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SHORT COMMUNICATION

NOTES ON AQUARIUM BROOD RELEASE AND FEEDING OF THE OPOSSUM PIPEFISH, *MICROPHIS BRACHYURUS LINEATUS*

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INTRODUCTION

The opossum pipefish, *Microphis brachyurus lineatus*, is a migratory syngnathid with a salmon-like life history (Frias-Torres 2002). Adults breed in freshwater and oligohaline habitats associated with emergent vegetation, mostly *Panicum* sp. and *Polygonum* sp.; breeding occurs during the wet season (May to November) (Gilmore and Hastings 1983). In southern Mexico, opossum pipefish associate with *Ruppia maritima*, and reproduction is year-round (Miranda-Marure et al. 2004). Pelagic juveniles are found in the Atlantic Ocean and are associated with *Sargassum* sp. (Böhlke and Chaplin 1968). Juveniles eventually recruit into oligohaline habitats. The species range is from Sao Paulo, Brazil, to New Jersey, USA, although the northernmost limit of permanent breeding populations occurs in the freshwater tributaries to the Indian River Lagoon in east central Florida (Gilmore and Gilbert 1992). The opossum pipefish is one of 25 species of diadromous fish at risk of extinction in North America (Musick et al. 2000) and is a candidate species to the US Threatened and Endangered Species List (Federal Register 1999).

The opossum pipefish diet was unknown until Teixeira and Perrone (1998) analyzed the gut contents of 109 opossum pipefish from the southeastern Brazil population. They found that the most abundant prey were insect larvae, followed by juvenile fish (Gerreidae) and small crustaceans. However, the diet necessary to maintain aquarium-kept opossum pipefish had not been determined prior to the present paper.

Male Syngnathidae (seahorses and pipefishes) carry a brood of fertilized eggs in a partially or completely closed pouch, depending on the species. Hatching occurs inside the pouch, followed by release of the young syngnathids.

Brood release has been documented for common pipefish and seahorse species that have been succesfully kept in aquaria (Garrick-Maidment 1997). Gilmore (1977) reported opossum pipefish brood release in a freshwater aquarium, but the actual event of brood release was not observed. Long-term aquarium keeping of opossum pipefish has not been attempted before, and many fundamental questions of the biology of the species remain unresolved.

In 350 BC, Aristotle was the first scientist to describe the process of brood release in Syngnathidae, probably *Syngnathus acus*, a common pipefish with a pouch covered by a fleshy membrane found in inshore coastal areas of the Mediterranean Sea:

> "When the time of parturition arrives, [the pipefish] bursts in two, and the eggs escape out (…) the fish has a diaphysis or cloven growth under the belly and abdomen, and after it has spawned by the splitting of this diaphysis, the sides of the split grow together again. (…) The young fish cluster round the parent (…) for the fish spawns onto herself; and if any one touch the young, they swim away."

The goal of the present study was to gain insight into adult feeding and brood release of opossum pipefish in captivity as a step towards a better understanding of the biology of the species. Two primary objectives were: 1) to apply Teixeira and Perrone's field observations to the diet supplied to captive opossum pipefish and 2) to video record an opossum pipefish brood release event.

METHODS

Male-female pairs of opossum pipefish were collected at the Fellsmere Canal, Sebastian River, east central Florida, during the wet season (May to November) of 2000. Collections were targeted to areas with underwater bank vegetation using a 30 x 40 cm square dipnet with an outer net of 4 mm and an inner net of 0.5 mm mesh size. Fish were transferred into 25 L coolers equipped with airstones and filled with water and vegetation from the capture site. Additional *Panicum* and water were collected to establish aquaria in the laboratory. Adult male-female pairs and brooding males were transferred to freshwater 50 L glass aquaria fitted with standard undergravel filters and air stones. Several stems of *Panicum* were kept at the surface and half submerged. Illumination was set on a 13:11 light:dark cycle. Water and air temperature was kept at 25 ºC.

Captive opossum pipefish were presented with a variety of dried and live food types (brine shrimp, amphipods,

freshwater shrimp and guppies) one at a time, and their reaction (consumption or rejection) over a 15 min observation period was recorded. Insect larvae were not tested as potential diet for captive opossum pipefish. Daily observation of embryo development determined when brood release was imminent. At that point, a 24 h watch was kept to allow for video recording of a brood release event.

RESULTS AND DISCUSSION

Opossum pipefish rejected brine shrimp (*Artemia salina*) and amphipods, the 2 most common types of dried and frozen foods usually sold in pet stores as ideal feeding for Syngnathidae. Opossum pipefish also rejected live amphipods but consumed all other types of live food offered: *A. salina* adults (which survive a few minutes in freshwater); juvenile freshwater glass shrimp (*Palaemonetes kadiakensis* Rathbun); fry, juveniles, and small adults of guppies (*Poecilia* sp.); and mosquitofish (*Gambusia* sp.). To ensure a constant suppy of food, wild and commercially available freshwater shrimp, guppies and mosquitofish were fed to the opossum pipefish.

Brood release occurred several times in aquaria. The actual event of larval release was first observed from a 132 mm SL brooding male, 9 d after capture. Male opossum pipefish have an open brood pouch under the tail, where eggs are protected with bilateral pouch plates but are not covered by a pouch membrane (subfamily Doryrhamphinae). Therefore, direct observation of every stage of larval release was possible. On August 22, 2000 a power outage interrupted the automatic light cycle at 2:00 PM. At 3:00 PM the male started to release the brood. During brood release, the male remained close to the bottom, in a diagonal head-up orientation. The male vibrated for 2 sec from side to side, whereupon a string of 5 to 6 eggs detached from the pouch in a tail-to-head direction. Beginning with the most distal egg, the egg membrane ruptured, releasing a curled larva. Released larva then uncurled and with an undulating movement swam away from the male. In the frontal and medial sections of the pouch, direct hatching (without a preliminary release of a string of eggs) was observed (Figure 1). In this case, the larvae were violently ejected from the pouch. The observed brood release event lasted 35 min. In comparison, release of the seahorse brood (*Hippocampus* sp.) was preceded for up to 12 h of contractions, with the actual release taking just a few seconds (Garrick-Maidment, 1997).

Aquarium observations suggest that in the wild, opossum pipefish brood release occurs at dusk or at night. The power outage in the early afternoon, and the observed hatching that followed the dark period seems to confirm a

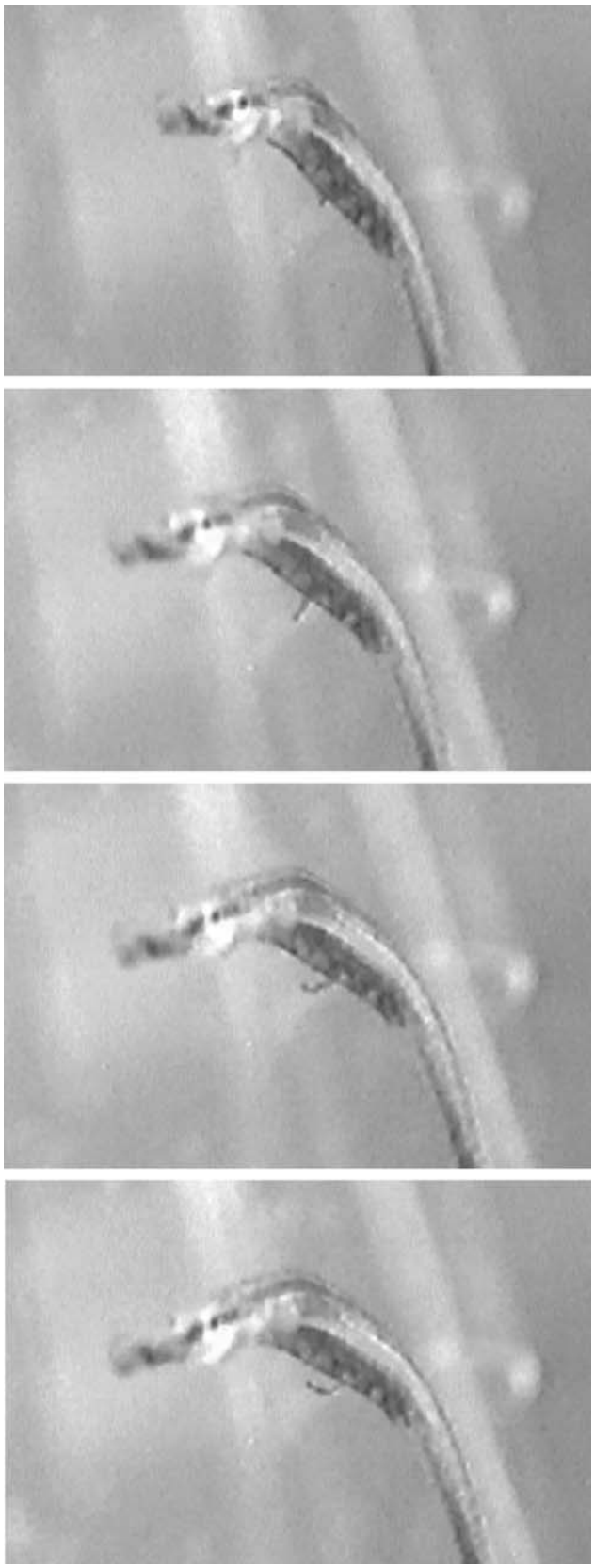

Figure 1. A 135 mm SL male opossum pipefish, *Microphis brachyurus lineatus*, releasing a 6 mm larvae. Sequence extracted from a 54 minute video recording.

dusk or nocturnal preference for larval release. Larval release was observed and video recorded for other brooding males during the wet season of 2000. All males followed a similar pattern of release at dusk, or soon after midnight, with vibrations preceding pouch release. In cases when the brood release was not observed, larvae were first seen swimming in the aquarium either late at night or just after sunrise.

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