

First record of *Ombrana sikimensis* (Jerdon, 1870) (Anura: Dicroglossidae) from the Himalayan Kingdom of Bhutan, with comments on its use and conservation status

Jigme Tshelthrim Wangyal^{1,2}  Tandel Zangpo³  and Sonam Phuntsho³ 

¹University of New England, Armidale, NSW, Australia

²Jigme Khesar Strict Nature Reserve, Haa, Bhutan

³Zhemgang Forest Division, Zhemgang, Bhutan

*Corresponding author ✉ jigmewangyal@gmail.com

Abstract

We report the discovery of the Sikkim Frog, *Ombrana sikimensis* from Central Bhutan's Zhemgang district, in the Himalayan Kingdom of Bhutan. The frog which was found residing in a clean perennial stream is used by the local human population for consumption. It is supposed to heal stomach related ailments. This record will help Bhutan understand the use and importance of the species and help in prioritizing conservation.

Received: 12 December 2020

Accepted: 31 December 2020

Published online: 31 March 2021

Key words: Bhutan, conservation, location, new record, uses, Zhemgang

Introduction

The family Dicroglossidae, Anderson 1871 is represented by ca. 212 recognized species and is one of the most ecologically diverse and species-rich families of the order Anura, Class Amphibia (Frost, 2020). Members of this amphibian group are considered important since they are known to be indicators of climate change (Alford and Richards, 1999; Beebee and Griffiths, 2005; Böll et al., 2013). The stream-dwelling frogs are often found in good numbers and indicate the health of the stream ecosystem (Welsh and Ollivier, 1998; Shrestha and Gurung, 2019). Thus, research on stream frogs could provide further understanding of ecological niches (Ningombam, 2009) which would be helpful in designing efficient conservation plans for amphibians which are under severe extinction threat (Baillie et al., 2004).

The Anuran fauna of the Kingdom of Bhutan is represented by ca. 76 species (Wangyal and Gurung, 2017; Tenzin and Wangyal, 2019; Wangyal et al., 2020) of which 21 species belong to the family Dicroglossidae. Wangyal and Das (2014) first mentioned the presence of *Ombrana sikimensis* from a dehydrated specimen from a roadside camp in central Bhutan not far away from the current location. Details of the location of this first specimen was not specified since the people around this

locality did not know about the actual stream site from where the species originated. This current report is the first formal report of *O. sikimensis* with details of location, conservation and use in the locality and encourages further research and monitoring, regarding their conservation and use in the near future.

Material and Methods

An ad hoc visual encounter survey happened from the first week of April 2020 until the 16th of May 2020 for initiation of a plantation on the site the frog (Fig. 1) was found. Our team was conducting detailed survey in the area by collecting geo-coordinates and altitudes for reforestation with local plant species. One specimen of this frog was collected from the plantation site close to Dhangkhar village (27°13'30.65"N, 90°40'01.22"E, and 1394 m a.s.l.), Zhemgang District, Bhutan.

The specimen was photographed, measured, and then deposited in the Zhemgang Forest Division Office for preservation and future reference. The specimen was deposited in the field forest office since there are no official museums that allot numbers or preserve specimens in the country. Subsequently, the specimen was identified using the descriptions and diagnoses given in the recent literature (Ohler et al., 2018).

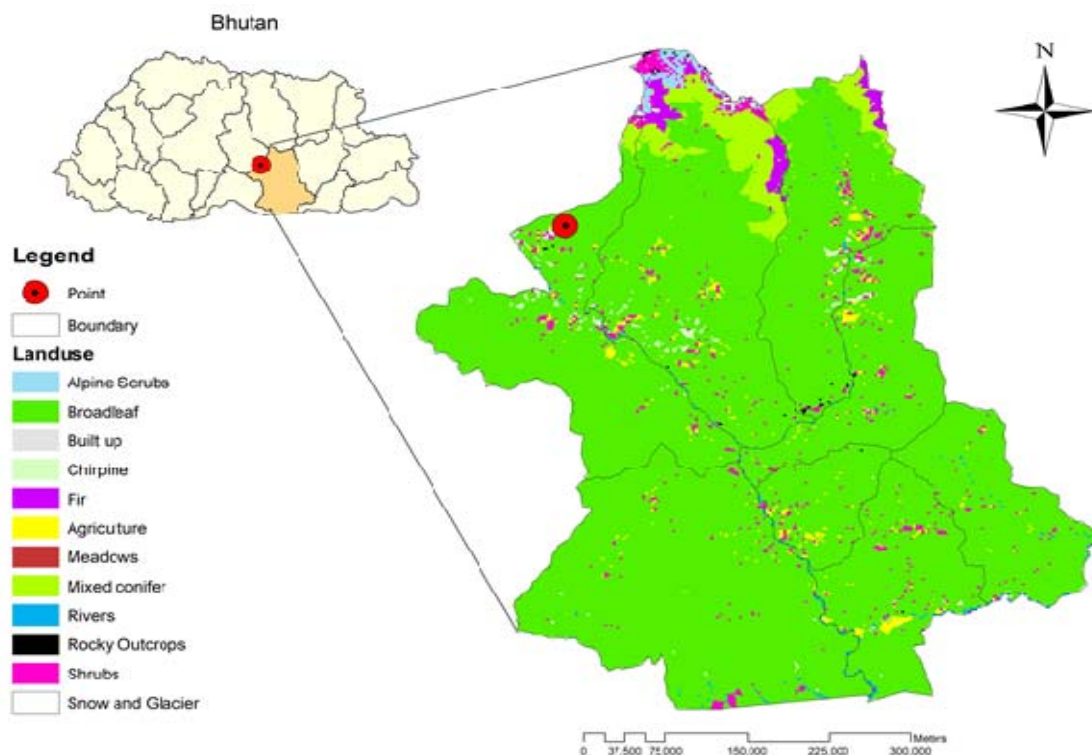


Figure 1: GIS map showing present record of *Ombrana sikimensis* from Bhutan.

Our identification of this species as *Ombrana sikimensis* was further verified by Professor Annemarie Ohler (former Professor of the Muséum national d'Histoire naturelle, France) through email correspondences. Ecological data for this species were noted and important plant species found in the habitat were collected and prepared as herbarium specimens following standard methods. Those plant species were identified following Barneby (1988).

Results and Discussion

Description of the specimen- *Ombrana sikimensis* (Jerdon, 1870)

This is a large-sized frog (78 mm SVL) with less prominent interrupted folds and/or elongated warts on the dorsum. It has a hidden tympanum under the supratympanic fold (Fig. 2). Snout round in dorsal view, supratympanic and dorsolateral folds are distinct. Dorsal skin surface is smooth but with scattered tubercles along the body including flanks and limbs. Tubercles on flanks are more prominent. Nostril opening closer to the eye than the tip of the snout. Finger length formula: $3 > 4 > 2 > 1$. Toe length formula: $4 > 5 > 3 > 2 > 1$. Toes fully webbed. No nuptial spines on the forearms, fingers, or on the pectoral regions, but numerous spine-like ornamentations occur above the cloaca; hence this specimen may be a male individual. Body color dark brown on the dorsal surface and

lateral sides; ventral surface white to yellowish; ventral sides of limbs white.

Ecological and distribution data

Ombrana sikimensis was first described by Jerdon (1870) as *Rana sikimensis* based on a brief description. However, this old name was neglected until Dubois (1975) resurrected it as the senior and valid name for this taxon. He also stated the type locality as Darjeeling (West Bengal, India). Outside Bhutan, this species is found in the Indian states of West Bengal (the type locality), Meghalaya and Sikkim. Dubois (1974) reported it as *Rana assamensis* in Khasi hills of the Indian state of Meghalaya and in Sikkim as *Rana (Paa) sikimensis*. In addition, *Ombrana sikimensis* is also found near freshwater streams in Nepal-Himalayas (Schleich and Kästle, 2002; Shrestha and Gurung, 2019; Gautam et al., 2020).

This specimen of *Ombrana sikimensis* was found in spring (May, 2020) (Fig. 2A, B). However, another specimen was found during the winter (December, 2020) at the same spot where the first one was found. It was encountered on the bank of a lotic (slow-moving and shallow) mountain stream locally known as Barkhoe. This habitat (Fig. 3) with rocky boulders is similar to the habitat described in Sikkim State of India by Subba et al. (2017). The surrounding forest is partially disturbed due to the harvesting of firewood by



Figure 2: Dorsal aspect (A) and Dorsolateral aspect (B) of *Ombrana sikimensis*, in life, collected from Dhangkhar village. Photo by Tandel Zangpo.



Figure 3: Habitat of *Ombrana sikimensis*, in central Bhutan. Photo by Tandel Zangpo.

by villagers of Dangkhar. The habitat also serves as a perennial source of water for the local villages of Dumangkho and Jaiyam. The main vegetation of the area includes mixed broad-leave forests dominated by large tree species such as *Lithocarpus elegans* (local name: Kroi), *Alnus nepalensis* (local name: Gangsengma) and *Castronopsis indica* (local name: Sakhoi), while the undergrowth vegetation is comprised of shrubs such as *Elastostema* sp., *Pteridium* spp., *Urtica* spp., and *Piper* spp. The record of *Ombrana sikimensis* is a new addition to the national amphibian list of Bhutan and thus increases the number of microglossid species in Bhutan.

The highest daily maximum temperature recorded at Zhemgang in May 2020 was 24.5 °C while the minimum was 9 °C (average, 33.5 °C) and the highest daily rainfall recorded at Zhemgang in May 2020 was 101.6 mm, with the total rainfall for the month being 374.9 mm (Climate Information Services, 2020).

Uses

It is well-known that certain species of frogs are used by some communities in the world for medicines or food. Similarly, some people in Bhutan also use frogs as they believe that they cure stomach-related ailments. For example, people of Jomotshangkha in Samdrup Jongkhar District Bhutan, consume *Hoplobatrachus tigerinus* (Daudin) because they believe that the species cures piles (Wangyal and Das, 2014). Also, people in the Chamgang area in Thimphu eat certain *Nanorana* and *Amolops* species (Jigme Tshelthrim Wangyal, personal observation, 2011) for use as medicine. Similarly, the local people of the area where *Ombrana sikimensis* was found, use this frog for treating dysentery-related stomach disorders. They use the skinned animal body as curry (boiled with spices and other vegetable materials) while the skin of the frog is used to treat freshly cut wounds. They paste the skin of the frog over the wound to stop the bleeding as well as a cure.

Local foresters, responsible for the overall conservation of the area, confirm that there is no mass collection this frog species. The local foresters are also of the view that there are no other (sympatric) species of amphibians around the study area. Nevertheless, proper survey of the area is necessary to confirm if there are other species of amphibians in the vicinity. *Ombrana sikimensis* inhabits and breeds in pristine streams (Shrestha and Gurung, 2019), and so increased urbanization, pollution and deforestation are all threats to this species that may happen in the near future.

Conservation

According to the International Union for Conservation of Nature (IUCN), *Ombrana*

sikimensis is categorized as a species of Least Concern (Bordoloi et al., 2004) but in Bhutan, amphibian species are not protected by any national rules or policies. However, the habitats are well protected, and so by saving streams and associated ecosystems, the local species are preserved as well. Furthermore, the majority Buddhist community in this region control animal and plant exploitation due to their religious practices but use for indigenous medical practices is permitted.

Conclusions

Based on the previous and present record, the occurrence of *Ombrana sikimensis* in Bhutan is confirmed. The specimen for this record was verified by a leading batrachologist and also this species habitat characteristics were in accordance with the type locality. This record highlights the importance of inventorying fauna in this unique region and initiating future broad faunal surveys. In order to conserve this species, and other fauna and flora, the human uses of *Ombrana sikimensis* in Bhutan have to be studied in the future.

Acknowledgement

Firstly, we thank Annemarie Ohler, former Professor at Muséum national d'Histoire naturelle Paris, France for helping us identify the species. We wish to acknowledge the kind support of our field colleagues of Zhemgang Forest Division, including the dynamic Chief Forest Officer, Mr. Jigme Dorji. Thanks to the community members of the Dhangkhar village, community foresters, plantation workers and the roadside workers. We also would like to thank Professor Indraneil Das, University Malaysia Sarawak for his encouraging words and for reviewing this work and two anonymous reviewers for their valuable comments on our work.

Conflict of interest

All the authors declare that there are no conflicting issues related to this research article.

References

- Alford, R. A. and Richards, S. J. (1999). Global amphibian declines: a problem in applied ecology. *Annual Review of Ecology, Evolution, and Systematics*, 30: 133–165. <https://doi.org/10.1146/annurev.ecolsys.30.1.133>
- Baillie, J. E. M., Hilton-Taylor, C. and Stuart, S. N. (2004). 2004 *IUCN Red List of Threatened Species. A Global Species Assessment*. International Union for Conservation of Nature, Gland, Switzerland and Cambridge, United Kingdom. 191 pp.

- Bameby, R. C. (1988). Flora of Bhutan, including a record of plants from Sikkim. Volume 1, Part 3. *Brittonia*, 40: 289. <https://doi.org/10.2307/2807475>
- Beebee, T. J. C. and Griffiths, R. A. (2005). The amphibian decline crisis: A watershed for conservation biology? *Biological Conservation*, 125 (3): 271–285. <https://doi.org/10.1016/j.biocon.2005.04.009>
- Böll, S., Schmidt, B. R., Veith, M., Wagner, N., Rödder, D., Weinmann, C., Kirschey, T. and Lötters, S. (2013). Amphibians as indicators of changes in aquatic and terrestrial ecosystems following GM crop cultivation: a monitoring guideline. *BioRisk*, 8: 39–51. <https://doi.org/10.3897/biorisk.8.3251>
- Bordoloi, S., Ohler, A. and Shrestha, T. K. (2004). *Ombrana sikimensis*. *The IUCN Red List of Threatened Species* 2004: e.T58246A11757068. <https://dx.doi.org/10.2305/IUCN.UK.2004.RLT.S.T58246A11757068.en>.
- Climate Information Services (2020). National Center for Hydrology and Metrology. Royal Government of Bhutan. Thimphu. (26th December, 2020). Electronic Database accessible at <https://www.nchm.gov.bt>
- Dubois, A. (1974). Liste commentée d'Amphibiens récoltés au Népal. *Bulletin du Muséum National d'Histoire Naturelle*, (3), 213 (Zoologie 143): 341–411.
- Dubois, A. (1975). Un nouveau sous-genre (*Paa*) et trois nouvelles espèces du genre *Rana*. Remarques sur la phylogénies des Ranidés (Amphibiens, Anoures). *Bulletin du Muséum National d'Histoire Naturelle*, (3), 324 (Zoologie 231): 1093–1115.
- Frost, D. R. (2020). Amphibian Species of the World: An Online Reference. Version 6.1. American Museum of Natural History, New York, USA. Electronic Database at <https://amphibiansoftheworld.amnh.org/index.php>. Accessed on 07/11/2020. <https://doi.org/10.5531/db.vz.0001>
- Gautam, B., Chalise, M. K., Thapa, K. B. and Bhattarai, S. (2020). Distributional patterns of amphibians and reptiles in Ghandruk, Annapurna Conservation Area, Nepal. *IRCF Reptiles and Amphibians*, 27 (1): 18–28.
- Jerdon, T. C. (1870). Notes on Indian herpetology. *Proceedings of the Asiatic Society of Bengal*, 1870: 66–85.
- Ningombam, B. (2009). Amphibian fauna in and around Loktak Lake, Manipur, India with reference to the genus *Amolops* Günther. Ph.D. Dissertation, Gauhati University, Jalukbari, Guwahati, Assam, India.
- Ohler, A., Borah, M. M., Das, M. K., Tesia, C. and Bordoloi, S. (2018). A study on amphibian fauna of Arunachal Pradesh (India). *Alytes*, 36 (1–4): 276–288.
- Schleich, H. H. and Kästle, W. (2002). *Amphibians and Reptiles of Nepal: Biology, Systematics, Field Guide*. First Edition. A.R.G. Ganter Verlag, Ruggell, Liechtenstein. 1, 201 p.
- Shrestha, B. and Gurung, M. B. (2019). Natural history notes on three sympatric frogs, *Amolops formosus* (Günther 1875), *Nanorana liebigii* (Günther 1860), and *Ombrana sikimensis* (Jerdon 1870), from Manaslu Conservation Area, Nepal. *Amphibian and Reptile Conservation*, 13 (2) [General Section]: 152–159 (e198).
- Subba, B., Aravind, N. A. and Ravikanth, G. (2017). Amphibians of the Sikkim Himalaya, India: an annotated checklist. *Check List*, 13 (1): 1–14. <https://doi.org/10.15560/13.1.2033>
- Tenzin, J. and Wangyal, J. T. (2019). New record of Blue-eyed Eastern Spadefoot Toad *Leptobrachium bompu* (Amphibia: Megophryidae) from Sarpang District in Bhutan. *Journal of Threatened Taxa*, 11 (3): 13385–13389. <https://doi.org/10.11609/jott.4134.11.3.13385-13389>
- Wangyal, J. T. and Das, I. (2014). Status, distribution and conservation issues of the amphibians of the Himalayan country of Bhutan, In: Heatwole, H. and Das, I. (Eds.), *Conservation Biology of Amphibians of Asia, Status of Conservation and Decline of Amphibians: Eastern Hemisphere*. Volume 11 (3). Natural History Publications (Borneo) Sdn Bhd., Kota Kinabalu. pp. 194–200.
- Wangyal, J. T. and Gurung, D. B. (2017). The current status of herpetofauna in Bhutan, In: Gurung, D. B. and Katel, O. (Eds.), *An Introduction to the Biodiversity of Bhutan in the Context of Climate Change and Economic Development*. Centre for Rural Development Studies. College of Natural Resources, Lobesa, Punakha. Kuensel Corporation Limited. pp. 39–55
- Wangyal, J. T., Bower, S. D., Sherub, Tshewang, S., Wangdi, D., Rinchen, K., Phuntsho, S., Tashi, C., Koirala, B. K., Gyeltshen, Bhandari, G. S., Jamtsho, S., Phuntsho, Y., Koirala, T. P., Ghalley, B. B., Chaida, L., Tenzin, J., Powrel, R. B., Tshewang, R., Raika, O. N., Jamtsho, S., Kinley, Gyeltshen, Tashi, S., Nidup, D., Wangdi, N., Phuntsho, Norbu, L., Wangdi, K., Wangchuk, T., Tobgay, P., Dorji, T. and Das, I. (2020). New herpetofaunal records from the Kingdom of Bhutan obtained through citizen science. *Herpetological Review*, 51 (4): 790–798.
- Welsh, H. H. and Ollivier, L. M. (1998). Stream amphibians as indicators of ecosystem stress: A case study from California's redwoods. *Ecological Applications*, 8 (4): 1118–1132. [https://doi.org/10.1890/1051-0761\(1998\)008\[1118:SAIOE\]2.0.CO;2](https://doi.org/10.1890/1051-0761(1998)008[1118:SAIOE]2.0.CO;2)