfaces (Odum 1968). In general, mullets are known to be benthic feeders (Rao and Babu 2013). Wijeyaratne and Costa (1987b) reported presence of benthic polychaetes and sand particles in the diet of *Liza macrolepis* indicating that fish are bottom feeders.

An extensive literature has established that the major food items of mugilids comprise of three categories:

- Microalgae including epiphytic and benthic diatoms, dinoflagellates, green and blue-green algae,
- Decaying plant detritus, and
- Inorganic sediment particles.

The inorganic (sand) particles are used by mugilids for grinding plant cell walls in the highly modified gizzard like pyloric stomach (Thompson 1966).

Present communication forms part of a comprehensive trophic ecological study of fish assemblages in brush-parks in the Negombo estuary, Sri Lanka to evaluate the ecomorphological correlates of dietary habits, trophic guilds and resources partitioning carried out during 2014-2016, with a view to defining robust management strategies through ecosystem approach to fisheries. During the study, a food item that was not found in the aquatic environment, such as zooplankton, phytoplankton, macrophyte or detritus, was observed (Figure 1). Luther (1964) reported the presence of a similar structure among the food items of *Liza macrolepis* and *Mugil cephalus* from the Palk Bay, Mandapam, India, which was postulated as shedded gill rakers and considered shedding of gill rakers as a special characteristics of grey mullets. Luther (1964) stated that the reason for shedding of gill rakers either could be excessive feeding by fish on its favorite item of food or due to the clogging of the branchial apparatus by the suspended particles present in the surrounding environment. Das (1979) has also supported these findings who studied the stomach contents of *Mugil cephalus* in Goa region, India.

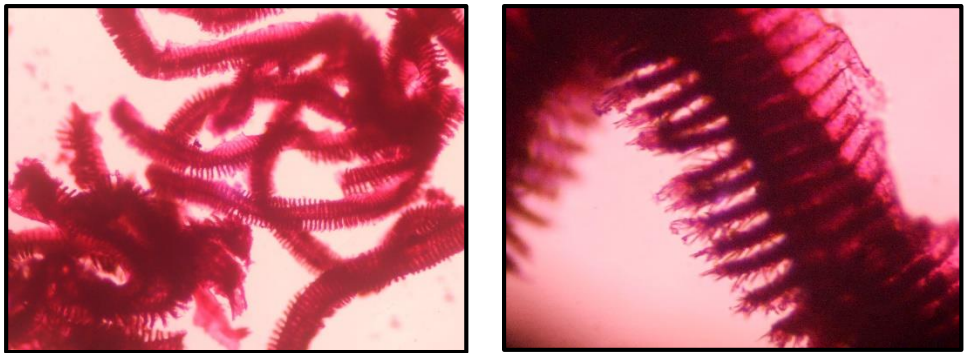

Figure 1. Gill epithelia found in stomach contents of Mugilids in Negombo estuary.

In this communication, the authors report that in contrast to what was reported in literature, the frequency of occurrence of these peculiar items in the gut contents were not shedded gill rakers but shedded gill epithelia. The contribution of shedded gill epithelia in different species of grey mullets including *Mugil cephalus, Liza subviridis, Liza macrolepis, Liza melinoptera, Valamugil seheli* and *Valamugil buchanani* was found to be about 66%. Even though shedded gill epithelia were not considered as a food item, they were the most common item in the stomach contents contributing to 49.9% of the mean volume of stomach contents. Gill epithelia accounted for 64% by volume in *Mugil cephalus* followed by *Valamugil seheli* (57.6%), *Liza subviridis* (43.4%), *Liza melinoptera* (42.8%) and *Liza macrolepis* (41.4%) of total stomach contents (Figure 2).

Although there have been several studies on the food and feeding habits of mullet grey species in Sri Lanka, shedding of gill epithelia has not been reported probably due to the fact that they are not the food items gathered from the environment. Nevertheless, reporting this will help to avoid misidentifying them as periphyton or polychaete moults. Therefore, the authors are confident that future research on the trophic ecology of this important group of fish in the tropical estuaries and lagoons would be benefitted.

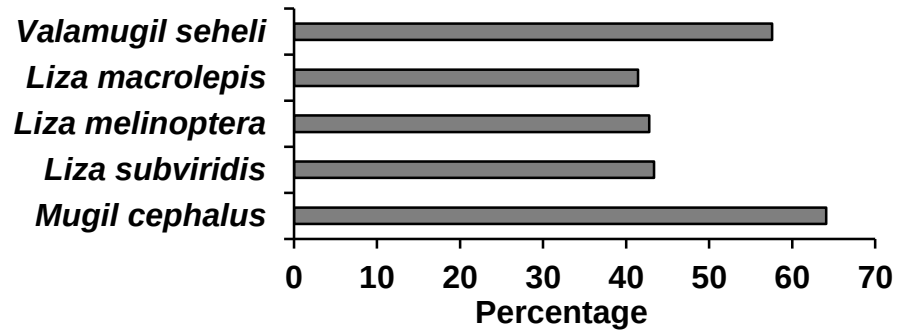

Figure 2. Percentage of volume of gill rakers in the stomach contents of Mugilids in Negombo estuary.

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