

~~LITERATURE CITED~~

- ~~Ayala, S. C. 1971. Lizard malaria in California; description of a strain of *Plasmodium mexicanum*, and biogeography of lizard malaria in Western North America. J. Parasit. 56:417-425.~~
- ~~Savage, J. M. 1960. Evolution of a peninsular herpetofauna. Syst. Zool. 9:184-212.~~
- ~~Smith, H. M. 1939. The Mexican and Central American lizards of the genus *Sceloporus*. Field Mus. Nat. Hist. Zool. Ser. 26:1-397.~~
- ~~Stebbins, R. C. 1966. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Co., Boston, Massachusetts. 279 pp.~~
- ~~Thompson, P. E. and C. G. Huff. 1944. Saurian malarial parasites of the United States and Mexico. J. Inf. Dis. 74:68-79.~~

~~ELLIS C. GREINER, Department of Zoology and Entomology, Iowa State University, Ames, Iowa 50010 and PIERRE M. DAGGETT, Department of Zoology, University of Nebraska-Lincoln, Lincoln, Nebraska 68508.~~

~~1973 JOURNAL OF HERPETOLOGY 7(3): 303-304~~

COMMENTS ON TENTACLE STRUCTURE AND FUNCTION IN *ERPETON TENTACULATUM* (SERPENTES: COLUBRIDAE)

The unusual paired cylindrical tentacles of *Erpeton tentaculatum* Lacépede with unknown structure and function have long been of interest to herpetologists. *E. tentaculatum* are totally aquatic fish-eaters, live in sluggish or still fresh or brackish water in the Indochina area, and are ovo-viviparous, having from 7 to 13 young in a brood (Shaw, 1965). Morice (1875) asserted that this snake feeds on the aquatic plant *Jussiaea repens*. Phillips (1968) also reported a specimen that defecated the remains of an unknown water plant with closely rolled leaves, and attributed this to accidental ingestion. There is no modification of either the teeth or digestive tract for a vegetarian diet, nor is there any other species of snake known to intentionally ingest plants.

Several possible functions of the tentacles have been proposed. Günther (1864), Morice (1875), and Hopley (1882) suggested that they might serve as special sense organs for detecting food underwater and in mud. Smith (1943), Parker (1963), and Bellairs (1970) postulated that the tentacles may be used as a lure for fish, thus one of the common names "The Fishing Snake". Shaw (1965) thought that the tentacle enhanced the camouflage effect of the snake among the subsurface roots, twigs, and branches in its natural habitat, or that it is simply decorative with no real use.

A live adult Tentacled Snake, measuring 522 mm total length, was purchased and observed during May through August of 1966. The snake was kept in a 10 gallon aquarium with a variety of small fishes native to Louisiana. Most of its time was spent in a straight, rigid pose, its prehensile tail wrapped around vegetation or rocks, and its head most often near the surface of the water. The level of the water determined the position of the animal; the greater the depth, the more perpendicular to the surface the snake rose, until it appeared to be "standing on its tail". Considering the pattern of longitudinal alternating shades of brown, white and yellow stripes extending the length of the body, and the stiff, vertical pose of the snake, it might easily be mistaken for a reed, root, or other aquatic vegetation.

Although the snake was observed frequently, no fish was ever seen nibbling on, or otherwise attracted to the tentacles which floated freely in front of the snout. Nor was any fish observed being captured, although many were eaten. Campden-Main (1970) kept Vietnamese specimens in captivity for over two years on a diet of fish, but made no mention of the tentacles serving as lures. Shaw (1965) also kept a number of specimens several years, and doubted the tentacles were ever used as fish lures. Phillips (1968) offers the only description of the feeding of this snake, but does not mention luring. When the head of my specimen was projected above the surface of the water the tentacles would lie flaccid along either side of the

snout. Bellairs (1960) stated that "the paired 'proboscis' is extended or retracted like a worm", and Parker (1963) stated that the tentacles are "muscular and can be agitated to act as decoys for unwary fish". Pope (1955:159), Gyi (1970) and Goin and Goin (1962) also mentioned their motility. These statements are incorrect as will be shown. My specimen was incapable of any such independent movement of the tentacles, and even failed to respond to taps or pinches to the appendages. Shaw (1965) also failed to observe any voluntary movement of the tentacles.

In *Erpeton*, the tentacles are the same shade of brown as the snout, and much of the rest of the body. In other reptiles that definitely do use lures, there are always two common factors present: independent voluntary motility of the appendage, and bright coloration of the lure, which sharply contrasts with duller colored surrounding tissue. Juvenile *Agkistrodon bilineatus*, *A. contortrix*, *A. hypnale*, *A. piscivorus*, *Vipera russelli*, *Crotalus lepidus klauberi*, and adult *Bothrops bilineatus* use their brightly colored tail tip with a worm-like wiggling to successfully lure frogs and lizards into striking range (Neill, 1960; Greene and Campbell, 1972; Burger and Smith, 1950). Birdsnakes (*Thelotornis*) may use insect-like movements of their black-tipped, bright red or orange tongues to lure small birds and lizards (Fitzsimons, 1962). The Madagascan snake genus *Langaha* also has a single projection from the snout, at least superficially similar in structure to the tentacles of *Erpeton*. These structures probably aid the animals as camouflage, but may serve as sexual ornaments, as there is sexual dimorphism in the shape and size of the tentacle (Bellairs, 1970). There is no difference in the coloration of the tentacle and that of the head. Hopley (1882) suggests that the nasal appendage of *Langaha* and other snakes with similar structures are sensitive and in nocturnal species "act as a sort of herald in the dark, like a cat's whiskers".

My specimen of *Erpeton* was preserved and the tentacles removed for microscopic examination. Serial longitudinal and cross sections were prepared and stained with hematoxylin-eosin. The histology of the tentacles provides some negative evidence as to their function.

The proximal scales overlap those more distal to the snout, and the tentacle terminates in a small, rough, scaleless area. The outer surface of the scales consists of simple columnar epithelium, thinning to cuboidal epithelium on the inner surface. In both cell types the nuclei are situated basally. The apical surface of the scale is covered by a moderate layer of keratin. The basal surface of epithelium abuts a poorly vascularized loose (areolar) connective tissue bed, which completely fills the interior of the tentacle. There is a thin tissue layer adjoining the epithelium, consisting almost entirely of collagenous (white) fibers with little intercellular substance and a few elongate fusiform fibrocytes. Toward the interior the areolar connective tissue has more cellular elements, much more intercellular substance, and fewer collagenous fibers. No elastic fibers are present nor is smooth or striated muscle tissue present in the tentacle, even at the base. Capillaries are sparsely distributed in the tentacle. No apparent nerves, specialized nervous tissue, or sense organs were found. Individual cell types occurring in the interior areolar tissue consist primarily of elongate fusiform fibrocytes, a few fibroblasts, and a number of elongate melanophores and xanthophores, the last of which are more abundant in the peripheral areas of the loose connective tissue. A few macrophages, an occasional lymphocyte, and tissue eosinophiles are also present. Fat and mast cells are absent.

Conclusions: (1) the tentacles have no major sensory function, if indeed they have any innervation at all; (2) the tentacle, lacking the musculature for independent movement, and bright coloration, probably does not serve as a lure; (3) the branch-like tentacles, together with the peculiar rigid pose and reedlike coloration of the snake, probably serves to make the camouflage more effective, which is the chief function of the appendages.

I thank Dr. Larry D. Wilson for reading the manuscript and offering many helpful suggestions.

LITERATURE CITED

- Bellairs, A. 1960. Reptiles: Life history, evolution, and structure. Harper & Brothers, New York, p. 178.
 ————. 1970. The life of reptiles. Universe Books, New York, pp. 315-16.

- Burger, W. L. and P. W. Smith. 1950. The coloration of the tail tip of young fer-de-lances: sexual dimorphism rather than adaptive coloration. *Science* 112 (2911):431-433.
- Campden-Main, S. M. 1970. A field guide to the snakes of South Vietnam. Washington, D. C.: Smithsonian Instit. p. 79.
- Fitzsimons, V. F. M. 1962. Snakes of Southern Africa. Purnell and Sons, Capetown, p. 204.
- Goin, C. J. and O. B. Goin. 1962. Introduction to herpetology. W. H. Freeman and Co. San Francisco, p. 300.
- Greene, H. W. and J. A. Campbell. 1972. Notes on the use of caudal lures by arboreal green pit vipers. *Herpetologica* 28(1):32-34.
- Günther, A. C. L. G. 1864. The reptiles of British India. Ray Society, London, p. 289.
- Gyi, K. K. 1970. A revision of colubrid snakes of the subfamily Homalopsinae. *Univ. Kansas Pub. Mus. Nat. Hist.* 20(2):47-223.
- Hopley, C. C. 1882. Snakes: curiosities and wonders of serpent life. Griffith and Farran, London, pp. 325-26.
- Morice, A. 1875. Sur les habitudes d'un remarquable serpent de la Cochinchine: l'*Herpeton tentaculatum*. *Annales des Sciences Naturelles* 6(5):128-129.
- Neill, W. T. 1960. The caudal lure of various juvenile snakes. *Quart. J. Florida Acad. Sci.* 23:173-200.
- Parker, H. W. 1963. Snakes. Robert Hale Ltd., London, p. 75.
- Phillips, C. 1968. Some unusual aquatic snakes. *Erpeton* 68(1):11-15.
- Pope, C. H. 1955. The reptile world. A natural history of the snakes, lizards, turtles and crocodilians. Alfred A. Knopf, New York.
- Shaw, C. E. 1965. Tentacled fishing snake. *Zoonooz.* 38(8):3-5
- Smith, M. A. 1943. The fauna of British India, Reptilia and Amphibia, Vol. 3, Serpentes. Taylor and Francis, London, p. 402.

DONALD E. HAHN, Laboratory, Marcus J. Lawrence Memorial Hospital, Cottonwood, Arizona 86326.

1973 JOURNAL OF HERPETOLOGY 7(3): 304-306

~~NOTES ON AN UPPER AMAZONIAN CORAL SNAKE, *MICRURUS PUTUMAYENSIS* LANCINI~~

~~Lancini (1962) described *Micrurus putumayensis* on the basis of a single female specimen from Puerto Socorro, Rio Putumayo, Amazonian Peru. Medem (1969) recorded another specimen from the Rio Putumayo basin, but did not give further data on it. It appears that no other specimens have been described, other than the holotype.~~

~~In the course of continuing studies of the local herpetofauna in Amazonian Peru, 3 males and one female *Micrurus putumayensis* were taken near the village of Centro Union, Rio Aucayo, approximately 20 km SE of Iquitos, Department of Loreto, Peru. All 4 were found on ground litter and among ground vegetation in a closed-canopy forest situation, in the day-time. Since no previous descriptions of males exist, they are described in detail below.~~

~~Body shape cylindrical; head only slightly wider than neck, with normal set of head shields; tail relatively long (15.4 per cent of total length), tapering and pointed distally, but somewhat constricted basally and markedly swollen medially, giving it a bulbous appearance. LEPIDOSIS: Rostral a little wider than high; frontal longer than prefrontals and much wider than supraoculars; parietals longer than frontal, but shorter than their distance to snout; one pre- and two postoculars; temporals 1 + 1 (no. 1348 has the right post temporal divided horizontally); supralabials 7(3,4); infralabials 7(4); mental separated from first pair of chin shields by first pair of infralabials; posterior pair of chin shields longer than anterior pair; dorsal scales in 15 rows throughout; ventrals 197 to 204, preceded by 3 median gulars; subcaudals 47 to 50, all paired, except in no. 1348 that has 15 single scales; anal plate divided; no supra-anal tubercles. COLOR PATTERN: A black cap extends from snout to posterior end of the parietals, postoculars and 4th labials. This is followed by a yellow occipital-nuchal band, that is bounded posteriorly by the first black body band, 4 scales behind the parietals. The yellow scales are heavily black-pigmented. The infracephalic scales are mainly black, except 3 or 4 of the last labials and the gulars that are yellow with heavy, black pigmentation. There are 10 to 13 black bands on the body and tail, alternating with yellow bands; all forming complete rings,~~