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ON *NYCTIBATRACHUS MAJOR* BOUL. (RANIDAE) WITH A DESCRIPTION OF ITS TADPOLE

R. S. PILLAI

Zoological Survey of India, Southern Regional Station, Madras

ABSTRACT

The present account is a brief redescription of the type-species, *Nyctibatrachus major* Boulenger, to incorporate the new characters. Notes on ecology of the species are given. The tadpole is described for the first time. A key to the identification of the species known so far under the genus is also provided.

INTRODUCTION

Genus *Nyctibatrachus* is endemic to Western Ghats extending as far north as Bombay. Five species and one subspecies of the genus are so far known. These are *N. pygmaeus* (Günther) from the Anaimalai hills (Boulenger, 1882), *N. major* from Wynad and Aryankavu range near Shencottah (Boulenger, 1882 ; Annandale, 1910 as *Rana travancorica*), *N. sanctipalustris* from Brahmagiri hills, Coorg, including the subspecies *sanctipalustris modestus* from Shimoga (Rao, 1920), *N. sylvaticus* from Hassan, Mysore (Rao, 1937) and *N. humayuni* from N. Kanara, Mahabaleshwar and Khandala, Bombay (Bhaduri and Kripalani, 1955).

The concept of Amphibian systematics and characters which form its basis have undergone major changes within the last 90 years somuchso that Boulenger's short descriptive accounts of the species leave considerable ambiguity with regard to many details in contrast to the recent detailed description of *N. humayuni* by Bhaduri and Kripalani. This is more so for *N. major* which has been designated as type-species of the genus. Its description is so brief that Bhaduri and Kripalani (*loc. cit.*) had to borrow topotypes of *N. major* from the British Museum of Natural History to establish the specific distinctness of *N. humayuni*. Nothing is known about the type-locality, habitat or ecology of *N. major*.

Special efforts were therefore made by the author to collect these frogs during a faunistic survey tour to Wynad in 1976 as a result of which 42 specimens were collected. A detailed study has brought to light a number of characters hitherto unknown for the species some of which would be of positive help in tracing the phylogeny and affinities of the genus *Nyctibatrachus*.

One important character cited for the separation of *Nyctibatrachus* and *Nannobatrachus* from *Rana* and *Micrixalus* (Boulenger, 1890) is the vertical condition of the pupil in the former. Study of the present mate-

rial, however, shows that the utility of this character cannot be relied upon since preserved material shows an almost circular, elliptical or rhomboidal pupil. Annandale (1910) described it as a new species of *Rana* (*travancorica*) presumably because of this condition of pupil which is characteristic of *Rana*. Rao (1937 p. 400) has pointed out the unreliability of this character in the separation of *Nannobatrachus* from *Nannophrys*.

Material

42 young and adults were collected as under :—

(1) One example from the Baveli forest at Manantoddy, Cannanore Dist., Altitude 650 metres, coll. R. S. Pillai, Oct. 7, 1976.

(2) 41 examples from Kurichiat Reserve forest, Chedleth, Wynad, Altitude 825 metres, coll. R. S. Pillai, Oct. 15, 20 and 21, 1976. The small stream from where they were collected ultimately joins the Kabbani River which is a tributary of the Cauvery System.

Description

Colour : Dorsum in adults very dark or brownish black. Upper side of limbs dark brown with black cross bars. Upper and lower lips uniformly dark. Throat (upto coracoid level) marbled with brownish grey or sepia. Belly, ventral part of forelimbs and proximal ventral part of thighs immaculate.

Juveniles (upto about 25 mm body size) less dark, brownish. A narrow dark transverse band connecting the two dark upper eyelids. Two more such broad transverse patches behind this and a few longitudinal patches on either side of dorsum. Limbs crossbarred upto digital tips. Lower temporal area pale. Upper and lower lips with thin vertical white stripes. Whole of venter devoid of pigmentation.

Head : Depressed, slightly broader than long ; snout obtusely pointed, slightly longer than eye. Nostrils dorsal, elevated and close together, their distance being less than inter-orbital space. Eyes with elliptical or rhomboidal pupil, its diameter a little longer than inter-orbital space and little less than snout. Upper eyelid narrow, lower with a small papilla at its hind corner. Tympanum indistinct, covered over by smooth skin which in a few examples is loose. Vomerines cushion-like, oval and close together behind the level of choanae. Tongue large, bifid, with depressed impressions of vomerines on its attached part.

Forelimbs : Short, about half the length from snout to vent. Fingers free, with bulbous tips devoid of circum-marginal groove.

Hindlimbs : Short and robust, about 1½ times body length ; tibia stout being twice as long as broad, shorter than forelimb and equal to foot ; tibio-tarsal articulation of the adpressed hindlimb reaching eye, heels not touching when limbs are folded at right angles to the body. Toes two-thirds webbed, the free phalanges on each toe being as follows :

First	Second		Third		Fourth		Fifth
	int.	ext.	int.	ext.	int.	ext.	
1	2	1	2½	1	2½	2½	1

Toe tips with small discs which are about as long as broad, with crescentic circum-marginal grooves. The grooves form deep pockets which open out at the dorsal extremity of discs, the proximal lip being notched. Terminal phalanx with a transverse expansion distally. Outer metatarsal separated by web

almost to base and with distinct dermal fold. Inner metatarsal tubercle narrow, elongated, about half the length of inner toe measured from the distal end of tubercle. Prominent dermal fold from proximal end of the inner metatarsal tubercle to tarso-metatarsal articulation. No outer tubercle.

Skin : Corrugated with numerous short, irregular folds all over dorsum and flank. Snout with a median longitudinal narrow fold from upper lip to the level of nostrils where it bifurcates and run toward anterior corner of eyes. A short transverse fold connecting the two upper eyelids and another longer one parallel to it a little distance behind. An arching supratemporal fold from hind corner of eye towards shoulder and a short fold from lower part of eye to angle of jaw ; these two folds incompletely encircling the tympanic region. Upper eye-lid warty. Hind part of dorsum with small white-tipped tubercles which extend to around vent. Tibia and tarsus similarly studded. Throat longitudinally rugose, belly with faint transverse folds and grooves. Vermiculation less in Juveniles.

TABLE 1. Body mesurements in mm of *Nyctibatrachus major* Boul. from Wynad

Body parts	1	2	3	4	5	6	7
1. Length of head and body (from tip of snout to vent)	36	35	32	31	30	25	23
2. Length of head (from tip of snout to angle of jaws)	13	13	11	11	10	9	9
3. Width of head (at angle of jaws)	15	14	14	13	13	11	11
4. Length of snout (from tip of snout to anterior corner of eyes)	7	7	6	5.5	6	4.5	4.5
5 Length of eye (maximum from anterior to posterior corner)	5	5	5	5	5	4	4
6. Minimum inter-orbital distance	4	4	3	3	3	3	3
7. Distance between anterior edge of nostris and tip of snout	3.5	4	3.5	3	3	3	3
8. Length of forelimb	19	17	17	16	16	12	13
9. Length of hand	10	10	8.5	8	8	7	6
10. Length of first finger	4	4	4	4	4	3.5	3
11. Length of second finger	5	5	5	5	5	4	4
12. Length of third finger	7	7	6	6	6	5	5.5
13. Length of hind limb	50	50	43	44	44	37	38
14. Length of tibia	16	15	15	14	12	10	11
15. Length of foot	16	16	15	15	15	12	11
16. Length of first toe	4	4	4	4	4	3	3
17. Length of second toe	6	6	6	5.5	6	5	5
18. Length of third toe	8	8	8	7	7	7	6
19. Length of fourth toe	15	16	13	13	13	12	13

Ecology and field notes :

The single specimen from Manantoddy was taken from under a dead log from a slushy part of the forest near the origin of a small stream. The 41 examples were all collected from a six kilometre-stretch of heavily leech-infested forest stream flowing over a muddy bed among large boulders and stones. The water was only a metre or two across with occasional pools and rocky cisterns. All specimens were collected from under stones in shallow water. On lifting the cover they would dart to the nearest stone and creep under with commendable agility. Seldom did they try to bury themselves in mud and none tried to leave the water and take shelter in the matty undergrowth that grew next to the water's edge. It was evident that they were admirably adapted for life in rock crevices and under stones. The digital discs on toes with their pocket-like excavations enable them to cling fast to stones and prevent them from being washed away even in fairly swift current.

Remarks : Presence of a deep circum-marginal groove on toe-discs has not been mentioned in any of the earlier descriptions of the species. Neither did Bhaduri and Kripalani (1955) mention its presence in the topotype which they have examined. While *N. humayuni* possesses such grooves on digits of both limbs, *N. major* has them only on hind limbs, the finger tips being merely swollen I have not examined the other three species of *Nyctibatrachus* but it is quite probable that they also may be having these grooves. If this be so, the genus *Nyctibatrachus* would find a place close to *Hylorana* (Genus *Rana*).

KEY TO THE KNOWN SPECIES OF NYCTIBATRACHUS

1.	Skin of dorsum (excluding head) smooth	*pygmaeus*
1.	Skin of dorsum with closely set folds	2
2.	Toes nearly fully webbed ..	3
2.	Toes half webbed	4
3.	Fingers with discs and horizontal circum-marginal grooves	*humayuni*
3.	Finger tips merely swollen and without circum-marginal grooves	*major*
4.	Canthus rostralis present	*sylvaticus*
4.	Canthus rostralis absent	*sanctipalustris*

DESCRIPTION OF THE TADPOLE

(Figs. 1, A & B)

Tadpoles were collected from certain rocky cisterns along the course of the stream in Kurichiat forest at Chedleth from where adults have been taken. Out of the three examples, two are without limbs, the third with short hindlimbs. Two more tailed juvenile frogs have been collected, all these constituting a fairly complete series connecting the young frog with the tadpole.

Colour : Head and body blackish with two close whitish longitudinal patches on the hind half. Dusky below ; tail whitish with a few transverse bars dorsally.

Head and body : Oval, slightly flattened, ventral surface a little convex. Tip of snout bluntly rounded. Nostril nearer to anterior corner of eye than to tip of snout. Inter-narial distance less than inter-orbital space. Eyes dorsal, placed about one-third distance between tip of snout and base of tail. A row of minute glands encircling the orbit is continued forwards to meet its fellow a little behind tip of snout. Spiracle sinistral, tubular and lying almost in between tip of snout and base of tail, the opening being vertically elliptical. Vent situated dextrally.

Mouth disc : Small, directed downwards and slightly forwards, without horny teeth. Anterior lip distinct, consisting of a large median

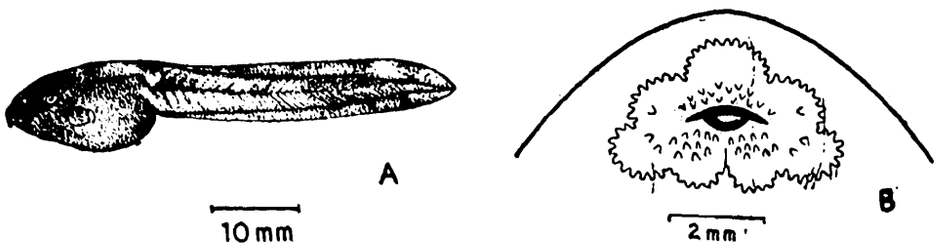

Fig. 1. Tadpoles of *Nyctibatrachus major* Boul. A. Lateral view of tadpole ; B. Mouth disc.

lobe overhanging the mouth and two lateral extensions, fringed with papillae. One or two rows of longer papillae between this lip and the upper beak. Posterior lip divided into 4 backwardly directed lobes with a deep median cleft and edged with papillae. Beaks black, narrow, the lower V-shaped one being broader than the upper. Both beaks very finely serrated.

Tail : One and a half to twice the length of head and body, tapering to a blunt point rather abruptly. Tail membrane a little deeper dorsally than ventrally, the upper usually commencing from the posterior part of the body slightly in front of the ventral.

Annandale (1918a ; 1918b footnote on p. 28) has remarked about the peculiar structure of the mouth disc in the tadpoles of *Rana leptodactyla* and *R. semipalmata* collected from the hills of S. India as exceptions to Ranidae in the absence of horny labial teeth and the well developed suctorial mouth disc. Tadpoles of *R. leptodactyla* bear a striking resemblance to that in *Nyctibatrachus major* described above. This and the facts that Annandale's identification was not based on a complete series and the observations of Rao (1920) on the larvae of true *leptodactyla* constitute ample proof that Annandale's *leptodactyla* was nothing other than tadpoles of *N. major*.

TABLE 2. Measurements in mm of tadpoles of *Nyctibatrachus major* Boulenger

Body parts	1	2	3	4
1. Total length	37	48	52	40
2. Length of head and body	15	16	18	19
3. Width of head and body	10	10	11	9
4. Length of tail	22	32	34	21
5. Max. height of tail	8	7	9	5

No. 3 With only hind legs
No. 4 With both fore- and hind legs

Remarks : It has to be admitted that our present knowledge on the taxonomy of Indian tadpoles is very scrapy because of the fact that many of the descriptions have not been properly connected up with their adults.

While referring tadpoles of *N. pygmaeus* described earlier (1918a) to *Philautus* (=*Ixalus*) *variabilis*, Annandale (1919) states that the true tadpoles of *Nyctibatrachus* do not have horny teeth and resemble those of *R. semipalmata*. By virtue of the fact that a member

of the genus *Rana* is very unlikely to possess a tadpole described under *R. semipalmata* it stands to reason that Annandale's material collected by Gravely from Parambikulam could only have belonged to *N. pygmaeus*. The close similarities of this tadpole with those of both *N. major* and *N. humayuni* (Bhaduri and Kripalani, 1955) strongly support this.

Thus we have descriptions of tadpoles of three species *viz. N. major*, *N. pygmaeus* and *N. humayuni* showing very close similarities to each other and exhibiting a basic pattern in the presence of overhanging, lobulate lips fringed with papillae and absence of horny labial teeth. A comparison of these with the tadpole of *N. sanctipalustris* (Rao, 1923) reveals that the latter constitutes a deviation from the pattern in the retention of labial teeth, absence of papillae on the anterior lip and presence of certain rounded melanin-pigmented papillae. Tadpole of the fifth species, *N. sylvaticus* is as yet unknown.

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