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By Benjamin Tapley and Christopher Michaels, Zoological Society of London and David Gower and Mark Wilkinson, Department of Life Sciences, Natural History Museum

# Filling in the blanks

## The role of caecilians in zoo collections

**Nearly everyone is familiar with frogs, but not everyone has heard of a caecilian. Caecilians are an order of legless amphibians called Gymnophiona, and there are currently 207 species known to science. 23% of these were described by science in the last 14 years alone, including an entire new family (Chikilidae, from India).**

Their tropical distribution and often soil-dwelling habits (a few neotropical species are aquatic as adults) mean that caecilians are rarely encountered in routine herpetological surveys. The population, and therefore conservation status, of many caecilian species is unknown; 65% of caecilian species have been assessed as Data Deficient by the IUCN. Moreover, the true diversity of caecilians is almost certainly much higher, because many undescribed species are likely to exist. The conservation needs of caecilians have been largely neglected, in part due to the paucity of information on caecilian ecology and this is a concern in light of global amphibian declines (42% of amphibians are threatened). The requirements of captive amphibians are often extremely complex and extremely difficult to meet. This is especially the case for groups about which almost nothing is known. Our lack of knowledge may undermine our ability to establish conservation breeding initiatives.

Conservation breeding programmes are becoming increasingly important for the long-term survival of many amphibian species. The reproductive biology of caecilians is fascinating. Some species give birth to live young after long pregnancies, during which the young graze on fatty secretions in the female's oviduct and absorb oxygen via huge external gills. Other caecilians lay eggs, which the mothers guard in chambers in the soil. Once they hatch, the young are nourished by the thickened fatty skin of the mother that they rip off and consume.

Maintaining caecilians in captivity provides opportunities to make new discoveries about life history, behaviour and reproductive biology, and to investigate and develop treatment protocols for diseases.

In 2012, the herpetology team at the Zoological Society of London focused their attention on this neglected taxon in partnership with caecilian specialists from the Natural History Museum, London.

Together we have worked to develop husbandry protocols for an array of species from the Neotropics

and Central Africa, including novel studies of substrate preference. Our team has developed husbandry guidelines and care sheets for aquatic caecilians, which are available on the BIAZA website. We also reported the first evidence of lethal chytridiomycosis in a caecilian amphibian. At the time, it was not known if caecilians were susceptible to the disease and our work answered a question that amphibian biologists had been scratching their heads over. We went on to develop a viable chytrid treatment protocol for both fossorial and aquatic caecilians; the latter protocol has been adapted for use with aquatic salamanders. Currently, we are working to develop and validate marking techniques that can then be used to track individual caecilians in captivity and also in nature. This will facilitate further study of this group and improve our ability to manage captive and free-living populations.

Our team has also been involved in work focusing on highly threatened caecilians in Africa. ZSL awarded EDGE Fellowships to local biologists working on the Sagalla caecilian (*Boulengerula niedeni*), an Endangered species which is endemic to Sagalla Hill in southern Kenya and considered a global priority for conservation due to their evolutionary distinctiveness and global endangerment. The herpetology team worked with the Fellow and MSc students to develop a field survey manual for the project and provided training on how to handle and collect pathogen samples from caecilians.

This work demonstrates the value of amphibians in our living collections. None of the caecilian species we hold are threatened, but they are all poorly known. Through working closely with appropriate partners we have been able to generate tangible conservation research projects which have furthered our understanding of these amazing amphibians.



Photos: Diogo Lagroteria