



## H U S B A N D R Y

# Captive Husbandry of Green Keelbacks, *Macropisthodon plumbicolor* (Cantor 1839)

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Photographs by the author except where noted.

The Green Keelback (*Macropisthodon plumbicolor*; Fig. 1) is a nonvenomous, oviparous colubrid widely distributed in India, Pakistan, Bangladesh, and Sri Lanka at elevations to 2,000 m (Whitaker and Captain 2004, 2008). Although distributed across most of mainland India, this species has not been recorded from the eastern regions, the Ganges Valley, and the extreme northwest. In Gujarat, it occurs mainly in central and southern parts of the state (Desai 2011, 2017). Infrequently encountered in most areas, it is common in parts of The Dangs District, much of the Western Ghats, and in some areas of the neighboring state of Maharashtra.

Green Keelbacks occur in a wide variety of natural and altered habitats, including grasslands, areas of low vegetation, forests, gardens, and urban areas, often near bodies of water where they frequently seek shelter in rock piles. Green Keelbacks are mild-tempered and inoffensive (Desai 2011, 2017), largely nocturnal, but sometimes crepuscular. Females are larger than males (Whitaker and Captain 2004, 2008), but little is known about reproduction. On 20 June 1989 a female from the Makarpura Area in the Vadodra District of



Fig. 2. Two gravid female Green Keelbacks (*Macropisthodon plumbicolor*).

Gujarat laid five eggs and another female laid five eggs without calcareous shells on 5 April 1992 (Vyas 1993). Daniel (1983) reported clutch sizes of 7–16 eggs and hatchling total lengths of 136–166 mm, and Whitaker and Captain (2004, 2008) listed clutches of 8–14 eggs and hatchling lengths of 75 mm. Herein I provide information derived from the incu-



Fig. 1. Hatchling Green Keelbacks (*Macropisthodon plumbicolor*) from the two clutches described herein.



Fig. 3. Administering CIPMOX solution to a female Green Keelback to treat a respiratory infection.

bation of two clutches from two different females, including previously undescribed behavior of hatchlings.

Rajesh Kumar R. Sharma and I rescued two gravid females (Fig. 2) from the Surat District of Gujarat on 4 and 7 January 2018, respectively. The former suffered from a respiratory ailment and blister disease. I diluted one-third of a CIPMOX 500-mg capsule in water (166.6 mg dose for the 63.5-g body weight of the snake) and administered the solution orally using a 1-ml dropper (Fig. 3) for four days. The snake showed marked improvement after 24 hours, and it appeared to be fully recovered at the end of the four-day treatment. Because so little is known about reproduction in this species, I decided to keep both individuals in captivity until they laid eggs and the eggs subsequently hatched.

**Preparation for incubation.**—I housed the two females separately (having noted cannibalism in this species in 2009) and monitored them carefully. I offered them frogs and eggs, but neither showed any interest, so I force-fed them with Indian Cricket Frogs (*Fejervarya* sp.). In anticipation of incubating the eggs and having learned from my prior experience, I acquired new plastic boxes (8.5 x 6.5 x 10.5 in; Fig. 4), drilled holes for ventilation in all four sides, and sterilized new substrate by submerging it in boiling water and drying it in sunlight.

At 2201 h on 15 January, the first female sloughed its skin. In my experience, this pre-ovipositional ecdysis often indicates that a snake will soon lay eggs. At 1115 h on 20

January, the second female shed its skin. After each snake shed, I removed the substrate, cleaned the containers, and spread a cloth liner so that egg deposition would be in hygienic conditions (Fig. 5). I measured weights of both females using a digital scale, measured girth with a string, but did not attempt to measure body length to minimize stress attributable to excessive handling.

**Incubation of the first clutch.**—The first female (SVL 721.4 mm, tail 81.3 mm, midbody girth 81.3 mm, weight 192.8 g) laid 18 eggs with round spots or patches over a period of three days at temperatures of 18–20 °C and relative humidity of 45%. The 18-egg clutch exceeded all previously reported sizes (Daniel 1983; Whitaker and Captain 2004, 2008).

She laid 16 eggs between 0810 h and 1320 h (a period of 5 h and 10 min) on 23 January, eight days after ecdysis. The remaining two eggs were laid on different days; the seventeenth at 0858 h on 26 January 2018 and the eighteenth at 0810 h on 27 January. Because the female was weak and appeared emaciated, I forcibly fed it with one frog on 24 January and two frogs on 25 January. The last two eggs were larger and heavier than those laid initially, the eighteenth egg the heaviest of all. Measurements of the female after ovipositioning were

**Table 1.** Sizes and weights of eggs in the first clutch on the day they were laid (23 January 2018) and weights on day 40 of incubation (4 March 2018). Weights of eggs K–R were not measured after egg J ruptured during handling.

Egg	Initial size (mm)	Initial weight (g)	Weight on day 40 (g)	Increase (g)
A	25 x 17	4.33	5.36	1.03
B	25 x 17	4.44	4.89	0.45
C	26 x 18	4.65	6.12	1.47
D	24 x 18	4.33	5.16	0.83
E	25 x 17	4.24	4.69	0.45
F	24 x 17	3.99	4.94	0.95
G	24 x 17	3.99	5.06	1.07
H	26 x 17	4.37	Rotten	—
I	25 x 17	4.48	5.64	1.16
J	25 x 18	4.23	5.42	1.19
K	25 x 17	3.85		
L	26 x 17	4.40		
M	24 x 17	4.10		
N	22 x 12	1.71		
O	24 x 17	4.16		
P	22 x 12	1.80		
Q	29 x 19	5.22		
R	26 x 19	5.64		
<b>Mean</b>	<b>25.0 x 16.8</b>	<b>4.10</b>	<b>5.25</b>	<b>0.95</b>



**Fig. 4.** Incubation chambers for two clutches of Green Keelback eggs. Note the covered ventilation holes.



**Fig. 5.** Female Green Keelback laying eggs.

63.5 mm (midbody girth), a reduction of 17.8 mm, and 124.6 g (weight), a reduction of 68.2 g. She shed her skin at 1920 h on 13 February, 21 days after ovipositioning.

Eggs were marked, measured, and weighed (Table 1) before placement in an incubation chamber filled with a 4-cm layer of substrate. Each day at 1000 h during incubation, I exposed the eggs for 25–45 sec to morning sunlight entering the room through a window. Ambient temperatures were increasing day by day, so I used a fan from 1100–2000 h in order to maintain temperatures at 29–30 °C.

Challenges began at 1000 h on 28 January (the sixth day of incubation) when, despite having covered the ventilation holes with fine netting, I observed two fruit flies inside the incubation box. I removed the flies, wiped the eggs with a fine paint brush, and covered the box with a thin piece of cloth sealed with tape.

On day 40 (4 March), I measured and weighed the eggs (Table 1) again. One egg was spoiled and not measured. For two eggs that ruptured on the scale, I collected and froze the liquid. When the first egg ruptured, I initially thought it might have been defective and continued to measure the other eggs. However, when the second egg ruptured, I stopped measuring the weight of the eggs. The weight of the first egg before bursting was 4.69 g, an increase of 0.45 g from its original weight; 1 hour and 12 mins later, its weight was 4.37 g, a decrease of 0.13 g. Similarly, the weight of the second ruptured egg was 5.42 g, an increase of 1.19 g from its original weight; 49 min after bursting, its weight was 4.39 g, a decrease of 1.03 g. Before placing those two eggs back in the incubation box, I observed that a small cream to greenish-yellow bubble had formed, and it solidified in such a way that it completely stopped the leakage of yolk (Fig. 6). Analysis of a yolk sample provided an estimate of 6.95 mg/ml of protein. Another egg ruptured subsequently in the incubation box and yet another burst while I was candling it. The former failed to develop further, whereas the second survived.

On day 56, I initially thought one egg had hatched, but closer examination revealed nothing inside except dried yolk. On day 59 (23 March), a 3-mm slit appeared in another egg and a hatchling extended its snout; after emergence the slit was extended to 5 mm. The other hatchlings in this clutch enlarged the initial 3–4.5-mm slits to 5–8 mm during emergence.

On day 60, I saw movement inside another egg at 0900 h on 24 March. The initial slit was 4.5 mm in length.



**Fig. 6.** Formation of a granular yolk plug that stopped the leakage of fluids from a ruptured egg.



**Fig. 7.** Dissected eggs with fully developed but dead hatchlings; death probably was attributable to an infection passed on by the parent.

Although the hatchling extended its snout, it did not emerge until three days later. Based on successful efforts (Parmar 2017) to encourage emergence of Common Trinket Snakes (*Coelognathus helena*), I sprinkled some water around the egg in an effort to reduce the ambient temperature and then wrapped it in newspaper to increase the temperature; neither had any effect. Finally, I opened the egg only to find that the fully developed female hatchling had died. Measurements were 112 mm SVL, 21 mm tail length, 16 mm midbody girth, and a weight of 1.42 g. Another unsexed hatchling that had not emerged after many days had not properly developed its parietals. It had an indentation instead of parietal shields; it also was the smallest and lightest measured hatchling (89 mm SVL, 17 mm tail, 10 mm midbody girth, weight 0.31 g). The parietal shields appear to develop late, even the hatchlings that appeared weak at birth had somewhat semi-transparent and very fragile parietal shields.

On day 61 (25 March), another hatchling slit the shell and extended its snout. After 24 h, I saw that the shell had become dry and hard and that the hatchling was unable to emerge. Not wanting to wait for three days, I carefully cut away the upper part of the shell and saw that the hatchling was alive, albeit breathing with difficulty and still attached to the yolksac and shell. I then removed all but a very small piece of shell. After a night had passed, the hatchling began to emerge at 0635 h and had detached itself from the rest of the shell by 0707 h. The umbilicus remained attached until it separated on its own after a couple of days.

In my experience, most incubated eggs hatch within 45–57 days, but 63 days had already passed and only four hatchlings were born alive. So, I decided to dissect all but two of the remaining eggs on day 65. All but one apparently infertile egg contained dead, fully developed hatchlings (Fig. 7). I opened the two additional eggs on day 70 to find that they were spoiled.

**Incubation of the second clutch.**—The second female (SVL 627.9 mm, tail 73.7 mm, midbody girth 81.3 mm, weight 170.0 g) laid 15 eggs nine days after ecdysis at 2110–0120 h (4 h and 10 min) on 28–29 January at a temperature of 25 °C and relative humidity of 39%. One egg was very small, misshapen, and infertile. Measurements of other eggs are listed in Table 2.

**Table 2.** Sizes and weights of eggs in the second clutch on the day they were laid (29 January 2018) and weights on day 40 (10 March 2018) and day 57 (27 March 2018) of incubation. The asterisk (\*) marks the hatchling that emerged on the day before day 57.

Egg	Initial size (mm)	Initial weight (g)	Weight on day 40 (g)	Increase (g)	Weight on day 57 (g)	Decrease (g)	Weight of shell (g)
1	31 x 16	5.08	5.64	0.56	4.07	1.01	0.10
2	30 x 16	5.01	5.52	0.51	4.57	0.44	0.16
3	24 x 12	1.67	Infertile	—	—	—	—
4	31 x 16	5.03	5.87	0.84	4.55	0.48	0.33
5	31 x 16	5.19	5.80	0.61	4.63	0.56	0.18
6	30 x 17	5.08	5.48	0.40	4.44	0.64	0.10
7	33 x 16	5.15	5.29	0.14	4.84	0.31	0.15
8	27 x 17	4.74	5.06	0.32	4.37	0.37	0.29
9	28 x 17	4.94	5.38	0.44	4.67	0.27	0.11
10	28 x 17	4.80	5.09	0.29	4.49	0.31	0.21
11	28 x 17	4.72	5.06	0.34	4.21	0.51	0.10
12	28 x 17	4.98	5.31	0.33	4.62	0.36	0.12
13	27 x 17	4.58	5.13	0.55	4.80	0.22	0.13
14	26 x 16	4.57	4.70	0.13	4.46	0.11	0.25
15	28 x 17	4.57	5.23	0.66	*	—	0.50
<b>Mean</b>	<b>28.7 x 16.3</b>	<b>4.67</b>	<b>4.95</b>	<b>0.43</b>	<b>4.51</b>	<b>0.39</b>	<b>0.19</b>

Eggs were marked, measured, and weighed (Table 3) before placement in an incubation box prepared as for the first clutch. I again measured and weighed the eggs of this clutch on day 40 (10 March) and day 57 (27 March), the latter when one hatchling had already emerged. The weight of eggs on day 40 had increased when compared to the initial weight when laid but was less on day 57. The increase is attributable to the acquisition of moisture during incubation,

whereas the reduction at hatching is due to the consumption of yolk and loss of fluids during development.

Emergence began on day 57 and all hatchlings had left their shells within 48 h on 29 March. Initial slits were 4–8 mm and enlarged to 9.5–20 mm at emergence. The egg tooth of hatchlings was visible at birth (Fig. 8) and one hatchling retained an umbilicus for several days. Measurements of the female after ovipositioning were 61.0 mm (midbody girth), a reduction of 20.3 mm, and 99.0 g (weight), a reduction of 71.0 g. The female shed her skin at 0134 h on 21 February, 23 days after ovipositioning.

**Comparisons between the two clutches.**—Eggs laid by the first female were spotted, appeared to be unhealthy, and were uniformly very small compared to the white, leathery, spotless, and variously larger eggs laid by the second female (Fig. 9). I attribute this to the female’s diseased state while gravid. I assumed that the spots on the eggs of the first clutch would disappear within a few days but after some slight fading, they reappeared and remained obvious throughout incu-



**Fig. 8.** The intact egg tooth is clearly visible on this hatchling Green Keelback.



**Fig. 9.** A spotted, small, and apparently unhealthy egg from the first clutch (left) and larger, white, and healthy egg from the second clutch (right).

**Table 3.** Measurements of hatchlings at birth and before release. Asterisks (\*) mark hatchlings that died before release.

Hatchling (sex)	Date/time of hatching	SVL + tail length (mm)	Midbody girth (mm)	Weight (g)	Date of ecdysis	SVL + tail length (mm)	Increase in length (mm)
B (♀)	24 March 1109 h	115 + 21	22	2.70	1 April	141 + 24	29 in 16 days
C (♀)	26 March 0230 h	120 + 24	22	3.22	1 April	138 + 24	18 in 14 days
D (♂)	26 March 1715 h	122 + 24	21	2.59	2 April	135 + 27	16 in 14 days
O (♂)	26 March 0707 h	115 + 24	21	2.33	2 April	*	—
1 (♀)	27 March 0753 h	154 + 24	22	3.51	4 April	164 + 24	10 in 13 days
2 (♀)	28 March 0108 h	152 + 26	22	3.68	3 April	162 + 30	14 in 12 days
4 (♀)	28 March 0346 h	129 + 25	20	3.54	3 April	153 + 25	24 in 12 days
5 (♀)	28 March 0255 h	151 + 27	24	3.74	3 April	162 + 27	11 in 12 days
6 (♀)	28 March 0345 h	155 + 25	24	3.66	3 April	157 + 25	2 in 12 days
7 (♂)	29 March 0430 h	155 + 25	24	3.62	*	—	—
8 (♂)	28 March 0222 h	134 + 21	23	3.49	3 April	153 + 25	23 in 12 days
9 (♀)	28 March 1415 h	151 + 27	22	3.35	3 April	156 + 27	5 in 12 days
10 (♀)	29 March 0400 h	154 + 26	22	3.40	—	162 + 28	10 in 11 days
11 (♂)	28 March 1215 h	153 + 25	22	3.38	3 April	153 + 28	3 in 12 days
12 (♀)	28 March 0121 h	153 + 25	22	3.49	—	156 + 25	3 in 12 days
13 (♀)	28 March 0400 h	154 + 26	23	3.52	3 April	162 + 31	13 in 12 days
14 (♀)	28 March 1700 h	154 + 26	23	3.51	3 April	*	—
15 (♀)	28 March 1005 h	151 + 27	24	3.24	*	—	—

bation. The eggs of the second clutch varied somewhat in size and shape. Both the initial and final slits cut in the shells made by emerging hatchlings in the second clutch were larger, although all were smaller than those of hatching Common Trinket Snakes (*Coelognathus helena*), which were 10 mm (initial slit) and 25 mm after emergence (Parmar 2017).

**Temperature and moisture during incubation.**—Early summer temperatures increased from 28–30 °C to 33 °C dur-

ing the first eight days of incubation of the first clutch and the first two days of incubation of the second clutch. At least two eggs in the first clutch were shrinking, likely due to the water loss correlated with the rising temperatures. At various times, eggs in both clutches were hypoosmotic, which resulted in shrinking eggs; hyperosmotic, which resulted in swelling; and isosmotic, the ideal condition when eggs are neither shrinking nor swelling (Fig. 10). Throughout incubation I moved

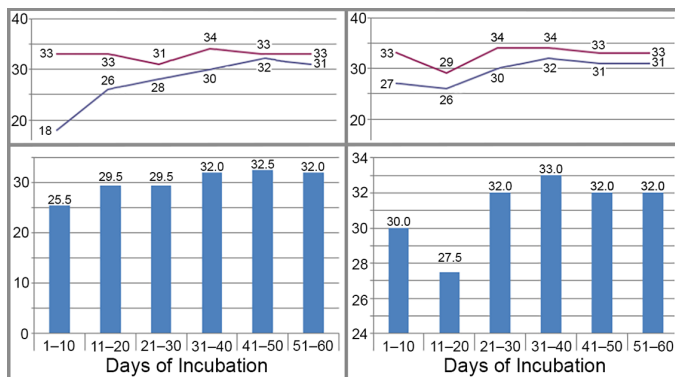


**Fig. 10.** Hypoosmotic (left), hyperosmotic (center), and isosmotic (right) Green Keelback eggs.

eggs from the incubation boxes to another small tray while slightly moistening the substrate in the incubation boxes. After returning the eggs to their respective incubation boxes, I measured temperature and relative humidity, trying to keep them at a steady 30 °C and 70%, respectively. To offset the increases in temperature, I dripped water almost every day, especially in the first clutch; when this resulted in hyperosmotic eggs, I reduced dripping to once in five days or a week.

To deal with hypoosmotic eggs, I developed a dripping method in which I made vertical cylindrical holes in the substrate with a pencil, making sure to keep the holes 3–5 mm from the bottom and evenly spaced around the perimeter of the incubation box. I then filled the holes with water and covered them with substrate. This method can be used at any temperature because it moistens the substrate and evenly hydrates the eggs. If the eggs are hypoosmotic, water can be applied more frequently; if eggs are hyperosmotic, the frequency can be reduced. Individual hypoosmotic eggs can be targeted by making additional holes around those particular eggs. Occasionally, I also sprayed or dripped water on the substrate after covering the eggs completely; subsequent to the application, I exposed the eggs using a paint brush. However, this method can be risky. If too much water is applied to eggs, it can promote fungal growth and cause the eggs to spoil.

I sometimes used cold-water dripping to effectively reduce the incubation temperature when it rose to 33–34 °C (Fig.



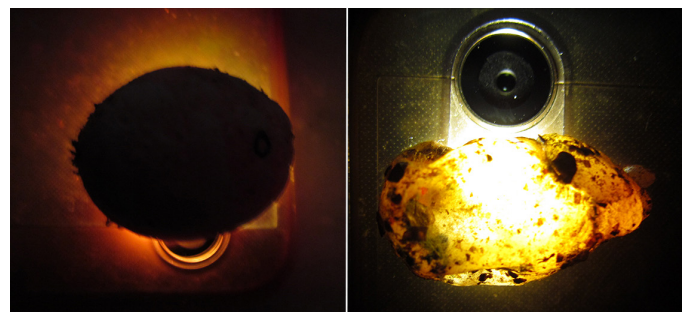
**Fig. 11.** Maximum (red lines), minimum (blue lines), and average (blue bars) temperatures (°C) for the first (left) and second (right) clutches of Green Keelback eggs during each 10-day period of incubation.

11). When I applied cold water around targeted hypoosmotic eggs, I observed recovery to essentially normal condition after about six hours. I occasionally noted the presence of a white fungus on some eggs, but it disappeared after repeated gentle cleaning with a paint brush. In each instance when I cleaned such a fungus from the eggs, they incubated successfully.

**Treating infected eggs.**—On day 12, I found a discolored (= pale yellow instead of white) egg in the first clutch and immediately moved it to another container. This is essential for preventing healthy eggs from becoming infected. On day 26, two additional eggs started shrinking and turning moldy. I continued water dripping to resist hypoosmosis and to maintain the temperature and humidity in the incubation boxes. After two days, I covered those two eggs with moistened Holy Basil or Tulsi (*Ocimum tenuiflorum*) leaves (Fig. 12). One egg recovered fully but the other did not. In addition to the Tulsi leaves, I applied turmeric powder, which also has medicinal effects and is used as an antiseptic against wounds and other infections. When that failed, I isolated the egg and sprinkled Cloxip antifungal and bacterial powder in the container to determine if it would prevent further con-



**Fig. 12.** Use of Holy Basil (= Tulsi) (*Ocimum tenuiflorum*) leaves to treat mold on developing Green Keelback eggs.



**Fig. 13.** Using the flash of a mobile phone camera to candle an opaque fertile egg from the first clutch (left) and a translucent infertile egg from the second clutch (right).

tamination. Although it reduced the foul smell of the infected egg, the egg did not survive.

**Diagnosis of fertility.**—To diagnose fertility in eggs, I used the flash of my mobile phone to candle the eggs in a dark room. Developed eggs were opaque or dark, whereas undeveloped eggs were light, transparent yellowish or pinkish red (Fig. 13). Fertility of an egg can also be determined by the presence of vibrations, but care must be taken since misleading vibrations can be induced by air movements triggered by a fan or another source.

**Morphology of hatchlings.**—Hatchlings from the two clutches differed in coloration, pattern, and size (Table 3; Fig. 14). Like the eggs, the hatchlings of the first clutch (n = 4, 2 males and 2 females, 133–146 mm total length) were smaller than those of the second clutch (n = 14, 3 males and 11 females, 154–180 mm total length). The largest hatchling exceeded all previously reported sizes (Daniel 1983; Whitaker and Captain 2004, 2008). Increases in length subsequent to emergence varied considerably, ranging from 2 mm to 24 mm after 12 days.

One hatchling in the first clutch exhibited breathing problems like its mother while it was still in egg (Fig. 15); it survived for only a few days. Many hatchlings from the first clutch were



**Fig. 15.** One hatchling in the first clutch exhibited breathing problems like its mother while it was still in egg; it survived for only a few days.

fully developed but did hatch or hatched only with assistance, whereas all of the hatchlings in the second clutch emerged naturally. As for the size and color of the eggs, I attribute these differences to the first female's diseased state while gravid.

Differences in color and pattern were certainly genetic. Hatchlings from the first clutch were light to bright green with prominent black transverse bands on the body and 4–6 white dots or small streaks and a few scattered black patches between the bands; the venters were glossy black or black with white posterior edges. Hatchlings from the second clutch were dark green or bottle green with fewer indistinct white dots or streaks that usually were limited to the interspaces between the first four black bands on the anterior body; venters were white to gray with traces of black (Fig. 16). Prior to ecdysis, hatchlings of both clutches were dull green dorsally and gray ventrally.

**Feeding adults and hatchlings.**—After ovipositioning, I offered frogs (*Fejervarya* sp.) to both females and both hunted actively. At that time, the first female was attacking anything that moved, so I offered her a gecko (*Hemidactylus* sp.), which she initially ignored, but after some time, she pursued it and ate its tail (Fig. 17). When the snake did not consume the gecko, I released it.



**Fig. 14.** A comparison of hatchlings from the first (right) and second (left) clutches of Green Keelback eggs.



**Fig. 16.** Ventral views of hatchlings from the first clutch (left and center) and from the second clutch (right).



**Fig. 17.** When offered a gecko (*Hemidactylus* sp.), the first female ate only the tail.

I offered small Cricket Frogs (*Fejervarya* sp.) to the hatchlings but they ignored them. I then offered egg yolk mixed with water, which they drank (Fig. 18). I fed them in the morning and again in the evening, placing them individually on the edge of a bowl with the yolk-and-water mixture. Subsequently, I placed them in water and removed any sticky yolk from their bodies. Hatchlings that did not feed actively during these feedings died.

**Behavior.**—Both adults and hatchlings rub both sides of their mouths on the ground after drinking water or consuming a frog (Fig. 19). When drinking, these snakes appear to hold water in the oral cavity for some time before swallowing it. I also observed this when hatchlings were drinking the yolk-and-water mixture. If hatchlings were handled before



**Fig. 18.** Hatchling Green Keelback drinking an egg yolk and water mixture.



**Fig. 19.** An adult and a hatchling Green Keelback rubbing their mouths on the substrate after consuming a frog or drinking.



**Fig. 20.** An adult Green Keelback swallowing frogs (*Fejervarya* sp.) immobilized by toxic saliva. Snakes made no effort to swallow prey headfirst or right side up.

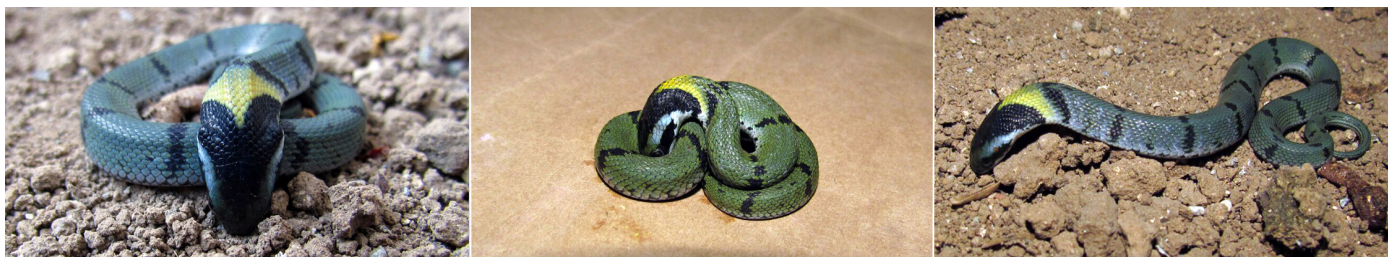
completely swallowing either yolk or water, they immediately voided the consumed liquid. However, they did not regurgitate fully swallowed fluids in response to handling, suggesting that the expulsion of liquids might serve some other purpose.

When feeding, snakes sometimes held and immobilized frogs with toxic saliva but also ate frogs without subduing them, holding them in the throat while frogs squealed. Daniel (1983) had noted the latter behavior in Checkered Keelbacks (*Xenochrophis piscator*). Snakes made no effort to swallow prey headfirst or right side up (Fig. 20).

When threatened, both adults and hatchlings flattened their necks and displayed cobra-like hoods. Many snakes are known to employ such tactics. I also saw hatchlings elevating the anterior part of their bodies and touching their snouts to the ground or within a coil of their bodies (Fig. 21). This behavior might serve a dual purpose, hiding the head to protect it from injury if attacked or displaying the bright yellow nuchal chevron as a warning. When they feel safe, they slip away, but immediately repeat the performance if they feel threatened again. To the best of my knowledge, this is the first time this behavior has been observed in any species of snake in Gujarat.

**Releasing snakes.**—I always kept hatchlings isolated in clearly labeled plastic bottles. After data were collected at hatching and on the day of release (Table 3), I released hatchlings into suitable habitat near a lake in the Surat District





**Fig. 21.** Hatchlings elevating the anterior part of their bodies and touching their snouts to the ground or within a coil of their bodies. This behavior might serve a dual purpose, hiding the head to protect it from injury if attacked or displaying the bright yellow nuchal chevron as a warning.



**Fig. 22.** A hatchling one day after release into a marshy area. The telltale bulge indicates that it had fed since its release.



**Fig. 23.** Releasing the adults into suitable habitat in The Dangs District. Photograph by Jaydip R. Vasava.

on 9 April at 2130 h. On subsequent days we found several released hatchlings, often in very close proximity to the release

site. One hatchling had a telltale bulge (Fig. 22) indicating that it had fed since released. It was active and raised its hood when approached. The adults were released at 2244 h on 28 April into favorable habitat of The Dangs District (Fig. 23).

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