

Callichthys callichthys (Flat-head Cascadu or Chato)

Family: Callichthyidae (Plated Catfish)

Order: Siluriformes (Catfish)

Class: Actinopterygii (Ray-finned Fish)



Fig. 1. Flat-head cascade, *Callichthys callichthys*.

[“<http://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=335>”, Downloaded 10th October 2011]

TRAITS. Was first described by Linnaeus in 1758 and was named *Silurus callichthys*. They generally reach a maximum length of 20 cm and can weigh up to 80g.(Froese and Pauly, 2001) The females are generally larger and more robust as compared to the males. The *Callichthys callichthys* is an elongated catfish with a straight or flattened belly profile. It also has a broad flattened head and a body which is almost uniform in breadth with some posterior tapering which begins after dorsal fin. (Figure 2) Its body consists of 2 rows of overlapping plates or scutes. Approximately 26 – 29 scutes seen on the upper lateral series and 25 – 28 scutes seen on the lower lateral series. The fins are rounded and the fish also has a total of 6-8 soft dorsal rays. It also has 2 pairs of maxillary barbules near its mouth and small eyes. The fish has an inferior type mouth (Berra, 2007). The *Callichthys callichthys* is dark olive green in colour to a grey brown as seen in Figure 1, with the males having a blue to violet sheen on its flanks.

ECOLOGY. *Callichthys callichthys* is a freshwater organism which is primarily riverine in habitat (Arratia, 2003). Only 2 families of catfishes are found to colonise marine habitats

(Arratia, 2003). The *Callichthys callichthys* is mainly distributed in rivers in South America. It is also found in a relatively wide range from Trinidad to Buenos Aires and includes the upper Paraguay and Amazon River systems (Berra, 2007). The *Callichthys callichthys* is usually found in subtropical regions with temperatures of 18^oC – 26^o C and in freshwater with a pH of 5.8-8.3. This catfish can be found occupying areas of extreme anoxic conditions to turbid streams. If its habitat becomes dry, it can move out of water to locate aquatic environments, this is due to its vascularised intestinal system (EOL, 2011). These are nocturnal, benthic and omnivorous organisms. Feeding occurs at night with the adults feeding on small fish, insects and plants and the juveniles feeding on rotifers, aquatic insect larvae and micro- crustaceans (Froese and Pauly, 2001). This nocturnal behaviour is also displayed in the genus *Dianema* and *Hoplosternum* which are found in the family *Callichthyidae* along with the genus *Callichthys*.

SOCIAL ORGANISATION: The *Callichthys callichthys* is a relatively peaceful animal which tends to form small schools. Found to prefer densely planted regions of habitat and also to use hide outs in the form of stones and drift wood, this is done during the day. Though usually peaceful animals, the males show aggressive and territorial behaviour while guarding nest and offspring. The females of the *Callichthys callichthys* do not participate in parental care of offspring. Males are also monogamous, that is the male will only mate with one female at a time. They are generally found at the bottom of the water column but sometimes may also be found swimming in the water column in small groups. (Graham, 1997) This is especially important in low oxygen conditions causing behaviour known as synchronised air breathing. The *Callichthys callichthys* also is found resting in small groups, closely packed together often even found one on top the other.

ACTIVITY: Nocturnal animal therefore foraging or any other activity occurs after dusk along the bottom substrate of habitat and usually all activity ends at dawn. During the day the animal usually hides in densely planted regions or under stones or driftwood. The *Callichthys callichthys* also burrows as a form of hiding during the day and also when there is a drop in water level of its habitat. The *Callichthys callichthys* is a predominantly a defensive animal rather than an offensive one. Due to their limited vision, the maxillary barbules are essential for detecting food. The barbules are also held extended in front of the organism since they are used as organs of touch. (Alexander, 1981) In some captive situations, the *Callichthys callichthys* may also be found “resting” out of the water on filters or on highest pieces of wood placed in tank. Having a mouth that ends in a structure similar to a sucker, these specialised mouth parts are important since they are used like suckers to cling to rock surfaces in moving streams.

FORAGING : Due to their wide ranges of adaptations and behaviours catfishes occupy all or most feeding niches in freshwaters. (Arratia, 2003) As previously mentioned, the *Callichthys callichthys* usually forages after dusk, since it is a nocturnal organism and ends before dawn. They are very excitable during feeding times. The 2 pairs of maxillary barbules are used to detect its prey in murky dark environments. The maxillary barbules are moved in the area around the organism (can reach pectoral fins when laid back) and contain sensory organs which allow the detection of food such as benthic organisms or dead decaying organic matter. The lower maxillary barbules are usually trailed along and below the sides of the mouth of the fish while the upper barbules may be used to touch surfaces in front of and around the fish. (Alexander, 1981) The *Callichthys callichthys* shows gulping mode of consuming the food that it detects with the maxillary barbules (Alexander, 1981) The fish shows another feeding behaviour known as bottom

grubbing. The juveniles and cascadu larvae often dig into the substrate for insect larvae. The *Callichthys callichthys* larvae tend to prefer insect larvae with 17.62 % of the stomach content. The adult and juvenile *Callichthys callichthys* prefer crustaceans which were found to have 55% of the stomach content as compared to worms and shrimps with 8.95% and 1.92% of the stomach content. (Froese and Pauly, 2001) As with many fish, the diet varies with between larvae and adult stages, that is the larvae will consume easily digestible food which is easy to obtain while the adult will consume food more difficult to digest which is harder to obtain.(Arratia, 2006)

COMMUNICATION: The *Callichthys callichthys* was found to communicate viva sounds which are produced in both sexes. This is a result of the vibration of the swim bladder due to the rubbing of the pectoral fins together. The both sexes especially make these loud low grunting noises during the courtship and mating ritual.(Arratia , 2003) This acoustic behaviour is also made by males, this territorial stridulation is especially emitted when they are patrolling their nest. It was also found that these noises are made regardless of whether or not conspecific males are in the area. Therefore this call is an advertisement call for the attraction of females to the constructed bubble nest and as a territorial defence towards other males. (Arratia , 2003) The males may also produce these aggressive signals at the beginning of spawning, this is directed at both conspecific males and females. Females also emit threat sounds directed at other females during conflicts for males during spawning.

BEHAVIOUR REGARDING OXYGEN AND WATER SHORTAGE: Some catfishes have adapted to depleted oxygen conditions. *Callichthys callichthys* is one species which has adapted mechanisms to deal with reduced oxygen. The fish may show horizontal migrations to better oxygenated areas or vertical migrations to the rich oxygenated surface area of the habitat. Horizontal migrations may include moving out of its habitat of macrophytes into open water, which causes the depletion of oxygen at night when the *Callichthys callichthys* is active. The *Callichthys callichthys* also swims continuously at the air water interface. This behaviour is known as “aquatic surface respiration” (Arratia , 2003), facilitated by a greater vascularised digestive tract. The fish is observed at the air water interface taking quick gulps of air bubbles.(Schmidt-Nielsen, 2002) *Callichthys callichthys* also possesses crawling abilities which is used to move from habitats which have a water shortage. The pectoral fins of the fish are used to pull it along the terrestrial habitat.

SEXUAL BEHAVIOUR: Breeding begins due to the cue of increased water depth due to rainfall. During breeding the male builds a bubble nest under a large leaf and may also use other plant material to protect the nest further. The bubbles are made from air and mouth secretions. As the nest is constructed the male may chase the female from the nest until he is satisfied with it, only then is she allowed to enter. After the female deposits the eggs which are fertilized by the male, the female leaves. Fertilization is external. The female usually lays approximately 120 eggs(Froese and Pauly, 2001) The nest is then guarded by the male.(Blumer, 1981) After about 4-5 days the eggs hatch and the fry are protected by the male up to 1 month. The males are monogamous , this species therefore shows the behaviour known as “sex role reversal”. This is since the male invests more energy into the offspring than does the female which is different from normal roles of male and female animals. During the breeding season the underside of the male and its pectoral spines turn bright orange to red, this may be a signal that the male is sexually active to potential female mates as seen in Figure 3.

ANITPREDATOR BEHAVIOUR: *Callichthys callichthys* is nocturnal, that is activity such as foraging begins at dusk or early night. Hiding places occupied during the day are left and all activity is ended before dawn. Also during the day, when there is a greater chance of predation the fish may hide in shallow water and move to deeper water during the night (Arratia, 2003) Also another anti-predator behaviour is erection of the dorsal spine and the extending of the pectoral spines. This prevents the fish from being swallowed or possible even bitten. Another behaviour is the production of sounds when it is caught and held or taken out of the water. This may serve as a warning to the other fish in the are of the same species that a predator is in the area (Arratia, 2003).

REFERENCES

- Arratia, G. et al. (2003) “ Catfishes Volume 1/2” (USA , 2003) 235-645
EOL (2011). *Callichthys callichthys, Armored Catfish*. Eol.org, 2011, <http://eol.org/pages/208963/overview>.
Graham, J. (1997). Air Breathing Fishes, Evolution Diversity and Adaptation” (San Deigo, California, USA , 1997), p. 37- 38
Schmidt-Nielson, K. (2002). Animal Physiology, Adaptation and Enviroment (Cambridge UK), p. 36-38
Blumer, L.S. (1982). Bibliography and Categorization of bony fish exhibiting parental care” *Zoological Journal of the Linnean Society* 76:1-22
Froese, R. and Pauly, D. (2001). *Callichthys callichthys* (Linnaeus 1758), *Fish Base*.
<http://www.fishbase.org/home.htm>.
Alexander, R. McN. (1981). The Chordates (New York), p. 193
Berra,T.M. (2007). Freshwater Fish Distribution (United States of America), p. 223-226

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Fig 2. Tapering of the body of *Callichthys callichthys*.

[http://acsi.acnatsci.org/base/image_list.html?mode=genus&genus=Callichthys”, Downloaded 21st October 2011]



Fig 3. Bright orange red pectoral spines of *Callichthys callichthys*.

[http://www.scotcat.com/factsheets/callichthys_callichthys.htm”, Downloaded 7th October 2011]