

ON A STRANGE ESCAPE BEHAVIOUR SHOWN BY COMMON PAKISTANI TOAD *BUFO STOMATICUS* TO AN OPHIDIAN PREDATOR

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During 1985-86, on different occasions snakes like *Eryx johnii*, *Amphiesma stolata* and *Bungarus caeruleus* have been kept in a wooden terrarium (48 × 30 × 30cm) with wire gauzed sides, in our laboratory. A 5 cm deep layer of loose sand was provided as substratum. Water was provided in a glass dish.

Common Pakistani toad *Bufo stomaticus* is included in the diet of these snakes in nature (personal observations). These snakes were kept for variable periods and all were provided with live toads as food. This led to present record of interesting behaviour of the toads to the captive snakes. First snake which was kept was *Amphiesma stolata*. A pair of toads, s.-v. length 68mm, were released in the terrarium. On the next morning there was no sign of toads in the terrarium, neither the uniform diameter of the snake (an adult female, s.-v. length 520mm and tail length 89mm) indicated that the toads have been preyed upon by the snake. As a last resort, the sandy substratum was disturbed, and both toads hopped out of it! Obviously, they had burried themselves in the loose sand. The snake was lying coiled in the left front corner of the terrarium. It was disturbed by the operation, so began to move towards right corner along the front gauzed side of the terrarium. Both toads disregarded the observer and orientate themselves towards the moving snake, at the same time posterior part of their bodies and feet working sideways

in quick movements, displacing the sand towards side. Within next second posterior half of their body was under the sand. By this time, the snake has moved to the level of the heads of the toads and with a strong lateral flip of the legs both toads were under the sand. Except their eyes nothing was to be seen on the surface of the sand. As the posterior part of the snake trailed passed them, with the lateral jerk of the head the eyes were also covered with a layer of sand. On third day, the snake was able to take one of the toads.

It was later observed that toads remained burried when the snake was active. After 15 to 30 minutes that the snake has settled, the toads begin to show themselves and within seconds are out and hopping here and there not minding the immobile snakes. The movements of the part of the snake will drive them again into the sandy refuge. Toads when emerge are quite etiolated and dry, apparently much of the moisture of their skin is lost in the dry sand. They readily climbed into the water dish and squat in water, a habit noted by Khan (1976) exhibited by the toads during dry hot season.

Similar sand-sinking behaviour was exhibited by the toads in the presence of *Eryx johnii* and *Bungarus caeruleus*.

Summary of escape behaviour of Bufo stomaticus in the terrarium, in the presence of a snake

A. Terrarium without snake:

Toad hops here and there, apparently in search of an outlet, resting now and then, and squatting in the water dish.

B. Terrarium with a snake:

i) Snake resting

Toad reacts normally to the terrarium atmosphere, disregarding the immobile snake. In this effort often touching the body of immobile snake.

ii) Snake moving

a. Toad freezes, with head directed towards the moving snake.

b. With quick sideway movements of feet and hind part of the body, the sand is pushed away and posterior part of the toad gradually sinks down until only head top is visible.

c. If the snake continues to move on, the head is covered by a thin layer of sand by a lateral jerk of head. The toad is completely under the sand.

iii) Snake comes to rest

a. Head top of toad is exposed, gradually the whole toad is out of its sandy burial.

b. It hops here and there, then climbs the water dish and squat in it.

Vision is primary sense in toads for detection of prey and predator (Heatwole and Heatwole, 1968; Brehm, 1876; Honigmann, 1944; Kuhn, 1919; Eibl-Eibesfeldt, 1951; Schneider, 1954). However, visual guided prey catching behaviour of toads and frogs is a fixed action pattern released by certain complex stimuli (Ewert, 1976; Ingle, 1976). Prey, non-prey and predator are distinguishable mainly according to size and configuration (Ewert, 1976). Ewert et al. (1983) have shown that prey catching as well as predator avoiding sequence is controlled by a multiple action system involving complex sensory and motor activity. Depending on size and shape of

the predator, toad shows different kind of avoidance reactions like raising the body, running, abrupt jumping awkwardly, ducking, sudden turning away, stiff-legged posture, puffing up, presenting head-top with parotoid glands, discharge of disagreeable odors, release of urinary bladder water, body tilting and side stepping, heavy breathing (Ewert and Rehn, 1969; Ewert and Traud, 1979; Noble, 1931; Holmes, 1908; Ratner, 1967).

Present authors have no access to all the literature listed by Dodd (1976), however literature available to us do not record sand burrowing as predator avoiding mechanism in toads. Toads are highly terrestrial, going in water only during breeding period for short time. Noxious secreting glands are present all over the body, these and presence of warts, spines and pustules have made *Bufo stomaticus* highly unpalatable to the local birds and mammals, except its ophidian predators. However, freezing and sand or possibly loose soil burrowing habit help this animal to avoid the latter.

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要 約

捕食者であるヘビに対するパキスタンのヒキガエル *Bufo stomaticus* の退避行動について

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パキスタンのヒキガエル, *Bufo stomaticus* は自然界においても飼育下でも, ブラウンスナボア *Eryx johnii*, キスジクサヘビ *Amphiesma stolata*, インドアマガサヘビ *Bungarus caeruleus* の餌の一部になっているが, 飼育下においてこれらのヘビが近づくと, 砂に潜って隠れる行動を示した。ヘビが動かないしていると平気で砂から出て動き回るので, これは捕食者に対する退避行動と思われる。

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