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First record of predation on the caecilian *Microcaecilia unicolor* (Duméril, 1863)

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As their name suggests, caecilians of the genus *Microcaecilia* Taylor, 1968 are more diminutive than the species of many other Neotropical caecilian genera. New species descriptions (Wilkinson et al., 2009, 2013a, 2015; Wilkinson and Kok, 2010; Maciel and Hoogmoed, 2011a, b, 2013; Donnelly and Wake, 2013) and synonymies (Wilkinson et al., 2013b, 2014) have led to *Microcaecilia* being the second most speciose Neotropical caecilian genus. However, as with many caecilians (Wilkinson, 2012) there is very little natural history data for any of the 16 currently recognized species and, as far as we are aware, there is only a single report of predation upon any *Microcaecilia*. Based on the unpublished data of L.J. Vitt and J.P. Caldwell, Martins and Oliveira (1998) report a *Microcaecilia* sp. in the stomach of a *Micrurus lemniscatus* (Linnaeus, 1758) from 100 km south of Santarém, Pará, Brazil. Here we report predation upon *Microcaecilia unicolor* (Duméril, 1863) by *Anilius scytale* (Linnaeus, 1758) in French Guiana.

The South American snake *A. scytale*, the only species in its genus, is easily recognisable by its distinctive black and red colour pattern and dorsoventrally flattened body. *Anilius* is thought to have fossorial habits and is found both on the forest floor and in aquatic environments (e.g., Maschio et al., 2010). This species occurs mainly in the Amazon forest but there are records from the Cerrado and humid forest enclaves in the Caatinga region (Silva-Jr, 2001). The diet of *A. scytale* includes both aquatic and terrestrial species of vertebrates, including four species of caecilians (Table 1). Orthopterans have also been found in the gut contents of *A. scytale* though they have been regarded as secondary ingestion (Greene, 1983). Prey ingestion seems to occur mainly headfirst (Greene, 1983; Maschio et al., 2010; Villacampa and Whitworth, 2016).

On 11th May 2010 at approximately 02:30 in the morning and after several hours of heavy rain we found a specimen of *A. scytale* on the Kaw Road in French Guiana (4.558ºN, 52.188ºW). The snake was placed in a plastic container and upon examination at about 08:00 was found to have regurgitated a partially digested caecilian (now BMNH 2018.5600; field number MW 6500). After disgorging the caecilian, the *Anilius*, which was not preserved, had a total length of 480 mm and a weight of 28.14 g. In preservative, the caecilian has a total length of 184 mm and a width, depth and circumference close to mid-body of 6.8, 4.6 and 19 mm respectively, and is somewhat artefactually dorsoventrally flattened. The posterior part of the caecilian (Fig. 1A) is well-preserved externally with 76 primary annuli, all of which are subdivided by secondary annular grooves, the last 50 of which completely encircle the body. Primary and secondary annular grooves are pale against a uniformly dark body colour. Six or seven scale rows are present in deep pockets, bounded by batteries of elongate granular glands, in the posteriormost annuli (Fig. 1B). The anteriormost two primary annuli that can be discerned lack the stratum corneum of the epidermis. Anterior to these there are 22 additional, skinless body segments, with increasing degrees of damage. The anteriormost segment comprises a partially digested vertebra with very little soft tissue, followed by a more intact vertebra lacking any ribs. In subsequent segments ribs are present and there is increasing amount of vertebral muscle. Close to the skin, parts of the external muscular sheath (Naylor and Nussbaum, 1981) remain along with some lobes of liver and lung tissue. We identified the caecilian as female on the basis of having poorly differentiated phallodeal and urodeal chambers of the cloaca and lacking copulator loops (Wilkinson, 1990). Dissection

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Table 1. Diet of the snake *Anilius scytale*. Prey habits: aquatic (A) or terrestrial (T).

Species	Habit	Source
FISH		
Synbranchus marmoratus Bloch, 1795	A	Martins and Oliveira (1998)
REPTILES		
Amphisbaena amazonica Vanzolini, 1951	T	Cunha and Nascimento (1978), Maschio et al. (2010)
Amphisbaena anomala (Barbour, 1914)	T	Greene (1983), Maschio et al. (2010)
Amphisbaena fuliginosa Linnaeus, 1758	T	Greene (1983)
Amphisbaena mitchelli Procter, 1923	T	Maschio et al. (2010)
Amphisbaena polystegum (Duméril, 1851)	T	Cunha and Nascimento (1978), Greene (1983) Maschio et al. (2010)
Amphisbaena vanzolinii Gans, 1963	T	Martins and Oliveira (1998)
Atractus torquatus (Duméril, Bibron and Duméril, 1854)	T	Martins and Oliveira (1998)
Anilius scytale (Linnaeus, 1758)	T	Maschio et al. (2010)
Tantilla melanocephala (Linnaeus, 1758)	T	Maschio et al. (2010)
Typhlops sp.	T	Greene (1983)
AMPHIBIANS		
Caecilia cf. *gracilis*	T	Taylor (1968), Maschio et al. (2010)
***Microcaecilia unicolor* (Duméril, 1863)**	**T**	**Present study**
Oscaecilia bassleri (Dunn, 1942)	T	Villacampa and Whitworth (2016)
Siphonops annulatus (Mikan, 1820)	T	Greene (1983)
Typhlonectes sp.	A	Beebe (1946)

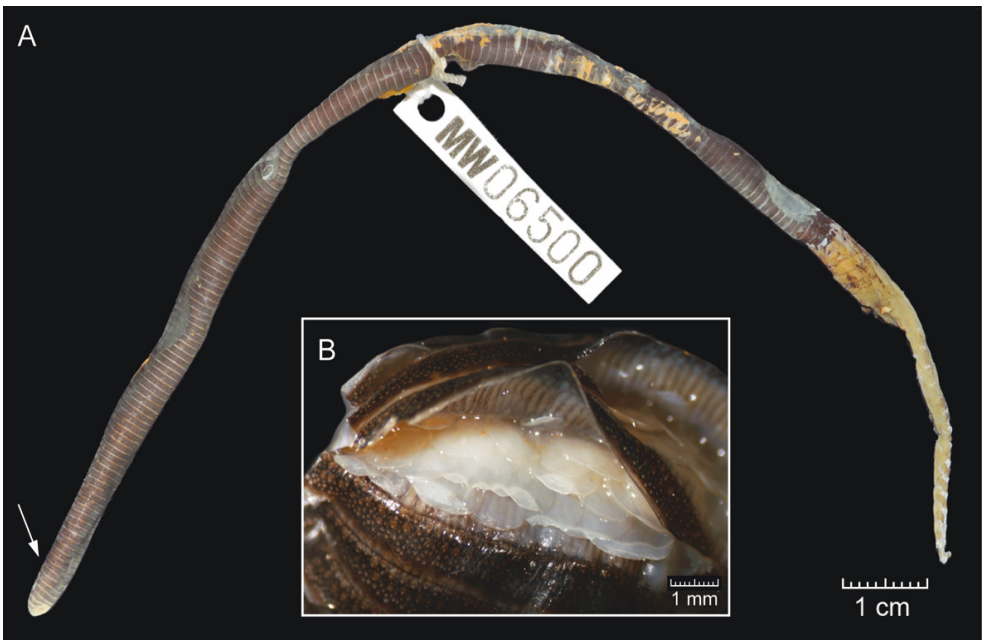

Figure 1. Regurgitated *Microcaecilia unicolor* (BMNH 2018.5600). A – whole body showing progressively greater digestion anteriorly. B – posterior scale pocket opened middorsally showing multiple scale rows and elongate granular glands. Arrow indicates position of the opened scale pocket in B.

reveals some maceration of the viscera and we found no trace of ovaries or eggs. The hindgut contained, soil, nematodes and some chitinous remains of arthropods. The pattern of progressive damage to the caecilian indicates head-first ingestion, a pattern which appears to predominate in snake predation upon elongate prey (e.g., Greene, 1983; Gower et al., 2004b).

Although it lacks a head, the caecilian is readily identifiable as a *Microcaecilia unicolor* on the basis of colour (dark with pale annular grooves), annulation (many secondary annular grooves) and squamation (multiple scale rows). No other caecilian known from the Kaw Mountains of French Guiana approaches this combination of features. The specific identity of the *Microcaecilia* sp. reported in the diet of the coral snake *Micrurus lemniscatus* by Martins and Oliveira (1998) is not known but we are confident that it is not *M. unicolor* because of its provenance south of the River Amazon. In contrast, *M. unicolor* is known with certainty only from north of the River Amazon, from French Guiana.

This is the first report of predation upon *Microcaecilia unicolor* and only the second report of predation on any *Microcaecilia*. The predator is perhaps unsurprising. Fossorial vertebrates such as amphisbaenians and caecilians have been found frequently in the diet of *A. scytale*, reinforcing the idea that this snake has fossorial habits. *Microcaecilia* have a combination of features, including heavily ossified stegokrotaphic skulls with orbits covered by bone, tentacular apertures close to the orbit, and relatively uniform body shape, suggestive of a dedicated burrowing lifestyle (e.g., Gower et al., 2004a) and, in contrast to the other terrestrial caecilians of the Kaw Mountains, we have never encountered this species above ground, further supporting the notion that *A. scytale* hunts underground. However, given the presence of non-fossorial and aquatic species of elongated vertebrates in its gut contents, *A. scytale* probably also spends time foraging above ground and in aquatic environments. We have found *A. scytale* in soil by digging and have also observed specimens on the surface after heavy rain.

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