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A REDISCOVERY AFTER TWO DECADES: THE CHANGAMWE LOWLAND CAECILIAN *BOULENGERULA CHANGAMWENSIS* LOVERIDGE, 1932 (AMPHIBIA: GYMNOPHIONA: CAECILIIDAE)

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ABSTRACT

Boulengerula changamwensis is known only from a few specimens and has not been reported for more than 20 years and from its type locality for 70 years. We here report our recent collection of an additional specimen from the vicinity of the type locality and provide some morphometric and meristic data.

INTRODUCTION

Subterranean amphibians and reptiles are often overlooked even in areas where they are common and are usually underrepresented in collections. This holds especially true for caecilians (Gymnophiona), limbless burrowing amphibians that are almost exclusively confined to the tropics and subtropics of Africa, South America and Asia. Due to their secretive lifestyle, caecilians are rarely encountered and a substantial number of species are only known from a single or very few specimens (e.g. Taylor, 1968). Their perceived rarity has led to many speculations about their conservation status and some have been considered endangered or even extinct (e.g. Wake, 1993, Pennisi, 2000). In a recent review of conservation biology of caecilians, however, Gower and Wilkinson (in press) demonstrated that the vast majority of conservation status classifications are not founded on any data but on speculation. A recent Global Amphibian Assessment (GAA) workshop on caecilians reassessed available data and concluded that most caecilian species (65%) have to be regarded as 'Data Deficient' (Gower *et al.*, in press).

The caecilian *Boulengerula changamwensis* was described by Loveridge (1932) based on four specimens collected at Changamwe, near Mombasa, Kenya. The last time the species was reported from its type locality was when Loveridge collected an additional three

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specimens during the 1933/1934 expedition of the Museum of Comparative Zoology, Harvard (Loveridge, 1936). Nussbaum and Hinkel (1994) reported two additional specimens attributed to *B. changamwensis*: one specimen collected in 1981 in the Shimba Hills, about 35 km south of Mombasa and the other specimen probably collected in the early 1890s in the Shire Hills of Malawi, more than 1300 km away from Changamwe. Another, hitherto unreported specimen is housed in the collection of the Museum of Vertebrate Zoology (MVZ), Berkeley and was collected in 1970 or 1971 from approximately 17 km north of Mombasa, raising the total number of specimens in museum collections to a mere ten specimens. No further data are available about its biology and *B. changamwensis* has therefore been classified as 'Data Deficient'. The lack of reports from the type locality for 70 years however, and the change in land use—today Changamwe is home to numerous light industries and Mombasa international airport—prompted us to visit the vicinity of Changamwe to search for *B. changamwensis*.

MATERIAL, METHODS AND RESULTS

Locality

From a previous short visit, during which no attempt at digging was made, we identified a valley dominated by banana and coconut trees, about half way between Mazeras and Changamwe just off the Nairobi-Mombasa highway, as a potential suitable habitat for caecilians. This area is approximately 10 km away from the type locality of *B. changamwensis*. The slopes of this valley were dry and degraded and supported mainly xeric vegetation. Conversely the bottom of the valley was well sheltered and planted with coconut palms, mangos, bananas, sugarcane and indigenous *Ficus* trees. We visited this site again on 16 January 2004 and collected one specimen of *B. changamwensis* during three hours of digging (six man-hours) in daylight. The caecilian was found in the top 5 cm of soil, under the cover of loose, decaying grass debris, dead palm leaves, and bark, near banana plants and coconut trees. According to local farmers, the locality (03°58.858' S, 39°33.347' E; approximately 43 m) is known as Bonje village (Kilifi District). The short rainy season (Vuli rains) appeared to have continued into January and it was moderately wet from previous rainfall during our visit. We further experienced some light rains while sampling. At the same locality we also collected one specimen each of the scolecophidian snakes *Rhinotyphlops mucruso* Peters, 1854 (Zambezi blind snake) and *R. pallidus* Cope, 1869 (Zanzibar blind snake). The caecilian specimen has been deposited in the herpetological collection of the National Museums of Kenya (NMK A/4129).

Colouration in life

The colour in life is a fleshy pink with the posterior end of the body subtly lighter, whitish coloured. It is most similar to *B. fischeri* Nussbaum and Hinkel, 1994 as depicted by Fischer and Hinkel (1992).

Measurements and counts

All measurements are given in mm. Sex: female; total length: 179; number of annuli: 150 (including the terminal shield); number of vertebrae: 157; head length (from first nuchal groove): 4.5; distance between snout tip and angle of jaws: 3.1; distance between tip of lower jaw and first nuchal groove: 3.1; distance between tip of lower jaw and angle of jaws: 1.8; length of first nuchal collar: 1.5; head width at first nuchal groove: 3.2; head width at

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angle of jaws: 2.9; distance between external nares: 1.3; distance between tentacles: 2.6; distance between external naris and tentacle: 1.2; distance between tentacle and margin of upper lip: 0.3; distance between external naris and first nuchal groove: 3.9; distance between external naris and angle of jaws: 2.8; distance between tentacle and tip of snout: 1.5; distance between tentacle and angle of jaws: 1.4; distance between snout tip and anterior margin of mouth: 0.7; width at mid-body: 3.2; body width at level of vent: 2.2; distance from vent to body terminus: 0.7; circumference at mid-body: 10; number of premaxillary-maxillary teeth: 19; number of vomerine teeth: 6; number of palatine teeth: 12; number of dentary teeth: 17; number of splenial teeth: 2.

Life history notes

The specimen contained a single large, yolked oocyte of 1.2 x 0.5 mm in its left ovary. Both ovaries additionally contained a few smaller, unyolked or only partially yolked oocytes. Among the gut contents we found insect remains, which were identified as the head capsule of an indeterminate termite worker.

DISCUSSION

East Africa is home to a moderately diverse caecilian fauna and four species of caeciliids are currently recognized from Kenya. These are *Boulengerula taitanus* Loveridge, 1935, an endemic of the Taita Hills, *B. changamwensis*, a coastal species (Nussbaum and Hinkel, 1994), and *B. denhardtii* Nieden, 1912, which was recently resurrected from the synonymy of *Schistometopum gregorii* Boulenger, 1895 (Wilkinson *et al.*, 2004), the fourth caecilian species known from Kenya. Of these, only *B. taitanus* has been collected by several researchers in recent times and is known to be locally abundant (e.g. Glaser, 1984; Hebrard *et al.*, 1992; Nussbaum and Hinkel, 1994; Gaborieau and Measey, 2004; Measey, 2004; PKM and HM, pers. obs.). *Boulengerula changamwensis* and the other two species have been collected far more infrequently. *Boulengerula denhardtii* is only known from the holotype, which was collected somewhere in the Tana River area prior to 1912 and *S. gregorii*, although known from numerous specimens from the Tana River Delta region, has not been collected in Kenya since 1934 (Nussbaum and Pfrender, 1998).

The Kenyan caecilian fauna nicely illustrates the general state of affairs in caecilian biology in that a substantial proportion of all species are either only known from the holotype or a few specimens (Taylor, 1968), or have not been found for a considerable amount of time since their description. This has lead to the notion that caecilians are rare animals and raised concerns about their conservation status (see Gower and Wilkinson, in press). In many cases, this perceived rarity is attributable to a lack of data rather than reality and although some caecilian species are certainly rarer than others, recent studies have shown that certain caecilian species occur in high densities even in anthropogenic altered habitats (e.g. Measey *et al.*, 2003).

Loveridge (1936) stated that despite several days of searching at Changamwe, he only obtained three specimens of *B. changamwensis*, although he does not specify whether the search involved digging and how many people searched for how long. We also managed to find only one specimen during six man-hours of digging. When we showed the caecilian to local farmers and asked about its abundance and preferred habitats, we received inconclusive answers although most farmers referred to it as an uncommon species. All this suggests that *B. changamwensis* might indeed be an uncommon species, at least that it is less abundant in

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surface soils than other species of the genus *Boulengerula* (Measey, 2004). However, from our brief search it is clear that unless specific efforts are made it is inappropriate to conclude that a subterranean animal has become rare or even extinct. From our observation there are many sites in the greater Mombasa area that appear potentially suitable for *B. changamwensis*. These include the areas around Mazeras (Kilifi district), Miritini, Kwa Jomvu, Mikindani, and Port Rietz among other areas in Changamwe, Kisauni, and Likoni divisions in Mombasa district. Other possible areas are along the coast north of Mombasa in Kilifi district such as Mtwapa and Kikambala, and, along the south coast, areas like Tiwi and Ukunda towards Shimba Hills in Kwale district.

Our morphometric and meristic data for the newly collected specimen fall within the range of the type series and additional material of *B. changamwensis* (Loveridge, 1932, 1936; Taylor, 1968; Nussbaum and Hinkel, 1994). In his 1936 paper, Loveridge stated that the diameter is included 4.5 times in the length of the holotype and five times in the respective length of the largest known specimen. This is an apparent error for the correct values should be 46 times and 47 times, respectively. In view of the vastly disjunct distribution of *B. changamwensis* and the high degree of endemicity exhibited by other members of *Boulengerula* (Taylor, 1968), it appears possible that populations currently assigned to *B. changamwensis* might represent two or more cryptic species. Therefore efforts should be made to establish the distribution of *B. changamwensis* and to obtain larger samples for taxonomic research.

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