



First Record of Maskey’s Burrowing Frog, *Sphaerotheca maskeyi* (Schleich and Anders 1998), from Bhutan

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Bhutan, a small, landlocked country, is part of the eastern Himalayan Biodiversity hotspot characterized by diverse species, habitat types, and ecosystems (Myers et al. 2000; Mittermeier et al. 2005). The Kingdom is home to about 83 species of amphibians (Wangyal 2022) of which 21 are in the family Dicroglossidae. Research on the taxonomy and ecology of amphibians in Bhutan is limited; however, recent studies (Wangyal and Gurung 2012, 2017; Wangyal 2014, 2022; Wangyal and Das 2014; Wangyal et al. 2020, 2022) have made substantial contributions. Additionally, recent investigations into the taxonomy of the *Amolops* group (Mahony et al. 2022) and the prevalence of *Batrachochytrium dendrobatidis* (Streicher et al. 2020) have highlighted the importance of conducting comprehensive taxonomic research using molecular genetics. This is especially crucial as many species and diseases in Bhutan have yet to be documented.

Eight species of burrowing frogs in the genus *Sphaerotheca* are currently recognized: *S. bengaluru* Deepak, Dinesh, Ohler, Shanker, Channakeshavamurthy, and Ashadevi

2020a; *S. breviceps* (Schneider 1799); *S. dobsonii* (Boulenger 1882); *S. leucorhynchus* (Rao 1937); *S. maskeyi* (Schleich and Anders 1998); *S. pluvialis* (Jerdon 1853); *S. rolandae* (Dubois 1983); and *S. strachani* (Murray 1884), with distributions in Pakistan, India, Nepal, Sri Lanka, Myanmar, and Bangladesh (Frost 2024).

Maskey’s Burrowing Frog (*Sphaerotheca maskeyi*) was described in 1998 by Schleich and Anders based on the collection of the Chitwan Jungle Lodge, Nepal. The species is known to occur from western regions of peninsular India (Gujarat, Maharashtra, and Karnataka) through the Deccan Plateau (Maharashtra, Madhya Pradesh) to the Himalayan foothills (Uttarakhand and Himanchal Pradesh) and northern India including Pakistan (Khyber Pakhtunkhwa, Punjab Provinces, northern Pakistan), Chitwan National Park in central Nepal, and Chinpore (= Chainpur) in far western Nepal at elevations of 100–500 m asl (Prasad et al. 2019; Dandekar et al. 2020; Deepak et al. 2020b; Sreekumar and Dinesh 2020; Frost 2024).



Figure 1. A Maskey’s Burrowing Frog (*Sphaerotheca maskeyi*) (ZRC(IMG) 1.262a) encountered on 18 August 2022 at Yangpelthang (Bhimtar), Norbugang Block, Samtse District, Bhutan. Photograph by Chogyal Tashi.



Figure 2. A Maskey’s Burrowing Frog (*Sphaerotheca maskeyi*) (ZRC(IMG) 1.262b) found on 20 August 2022 at Yangpelthang (Bhimtar), Norbugang Block, Samtse District, Bhutan. Photograph by Chogyal Tashi.

Padhye et al. (2017) considered the western population of *Sphaerotheca* to be *S. pashchima*. However, when Jablonski et al. (2021) confirmed the presence of *S. maskeyi* in Pakistan and Khatiwada et al. (2021), using molecular methods, suggested that *S. pashchima* was a junior synonym of *S. maskeyi*, *S. pashchima* was relegated to the synonymy of *S. maskeyi*.

Without evidence and erroneously citing Frost's *Amphibians of the World* website, Jablonski et al. (2021) noted the occurrence of frogs in the genus *Sphaerotheca* in Bhutan. In fact, Frost (2024) stated that *S. maskeyi* is "likely/controversially present" in Bhutan. We herein confirm the occurrence of *S. maskeyi* in the Kingdom of Bhutan.

At 1445 h on 18 August 2022, CT, while on covid-19 border duty (Bhutan places foresters at border crossings to help health professionals control diseases from being introduced from India), observed a frog in an agricultural (paddy field) grassland left fallow by farmers at Yangpelthang (Bhimtar), Norbugang Block, Samtse District, Bhutan. He took photographs and a video clip and left the animal undisturbed (Fig. 1). Because the frog appeared to be different than others found in the area, he tried to identify the species. Images posted to the Facebook page of a local herpetofaunal study group determined that the species had not been recorded from Bhutan. On the advice of JTW, CT attempted to catch the frog the next day but failed. However, on the third day, he found an individual in a marsh not far from the first sighting (Fig. 2).

This frog, which was in a shallow temporary pool near the same grassland (26.94059, 89.01939) (Fig. 3), was captured by hand, photographed, subjected to morphometric measurements (Watters et al. 2016), euthanized, preserved, and stored at the research section of the Samtse Forest Division, Samtse, Bhutan. Photographs were deposited at the Lee Kong Chian Natural History Museum at the National University of Singapore (ZRC(IMG) 1.262a–c).

Lacking the ability to assess molecular data (Bhutan does not have a genetics laboratory for conducting molecular studies) we compared morphological data from the literature for *S. maskeyi* (Schleich and Anders 1998; Anders 2002; Shah; and Tiwari 2004; Jablonski et al. 2021) and *S. breviceps*

(Schneider 1799; Boulenger 1920; Dubois 1981; Dubois 1999). The dorsum of the first frog was uniformly brown whereas that of the second frog was uniformly reddish. Both had dark lines from snout to eye and along the supratympanic fold and extending, albeit somewhat broken, laterally to the

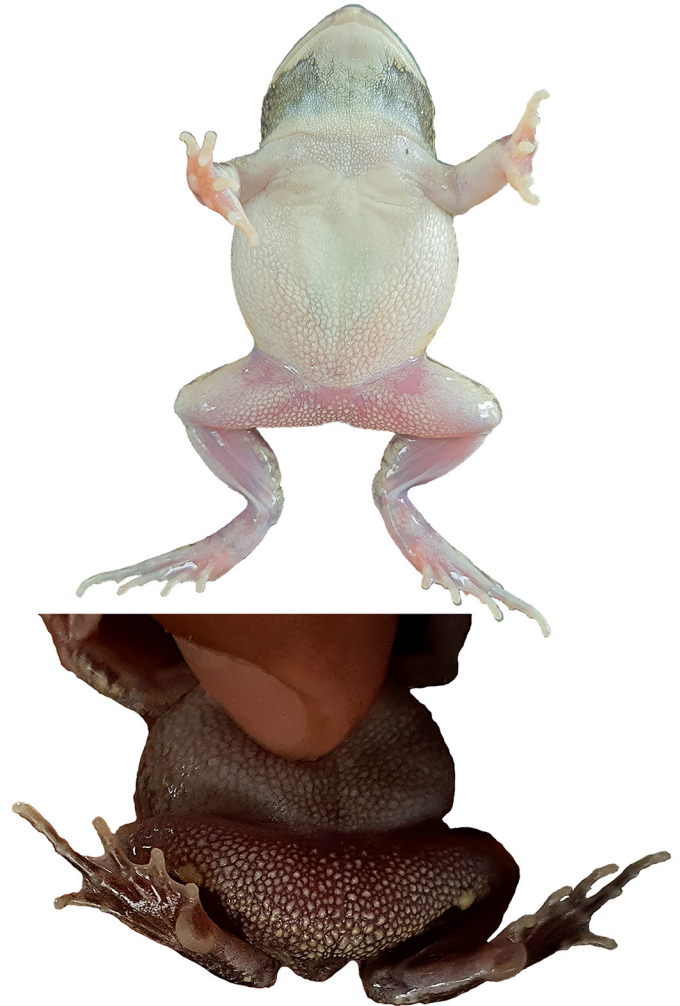


Figure 4. Morphological characters of Maskey's Burrowing Frog (*Sphaerotheca maskeyi*) (ZRC(IMG) 1.262c) from Bhutan: Ventral view showing smooth skin on the chin and chest (top) and inner metatarsal tubercle distinctly longer than the first toe and granular skin between axilla and groin (bottom). Photographs by Chogyal Tashi.



Figure 3. Map showing the site where Maskey's Burrowing Frogs (*Sphaerotheca maskeyi*) were found in Bhutan (arrow).



Figure 5. Habitat where Maskey's Burrowing Frogs (*Sphaerotheca maskeyi*) were found in Bhutan. Photograph by Chogyal Tashi.

groin (Figs. 1 & 2); limbs bore dark crossbars dorsally; skin on the chin and chest was smoother than that on the throat and belly (Fig. 4A); the tibiotarsal joint reached the tympanum; the first toe was shorter than the inner metatarsal tubercle (Fig. 4B); and no outer metatarsal or tibiotarsal tubercles were present — all consistent with published descriptions of *S. maskeyi*, as were morphometric measurements: SVL = 46 mm, head length = 16 mm, head width = 17 mm, snout length = 6 mm, internarial distance = 5 mm, interorbital distance = 3 mm, diameter of the tympanum = 3 mm, eye diameter = 7 mm, hand length = 9 mm, thigh length = 19 mm, tibial length = 16 mm, and foot length = 16 mm.

Consequently, although lacking molecular data, we concluded that the species was in fact *S. maskeyi*. The other species of *Sphaerotheca* that could be present in Bhutan (Jablonski et al. 2021) is *S. breviceps*. However, recent molecular studies (Deepak et al. 2020a; Dandekar et al. 2020; Jablonski et al. 2021; Shauri Sulakhe, pers. comm. August 2020) restricted the distribution of that species to the eastern coastal plains of India.



Figure 7. An undescribed species of *Sphaerotheca* from Trashiyangtse, Bhutan. Photograph by Dorji Norbu.



Figure 6. Coastal Bullfrogs (*Hoplobatrachus litoralis*) and cricket frogs (*Minervarya* sp.) (ZRC(IMG) 1.262d) found syntopically with Maskey's Burrowing Frogs (*Sphaerotheca maskeyi*). Photograph by Chogyal Tashi.

Straight-line distance from the new location in Bhutan and the type locality of *S. maskeyi* at the Chitwan Jungle Lodge, Nepal (27.58341, 84.49498), was 453 km. Habitat consisted of active and degraded agro-ecosystems (*sensu* Prasad et al. 2019) (Fig. 5) and Coastal Bullfrogs (*Hoplobatrachus litoralis*) and cricket frogs (*Minervarya* sp.) (Fig. 6) were found syntopically with Maskey's Burrowing Frogs.

The new locality record for *S. maskeyi* in Bhutan is outside the Protected Area (PA) network, where conservation, research, and management activities for wildlife are less focused than in PAs. This could be one reason why *S. maskeyi* remained unrecorded until now. Threats to wildlife in Samtse District include gravel and stone quarrying and mineral extraction from state and private land. Therefore, we suggest detailed surveys of amphibians in the area to better understand their distributions, habitat requirements, and natural history, all of which are critical for developing and implementing conservation programs.

The prediction in Jablonski et al. (2021) of a species of *Sphaerotheca* in Bhutan was coincidental but ultimately true. Interestingly, a *Sphaerotheca* (Fig. 7) was found in 2018 in Trashiyangtse, the Kingdom's easternmost district, but the discovery was not published due to a lack of molecular data. As molecular studies become increasingly important for identification, many amphibian and reptilian species that occur in Bhutan could remain unreported until such time as the Kingdom develops the means to analyze molecular data.

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