

## Dermal fungal infection in a frog from the Western Ghats, India

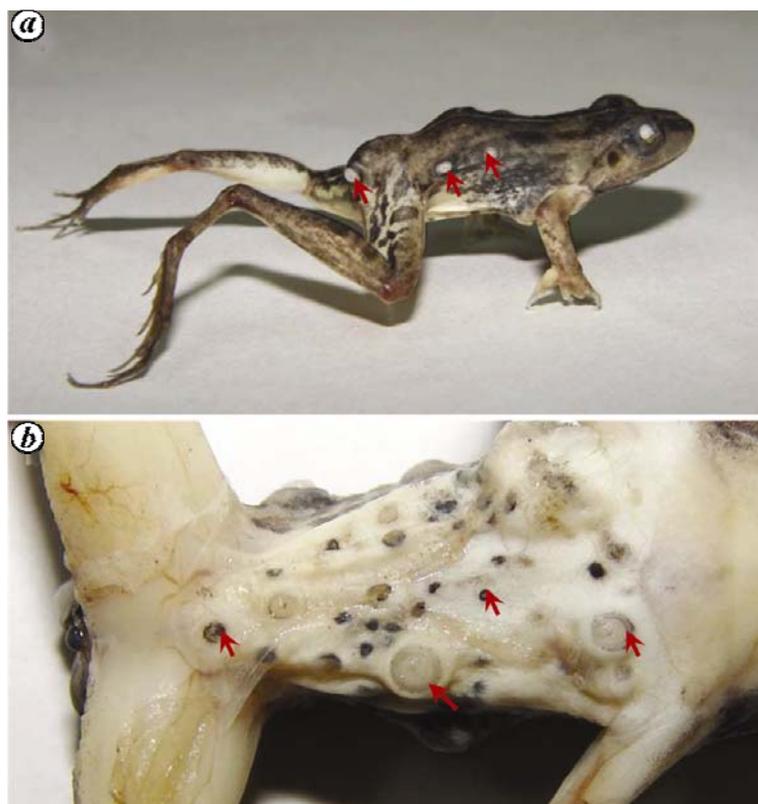
Nearly one-third of over 6600 species of amphibians worldwide is facing threat of extinction<sup>1</sup>, making them the most threatened vertebrate group on the planet<sup>2</sup>. Populations of many species are declining rapidly, beyond the extinction rates that have occurred previously. Rapid urbanization leading to change in suitable habitat plays a major role in such a decline. Simultaneously, UV-B radiation, parasite and fungal infection and diseases have also been implicated in population decline, but are less known<sup>3</sup>. Fungal infection in amphibians was first reported in 1997 and named in 1999 as *Batrachochytrium dendrobatidis* (*Bd*). It is now considered as a potential threat in several enigmatic declines of amphibian populations<sup>4,5</sup>. The causative agent, *Bd*, colonizes the keratinized epithelium of adult amphibians<sup>4</sup>. The mechanism by which it causes the death of amphibians is not known. However, the production of certain toxins by *Bd* or the interference in fluid-ion balance functions of the skin by the growing chytrids is cited to be the major reason for on the death of the anurans<sup>4,6</sup>. Once the skin gets affected, the infection spreads rapidly. Moreover, under the presence of organic materials, the fungal pathogen can persist and remain infectious for a long time under moist conditions, making it lethal for the survival of the anurans<sup>7</sup>. The discovery of anti-microbial peptides (AMPs) from the granular glands of frogs has given an exciting opportunity to understand their defence mechanisms and survival strategy. Studies show that AMPs could be promising in overcoming chytridiomycosis<sup>8</sup>.

So far, no fungal infection in amphibians has been reported from the Indian sub-continent, though the severity of the *Bd* infection is prominent in Australia, North and South America and Spain, in particular, in Europe<sup>2</sup>. Through human mediation, the disease is spreading across the globe and *Bd* appears to be evolving continuously<sup>2</sup>. Here, we report a fungal infection in an Indian frog. The taxonomic identity of fungus remains unknown.

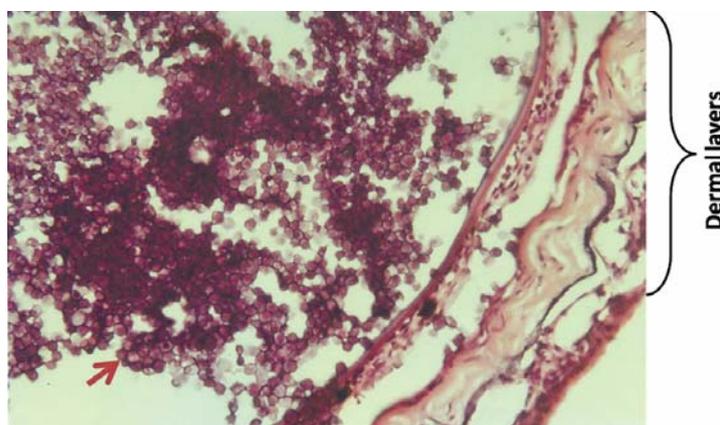
In August 2009, during regular sampling of amphibians in the Western Ghats in Kali River basin near Dandeli, Uttara Kannada District, Karnataka (15.18438°N, 74.64832°E, 488 m asl), an

individual of *Fejervarya caperata* (male, snout-vent length – 27.24 mm, weight – 1.95 g) caught the attention of one of the authors (K.V.G). This small frog is widely distributed in South India<sup>9</sup> and was found on a grass patch next to a man-made tank, in the middle of a teak (*Tectona grandis*)-dominated, dry-

deciduous forest during the study. The individual was slow to react to the torch light and on close examination, was found to have lesions on the body (Figure 1). After necessary measurements, the individual was preserved in 70% alcohol. A lesion on the skin (measuring about 5 sq. mm) from the abdomen was



**Figure 1.** a, Dorsolateral view of skin lesions (indicated by arrows) in *Fejervarya caperata*, the common cricket frog. b, Skin lesions on the abdomen.



**Figure 2.** Hematoxylin and eosin-stained section of skin showing fungal spores (indicated by arrow).

cut, embedded in wax, sectioned and stained (hematoxylin and eosin). It was confirmed to be a fungal infection diagnosed as 'ulcerated subdermal mycotic granulomata' (Figure 2) based on the section. Although molecular work on the fungal spores was carried out, the identity of the fungus could not be resolved as DNA was contaminated.

To our knowledge, this is the first scientific documentation on fungal infection in an Indian frog. Although detailed study is necessary to ascertain the species of fungus and determine its virulence, spread, etc., the presence of fungal infection is sufficient to call the attention of researchers to take necessary steps to study and prevent the spread of the disease. This is of particular importance, as the Western Ghats is a biodiversity hotspot harbouring 157 species of amphibians, of which 138 are endemic, and more species are being discovered<sup>10</sup> and rediscovered from the region<sup>11</sup>.

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