Synbranchus marmoratus (Swamp Eel)

Family: Synbranchidae (Swamp Eels)
Order: Synbranchiformes (Swamp Eels)
Class: Actinopterygii (Ray-finned Fish)

Fig. 1. Swamp eel, *Synbranchus marmoratus.*

[http://www.aquahobby.com/gallery/others/e_Synbranchus_marmoratus.php, downloaded 14 November, 2011]

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TRAITS. The swamp eel, *Synbranchus marmoratus* is able to grow to about 59 inches in length (150 cm). This eel is marbled with black spots, the body being yellowish beneath (fig. 1). The physical characteristics of this eel consists of a long cylindrical body, the absence of pelvic and pectoral fins in adult eels (the larvae has large pectoral fins), vestigial (reduced size through evolution) dorsal and anal fins. Caudal fins appear very small if at all present. *Synbranchus marmoratus* does not have scales and its eyes are small. The gill membranes are fused and the opening of the gill may appear as a slit or pore underneath the throat. There is no swim bladder or ribs in these eels which is an adaptation to burrowing in mud during the dry season. Swamp eels have highly vascularised mouth and pharynx which assists in the function as a facultative air-breather. This acts as a primitive but yet efficient lung. (Wikipedia, 2011.) The swamp eel, *Synbranchus marmoratus* has over 40 common names comprising of marbled swamp eel, mottled swamp eel and marmorated swamp eel among others (Encyclopedia of Life, 2011).

ECOLOGY. Inhabits fresh and brackish waters in a variety of locations such as in streams, canals and ponds. As it is a facultative air-breather (can use both water and air to breathe), it can

be seen in both clear and murky waters. *S. marmoratus* is a nocturnal fish (active at night) found on the edge of the water which feeds on small fish, tadpoles and invertebrates. It is preyed on by larger organisms such as crocodilians and fish-eating birds (Novelguide 2011). In addition to tropical areas (Trinidad), they can be found from Mexico to Argentina.

SOCIABILITY. *S.marmoratus* can live in groups or alone (fig. 2). It is also pacific with other species but may feed on organisms that can fit in its mouth (RevistaAquario 2011).

ACTIVITY. *Synbranchus marmoratus* is a nocturnal species which are also able to move overland as a means of finding new habitat. During the beginning of the dry season when there is a decline in water level, they burrow through the soil where they go into a state of aestivation (dormancy). This burrow is mostly sub-horizontal with a vertical section which leads to the exterior by only one opening (Encyclopedia of Life 2011). While in this dormant state, the eel's metabolism slows down but if disturbed, it is able to flee. As the dry season progress, *Synbranchus marmoratus* burrow deeper to remain in contact with the water table. After the first rainfall, the eel will return to larger bodies of water (Graham, 1997). Experiments on *S.marmoratus* showed that it can survive six to nine months in drying laboratory conditions and tried to escape when uncovered from their tubes (Graham, 1997).

FORAGING BEHAVIOUR. As these eels have amphibious capability (survive on land) (fig. 3), they can create habitats on a wider range compared to other fishes. For instance, in South America and Panama, synbranchids are one of the few fishes found above major waterfalls. Synbranchus fishes have become an ecologically important predator on tadpoles in habitats where there is high elevation. They are also aggressive, nocturnal predators. They feed at night by methodically searching the shallows and burrows for food (Graham, 1997).

AIR-BREATHING. *S. marmoratus* are facultative air-breathers hence they can use either air or water to breathe. This is most probable as Synbranchids habitats are subject to hypoxia (reduced dissolved oxygen in water). Synbranchids respire aerially using a vascular epithelium that lines the mouth, pharynx, and the branchial chambers. *S.marmoratus* exposed to air breathe by holding their mouths open for extended periods of time (fig. 4). They perform this periodically. When the eel return to the water, the gulped air is held in its mouth and the inspired air is large enough to inflate the buccal, pharyngeal, and branchial cavaties. These breaths of air inspired can be so large, that the head of the fish can float. This position of the eel may prove advantageous as it may favour attack against prey that swim past. To prevent the loss of air during respiration and debris (mud) from entering the brachial chamber when burrowing, the opercular opening in *S. marmoratus* is reduced to a single, common ventral slit (Graham, 1997).

SEXUAL BEHAVIOUR: These eels may undergo sequential hermaphroditism, where some fish function first as females and then as males. This may occur around four years of age in the eels (Wikipedia, 2011). This is called protogyny and therefore the *S. marmoratus* is termed protogynous. Males from the beginning are called primary males while some begin as females, a characteristic that is termed diandric. When males and females come in contact, external fertilisation can take place.

JUVENILE BEHAVIOUR. Although the adults *S. marmoratus* are finless, the larvae are born with enlarged pectoral fins. The purpose of these large fins are to propel oxygenated water along the surface of the larva's body. The skin of the larva is also thin and highly vascularised, further enhancing its function of maximising as much oxygen intake into the larva's body from the surrondings water. As the larvae grows, adult organs that enable it to breathe begins to develop, and the eel no longer requires the fins. At the age of two weeks, the larvae sheds its pectoral fins and becomes an adult (Graham, 1997).

PARENTAL CARE. Experiments that were done, shown that male *S. marmoratus*, which guard nestlings, are capable of extruding aerially obtained oxygen across their skin into the nest water. Also, males had a greater capillary density in their skin compared to females. These features of the males would enable them to release as much as oxygen as possible in the water to their nestlings (Graham, 1997).

GENERAL BEHAVIOUR AND ADAPTATIONS TO THE ENVIRONMENT. Swamp eels are capable of extended amphibious (on land) trips brought about by snake-like undulations of their body. This usually occurs during the wet season. Overland movements allow synbranchids to reach streams above waterfalls. They hunt their prey by their sense of smell. By a cork-screwing motion of their body, these eels can dig burrows during the dry season in order to aestivate. Being finless, may allow adaptation for such movements (Graham, 1997).

REFERENCES

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Fig. 2. *Synbranchus marmoratus* living in a group of two.

[http://www.revistaaquario.com/pt-br/synbranchus-marmoratus/, downloaded 14 November, 2011]

Fig. 3. *Synbranchus marmoratus* on land.

[http://www.flickr.com/photos/knowprose/2501868142/, downloaded 14 November, 2011]

Fig. 4. *Synbranchus marmoratus* air-breathing.

[http://www.fishbase.org/Photos/PicturesSummary.php?StartRow=0&ID=5319&what=species&TotRec=3, downloaded 14 November, 2011]