

Oreochromis mossambicus (Mozambique Tilapia)

Family: Cichlidae (Cichlids and Tilapias)

Order: Perciformes (Perch and Cichlids)

Class: Actinopterygii (Ray-finned Fish)



Fig. 1. Mozambique tilapia, *Oreochromis mossambicus*.

[http://ja.wikipedia.org/wiki/%E3%83%95%E3%82%A1%E3%82%A4%E3%83%AB:Oreochromis_mossambicus_by_NPS.jpg, downloaded 5 October 2012]

TRAITS. *Oreochromis mossambicus* is a medium sized, laterally compressed fish that has long dorsal fins with 10-13 rays and spines (Froese & Pauly 2007). Its scales are large along the snout and fore head and become smaller along the body (Luna 2012). The coloration is a dull greenish yellow with weak banding pattern along the body (Froese & Pauly 2007). The adults range in size from 25 cm in the female to approximately 35 cm in the male. The male has an average weight of 2.5 pounds and the female ranges from 1.8-2 pounds at its maximum weight (Froese & Pauly 2007). *O. mossambicus* exhibits sexual dimorphism, the best descriptors are the premaxilla width, anal fin height and snout length; traits vital for agonistic displays, nesting and fighting (Oliveira & Almeda 1995). The size and coloration vary in captivity and with its diet. Some *O. mossambicus* look almost black in colour; females, non-breeding males and fry/ juveniles have a silvery colour on the scales (Luna 2012). *O. mossambicus* can live in both brackish and salt water and can survive a wide range of temperatures (Froese & Pauly 2007), and can live up to 11 years (Luna 2012).

ECOLOGY. *O. mossambicus* is found in habitats ranging from brackish to canals, ponds, coastal lakes and well vegetated areas, they can also thrive in sea water (Luna 2012). They are rarely found at high altitudes and are known to be tropical fish (Van der Waal 2002). Their habitat range is tropical between 17-35 °C and geographical range of 13-35 °S and originates in South Africa and Central Africa (Luna 2012) such as Zambezi, Angola (Van der Waal 2002). It is widely introduced, for example in south-east Asia including Taiwan, India and Japan (FAO 2012), and in Trinidad and Tobago. There is extensive habitat use and in many countries where *O. mossambicus* has been introduced the species becomes invasive and dominates the habitat (Trewevas 1983). *O. mossambicus* are omnivorous and consume detritus material, diatoms, and invertebrates (Mook 1983) algae and phytoplankton (Trewevas 1983), insects and vegetation. Juveniles tend to be carnivorous and eat fry, and these fish occasionally cannibalize their own young (Luna 2012).

SOCIAL ORGANIZATION. *O. mossambicus* are group-living and territorial and travel in schools like other cichlids (Mook 1983). Males exhibit territorial threat displays (Almada & Oliveira 1998) and the agonistic interactions also follow a hierarchical system that forms a linear relationship based on size (Almada & Oliveira 1996). Alpha males are the largest in the group and illustrate the greatest display of aggression; though common among males aggression tends to occur less frequently among females and between males and females (Almada & Oliveira 1996). *O. mossambicus* can tolerate a variety of habitats and therefore are considered to be one of the most invasive species in the world either being introduced through aquaculture or deliberately to control mosquito populations (Froese & Pauly 2007) through competition for food and habitat (FAO 2012). Females primarily guard the young fry from danger, and the males guard nesting sites (Oliveira & Almeida 1995). Before reproduction there are primary courtship displays and preparation such as digging the nest and defence displays (Almada & Oliveira 1998).

FEEDING BEHAVIOUR. As previously described the feeding behavior of tilapia is primarily on macrophytes (plants), with adults feeding on filamentous algae and aquatic macrophytes (Luna 2012). The feeding patterns tend to vary as they can both effectively harvest plankton from the water as well as use benthic and detritus to feed, this is done without disturbing benthic sediment (FAO 2012) as tilapia prefer clean water (Luna 2012). *O. mossambicus* adults are not carnivorous, however the juveniles eat young fry. In captivity and in commercial systems tilapia are exposed to both algae and pelleted foods, and the fish may learn to feed itself using demand feeders. During feeding in commercial systems the fish jump out of the water in a vigorous manner (Froese & Pauly 2007). Feeding is normally uninterrupted however in the case of mouth brooding females feeding patterns are stagnated and interrupted (Luna 2012).

COMMUNICATION. Tilapia fish use various displays to communicate, for agonistic and sexual courtship. *O. mossambicus* produces sounds during mating and agonistic interactions (Amorim et al. 2003). Only the most dominant males produced sounds and was found to be positively correlated to the rate of courtship (Amorim et al. 2003). Whereas other tilapia show the sound formation during only the primary stages of courtship the *O. mossambicus* produces sounds during all stages and is suggested to display the spawning readiness of the males as well as synchronizing egg release by females (Amorim et al. 2003).

ANTIPREDATOR BEHAVIOUR. Male *O. mossambicus* are territorial and this influences the aggressive behaviour that they display (Almada & Oliveira 1996). Population density and habitat influence the degree of aggression displayed (Almada & Oliveira 1998). Using visual aggression and signals such as erect median fins, mouth expansions and tail flickering which is detected via the lateral line on the fishes body (Almada & Oliveira 1998). Males use aggression signals such as butting and nipping for intruders (Amorim et al. 2003). When females are introduced they stimulate similar behaviour and when she does not react the males' behaviour switches to courtship (Balshine-Earn & Earn 1998).

SEXUAL BEHAVIOUR. The reproductive biology of *O. mossambicus* is polygamous maternal mouth brooder, with sexual maturity at two (2) months (Luna 2012); this may however stunt growth and is not popular in commercial systems (Froese & Pauly 2007). Courtship behaviour is exhibited by male when the female enters its territory, firstly he displays defence mechanisms, once assured it is a female and potential mate, the behaviour changes (Oliveira & Almada 1998) to a slow series of movements in a downward tilted position. The female is led to the pit and the courtship involves shuddering movements with slow swimming around the nest while the male butts at the projected genital tube of the female. The mouth brooders follow courtship with progeny; the female lays hundreds of eggs and picks them up in her mouth (Luna 2012) and the male spreads sperm over the site where the eggs were laid, and the female picks up the sperm mass, allowing for fertilization within the buccal cavity (Oliveira & Almada 1998). Males then abandon the female and begin more courtship with other females (Oliveira & Almada 1998). Breeding males in captivity synchronise their presence in the territories and their reproductive activity when other males begin their mating tactics, and establish a strong hold on their territory. In some studies males may even court males and those that responded frequently adopted female qualities (Almada & Oliveira 1998).

PARENTAL BEHAVIOUR. Social bonds are formed between females and her offspring during mouth brooding (Froese & Pauly 2007). Extra attention is given to the young, this is an example of uni-parental care which is solely carried out by the female. Females carry the eggs in her mouth for a period of approximately 12 days and therefore feeding and breathing is constrained (Luna 2012; Trewevas 1983). Young fry occasionally swim out of the mother's mouth before the period is over, this however is primarily unfavourable and the mother quickly takes them back into her mouth until a suitable time has passed (Froese & Pauly 2007; Balshine-Earn & Earn 1998). After their release they keep close to the mother (Froese & Pauly 2007). Both the mother and her offspring are essentially highly vulnerable at this stage however parental care is exhibited if any sign of danger is presented by a predator (Luna 2012). If a predator is observed the mother alerts the young and they show a backward swimming pattern (Balshine-Earn & Earn 1998).

JUVENILE BEHAVIOUR. Juvenile *O. mossambicus* are kept in the mother's mouth until they can survive on their own. At this point they are released and allowed to grow. The juveniles swim in schools and remain close together as well as their mother (Balshine-Earn & Earn 1998). Young fish are sensitive to changes in temperature and salinity, however are highly resilient (Luna 2012) and become even hardier as they reach adulthood. Juvenile fish reach sexual maturity at 2 months and a size of 6-7 inches (Luna 2012). Young *O. mossambicus* are omnivorous and can prey on small fry (FAO 2012), however as they mature they become strictly

herbivorous and eat only vegetation (Luna 2012). Tilapia are a fast growing species and reach maximum size within 5-6 months of hatching.

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Fig. 2. Mouth brooding: female *Oreochromis mossambicus* releasing fry from her mouth.

[http://www.vestafrika.dk/%C3%B8vrige_afrika/oreochromis_sl%C3%A6gten/oreochromis_mossambicus/oreochromis_mossambicus.htm, downloaded 5 October 2012]



Fig. 3. Male *Oreochromis mossambicus* making a nest in preparation for mating.

[<http://www.qldaf.com/forums/african-cichlid-discussion-16/what-cichlid-56326/index2.html>, downloaded 5 October 2012]