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HERPETOCULTURE NOTES

TESTUDINES — TURTLES

BATAGUR BASKA (Northern River Terrapin). BODY SIZE, GROWTH, AND CONSERVATION STATUS. *Batagur baska* historically occurred in coastal rivers, mangrove swamps, and estuaries from India (Orissa) eastwards to the Thanlwin (formerly Salween) Estuary of Myanmar (Moll et al. 2009. *Chelon. Res. Monogr.* 5:37.1–37.10). It is now considered one of the most critically endangered chelonians in the world due to chronic over-harvesting of adults and eggs, coupled with widespread habitat degradation (Stanford et al. 2018. *Turtles in Trouble: The World's 25+ Most Endangered Tortoises and Freshwater Turtles—2018.* Turtle Conservation Coalition, Ojai, California. 84 pp.). Reproduction among the few remaining wild turtles apparently no longer occurs, and hence the long-term conservation prognosis for *B. baska* is dire (Stanford et al., *op. cit.*). The only remaining viable populations of *B. baska* are those maintained in four captive assurance colonies in India and Bangladesh (Stanford et al., *op. cit.*), which collectively consist of fewer than 10 breeding females (Weissenbacher et al. 2015. *Int. Zoo Yrbk.* 49:31–41).

Information on the natural history of *B. baska* is notably sparse, which is unsurprising given its rarity, and in particular little is known concerning body size and growth (Moll et al., *op. cit.*). Very few adult *B. baska* appear to have ever been measured (seven males, four females [including one we describe below], and one shell of undetermined sex; Moll et al., *op. cit.*), which is lamentable because information on adult body size is important for understanding life history characteristics (Kirkpatrick 1984. *Ecology* 65:1874–1884). Furthermore, with the exception of a group of captive-bred juveniles (N = 84) reared in Bangladesh (Weissenbacher et al., *op. cit.*) almost nothing is known concerning growth in *B. baska* (Moll et al., *op. cit.*). We here report measurements of three adult female *B. baska* in Myanmar,

one of which was re-measured after an interval of > 10 years. We also comment on the conservation status and future prospects for the survival of *B. baska* in Myanmar.

The first *B. baska* we measured was an adult female inhabiting a concrete pond on the grounds of Botahtaung Pagoda in downtown Yangon. According to a security guard we interviewed (October 2014), the turtle was present in the pond when he was initially hired by the pagoda in 1973, and a large *B. baska* with a carapace length of “about 50 cm” observed by Frazier et al. (1994. *Hamadryad* 19:47–66) during a 1987 visit to Botahtaung Pagoda is almost certainly the same turtle. Platt et al. (2008. *Chelon. Conserv. Biol.* 7:261–265) speculate this turtle was brought from the Ayeyarwady Delta, where small numbers of *B. baska* persisted into the late 1980s (Thorbjarnarson et al. 2000. *Nat. Hist. Bull. Siam Soc.* 48:185–191), and liberated in the pond by religious pilgrims in hopes of earning karmic merit. Merit release of captive animals (usually fish, turtles, and birds) is a central tenant of Buddhism and widely practiced at pagodas throughout Myanmar. In common with most pagodas, no specific care is provided to the turtles at Botahtaung Pagoda; the diet consists largely of dried bread, fried flour balls and shrimp paste, and bananas, all of which are sold by hawkers on the pagoda grounds.

In January 2004, one of us (KP) drained the pond at Botahtaung Pagoda, captured the turtle, determined its sex, and used tree calipers to measure midline carapace length (CL = 558 mm; Method D of Iverson and Lewis 2018. *Herpetol. Rev.* 49:453–460) and maximum carapace width (CW = 444 mm) (Platt et al., *op. cit.*). The CL of this turtle was slightly less than the maximum size (CL = 590 mm) of *B. baska* given by Smith (1931. *The Fauna of British India, including Ceylon and Burma. Vol. 1. Loricata and Testudines.* Taylor and Francis, London. 185 pp.), and exceeds the CL of two other females (CL = 500 mm) reported by Moll et al. (*op. cit.*).



FIG. 1. Female *Batagur baska* photographed at Botahtaung Pagoda in Yangon, Myanmar (October 2014). This turtle is one of only two *B. baska* known to survive in Myanmar.

On 25 October 2014, we returned to the pagoda, recaptured the turtle (Fig. 1) and using tree calipers, repeated the earlier measurements (CL = 562 mm; CW = 447 mm). When recaptured, the turtle was grossly overweight, most likely due to excessive consumption of carbohydrate-rich food provided by visitors and limited opportunities for movement in the small pond. During the 129-month interval between measurements, CL and CW increased by 4 and 3 mm, respectively. Based on the apparent increase in CL, we calculated a growth rate of 0.03 mm/month (0.36 mm/year). Our data suggest that at least in this turtle, growth is indeterminate; i.e., growth continues at a reduced rate after an individual attains sexual maturity (Congdon et al. 2013. *Evol. Ecol.* 27:445–459). Indeterminate growth is probably widespread among chelonians, although the data needed to categorize growth patterns are lacking for most species (Congdon et al., *op. cit.*).

Our report appears to be the only description of growth in an adult *B. baska*, and importantly, the first indication that indeterminate growth might occur in this species. That said, we cannot rule out the possibility that our findings are the result of measurement error, particularly in light of the very small growth increments. If the size increase we documented is indeed real, the growth rate of this female appears unlikely to deliver a significant increase in fecundity (with the caveat that body size–fecundity relationships in *B. baska* are unknown) even if sustained over a very long period (e.g., 10 mm increase in CL would require 27.7 years of growth).

We measured two other female *B. baska* kept in a pond at Shin U Pa Gotta Pagoda in Ywa Lut Village (16.496°N; 97.533°E; India-Bangladesh datum), Belu Kyun Township, Mon State. According to local villagers, these turtles were captured (most likely from the Thanlwin Estuary) prior to World War II (1939–1945) and kept as pets in a small village pond. Following the death of their caretaker in the 1960s, the turtles were released into the Thanlwin River, but soon returned to the village pond and remained there for about

25 years, when both were transferred to the pagoda. The turtles have long been maintained on a diet of Water Spinach (*Ipomoea aquatic*) mixed with lumps of Toddy Palm (*Borassus flabellifer*) sugar. On 7 June 2015, one of us (WKK) captured and measured the CL of the largest female (CL = 609 mm), which exceeded the previously reported size maxima for *B. baska* (Smith, *op. cit.*). In late December 2018, the second female died from unknown causes, and WKK retrieved and measured the carcass prior to an autopsy conducted by a government veterinarian. The CL of this turtle (533 mm) was larger than reported for other female *B. baska* by Moll et al. (*op. cit.*). The shells of both females at Shin U Pa Gotta Pagoda were smooth with no discernible annuli on the carapace or plastron, the seams between the scutes of the plastron and carapace were only faintly visible, and deep pitting was evident on the plastron.

The current conservation prognosis for *B. baska* in Myanmar appears bleak. To our knowledge, the two females kept at Botahtaung and Shin U Pa Gotta pagodas are the only *B. baska* now surviving in the country. Requests to transfer these turtles to a captive-breeding center within Myanmar (with one or more males to be loaned from *ex-situ* programs in India or Bangladesh) have been rebuffed by trustees of both pagodas, who are reluctant to relinquish control of what are perceived as extremely valuable animals that generate income by attracting visitors to the pagodas. Although *B. baska* has long been considered ecologically extinct in Myanmar (Platt et al. 2018. *Nat. Hist. Bull. Siam Soc.* 63:67–114), the recent death of one female at Shin U Pa Gotta Pagoda highlights the inevitable biological extinction that will follow when the two remaining females eventually succumb. Indeed, *B. baska* in Myanmar is perhaps best characterized as a “zombie species,” defined by Rosenzweig (2003. *Win-Win Ecology: How the Earth’s Species Can Survive in the Midst of Human Enterprise*. Oxford University Press, Oxford. 224 pp.) as a population of a few long-lived individuals (“the living dead”) doomed to extinction because of the continued lack of reproductive success.

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