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NATURAL HISTORY NOTE

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A series of unlikely events: from washing machine to new species

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On 13th December 2015, a guttural toad (*Sclerophrys gutturalis*, Fig. 1) entered our care after a series of unlikely events. The toad reached the Cambridge area after hitching a ride back to Great Britain from Mauritius as a stowaway in the bags of a couple of elderly holidaymakers. Native to most of sub-Saharan Africa (Channing, 2001), this toad species does not regularly enter Britain in this manner. In Mauritius, where there are no native amphibians, *S. gutturalis was* introduced in 1922 as a biocontrol agent for the cane beetle *Phyllophaga smithi* (Cheke & Hume, 2008).

Figure 1. The female guttural toad *Sclerophrys gutturalis* shortly before parasitic worms were discovered in its faecal pellets

The holidaymakers were unaware of the toad's presence until they washed the contents of their suitcase and removed them from the washing machine, at which point the female *S. gutturalis* was discovered. The toad was quickly packaged in a temporary quarantine facility (a plastic sweet container with damp paper towels as a substrate) following guidance from JWW, before MJG collected the toad from the confused couple. During the time that the toad was in our care, it shed a number of parasitic worms which were later confirmed to be a new species (Smales et al., 2020). The toad was identified as a female as it did not respond to call playbacks of its own species, trialled on multiple occasions. The toad also failed to call during its time in captivity which also supports this earlier assumption.

Sclerophrys gutturalis is an extremely adaptable species. This has facilitated its range expansion since it can inhabit niches that are intolerable to other amphibian species and can out-compete other species for resources. The species may also adapt its breeding behaviour to better suit the climate in which it finds itself, helping to maximise reproductive output (Vimercati et al., 2019). This may lead to alarming declines of native amphibians (Measey et al., 2017).

Whilst in our care during the quarantine period, the toad was housed in a 12 litre terrarium (Exo Terra Faunarium) filled to approximately 25 mm depth with hydrated coconut fibre substrate. A further 15 mm of Sphagnum moss was added to this to provide better cover for the toad and also to help maintain the humidity. A small Tupperware container, 15 x 22 cm in size, was used to create a water bath at one end of the terrarium. Brown crickets (*Gryllus assimilis*) made up the majority of the diet of the toad during this period, although the diet was supplemented with other invertebrates when available. At the time of rehoming, the *S. gutturalis* was the only species of amphibian in our care.

Over the course of the initial 21 days, the toad was closely monitored to ensure it was feeding and was not suffering any ill effects of its journey. During this time, the new habitat was kept moist (sprayed every 24 h), abundantly supplied with food, and with constant access to Asda Still Natural Mineral Water. On the 15th December 2015, several parasitic worms were found drowned in the water bath within the remains of a faecal pellet. These were carefully extracted and preserved in 70 % ethanol before the water was changed. Over the course of the following two weeks, the toad shed more parasitic worms (all of which were found in the water bath deceased). Again, these were collected to allow for formal identification. To the untrained eye, they resembled tiny beansprouts with no discernible head end. In total, 27 whole or partial parasitic worms were shed. These were later identified as a new species of the family Echinorhynchidae and named *Pseudoacanthocephalus goodmani*, after MJG (Smales et al., 2020). This species of this family are known to live in the intestines of fish, amphibians and reptiles.

The toad was later rehomed by JWW and maintained in isolation from February 2016. Throughout that time, it failed to shed any more parasitic worms which may indicate that the flushes in late 2015 removed all these parasites. The *S. gutturalis* was not tested for any pathogens and as a consequence no other captive amphibians were brought into contact with the terrarium or its contents. Despite our initial fears over potential stunted growth due to a high parasite

load, the activity patterns and appetite of the toad appeared to be normal. The toad continued to grow to a near-mature size but unfortunately died in early 2020. The fact that the toad didn't grow to the full mature size was attributed to the recently documented island dwarfism displayed by populations introduced into Mauritius and Réunion (Baxter-Gilbert et al., 2020).

Should the toad have been released in northern Europe, it is unlikely that it could have easily become established in the wild. We suggest that the stress of being washed in the washing machine (along with the chemical detergents) resulted in the parasites being shed. If the *P. goodmani* were not deceased at the point of expulsion (or shortly after) and the toad had escaped into the wild then it is at least possible that these could have been transmitted to native species. Nothing is currently known of the lifecycle or potential intermediate hosts of *P. goodmani*.

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