

# THE PHILOGENY OF CLARIDES AND THE ECOMORPHOLOGY OF THE AFRICAN CATFISH

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## **Abstract**

The African catfish was introduced into Romanian fish breeding starting with the year 2002. It is artificially bred, intensively, in a monoculture in a private ranch near Oradea.

**Keywords:** African catfish, phylogeny, ecomorphology

## **Material and Method**

Its bibliography has been studied and existing information has been gathered even from the internet.

## **Results and Discussions**

The phylogeny of Clarides is being still studied and largely debated and discussed on an ontogenetical and phylogenetical level of this fish species, due to the numerous expeditions in Africa, their natural environment.

## **Conclusions**

The phylogeny of the African catfish is keeping on being the focus point nowadays; but the unpredictable risks of the translocation of the African catfish is of a great importance because of their negative effects upon the biodiversity of invertebrates and the possibility of transmitting parasites, bacteria and viruses.

### **The phylogeny of Clarides**

The resemblance found between certain species is mainly based on the complete studies of professor Melanie from The Natural History Museum of New York, the Ichthyology department. These studies consisted in phylogenetical analysis concerning morphological character related to the shape of the head and trunk, the structure of cranial carcass, biomechanics of the bite, all of which pointed towards mutual features of fish related to Clarides. Several ideas regarding the evolution of teleostean anquiliformed fish, of which also the African catfish makes part, were launched. The

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development theories referring to teleostean anquiliformed fish are the following:

1. The converging evolution theory of teleostean anquiliformed fish with similar mutual aspects of phylogeny,
2. The theory referring to the length of the body, while the head of these fish remains small,
3. The adjustment to the skull type, which leads to the relationship between the length of the body compared to the head dimension,
4. Mutual aspects regarding the existence of a developed muscle system along with the extreme length of the body, development of jaw muscles, which is an aspect of the development of teleostean anquiliformed fish concerning the extreme length of the body and the hypertrophy of jaw muscles, but there shall be mentioned that this last peculiarity isn't something found in all studied species.

All these studies and their conclusions keep these fish as a point of interest for specialists in order to conclude the moments of evolution of these species and their correct taxonomy.

### **The ecomorphology of the African Catfish**

The clariids from which the African Catfish makes part of, are fish which have a body length and cylindrical shape similar to that of an eel.

The dorsal and anal fins contain soft bony beams and the bony beam of the pectoral fin has the shape of a spine, the ventral one has as a component a number of six soft bones.

The flattened back ventral head is highly ossified, the skull has the shape of a helmet and the body is covered by a soft scaleless skin.

The skin is generally pigmented on the back and side of the body. The color is regular and changes to greyish olive to a dark shade, seizing the color of the environment he lives in. On exposure its skin becomes brighter and acquires a persistent mucus.

He's got four pairs of barbels, a nazal pair, a jaw pair, which is also the longest. Two pairs of mandibular barbels up and down, in the exterior and interior. The inferior and superior jaw is equipped with needlelike rough teeth.

Above the bronchis we find a respiratory accessory – the arborescent organ consisting of a pair of pear-shaped air chamber, which contain two arborescent structures in general present. These structures have a cauliflower – like shape which are situated in the second branchial arch. These are sustained by a gristly support being covered by a highly vascularized tissue.

The air chamber communicates with the pharynx, the complementary breathing apparatus-gill chamber-allows the fish to survive several hours outside the water, or for several weeks in muddy marshes near shores.

The hydrostatic function is according to Buoyancy controlled by the air in the over branchial chamber. We may say that he posses a bucal-aesophagus, the aesophagus is not a self-sufficient cavitar organ.

The natural food consists in water insects, terrestrial insects, fruits and mollusk, but it feeds with fish, water bird and submerge vegetation.



Photo 1. General morphological aspect – dorsal side



Photo 2. General morphological aspect – ventral side

This kind of fish is an omnivorous animal, with strong predatory tendency towards other fish-he possesses predatory skills, sole or group hunting .

The African catfish is “eurytypical” holding on throughout a series of variation and is spread over in a variety of terrestrial sweat water, lakes, rivers, swamps, moor. This habitat exerts aspects of the morphology, due to this he’s well fit to life and environment.

This species is spread all over and is also to be found in lakes with a high peat range and a low water level, e.g. Ngami Lake and Nyamithi Pan and as a contrast clear and deep water e.g. Malawi, Sibaya, Victoria. They are also to be successfully found in rivers.

Regarding the water temperature this species may be found in water measuring from 8° to 35°C and the breeding takes place at a temperature of over 18°C . The water temperature at hatching is between the limits of 17° to 32°C, this being the perfect growth of young at 28° to 30°C. The salinity of water 0 to 12 ppt, 0 to 2,55 and optimum is 11g/ liter.

The oxygen water contains saturating is from 0 to 100 .

*Clarias gariepinus* benefits of arborescent organs and is an efficient fish breathing through the gill filaments and gill rakers.

It breathes through its skin when being on land. It is also lasting to drought, when the branchies stop or are being blocked by mud, it produces a mucus to maintain its skin hydrated or it digs mudholes to stand out the drought and sun rays.

It withstands ammonia concentrations in water from 2,3 mg/liter the larva and young and the adults up to 6,5 mg/ liter and they resist to different water ph-levels.

With the breeding of such fish, the performances of the artificial breeding is different and it is recommended not to expect the optimum of the artificial versus the natural.

The African Catfish is the kind of fish which is best recommended to worldwide fish breeding.

The African catfish breeding has been studied in different locations in South Africa, Namibia, Zimbabwe, Malawi the growth rate being variable in these areas.

The breeding of both sexes is the most indicate due to growth variations in the first year from 200-300 mm in length and the following years adding 80 to 150 mm, depending on the areas. It must be said that the natural breeding takes place without external feeding.

This fish weighs in natural conditions, in the majority of lakes and small rivers rarely 20 kg. There have been captured specimen weighing 40 kg and the max was 58,9 kg, caught in Vaal river in South Africa.

Concerning the growth rate between male and female there is no difference.

Sexual maturity of male and female is being reached at 1-4 years, depending on ecological environment opportunities, which determine the growth rate. This characteristic is obvious if we don’t pay attention to the medium mass of the sixth fish population in South Africa on 1000 mm TL (medium weight differs comparing to the length of fish). Therefore the conclusion that any biological and aquatic work has in its roots the length/mass equation.

The ecomorphology of this fish demonstrates its adjustment to different environment conditions.

This acclimatisation brings with it some ecological hazards when relocating this fish.

### **The ecological hazards of relocating the African catfish in natural conditions**

There are some serious risks regarding relocating and breeding *Clarias gariepinus* outside its natural environment. This species has all aggressive qualities of a successful predator, which fits rapidly in

an new place, due to the following:

- it is extremely fertile, it possesses a flexible phenotype,
- it has several preferences regarding its environment and it resists to environment changes,
- it is capable to feed on a large variety of prey,
- it rapidly develops weight and length.

In South Africa, *Clarias gariepinus* colonized the Great fish river through the Orange fish tunnel and some other river systems in the east and west.

The Cape doesn't represent though a threat to the indigenous fish population, *Sandella bairdii* (Anabantidae) and *Barbus palidus* (Cyprinidae) and neither *Potomomanetes perlati*.

Studies made in east Africa show that after introducing the African Catfish aquatic environment was seriously disturbed. At least 20 species of parasite are hosted by the African catfish, one of them – *Arquillus japonicus* – an unwanted alien, which can translocate.

Aquaculturalists in Africa and elsewhere in the world need to be much more sensitive to dangers posed by introducing the African catfish and not damaging their own country through the transfer of parasites that may induce the ecological risk of a native fish decimation.

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