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Maximum length and notes on the habitat of *Caecilia gracilis* (Amphibia: Gymnophiona: Caeciliidae)

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Caecilia gracilis Shaw, 1802 is a terrestrial caecilian widely distributed throughout Amazonia in Brazil, French Guiana, Guyana, Peru, and Suriname, and also found in riparian forests in the adjacent Cerrado in Brazil (Maciel & Hoogmoed 2011). This species is one of the few Neotropical caecilians in which some basic ecological information is known. In a riparian forest population in the Brazilian Cerrado, the species did not exhibit sexual size dimorphism, was always found close to water, fed mainly on earthworms, and migrated to greater depths in the dry season (Maciel et al. 2012). Furthermore, *C. gracilis* is known to be preyed by the hawk *Pseudastur albicolis* (Latham, 1790) (Taylor 1968) and the snake *Anilius scytale* (Linnaeus, 1758) (Taylor 1968; Maschio et al. 2010).

On 04 June 2020, approximately 8:30 a.m., two individuals of *Caecilia gracilis* were found by construction workers while digging to build the foundation for a new house (1°21′56.4′′ S, 48°26′21.3′′ W; elevation 14 m), in the municipality of Belém, state of Pará, Brazil. The individuals were buried approximately 40 cm deep in partially flooded soil covered mainly by grasses (Fig. 1) and were delivered to ALCP, who resides in the neighborhood. The caecilians exhibited some injuries on their bodies probably caused by the hoes used in the excavations and were deposited in the Herpetological collection of the Museu Paraense Emílio Goeldi (MPEG 43054 and 43055).

MPEG 43054 is a mature male (Fig. 2) with total length 920 mm, mass 55 g, primary annuli 218, and secondary grooves 33. MPEG 43055 is a gravid

female with total length 810 mm, mass 82.5 g, primary annuli 194, and secondary grooves 31. Numbers of annuli are within the known range of the species, except for the number of primaries in MPEG 43054, which has 218, greater than the known range of 177 – 208 (Maciel & Hoogmoed 2011). Despite this, we have no reason to assign this specimen to a species other than *C. gracilis*. To date, the largest known specimen of *C. gracilis* is from Viseu, Pará, Brazil, a male with a total length of 735 mm (Maciel & Hoogmoed 2011). We therefore report a new known maximum size of 920 mm for the species, based on our newly collected specimens.

The habitat where the individuals were found is a partially flooded area that was deforested for the construction of residences. The closest forested area is a small fragment, approximately 2.3 ha, 340 m from the locality of our record (Fig.1 and Fig. 3), which demonstrates that this species may persist in areas covered only by underbrush vegetation, if moist soil is available.

In Suriname, a specimen documented by Nussbaum & Hoogmoed (1979) was collected by Stahel & Geijskes (1939) during excavation of a nest of the ant *Atta sexdens* (Linnaeus, 1758) in a forested area. The nest was close to a river that expands in the rainy season to form a lake; the top layer of soil was black and full of roots and below this was Kaolin (sedimentary rock rich in Kaolinite clay) which was saturated with water (Stahel & Geijskes 1939). In the Brazilian Cerrado, the species was found only in humid or partially flooded soils in forest (Maciel et al. 2012).

Considering the wide distribution of the species, the available data in the literature is very scarce. Reviewing data of 50 Amazonian specimens of *Caecilia gracilis* in the Herpetological collection of MPEG, we found that only 11 individuals have accurate collection data that includes the habitat where they were found. These 11 specimens were collected near water bodies: on the MPEG Research Campus in Belém, MPEG 38610 was found near a permanent pond; on the Campus of the Universidade Federal do Pará, MPEG 31052 was collected in an area of Igapó, which is flooded daily by the tides on the Guamá River; MPEG 29421 was found swimming in an Igapó Forest, in the municipality of Tracuateua, state of Pará; and in Melgaço, state of Pará, MPEG 15741 was collected in a pitfall trap in an area that has been inundated. Thus, we suggest that this species lives close to water bodies and depends on high levels of humidity in the soil.

In comparison with some other terrestrial caecilians with which may live in sympatry, such as *Siphonops paulensis* Boettger, 1892 in the Cerrado (Maciel et al. 2012), *S. annulatus* (Mikan, 1822),

and *Caecilia tentaculata* Linnaeus, 1758 in the Amazonia (AOM, personal observation), *C. gracilis* releases much less mucus from its skin when handled, dries quickly, and has difficulty moving (AOM, personal obs). It is possible that this species is more susceptible to desiccation than other caecilians, which may indicate a preference for humid habitats.

Siphonops paulensis can inhabit dry areas where no other caecilians are known (Montero et al. 2005; Maciel et al. 2012), and was never found in the same microhabitats as *C. gracilis* in the Cerrado (Maciel et al. 2012). *Siphonops annulatus* and *C. tentaculata* are found generally in humid rainforests (Nussbaum & Hoogmoed 1979; Montero et al. 2005; Borges-Nojosa et al. 2017), but can be observed in areas which are very dry during periods of reduced rainfall (AOM, personal observation). However, comparative morphological studies of the integument and physiology of these species are necessary.

In Africa and Asia, where several species were studied under quantitative ecological methods, terrestrial caecilians are known to occupy a variety of habitats, from forests to agricultural and other anthropogenic habitats (e.g. Oommen et al. 2000; Gaborieau & Measey 2004; Gower et al. 2004; Kupfer et al. 2005; Kouete & Blackburn 2020). In the Neotropical region, habitat preferences of most species are still unknown. Therefore, we encourage the study of the ecology of neotropical caecilians.

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Figure 1. Site where the two *Caecilia gracilis* were found buried in partially flooded soil in Belém municipality, state of Pará, Brazil.

Figure 2. Male of *Caecilia gracilis* (MPEG 43054) total length 920 mm, Belém municipality, state of Pará, Brazil.

Figure 3. Partial aerial view of Belém showing the locality where the two *Caecilia gracilis* were found (red dot), and the nearest forest fragment (yellow line) which is 340 m from the locality. Image captured from Google Earth Pro.