

DESCRIPTIONS OF INDIAN AND INDO-CHINESE TADPOLES.

By MALCOLM A. SMITH, *F.Z.S.*

(Plate VII).

Among a small collection of batrachians recently submitted to me by Dr. Nelson Annandale for determination are the tadpoles of two species as yet undescribed. Thanks to him also I am able to give a complete account of the tadpole of *Rana livida* (Blyth). I take this opportunity to describe the larvae of other Indian and Indo-Chinese batrachians.

Rana spinosa.

Rana spinosa, Boulenger, *Rec. Ind. Mus.*, XX, p. 74 (1920).

Description.—Tadpole of rather large size, head and body stout. Length of head and body $1\frac{1}{3}$ times its width, snout broadly rounded, nostrils midway between the eyes and the tip of the snout, the distance between them equal to the interocular width; eyes supero-lateral.

Spiracle sinistral, looking upwards and backwards, nearer the eye than the vent; anus dextral. Tail $2\frac{1}{2}$ times as long as high with obtusely pointed tip; crests moderate, the upper higher than the lower and not extending on to the back.

Mouth subterminal, its width less than one-third the greatest body width; a fringe at the sides and below beset with very short papillae; beak broadly margined with black, with coarsely serrated edges.

Upper lip with 4 series of teeth, the uppermost long and continuous, the second also long but narrowly interrupted, the third and fourth rows broadly interrupted by the beak; lower lip with 3 series, the uppermost long and narrowly interrupted, the lower two continuous and shorter in length.

Colour, olive above, tail thickly spotted with black.

Dimensions of a specimen with budding hind limbs:—

Total length 50; length of head and body 20; width of body 15; height of tail 11 mm.

These tadpoles agree almost exactly with the description of the larvae of *R. annandalii* Boulenger, from the eastern Himalayas, the two frogs being also closely related. *Rana spinosa* is found in the mountains of southern Chinā and Tonkin.

My tadpoles were collected on the Peak at Hongkong in March 1923, together with numerous adult frogs. Under *R. kuhlii*, Annandale has described two immature tadpoles from the same locality which evidently belong to *spinosa* (*Mem. Asiat. Soc. Bengal*, 1917, VI. p. 147). Like Dr. Annandale I at first mistook my frogs for *R. kuhlii*, until the capture of an adult male with horny spines upon the chest and fingers settled the diagnosis.

Rana cubitalis.

**Rana cubitalis*, Bouleng., *Rec. Ind. Mus.*, XX, p. 138 (1920).

Description.—Length of head and body $1\frac{1}{2}$ times its breadth, not markedly depressed; snout rounded; nostrils midway between the eyes and the end of the snout, nearly as far apart as the interorbital space; eyes supero-lateral.

Spiracle sinistral, pointing backwards and upwards, midway between the eye and the vent; anus dextral. Tail about 3 times as long as high, the tip pointed; crests full, subequal in depth, the upper just extending on to the back.

Mouth large, subterminal, its width nearly half that of the body; a fringe with short papillae at the sides and below. Beak narrowly margined with black, with finely serrated edges; upper lip with 2 long series of teeth, the lowest narrowly interrupted; lower lip with 3 long uninterrupted series.

A patch of granular skin on each side of the back behind the eye.

Colour, above light brown with darker spots.

Dimensions of a specimen with well developed legs:—

Total length 38; length of head and body 14; breadth of body 9; height of tail 8 mm.

Described from tadpoles collected in the Nakon Sritamarat mountains, Peninsular Siam, in March 1922. With their granular patches of skin upon the body these larvae have affinities with those of *Rana chalconota* Schlegel, the mouth parts of which are also closely related.

Distribution of the species. Hills of Western Siam.

Rana sauteri johnsi.

Rana sauteri johnsi, Malcolm Smith, *P. Z. S. London*, 1921, p. 434.

Description.—Tadpoles of moderate size, head and body somewhat depressed, snout rounded. Length of head and body $1\frac{1}{3}$ to $1\frac{1}{2}$ times its breadth; nostrils midway between the eyes and the end of the snout; eyes supero-lateral, the distance between them greater than that between the nostrils.

Spiracle sinistral, looking upwards and backwards, a little nearer the eye than the vent; anus dextral. Tail $3\frac{1}{2}$ times as long as high, the tip pointed; crests moderate, subequal in depth, that of the upper not extending on to the back.

Mouth subterminal, its greatest width more than one-third the greatest width of the body; a fringe with short papillae at the sides and below. Beak edged with black, with finely serrated edges; 5 series of teeth in the upper jaw, the first long and continuous, the second narrowly interrupted, the lower 3 broadly interrupted by the beak; lower lip with 5 long series, the uppermost of which is narrowly interrupted.

Colour, olive brown above, membranes of the tail with minute dark specks.

Measurements of a specimen with well developed legs:—

Total length 46; length of head and body 17; breadth of body 12; height of tail 8.5 mm.

Described from tadpoles collected on the Langbian plateau, S. Annam, Indo-China, at an altitude of 1,000 metres, in March 1917,

Rana alticola.

(Pl. VII, fig. 5.)

Rana alticola, Annandale, *Rec. Ind. Mus.* VIII, p. 22 (1912).

Both Boulenger and Annandale have described and figured this tadpole but neither of them gives any idea of the huge size to which it attains in the mountain streams of peninsular Siam. My largest specimen is 96 mm. in total length, and this size is commonly reached. The young larvae show two distinct types of colouration. One is pale yellowish, semi-translucent, with black spots, the other is entirely black except the ocelli. The full grown tadpole is dark brown or jet black in colour,¹ with a single orange coloured ocellus near the base of the tail.

These large and conspicuous creatures haunt the bigger pools or open streams where the current is not too swift, and the immunity which they enjoy from the attacks of fish and other beasts is due no doubt to the secretion produced by their parotid glands.

Rana livida.*Rana livida*, Boulenger, *Rec. Ind. Mus.* XX, p. 214 (1920).

The tadpole of this frog, for lack of sufficient material, has never yet been fully described. It closely resembles that of *Rana afghana* (Günther).

Description.—Tadpoles of fairly large size, head and body convex above, much flattened below. Snout broadly rounded. Nostrils nearer the eyes than the tip of the snout, the distance between them less than the interorbital width ; eyes looking upwards and outwards.

Spiracle sinistral, placed very low down on the side of the body looking almost directly backwards, nearer the eye than the vent.

Tail nearly twice the length of the head and body, tip obtusely pointed, muscular portion strongly developed in the anterior $\frac{2}{3}$, tapering suddenly in the posterior $\frac{1}{3}$. Upper crest deeper than lower, not reaching to the body, lower crest almost straight, commencing behind the level of the upper.

Ventral disc large, truncate anteriorly, where its margin is formed by the lower lip, free at the sides and posteriorly, its length together with the mouth more than half the length of the head and body. Beak stout, black, the upper mandible with a white spot in the mid-line above, giving the impression of a notch, and a minute tooth-like projection opposite it.

Dental formula 3 : 5 + 5/1 + 1 : 2.

Skin with a circular patch of glandular granules behind each eye, and a larger, oval patch on the hinder and lower part of the body near the base of the tail.

Colour. Olive above with darker markings, the granular patches brown. Dr. Annandale tells me these patches are black in life and are much more distinct than in the preserved specimen.

¹ So far as my experience goes the tadpoles are never black or even dark brown in the Khasi Hills.—N. A.

From the tadpole of *R. afghana* it differs in the white V-shaped notch on the upper mandible, and in the larger and more conspicuous glandular patches.

Measurements of a specimen with the hind limbs about half-developed:—Total length 59 mm. ; length of head and body 21 ; breadth of body 13·5 ; depth of tail 10 ; length of ventral disc without mouth 8·5 ; breadth of disc 10.

Described from two specimens collected by Dr. S. W. Kemp at Tura, in the Garo Hills, Assam.

Distribution of the species. From the eastern Himalayas to southern Yunnan and hills of southern Burma.

Micrixalus opisthorhodus.

(Pl. VII, fig. 2.)

Micrixalus opisthorhodus, Boulenger, *Fauna Brit. Ind., Rept. and Batr.*, p. 465.

Head and body nearly twice as long as broad, considerably depressed, snout rounded. Nostrils equidistant between the eyes and the tip of the snout, a little farther apart than the eyes. Eyes small, on the top of the head and placed far forwards.

Spiraculum small, sinistral, directed obliquely upwards and backwards, much nearer the eye than the vent. Anus dextral.

Tail long and slender, tapering gradually to an obtusely pointed tip. Muscular portion in the middle about half the total depth. Membranes shallow, the upper and lower about equal in depth.

Mouth subterminal ; disc moderate, about half or a little less than the greatest body-width, transversely oval, sucker-like, the lip completely surrounding it except in the mid-line above, and fringed with several rows of shortish papillae. A single short row of poorly developed teeth in the upper jaw. Mandibles stout, entirely black, their margins finely serrated ; neither of them deeply semilunar or V-shaped.

Colour. Brown above and on the sides, paler below.

Length of head and body 9 ; breadth of body 5·5 ; length of tail 20 ; depth 4 mm.

This description is drawn up from two poorly preserved specimens said to belong to *M. opisthorhodus*. Both larvae are young, there being no trace of budding hind limbs. A third example, completely developed as a perfect frog but with the tail unabsorbed, measures 42 mm. in total length ; head and body 16.

Taken at Kotagiri, Nilgiris, at 6,000 feet.

Distribution of the species. Hills of Southern India.

Philautus vittatus.

(Pl. VII, fig. 4.)

Ixalus vittatus, Boulenger, *Fauna Brit. Ind., Rept. and Batr.*, p. 485.

Description.—Length of head and body $1\frac{2}{3}$ times its breadth ; snout obtusely pointed ; nostrils nearer the tip of the snout than the eye ; eyes looking upwards and outwards, twice as far apart as the nostrils.

Spiraculum sinistral, nearer the eye than the vent ; anus dextral. Tail about $3\frac{1}{2}$ times as long as deep, tip pointed. Crests moderate, the upper nearly twice as high as the lower, not extending on to the back.

Mouth subterminal ; lips with short papillae at the sides and below, interrupted for a short distance in the mid-line ; beak edged with black. Upper lip with 4 or 5 series of teeth, the first two uninterrupted, the last 2 or 3 broadly interrupted, the 5th row when present very short ; lower lip with 3 long uninterrupted rows or the uppermost narrowly interrupted.

Colour. Light brown, thickly speckled with dark brown and gold, below whitish ; membranes almost colourless.

Another form has a dark band along each side of the head and body and continued along the muscular part of the tail, the posterior part of which is black.

Dimensions of a specimen with the hind limbs well developed. Total length 33 ; head and body 10 ; width of body 6.5 ; depth of tail 6.5 mm.

Philautus vittatus was originally described from Upper Burma, but the species has since been discovered in Siam and Cochin China. The actual tadpoles here described are from Ta Rua, near Bangkok, Siam.

This frog is one of the few species of the genus to be found at sea level. It frequents low bushes by the side of ponds, and makes a round frothy "nest" similar to that made by the common tree frog *Rhacophorus leucomystax* (Gravenh.). This is attached to some bough overhanging the pool and the larvae, as they hatch, are washed out of it by the rain, and dropping into the water below continue their development in the usual manner.

Microhyla inornata.

Microhyla inornata, Boulenger, *Fauna Malay Penin., Rept. and Batr.*, 1912, p. 259.

On two occasions, when rearing the tadpoles of what I believed to be *M. ornata* in Bangkok, I have found that some of them, on completing their metamorphosis, were actually those of *M. inornata*. Minute differences between the two larvae probably exist, but they were not sufficient for me to detect in the course of the usual examination given them during development.

Microhyla berdmorei.

(Pl. VII, fig. 1.)

Microhyla berdmorei, Boulenger, *Fauna Brit. Ind., Rept. and Batr.*, p. 492.

Head and body squarish, $1\frac{1}{3}$ to $1\frac{1}{4}$ times as long as broad. Mouth slightly superior, a portion of the lower lip being visible from above. Eyes perfectly lateral, eight times as far apart as the nostrils, which are equidistant between the mouth and a line drawn connecting the eyes. Tail not terminating in a filament, membranes well developed, subequal in depth. Spiracle median, opening below the centre of the gut.

Pale greyish brown above, partly translucent (speckled with minute dots under the glass) ; a dark patch between the eyes. Toes not fully webbed.

Dimensions of a well grown specimen :—Total length 23 mm., length of head and body 9 ; breadth of body 7 ; depth of tail 5.

The actual specimens here described were obtained at Daban (alt. 200 m.), Phan Rang province, S. Annam, in April 1918, but the species is common on hills throughout Burma, Siam, Indo-China and the Malay Peninsula.

Bufo latastii.

(Pl. VII, fig. 3.)

Bufo latastii, Boulenger, *Fauna Brit., Ind., Rept. and Batr.*, p. 503.

Tadpole of moderate size, head and body very stout, the length only about $1\frac{1}{4}$ times the breadth ; snout rounded. Nostrils close together, equidistant between the tip of the snout and the eyes ; eyes superolateral, the interocular width narrower than the distance between the nostrils. Spiraculum sinistral, short, directed upwards and backwards, a little nearer the eye than the vent. Anus median.

Mouth subterminal, rather small, the disc transversely oval, its width about one-third that of the greatest body width. A fringe of short papillae at the sides only. Dental formula 1:1+1/3, the lowest row of teeth on the lower lip a little shorter than the other two. Mandibles broadly edged with black, finely serrated, the lower one broadly V-shaped.

Tail well developed, the tip rounded ; the upper and lower crests about equal in depth.

Colour olive greyish, speckled with darker ; below uniform greyish ; membranes of the tail translucent.

Dimensions of a specimen with the hind legs well developed.

Length of head and body 17 ; breadth of body 14 ; length of tail 26 ; depth of tail 10 mm.

Tadpoles of this toad together with fully developed young ones with the tail still unabsorbed were obtained in ponds at Ganderbal, Kashmir, at 6,000 feet, and also in ponds on the Ichabal—Martand road, Kashmir, in July 1921. The specimens with well developed hind limbs are easily identified by the double metatarsal tubercles.

Megalophrys boettgeri.

? *Megalophrys boettgeri*, Annandale, *Mem. Asiat. Soc. Bengal* VI, p. 155, pl. vi, fig. 111 (1917).

Annandale in 1917 described the tadpole of this toad with doubt, the specimens which he collected on the Peak at Hongkong being unaccompanied by any forms sufficiently mature to establish a diagnosis.

I am now able to confirm his opinion, having obtained both the larvae and adults in the same locality in March 1923.

My specimens are dark brown in colour, spotted all over, but more conspicuously above, with black. Tail about four times as long as high, the crests low and subequal in depth ; tip of the tail pointed.

At the time of my visit the male toads were calling vociferously and could be heard a long distance off. So securely, however, were they esconced among the rocks and boulders of the stream in which they lived, that in spite of the most diligent hunt I could only obtain two of them.

Distribution of the species: Southern China; and, if *M. kempi* Annandale is identical with *M. boettgeri*, to the eastern Himalayas.