

III. NOTES ON SOME SOUTH INDIAN BATRACHIA

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I. The Larvae of *Microhyla rubra* and *Rana breviceps*.

These tadpoles have been described by Mr. H. S. Ferguson, F.L.S., late Director of the Trevandrum Museum, in his paper on "A List of Travancore Batrachians," published in the *Journal of the Bombay Natural History Society* (Vol. XV, p. 499). I am of opinion that Mr. Ferguson has mixed up the larvae of *M. rubra* with those of the allied species *M. ornata*, and there is considerable difference between his account of the tadpoles of *R. breviceps* and the specimens I have collected. These facts sufficiently justify the publication of the following notes, in which I purpose to describe the specimens in full and at the end indicate the chief points wherein I differ. I might add here that examples of all these larvae have been sent to Dr. N. Annandale whom I have to thank for examining them.

Larva of *M. rubra*.

H. S. Ferguson, *J.B.N.H.S.*, Vol. XV, 1904, p.506; Boulenger, *Fauna*, p. 491.

Towards the middle of July, a few specimens of this tadpole were obtained at Bangalore from a pond in which rain water had collected. Other tadpoles found in their company were those of *M. ornata*, *R. breviceps* and *Rhacophorus maculatus*. The tadpoles were allowed to complete their metamorphosis in the college aquarium. They may be described as follows:—

The head and body.—Head depressed and almost flat, snout broadly rounded but not squarish. Both dorsal and ventral surfaces of trunk flat. In horizontal section, the body is nearly elliptical. Skin smooth.

Eye and nostril.—Nostrils nearer to the snout than the eyes, and are dorsal. The inter-orbital space nearly six times the inter-nasal. Eyes lateral, visible from below and by no means prominent. Pupil round. (It is vertical in the adult).

Mouth.—Very small, nearly terminal or dorsal; broadly triangular or nearly oval. Upper lip better developed, with a horny edge. Beaks, horny teeth and papillae absent.

Sensory glands and pits.—A conspicuous white glandular area, somewhat dome-shaped, just behind the mouth or between the nostrils. A number of sensory pits round the mouth, especially

about the corners. A fine white glandular streak from nostrils to the outer angle of the eyes, extending along the sides of the body. In a few specimens a similar dorso-median streak is occasionally present.

Spiracle.—Situated in the midventral line, large and broadly "Λ"-shaped, opening directed backwards and is far from the snout. Behind, another pore involved in the lower caudal crest is present, marked abdominal pore in figure B. There is reason to suppose this to represent a secondary spiracle. Water comes out in two streams as may be experimented with carmine solution.

Vent.—Slightly sinistral, inconspicuous, covered over by the lower tail lobe.

Tail.—Muscular portion thick at the root and ends in a very

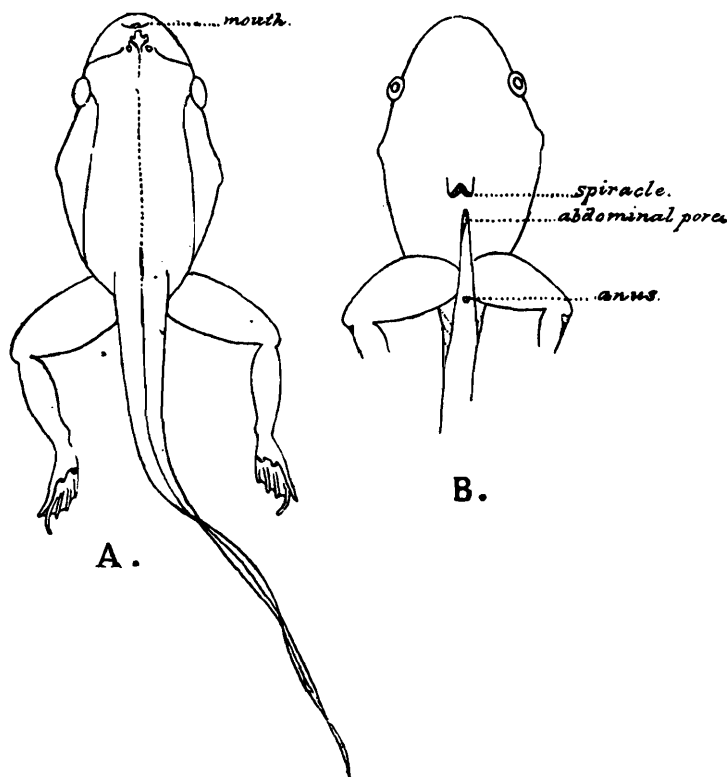


FIG. 1.—Tadpoles of *Microhyla rubra*.
A. Dorsal view. B. Ventral view.

fine flagellum. At the greatest width, i.e. between the thighs, the ventral crest is more than four times the upper membrane. The former begins behind the spiracle and surrounds the second pore. The lobes are delicate and transparent.

Colour.—Live specimens are olive above, beautifully marbled. Spirit specimens do not, however, show this delicate scheme of colour. Following the glandular line of the head and body, is a dark band which throws it in relief. Limbs barred. A brown band across the thighs. Abdomen immaculate, occasionally the throat is bronzed.

Dimensions.—The following are the average measurements of four tadpoles with well-developed hind limbs:—

Total length	40 mm.
Length of head and body	15 mm.
Maximum width of body	9 mm.
Do. depth do.	7 mm.
Do. do. tail	9 mm.

Biological.—The period occupied by development in the aquarium is roughly twenty days, and it must also represent the time taken in nature. *Microhyla* like the other genera of the family Engystomatidae spawns in localities which dry up very soon, and the tadpoles are also otherwise exposed to attacks by ducks and geese. Rapid metamorphosis is apparently a provision, in the case of these thoroughly terrestrial forms, for the preservation of the species.

The larvae float on the surface and the highly contractile mouth is a character which they share in common with the other species, *M. ornata*, noticed by Capt. S. S. Flower and Mr. Ferguson. The food of the tadpoles consists of small micro-organisms such as water fleas, Infusoria and Rotifers. The fine flagellum at the end of the tail is kept lashing the water. As soon as the forelimbs develop, the larvae leave the water and squat on the stones in the aquarium, and if these are removed they easily perish. The metatarsal tubercles are well-developed and the baby frogs with short stumpy tails use them in burrowing. The web which completely invests the toes in the larval stage atrophies when the tadpoles leave the water.

Points of Difference.

I shall next proceed to enumerate briefly the points in which I differ from Mr. Ferguson.

(1) He remarks that the nostrils are nearer the eye than the end of snout.

I make out in my specimens that the converse is true; the distance between the eye and the nostril is at least $1\frac{1}{2}$ mm. greater than that between the nostrils and snout.

(2) The spiraculum is described by him as being directed *downwards* and backwards.

I notice that the spiracle is directed *downwards* and backwards in the larvae of *M. ornata* in which the abdomen is laterally compressed; while in *M. rubra*, the body being dorso-ventrally depressed, the spiraculum opens backwards as a rule.

(3) Again Mr. Ferguson observes that the spiraculum is close to the anus which also opens in middle line in the lower edge of the subcaudal crest.

It is obvious that he mistakes the abdominal pore for the anus which for anatomical reasons cannot occupy that position. The anus, however, is normal in position between the hind legs and is slightly sinistral.

(4) In describing the colour, Mr. Ferguson observes that in life the body is almost transparent.

I am perfectly certain that the tadpoles of *M. rubra* are opaque while the transparent character of the larvae of *M. ornata* is noticed by Capt. S. S. Flower and Mr. A. L. Butler.

(5) Further down Mr. Ferguson notices that the dark marks form a more or less diamond-shaped figure on the back.

This is again a feature characteristic of the tadpoles of *M. ornata* and not met with in the allied form, viz. *M. rubra*. In the former species, if we follow the progress of metamorphosis, we may notice the diamond-shaped figure developing in the adult into "a large dark marking on the back, beginning between the eyes and widening as it extends to the hind part of the body." Boulenger (*Fauna*, p. 412).

Habits of the Adult.

This frog does not appear to extend into the Malay Peninsula as may be judged from Mr. A. L. Butler's account of the batrachians of that region (*J.B.N.H.S.*, Vol. XV, p. 387), nor does it occur in such abundance as the other little frog *M. ornata*. It is a deep digger as is evidenced by the presence of two powerfully developed metatarsal tubercles, and I have myself obtained specimens nearly two feet from the surface. The frog does not come out of the burrow during the hot weather and only a very heavy shower of rain, an inch and a half or two, can induce it to leave its hiding place. During the breeding season which in Madras comes off between November and January, and in Bangalore between June and September, the batrachian generally remains on the surface hiding by day under stones, flower pots or in hedges and coming out to feed or spawn by night. The frogs are very good jumpers, but if kept long in water show signs of distress. They feed voraciously on young termites and can stand captivity well. The call notes resemble the shrill chirping of a tree cricket from which they however differ in being an interrupted cry. It is by no means difficult to distinguish the cry of this species in the general babel of amphibian voices that ensue a heavy shower of rain in the night.

Larva of *R. breviceps*.

H. S. Ferguson, *J.B.N.H.S.*, Vol. XV, 1904, p. 502; Boulenger, *Fauna*, p. 451.

These tadpoles were taken in conjunction with the larvae of *M. rubra* and were reared in the college aquarium. They differ from Mr. Ferguson's account in so many particulars that I have no doubt that he is describing some other species. My specimens may be described thus:—

The head and body.—Body short and oval. Dorsal and ventral surfaces moderately flat or slightly arched. Snout obtuse or

rounded. Length of body about one and a half times the breadth. Mouth ventral.

Nostril and eye.—Small, not prominent, nostrils dorsal, nearer to eyes than to mouth. The inter-orbital space is slightly more than twice the distance between the nostrils. Eyes dorso-lateral.

Mouth.—Ventral, small. Lower lip better developed and directed forwards. Both lips are bare of papillae, which, however, are large and are aggregated in two or three rows in the corners of the mouth. Occasionally in a few cases a small ovoid gland may be present in the same region. Beaks horny and not powerful; both finely serrated; lower jaw broadly V-shaped and the upper crescentic. Dental formula, 1 : 1/3.

Sensory pits and glands.—Occur generally scattered on the head. A fine row of whitish glands from the eyes to the tympanum. A dorso-median streak sometimes found.

Spiracle.—Tubular, sinistral, pointing upwards and slightly backwards; a fairly circular opening; somewhat low on the side, nearer to eye than to root of tail.

Vent.—Also sinistral, a fairly prominent tube.

Tail.—Tip not pointed; dorsal lobe beginning much behind the root of legs, is strongly arched. The ventral poorly developed, the outer margin of which is almost parallel to the long axis of the muscular portion. The greatest depth of tail is $\frac{1}{5}$ of the total length, and at this part the lower membrane is only $\frac{1}{3}$ of the upper. Muscular portion strongly developed.

Skin and colouration.—Skin either granular or warty with strongly developed tubercles. Dorsal surface deep grey with broadly V-shaped dark mark between the eyes, and M-shaped, sometimes broken, marks on the back. Ventral surface whitish and sides finely dotted in a few specimens. The muscular portion and lobes and tail deeply blotched. Limbs barred.

Limbs.—Short, toes poorly webbed at the base. The metatarsal tubercle well-developed, about the size of the first toe. Subarticular tubercles well formed.

Dimensions.—A fully grown tadpole measures as follows:—

Total length	50 mm.
Length of body	20 mm.
,, ,, tail	30 mm.
Maximum breadth of body	13 mm.
,, depth ,, ,,	9 mm.
,, ,, ,, tail	8 mm.

Biological.—The time occupied by the development of this frog is almost the same as that taken by the other burrowing types, viz. 18 to 20 days. I have noticed that these larvae remain at the bottom of the aquarium, occasionally coming to the surface to breathe air. When disturbed, they would move on their legs, rather than swim. They were fed on weeds and also on dead tadpoles. Foul water is death to them. Like the larvae of other

Engystomatidae, they leave the water as soon as the front limbs sprout.

Points of Difference.

The particulars in which the above description differs from Mr. Ferguson's may be briefly indicated below.

(1) He states at page 502 of the journal cited above, that the length of the body is one and three quarters its breadth.

I have measured ten full-grown specimens and I find the average ratio of length to breadth is as 15 : 10 mm, in other words the length is one and a half times the breadth.

(2) Further he describes that the distance between the eyes is one and a quarter that between the nostrils and is equal to the width of the mouth.

In measuring the same ten specimens, I find that the inter-orbital space is more than twice the internasal, and is one and two-thirds of the width of the mouth.

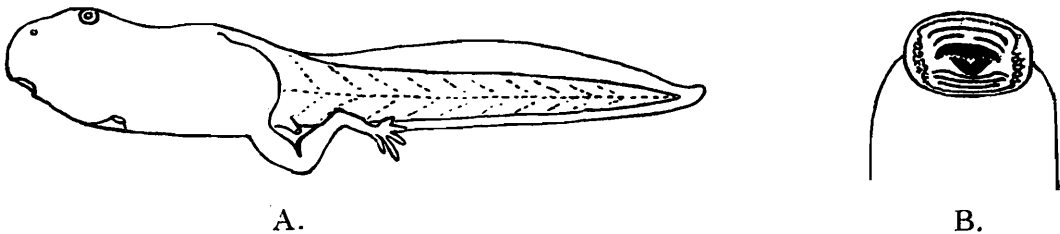


FIG. 2.—Tadpoles of *Rana breviceps*.
A. Lateral view. B. mouth.

(3) Mr. Ferguson states in regard to the spiraculum that it is visible above and below.

In all my specimens the spiracle is so low on the side that it is visible from neither view.

(4) He makes out that the anal opening is on the middle line.

All the adult tadpoles in my collection possess a sinistral vent.

(5) The tail is described in the Travancore specimens as being acutely pointed.

Almost all the specimens in my collection show a rounded tip.

(6) In the description of mouth parts, Mr. Ferguson states that the upper mandible has a blunt tooth-like prominence and that the outermost row of teeth on the lower lip is less than half the length of the middle row which again is shorter than the upper.

The prominence spoken of, perhaps such as is met with in the larva of *R. tigrina*, is not discoverable and as regards

the rows of horny teeth, the first two rows are nearly equal, while the third is only slightly shorter than either the first or the second.

(7) The total length of Mr. Ferguson's specimens is 41 mm.

The maximum length of my specimens exceeds this by at least 9 mm.

Habits of the Adult.

The adult frog is thoroughly terrestrial and the burrowing habits have produced an external appearance not unlike that of *Cacopus systoma*: a rounded snout, small mouth, a stout body, short hind limbs, a powerful metatarsal tubercle and very slight web. It leads a solitary life and congregates only during the pairing season. A light vertebral line is present in most specimens and its occurrence is purely arbitrary. It is not one of the concert-giving frogs like *R. cyanophlyctis* and the call notes may be expressed by the short syllables "Rut-Rut-Rut," uttered in quick succession. The batrachian is entirely nocturnal in its habits and young frogs stand captivity much better than adult examples.

II. II The Distribution and Habits of *Bufo fergusonii*.

This little toad has been described by Dr. G. A. Boulenger, (*J.B.N.H.S.*, Vol. VII, p. 317).

In the article quoted above (*viz.* "A list of Travancore Batrachians"), Mr. Ferguson makes the following remark in the opening lines: "There have been so far thirty-four species of Batrachians described as occurring in Travancore, three of which have not been found elsewhere as yet. They are *Rana aurantiaca*, *Ixalus travancoricus* and *Bufo fergusonii*" (*J.B.N.H.S.*, Vol. XV, 1904, p. 499).

I have no doubt that this species of *Bufo* enjoys a much wider distribution. In 1903, two specimens were taken in the compound of the then residence of Dr. William Miller in Nungambakam, Madras; one of which was sent to Dr. G. A. Boulenger, who in acknowledging receipt of the toad, mentions that it is also known from Ceylon. Since then specimens have been obtained from S. Malabar and the outlying districts of Mysore. It is possible that the little toad may be found in North India, though, however, its occurrence is not yet reported.¹

The following is a short account of the observations made on the habits of this animal. It is entirely nocturnal and does not appear to occur in any large numbers and is certainly one of the rare toads. When given loose earth, it burrows with great ease. It feeds almost exclusively on termites. It does not touch black ants, smaller beetles and earthworms which form the staple

¹ I think that this toad is replaced in Northern India by *B. stomaticus*, Lütken.—*N. A.*

food of the bigger toads like *B. melanostictus*. Walking is the normal mode of progression and it can also run, especially if quarry is sighted at a distance. When the animal walks, the body is lifted from the ground, but is still underhung from the limbs, and the movement has all the awkwardness of a *Calotes*, which arises from the inequalities of the limbs. In trying to take a wider range of view of the surroundings, the body is supported on the four legs and the animal may move in that condition somewhat mammal-wise. In running the head is kept low. When left on the table it gently crawls round the edge (body almost touching the surface) measuring the height, and prefers to remain quiet in the centre to performing the heroic feat of jumping off. Even if pressed under the arm pit, it does not utter the plaintive metallic cry characteristic of the common toad. When held, it does not struggle to escape, but will remain quiet and even pick up white ants from off one's hand. If thrown in water, especially if it is deep, it darts here and there and then is easily drowned if not rescued in time.

