



Research Article

HATCHING AND SURVIVAL SUCCESS OF THE RESCUED EGGS OF COMMON BRONZEBACK TREE SNAKE, *DENDRELAPHIS TRISTIS* (REPTILIA:SQUAMATA:COLUBRIDAE) RESORTED TO INDIGENOUS TACTICS

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ABSTRACT

Conserving biodiversity is the high need of hour. Most of the snakes are harmless and play a pivotal role in maintaining the ecological balance irrespective of their conservation statuses. One needs to understand the reproductive success and the optimum conditions rendering a successful hatching and survival of the new born individuals to facilitate a hassle free life cycle of this faunal diversity amidst the human chores. Laying of eggs by snakes in human inhabited places has mostly resulted in destroying of the clutch thereby hampering the biodiversity. Accidental incidents like road kills too had impacted on the decreasing population of herpetofaunal diversity. This study deals with the rescuing of eggs of Common Bronzeback tree snake laid under human populated area, thereby resorting to certain indigenous tactics, resulting in the successful hatching and survival of the new individuals. The species has been hugely photographed but hardly any behavioural documentation has been enlisted till date. This is the first documentation of such an indigenous tactics with 100% survival success of the hatchlings from the Indian landmass.

Keywords: Common Bronzeback tree snake, Hatching success, Indigenous techniques, Rescued eggs, Survival success.

INTRODUCTION

Most of the snakes are harmless rather beneficial to humans and to the natural ecosystem. They are a boon to farmers and contribute in maintaining the ecological balance. Snakes are found all over the world except the Arctic Region, New Zealand and Ireland (Goin and Goin 1971). Uetz & Hošek (2015) had reported of 3,496 species of snakes under 26 families around the world; but the Reptile Database (<http://www.reptile-database.org/>) presently accounts for 3789 species of snakes throughout the globe till August 2019.

Common Bronzeback tree snake, *Dendrelaphis tristis* (Daudin, 1803) is autochthonous to the Indian mainland, out skirting Sri Lanka, Pakistan and Nepal (Karmakar,

2006). It is the most widespread *Dendrelaphis* species of India which is the only species of genus in most of the parts on Indian landmass (Van Rooijen and Vogel, 2008). This long slender, smooth scaled, flat headed and large eyed tree snake is often dark brown or black in colour with a wide light bronze stripe down the centre of the back from head to tail. Juveniles mimic adults in appearance to a great extent unlike the faint banded pattern which disappears in the first year (Sharma, 1998). There are in all 11 species of Bronzebacks in India (Aengals, 2018) (Figure 2). Members of this genus are slender, diurnal species that are predominantly arboreal and feed mainly on lizards and amphibians (Van Rooijen and Vogel, 2008; O'Shea *et al.*, 2015). A clear rounded whitish spot present on the middle of top which equally covers both parietal scales. This

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characteristic is found only in this species of Bronzeback and quite helpful to identify quickly; large eyes with rounded pupils. Tongue colour is bluish-grey. This fast and spontaneous species resorts to fast locomotion both in arboreal and terrestrial environment. It is usually non-venomous and non-offensive, often recouring to inflation of much of its fore body to show the blue edge of most of the dorsal scales, when threatened under natural conditions.

Ferguson (1895) was the first to record *Dendrophis bifrenalis* from India and documented that it is not uncommon in Trevandrum (today Thiruvananthapuram, Kerala). Subsequently, Wall (1921) confirmed the occurrence of this species in India, namely in Trevandrum and in Travancore. Series of successive reporting by Smith in 1943, Mahendra (1984) and Sharma (2007) had not presented new locality records, yet Whitaker and Captain (2004) doubted the occurrence of this species in India, assuming it to be an endemic to Sri Lanka. Though Ferguson reported it way back in 1895 and had designated it to be common yet its reports are scanty on Indian landmass.

Major threats to this Schedule 4 species (Wildlife Protection Act, 1972) are chiefly habitat destruction. Road kill and intentional killing due to unawareness among mass are other reasons adding to their unnatural mortality (Das *et al.* 2007). The present study aims at devising an indigenous tactics to carry out a successful hatching of the eggs and at the same time aims for creating awareness among human community to resort to these convenient tactics for successful conservation of the declining herpetofaunal diversity.

MATERIALS AND METHODS

Upon call from the villagers, the rescue mission underwent in a village named Debipur, Chandpara in the district of

North 24 Parganas, West Bengal ($22^{\circ}58'11.8308''\text{N}$; $88^{\circ}47'8.21328''\text{E}$) on 4th July, 2019 (Figure 1). A clutch of eleven oblongated eggs were rescued directly from the dark and moist wall corner of the living room of a local inhabitant. A Common Bronzeback tree snake was found within the clutch, thus posing the maximum affirmation to be the parent. Identification of the probable parent snake was done following (Vogel and Rooijen, 2011). Thorough and careful observations of the soft and leathery shell, oblongated shape, presence of the adult snake and post-hatching scenario together led to the confirmation of the eggs being those of Common Bronzeback tree snake. The eggs were immediately harnessed and shifted to a safe location, well aloof from the regular chores of daily life because the inhabitants had threatened to destroy the mother and the eggs if kept within their vicinity. The rescued eggs were intact and were placed in a circular container (diameter of 40 centimetres) made up of polyvinyl chloride (PVC), two-third filled with construction sand. Measurements of the eggs were taken using an inch measurement tape. The eggs were placed on the sand in the same way as they were harnessed during rescue, in upright positions resting against the wall of the container and were sprinkled with water (about 20 ml) once in every two days until they hatched. Regular observations followed for any fungal attacks or alike hindrances for a successful hatching. After hatching, the hatchling were transferred to a rectangular container, ($35 \pm 0.2 \times 27 \pm 0.17 \times 15 \pm 0.21$) cm^3 , with ventilated lid prior to release.

Statement of human and animal rights: Authors would like to inform that, the rescue operation was done as per the sole interest of the authors towards animal protection and care. Post recovery of eggs and up to releasing of new hatchlings in the wild, all the procedures were followed by animal ethical guidelines and no harm was done to the animals during the procedure.

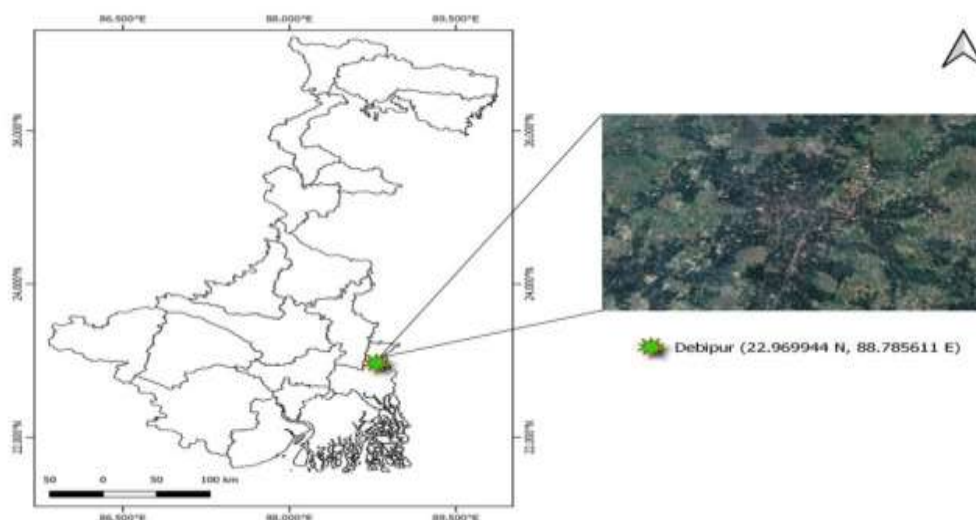


Figure 1. Map denoting the rescue site of CommonBronzeback tree snake.

RESULTS AND DISCUSSION

A clutch of eleven eggs were rescued from the residence of a local inhabitant on 4th July 2019 (Figure 3A). This clutch size is unlike the commonly known clutch size of 6-8 eggs reported earlier in Indian Biodiversity Portal. The eggs had a mean size of $4.85 \pm 0.55 \times 1.27 \pm 0.75$ cm² and weighed 11.8 ± 1.45 g. The parent species has enlarged vertebrals and ridged ventrals, scales 15:15:11, vertebral scales are slightly enlarged on neck portion; ventrals are counted to be 182. The head is elongated and has a blunt and rounded snout. Supralabials are 9/9 with 5th and 6th touching the eyes. Anal slit is divided. Subcaudals are 188. Total length, TL of the body is measured to be 82.3 (snout-vent length) + 39.5 (tail length) = 121.8 cm. Tail is about one-third of the total body length (Figure 2).

The PVC container (of volume 25 litres) more than half filled with sand had eggs kept on them in the manner they were when rescued (Figure 3B). Out of eleven eggs, six were positioned upright, leaning them against the wall of the container and the remaining five were rested horizontally on the sand. The average temperature of the

room ranged from $27 \pm 2^\circ\text{C}$ to $30 \pm 2^\circ\text{C}$, measured thrice a day throughout the incubation period. About 20 ml of water was sprinkled (using a hand sprinkler) over the eggs at an interval of every two days from the day of rescue till they hatched. Post 20 days of incubation, the eggs were carefully observed under white light (mobile LED torch was used) to check embryo growth inside each eggs (Figure 3C, D). The dense venation and the vascularisation of the tissue material inside the egg confirmed the embryological development during the incubation period. No fungal outgrowths on the surface of the eggs concluded healthy ambience of the indigenous set up.

On 4th September 2019, exactly on 60th day post rescue, first hatching took place in the forenoon (Figure 3E). Within the next 5-6 hours, the successive hatching resulted in the coming out of the new born babies. Just after the hatching, the babies were observed to feed on the yolk remnants from the egg shells (Figure 3F). The length and weight of the newly hatched ones are tabulated in (Table 1). They were liberated to the nearby forest within the next 12 hours of their hatching (Figure 3G).

Table 1. Morphometry of the hatchlings.

Offsprings	1	2	3	4	5	6	7	8	9	10	11
Total Length (in cm)	27.5	24.6	21.2	26.1	23.7	21.3	25.4	22.3	22.9	23.7	26.7
Weight (in g)	8.6	7.2	6.4	7.9	6.8	6.1	7.3	6.6	6.7	7.0	8.2
Sex	F	F	F	M	M	F	F	M	F	M	F



Figure 2. Parent species of the rescued eggs.



Figure 3. Hatching of rescued eggs of Common Bronzeback tree snake by indigenous tactics; **A** – Rescue of eggs from human habitation; **B** – Home-made set up for providing ambient condition for successful hatching; **C & D** – Observatory tactics to ascertain embryological development; **E** – First hatching among the clutch; **F** – Successive hatchings continued; **G** – Successful hatching and survival of the new borns; **H** – Liberating the newborns to the wild.

Out of the 41 species of the genus *Dendrelaphis* documented from Asia (Figuroa *et al.* 2016), ten species have been documented from India (Whitaker and Captain, 2004). Presently, Zoological Survey of India has published a checklist of reptiles accounting for eleven species of *Dendrelaphis* in India. In India, *D. tristis* has so far been reported from most of the Peninsular India and the States of Sikkim and West Bengal in the northeast (Whitaker and Captain, 2004; Sharma, 2007; Van Rooijen and Vogel, 2008) (Figure 4). In addition to this, the species has been recorded from Katarniaghat Wildlife Sanctuary, Uttar Pradesh by Das *et al.* (2012) which is commendable

considering the presence of this species in Nepal also. Furthermore, this species has been reported from the Himalayan foothills of Uttarakhand by Vasudevan and Sondhi (2010) however, neither any description nor locality record is provided in their checklist. Harikrishnan (2015) have reported the same from Dehradun and Jim Corbett National Park respectively, however, no diagnostic data are provided. Among all these reporting, even from West Bengal, none have earlier devised or reported any tactics for successful hatching of the eggs. The entire procedure is indigenous and if proper awareness can be spread, this could stand out to be a boon

to restore and conserve the herpetofaunal diversity of the area.

It was found that the major habitats preferred by snakes are encroached by human being and there is an impact of human activities, hence the snake kill is maximum by human being as compare to any other factor in nature. However in the present study the hatching of the eggs were monitored until the hatchlings survived to be released into the wild habitat. It can be predicted that hatchling condition affects survival during the first year of life. For example, larger offspring had higher survival during the first year of life in Keel back Snakes (*Tropidonophis mairii*) incubated in a laboratory in Australia (Brown and Shine, 2005), and Garter Snake hatchlings (raised in laboratories) that were heavier at birth likewise survived better than others (Bronikowski,

2000). According to Brown and Shine (2005), body size was also positively related to survival in the Keelback Snakes mentioned before and the same was stated by Hyslop *et al.*, (2012) in Eastern Indigo Snakes (*Drymarchon couperi*) from Georgia. Further, as per Rosen and Lowe (1994), a persistent loss at population level may be detrimental for the species as road mortality of snakes has been identified as constituting a ‘sink’ for local populations. To sum it up, irrespective of the conservation statuses of IUCN, which often lacks the present updates, herpetofaunal diversity needs to be conserved at all fronts of ecological niches. Even though this particular LC species of our study has been marked least concerned (LC), yet it’s mentioned reports of being endemic to certain landmasses dents the fact of its easy vulnerability if reckless casualties are not checked.



Figure 4. Distribution of the Genus *Dendralaphis* throughout the Indian landmass.

CONCLUSION

Devoid of proper knowledge leading to mishandling of snakes, careless behaviour asserting to snake bites are the burning reasons for unnatural snake killing. Continuous monitoring on the snake species diversity of a region is essential, it is possible through the special awareness program for the people, common man, farmers, students so that snake bite, snake kills may be prevented and snake diversity, food chain and food web of this ecosystem will be conserved. This will help to protect the survival of human and snakes both. The modus operandi of the present study encircles the notion of conserving the wide

diversity of herpetofauna prone to immense massacre mostly by human negligence and allied activities. The tactics devised here are indigenous and easy to imbibe resulting in absolute hatching and survival success. The aim of the study is also to create a mass awareness among the fittest inhabitants of the globe to opt for a view of conservative and sustainable development. Snakes are an indispensable part of nature, playing a fairly important role in food chains and maintaining ecological balance. Resorting to the mention indigenous tactics by even non-professionals will reduce the unnatural killing of any snakes dwelling with human habitat. Observing and

documenting the hatching and survival success of other and allied groups of snakes following this indigenous tactics pave the way for the future scope of this research.

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