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Research

Incidence of Dermatophagy by Common Indian Toad *Duttaphrynus melanostictus* (Schneider, 1799)

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Abstract
The skin of amphibians serves as a vital immune barrier that is essential for survival. In amphibians, the shedding of skin, or dermatophagy, is a multifaceted process influenced by factors such as species, age, and environmental conditions. This article explores an interesting incident of dermatophagy observed in *Duttaphrynus melanostictus*, the Common Indian Toad, within the Nature Garden of Amboli, Maharashtra. The toad exhibited the unique behaviour of consuming its own shed skin, a phenomenon not widely documented in amphibians. While dermatophagy has been studied in various reptiles, its purpose remains unclear. This observation provides insights into the ecological and behavioural aspects of amphibians, raising questions about the active or incidental nature of dermatophagy and its potential ecological correlates. Further research is warranted to unravel the precise reasons behind this intriguing behaviour in amphibians.

Keywords: Dermatophagy, Ambhibians, Common Indian Toad, Amboli.

Introduction

As skin presents a barrier to pathogens and infective agents, reducing their entry into the body, it forms an integral part of the immune system. Skin in amphibians can be considered a versatile tissue as it performs a variety of biological functions that are very important from a survival point of view. The epidermis helps in respiration and osmoregulation, as well as acting as a physical barrier to infections (Herman, 1992). Vertebrates are known to carry moulting or desquamation to ensure the continued integrity of the skin surface. Unlike many other vertebrates, tetrapod vertebrates undergo a cyclic moulting process that involves moulting the keratinized layer of the outermost skin (Jorgensen et al., 1964). The process may require a varying time interval, which can last from a few days to several weeks (Vitt et al., 2013).

Shedding of skin can be governed by many factors, such as species, age, and environmental conditions, especially in amphibians (Larson, 1976). A variety of amphibians and reptiles carry out dermatophagy, a behaviour in which the organism is known to ingest its own or that of conspecifics shed epidermis in nature. (Noble, 1931) reported that many reptiles, aquatic frogs, and salamanders eat their shed skins but lacked to indicate species carrying out dermatophagy.

Genus *Duttaphrynus*, earlier a part of the genus Bufo, is considered a genus of true toads that consists of 29 species. These species are considered endemic to southwestern China and southern Asia. Out of the 29 species, *Duttaphrynus melanostictus*, also known as Asian Common Toad, is distributed throughout tropical and subtropical habitats of Southeast Asia up to 2000m above the mean sea level (Khan, 2000; Pratihar et.al., 2014). It can be found in disturbed natural habitats and around anthropogenic habitats. Sometimes they can also be observed in close-canopy primary forests. (Khan, 1982). *Melanostictus* is a medium- to large-sized toad with highly variable skin colours. Most

commonly, they occur in greyish or reddish-brown, but sometimes the skin colour may vary from plain brick-red to almost black. A blackish band that runs between the chin and breast can be found in juveniles. Round warts of varying sizes, often capped with tiny dark spines, can be seen on the ventral surface in adults (Daniels, 2005; Forestry Department Sarawak, 2008; Khan, 2000).

Figure 1. Duttaphrynus Melanostictus

Study Location

This incident of dermatophagy by *Duttaphrynus melanostictus* was observed in the Nature Garden, set up by the forest department of Amboli. Amboli lies in the Sahayadri Hills of Maharashtra state in Western India and is renowned as one of the world's "Eco Hotspots" (Satose et al., 2018). At an altitude of 690 m (2,260 ft.), it is the last hill station before the coastal highlands of Goa. Amboli is known for its sheer abundance of herpetofauna (reptiles and amphibians).

Material and methods

A random search was conducted during a nocturnal trail, focusing on the observation of flora and nocturnal fauna in the Nature Garden of Amboli, Maharashtra. The study aimed to document the biodiversity and behaviours of various plant and animal species during nighttime conditions.

Discussion

During the night trail in the garden on October 3, 2018, *Duttaphrynus melanostictus* was spotted at a height of 1.5 metres above ground level in a tree trunk. Being night, the temperature was around 28 degrees Celsius. At first, it seemed as though the toad had been injured and was bleeding as the ventral surface was covered with red-coloured fluid. Further observed movements of his jaws could be seen clearly, which suggested that it was feeding. After a minute of observation, it was clear that the toad was feeding on its skin (Figure 1). When spotted, the toad was feeding on the remaining skin of his forelegs. From either side, i.e., from the left and right leg, the skin that was shed was in continuation with the skin that was in the mouth from either corner of the mouth.

While discussing the moulting habits of amphibians (Larson, 1976) and (Tyler, 1989) mentioned occasional skin eating in them. In lizards, especially geckos, dermatophagy has been documented most extensively (Bustard et al., 1965) whereas it has been commonly reported in snakes. With regards to snakes, it has been mentioned as a behavioural "quirk" (Groves, 1972) or cannibalistic habit (Keowng, 1973). Dermatophagy

was documented in 145 lizards, 94 frogs, 29 salamanders, 1 caecilian, 1 tuatara, 11 snakes, and 5 turtles during a survey conducted in zoos and aquariums worldwide, substantially increasing the number of species known to engage in the behaviour (Weldon et.al., 1993).

The exact reason for carrying out dermatophagy is not clear yet, but it is generally thought to reclaim epidermal protein that might be lost due to skin shedding (Bustard et al., 1965). In caecilians, it has been considered maternal care by feeding the offspring with nutrient-rich skin (Kupfer et.al., 2006). In some lizards, e.g., the American anole (*Anolis carolinensis*; (Greenberg, 1978) and the water dragon (*Hydrosaurus amboinensis*; (Ledereg, 1929), dermatophagy has been interpreted as a form of social grooming where ingestion of shed skins from conspecifics occurs. (Cramp et.al., 2014) had the view that dermatophagy helps in getting rid of pathogenic microorganisms. Eating the shed dermal layer also helps the animal maintain stealth mode (Klaubelr, 1972).

Conclusion

Despite numerous occasions where dermatophagy was recorded in various amphibians and reptiles, it is still unknown whether the behaviour is active or incidental and whether skin ingestion is done partly or totally. The exact reason behind the ingestion of shed skin is still unknown. According to (Bustard et al., 1965), the identification of species engaged in dermatophagy may help establish ecological or other correlates of such behaviour.

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