

DIVERSITY AND MORPHOMETRY OF *FEJERVARYA* (ANURA: DICROGLOSSIDAE) IN SONANADI WILDLIFE SANCTUARY , NAINITAL, UTTARAKHAND, INDIA

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ABSTRACT

Sonanadi Wildlife Sanctuary is situated at the edge of Corbett National Park, covering an area of 301 sq. km. It has been named after Sonanadi River. There is some reports of the presence of threatened species of mammals and reptiles and also of avian diversity richness but there is no report of the amphibian diversity of the area. The present study describes for the first time the diversity and morphometry of species of genus *Fejervarya* from the area. Kalushaheed and Hathikund were noted to be rich in species belonging to the genus *Fejervarya*. Three species are *Fejervarya syhadrensis* (Annandale); *Syhadra frog Fejervarya nepalensis* and Terai Cricket Frog *Fejervarya terraiensis* (Dubois).

Figures : 09

References : 47

Tables : 02

KEY WORDS : Amphibia, *Fejervarya*, Morphometry, Sanctuary, Sonanadi, Wildlife.

Introduction

The present study describes species of *Fejervarya* from Sonanadi Wildlife Sanctuary. The sanctuary is situated at the edge of Corbett National Park, covering an area of 301 sq. km. It has been named after Sonanadi River and the beauty of this serene park is simply breathtaking. The Sanctuary houses a large number of flora and fauna. There is some reports of the presence of threatened species of mammals and reptiles and also of avian diversity richness but there is no report of the amphibian diversity. The present study describes for the first time the diversity and morphometry of species of genus *Fejervarya* from the area.

In the current taxonomy²⁷ sixteen species are assigned to the genus *Fejervarya* where members have a distribution in South East Asia,

while 20 species are assigned to the genus *Zakerana*²⁹ with their predominant distribution range in South Asia and two species to the genus *Minervarya*¹⁸ with their distribution in the Western Ghats and the foothills of the Himalaya. A new monotypic genus, *Minervarya*¹⁸ was synonymized with *Fejervarya* based on phylogenetic results³³. *Minervarya* was resurrected from the synonymy of *Fejervarya* with the description of *Minervarya chilapata* from northeastern India⁴⁰. Further, erected the new genus *Zakerana*²⁹ under Dicoglossidae and assigned the species of *Fejervarya* distributed in Western Ghats and South Asia as members of this new genus. The name *Fejervarya* was then assigned only to members distributed in the South East Asian region. This was based on the phylogenetic pattern of two sister clades of *Fejervarya* observed by various researchers in the

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TABLE - 1: Amphibian diversity and their distribution in Sonanadi Wildlife Sanctuary

| Species | Distribution in Sonanadi Wildlife Sanctuary | Number of examples collected & registration numbers |
|-------------------------------|---|---|
| <i>Fejervarya sahydrensis</i> | Kalu Shahid, | 39 specimens |
| | 5 kms away from Hathikund | |
| | Dhaulkhand | |
| <i>Fejervarya nepalensis</i> | Kalu Shahid | 7 specimens |
| <i>Fejervarya terainensis</i> | Hathikund | 1 specimen |

past^{26,28,32,42} and more recently reported.

The analyses¹¹ based on extant data reaffirms the presence of two clades within *Fejervarya*. Workers^{28,32} revealed that the phylogenetic position of the two *Fejervaryan* clades, the South Asian and South East Asian clades, is uncertain, where the members of *Sphaerotheca* are sister to South East Asian members of *Fejervarya*. Their results suggest that the South Asian and South East Asian clades are sister clades which supports the large scale phylogenetic analyses⁴². In phylogenetic analysis, included 18 of 38 known species of Fejervaryan frogs and another 8 species which need authenticated species level identities¹¹. Owing to the fact that most fejervaryan frogs are terrestrial in habitat and have large distribution ranges, it is premature to separate the clades into two different genera without distinct morphological characters for generic level identities.

The distributional range of the species in the sister clades show a large region of overlap⁹². In the sister clade consisting of species from the Western Ghats, there are also members from Sri Lanka, Northeast India, Nepal Himalaya, Andaman Islands and unidentified lineage from Pilek, Thailand. In the other sister clade, there are species from Japan, parts of China, Taiwan parts of Indonesia, Manalysisia, Thailand and a single species from the east coast of Peninsular India (*Fejervarya orissanensis*). This clearly shows a zone of overlap in the east and northeast Indian regions and emphasizes taxon sampling.

Distribution data and historical biogeography analyses are needed to provide evidence of geographical structuring in the sister clades.

The morphological characters²⁹ identify the South Asian clade members of this group can be shown to be highly variable and are not consistent to fix them as generic characters¹¹. For example, (a) size (SVL) is used to distinguish *Zakerana/Fejervarya* where *Zakerana*, is a group of small frogs with the SVL range from 22 to 45 mm while 39 to 90 mm is the SVL, range for *Fejervarya*; however, body size ranges overlap for species of *Zakerana/Fejervarya*; (b) snout slightly pointed for *Zakerana* and snout pointed for *Fejervarya*, it is a subjective character and is not substantiated²⁹; (c) relatively small tympanum is a subjective character and is not justified with any range limits to distinguish the species of *Zakerana/Fejervarya*; (d) small rounded or slightly elongated laterally compressed internal metatarsal tubercles is again a subjective character and does not elucidate how the species of *Zakerana/Fejervarya* species are distinguished; (e) rudimentary webbing on feet is a subjective character and does not justify how the species of *Zakerana/Fejervarya* species are distinguished based on this character¹¹ ..

The absence of distinct morphological characters to distinguish members between these clades, phylogenetic inconsistencies across studies, poor representation of species from these regions, coupled with unclear geographical structuring suggests the need to retain the name *Fejervarya* until additional taxon sampling is made

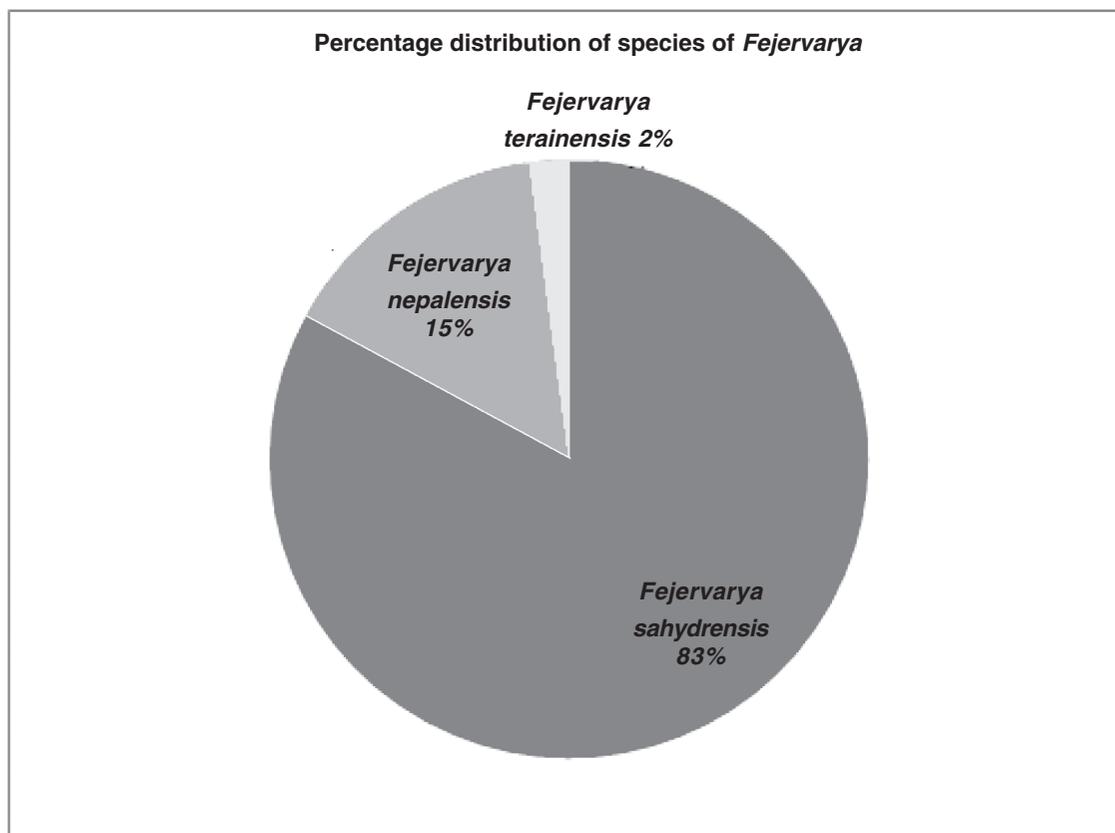


Fig.1 : Percentage distribution of species of genus *Fejervarya*

available. Thus *Zakerana*²⁹ is treated as a junior synonym of *Fejervarya*.

Members of this genus are medium to small size and have a dark brown, more or less wrinkled dorsum. They live around shallow standing waters, such as paddy fields, wetlands, ditches and temporary pools where they lay eggs.

Biochemical and molecular phylogenetic analyses^{12,34,45} indicated the existence of several cryptic species in *Fejervarya* from several localities in its wide distribution range. Partially revised the taxonomy of the *Fejervarya* species from southeastern Asia^{17,46}. However the status of southern Asian species is still in confusion, except for those of Nepal² and Sri Lanka^{20,36}

Fejervarya limnocharis complex from Nepal was separated into different species^{14,17} which were originally assigned to the genus *Rana*: *Fejervarya syhadrensis*, *Fejervarya nepalensis*, *Fejervarya pierrei* and *Fejervarya teraiensis*. The call

characteristics of the males were known to be the main criteria along with the morphological features for differentiating the species. Twenty one nominal species have been included in the *Fejervarya limnocharis* complex from India, these are *Fejervarya andamensis*, *F. brevipalmata*, *F. cancrivora*, *F. caperata*, *F. granosa*³⁵, *F. keralensis*¹⁵, *F. kudremukhensis*, *F. mudduraja*³⁵, *F. murthii*, *F. mysorensis*, *F. nepalensis*, *F. microbariensis*, *F. nilagirica*, *F. orissaensis*, *F. parambikulamanaq*, *F. pierrei*, *F. rufescens*, *F. sauriceps*, *F. syhadrensis* and *F. teraiensis*.

Among twenty one species only few i.e. *F. nepalensis*, *F. pierrei*, *F. teraiensis*, *F. orissaensis*, *F. syhadrensis*, *F. sengupti* have been reported from Northern, Northeastern India. In India *F. nepalensis*, Nepal warty frog, is reported to occur in Arunachal Pradesh, Assam, Nagaland and also reported from Uttarakhand^{5,13}. *F. pierrei*, Pierre's Cricket frog is known to be distributed in Assam, Meghalaya,

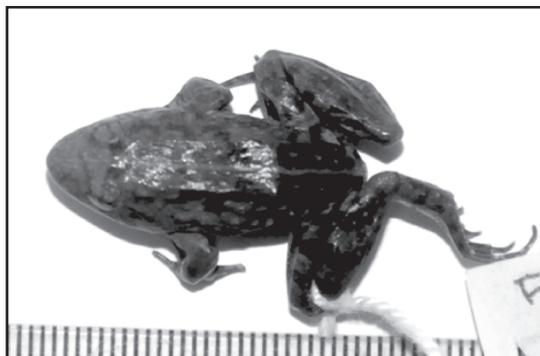


Fig. 2 : *Fejervarya syhadrensis* (Syhadra frog) female, dorsal view

Arunachal Pradesh, Nagaland, Mizoram, Workers⁷ reported it from Assam, whereas also reported it from Uttarakhand⁵. *F. syhadrensis*, Syhadra frog is distributed in Assam, Meghalaya, Maharashtra and Orissa. *F. teraiensis*, Terai warty frog is known to be present in Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura

Material and Methods

During survey to Sonanadi wildlife Sanctuary, specimens of anurans (Genus *Fejervarya*) were collected from various localities (Table 1). The specimens thus collected were fixed in 5% formalin for two days and later transferred to 70% alcohol for preservation. They were examined for different morphological features. Morphometric characters of post metamorphic individuals used here follow those of Matusi (1984)³⁹ and Borthoku *et al.* (2007)⁹. Abbreviations used are: ED = eye diameter; EN = eye-nostril distance; FEL = thigh (femur) length; FOL = foot length; HL = head length; HW = head width; IN = inter narial distance; IO = inter orbital width; SVL = snout-vent length; TBL = shank (tibia) length; TD = tympanum diameter. Sex was determined by examination of secondary sexual character. All illustrations were prepared with the aid of a Cannon 60 D, macro lens 18-135. All measurements were taken with digital calipers to the nearest 0.1 mm.

Results and Discussion

A total of 47 specimens were collected from Sonanadi Wildlife Sanctuary, Nainital, Uttarakhand. All specimens were identified based on morphometry analysis. They were noted to belong to the genus *Fejervarya*. A species of the genus *Fejervarya*, has diagnostic characters; SVL 34.0-

39.0 mm or female, SVL 22.0-40.1 mm for male, the presence of distinct circular spots on hind limb (both in male & female) with pale colour center, snout pointed, basic dorsal color olive green with distinct mid dorsal line, ventrum smooth, white and yellow on hind limb. In male the ventrum on throat with black spots & the hindlimb with intense yellow colour on ventrum, digital formula (fingers) 3>1>2>4. Subarticular tubercles are rounded with oval inner metatarsal tubercles and two additional oval palmer tubercles. The subarticular tubercles smaller than those of the fingers with oblong laterally flattened inner metatarsal tubercles & smaller outer tubercles. Subarticular tubercles prominent on hand & foot, dorsum dark olive green in live with longitudinal tubercles & cream coloured mid dorsal line. Eye diameter 5.0 – 5.5 mm in female, 5.0 – 5.5 in male and inter orbital distance 2.0-2.5 mm in female and 2.0-2.5 in male, inter narial distance 3.0 – 3.5 mm. in female, 3.0-3.5 in male and tympanum diameter 2.5-2.8 mm both in male and female. Thigh length 16.0 mm in female and 8.0 – 14.0 mm in male and shank length 18.0 – 19.0 mm in female and 17.0 – 18.0 in male. Hind limb (toes): Digital formula, 1<2<5<3<4. All these characteristic features were noted in 47 specimens examined (Table 2).

F. teraiensis (Dubois) has distinct patches of red and orange and males have typical W shaped dark marking on throat (Fig) and ovoid stocky body both in male and female. *F. syhadrensis* has forelimb darkly banded and the hindlimbs are dotted on thigh and striped on lower legs. The dorsum in the species has ring shaped spots with paler centre and sides of the body are marbled⁴⁴ (Figs 5-8; 12,13)

For comparison with species of *Fejervarya*



Fig. 3 : *Fejervarya syhadrensis* (Syhadra frog) female ventral view

limnocharis complex, Biodiversity Profiles Project (1995)⁶, Dubois (1975a, 1975b, 1981, 1984)¹⁴⁻¹⁷, Annandale (1919)³, Dutta (1997)²¹, Purkayastha and Matsui 2012⁴², Kuramoto et al. 2007³⁶, Veith et al. 2001⁴⁷, Djong et al. 2007¹², Kurabayashi et al. 2005³⁵, Frost et al. 2006²⁶, Sumida et al. 2007⁴⁵ were referred.

Detailed morphology features of the species of *Fejervarya* examined are as follows:

***Fejervarya syhadrensis* (Annandale); Syhadra frog**

In the present study 37 specimens examined belong to *Fejervarya syhadrensis* (Annandale). The adults have SVL 22.5 -35 mm. with red and orange patches on the dorsum (Table 1, Fig 1). The mid dorsal line rarely present and if present never broad. The throat of males is characterized by a large, darkly colored crescent shaped area. The body is spindle shaped in dorsal view. The head is pointed. The loreal region is slightly concave. The interorbital distance is almost equal to the distance between nares and 57.1-71.4% of the diameter of an upper eyelid. The nares are lateral and closer to the tip of the snout. The tympanum is round and spotted. A supratympanal fold extends from the posterior corner of the eyes to the insertion of the forelimb. The finger tips rounded with a relative finger length $1=2<4<3$ with 4th finger slightly longer than the second. Subarticular tubercles are globular with an oblong oval inner metacarpal tubercle and two additional rounded palmar ones. The toes are webbed with rounded tip and the webbing formula is $10-1111/2-11/2111/2-2+IV11/2-0V$. Subarticular tubercles are distinctly



Fig. 4 : *Fejervarya syhadrensis* (Syhadra frog) male dorsal view



Fig. 5 : *Fejervarya syhadrensis* (Syhadra frog) male ventral view

smaller than those of the fingers and are oval with an oblong inner metatarsal tubercle and a small point like outer tubercle in line with tarsal fold. A narrow ridge is formed by a series of very small tubercle between the outer metatarsal tubercle and the proximal subarticular tubercle of the 5th toe. The dorsum is smooth with a few round, oblong tubercles. The venter is uniformly smooth. Basic dorsal colour is grayish or brownish olive with a few black irregular spots partially fused into transverse bands. There are dark, ring shaped spots with a paler center and the sides of the body are faintly marbled. A very narrow yellowish white middorsal line is present. In 50% of the frog it is interrupted. An interorbital band is present. The forelimbs are darkly banded and the hind limbs are dotted on the thighs and striped on the lower leg. They prefer tropical and subtropical zones, preferring vicinity of water without being really aquatic and can be encountered far from water bodies between Sal trees and river valleys, near brooks, in open grass land and in agricultural regions, paddy fields, pools and ditches. In India the lowest record is from 610 m and the highest record 1,220m (Annandale 1919). (Figs. 5-8)⁴⁴

Fejervarya nepalensis; Nine specimens collected from the area belong to *Fejervarya nepalensis* with SVL of males 27.0-31.5 mm



Fig. 6 : *Fejervarya nepalensis*, (male) dorsal view

(average 29.7 mm); females 31.5-40.0 mm (average 36.8 mm). They are small aquatic frogs that always have mid dorsal line and sometimes have red patches on the dorsum. They have more distinct bands on the legs. The males have a characteristic laterally dark and medially pale coloured throat and vocal sac area. The body is an oblong oval with short hind limbs in dorsal view. The head is pointed and rounded on the side. The canthus rostralis is scarcely indicated. The loreal region is concave. The interorbital distance is only $\frac{2}{3}$ of distance between the lateral nares and $\frac{1}{2}$ the diameter of upper eyelid. The nares are closer to the snout tip than to the anterior angle of the eye. The tympanum is small, round and spotted, $\frac{1}{2}$ the diameter of the eye. A supratympanal fold extends from the posterior corners of the eyes to the forelimb insertion. The fingers have rounded tips and a relative length $2 < 1 < 4 < 3$ with the first scarcely longer than the 2nd finger. Subarticular tubercles are globular. There is an oblong oval, inner metacarpal tubercle at the base of the 1st finger and an oval palmer tubercle at the base of the other fingers. The toes are webbed with the formula I0-II1/2-11/2III1+-2IV1/2-1/2. Toe tips are rounded like finger tips. Slightly oval subarticular tubercles are present. There is an oval and laterally flattened inner metatarsal tubercle in line. The dorsum smooth with 4 longitudinal folds and there are short rounded tubercles on the sides of the body. The venter is uniformly smooth. Males have vocal sacs which



Fig.7: *Fejervarya nepalensis*, (female) ventral view

are black laterally but pale medially (Figs 9-11).

Basic dorsal colour is brown to grayish brown with dark, oblong, irregular spots and reddish dots on the dorsum. A dark interorbital band is interrupted by the middorsal line. The forelimbs have dark stripes and in some specimens an additional reddish spot is present at the insertion. The venter is uniformly yellowish and the throat is faintly dotted. The margins of the lower jaw have narrow dark bars. Males have vocal sacs and laterally dark throats (Figs 9-11) ⁴⁴.

Habitat: In and around brooks, ponds and often in wooded surroundings.

Fejervarya terraiensis (Dubois), Terai Cricket Frog

One specimen out of 47 specimens examined belong to the largest *Fejervarya* species with an ovoid, stocky body. The development of a mid dorsal line is highly variable (Table). The dorsum has distinctive patches of red, orange or green and males have atypical W shaped dark marking on throat. The SVL of adult females range from 41.0-48.5 mm and maximum SVL of the male is 51.0 mm and in females 56.0 mm (Dubois 1975b). The body is large oval. The head is pointed in dorsal view and blunt between nares. The snout

TABLE-2 : Morphometric measurements (in mm) of collected anurans

| Species | S.No. | SVL | TD | HW | HL | ED | IO | IN | Hind Limb | Foot length | Forelimb | TL |
|-------------------------------|-------|-----|----|----|----|----|----|----|-----------|-------------|----------|----|
| <i>Fejervarya sahydrensis</i> | 1 | 17 | 2 | 5 | 5 | 3 | 2 | 2 | 16 | 9 | 4 | 5 |
| | 2 | 18 | 2 | 5 | 5 | 3 | 2 | 2 | 16 | 9 | 4 | 5 |
| | 3 | 19 | 2 | 5 | 5 | 3 | 2 | 2 | 16 | 9 | 4 | 5 |
| | 4 | 18 | 2 | 5 | 5 | 3 | 2 | 2 | 16 | 9 | 4 | 5 |
| | 5 | 23 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 4 | 5 |
| | 6 | 28 | 2 | 9 | 9 | 3 | 2 | 2 | 17 | 9 | 5 | 5 |
| | 7 | 24 | 2 | 8 | 8 | 3 | 2 | 2 | 17 | 9 | 5 | 5 |
| Reg no 1149 | 8 | 21 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 6 | 5 |
| | 9 | 20 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 6 | 5 |
| | 10 | 20 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 6 | 5 |
| | 11 | 18 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 6 | 5 |
| | 12 | 17 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 6 | 5 |
| | 13 | 22 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 6 | 5 |
| | 14 | 19 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 6 | 5 |
| | 15 | 19 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 5 | 5 |

| | | | | | | | | | | | | |
|--|----|----|---|---|---|---|---|---|----|----|---|---|
| | 16 | 20 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 5 | 5 |
| | 17 | 21 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 5 | 5 |
| | 18 | 18 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 5 | 5 |
| | 19 | 20 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 5 | 5 |
| | 20 | 20 | 2 | 6 | 6 | 3 | 2 | 2 | 16 | 9 | 5 | 5 |
| | 21 | 18 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 22 | 17 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 23 | 18 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 24 | 18 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 25 | 20 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 26 | 20 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 27 | 22 | 2 | 7 | 7 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 28 | 19 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 29 | 19 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 30 | 19 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 31 | 18 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 32 | 17 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |

| | | | | | | | | | | | | |
|------------------------------|----|----|---|---|----|-----|---|---|----|------|----|---|
| | 33 | 20 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 34 | 20 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 35 | 19 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 36 | 19 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 37 | 17 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 38 | 27 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| | 39 | 24 | 2 | 6 | 6 | 3 | 2 | 2 | 2 | 16 | 9 | 5 |
| <i>Fejervarya nepalensis</i> | '1 | 20 | 2 | 6 | 6 | 3.5 | 2 | 3 | | 10.2 | | |
| | 2 | 19 | 2 | 6 | 6 | 3.5 | 2 | 3 | 10 | 12 | 8 | 5 |
| | 3 | 27 | 2 | 6 | 6 | 3.5 | 2 | 3 | 10 | 12 | 8 | 5 |
| | 4 | 24 | 2 | 6 | 7 | 3.5 | 2 | 3 | 10 | 12 | 8 | 5 |
| | 5 | 41 | 2 | 7 | 7 | 3.5 | 2 | 3 | 10 | 12 | 8 | 5 |
| | 6 | 16 | 2 | 6 | 6 | 3.5 | 2 | 3 | 10 | 12 | 8 | 5 |
| | 7 | 17 | 2 | 6 | 6 | 3.5 | 2 | 3 | 10 | 12 | 8 | 5 |
| <i>Fejervarya teraiensis</i> | 1 | 44 | 2 | 7 | 10 | 4 | 3 | 3 | 38 | 16 | 16 | 5 |



Fig. 8 : *Fejervarya terraiensis*, (Terai Cricket Frog)

is rounded. The loreal region is concave. The interorbital distance is equal to the distance between nares and 50-60% of the eye diameter. The nares are closer to the snout than to the anterior corners of the eyes. The tympanum is rounded and hidden by the spotted pattern with a variable diameter of 37.5-83.3% of the eye diameter. There is a narrow supratympanal fold between the posterior corners of the eyes and the forelimb insertion. The pineal organ is visible as a small pale dot between the anterior corners of the eyes.

The finger tips are rounded. The relative finger formula is $2=4<1<3$ with the 1st finger distinctively longer than the 2nd and 4th. Subarticular tubercles are globular. There is an oblong oval inner

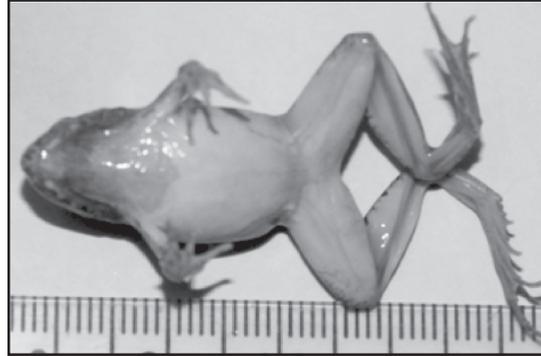


Fig. 9 : W-shaped marking on throat, a characteristic of male *Fejervarya terraiensis*, (Terai Cricket Frog)

metacarpal tubercle at the base of the 1st finger as well as a rounded median tubercle and an outer palmer tubercle at the bases of other fingers. The toes are webbed with a toe formula of I0-1+II0-1-III1/2-11/2IV11/2-0V as in *Fejervarya pierreii*. The toe tips are rounded. Subarticular tubercles are distinctly smaller than those of the fingers (Figs 12, 13) ⁴⁴

Conclusion

The present study indicated that Sonanadi Wildlife Sanctuary (District Nainital, Uttarakhand) is rich in species of genus *Fejervarya* with percentage distribution *Fejervarya syhadrensis* (Annandale); Syhadra frog 83%, *F. nepalensis* 15% and *Fejervarya terraiensis* (Dubois), Terai Cricket Frog 2%.

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DIVERSITY AND MORPHOMETRY OF *FEJERVARYA* (ANURA: DICROGLOSSIDAE) IN SONANADI WILDLIFE SANCTUARY, NAINITAL, UTTARAKHAND, INDIA 401

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DIVERSITY AND MORPHOMETRY OF *FEJERVARYA* (ANURA: DICROGLOSSIDAE) IN SONANADI WILDLIFE SANCTUARY, NAINITAL, UTTARAKHAND, INDIA 403

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