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Short Note

Dietary and Behavioral Notes on the Red-necked Keelback (*Rhabdophis subminiatus*) from Northeast Thailand

SHABNAM MOHAMMADI[1*] AND JACQUES G. HILL[2]

[1]*Department of Biology, Utah State University, Logan, Utah 84321, USA*
[2]*Division of Reptiles and Amphibians, Department of Zoology, Field Museum of Natural History, Chicago Illinois 60605, USA*
* Corresponding author. E-mail: shab.mohammadi@gmail.com
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Bufophagy (toad-eating) is unusual among predators due to the lethal toxicity of the bufadienolides found in the skin and parotoid glands of toads[1]. Here we present notes on bufophagy in the red-necked keelback, *Rhabdophis subminiatus,* a medium-sized natricine snake that is common throughout Southeast Asia[2]. These snakes can reach up to 130 cm in length[2]. Their dorsal coloration is uniformly olive green, and the venter is gray[2]. In adults there is a faded red band on the neck and many bear a black line from the eye to the supralabials[2]. In juveniles, the coloration on the neck is much brighter, and in addition to the red band, there is a black and yellow band (Fig. 1). Though several extensive studies have been published on the ecology, behavior, and toxicology of its Japanese congener, *R. tigrinus*[3-5], which possesses specialized nuchal glands that store sequestered bufadienolides from toads it has consumed[6-8] few have addressed *R. subminiatus*. Like *R. tigrinus, R. subminiatus* possesses nuchal glands[9], and it has been noted that they can store bufadienolides as well[10]. Although it is generally accepted that *R. subminiatus* shares the specialized characteristic of bufophagy, we are not aware of any dietary studies or observations in the primary literature to support this. We present a small feeding experiment on a series of juvenile *R. subminiatus* from Thailand that consumed the toad *Bufo melanostictus.*

On May 25 2007, a group of six juvenile *R. subminiatus* were spotted during the night in the Sakaerat Environmental Research Station (SERS) in a low-lying brush near a pond and dam, approximately 5 km northeast of the station headquarters. The station is located in the Sakaerat Biosphere Reserve in the Nakhon Ratchasima province of Thailand. Three of the juveniles were collected and taken back to the station lab. All snakes displayed body flaring when being handled or pinned during attempted captures. This behavior intensified the bright coloration of the neck. Over the following week, two additional juveniles were collected from the same location. The five captured snakes were kept together in a 20 gallon tank, and throughout the following week were randomly presented with small *Bufo melanostictus* collected from the vicinity of the station. All of the *B. melanostictus* offered to the snakes were captured and eaten. The snakes always grabbed the toads' legs-first and then proceeded to conspicuously chew their way up the toad's body (Fig. 1), releasing bufadienolide 'froth' from the skin of the toads. The mean environmental temperature during these feeding trials was 26.5 ^{O}C, and

FIGURE 1. Juvenile *Rhabdophis tigrinus* grabbing *Bufo melanostictus* by the legs first (**A**) and then chewing its way up (**B**). Photographed by Tracey Tamashiro, 2007.

the mean relative humidity was 94.9%. None of the snakes that consumed *B. melanostictus* showed any signs of ill effects, indicating that, like other members of its genus, *R. subminiatus* is resistant to bufadienolide toxicity, and most likely occupies the toad-eating niche of the ecosystem. In addition to *B. melanostictus*, the juveniles were offered small microhylid frogs (*Kaloula mediolineata*) which they also consumed, using the same conspicuous chewing action. This suggests that *R. subminiatus* is not a toad obligate and will also consume anurans other than toads as well. Whether they preferentially consume toads remains unknown. Interestingly, *K. pulchra* can exude highly sticky secretions, which are most likely used to deter predators[11]. These secretions are noxious (unpleasant tasting) but do not contain detectable levels of toxins[12]. All snakes were released unharmed at their location of capture after the laboratory observations.

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