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First description of swimming behaviour of *Amphisbaena bassleri* Linnaeus, 1758 (Squamata, Amphisbaenidae)

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Amphisbaenians are predominantly fossorial species and are therefore commonly considered to have restricted locomotor abilities (Longrich et al., 2015). In turn, this has led to the hypothesis that the dispersal capacity and range of these species is limited (Hembree, 2006), which is at odds with recent biogeographic, phylogenetic, and phylogeographic analyses suggesting that oceanic rafting might have played a substantial role in the dispersion of these species across continents (Vidal et al., 2008; Vidal, 2009; Longrich, 2015). Although dispersal on woody debris or other types of 'floating islands' requires little movement from individual organisms, it does suggest that at least some of these species have the capacity to withstand above-ground or even aquatic conditions for fairly prolonged periods of time. As best as I could determine, only two studies confirmed that amphisbaenians could overcome aquatic barriers, including Maschio et al. (2009), who recorded swimming behaviour in *Amphisbaena amazonica* Vanzolini, 1951 and *A. alba* Linnaeus, 1758, and Teixeira et al. (2014) who suggested the same held true for *A. caiari* Teixeira et al., 2014.

In this paper I present evidence for the swimming abilities of *A. bassleri*. Not much is known of the ecology or behaviour of this species, despite its wide distribution across tropical South America (Vanzolini, 2002; Lemos and Facure, 2007), even in anthropogenically disturbed landscapes (van der Hoek and Jarrín-V., 2017).

Observations

On the morning of 3 September 2017, following 12 h of rainfall (158 mm registered ca. 8 km from the locality of the specimen at Universidad Regional Amazónica Ikiam's weather station), a large flood occurred in the city of Tena, Ecuador. As a result, a privately-owned house near 0.9911°S and 77.8101°W (elev. ca. 510 m) flooded up to the first floor, submerging the basement level entirely. A day (24 h) later, the water level in this basement receded to a height of approximately 1 m, after which I found a live specimen of *A. bassleri* alternatingly swimming and resting on pieces of woody debris (Fig. 1; supplemental video deposited at https://youtu.be/eAnKWIghvaM).

Given that the basement had been flooded in its entirety for many hours, this individual of *A. bassleri* had been at least partially submerged in water for an extended period. When I encountered the animal for the first time, it was swimming using serpentine movements, raising its head above the water line every few seconds. After a few minutes it moved onto a piece of wood and remained there until disturbed by cleaning efforts near the house (heavy machinery employed nearby). It then entered the water again, and submerged for over 30 s. It alternated resting on pieces of wood with short periods of swimming for > 1 h, with the longest period of continuous swimming extending to nearly 10 min.

Discussion

Similar to those species recorded swimming by Maschio et al. (2009), this individual of *A. bassleri* swam using lateral undulations, unlike the more worm-like crawling typical of terrestrial movements of the species (see a video recording of aboveground movement of this species made by the author deposited at https://youtu.be/e5FfXkO9aaY). However, unlike in the observations made by those authors, this individual did not keep its head level above the water surface at all times but instead occasionally disappeared completely from sight.

That amphisbaenians are occasionally driven to the surface as the result of floods has been pointed out in earlier studies (e.g., Teixeira et al., 2014; van der

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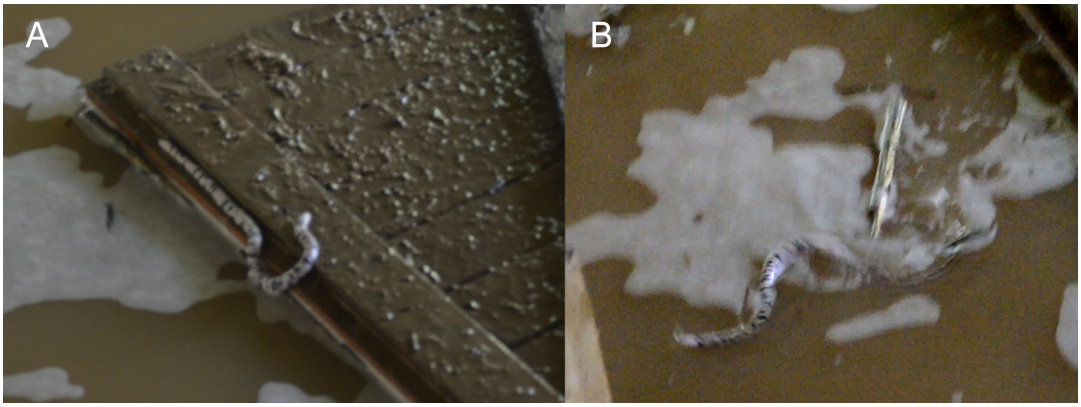

Figure 1. An individual of *Amphisbaena bassleri* Linneaus, 1758, resting on a piece of wood (A) and swimming (B) in a flooded basement near Tena, Ecuador.

Hoek and Jarrín-V., 2017). However, the relative ease with which these species can swim, either in terms of considerable distances (Maschio et al., 2009) or lengths of time (this study), suggest that the relationship of these species with aquatic environments goes beyond an ability to survive flooding and hints at a capacity, now or at least in evolutionary terms, to cross water bodies such as rivers and lakes (Teixeira et al., 2014). In turn, this capacity could explain how these species have been able to survive ocean crossings on floating islands, and that they might not be that poorly adapted to this journey as previously thought (Vidal et al., 2009).

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