Tropical Natural History 20(2): 219–222, August 2020

Short Note

Note on Eggs and Brooding of Topotypic *Ichthyophis kohtaoensis* Taylor, 1960 (Amphibia: Gymnophiona: Ichthyophiidae) in Dry Season

KANTO NISHIKAWA[1,2*], WICHASE KHONSUE[3], ANCHALEE AOWPHOL[4], ATTAPOL RUJIRAWAN[4], NATEE AMPAI[4] AND PORRAWEE POMCHOTE[3]

[1]Graduate School of Human and Environmental Studies, Kyoto University, Yoshida Nihonmatsu-cho, Sakyo-ku, Kyoto 606-8501, JAPAN
[2]Graduate School of Global Environmental Studies, Kyoto University, Yoshida Hon-machi, Sakyo-ku, Kyoto 606-8501, JAPAN
[3]Department of Biology, Faculty of Science, Chulalongkorn University, Bangkok 10330, THAILAND
[4]Department of Zoology, Faculty of Science, Kasetsart University, Bangkok 10900, THAILAND
* Corresponding Author: Kanto Nishikawa (nishikawa.kanto.8v@kyoto-u.ac.jp)
Received: 24 January 2020; Accepted: 27 June 2020

The caecilians, order Gymnophiona, are limbless amphibians, distributed in the tropical and subtropical parts of the globe. Because of their fossorial habits, the basic knowledge on their ecology and breeding habits are still largely lacking. The family Ichthyophiidae endemic to Southeast Asia includes two genera viz., *Ichthyophis* and *Uraeotyphlus*[1]. In Thailand, *Ichthyophis kohtaoensis* is common and ecological studies on this species has been conducted well[2,3,4]. However, its taxonomic identification was not validated yet, thus the individuals were treated as *I.* cf. *kohtaoensis*[2,3,4]. In this paper, we report the eggs and brooding habitat of *I. kohtaoensis* sensu stricto, because the observation was made in the type locality of the species and the adult morphology was well matched with the description and the type specimens.

On 11 October 2012, we searched for caecilians along a dried stream in the Tanote area, KoTao (=Tao Island), SuratThani province, Thailand (10°05’05”N, 99°50’46”E, 58 m asl) and one of the authors, AR, had collected a female caecilian brooding eggs at 1800h in its nest. The nest was made in the sandy soil ca. 8 cm below the ground on the bank of the dried stream, 180 cm distance from the center of the streambed (Fig. 1A). Air and soil temperatures at the time of the finding were 29.1 and 27.5 °C, respectively. The nest was broken during our digging survey, hence we could not confirm the chamber (Fig. 1B) as reported[5]. A total of 13 juveniles were found around the dried stream.

The voucher specimen, after being fixed in 10% formalin and transferred to 70% ethanol, was sexed by direct observation of the gonad, identified by measuring and counting morphological characters, and stored at the Graduate School of Human and Environmental Studies, Kyoto University (KUHE). The morphology of the individual well coincided with the original description and the type specimens that loaned from the National Museum of Natural History, Division of Amphibians and Reptiles, Washington, D.C. (data not shown).

The caecilian was found together with 23 eggs, but we could not confirm her brooding in field (Fig. 1B), but the female soon brooded her eggs when we took them into

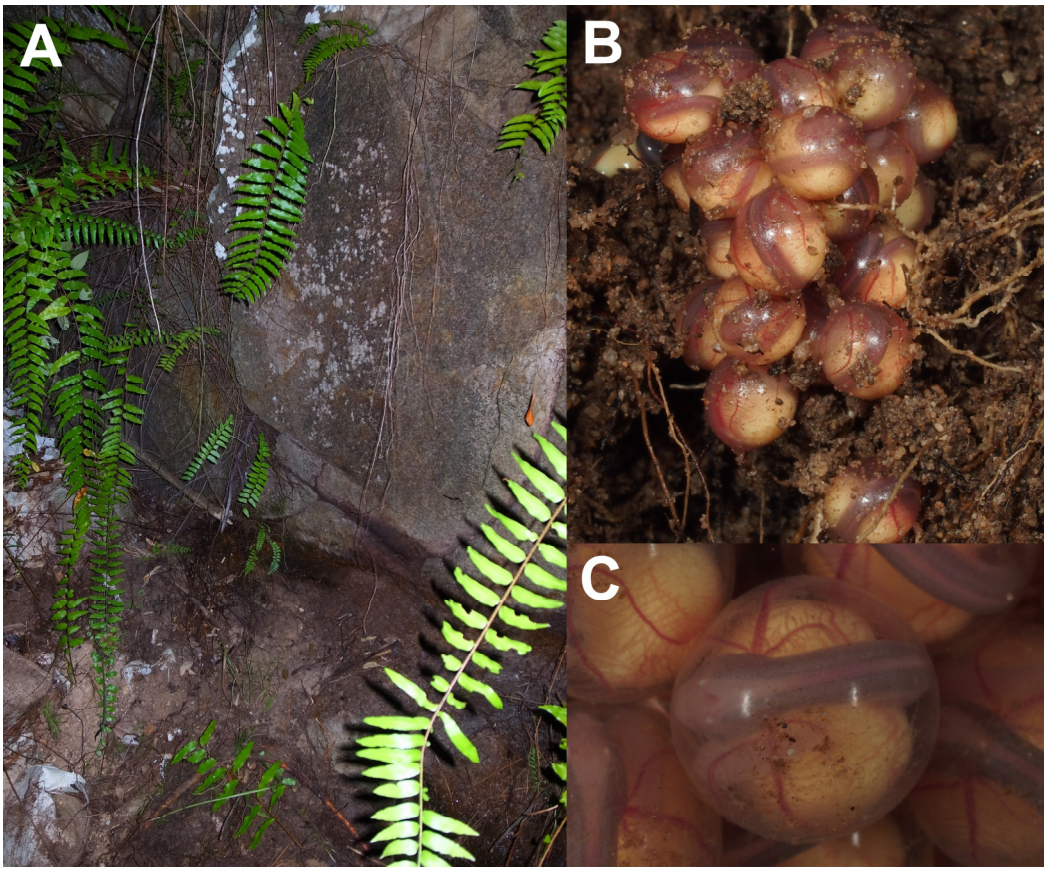

FIGURE 1. A. Habitat of the brooding site, B. Egg clutch and C. Enlarged view of the egg at stage 25, depicting three pairs of gills, of *Ichthyophis kohtaoensis*

the plastic bag and kept in the hotel (Fig. 2). The adult female (KUHE 54567) was 361.0 mm in total length and 47.4 g body weight. The diameter of the eggs, including their gelatinous capsules, ranged from 8.9 to 10.8 mm (mean ± SD = 9.5 ± 0.5, n = 23) The eggs were at the St. 25 of the develeopmental stage of *Ichthyophis*[6] (Fig. 1C).

Larvae of *I.* cf. *kohtaoensis* in Thailand developed to St. 25 by five weeks after deposition (mean temperatures ca. 27 °C)[2]. Because of the similar temperature between the previous study[2] and our record, the eggs might have been deposited during the beginning of the September, nearly the end of the rainy season in the southern Thailand[7].

The eggs of the *I.* cf. *kohtaoensis* hatched after 11 weeks[2], the present eggs would hatch in the end of December, thus, the mid of the rainy season. As suggested in the Bornean species of *I. asplenius*[5], this female also have deposited the eggs in the end of the rainy season as the eggs would hatch at the mid of the rainy season. Probably, the main breeding season of the caecilian in Thailand is rainy season[2], and few individuals has a strategy to lay eggs at the end of the rainy season and the hatched larvae probably crawl to the stream in the

FIGURE 2. A brooding female of *I. kohtaoensis* (KUHE 54567)

mid of rainy season. This may be a unique strategy for the caecilians, which can lay eggs even in the less moist condition prior to the rainy season[5].

ACKNOWLEDGEMENTS

We wish to acknowledge Dr. M. Mastui, for providing us the locality information. We also thank local guides for supporting our survey in the Tao Island. This work was supported by Shikata Memorial Trust for Nature Conservation and JSPS Core-to-Core Program Type B. Asia-Africa Science Platforms (Coordinator: Masaharu Motokawa) to KN.

LITERATURE CITED

1. Frost, D.R. 2020. Amphibian Species of the World: an Online Reference. Version 6.0. American Museum of Natural History, New York, USA. Available from: http://research.amnh.org/herpetology/amphibia/index.html., (accessed: 24 January 2020).
2. Kupfer, A., Nabhitabhata, J. and Himstedt, W. 2004. Reproductive ecology of female caecilian amphibians (genus *Ichthyophis*): a baseline study. Biological Journal of the Linnean Society, 83: 207–217.
3. Kupfer, A., Nabhitabhata, J. and Himstedt, W. 2005. Life history of amphibians in the seasonal tropics: habitat, community and population ecology of a caecilian (genus *Ichthyophis*). Journal of Zoology, London, 266: 237–247.
4. Kupfer, A., Kramer, A., Himstedt, W. and Greven, H. 2006. Copulation and egg retention in

an oviparous Caecilian (Amphibia: Gymnophiona). ZoologischerAnzeiger, 244: 223–228.
5. Nishikawa, K., Matsui, M., Imbun, P.Y., Sudin, A., Lakim, M.B. and Mohamed, M. 2008. Field observation of egg brooding in the caecilian *Caudacaecilia asplenia* from Sabah, Malaysia (Amphibia: Gymnophiona: Ichthyophiidae). The Raffles Bulletin of Zoology, 56:205–208.
6. Dünker, N., Wake, M.H. and Olsen, W.M. 2000. Embryonic and larval development in the caecilian *Ichthyophis kohtaoensis* (Amphibia, Gymnophiona): a staging table. Journal of Morphology, 243: 3–34.
7. Takahashi, H.G. and Yasunari, T. 2006. A climatological monsoon break in rainfall over Indochina—A singularity in the seasonal march of the Asian summer monsoon. Journal of Climate,19: 1545–1556.