

A NEW FROG, *PHILAUTUS GHERRAPUNJIAE* (FAMILY RANIDAE) FROM ASSAM, INDIA, WITH FIELD OBSERVATION ON ITS BEHAVIOUR AND METAMORPHOSIS

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(With 1 Text-figure and 2 Plates)

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I—INTRODUCTION

In early May, 1959, one of us (M. L. R.)\* collected some tadpoles and young frogs from the vicinity of the Circuit House near Cherrapunji (the Khasi-Jaintia Hills District, Assam, eastern India) and made some field observations on their behaviour and metamorphosis. On closer examination, the frog proved to be new to science and is described below, together with a description of the tadpole stage. Some field observations on the frogs and the tadpoles are also recorded. A second collection, of tadpoles only, was made in June, 1959, by Shri J. K. Sen, Zoological Assistant.

II—DESCRIPTION OF THE NEW FROG

(a) *Material*

All from vicinity of Cherrapunji (Khasi-Jaintia Hills District, Assam), Lat. 25°15'N. and Long. 91°44'E., altitude above mean sea-level 4369 ft. or *ca.* 1330 metres.

LOT (A).—Several young frogs and tadpoles, coll. *M. L. Roonwal* and *A. P. Kapur*, 7th May, 1959, from pools of water and from grass.

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\*Thanks are due to Dr. A. P. Kapur, Deputy Director, for kindly assisting in the collection of the material.

etc., near the Circuit House, about 3 km. from Cherrapunji town, as follows :—

Field Coll. No. R1/7.5.59.—Several young, recently metamorphosed frogs (head-and-body, excluding legs, *ca.* 13 mm. long).

No. R2/7.5.59.—Several tadpoles : From pools of water below Circuit House.

Lot (B).—Field Coll. No. A22, Several tadpoles, coll. *J. K. Sen*, 27th June, 1959, *ca.* 2 km. south of Circuit House, in a small pool, by the side of road connecting Cherrapunji bazar with Mablang village.

(b) *Description*

Family RANIDAE

Genus *Philautus* Gistel

1848. *Philautus*, J. von. N. F. X. Gistel, *Naturg. Thierr.*, Stuttgart, p. 10.

***Philautus cherrapunjiae* sp. nov.**

(Plates 24 and 25 ; and Table 1)

The following description is based on young, recently metamorphosed frogs ; older specimens were not available.

*General* : Colour (in alcohol) : Dorsally varying from grey to dark brownish, rather uniform and with no markings ; limbs paler. Ventrally, body slightly grey ; throat somewhat paler ; limbs paler and creamish. Skin above smooth, with few folds ; a weak fold from eye to shoulder present ; ventrally with coarse granulations on abdomen. Natural colour (in living specimens) Body : Dorsum : Dirty grass green, eyes blackish ; portion of head below eyes whitish. Venter : Chin and lower jaw whitish, chest and abdomen dusky grey. Arms and legs : Dorsally dirty white with pale green tinge, ventrally similar but paler. Some specimens much darker, almost dark grey dorsally and grey ventrally. Size small (head-and-body about 12-13 mm. long). Body depressed : constricted at the waist.

*Head* : Rather depressed ; broader than long ; snout short and truncate, a little shorter than the maximum diameter of eye ; canthus rostralis indistinct ; loreal region slightly concave. Nostrils closer to the tip of snout than to the anterior corner of eye. Eyes prominent, directed forwards and upwards, and with a rounded pupil ; upper eyelids broad ; minimum interorbital space about one-and-a-half times broader than the width of the upper eyelid and a little broader than the internarial space. Tympanum hidden. Tongue small, free, deeply notched behind and without a papilla. Vomerine teeth absent.

*Forelimbs* : Moderately long. Fingers half-webbed, moderately long and somewhat flattened dorso-ventrally : first finger shorter than second ; third longest ; fourth shorter than third but slightly longer than second ; tips of each finger dilated into a subround disk, that of the third the largest ; subarticular tubercles prominent ; no tubercles present on palm.

*Hindlimbs* : Moderately long ; tibio-tarsal articulation reaching between anterior corner of eye and tip of snout. Toes three-fourths webbed and somewhat flattened fourth toe the longest, third and

fifth subequal, nearly reaching the distal subarticular tubercle of fourth; second shorter than third and nearly reaching the distal subarticular tubercle of the latter ; first shortest and stopping far below the base of the disk of second ; tips of each toe dilated into a subround disk ; sub-articular tubercles moderately developed ; with a fold of skin on the outer side of fifth toe ; no metatarsal tubercle present.

Sexes not distinguishable externally in young frogs.

*Measurements.*—See Table 1.

TABLE 1.

*Body-measurements in mm. of young, recently metamorphosed frogs (holotype and paratypes) of Philautus cherrapunjiae Roonwal and Kripalani, from Cherrapunji, Assam.*

Body-parts	Holo- type	Paratypes				
	1	2	3	4	5	6
1. Length of head-and-body (from tip of snout to vent)	12	12.1	13	12	12.6	12.5
2. Length of head (from tip of snout to angle of jaws)	4.5	4.5	4.6	4.5	4.3	4.5
3. Width of head (at angle of jaw)	5	5	5.1	5	5	5
4. Length of snout (from tip of snout to anterior corner of eyes)	2.4	2.4	2.5	2.4	2.5	2.4
5. Max. length of eye (from anterior to posterior corner)	2.6	2.6	2.7	2.6	2.7	3.6
6. Min. interorbital distance	3	3	3	3.1	3	3.1
7. Distance between anterior edge of nostril to tip of snout	0.4	0.4	0.5	0.4	0.5	0.4
8. Distance between anterior edge of nostril and anterior corner of eye of its side	2	2	2	2	2	2
9. Length of arm (from proximal end of junction of arm with the body to tip of longest finger)	11.5	11.5	11.5	11.6	11.5	11.6
10. Length of hand (from base of palm to tip of longest finger)	4.5	4.5	4.5	4.6	4.5	4.6
11. Max. diameter of disc of 3rd finger	0.56	0.5	0.5	0.5	0.5	0.5

Body parts	Holo- type		Paratypes			
	1	2	3	4	5	6
12. Length of 1st finger	1	1	1	1.1	1	1.1
13. Length of 2nd finger	2	2	2	2	2	2
14. Length of 3rd finger	3	3	3	3	3	3
15. Length of 4th finger	2	2	2	2	2	2
16. Length of leg (from midventral line of attachment of leg with body to tip of longest toe)	19	19.5	20	19	19	19
17. Length of tibia (from knee to tibio-tarsal joint)	6	6	6	6.1	6	6
18. Length of foot (from base of foot to tip of longest toe)	7	7	7	7	7	7
19. Max. diameter of disc of 4th toe . . . . .	0.6	0.5	0.5	0.6	0.6	0.5
20. Length of 1st toe	2	2	2	2	2	2
21. Length of 2nd toe	3	3	3	3	3	3
22. Length of 3rd toe	4	4	4	4	4	4
23. Length of 4th toe	5	5.1	5	5	5	5
24. Length of 5th toe	4	4	4	4	4	4

(c) *Type-specimens*

All type-specimens are deposited with the Zoological Survey of India, Calcutta.

*Holotype*.—A young, recently metamorphosed frog, Z.S.I. Reg. No. 20806, in spirit in a vial, Cherrapunji, Assam (from LOT "A", No. R1/7.5.59, in "Material" above), coll. *M. L. Roonwal & A. P. Kapur*, 7th May, 1959.

*Paratypes*.—Six young frogs, with the same data as the holotype; Z.S.I. Reg. Nos. 20807-20812.

(d) *Type-locality*

INDIA : Near Circuit House, *ca.* 3 km. from Cherrapunji town (Khasi-Jaintia Hills District, Assam), alt. *ca.* 1330 metres above mean sea-level.

(e) *Geographical Distribution*

INDIA : Assam : Cherrapunji and immediate vicinity (Khasi-Jaintia Hills District), altitude *ca.* 1330 metres.

(f) *Comparisons*

*Philautus cherrapunjiae* Roonwal & Kripalani is close to

*P. vittatus* (Boulenger) from Upper Burma, Thailand and Cochin China, but differs from the latter as follows :—

(a) FROG :

(i) Snout truncated (*vs.* pointed in *vittatus*). (ii) Fingers half-webbed (*vs.* with only rudiments of webs). (iii) Metatarsal tubercles absent (a feeble inner metatarsal tubercle present in *vittatus*). (iv) Tibiotarsal articulation almost reaching the snout, *i.e.*, midway between anterior corner of eye and tip of snout (*vs.* stopping short at the eye in *vittatus*). (v) Colour above a uniform greyish to dark blackish brown, without a pattern and without any yellow (in *vittatus*, yellowish and closely speckled with brown, the latter forming a band on either side of head; above this a lateral yellowish band continued forward as a narrow line above the edge of upper eyelid).

(b) TADPOLE :

With the labial tooth row formula :

$$\frac{4 \begin{array}{c} 1 \\ - \\ 4 \end{array}}{1 \begin{array}{c} - \\ 1 \\ 2 \end{array}} \text{ (versus)} \quad \frac{3 \begin{array}{c} 1 \\ - \\ 3 \end{array}}{3} \text{ in } \textit{vittatus}.$$

### III—DESCRIPTION OF THE TADPOLE

#### (Plate 25 and Table 2)

The tadpoles collected were well developed. In some specimens the spiracle was still present and functional, and the forelegs had not yet emerged (Pl. 25, Fig. 1), while others were about to metamorphose (Pl. 25, Fig. 2) (and, in fact, some did metamorphose into frogs the day after the collection); in the latter the forelegs had emerged and the spiracle had disappeared. The description given below is based on the former stage—*i.e.*, with the tadpoles having the spiracle still present and functional and with no forelegs :—

*General* : Natural colour (in living specimens) : Blackish all over dorsum, dusky below ; tail blackish. Colour (in alcohol-preserved specimens) : Dorsum and tail dark grey ; below paler. Size : Moderate ; total length with tail (in spirit-preserved specimens) *ca.* 34-36 mm.

*Head and body* : Oval, slightly flattened, with the ventral surface moderately convex. Tip of snout bluntly rounded. Nostrils lying nearer the anterior corner of eye than to the tip of snout, and directed upwards and outwards ; the internarial distance less than the interorbital distance (*ca.* 1.5 mm. *vs.* 2.4 mm.). The paired eyes directed forwards and upwards and placed dorso-laterally on the snout ; lying about one-third the distance between the tip of snout and the distal end of base of hindlimbs, and about midway between the tip of snout and the spiracle. With a single spiracle which is sinistral, lateral, tubular and pointing upward and backward and lying somewhat nearer the base of the tail than to the tip of the snout ; opening of spiracle subround to oval, with the maximum diameter *ca.* 1 mm. Vent situated dextrally.

*Mouth disc* : Small, directed downwards and a little backwards. Anterior lip edged by two rows of lateral papillae. Posterior lip edged throughout by two rows of papillae. Beak well developed, with the

edges broadly blackened, lower part stout and V-shaped, both upper and lower parts finely serrated. Labial tooth row formula :

$$\begin{array}{c} 1 \\ 4 - 4 \\ \hline 1 - 1 \\ 2 \end{array}$$

*Legs*: Forelegs not yet emerged from body, except in tadpoles nearing metamorphosis. Hindlegs moderately long, but much shorter than tail, with 5 toes; each toe with a prominent, subround disc at the tip; intermetatarsal tubercles present.

*Tail*: About one-and-a-half times as long as head-and-body; gradually tapering distally to a blunt point. Tail membrane deeper dorsally than ventrally; both the dorsal and the ventral membranes arising a little behind the base of the hindlimbs; muscular portion of tail well developed and tapering distally to a point.

*Measurements*.—See Table 2.

TABLE 2.

*Measurements in mm. of well-developed tadpoles (Plate 25, Fig. 1) of Philautus cherrapunjiae Roonwal and Kripalani with the forelimbs not yet emerged and the spiracle still present.*

Body-part	Measurements (in mm.)
1. Total length, with tail.	34-36
2. Length of head-and-body (from tip of snout to the anterior base of hind leg).	12-13
3. Maximum width of head-and-body	8-9
4. Length of tail (from vent to tip of tail)	20-21
5. Maximum height of tail	4.5-4.6

#### IV—FIELD OBSERVATIONS

##### (a) *General (climate, etc.)*

##### (Table 3)

Owing to its altitude (4309 ft. or *ca.* 1330 metres), Cherrapunji (Lat. 25°15'N. and Long 91°44'E.) is a relatively cool place. The monthly means of daily maximum temperatures varied from 60.3°F. (in January) to 72.5°F. (in August), and of the daily minimum temperatures from 46.1°F. (in January) to 65.3°F. (in July and August). The highest temperature recorded during the 35-year period (1906-40) was 85°F. (on 4th October, 1938) and the lowest 33°F. (on 19th February, 1938 and 27th March, 1912).

Cherrapunji is a very humid place and also the wettest on earth. The mean fortnightly relative humidity varies from 61% (March) to 93% (July), the most humid months being May to September (mean fortnightly R.H., 82-93%). The mean monthly rainfall (data for 35 years, 1906-40) varies from 0.49 inches (in December) to 106 inches

(in June), the annual average being 425.23 inches. The bulk of this rainfall (*ca.* 323 inches) is received during the four monsoon months, May-August. The five driest months are from November to March when little or no rainfall is received, the figures, in inches, being as follow  $\epsilon$ :—November 2.70; December 0.49; January 0.75; February 2.11 and March 7.27. Even the grass is said to dry up in March and April.

The place is also very misty, low clouds constantly hovering about the place, particularly during the monsoon months.

The day when the young frogs were collected (7th May, 1959) was cloudy, with the sun peeping out occasionally and there was an intermittent drizzle throughout the day.

TABLE 3.

*Summary of weather of Cherrapunji, Assam (meteorological observatory at Lat. 25°15'N. and Long. 91°44'E. ; altitude above mean sea-level, 4309 ft. or ca. 1330 metres). [Data based on 35 years record (1906-1940) of the Meteorological Department.]*

Item	Range	Annual Total or Mean
1. Atmospheric pressure		
(a) First fortnight of month	863.0 mb. (July)—871.8 mb. (Dec.)	Mean : 868.3 mb.
(b) Second fortnight of month.	860.8 mb. (July)—869.5 mb. (Dec.).	Mean : 865.9 mb
2. Mean monthly temperature (degrees F.)		
(a) Daily Maximum	60.3 (Jan.)—72.5 (Aug.)	Mean : 68.9 F.
(b) Daily Minimum	46.1 (Jan.)—65.3 (July & Aug.).	Mean : 57.6°F.
3. Relative Humidity		
(a) First fortnight of month	61% (Mar.)—93% (July)	Mean : 76%
(b) Second fortnight of month.	62% (Mar.)—92% (July)	Mean : 80%
4. Mean monthly rainfall (in inches)	0.49 (Dec.)—106 (June)	Total : 425.23 inches

(b) *Behaviour of tadpoles and young frogs*  
(Text-fig. 1)

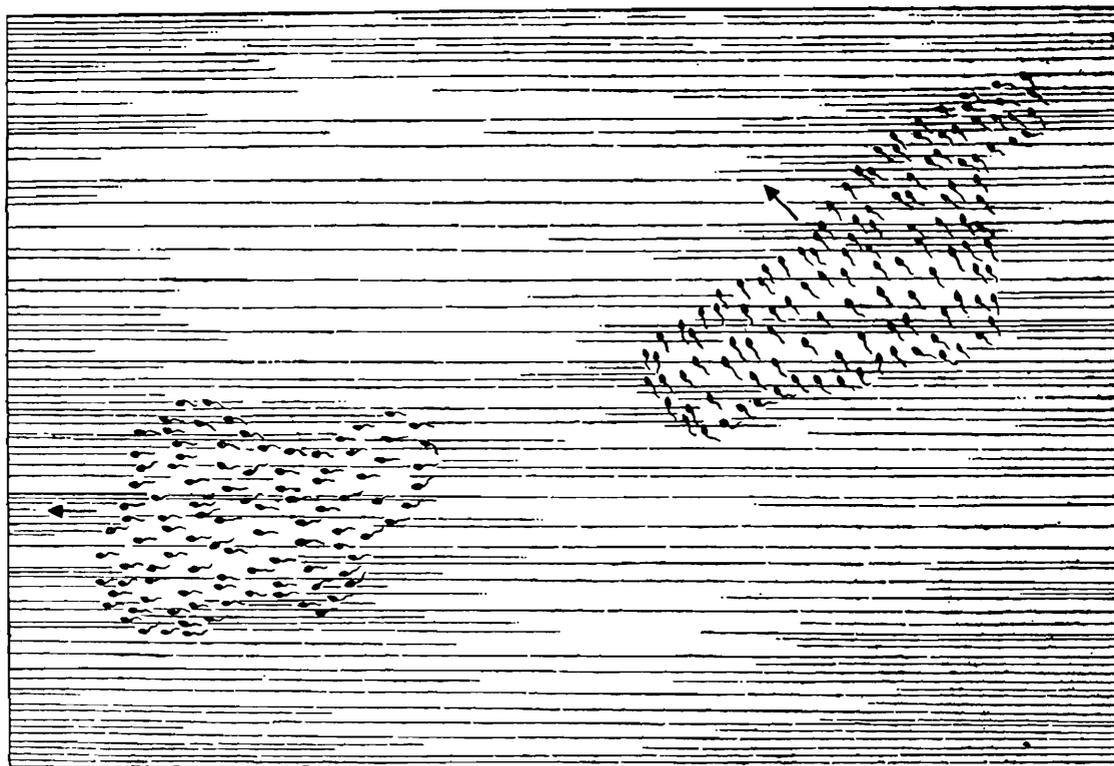
The following observations were made on the behaviour of tadpoles and young, freshly metamorphosed adults, in the field and in the laboratory.

(i) *Tadpoles :*

Just below the Circuit House of Cherrapunji, about 30 metres from the main gate, there were, on 7th May, 1959, two stagnant and apparently

permanent pools of water, one *ca.* 10×20 metres and the second somewhat smaller. The pools had low grass growing all round and also inside the pools, and were probably about 3-4 metres deep.

The tadpoles showed gregariousness and were found swimming in compact, irregularly-shaped schools (Text-fig. 1) of about 100-200 individuals in each, usually just below (*ca.* 10 cm.) the surface of water. These schools could be seen as dark patches on the water. Five such schools were seen, but there must have been more. When disturbed by means of a stick, the school temporarily broke up and the individuals swarm about separately, but within a few minutes they regrouped themselves into a school.



TEXT-FIG. 1.—Diagrammatic view of a pool of water below Circuit House, Cherrapunji (Assam) to show two schools of tadpoles, of *Philautus cherrapunjiæ* Roonwal & Kripalani as seen on 7th May, 1959.

(ii) *Young frogs :*

In the grass and elsewhere near the pools of water mentioned above, the young, freshly metamorphosed, frogs were found sitting singly or in groups of twos and threes. Their favourite place appeared to be the masonry gate pillars, about 2 metres high, of the Circuit House compound, and they gave the impression as if they were drying themselves, although the weather throughout the day was very cloudy and misty, with intermittent drizzles of rain. Some of these frogs still carried the remnant of the tadpole tail, about 5-8 mm. long.

(c) *Metamorphosis*

About 40 tadpoles which were collected at Cherrapunji on the 7th May, 1959, were brought to Shillong the same night, and kept in a basin of tap-water. (When collected at Cherrapunji, none of the tadpoles had any trace of external foreleg, but a pair of functional and well developed hindlegs was present the tail was long.) Next morning

(8.5.59) it was found that several of them were dead. A number of others which were metamorphosed into frogs during the night, had jumped out of the basin and were found in various parts of the floor of the room. Many of the remainder were now with a pair of forelegs emerged out of the tadpole body, and the tail was still long ; these individuals did not wish to stay in the water they were constantly trying to climb the sides of the basin and jump out. Some of these latter individuals which were trying to jump out were transferred to a bamboo basket with some green grass leaves at the bottom, but next morning (9.5.59) all these individuals were found dead and shrivelled up ; some tadpoles were still swimming actively in the basin on the 9th May.

#### V—SUMMARY

1. A new frog, *Philautus cherrapunjiae* Roonwal and Kripalani, from Cherrapunji (Assam, eastern India), is described.

2. It is allied to *P. vittatus* Boulenger (from Upper Burma, Thailand and Cochin China, but differs from the latter in having (in the frog) the fingers half-webbed (*vs.* with only rudiments of webs), metatarsal tubercles absent (*vs.* present), tibio-tarsal articulation almost reaching the snout (*vs.* stopping short at the eye), body-colour uniform grey (*vs.* with a yellow and brown pattern). In the tadpole, the labial tooth row formula is :

$$\begin{array}{ccc} 1 & & 1 \\ 4-4 & (\textit{vs.}) & 3-3 \\ 1-1 & & \\ 2 & & 3 \end{array} \textit{ in vittatus}.$$

3. The tadpole is described.

4. Field observations on the tadpoles and young frogs are recorded. The tadpoles are gregarious and swim in schools of 100-200 individuals. When disturbed, a school breaks up temporarily, but soon the individuals regroup themselves into a school.

5. The young, freshly metamorphosed frogs have the habit of perching themselves on high places such as gate pillars, as if for sunning.

6. The tadpoles were observed to metamorphose into frogs in early May.

#### VI—REFERENCES

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