

Oh Caecilian (On the music of Simon and Garfunkel 😊)

Ben Van Dyck

Benny.vandyck@kmda.org

Zoo Planckendael

Head Keeper

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Abstract

In this presentation you will be informed about the, for most zookeepers, unknown and beautiful world of a group of amphibians rarely kept in zoos “caecilians”. These legless, wormlike amphibians live their secret lives underground or in small creeks, ponds and rivers. They are an attractive species in the sense of their educational and scientific value. They are also an interesting challenge to keep in captivity, understanding their natural behavior, social structures, feeding and breeding behavior and much more. They are also attractive because they can be kept at low cost and have a high repay in scientific and conservation profits. None of the caecilians species are currently listed as endangered (probably we don’t know). Keeping them in captivity is a good way to collect vital knowledge for their future survival. The author also shares a few examples on how you can make this species display-worthy (which is quite necessary for a zoo-animal), how to take care of them and how to breed them. Trough captive breeding and propagation it’s my aim that every zoo in the world will be keeping at least one species of caecilian in their collection to insure that the future of these fascinating amphibians is secured. In this presentation I’ll share my experience (working with more than 30 species, both my own collection and the Antwerp Zoo collection) and show you a few different examples of keeping caecilians, in 101 pictures, movies and more.

Caecilians are amphibians, they are spread throughout the world in the continents Asia, Africa and South-America and make up an order which presently counts 256 discovered and described species (and dozens of undescribed species). There are 9 families of caecilians; *Caeciliidae*, *Chikilidae*, *Dermophiidae*, *Herpeliidae*, *Ichthyophiidae*, *Indotyphlidae*, *Rhinatreumatidae*, *Scolecophoridae*, *Siphonopidae* and *Typhlonectidae*. The family of the *Typhlonectidae* are the most common kept species in zoos. This is probably because of their aquatic lifestyle which is better visibility to the visitors, especially during feeding when they show a spectacular behavior. Of the other families only a handful are kept in zoological collections. Except for the aquatic *Typhlonectes spp* which are bred quite often only a few collections breed with caecilians. You’ll find caecilians in all kinds of lengths and weights starting at 9 centimeters (the smallest *Hypogeophis pti*) and reaching up to a stunning length of 2.4 meters (*Caecilia thompsoni*) which was once kept in the amphibian house in Detroit Zoo. A quarter of the described species are oviparous or egg-laying (meaning they have a kind of breeding behavior with an exception now and then), the other 75 % are viviparous which means they give birth to living offspring that start immediately feeding after birth on small living organism. Caecilians are both aquatic and terrestrial. All caecilians are carnivorous and most of them need living prey. The name caecilian comes from the Latin *caecus* which means “blind”, most species of caecilians have very small or non-functional eyes, there are even species where the eyes have

completely disappeared and instead they have a small antenna just above the place where the eyes should be. They use this antenna to “feel their food” through vibrations.

The fact that they are sensitive to vibration makes caecilians a challenge to keep in zoos with adults and kids knocking on the windows of their tanks. A special designed tank as used at the Antwerp Zoo for *Boulengerula uluguruensis* was a solution to this problem. Caecilians kept by private keepers were mostly kept in tanks of approximately 40 X 40 X 40 cm, filled with soil and only visible when taken out of their tank. We made a calculation of how many cm³ soil were kept in these tanks (of which the species survived) and designed flat tanks with the same amount of soil but only 5 cm deep. This created great visibility of our caecilians, allowing to see them make an interesting labyrinth in the soil and even show social behavior! In the second version we made an extra “breeding room” (in this case a small box 10 X 10 X 10 cm) that was connected to the flat tank and filled with soil and clay. This worked well and they started to make a real room in this box and even started to breed successfully. Caecilians have a fascinating behavior- and breeding system, for example the females of *Boulengerula taitana* develop an extra outer layer of skin to feed their offspring in contrast to most of the species which start feeding one small invertebrates and other living organism from day one. The best way to keep non-aquatic species is to refresh the soil with fresh soil from the forest. I didn't use the first 5 cm from above the forest ground to avoid that there was any contamination with chemical products. We refreshed the soil every 2 months and enriched it with self-bred springtails (*Collembola spp*) and commercial bred crickets (number 1 first shedding). The longest living *Boulengerula* in our collection reached a lifespan of 5 years!

The aquatic species of *Typhlonectes spp* has 2 species *Typhlonectes natans* and *Typhlonectes compressicauda*. This is the only species which has written WAZA husbandry guidelines. The only way to divide the subspecies is counting the divided parts in the cloacal disc. These eel like caecilians can be kept in a simple aquarium that has a content of at least 60 liters. They are aquatic but they need a place to rest on land otherwise they can drown. A good and nice looking solution for this land part is the use of floating aquatic plants. Our *Typhlonectes* did well on a diet of earthworms, which we first placed on wet paper towel for a few hours so the earth in their stomach was thrown up, to avoid digestive problems with our *Typhlonectes*. Breeding occurs mostly during night and offspring are born with gigantic external gills which explode just after birth, fascinating to see! Usually, after 2 to 4 days, the rest of the gills (in the form of small white wire like thing) are absorbed. The first days they will survive on the yolk, after a few days feed them on little earthworms, small shrimps, mussels...

But what about the species *Caecilia thompsoni* from Mexico, with a length that can reach up to 2.4 meters, a real Jurassic Park monster which I saw only once in a zoological collection in Detroit. There are species that show true breeding behavior and make beautiful breeding rooms to lay their eggs in when other species just drop their eggs around like Easter eggs, I'll give you a few examples. And don't forget the color, not all caecilians are pink like or blackish but there are also beautiful browns, and yellows and what do you think about fluorine purple a real “Prince” in the family. See and love them! Because of their strange wormlike appearance not many people will recognize caecilians as amphibians but they're and I'll will explain why. The caecilians have small scales which are recognized as a primitive characteristic of amphibians and they also have a skull (so they're not worms). When you look at the historical description of caecilians they were first categorized as snakes, but due their appearance, their vertebra and their phlegm glands as seen in amphibians, they have now their separate order within the amphibians. The important difference is that they have internal fertilization (frogs and toads have external fertilization, salamanders have spermatophore). They remain very strange and even more fascinating.

My aim is to convince at least one keeper in every zoo in the world, that this incredible interesting group of amphibians that should have a place in their zoo. That they are a low cost species to keep and a high-profit species to the public. I will bring you, in a fairy tale, the fascinating world of feeding, husbandry, display, sexing, breeding and Loving caecilians. Also scientifically, caecilians are an open world to discover with a great opportunity for your own scientific and educational department. A world of the unknown with many interesting insights and developments to be discovered. The aim of this presentation is to get as many zookeepers as possible interested in this wonderful group of amphibians. Become a member of the caecilian zookeepers Facebook-interest group, we can help you lobby in your zoo to keep at least 1 caecilian species. We can provide you with all the necessary information keep this species in your collection and the words "low-cost" and "high-profit" that every smart director is prepared to listen to.