



Pictorial Guide to
Amphibians
of North East India

**ROSAMMA MATHEW
AND
NIBEDITA SEN**



ZOOLOGICAL SURVEY OF INDIA



Pictorial Guide to the
AMPHIBIANS OF NORTH EAST INDIA

ROSAMMA MATHEW
AND
NIBEDITA SEN

Zoological Survey of India, North Eastern Regional Centre, Shillong - 793 003

Edited by the Director, Zoological Survey of India, Kolkata



Zoological Survey of India
Kolkata

CITATION

Mathew, R. and Sen, N. 2010. *Pictorial Guide to the Amphibians of North East India* : 1-144. (Published by the Director, *Zool. Surv. India*, Kolkata).

Published : January, 2010

ISBN 978-81-8171-247-9

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PRICE

Indian Rs. 750.00
Foreign : \$ 50; £ 40

Published at the Publication Division by the Director Zoological Survey of India, 234/4, AJC Bose Road, 2nd MSO Building, 13th floor, Nizam Palace, Kolkata 700020 and printed at M/s Power Printers, New Delhi - 110 002.

FOREWORD

The amphibians of North East India have been worked out by many scientists in the past. The Monographic work by Chanda (1994) deals with 54 species of Anurans from North East India had been the most comprehensive account on the group so far. Under the Conservation of Biodiversity Programme, the Government of India is taking Biological Sciences to the masses. Towards this effort, the Zoological Survey of India is bringing out publications to popularise science. The Pictorial Guide series on various groups of animals published by the Zoological Survey of India are the outcome of this scheme. The latest to add to this category is the present work by the authors. They have taken care to depict as many pictures as possible of the amphibians of North East India. The text contains 110 species of anurans, eight species of caecilians and one species of salamander. The diagnostic characters, habitat and distribution of the species have been incorporated. It is intended to serve students, researchers and laymen alike.

Dr. Ramakrishna
Director
Zoological Survey of India

ACKNOWLEDGEMENTS

The authors are grateful to Dr. Ramakrishna, Director, Zoological Survey of India and to Dr.J.R.B.Alfred, former Director, Zoological Survey of India who had been the guiding spirit behind this project. Mr. C.Radhakrishnan, Additional Director, Zoological Survey of India, Kozhikode, lent us voucher specimens and gave valuable literature and suggestions. Mr. S.J.S.Hattar, Scientist D & the then Officer-in-Charge, had been of much encouragement. The Officers -in- Charge of Zoological Survey of India, Western Ghat Regional Station, Pune and Fresh Water Biological Station, Hyderabad loaned us voucher material for comparative studies. Dr. A.K. Singh, the then Officer-in-Charge, Field Research Centre, Itanagar gave access to the Station's holdings. Dr. Raoul Bain and Dr. Jeffery Wilkinson gave us valuable suggestions and important literature. Dr. Saibal Sengupta, Dr. Sabitry Bordoloi and Dr. Meren Ao sent us amphibian material for comparison and also gave us valuable literature. Rev. Fr. Cyriac, Principal, Don Bosco College, Tura permitted us to study the *Ichthyophis garoensis* specimen from the College Museum.

Our colleagues took interest in this project and on many occasions collected material for us, in particular Ms. Ilona Kharkongar, Mr. M.S.Jyrwa, Mr. A.B.Meetei, Mr. Riyaz Uddin Ahmed and Mr.Gerald Japang. Mr. Kripendra Kumar Deb, Mr.Tilak Bahadur Rai, Mr. Silvester Swell, Mr. Makhan Singh. Special thanks to Dr. Dimos Khyrniam, and Mr. Nirmal Sapkota who had been of much assistance in the field.

The senior author is indebted to her children for help during the various stages of this project: Roselind had collected material from different localities; Aquarius lent the digital camera without which it would not have been possible to carry out this project; and Barry took most of the close up photographs and had been patient in attending to the computer related work initially.

**Rosamma Mathew
and
Nibedita Sen**

ACKNOWLEDGEMENTS FOR PHOTOGRAPHS

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INTRODUCTION

Amphibians are cold-blooded (poikilothermic) vertebrates. The present day amphibians are grouped in to three orders : Caudata (tailed amphibians); Gymnophiona (Caecilians) and Anurans (frogs and toads). Being more vulnerable to environmental changes than many other animals frogs are considered to be early indicators of global disaster. Frog populations around the world have shown increasing signs of stress. Habitat destruction, natural calamities and other environmental factors are causative agents for their depletion. Many species are wiped out from the earth even before they are discovered. At present there are about 285 species of amphibia in India and around 6433 species over the world (Frost, 2009, online reference).

North-east India comprising of the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura, lies between N 21° 58' to 29° 30' E 89° 45' to 97° 30' (Map). This ancient land finds its mention in the Indian epics of Ramayana and Mahabharata. Its topographical, physiographical and climatic factors are conducive for the growth of an abundant flora and fauna. The region therefore is one of the 'Hot spots' of Biodiversity. North-east India is also home to a number of human tribes with varied culture. Their traditional knowledge and inherent wisdom are important in terms of conservation since the people have the right to harness the bioresources of the area. The amphibian fauna of North East India has been studied by various authors in the past. The earliest reports are by Annandale (1912) and Boulenger (1906, 1913, 1919, 1920). There had been a number of publications since then on various aspects of amphibians (Ahmed, 2002; Ahmed and Dutta, 2000 , 2001; Ahmed and Goswami, 1999; Ahmed and Roy, 2001; Ao *et al.*, 2003; Bhaduri and Saha, 1980; Borah and Bordoloi, 2001; 2001a; Bordoloi and Borah, 1999; Bordoloi *et al.*, 2000, 2001, 2003, 2007; Borthakur *et al.*, 2007; Chanda, 1986, 1990, 1990a,b, 1991, 1992, 1993, 1995, 2002, 2006, 2007; Chanda and Ghosh, 1989; Chanda and Sarkar, 1997; Chanda and Talukdar, 1973; Choudhury *et al.*, 1999, 2001, 2001a, b; Das 1984, 1988; Das and Chanda, 2000; Das *et al.*, 2004; Dasgupta, 1990; Deuti and Dutta, 2002; Deuti *et al.*, 2000; Dey and Gupta, 1999, 2000, 2002 ; Dey and Ramanujam , 2003; Dutta ,1997; Dutta *et al.*, 2000; Ghosh and Sarkar, 2000; Grosslet *et al.*, 2004; Hooreo *et al.*, 2002; Hora, 1923; Kiyasetuo, 1986; Kiyasetuo and Khare, 1986, 1987; Mallick, 1997; Mansukhani and Sarkar, 1981; Mansukhani *et al.*, 1976; Mathew and Sen, 2003, 2003a, 2005, 2005a, 2006, 2006a, 2007, 2008, 2008a, 2009; Mathew *et al.*, 2005; Ningombam and Bordoloi, 2007; Pathak *et al.*, 2001; Pillai and Chanda, 1976, 1977, 1979,1981; Pillai and Ravichandran, 1999; Pillai and Yazdani, 1973; Romer, 1949; Roonwal and Kripalani, 1961; Roy *et al.*, 1998; Roy and Elepfandt, 1993; Saha and Gupta, 2007; Sahu, 1985; Saikia *et al.*, 2000; Sarkar and Roy, 2006; Sarkar and

Sanyal, 1985; Sarkar *et al.*, 2002; Selim, 2001; Sen, 2004; Sen and Mathew, 2003, 2004, 2006; Sengupta *et al.*, 2000, 2001, 2008; Singh, 1977, 1995; Smith, 1929, 1935; Talukdar *et al.*, 2007; Yazdani and Chanda, 1971).

The monographic work by Chanda (1994) on the anurans, covering 54 species, of the region is by far the only comprehensive account on the subject. Since publication of this monograph the need for a 'Pictorial Guide to the Amphibians of Northeast India' was felt primarily to popularize this lesser known group among the laymen. The present work deals with one hundred and ten species of Anurans, one species of Caudata and eight species of Caecilians. It is intended to serve both students and researchers alike.

Bufo cyphosus (Ye), *Microhyla pulchra* (Hallowell), *Leptobrachium hasseltii* (Tschudi), *Amolops himalayanus* (Boulenger), *Fejervarya keralensis* (Dubois), *Philautus dubius* (Boulenger), *Philautus jerdonii* (Gunther), *Philautus microdiscus* (Annadale), *Philautus parvulus* (Boulenger), *Polypedates teraiensis* Dubois, *Polypedates dugritei* (David), *Rhacophorus bisacculus* Taylor, *Rhacophorus nigropalmatus* Boulenger, *Rhacophorus reinwardtii* (Schlegel) and *Theloderma nagalandense* (Orlov, Dutta, Ghate and Kent) though reported from North East India, we have not incorporated these in the present study pending confirmation of their occurrence in the region.

Amphibian Nomenclature is undergoing rapid changes (Frost, 2009) (www.amnh.org). Barring the new species we described under the family Bufonidae we have followed Frost (2009) in the systematic arrangement of the species included in this work.

For the diagnostic characters of the anuran species which were not available with us we have referred mainly Boulenger (1882-1920), Chanda (1994, 2002), Schleich and Werner (2002) and Dubois and Ohler (1999, for *Bufo scaber*).

Abbreviations

SVL : Snout to vent length.

TTA : Tibio tarsal articulation (measured when hind limb is stretched along the body).

ERS/ZSI : Eastern Regional Station, Zoological Survey of India.



MAP OF NORTH EAST INDIA

SYSTEMATIC LIST

Class AMPHIBIA

Order ANURA

Family BUFONIDAE

Genus **Bufoides** Pillai and Yazdani, 1973

1. *Bufoides meghalayanus* (Yazdani and Chanda, 1971)

Genus **Bufo** Laurenti, 1768

2. *Bufo himalayanus* (Gunther, 1864)
3. *Bufo kiphirensis* Mathew and Sen, 2009
4. *Bufo macrotis* (Boulenger, 1887)
5. *Bufo mamitensis* Mathew and Sen, 2009
6. *Bufo manipurensis* Mathew and Sen, 2009
7. *Bufo melanostictus* (Schneider, 1799)
8. *Bufo mizoramensis* Mathew and Sen, 2009
9. *Bufo nagalandensis* Mathew and Sen, 2009
10. *Bufo scaber* Schneider, 1799
11. *Bufo stomaticus* Lutken, 1864
12. *Bufo stuarti* Smith, 1929
13. *Bufo wokhaensis* Mathew and Sen, 2009

Genus **Pedostibes** Gunther, 1876

14. *Pedostibes kempi* (Boulenger, 1919)

Family DICROGLOSSIDAE

Genus **Euphlyctis** Fitzinger, 1843

15. *Euphlyctis cyanophlyctis* (Schneider, 1799)
16. *Euphlyctis ghoshi* (Chanda, 1991)
17. *Euphlyctis hexadactylus* (Lesson, 1834)

Genus **Fejervarya** Bolkay, 1915

18. *Fejervarya limnocharis* (Gravenhorst, 1829)
19. *Fejervarya nepalensis* (Dubois, 1975)
20. *Fejervarya pierrei* (Dubois, 1975)

21. *Fejervarya syhadrensis* (Annandale, 1919)

22. *Fejervarya teraiensis* (Dubois, 1984)

Genus ***Hoplobatrachus*** Peters, 1863

23. *Hoplobatrachus crassus* (Jerdon, 1854)

24. *Hoplobatrachus tigerinus* (Daudin, 1802)

Genus ***Limnonectes*** Fitzinger, 1843

25. *Limnonectes khasianus* (Anderson, 1871)

26. *Limnonectes kuhlii* (Tschudi, 1838)

27. *Limnonectes laticeps* (Boulenger, 1882)

28. *Limnonectes mawlyndipi* (Chanda, 1990)

29. *Limnonectes mawphlangensis* (Pillai and Chanda, 1977)

Genus ***Nanorana*** Gunther, 1896

30. *Nanorana annandalii* (Boulenger, 1920)

31. *Nanorana blanfordii* (Boulenger, 1882)

32. *Nanorana liebigii* (Gunther, 1860)

33. *Nanorana mokochungensis* (Das and Chanda, 2000)

Genus ***Ombrana*** Dubois, 1992

34. *Ombrana sikimensis* (Jerdon, 1870)

Genus ***Occidozyga*** Kuhl and Van Hasselt, 1822

35. *Occidozyga borealis* (Annandale, 1912)

Family HYLIDAE

Genus ***Hyla*** Laurenti, 1768

36. *Hyla annectans* (Jerdon, 1870)

Family MEGOPHRYIDAE

Genus ***Leptobrachium*** Tschudi, 1838

37. *Leptobrachium nokrekensis* Mathew and Sen, 2009

38. *Leptobrachium smithi* Matsui, Nabhitabhata and Panha, 1999

Genus ***Scutiger*** Theobald, 1868

39. *Scutiger sikimmensis* (Blyth, 1855)

Genus ***Xenophrys*** Gunther, 1864

40. *Xenophrys boettgeri* (Boulenger, 1899)

41. *Xenophrys glandulosa* (Fei, Ye and Huang, 1991)
42. *Xenophrys kempii* (Anandale, 1912)
43. *Xenophrys major* (Boulenger, 1908)
44. *Xenophrys parva* (Boulenger, 1893)
45. *Xenophrys robusta* (Boulenger, 1908)
46. *Xenophrys serchhipii* Mathew and Sen, 2007
47. *Xenophrys wuliangshanensis* (Ye and Fei, 1995)
48. *Xenophrys zunhehotoensis* Mathew and Sen, 2007

Family MICROHYLIDAE

Genus *Kalophrynus* Tschudi, 1838

49. *Kalophrynus interlineatus* Blyth, 1855

Genus *Kaloula* Gray, 1831

50. *Kaloula assamensis* Das, Sengupta, Ahmed and Datta, 2005
51. *Kaloula pulchra* Gray, 1831
52. *Kaloula taprobanica* Parker, 1934

Genus *Microhyla* Tschudi, 1838

53. *Microhyla berdmorei* (Blyth, 1856)
54. *Microhyla heymonsi* Vogt, 1911
55. *Microhyla ornata* (Dumeril and Bibron, 1841)
56. *Microhyla rubra* (Jerdon, 1854)

Genus *Micryletta* Dubois, 1987

57. *Micryletta inornata* (Boulenger, 1890)

Genus *Uperodon* Dumeril and Bibron, 1841

58. *Uperodon globulosus* (Gunther, 1864)

Family RANIDAE

Genus *Amolops* Cope, 1865

59. *Amolops assamensis* Sengupta, Hussain, Choudhury, Gogoi Ahmed and Choudhury, 2008
60. *Amolops formosus* (Gunther, 1876)
61. *Amolops gerbillus* (Anandale, 1912)
62. *Amolops marmoratus* (Blyth, 1855)

63. *Amolops monticola* (Anderson, 1871)
64. *Amolops viridimaculatus* (Jiang, 1983)
 Genus ***Clinotarsus*** Mivart, 1869
65. *Clinotarsus alticola* (Boulenger, 1882)
 Genus ***Humerana*** Dubois, 1992
66. *Humerana humeralis* (Bouleger, 1887)
 Genus ***Hylarana*** Tschudi, 1838
67. *Hylarana erythraea* (Schlegel, 1837)
68. *Hylarana garoensis* (Boulenger, 1920)
69. *Hylarana leptoglossa* (Cope, 1868)
70. *Hylarana malabarica* (Tschudi, 1838)
71. *Hylarana nicobariensis* (Stoliczka, 1870)
72. *Hylarana nigrovittata* (Blyth, 1856)
73. *Hylarana taipehensis* (Van Denburgh, 1909)
74. *Hylarana tytleri* Theobald, 1868
 Genus ***Odorrana*** Fei, Ye and Huang, 1990
75. *Odorrana chloronota* (Gunther, 1876)
76. *Odorrana livida* (Blyth, 1856)
 Genus ***Pterorana*** Kiyasetuo and Khare, 1986
77. *Pterorana khare* Kiyasetuo and Khare, 1986
 Family RHACOPHORIDAE HOFFMAN, 1932
 Genus ***Chiromantis*** Peters, 1854
78. *Chiromantis cherrapunjiae* (Roonwal and Kripalani, 1961)
79. *Chiromantis doriae* (Boulenger, 1893)
80. *Chiromantis senapatiensis* (Mathew and Sen, 2009)
81. *Chiromantis shyamrupus* (Chanda and Ghosh, 1989)
82. *Chiromantis simus* (Annandale, 1915)
83. *Chiromantis vittatus* (Boulenger, 1887)
 Genus ***Kurixalus*** Ye, Fei and Dubois in Fei, 1999
84. *Kurixalus naso* (Annandale, 1912)

Genus ***Philautus*** Gistel, 1848

85. *Philautus andersoni* (Ahl, 1927)
86. *Philautus annandalii* (Boulenger, 1906)
87. *Philautus garo* (Boulenger, 1919)
88. *Philautus kempiae* (Boulenger, 1919)
89. *Philautus manipurensis* Mathew and Sen, 2009
90. *Philautus namdaphaensis* Sarkar and Sanyal, 1985
91. *Philautus sahai* Sarkar and Ray, 2006
92. *Philautus shillongensis* Pillai and Chanda, 1973

Genus ***Polypedates*** Tschudi, 1838

93. *Polypedates assamensis* Mathew and Sen, 2009
94. *Polypedates leucomystax* (Gravenhorst, 1829)
95. *Polypedates maculatus* (Gray, 1838)
96. *Polypedates megacephalus* Hallowell, 1861
97. *Polypedates subansiriensis* Mathew and Sen, 2009
98. *Polypedates taeniatus* (Boulenger, 1906)

Genus ***Rhacophorus*** Kuhl and Van Hasselt, 1822

99. *Rhacophorus appendiculatus* (Gunther, 1858)
100. *Rhacophorus bipunctatus* Ahl, 1927
101. *Rhacophorus htunwini* Wilkinson, Thin, Lwin, and Shein, 2005
102. *Rhacophorus maximus* Gunther, 1858
103. *Rhacophorus rhodopus* Liu and Hu, 1960
104. *Rhacophorus subansiriensis* Mathew and Sen, 2009
105. *Rhacophorus suffry* Bordoloi, Bortamuli and Ohler, 2007
106. *Rhacophorus taronensis* Smith, 1940
107. *Rhacophorus translineatus* Wu, 1977
108. *Rhacophorus tuberculatus* (Anderson, 1871)

Genus ***Theلودerma*** Tschudi, 1838

109. *Theلودerma asperum* (Boulenger, 1886)
110. *Theلودerma moloch* (Annandale, 1912)

Order CAUDATA

Family SALAMANDRIDAE GOLDFUSS, 1820

Genus *Tylototriton* Anderson, 1871

111. *Tylototriton verrucosus* Anderson, 1871

Order GYMNOPHIONA

Family CAECILIIDAE, RAFINESQUE, 1814

Genus *Gegeneophis* Peters, 1880

112. *Gegeneophis fulleri* (Alcock, 1904)

Family ICHTHYOPHIIDAE Taylor, 1968

Genus *Ichthyophis* Fitzinger, 1826

113. *Ichthyophis alfredii* Mathew and Sen, 2009
 114. *Ichthyophis daribokensis* Mathew and Sen, 2009
 115. *Ichthyophis garoensis* Pillai and Ravichandran, 1999
 116. *Ichthyophis glutinosus* (Linnaeus, 1758)
 117. *Ichthyophis husaini* Pillai and Ravichandran, 1999
 118. *Ichthyophis nokrekensis* Mathew and Sen, 2009
 119. *Ichthyophis sikimensis* Taylor, 1960

SYSTEMATIC ACCOUNT

Order ANURA

Family BUFONIDAE

1. *Bufoides meghalayanus* (Yazdani and Chanda, 1971)
 (Figs. 1-3)

Common name : Mawblang toad.

Diagnostic characters : Head broader than long; snout short, conical as long as eye; tongue elliptical; vomerine teeth absent; pupil horizontal; tympanum hidden; parotid glands absent; prominent pre orbital and post orbital warts; nostrils laterally situated and much nearer to tip of snout. Forelimbs moderate, fingers free with slightly dilated tips; hindlimbs moderate, toes almost fully webbed; TTA reaching the posterior corner of eyes. Sole with flesh pad. Dorsally uniform dark brown to black. Tips of warts and tubercles deep brown; ventrally grayish, spotted with brown.



Fig. 1. *Bufoides meghalayanus* (Yazdani and Chanda) (Lateral view)



Fig. 2. *Bufoides meghalayanus* (Yazdani and Chanda) (Ventral view)

Habitat : Occurs in fields and vegetation.

Distribution : INDIA: Assam, Meghalaya, Mizoram.

Elsewhere : Not known.



Fig. 3. *Bufoides meghalayanus* (Yazdani and Chanda) (Showing shape of tongue)

2. *Bufo himalayanus* (Gunther, 1864)

(= *Duttaphrynus himalayanus*)

(Fig. 4)

Common name : Himalayan Toad.

Diagnostic characters: Head broad, supra orbital ridges blunt; tympanum small, rather indistinct, about half the width of the eye; parotids long, elliptical; toes webbed at base; TTA reaching nearly the tip of snout. Dorsally uniform brown to yellowish with dark brown to black dots. Tips of warts and tubercles dark brown to black. Ventrally smooth, yellowish, spotted with brown.

Habitat : Occuring everywhere : fields, villages and within dense vegetation, usually far from natural water bodies.

Distribution : INDIA : Arunachal Pradesh, Assam, Manipur, Meghalaya, Sikkim, West Bengal.

Elsewhere : China, Nepal; Pakistan.



Fig. 4. *Bufo himalayanus* (Gunther)

3. *Bufo kiphirensis* Mathew and Sen, 2009

(Figs. 5-7)

Common name : Kiphire's Toad.

Diagnostic characters : Head broader than long; snout tip tuberculated; cranial ridges prominent; nostril closer to snout; tympanum vertically elongate; parotid long, reniform; tongue moderate, oval. Forelimb moderate; subarticular tubercles on digits double; palmar tubercles light brown; digit tips swollen. Hind limbs moderate; metatarsal tubercles light brown; TTA reaches up to the middle of parotid. Dorsum dark brown all over; ventrum paler. Body fully covered with various sizes of warts and tubercles, some with pointed spines mostly on posterior side and on limbs; four pairs of roundish

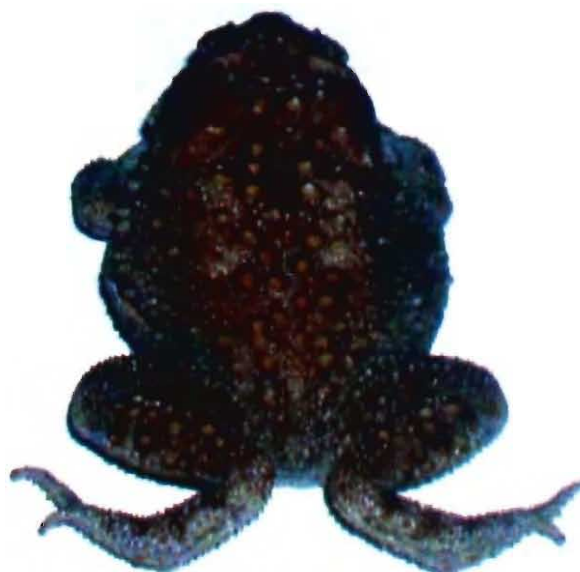


Fig. 5. *Bufo kiphirensis* Mathew and Sen (Dorsal view)



Fig. 6. *Bufo kiphirensis*
(Dorso-lateral view)



Fig. 7. *Bufo kiphirensis* Mathew and
Sen (Ventral view)

vertebral warts anteriorly; tubercles on dorsum large, uniquely rosette; colouration of warts and cranial ridges same as the body colour.

Habitat : Perianthropic.

Distribution : INDIA : Nagaland (Known from Type locality only)

4. *Bufo macrotis* (Boulenger, 1887)
(= *Ingerophrynus macrotis*)

(Fig. 8)

Common name : Big eyed toad.

Diagnostic characters : Head broader than long, with weak cranial ridges; snout short, truncated; pupil horizontal; tympanum very close to eye, distinct and vertically oval; more than half the diameter of eye; inter orbital space flat, a little



Fig. 8. *Bufo macrotis* (Boulenger)

broader than upper eyelid; Body rough, covered with spiny warts; parotids prominent; limbs with cross bands; toes barely half webbed with triangular spiny tubercles beneath; two small but distinct metatarsal tubercles present. Dorsal surface dark brown; ventral surface brownish with darker spots.

Habitat : Open land, undisturbed forest area.

Distribution : INDIA : Arunachal Pradesh.

Elsewhere : Myanmar through western and southern Thailand to the central highland of Vietnam to Northern Malaysia.

5. *Bufo mamitensis* Mathew and Sen, 2009.

(Figs. 9-12)

Common name : Mamit's Toad.

Diagnostic characters : Head broader than long; tip of snout between ridges minutely tuberculated; nostril equidistant to eye and tip of snout; tympanum almost round; tongue short, broad, subround. Forelimbs moderate; 1st and 2nd fingers close to each other; similarly 3rd and 4th fingers close to each other. Hind limbs moderate; TTA reaches tympanum ; toes webbed. Dorsum dark brown; venter paler; four pairs of vertebral warts



Fig. 9. *Bufo mamitensis* Mathew & Sen

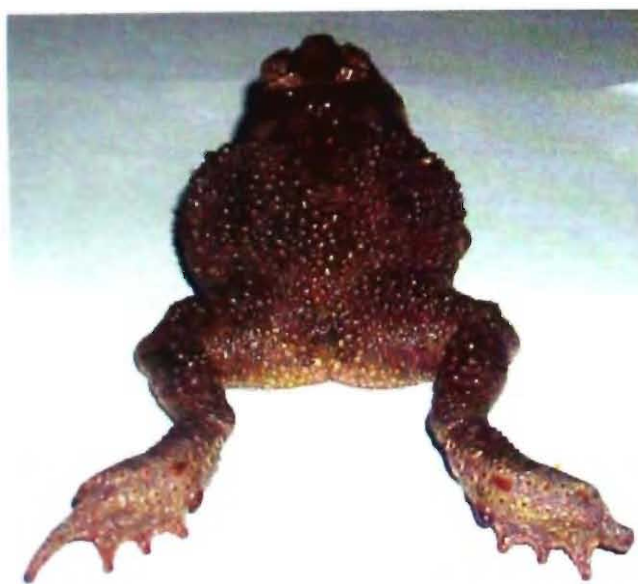


Fig. 10. *Bufo mamitensis* (Dorsal view)

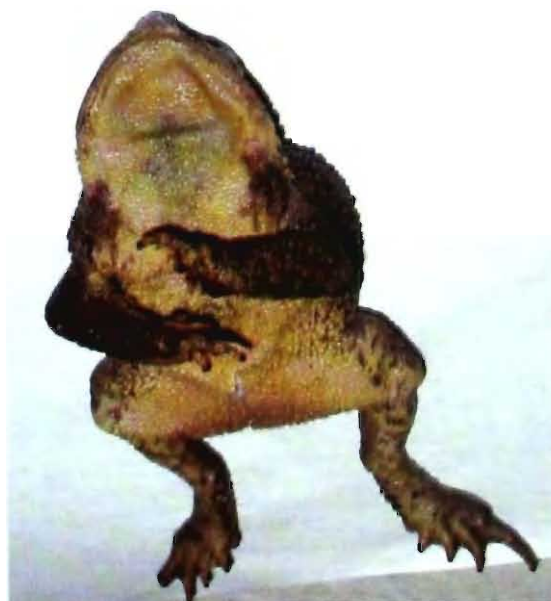


Fig. 11. *Bufo mamitensis* Mathew & Sen (Ventral view showing blotches at shoulder level)



Fig. 12. *Bufo mamitensis* Mathew & Sen (Lateral view showing tympanum)

anteriorly; chest with dark, round blotches at shoulder level; warts on body moderate, round/conical, of various sizes; flanks and limbs with smaller warts.

Habitat : Forest area , perianthropic.

Distribution : INDIA : Mizoram (Known from type locality only).

6. *Bufo manipurensis* Mathew and Sen, 2009

(Figs. 13-15)



Common name : Chandel's Toad.

Diagnostic characters : Head broader than long; snout pointed; nostril closer to tip of snout; tympanum moderate, vertically oval; parotid elongated, somewhat reniform; tongue elongate. Forelimbs short, moderate; fingers free; 1st finger longer than 2nd; digit tips blunt; meta carpal tubercles not black; subarticular tubercles double. Hind limbs short, moderate; TTA reaching posterior end of parotid; metatarsal tubercles distinct, not black;

Fig. 13. *Bufo manipurensis* Mathew & Sen



toes webbed. Body short, stumpy; cranial ridges narrow; dorsum dark brown; jaws and limbs barred; snout tip with few tubercles, not thickened; 3 pairs of vertebral warts on the anterior part; dorsum with black tipped, round and conical tubercles and warts of various sizes; warts on limbs smaller, some of them spiny.

Habitat : Forest area.

Distribution : INDIA : Manipur (Known from type locality only).

Fig. 14. *Bufo manipurensis* (Front view)

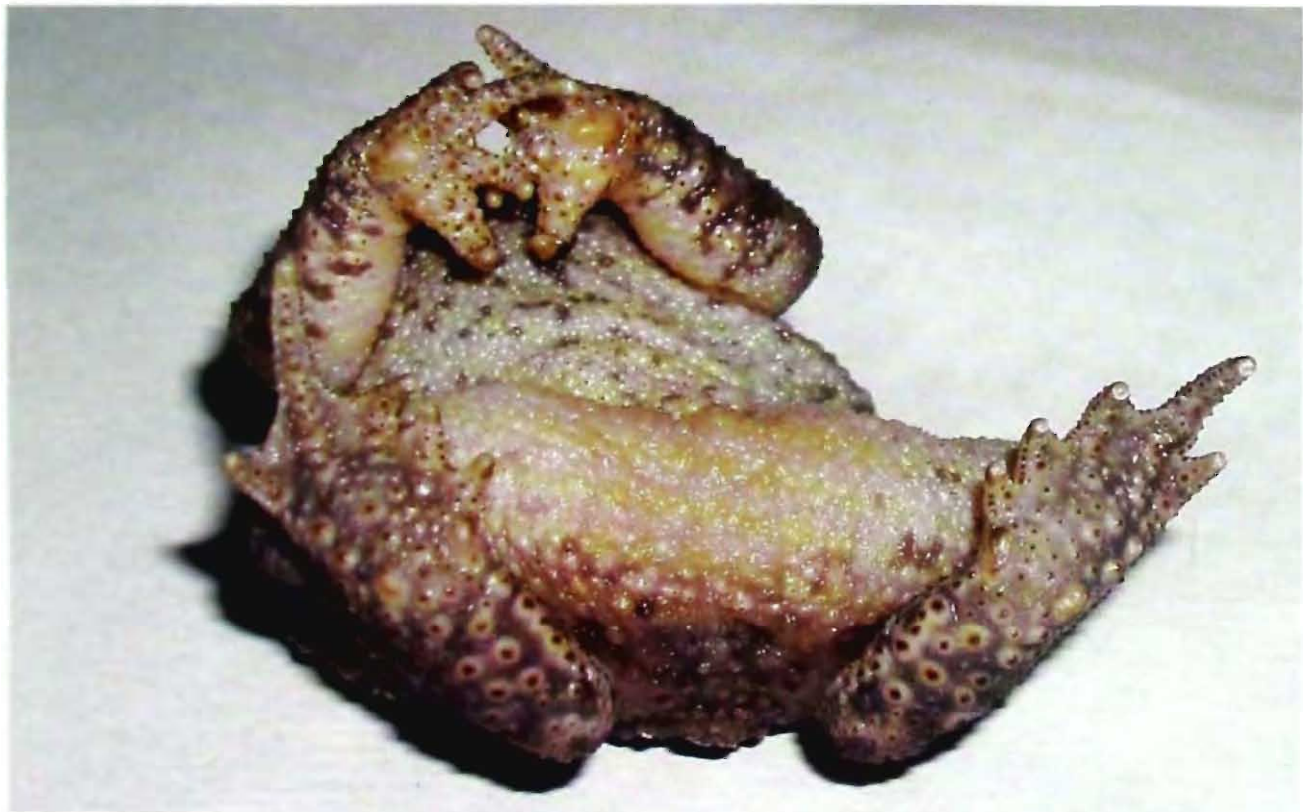


Fig. 15. *Bufo manipurensis* Mathew & Sen (Ventral view)

7. *Bufo melanostictus* (Schneider, 1799)

(=*Duttaphrynus melanostictus*)

(Figs. 16-18)

Common name : Common Indian Toad.



Fig. 16. *Bufo melanostictus* (Schneider)

Diagnostic characters : Head with canthal, pre orbital, supra orbital, post orbital and a short supra tympanic bony ridge; tympanum large, very distinct, more than $2/3^{\text{rd}}$ the eye diameter; toes blunt, half webbed. TTA reaching eyes. Dorsally brown or yellowish brown, sometimes with black spots. Tips of warts and ridges dark brown to black. Ventrally smooth, yellowish, more or less spotted with brown.



Fig. 17. *Bufo melanostictus* (Schneider)



Fig. 18. Towards 'survival of the fittest',
Eggs of *Bufo melanostictus*

Habitat : Occurring almost everywhere though strikingly perianthropic.

Distribution : INDIA : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura.

Elsewhere : Throughout India; Bali; Borneo; China; Hongkong; Indonesia; Java; Malaysia; Myanmar; Nepal; Pakistan; Philippines; Sumatra; Thailand; Sri Lanka.

Remarks : During the breeding season it is observed that more than one male cling on to a female thereby forming a 'ball' moving with the water current. One such 'ball' intercepted had 7 individuals.

8. *Bufo mizoramensis* Mathew and Sen, 2009

(Figs. 19-21)

Common name : Kolasib's Toad

Diagnostic characters : Head broader than long; snout tip dark, thickened with smooth warts; cranial ridges not black; nostril closer to snout; jaws banded; tympanum distinct, vertically elongate; tongue oval. Forelimbs slender; faint bands



Fig. 19. *Bufo mizoramensis* Mathew & Sen (Dorsal view)

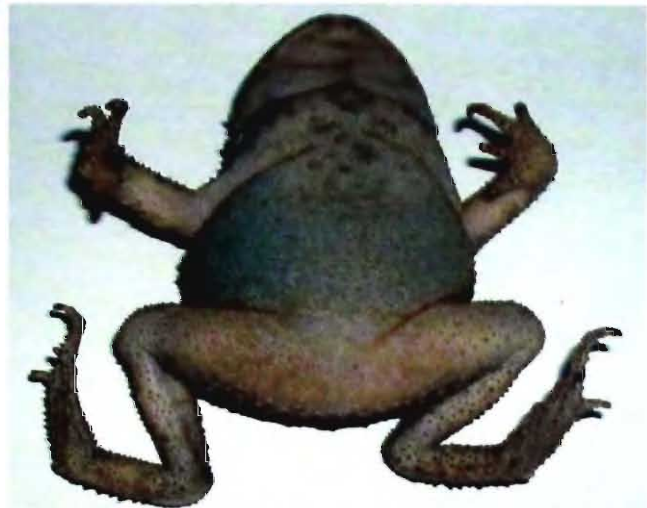


Fig. 20. *Bufo mizoramensis* Mathew & Sen (Ventral view)



Fig. 21. *Bufo mizoramensis* Mathew & Sen (Lateral view)

on limbs; digit with swollen tips; fingers slender Hind limbs moderate; TTA reaches middle of parotid; toes webbed. Dorsum grayish brown with lighter brownish warts, venter paler; anteriorly four pairs of vertebral warts of moderate size; elsewhere the warts are of different sizes, round, conical and spinous; smaller ones towards the sides and limbs; cranial ridges, warts and parotids concolourous with the body; ventrally granulated.

Habitat : Forest area.

Distribution : INDIA : Mizoram (Known from type locality only).

9. *Bufo nagalandensis* Mathew and Sen, 2009

(Figs. 22-24)

Common name : Nagaland's Toad.

Diagnostic characters : Head broader than long; upper eyelid warty, cranial ridges prominent; nostril closer to snout; a pair of tubercles between anterior part of eyes; tympanum vertically elongate; parotid elongate, reniform; tongue medium,



Fig. 22. *Bufo nagalandensis* Mathew & Sen
(Dorsal view)



Fig. 23. *Bufo nagalandensis* Mathew & Sen
(Ventral view)

oval. Forelimbs moderate; fingers free; subarticular tubercles double. Hindlimbs moderate; TTA reaching middle of parotid; digit tips not black, rather brown; toes webbed. Dorsum dark brown, venter paler; dorsum with various sizes of warts and tubercles; some warts and tubercles with pointed spines mainly on posterior side of body and limbs; 4 pairs of vertebral warts anteriorly; warts and tubercles not black tipped.

Habitat : Forest area.

Distribution : INDIA : Nagaland (Known from type locality only).



Fig. 24. *Bufo nagalandensis* Mathew & Sen
(Lateral view showing whitish tubercles & ridges)

10. *Bufo scaber* Schneider, 1799

(Figs. 25-28)

Common name : Schneider's toad

Diagnostic characters : Head broader than long; cranial ridges not very prominent; snout rounded, protruding, its length shorter than eye diameter; canthus rostralis not sharp; loreal region concave; inter orbital space flat, less than eye diameter; nostrils rounded, closer to tip of snout; tympanum half the eye diameter; tympanum-eye distance less than half tympanic diameter; parotid glands very prominent, round, not warty or spiny but thickened and somewhat uneven; tongue elongate; supratympanic fold



Fig. 25. *Bufo scaber* Schneider



Fig. 26. *Bufo scaber* (Dorsal view)



Fig. 27. *Bufo scaber* Schneider (Ventral view)

absent. Forelimbs moderate; tips of fingers round, not dilated; subarticular tubercles prominent, double; a single prominent round palmar tubercle; palm and fingers with many tubercles; relative length of fingers from shortest to longest, 2, 4, 1, 3. Hind limbs moderate; toes webbed, tips round, not dilated; subarticular tubercles prominent; inner metatarsal tubercle oval, prominent; outer metatarsal tubercle roundish oval; relative length of toes from shortest to longest 1, 2, 5, 3, 4. Snout somewhat smooth; lateral sides of head without warts; skin between eyes, eyelids and the region behind eye with round and conical warts; back and flanks with round (smoothened, small and large) and conical warts; limbs covered with warts and spines; ventrally with smaller warts; dorsum light brown, ventrally whitish.

Habitat: Undisturbed forest area near vicinity of water.

Distribution : INDIA : Manipur.

Remarks : The species is recorded for the first time from India. Therefore a detailed description along with habitat notes of the species is included. Dubois and Ohler (1999) who designated the lectotype after examining the specimen in Berlin Museum could not give a more precise distribution of the species than 'India'. Our material was collected from Moreh in Chandel district of Manipur and is deposited in the holdings of ERS/ZSI, Shillong.



Fig. 28. Tongue of *Bufo scaber* Schneider

11. *Bufo stomaticus* Lutken, 1864

(Fig. 29)

Common name : Marbled Toad.

Diagnostic characters : Head broader than long, dorsally flat or weakly concave; canthus round to angular; no cranial ridge; snout slightly pointed, but truncated between nostrils; nostrils closer to eye; tympanum distinct, vertically oval; Parotids elliptical and flat; several light and large tubercles partially fused behind mouth cleft. TTA reaches between shoulder and eyes. Dorsum with numerous small rounded flat warts which partially have black tips; ventrally granular; males with subgular vocal sacs.



Fig. 29. *Bufo stomaticus* Lutken

Dorsum grey to light olive or yellowish green, irregularly marbled with a small dark olive pattern. Belly uniform whitish yellow; in some specimens irregularly spotted on the gular and thoracic region.

Habitat : Of common occurrence, distinctly perianthropic.

Distribution : INDIA : Assam, Andhra Pradesh, Bihar, Kerala, Orissa, South-Western India, Tamil Nadu, Uttar Pradesh, West Bengal, Western Ghats.

Elsewhere : Afghanistan; East Iran; Myanmar; Nepal; Pakistan; Sri Lanka.

12. *Bufo stuarti* Smith, 1929

(Figs. 30,31)

Common name : Stuart's toad.

Diagnostic characters : Head broader than long; cephalic ridges absent; snout obtuse, protruding beyond mouth; canthus rostralis distinct; inter orbital space slightly concave; nostril closer to snout than eye; tympanum oval, vertical, distinct; parotid glands long, reniform. Forelimbs moderate, arm robust and enlarged; fingers long and thin, tip rounded. Hind limbs moderate; toes half webbed; TTA reach tip of snout; inner and outer metatarsal tubercles present; head and anterior of dorsum granular, posterior of dorsum with large keratinized warts; dorsal parts of limbs with keratinized warts; throat, chest, belly and thighs granular; dorsal and lateral parts of the head and body tan olive with brown warts; limbs dorsally of the same colour; ventral parts of head, body, and limbs whitish.

Habitat : Undisturbed Forest area.

Distribution : INDIA : Meghalaya.

Elsewhere : Myanmar.

Remark : Smith's (1929) paper "On a collection of amphibians and reptiles from the upper reaches of the Brahmaputra" dealt with seven species of amphibians namely *Rana cyanophlyctis*, *R. limnocharis*, *R. hascheana*, *R. alticola*, *Rana afghana*, *Bufo stuarti*, and *Megophrys major*. The adult male specimen of *Bufo* which formed the holotype of *stuarti* was collected 'on the Putao plain, N.E. Burma, near the Tibetan frontier' Subsequent researchers who probably had no access to this publication had been misled by the title of the paper and attributed the distribution of *Bufo stuarti* to Assam without confirming the details (Das and Dutta, 1998; Dutta, 1992, 1997; Frost, online reference (2009) ; Inger and Dutta, 1986, Wogan *et al.*, 2003).



Fig. 30. *Bufo stuarti* Smith



Fig. 31. *Bufo stuarti* Smith (Lateral view)

While studying the amphibians from the Reserve Forest of Baghmara, in South Garo Hills district of Meghalaya, the authors came across a single specimen of *Bufo stuarti* measuring 21 mm (Hattar *et al.*, sent for publication) which is the first record of this species from India.

13. *Bufo wokhaensis* Mathew and Sen, 2009

(Figs. 32-35)

Common name : Wokha's Toad.

Diagnostic characters : Head depressed; cranial ridges white, very prominent; head much broader than long; nostril equidistant to eye and snout tip; jaws white; tympanum large, vertically oval, brown; parotid glands elongate, perforated; tongue short, subround. Forelimbs moderate; subarticular tubercles on digits double; palmar tubercles white; 1st finger longer than 2nd. Hind limbs short, stout; subarticular tubercles on digits single; metatarsal tubercles white; heels just touching when hind limbs folded at right angles to the body; TTA reach parotid; toes webbed. Body stout; dorsum brown,



Fig. 32. *Bufo wokhaensis* Mathew & Sen (Dorsal view)



Fig. 33. *Bufo wokhaensis* Mathew & Sen (Ventral view)



Fig. 34. *Bufo wokhaensis* Mathew & Sen
(Lateral view showing tympanum and white ridges)



Fig. 35. *Bufo wokhaensis* Mathew & Sen (Back view)

fully covered with warts and tubercles of various sizes; eight pairs of large, round vertebral row of warts from parotid region to groin; ventrally lighter; throat and chest speckled with brown.

Habitat : Perianthropic

Distribution : INDIA : Nagaland (Known from type locality only).

14. *Pedostibes kemp* (Boulenger, 1919)

(Fig. 36)

Common name : Garo hills's tree toad.

Diagnostic characters : Head broader than long; snout pointed; parotid glands prominent; tympanum hidden; toes more than half webbed, with round tips; inner metatarsal tubercle prominent, outer indistinct; TTA reaches shoulder. Skin rough with irregular tubercles of various shapes and sizes all over; dorsally dark grey to brown, ventral surface dark brown; a pair of large round axillary gland on either side of chest near base of arm.

Habitat : Forest area.

Distribution : INDIA : Meghalaya.

Elsewhere : Not known.

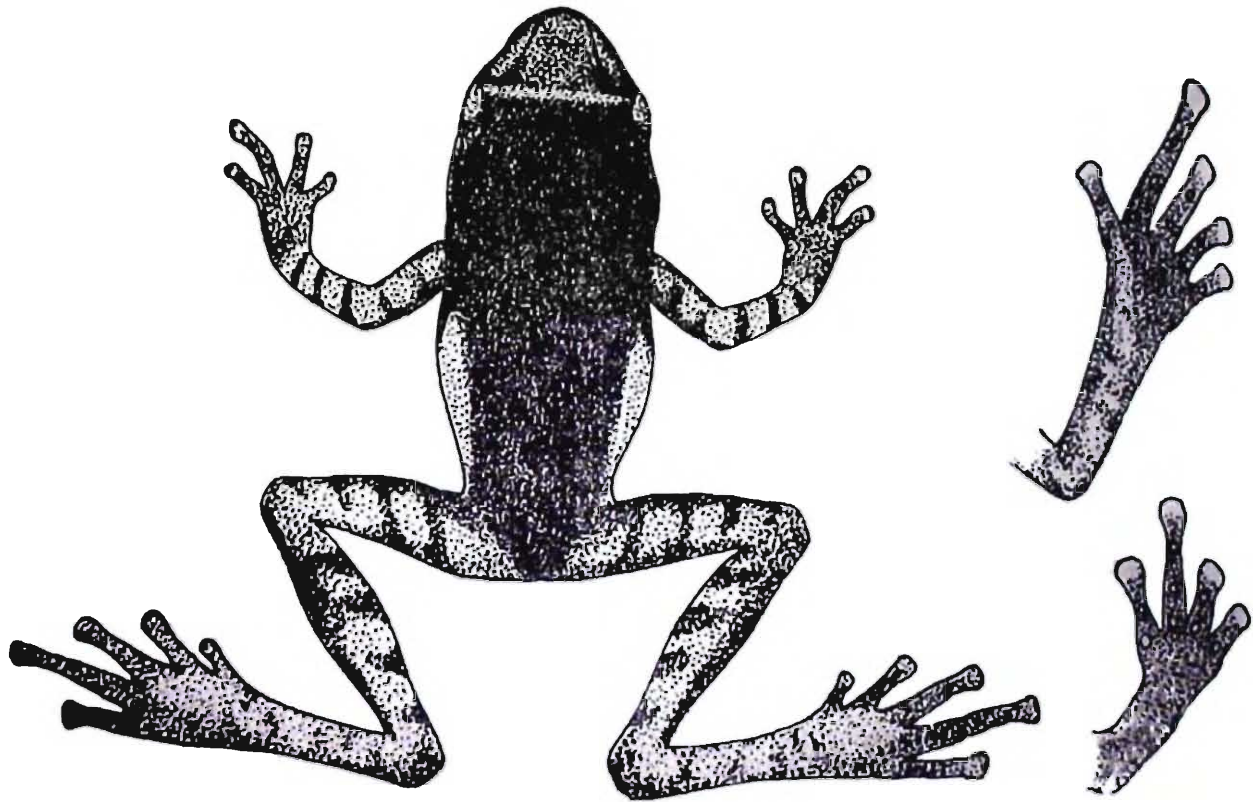


Fig. 36. *Pedostibes kempi* (Boulenger)

Family DICROGLOSSIDAE

15. *Euphlyctis cyanophlyctis* (Schneider, 1799)

(Figs. 37, 38)

Common name : Indian Skipper frog.

Diagnostic characters : Head slightly broader than long; snout pointed; loreal region oblique and concave; nostrils equidistant to eye and tip of snout; inter orbital space equal inter narial space; tympanum distinct, $\frac{2}{3}$ rd diameter of eye; vomerine teeth oblique; fingers and toes pointed; toes fully webbed; TTA reach a little beyond eye. Greyish, brownish or olive above, spotted or marbled with black; ventrally smooth, white or



Fig. 37. *Euphlyctis cyanophlyctis* (Schneider)



Fig. 38. *Euphlyctis cyanophlyctis* (Schneider)

pale yellowish, speckled with or without black dots; dorsum with small tubercles and warts; laterally with a distinct row of pores.

Habitat : Varied aquatic habitats including hot springs; paddy fields, ponds, streams and rivers.

Distribution : INDIA : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Throughout India.

Elsewhere : Afghanistan, Bangladesh, Bhutan, Malaya, Myanmar, Nepal, Pakistan, Saudi Arabia, Sri Lanka.

16. *Euphlyctis ghoshi* (Chanda, 1991)

(Fig. 39)

Common name : Ghosh's frog.

Diagnostic characters : Head broader than long, depressed; snout rounded; tympanum half the diameter of eye; lower jaw with tooth like bony process; vomerine teeth oblique; fingers free with round tips, first finger slightly longer; subarticular tubercles small, very prominent; toes fully webbed with round tips; TTA reaching tympanum; inner meta tarsal tubercle prominent, oval; outer meta tarsal tubercle absent. Dorsally light brown with dark irregular blotches; a dark stripe extends from posterior border of eyes to the shoulder; dorsum rough with small tubercles; ventrally pale, smooth; a glandular dorso-lateral fold extending from eyes to groin.

Habitat : Known to occur in the vegetation overhanging streams.

Distribution : INDIA : Manipur.

Elsewhere : Not known.

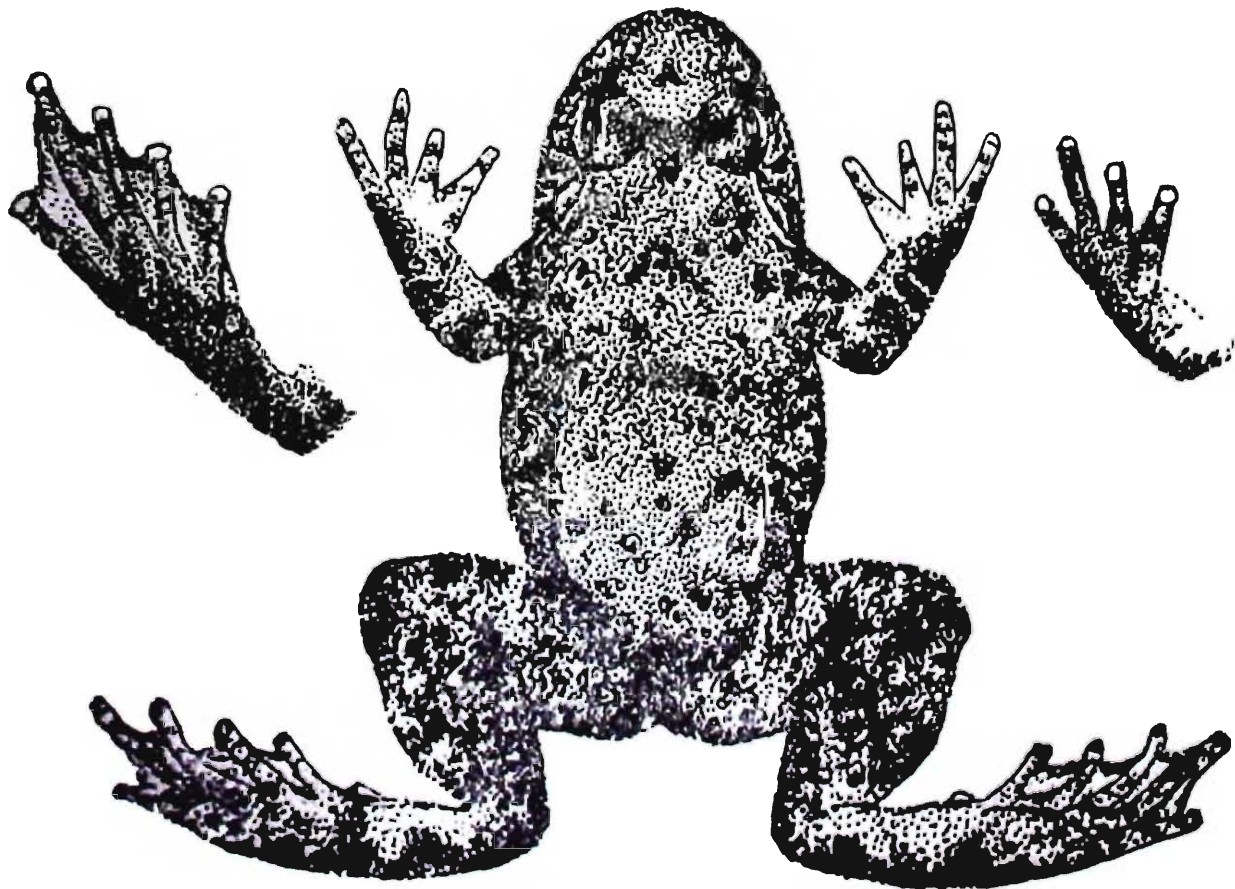


Fig. 39. *Euphlyctis ghosi* (Chanda)

17. *Euphlyctis hexadactylus* (Lesson, 1834)

(Figs. 40-42)

Common name : Indian Pond frog.

Diagnostic characters : Head slightly broader than long; snout pointed; nostril dorsally placed; tympanum distinct, $\frac{3}{4}$ th to once the size of the eye; pineal ocellus present; fingers rather blunt, 1st longer than 2nd; toes fully webbed; TTA reach between tympanum and eye; inner metatarsal tubercle digitiform; outer metatarsal tubercle absent. Dorsum brownish to blackish with darker blotches and usually with prominent warts; ventrally either plain or thinly or thickly mottled with brown and with distinct rows of pores, one each on lateral side, two rows on either side of belly and one across throat.

Habitat : Ponds, lakes, rivers, aquatic vegetation etc.



Fig. 40. *Euphlyctis hexadactylus* (Lesson)



Fig. 41. *Euphlyctis hexadactylus* (Lesson)



Distribution : INDIA : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Kerala, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Throughout south, west and east India, West Bengal.

Elsewhere : Bangladesh, Sri Lanka.

Fig. 42. *Euphlyctis hexadactylus* (Lesson) (Showing infected porous lines)

18. *Fejervarya limnocharis* (Gravenhorst, 1829)

(Figs. 43, 44)

Common name : Cricket frog.

Diagnostic characters : Head broader than long; snout oval, protruding; nostrils oval with small lateral flap; tympanum distinct, $\frac{1}{2}$ the diameter of eye; pineal ocellus present; tips of fingers and toes pointed; sub articular tubercles prominent, round; toes moderately webbed; dermal fringe along 5th toe well developed; inner meta tarsal tubercle short, prominent; outer metatarsal tubercle absent. Dorsum light brown to black or olive with distinct or variable markings; dorsally a chevron shaped marking; a distinct, thin or thick, vertebral line present or absent; similar lines may be present along thighs right up to heels.

Fig. 43. *Fejervarya limnocharis* (Gravenhorst)

Habitat : Paddy fields; Grass lands; cultivated lands; moist forest-bed; and in and around water bodies.

Distribution : INDIA : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Throughout India.

Elsewhere : Bangladesh, Borneo, China, Indochina, Japan, Java, Malay Peninsula, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Sumatra, Taiwan, Thailand, Vietnam.

Remarks : Frost (2009) commented that the species *Fejervarya limnocharis* is distributed only in Indonesia, Malaysia, Thailand, Laos, and Cambodia and the populations currently associated with this name from India, Bangladesh, Japan and elsewhere are unnamed species. Further studies will throw light on its identity and distribution.

Fig. 44. *Fejervarya limnocharis* (Gravenhorst)

19. *Fejervarya nepalensis* (Dubois, 1975)

(Figs. 45-47)

Common name : Nepal warty frog.

Diagnostic characters : Head pointed in dorsal view, rounded from side; loreal region concave; nostrils closer to snout tip; tympanum small, round, $\frac{1}{2}$ the eye diameter, inconspicuous and spotted; fingers with round tips, 1st finger scarcely longer than 2nd; subarticular tubercles globular; TTA reach between eye and nostril; Dorsum smooth with four longitudinal folds consisting of oblong tubercles, besides several short tubercles present on body and tibia; venter uniformly smooth, always with a vertebral line with or without red patches on dorsum; males with characteristic laterally dark and medially pale coloured throat and vocal sac area.

Habitat : In and around brooks and ponds.

Distribution : INDIA : Arunachal Pradesh, Assam, Nagaland.

Elsewhere : Nepal.



Fig. 45. *Fejervarya nepalensis* (Dubois)



Fig. 46. *Fejervarya nepalensis* (Dubois)



Fig. 47. *Fejervarya nepalensis* (Dubois)

20. *Fejervarya pierrei* (Dubois, 1975)

(Figs. 48,49)

Common name : Pierre's Cricket frog.

Diagnostic characters : Head pointed, snout tip jutting out above the lower jaw; canthus rostralis not prominent; loreal region slightly concave; inter orbital distance more than half of eye diameter and less than inter narial distance; nostrils laterally placed, closer to snout tip; tympanum not very distinct due to spotted colouration; a narrow supra tympanic fold present. Forelimbs moderate, finger tips rounded; 1st and 2nd fingers subequal, subarticular tubercles globular. Hind limbs short, weakly barred, 3/4th webbed. Dorsum smooth with rows of oblong tubercles and long longitudinal folds; tiny pale warts in the loreal and cloacal region and on leg. Brownish olive above with a few dark irregular oblong spots; a cream coloured mid dorsal stripe from snout to vent with reddish spots which interrupt inter orbital band. Venter uniformly white; jaws with dark narrow bars; vocal sacs in male laterally darker and medially paler.

Habitat : Aquatic; woods along rivers and in grass lands; also perianthropic.

Distribution : INDIA : Assam, Meghalaya, Arunchal Pradesh, Nagaland, Mizoram.

Elsewhere : Nepal.

Remarks : As per Frost (2009), the distribution of the species is only in Central and eastern Nepal at lower elevations. Borthakur *et al.* (2007) reported it from Assam. We have collected this species from almost all the north eastern states. Further studies will confirm its distributional trend.

Fig. 48. *Fejervarya pierrei* (Dubois)Fig. 49. *Fejervarya pierrei* (Dubois)

21. *Fejervarya syhadrensis* (Annandale, 1919)

(Figs. 50, 51)

Common name : Syhadra frog.

Diagnostic characters : Head pointed; canthus rostralis indistinct; loreal region slightly concave; interorbital space equals the inter narial distance and is almost $3/4^{\text{th}}$ the eye diameter; nostrils lateral, closer to tip of snout; tympanum round, half the eye diameter and spotted with dark; supra tympanic fold present. Forelimbs moderate, finger tips round, 1st finger longer than 2nd, subarticular tubercles globular. Hind limbs moderate, toes half webbed with round tips; TTA reaches between eye and snout tip. Dorsum greyish to brownish olive with black irregular spots and often with red or orange patches on dorsum and forelimbs; a narrow yellowish white middorsal line may or may not be present; an inter orbital band present; jaws with dark bars; vocal sac in male crescent shaped.



Fig. 50. *Fejervarya syhadrensis* (Annandale)

Hind limbs moderate, toes half webbed with round tips; TTA reaches between eye and snout tip. Dorsum greyish to brownish olive with black irregular spots and often with red or orange patches on dorsum and forelimbs; a narrow yellowish white middorsal line may or may not be present; an inter orbital band present; jaws with dark bars; vocal sac in male crescent shaped.

Habitat : Prefers vicinity of water, can be encountered far from water bodies, open grass land, paddy fields, pools and ditches.

Distribution : INDIA : Assam, Meghalaya, Maharashtra, Orissa.

Elsewhere : Nepal, Pakistan.



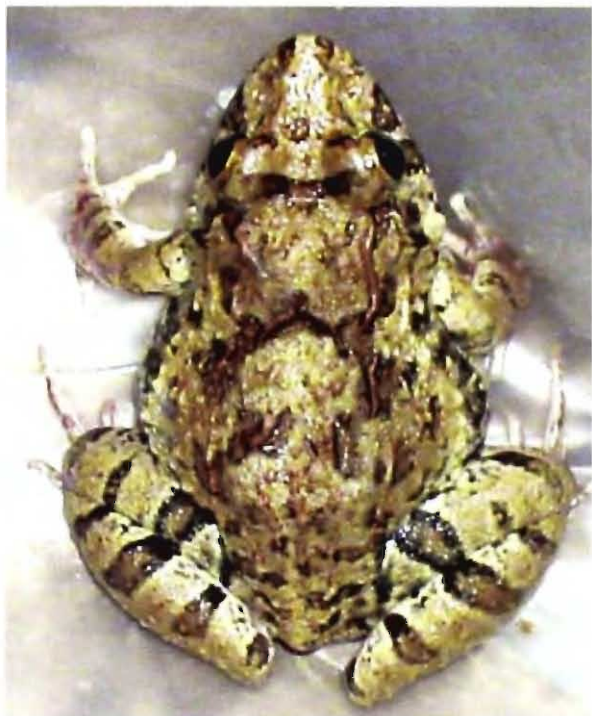
Fig. 51. *Fejervarya syhadrensis* (Annandale)

22. *Fejervarya teraiensis* (Dubois, 1984)

(Figs. 52, 53)

Common name : Terai Warty frog.

Diagnostic characters : Head broader or as broad as long; snout oval, projecting; nostril placed dorso-laterally; tympanum distinct, $\frac{2}{3}$ rd the diameter of eye; a whitish depressed mark from eye to shoulder covering tympanum; pineal ocellus present; symphyseal knob prominent; rictal gland present; tips of fingers blunt, round, not enlarged, without dermal fringe; sub articular tubercles well developed; palm cushioned; hind limbs short, TTA reach shoulder; inner meta tarsal tubercle elongate, distinct, outer meta tarsal tubercle indistinct; Colour of dorsum minutely granulated with or without thin or broad mid dorsal line; back with distinct symmetrical longitudinal folds, blotches and warts of various sizes; limbs with symmetrical blotches; vocal sac region in males with 'I' shaped black colour pattern.

Fig. 52. *Fejervarya teraiensis* (Dubois)

Habitat : Hides by day under rocks, crevices, and other such places near human habitation and come out to feed at dusk; mostly perianthropic.

Distribution : INDIA : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura.

Elsewhere : Nepal.

Fig. 53. *Fejervarya teraiensis* (Dubois)

23. *Hoplobatrachus crassus* (Jerdon, 1853)

(Fig. 54)

Common name : Jerdon's Bull frog.

Diagnostic characters : Head broader than long; snout pointed; nostrils closer to tip of snout; tympanum distinct, nearly $2/3^{\text{rd}}$ eye diameter. Fingers short, 1^{st} finger longer than 2^{nd} ; toes moderate with slightly swollen tips and fully webbed; inner meta tarsal tubercle large, shovel shaped; outer meta tarsal tubercle absent; sub articular tubercles feebly distinct; TTA reach tympanum or eye; heels do not overlap when hind limbs are folded at right angles to the body. Dorsum smooth or granulate with prominent warts and regular longitudinal glandular folds ; green or olive above with a number of irregular dark patches.

Habitat : Semi aquatic lowland species, lives predominantly along the margins of woods.

Distribution : INDIA : Arunachal Pradesh, Assam, Nagaland, Tripura, Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh, Orissa, Tamail Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Nepal, Sri Lanka.



Fig. 54. *Hoplobatrachus crassus* (Jerdon)

24. *Hoplobatrachus tigerinus* (Daudin, 1802)

(Figs. 55, 56)



Fig. 55. *Hoplobatrachus tigerinus* (Daudin)

Common name : Indian Bull Frog.

Diagnostic characters : Head as long as broad, snout pointed; tympanum distinct, $2/3^{\text{rd}}$ eye diameter; nostrils nearer tip of snout. Forelimbs moderate, fingers free with rounded tips, 1^{st} finger longer than 2^{nd} ; hindlimbs long, TTA reach eye or between eye and nostril; heels overlap when hind limbs are folded at right angles to the body; dorsum with regular longitudinal folds; inner meta tarsal tubercle blunt, feebly compressed; outer meta tarsal tubercle absent. Dorsally grayish olive to greenish olive or yellowish olive or yellowish with irregular dark patches; narrow yellow vertebral streak often present; another wider one extending from the posterior corners of the eyes obliquely down to the groin.



Fig. 56. *Hoplobatrachus tigerinus* (Daudin)

Habitat : Forests, agricultural land, paddy fields, grass fields, ponds, lakes, rivers.

Distribution : INDIA : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Throughout India.

Elsewhere : Bangladesh; China; Indochina; Madagascar; Myanmar; Nepal; Pakistan; Sri Lanka.

25. *Limnonectes khasianus* (Anderson, 1871)

Common name : Khasi Hills frog.

Diagnostic characters : Head broader than long; snout short and rounded; eyes large prominent; nostrils equidistant to eye and tip of snout; tympanum small, faintly visible, covered by skin, more than $\frac{1}{2}$ the diameter of eye; vomerine teeth oblique. Fingers free, three small subarticular tubercles on the palm; hind limbs short; inner meta tarsal tubercle shovel shaped and laterally compressed; outer meta tarsal tubercle absent. Dorsum uniform brown, spotted with brown on lateral side; thighs faintly barred, chin, thorax and legs spotted with brown; dorsal skin smooth, no trace of tubercles; venter almost smooth.

Habitat : Forested area.

Distribution : INDIA : Meghalaya.

Elsewhere : Not known.

26. *Limnonectes kuhlii* (Tschudi, 1838)

(Fig. 57)

Common name : Kuhl's creek frog.



Fig. 57. *Limnonectes kuhlii* (Tschudi)

Diagnostic characters : Head broader than long; snout rounded or obtusely pointed; without canthus rostralis; loreal region oblique, slightly concave; nostrils nearer to tip of snout; inter narial space and inter orbital width almost equal; lower jaw with two teeth like prominences; vomerine teeth in oblique rows; tympanum usually hidden, rarely slightly distinct, $\frac{1}{2}$ to $\frac{2}{3}$ rd the diameter of eye, widely separated from the eye. Fingers short, moderate, sub articular tubercles large, moderately prominent; hind limbs rather short, TTA reaches eye; heels meet or faintly meet when hind limbs folded at right angles to the body; toes short, tips dilated into small but distinct discs; toes fully webbed; a narrow tarsal fold; inner meta tarsal tubercle narrow, prominent, outer meta tarsal tubercle absent. Skin smooth above, warty on the calves and posterior part of upper eye lid or with short longitudinal folds or roundish tubercles. Dorsum brown with rather indistinct light cross band between the eyes.

Habitat : Semi aquatic.

Distribution : INDIA : Assam, Meghalaya.

Elsewhere : Borneo; China; Indochina; Indonesia; Java; Malayan Archipelago; Sumatra; Taiwan.

27. *Limnonectes laticeps* (Boulenger, 1882)

(Figs. 58, 59)

Common name : Flat headed frog.

Diagnostic characters : Head broader than long; snout obtusely pointed; canthus rostralis obtuse; loreal region concave; nostrils closer to tip of snout; tympanum not very prominent. Forelimbs thick and stout; fingers free with swollen tips, 1st finger shorter than 2nd; hind limbs long; TTA reach or cross nostrils; inner meta tarsal tubercle digitiform; outer meta tarsal tubercle absent; toes 3/4th to fully webbed; a glandular tympanic fold from behind eye to the shoulder; lower jaw with distinct flowery blotches; upper eye lids with tubercles and warts; limbs pinkish-orangish, to orangish all over; fore limbs, throat and ventral side thinly or thickly mottled with brown. Dorsum slightly brown with longitudinal warts, tubercles and dark spots; a dark bar connecting inter orbital space; an inverted 'V' shaped mark dorsally at the level of forelimbs.



Fig. 58. *Limnonectes laticeps* (Boulenger)
(Dorsal view)



Fig. 59. *Limnonectes laticeps* (Boulenger)
(Ventral view)

Habitat : Semi aquatic, streams, in and around agricultural land.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya, West Bengal.

Elsewhere : Bangladesh; Borneo; Malaya; Myanmar; Thailand.

28. *Limnonectes mawlyndipi* (Chanda, 1990)

(Fig. 60)

Common name : Mawlyndip frog.

Diagnostic characters : Head broader than long; snout slightly pointed; nostrils equidistant to eyes and snout tip; tympanum small, prominent, less than half the eye diameter; eyes large; pupil horizontal; vomerine teeth oblique. tongue large and entire. Forelimbs short and stout; fingers long and free; tips of fingers dilated into small discs; 1st finger slightly shorter than 2nd; hind limbs long; toes more than 2/3rd webbed, tips of toes dilated into prominent discs which are equal to finger tips; subarticular tubercles prominent and well developed; TTA reach nostrils; inner metatarsal tubercles prominent, outer metatarsal tubercles absent. Dorsally deep brown to blackish with black canthal and temporal bands; throat and ventral side of limbs spotted or marbled with brown to black; skin smooth; a tympanic fold present; ventrally smooth.

Habitat : Semi aquatic, ponds, vegetation in and around water bodies.

Distribution : INDIA : Meghalaya.

Elsewhere : Not known.

Remark : No material of this species could be collected or studied. The description above is from Chanda (1990). However, the shape and size of tongue as per Chanda's description is confusing.

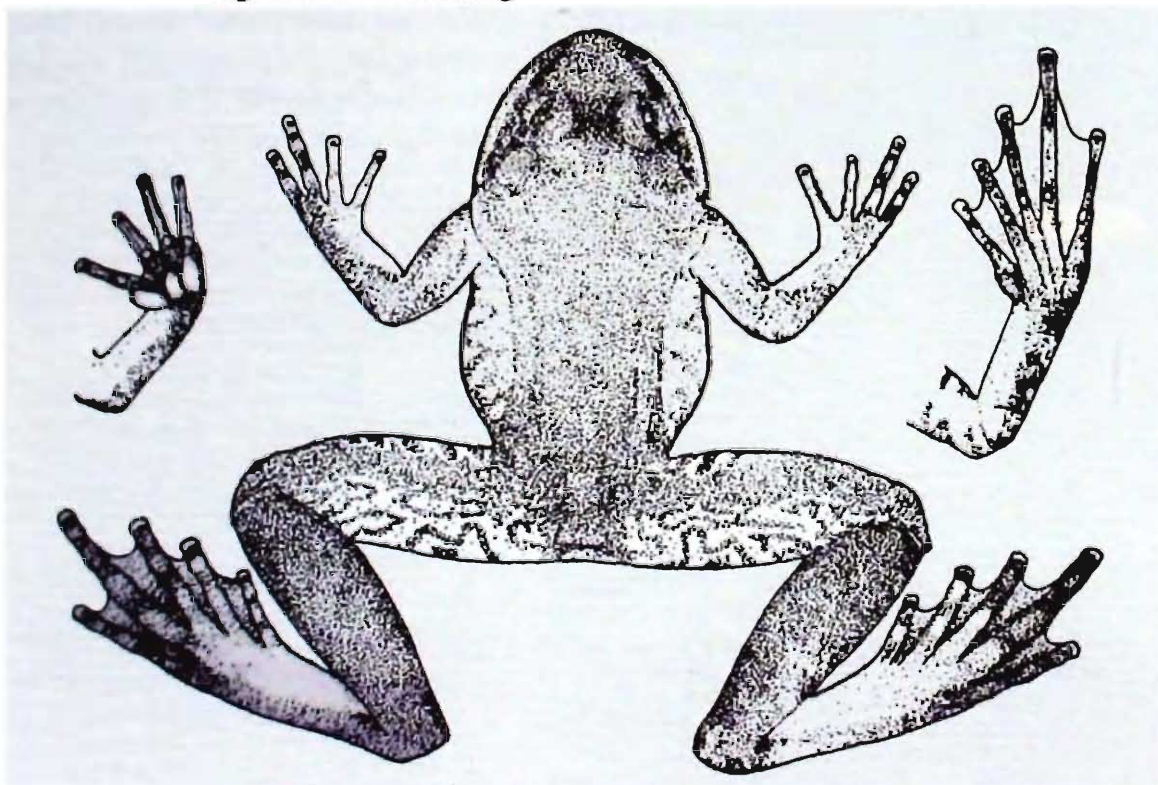


Fig. 60. *Limnonectes mawlyndipi* (Chanda)

29. *Limnonectes mawphlangensis* (Pillai and Chanda, 1977)

(Figs. 61, 62)



Common name : Mawphlang frog.

Diagnostic characters : Head as long as broad; snout pointed; nostrils equidistant to eye and snout tip; tympanum distinct, more than half the eye diameter; tympanic fold indistinct. Forelimb fairly stout, fingers free, tips dilated into small discs; 1st finger slightly longer than 2nd; hindlimbs long and robust; toes 3/4th webbed; ultimate and penultimate phalanges of 4th toe free; inner meta tarsal tubercle moderately prominent; outer metatarsal tubercle absent; TTA reach tip of snout; tips of toes dilated into prominent discs. Dorsally bluish black to slate coloured, ventrally yellowish to white; lower jaw, lateral sides of body and ventral sides of limbs spotted or marbled with black; inner two toes whitish and the outer toes bluish black.

Habitat : Semi aquatic, forest area, in and around water bodies.

Distribution : Assam, Manipur, Meghalaya, Nagaland, West Bengal.

Remarks : Mahony (2008) redescribed it and put it under the genus *Odorrana*. Frost (2009) retained it under the genus *Limnonectes*.

Fig. 61. *Limnonectes mawphlangensis* (Pillai and Chanda)



Fig. 62. *Limnonectes mawphlangensis* (Pillai and Chanda)

30. *Nanorana annandalii* (Boulenger, 1920)
(Figs. 63)

Common name : Annandale's frog

Diagnostic characters : Head little broader than long; nostril equidistant to eyes and snout tip; tympanum feebly distinct or hidden. Fingers obtusely pointed, 1st and 2nd fingers equal; subarticular tubercles feebly prominent; hind limbs long; TTA reach nostril; toes 3/4th webbed, with small swollen discs; two phalanges of 4th toe free; inner meta tarsal tubercle narrow, feebly prominent; outer meta tarsal tubercle absent. Dorsum smooth with granules and small warts; a prominent



Fig. 63. *Nanorana annandalii* (Boulenger, 1920)
Photo : K. Deuti, ZSI

tympanic fold present; dorsolateral glandular fold distinct anteriorly; olive above with darker markings and small light spots; a dark cross bar between eyes; limbs with numerous dark cross bars; white beneath; throat and chest spotted with brown; a patch of large black spines on each side of chest, and on inner side of the 1st finger and on the metacarpel tubercle.

Habitat : Around vegetation, forest streams.

Distribution : INDIA: Arunachal Pradesh.

Elsewhere : West Bengal, Nepal.

31. *Nanorana blanfordii* (Boulenger, 1882)

(Fig. 64)

Common name : Blanford's frog.

Diagnostic characters : Head little broader than long; snout rounded, canthus rostralis obtuse; loreal region oblique, concave; inter orbital distance less than inter narial distance; nostrils nearer to eyes; tympanum distinct or indistinct, about half of eye diameter. Fingers obtuse, 1st finger shorter than 2nd; hind limbs long, TTA reaches nostril or tip of snout; toes with swollen discs, 2/3rd to 3/4th webbed; web deeply emarginated and extending only as a fringe to tip of 4th toe; inner metatarsal tubercle narrow, feebly prominent; outer metatarsal tubercle absent. Skin smooth above or with small granules and longitudinal folds; tympanic fold present; lower part smooth; olive above with small blackish spots which may have a light centre; a blackish cross bar between eyes; limbs with interrupted dark cross bars; throat of male brownish or marbled with brown, ventrum white.

Habitat : Aquatic; in mountain streams and vegetation.

Distribution : INDIA : Meghalaya, Uttar Pradesh, West Bengal.

Elsewhere : Nepal.



Fig. 64. *Nanorana blanfordii* (Boulenger)

32. *Nanorana liebigii* (Gunther, 1860)

(Fig. 65)

Common name : Liebig's frog.

Diagnostic characters : Head broader than long; nostrils nearer to eyes; tympanum small, hidden or very indistinct. Fingers moderate, tips rounded, sub articular tubercles globular and distinct. Hind limbs moderate; TTA reach tip of snout or little beyond; toes fully webbed, toe tips swollen into small discs; inner meta tarsal tubercles oval or elliptical, feebly prominent; outer metatarsal tubercle absent. Dorsum smooth or with granules or small warts; a more or less distinct fold across the head behind the eyes; a strong glandular fold from eye to shoulder; dorsolateral glandular fold distinct; lower part smooth; olive or brown above, uniform or with small darker spots; dorsolateral fold often edged with blackish; limbs usually with irregular dark cross bars; ventrally brownish or whitish marbled with brown; males with internal vocal sac; breeding males with thick, black horny spines on arms.



Fig. 65. *Nanorana liebigii* (Gunther)

Habitat : Aquatic; in hill streams and vegetation.

Distribution : INDIA : Arunachal Pradesh, Eastern Himalayas, Himachal Pradesh, Jammu and Kashmir, Sikkim, Uttar Pradesh, West Bengal.

Elsewhere : China, Nepal.

33. *Nanorana mokokchungensis* (Das and Chanda, 2000)

(Figs. 66, 67)

Common name : Mokokchung frog.



Fig. 66. *Nanorana mokokchungensis* (Das & Chanda) (Dorsal view)



Fig. 67. *Nanorana mokokchungensis* (Das & Chanda) (Ventral view)

Diagnostic characters : Head broader than long; snout flattened, round; nostrils equidistant to eye and tip of snout; inter orbital width twice the eye diameter; vomerine teeth prominent. Forelimb short and stout, fingers free; tips of fingers swollen, hindlimbs robust, tips of toes weakly swollen, toes not fully webbed; subarticular tubercles prominent. Dorsum with large scattered conical tubercles; upper eyelid smooth; upper surface of thighs tuberculate; throat and pectoral region smooth. Dorsum grey; thighs with diffused bands; upper eyelid yellowish grey, ventrum including throat, pectoral region and abdomen cream with yellowish variegations.

Habitat : Semi aquatic; in and around mountain streams.

Distribution : INDIA : Nagaland.

Elsewhere : Not known.

34. *Ombrana sikimensis* (Jerdon, 1870)

Common name : Sikkimese frog.

Diagnostic characters : Head broader than long; snout pointed; tympanum distinct; vomerine teeth oblique; fingers with rudimentary web, tips blunt; toes fully webbed with small discs; TTA reaching far beyond the tip of snout; inner metatarsal tubercle long, compressed; outer absent. Dorsally yellowish to blackish brown with dorso-lateral glandular fold; a faint dark band between eyes; lips and limbs with brownish cross-bars; skin smooth with few warts; ventrally smooth, dull white.

Habitat : Rivers and streams.

Distribution : INDIA : Assam, Meghalaya, Sikkim, West Bengal.

Elsewhere : Nepal.

35. *Occidozyga borealis* (Annandale, 1912)

(Figs. 68-70)

Common name : Rohtung frog.

Diagnostic characters : Head broader than long; nostril lateral, equidistant to eye and snout tip; tympanum not distinct; vomerine teeth absent; a prominent tooth on apex of lower jaw; supratympanic glandular fold prominent. Rudiment of



Fig. 68. *Occidozyga borealis* (Annandale)

web on all the fingers; fingers with rounded discs; toes fully webbed, distal phalange of 4th toe free; TTA reaching eye; inner metatarsal tubercle elongate, outer metatarsal tubercle absent; palm and sole fleshy. Dorsum smooth, light grey to dark brown; flanks darker, powdered black all over; ventrally speckled with purplish brown on throat and chest; lower abdomen somewhat plain; thigh and lower parts ventrally powdered with purplish brown; limbs with dark bars; one prominent white spot below the eye on upper jaw; inter orbital bar present.



Fig. 69. *Occidozyga borealis* (Annandale)



Fig. 70. *Occidozyga borealis* (Annandale) (Dorso-lateral view)

Habitat : Aquatic, river banks, forest streams, under stones; dug out from hibernating burrows on the river banks.

Distribution : INDIA : Arunachal Pradesh, Meghalaya, Nagaland.

Elsewhere : China; Eastern Himalayas.

Family HYLIDAE

36. *Hyla annectans* (Jerdon, 1870)

(Figs. 71-75)

Common name : Indian hylid frog.



Fig. 71. *Hyla annectans* (Jerdon)

Diagnostic characters : Head broader than long; snout round; nostril closer to tip of snout; tympanum distinct, slightly depressed. Forelimbs moderately long, fingers free; sub articular tubercles prominent. Hindlimbs long, slender; tips of



fingers and toes swollen, claw shaped; TTA reaching anterior corner of eye; toes 2/3rd webbed; an oval inner metatarsal tubercle present, outer absent. Dorsally dark green with a light brownish stripe from eyes to nostrils. A black lateral stripe present up to groin, often terminating in two black spots of different sizes. Ventral surface of thighs yellowish, a few black spots arranged more or less in a line present on ventral surface of femur and tibia. Hands and feet stout. A strong tuberculated fold from eye to shoulder over tympanum.

Fig. 72. *Hyla annectans* (Jerdon) (Front view)



Fig. 73. *Hyla annectans* (Jerdon)
(Showing vocal region)

Habitat : Forested area.
Distribution : INDIA : Assam,
Meghalaya, Nagaland, Tripura.

Elsewhere : China; Malaysia;
Myanmar; Thailand; Vietnam.



Fig. 74. *Hyla annectans* (Jerdon) (Lateral
view of head)



Fig. 75. *Hyla annectans* (Jerdon) (Thigh showing spots)

Family MEGOPHRYIDAE

37. *Leptobrachium nokrekensis* Mathew & Sen

(Figs. 76-83)

Common name : Nokrek's Spade foot Toad.



Fig. 76. *Leptobrachium nokrekensis* Mathew & Sen



Fig. 77. *Leptobrachium nokrekensis* Mathew & Sen
(Showing eggs through skin)

Diagnostic characters : Head broader than long; tympanum sunk, dark coloured, vertically oval, on either side of tympanum a pair of reddish tubercles present; supratympanic fold distinct followed by a red tubercle; upper jaw toothed, with black bands; mouth wide; vomerine teeth absent. Tongue distinctly notched.



Fig. 78. *Leptobrachium nokrekensis* Mathew & Sen
(Showing ventral and dorsal colour pattern)



79

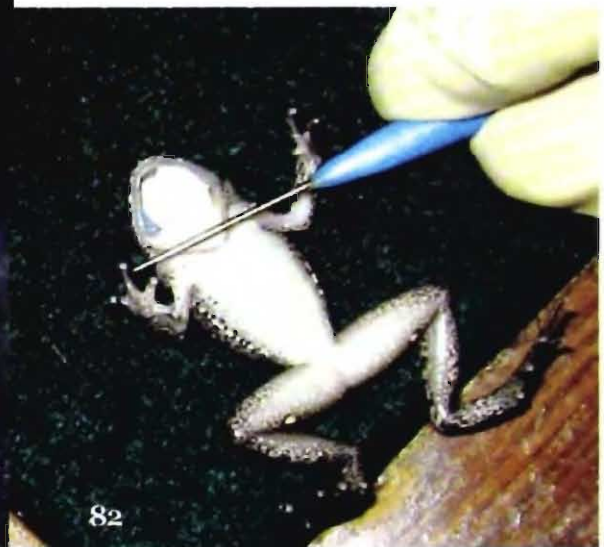


80



81

Eyes bulging, eye balls on upper part reddish orange, pupil vertical; loreal region concave, nostril nearer to tip of snout. Dorsum brownish with dark irregular markings all over, powdered with white. A triangular mark between eyes followed by an inverted 'Y' shaped mark. A pair of axillary and femoral glands. Belly creamish, laterally bordered with blackish spots and a line of white glandular tubercles. Dorsum with tubercles and few longitudinal folds; vent below and above with reddish warts. A prominent fold of skin overhanging the vent. Forelimbs slender, moderate, with cross bands; fingers free; 1st finger shorter than 2nd; palmar tubercle swollen, prominent; finger tips blunt, slightly swollen. Hind limbs moderate with black bands and many tubercles of varied sizes, particularly on femur; TTA reaching posterior corner of eye. Toes webbed at base, inner metatarsal tubercle oval, rather swollen; outer absent.



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- Fig. 79.** *Leptobrachium nokrekensis* Mathew & Sen Showing distinct lateral glandular band
Fig. 80. *Leptobrachium nokrekensis* Mathew & Sen Showing glandular palmer tubercles
Fig. 81. *Leptobrachium nokrekensis* Mathew & Sen Showing pupil and tympanum
Fig. 82. *Leptobrachium nokrekensis* Mathew & Sen Showing notched tongue



Fig. 83. *Leptobrachium nokrekensis* Mathew & Sen (Lateral view)

Habitat : Rivers and streams in undisturbed forest area.

Distribution : INDIA : Meghalaya.

Remarks : The description of this new species is in press.

38. *Leptobrachium smithi* Matsui, Nabhitabhata and Panha, 1999
(Figs. 84, 85)

Common name : Java spade foot toad.

Diagnostic characters : Head broader than long; distinct canthal and temporal streaks present; canthal streak surrounds the tympanum; nostrils nearer to tip of snout; eyes large; mouth wide; upper jaw toothed; vomerine teeth absent; tympanum not prominent; limbs slender and weak; fingers free; toes webbed at base; TTA reaching tympanum; inner metatarsal tubercle present, outer absent; finger and toe tips blunt, not pointed. Limbs with



Fig. 84. *Leptobrachium smithi* (Lateral view)



Fig. 85. *Leptobrachium smithi* (Ventral view)

cross bars; flanks with several dark spots in rows; throat and belly granular, mottled with brown. A hump like structure above vent. Dorsally varying from ashy to black with several brown and black spots and markings.

Habitat : Terrestrial, breeds in puddles of mountain streams.

Distribution : INDIA : Assam, Meghalaya.

Elsewhere : China, Indonesia, Malaysia, Myanmar, Philippines, Thailand.

Remarks : Sengupta *et al.* (2001) who reported *L. smithi* from Assam observed that *L. hasseltii*, according to Matsui *et al.* (1999) is restricted in distribution to Sundas, Thailand. Further studies will ascertain its presence in India. We collected *L. smithi* from Meghalaya.

39. *Scutigera sikimensis* (Blyth, 1854)

(Figs. 86-88)

Common name : Sikimese pelobatid toad.**Fig. 86.** *Scutigera sikimensis* (Blyth)
(Dorsal view)**Fig. 87.** *Scutigera sikimensis* (Blyth)
(Ventral view)

Diagnostic characters : Head broader than long without cranial ridges; snout rounded; canthus rostralis prominent; nostrils closer to tip of snout; tympanum hidden; vomerine teeth absent; parotid glands present. Forelimbs slender, fingers free. Hindlimbs short, slender; TTA reaching shoulder; toes $\frac{1}{2}$ webbed; both inner and outer metatarsal tubercles present. Dorsally varying from yellowish to brown. Hind part of the body yellowish (including belly and throat) with conspicuous black spots. Dorsal skin with large porous warts forming irregular longitudinal series on the back. Lower parts smooth. Limbs dorsally with dark brown patches; whole body covered with warts of various sizes.

Habitat : Forested area.**Distribution** : INDIA : Meghalaya, Nagland, Sikkim, West Bengal.**Elsewhere** : Bhutan, China, Myanmar, Nepal, Tibet.**Fig. 88.** *Scutigera sikimensis* (Shape of tongue)

40. *Xenophrys boettgeri* (Boulenger, 1899)

(Fig. 89)

Common name : Boettger's pelobatid toad.

Diagnostic characters : Head moderate, slightly depressed, longer than broad; snout tip rounded, projecting little beyond the lower jaw; nostril nearer to tip of snout; canthus rostralis distinct; loreal region concave; tympanum distinct, as large as eye; vomerine teeth absent. Forelimbs slender, fingers short, 1st finger shorter than 2nd. Hindlimbs long, TTA reaches tip of snout; toes with rudiment of web, metatarsal tubercles absent. Dorsally dark olive with more or less symmetrically arranged greyish green marks. Hindlimbs with dark olive bands. Throat dark olive with yellowish spots. Irregular tubercles present on the base of thighs.

Habitat : Forest area.**Distribution** : INDIA : Arunachal Pradesh, Sikkim.**Elsewhere** : China.Fig. 89. *Xenophrys boettgeri* (Boulenger)41. *Xenophrys glandulosa* (Fei, Ye and Huang 1991).

(Fig. 90)

Common name : Glandular horned toad.

Diagnostic characters : Head broader than long; snout broadly pointed; nostril much nearer to eye; tympanum small, horizontally oval, supratympanic glandular fold prominent; tongue subround (with a stalk at base) and with a median notch anteriorly; throat with dark brown blotches; dorsum light brown (in preserved specimens), laterally with a number of enlarged smooth glands; dorsum with 'V' shaped glandular marks behind the eyes and longitudinal glandular fold laterally; limbs with faded cross bands; arms with dark brown spots in a line;

Fig. 90. *Xenophrys glandulosa* (Fei, Ye & Huang)

thigh and tarsus with rows of dark brown spots; few spots on lateral sides of body below arm pit; toes $\frac{1}{4}$ webbed; TTA crossing snout; a pair of femoral glands prominent.

Habitat : Forested area near streams.

Distribution : INDIA : Nagaland.

Elsewhere : China.

42. *Xenophrys kempii* (Annandale, 1912)

Common name : Kemp's horned toad.

Diagnostic characters : Head moderate, depressed; snout longer than eye, rounded at the tip, truncate vertically, projecting very little beyond lower jaw; nostril closer to tip of snout; canthus rostralis distinct; loreal region concave, nearly vertical; inter orbital width greater than eye diameter; tympanum distinct, as large as eye; vomerine teeth absent. Limbs slender; fingers short; hindlimbs long; TTA reaches tip of snout; toes slender with rudiment of web. Dorsally dark olive with more or less symmetrically arranged grayish green marks; hind limbs with dark olive bands; base of thighs with tubercles. Throat densely powdered with dark olive and ornamented with yellow spots.

Habitat : Forested area.

Distribution : INDIA : Arunachal Pradesh, Assam.

Elsewhere : China, Myanmar.

43. *Xenophrys major* (Boulenger, 1908)

(Figs. 91, 92)



Fig. 91. *Xenophrys major* (Boulenger)

Common name : Major's horned toad.

Diagnostic characters : Head broader than long; triangular, eyes large, prominent, jutting out above head; snout broadly pointed; nostril closer to eye; loreal region concave; upper jaw white; vomerine teeth vertical; tympanum small, distinct; a dark band from tip of snout to shoulder along the eye and



Fig. 92. Dorsal view of *Xenophrys major* (Boulenger)

tympanum. A median triangular patch across the the orbit which is followed across the forelimb region with a faint, thin hour-glass mark; throat dark, with indistinct darker band extending to flank; glandular tubercles roundish; limbs with faint thin bands; tibia with longitudinal bands; two pairs of femoral glands that are closer to each other than in *robusta*, inner pair small, outer large; limbs long and sturdy ; fingers free; digits with round flattened tips; toes 1/4th webbed; TTA crossing snout; dorsum brown with dark markings.

Habitat : Forest area near vicinity of water.

Distribution : INDIA : Arunachal Pradesh, Assam, Mizoram, Nagaland.

Elsewhere : Bangladesh; China; Hongkong; Myanmar; Vietnam.

44. *Xenophrys parva* (Boulenger, 1893)

(Figs. 93-95)

Common name : Concave crowned horned toad.



Fig. 93. *Xenophrys parva* (Boulenger)



Fig. 94. *Xenophrys parva* (Boulenger)
(Front view)

Diagnostic characters : Head broader; tympanum not very distinct; supra tympanic glandular fold terminating in a glandule near shoulder; dorsum brown with a tinge of crimson all over; skin smooth, glandular with lateral tubercles. 'V' shaped mark on head covering posterior half of eye; legs crimson, mostly so on the ventral side; ventrally mottled with brown; throat and abdomen with longitudinal marks; axillary and femoral glands prominent; toes webbed at base.



Fig. 95. *Xenophrys parva* (Boulenger) (Lateral view)

Habitat : Forested area near streams.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya, Nagaland, Sikkim, West Bengal.

Elsewhere : Bangladesh, China, Myanmar, Nepal, Thailand, Vietnam.

45. *Xenophrys robusta* (Boulenger, 1908)

(Figs. 96, 97)

Common name : White lipped horned toad.

Diagnostic characters : Head broader than long, triangular; loreal region concave; canthus pronounced; eyes large, prominent, jutting out above head; nostril closer to eye; snout pointed; tympanum distinct; vertically broadly oval; vomerine teeth in vertical series; inter orbital and inter narial region concave; upper jaw white; throat light brown, bordered on either side with dark band which extends to the flank; an elongated dark bar connecting the orbit extends posteriorly to form a triangle; axillary glands prominent; two pairs of femoral glands, larger pair closer

Fig. 96. *Xenophrys robusta* (Boulenger)

to tibia joint, smaller pair closer to vent; large glandular tubercles present on the flanks posteriorly; a broad hour glass pattern present across the forelimb level on the dorsal side; limbs long; digits with round swollen tips; fingers free, 1st finger longer than 2nd; toes 1/4th webbed; TTA reaching nostril. Dorsum smooth, a few minute tubercles present near vent; a dark band from snout tip to shoulder across eye and tympanum; tibia with longitudinal and round spots; limbs with broad bands that are diffused on lower portion of thigh.

Fig. 97. Hind limbs of *Xenophrys robusta* (Boulenger)

Habitat : Woody and shadowy vicinity of springs.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya, Nagaland.

Elsewhere : Bangladesh, China, Hongkong, Myanmar, Vietnam.

46. *Xenophrys serchhipii* Mathew & Sen, 2007

(Figs. 98, 99)

Common name : Serchhip's horned toad



Fig. 98. *Xenophrys serchhipii* Mathew & Sen
(Dorsal view)



Fig. 99. *Xenophrys serchhipii* Mathew & Sen

Diagnostic characters : Head broader than long; nostril prominent, closer to tip of snout; snout sharply pointed, vomerine teeth very prominent, globular, close to each other; tympanum large, oval, depressed, darker, bordered above by the supra tympanic fold, distinct; supra tympanic glandular fold prominent; jaws with white cross bars, that on lower jaw broader; head above with various sizes of round warts. Forelimbs moderate; fingers free, long, 2nd and 4th fingers sub equal in length, 3rd longest; tips of fingers swelled up into small discs; subarticular tubercles indistinct. Hindlimbs moderate; TTA reach up to anterior region of eye; legs above with dark bands; tips of toes swelled up into small discs; toes free with rudiment of web between 2nd and 3rd digits; belly and ventral side of femur and tibia whitish; toad like species. Dorsum dark brown or almost black, without the usual dark triangular mark between the eyes; a 'V' shaped ridge dorsally between eye and shoulder level; dorsum below the tympanic region with longitudinal ridges and small, round and conical warts of varied sizes, these are more on the lateral side. Dorsum homogeneously dark; tip of snout concave dorsally; upper eye lid with two prominent warts; ventrally throat and chest brown to black, mottled with white; a pair of axillary and femoral glands.

Habitat : Forest area, perianthropic.

Distribution : INDIA : Mizoram (Known from type locality only).

47. *Xenophrys wuliangshanensis* Ye and Fei, 1995

(Figs. 100, 101)

Common name : Wuliangshan's horned toad.**Fig. 100.** *Xenophrys wuliangshanensis* (Ye & Fei)

Diagnostic characters : Head longer than broad; inter narial distance slightly broader than inter orbital width; tympanum distinct, smaller than eye diameter; jaws banded; fingers free, toes with rudiment of web between 2nd and 3rd and 3rd and 4th; TTA reaching barely middle of eye. Dorsum grayish brown with broad 'U' shaped mark below the eyes; flanks with black glandular spots; hands and feet with cross bands; ventrally speckled with dark brown spots.

Habitat : Forested area near water source.

Distribution : INDIA : Nagaland.

**Fig. 101.** *Xenophrys wuliangshanensis* (Ye & Fei)

48. *Xenophrys zunhebotoensis* Mathew and Sen, 2007

(Figs. 102, 103)

Common name : Zunheboto's horned toad



Fig. 102. *Xenophrys zunhebotoensis* Mathew & Sen (Female, dorsal view)

Diagnostic characters : Head broader than long; nostril closer to eye; vomerine teeth prominent, close to each other; snout slightly upturned, obtusely pointed. supratympanic glandular fold white, distinct, curving on to the anterior region of the tympanum to give it a round shape. Forelimbs slender, fingers free with small swollen discs. Hind limbs slender, TTA reach the middle of eye; digits free with small swollen discs, smaller than that on fingers; legs with dark bands dorsally. Dorsum smooth with few ridges and warts; slaty brown above; a dark triangular patch between the orbit; a broad incomplete 'V' shaped ridge behind the eye, another similar ridge of inverted 'V' shape towards the posterior side thereby imparting an indistinct hourglass pattern on the back; 2 parallel lines on either side between the 'V' shaped ridges; flanks with small round tubercles; ventrally throat and chest the colour of dorsum; abdomen, thighs and shank off white with light round blotches ; axial and femoral glands prominent, smaller in males.

Habitat : Torrential mountain stream strewn with rocks and boulders.

Distribution : INDIA : Nagaland (Known from type locality only).



Fig. 103. *Xenophrys zunhebotoensis* Mathew & Sen (Female, ventral view)

Family MICROHYLIDAE

49. *Kalophrynus interlineatus* Blyth, 1855

(Figs. 104, 105)

Common name : Blyth's microhylid frog.**Diagnostic characters** : Head broader than long; snout pointed, projecting beyond mandible; nostrils nearer to tip of snout; canthus rostralis distinct; inter orbital width greater than upper eyelid; loreal region vertical; tongue elongate,smooth with rounded tip; pupil round; tympanum distinct; supra tympanic fold present. Limbs with dark bars. Finger free, toes webbed at base; digit tips round, a single subarticular tubercle on 4th finger; both inner and outer metatarsal tubercles present. Dorsum granular; abdomen and inner side of thighs coarsely granular. Deep reddish brown to cream; an inverted 'V' shaped mark present on dorsum from tip of snout to the inguinal region; an ocellus present on inguinal region.**Habitat** : Forest area, grass land.**Distribution** : INDIA : Assam.**Elsewhere** : Not known.**Fig. 104.** *Kalophrynus interlineatus* Blyth**Fig. 105.** *Kalophrynus interlineatus* Blyth

50. *Kaloula assamensis* Das, Sengupta, Ahmed and Dutta, 2005

(Figs. 106, 107)

Common name : Assam's microhylid frog.



Fig. 106. *Kaloula assamensis* Das, Sengupta, Ahmed & Dutta (Dorsal view)



Fig. 107. *Kaloula assamensis* (Lateral view)

Diagnostic characters:

Head broader than long, snout tip rounded; nostril dorso-lateral, nearer to the tip of snout; tympanum not externally visible; eyes large, interorbital space flat; tongue oval with papillae; supra tympanic fold distinct. Vomerine teeth absent. Forelimbs moderate; fingers free; tips of fingers slightly dilated; sub articular tubercles round, prominent. Hind limbs moderate; toes half webbed; toe tips slightly rounded; inner metatarsal tubercle pointed, outer oval. Dorsum granular, abdomen coarsely granular. In preserved specimen dorsum brown with a dark edge bright yellow vertebral stripe from tip of snout to vent. A pair of dark edged dark brown lateral stripe from post ocular region to inguinal region; venter cream; light peri cloacal ring present. In live specimen dorsum pink edged with brown. Dorsolateral bands pale, pinkish buff. Upper surface of limbs flesh coloured.

Habitat : Forest area near stream

Distribution : INDIA : Assam

Elsewhere : Not known.

51. *Kaloula pulchra* Gray, 1831

(Fig. 108)

Common name : Painted microhylid frog.

Diagnostic characters : Head broader than long, small; snout short, round; nostrils closer to tip of snout; canthus rostralis round; loreal region oblique; tympanum hidden; inter orbital space much broader than upper eyelid; limbs short, digit tips dilated into truncated disc; TTA reaching shoulder; toes with rudimentary web; inner and outer metatarsal tubercles present. Dorsum dark brown with bright orange broad band extending from tip of snout between eyes on either side of body up to its posterior end; venter with small white spots, otherwise uniform, throat region darker, minutely granulated.

Habitat : Fossorial and nocturnal.

Distribution : INDIA : Assam, Meghalaya, Mizoram, Nagaland, Tripura, Bihar, Karnataka, Kerala, Madhya Pradesh, Orissa, Tamil Nadu, West Bengal.

Elsewhere : Borneo, China, Myanmar, Singapore, Sri Lanka, Sulawesi, Sumatra, Thailand.

Fig. 108. *Kaloula pulchra* Gray52. *Kaloula taprobanica* Parker, 1934

(Figs. 109, 110)

Fig. 109. *Kaloula taprobanica* Parker**Common name** : Sri Lankan painted frog.

Diagnostic characters : Head much broader than long; snout very short and blunt; inter orbital distance smaller than diameter of upper eye lid; nostrils closer to eye; supra tympanic fold developed; fingers with well developed adhesive pads; one sub articular tubercle each on 1st and 2nd fingers, two sub articular tubercle each on 3rd

and 4th fingers; toes with obtuse and rounded tips, 1/2 webbed; inner meta tarsal tubercle spade like, 1 1/2 times the size of the outer meta tarsal tubercle; TTA reaches the axilla or shoulder; dorsum smooth with or without small, smooth tubercles; venter granulate; males with large external gular vocal sacs. Body stocky, globular.



Head dorsally and laterally with reddish orange to red bands; dorsum greyish black.

Habitat : More or less humid habitats, often perianthropic and even far from perennial waterbodies.

Distribution : INDIA : Assam, Karnataka, Kerala, Tamil Nadu.

Elsewhere : Nepal, Sri Lanka.

Fig. 110. *Kaloula taprobanica* Parker

53. *Microhyla berdmorei* (Blyth, 1856)

(Figs. 111, 112)

Common name : Berdmore's narrow mouthed frog.

Diagnostic characters : Head broader than long, pointed; snout obtusely pointed; tympanum hidden; inter orbital space broader than upper eyelid. Limbs moderate; fingers with slightly swollen tips; toes entirely webbed, tips dilated into well developed discs; TTA reach beyond tip of snout; skin smooth or with few scattered indistinct tubercles. Bronze or pinkish above; a dark slaty blue light edged, large mid dorsal spot on back; black spots on sides of limbs and occasionally on the



Fig. 111. *Microhyla berdmorei* (Blyth)



Fig. 112. *Microhyla berdmorei* (Blyth)

flanks; a chevron shaped black mark on the vent region; throat and chest clouded with brown; belly yellowish.

Habitat : Seen in bamboo thickets near the vicinity of water. They jump helter-skelter when attempted to collect.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya, Mizoram, Tripura.

Elsewhere : Bangladesh, Borneo, Cambodia, China, Indochina, Indonesia, Laos, Malaysia, Myanmar, Sumatra, Thailand, Vietnam.

54. *Microhyla heymonsi* Vogt, 1911

(Figs. 113, 114)

Common name : Heymon's narrow mouthed frog.

Diagnostic characters : Head broader than long, moderate; snout pointed; tympanum hidden; fingers free; tips of fingers dilated into small terminal disc; first finger shorter than second. Hind limbs moderately long; toes webbed at base; tips of toes dilated into small discs ; TTA reaching eye or beyond tip of snout; sub articular tubercles well



Fig. 114. *Microhyla heymonsi* Vogt
(Dorsal view)



Fig. 113. *Microhyla heymonsi* Vogt

developed, inner and outer metatarsal tubercles present. Dorsum yellowish with a median dark broad band from snout tip to vent bordered on either side by golden yellow bands; a black band laterally on the flank on either side. Two black spots between orbit and another pair of black spots near vent.

Habitat : Stream bed.

Distribution : INDIA : Manipur, Andaman and Nicobar Islands.

Elsewhere : Formosa, South China, Malay Peninsula, Sumatra, Thailand.

55. *Microhyla ornata* (Dumeril and Bibron, 1841)

(Figs. 115, 116)

Common name : Ornate narrow mouthed frog.**Diagnostic characters** : Head broader than long, pointed; snout obtuse and broadly rounded; tongue elliptical; inter orbital width broader than eye diameter; tympanum invisible. Limbs moderate; fingers free; toes webbed at the base;Fig. 115. *Microhyla ornata* (Dumeril & Bibron)Fig. 116. *Microhyla ornata* (Dumeril & Bibron)
(Dorsal and ventral view)

metatarsal tubercles subequal, very small; tips of fingers and toes swollen into very small discs; subarticular tubercles very distinct; TTA not reaching beyond eye. Skin smooth, reddish or grayish, dorsally a dark longitudinal mark, with symmetrical lateral projections, which broadens towards the posterior region; a dark band along the side of head and body; limbs with dark cross bars.

Habitat : Found in bamboo forests; under logs and leaf litter; in rivers and marshy areas.**Distribution** : INDIA : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Throughout India.**Elsewhere** : Bangladesh, Bhutan, China, Indochina, Japan, Malay Peninsula, Malaysia, Myanmar, Nepal, Pakistan, Taiwan, Sri Lanka.

56. *Microhyla rubra* (Jerdon, 1854)

(Fig. 117)

Common name : Jerdon's narrow mouthed frog.

Diagnostic characters : Head broader than long; nostril closer to tip of snout; tympanum hidden. Limbs short; fingers free; toes moderate, nearly 1/3rd webbed; subarticular tubercles very distinct; metatarsal tubercles prominent, compressed; TTA reach beyond shoulder but not up to eye; skin smooth, brownish to golden brown above, sides darker; a dark brown, almost black, line from tip of snout through eye along the side of the back to the groin; a mid dorsal dark mark beginning at the orbit level and broaden towards the posterior region; limbs with distinct cross bars; ventrally with or without dark spots.



Habitat : Near streams, under logs and stones, leaf litter, bamboo forest and forest floor.

Distribution : INDIA : Assam, Mizoram, Nagaland, Goa, Karnataka, Kerala, Tamil Nadu, West Bengal.

Elsewhere : Myanmar; Sri Lanka.

Fig. 117. *Microhyla rubra* (Jerdon)

57. *Micryletta inornata* (Boulenger, 1890)

(Fig. 118)

Common name : Boulenger's ornate microhylid frog.

Diagnostic characters : Head broader than long, dorso-ventrally compressed; eyes not very prominent; nostril lateral; loreal region slightly concave; no parotids; tympanum feebly marked, large, 3/4th the eye diameter; nostril nearer the tip of snout; tongue elongate; upper jaw toothless; no vomerine teeth. Forelimbs slender; fingers free; subarticular tubercles very prominent; fingers with round tips, not dilated. Hind limbs slender;



Fig. 118. *Micryletta inornata* (Boulenger)

toes free; a small inner metatarsal tubercle and an impression of outer metatarsal tubercle; TTA reaching posterior end of eye; toes not pointed, with round tips, not dilated; subarticular tubercles very prominent. A mid dorsal line from snout to tip of vent; skin dorsally minutely tuberculated, tubercles more on the thigh; a glandular fold from tympanum to shoulder; tympanic glandular fold bordered with black, which continues beyond shoulder after abruptly ending at the arm joint; flanks speckled with dark brown; dorsally pink in life; dorsum with dark brown or black spots on either side; ventrally purplish; throat and chest thickly speckled.

Habitat : Undisturbed forest area near vicinity of water.

Distribution : INDIA : Manipur, Andaman Islands.

Elsewhere : China; Myanmar; The Malay Peninsula; Indonesia; Thailand.

Remark : The only other record of this species in India is that of a juvenile specimen reported by Pillai (1977) from Andaman Islands.

58. *Uperodon globulosus* (Gunther, 1864)

(Fig. 119)

Common name : Indian balloon frog.

Diagnostic characters : Head broader than long; snout rounded; canthus rostralis indistinct, blunt; inter orbital space three times that of the upper eyelid; eyes small with round pupil; nostril closer to snout; an occipital and a weak supratympanic fold; tympanum hidden. Forelimbs moderate; fingers free; hindlimbs short; toes short with round tips, feebly webbed; TTA reaching the junction of forelimbs meeting the body. Dorsum smooth to weakly tuberculate; ventrally smooth to wrinkled. Of stout build; globular; Uniform brown above or spotted with darker, ventrally white.

Habitat : Moist soil that is sandy to a certain degree; light woods and fields; found within or near ant and termite nests.

Distribution : INDIA : Arunachal Pradesh, Assam, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, West Bengal.

Elsewhere : Nepal.



Fig. 119. *Uperodon globulosus* (Gunther) (Front view)

Family RANIDAE

59. *Amolops assamensis* Sengupta, Hussain, Choudhury, Gogoi, Ahmed and Choudhury, 2008

(Fig. 120)

Common name : Sengupta's Cascade frog.

Diagnostic characters : Head broader than long; vomerine teeth in oblique rows present between the choanae and angular to body axis; tympanum flat, rounded, small, separated from eye by a distance slightly less than its diameter; a distinct pineal body present. Forelimb about twice the hand length; fingers at tips bear large discs with circum marginal groove; toes fully webbed, discs on them smaller than that of the fingers; a large elongate innermetatarsal tubercle and a small oval outer metatarsal tubercle present; TTA reach beyond snout. Skin granular, with scattered tubercles on back and flank; subarticular tubercles large, distinct; dorsolateral rows of minute glands and rictal glands present; tuptympanic fold distinct. Dorsal ground colour olive green with rounded or irregular brown patches; sides of head olive green; tympanum reddish brown; flanks olive green with large brown patches on the upper part. Limbs dull yellow and barred with reddish brown.

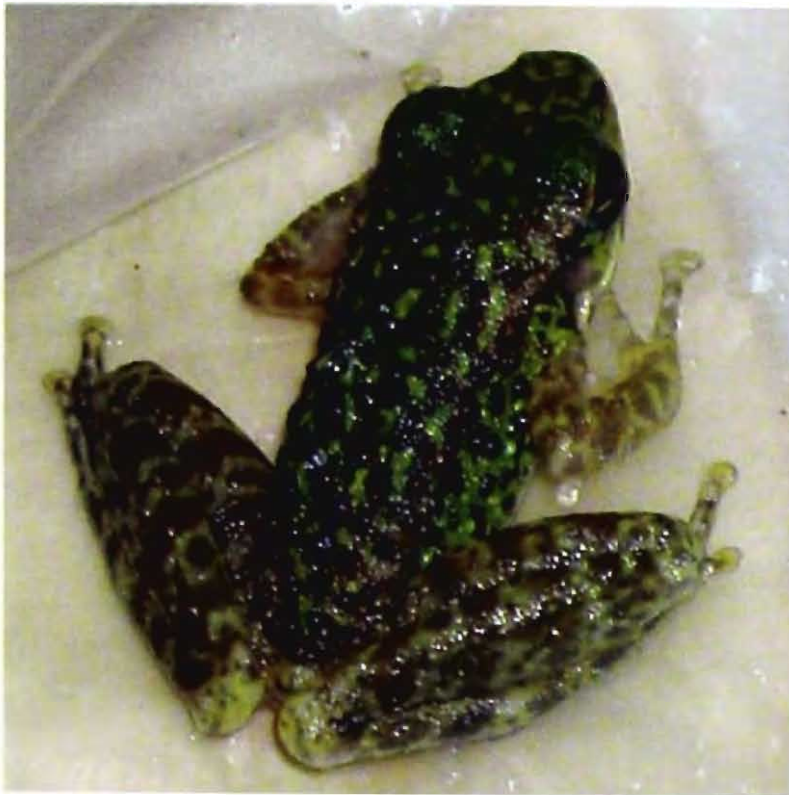


Fig. 120. *Amolops assamensis*

Habitat : Found in fast flowing streams, and associated with the splash-zone of dark, moist rock crevices, with overhead canopy cover.

Distribution : Assam.

60. *Amolops formosus* (Gunther, 1876)

(Figs. 121, 122)

Common name : Assam cascade frog.

Diagnostic characters : Head broader than long; vomerine teeth in oblique rows; tympanum not very distinct. Limbs strong; fingers long and free; tips of fingers dilated into large discs with circum marginal groove; limbs with cross bars; toes fully webbed, web deeply notched; discs on them smaller than that of the fingers;



Fig. 121. *Amolops formosus* (Gunther)



Fig. 122. *Amolops formosus* (Gunther)

inner metatarsal tubercle oval, outer metatarsal tubercle absent; males with internal vocal sacs. TTA reach beyond nostril or up to tip of snout but never beyond; length of tibia more than half SVL; sub articular tubercles moderate. Dorsum olive green with blackish spots on head and body.

Habitat : Near water falls, rocky rivers.

Distribution : INDIA : Arunachal Pradesh, Meghalaya, Nagaland, Punjab, Sikkim, West Bengal, Uttar Pradesh.

Elsewhere : Nepal.

61. *Amolops gerbillus* (Annandale, 1912)

(Figs. 123, 124)

Common name : Gerbil's stream frog.

Diagnostic characters : Head as long as broad; slightly depressed; snout rounded; tympanum distinct, $1/3^{\text{rd}}$ eye diameter; vomerine teeth large, oblique. Limbs moderate; forelimbs short, fingers free; hindlimbs long; TTA reaching beyond tip of snout; subarticular tubercles small, prominent. Dorsum dark grey marbled with black; limbs with cross bars of irregular pattern; skin smooth, occasionally finely granulate, often tuberculated laterally; a faint glandular fold from eye to groin.

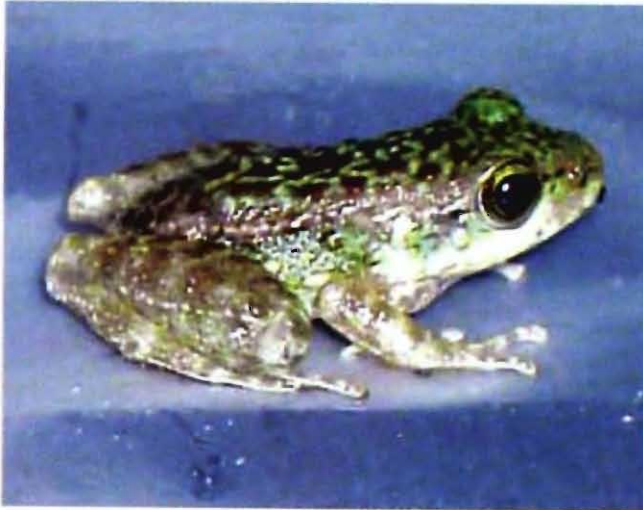


Fig. 123. *Amolops gerbillus* (Annandale)



Fig. 124. *Amolops gerbillus* (Annandale)
(Tadpole)

Habitat : Rivers, streams, nallahs.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, West Bengal.

Elsewhere : China, Myanmar, Tibet.

62. *Amolops marmoratus* (Blyth, 1855)

(Figs. 125, 126)

Common name : Marbled cascade frog.



Fig. 125. *Amolops marmoratus* (Blyth)



Fig. 126. *Amolops marmoratus* (Blyth)

Diagnostic characters : Head broader than long; snout projecting beyond mouth; vomerine teeth in straight or slightly oblique series; tympanum not very distinct. Forelimbs short, fingers free; toes entirely webbed; both inner and outer metatarsal tubercles indistinct; TTA reach beyond tip of snout; skin smooth above or with rounded glandules which are larger on sides of body; belly granular. Dorsum brown variegated with grey, spotted with darker; beneath yellowish, immaculate or marbled with brown; limbs with dark cross bars; males with internal vocal sacs.

Habitat : Rocky rivers, mountain streams and among thick plant growth.

Distribution : INDIA : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, West Bengal.

Elsewhere : China, Myanmar, Nepal, Tibet, Thailand.

63. *Amolops monticola* (Anderson, 1877)

(Figs. 127, 128)

Common name : Montane cascade frog.

Diagnostic characters : Head as long as broad, greatly flattened; snout round; nostril close to tip of snout; pineal ocellus present; tympanum indistinct, covered with warty granules; finger tips with large grooved discs ; toes fully webbed, discs on toes smaller; inner metatarsal tubercle flat, oblong; TTA reach beyond snout;



Fig. 127. *Amolops monticola* (Anderson)



Fig. 128. *Amolops monticola* (Anderson)

dorsal and ventral skin smooth; very small rounded warts posterior to eyes and anal region; dorso-lateral fold slightly prominent and end below axilla and groin; ventrally a gular and pectoral fold slightly indicated. Dorsum greyish or brownish with few irregular darker spots; a bluish black stripe extending from tip of snout along canthus and lateral fold; upper lip, post-oral glands and supra tympanic fold yellowish.

Habitat : Rapids, ponds, brooks and rivers.

Distribution : INDIA : Nagaland, West Bengal.

Elsewhere : China; Nepal; Tibet.

64. *Amolops viridimaculatus* (Jiang, 1983)

(Fig. 129)

Common name : Dahaoping cascade frog.

Diagnostic characters : Head broader than long, flat above, snout sub acuminate; nostril closer to eye; canthus rostralis round, concave, eyes moderate; inter orbital distance equals eye diameter; inter narial space broader than inter orbital width; tympanum small, partly hidden by thick supratympanic fold; space anterior and posterior to tympanum tuberculated; loreal region concave; forelimbs moderate, fingers with enlarged discs; hind limbs long, fully webbed; TTA reaching snout; inner metatarsal tubercle present, outer metatarsal tubercle absent; Dorsum and flanks brownish with purplish round spots; limbs with purplish cross bands; ventrum light brown with small white spots encircled with purple; dorsum smooth with indistinct dorsolateral glandular band and flanks with thin longitudinal folds.

Habitat : Rivers and streams.

Distribution : INDIA : Nagaland.

Elsewhere : China; expected in adjacent Myanmar.



Fig. 129. *Amolops viridimaculata* (Jiang)

65. *Clinotarsus alticola* (Boulenger, 1882)

(Figs. 130, 131)

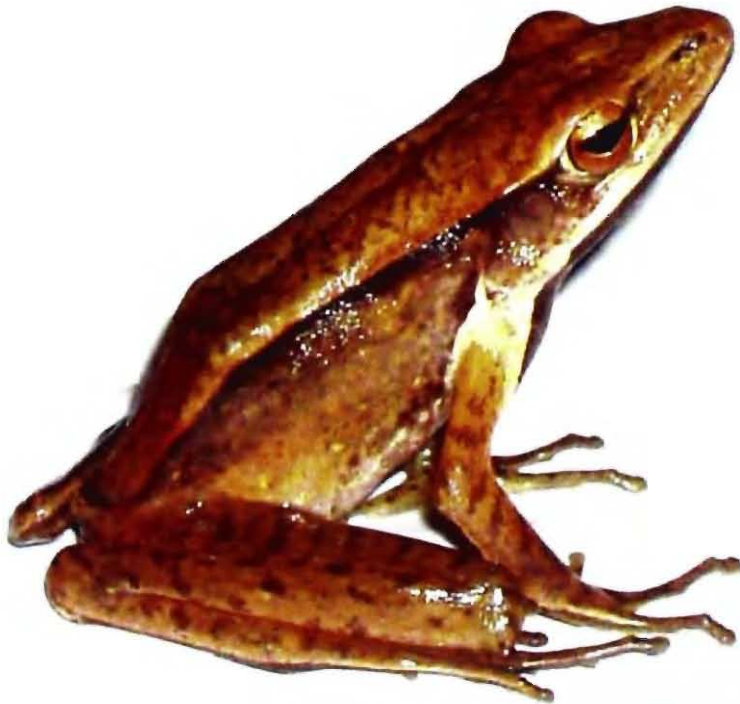
Common name : High altitude frog

Diagnostic characters : Head longer than broad; nostrils laterally placed, nearer to tip of snout; tympanum very distinct, $2/3^{\text{rd}}$ the diameter of eye; fingers and toes with small discs with groove separating upper and lower surface; subarticular tubercles prominent; TTA reach nostrils, tip of snout or beyond; toes fully webbed except 2 phalanges of 4th toe which are free; inner metatarsal tubercles small, oval; outer metatarsal tubercles indistinct; skin smooth; tympanic fold ending in glandules at corner of mouth. Males green and females orangish, colour fade in preservative.

Habitat : Paddy fields, lakes and ponds.

Distribution : INDIA : Assam, Meghalaya, Mizoram, Nagaland, Tripura, Andamans, Orissa, Sikkim, West Bengal.

Elsewhere : Bangladesh, China, Indonesia, Japan, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam.

Fig. 130. *Clinotarsus alticola* (Boulenger)Fig. 131. *Clinotarsus alticola* (Boulenger)

66. *Humerana humeralis* Boulenger, 1887

(Figs. 132-134)

Common name : Boulenger's green frog.

Diagnostic characters : Head as long as broad; snout projecting beyond mouth; nostrils nearer to tip of snout; tympanum distinct. Forelimbs moderate, tips of fingers and toes dilated into small discs with a horseshoe shaped groove separating upper and lower portion; TTA reach nostrils; toes fully webbed; inner metatarsal tubercle oval, outer metatarsal tubercle absent. Skin smooth, a narrow dorsolateral glandular fold from above tympanum to groin; supratympanic glandular fold ending in glandules; grayish brown or pale olive above, greenish on the flanks; upper lip whitish; limbs without cross bands; hinder parts of thighs blackish, lower parts white; males with external vocal sacs and large oval glands on arm.

Habitat : Paddy fields, lakes, and ponds adjacent to forests.

Distribution : INDIA : Arunachal Pradesh, Assam.



Fig. 132. *Humerana humeralis* (Boulenger)



Fig. 133. *Humerana humeralis* (Boulenger)



Fig. 134. *Humerana humeralis* (Boulenger)

67. *Hylarana erythraea* (Schlegel, 1837)

(Figs. 135-137)

Common name : Leaf frog.Fig. 135. *Hylarana erythraea* (Schlegel)Fig. 136. *Hylarana erythraea* (Schlegel)

Diagnostic characters : Head longer than broad, pointed; snout pointed; canthus rostralis prominent; loreal region concave; nostrils nearer to tip of snout; tympanum very distinct, nearly the diameter of eyes. Forelimbs slender, fingers long, free, tips of fingers dilated into small discs with circum marginal groove; hind limbs long; toes dilated into distinct discs; inner meta tarsal tubercles small, oval; outer metatarsal tubercles absent; TTA reach tip of snout; distinct dorsolateral glandular fold; tympanic fold ending in a glandule. Brown or olive above; upper lip and glandular fold white; hind limbs speckled with brown; longitudinally striped; ventrally immaculate.

Habitat : Aquatic, in rivers and paddy fields; on vegetation.

Distribution : INDIA : Arunachal Pradesh, Assam. Meghalaya, Mizoram, Nagaland.

Elsewhere : Borneo; Celebes; Indochina; Indonesia; Malay peninsula; Philippines; Myanmar; Thailand; Vietnam.



Fig. 137. *Hylarana erythraea* (Schlegel)

68. *Hylarana garoensis* (Boulenger, 1920)
(Figs. 138-140)



Fig. 138. *Hylarana garoensis* (Boulenger)

Common name : Swift cascade frog.

Diagnostic characters : Head as long as broad; snout projecting slightly beyond mouth; canthus rostralis obtuse; loreal region concave; vomerine teeth in oblique rows; tongue spatulate; tympanum depressed with darker centre; nostril lateral, closer to tip of snout. Forelimbs moderate, fingers free with swollen tips; hindlimbs long; TTA reaches snout or beyond; toes fully webbed, except the 4th toe. Dorsum light brown to dark brown; two dorsolateral stripes from eye to pelvic region; limbs with dark cross bars; fingers with swollen tips, free; both inner and outer metatarsal tubercles present.



Fig. 139. *Hylarana garoensis* (Boulenger)



Fig. 140. *Hylarana garoensis* (Boulenger)

Habitat : Fast flowing rivers and streams.

Distribution : INDIA : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, West Bengal.

Elsewhere : Nepal.

69. *Hylarana leptoglossa*

(Cope, 1868)

(Figs. 141-142)

Common name : Cope's noisy frog.

Diagnostic characters : Head as long as broad; nostrils lateral, nearer to tip of snout; corners of eye black edged; tympanum almost as large as eye; upper lip whitish; subarticular tubercles well developed, bulbous; palm



Fig. 141. *Hylarana leptoglossa* (Cope)



Fig. 142. *Hylarana leptoglossa* (Cope) (Back view)

padded; black patch ventrally on base of humerus. Hind limbs moderate; TTA reach eye or nostrils; toes $2/3^{\text{rd}}$ webbed; inner metatarsal tubercle oval; outer metastasrsal tubercle conical; limbs with cross bands; dorsolateral glandular fold broad; fingers and toes with swollen discs; dorsum granular; mandibular glandular fold ending in two well developed glandules; thorax mottled; dorsum with blotches; ventral region of thigh and forelimbs reddish; males with external vocal sacs.

Habitat : Streams, pools, ponds and lakes of forest area.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya, Mizoram, Tripura.

Elsewhere : Myanmar; Thailand; Vietnam.

Remarks : The common name is suggestive of its loud call which once heard can never be mistaken.

70. *Hylarana malabarica* (Tschudi, 1838)

(Figs. 143-144)

Common name : Fungoid frog.**Diagnostic characters** : Head as long as broad; nostrils closer to tip of snout; tympanum very distinct, as large as eye diameter. Fingers moderately long; 1stFig. 143. *Hylarana malabarica* (Tschudi)Fig. 144. *Hylarana malabarica* (Tschudi)

finger longer than 2nd; tips of fingers and toes little swollen; hindlimbs moderate; TTA reach tympanum or eye; toes 1/3rd to 1/2 webbed; 2-3 phalanges of 4th toe free; subarticular tubercles very prominent; inner and outer metatarsal tubercles prominent. Skin smooth or granulate above with small warts on the sides; dorsolateral glandular fold feeble; crimson above with or without a few small black spots and with a white or yellow lateral streak on the sides; tympanum often reddish brown; males with external vocal sacs.

Habitat : Hills and plains; rocky streams shaded by dense jungle.

Distribution :
INDIA : Assam, Mizoram, Western Ghats of southwestern India.

Elsewhere : Not known.

71. *Hylarana nicobariensis* (Stoliczka, 1870)

(Fig. 145)

Common name : Nicobarese frog.



Fig. 145. *Hylarana nicobariensis* (Stoliczka)

Diagnostic characters : Head broader than long; loreal region concave; snout more or less pointed; nostril closer to tip of snout; internarial space broader than inter orbital space. Tympanum large, as large as eye. Dorso lateral glandular fold prominent. Flanks and thigh behind with irregular dark brown spots. Limbs with cross bands. Forelimbs slender, hind limbs long, slender; TTA crossing snout. Toes fully webbed except 4th toe where the web is marginal. Fingers and toes with slightly enlarged tips. Dorsum buff coloured with light brown spots. Ventrums whitish.

Habitat : Forest area near aquatic habitat.

Distribution : INDIA : Assam, Mizoram, Tripura.

Elsewhere : Borneo; Myanmar; Nicobar island; Philippines; Thailand.

72. *Hylarana nigrovittata* (Blyth, 1856)

(Fig. 146)

Common name : Black spotted frog.

Diagnostic characters : Head as long as broad; nostrils equidistant to eyes and tip of snout or slightly closer to snout; tympanum distinct; tips of fingers and toes swollen into small discs with grooves separating upper and lower surface; TTA reach eye, nostril or between them; toes fully webbed, 2 phalanges of 4th toe free; skin smooth or granular above, often warty on the sides; supratympanic glandular

fold ending in a glandule; dorsolateral glandular fold from tympanum to groin; brown above with or without darker spots; a dark brown or blackish band on each side of head and body; limbs with dark cross bands; hinder side of thighs yellowish with black spots or markings; lower parts white often with small brown spots; males with internal vocal sacs.

Habitat : Paddy fields, ponds and lakes adjacent to forest area.

Distribution : INDIA : Assam, Meghalaya.

Elsewhere : Malaya; Nepal; Myanmar.



Fig. 146. *Hylarana nigrovittata* (Blyth)

73. *Hylarana taipehensis* (van Denburgh, 1909)

(Fig. 147)

Common name : Taipeh frog.

Diagnostic characters : Head longer than broad; nostrils closer to tip of snout; supratympanic fold ending in glandule; tips of fingers and toes dilated in to small discs; TTA reaching eye; toes entirely webbed, 2 phalanges of 4th toe free; sub articular tubercles well developed; both inner and outer metatarsal tubercles present; Dorsum brownish without any spots; two prominent white lines from behind eyes to base of thighs, inner edge of which is deeper brown and outer edge blackish; another stripe similar to above runs from anterior region of eyes to tip of snout; longitudinal stripes on hind limbs; dorsally smooth, fairly tuberculated posteriorly; white glandular fold from eye to groin; throat, chest and belly with white subcutaneous dots.

Habitat : Streams, paddy fields, grass lands.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya.

Elsewhere : China, Nepal, Thailand, Vietnam.



Fig. 147. *Hylarana taipehensis* (van Denburgh)

74. *Hylarana tytleri* Theobald, 1868
(Figs. 148, 149)

Common name : Theobald's ranid frog



Fig. 148. *Hylarana tytleri* Theobald

Diagnostic characters : Head longer; tympanum very distinct; supratympanic glandular fold ending in glandule; upper lip and glandular fold white; fingers slender, toes moderate, nearly entirely webbed; tips of fingers and toes dilated into small but very distinct discs; both inner and outer metatarsal tubercle very prominent and large; hind limbs with cross bands; TTA reaches snout; Prominent glandular lateral fold present. Green above, creamish below.

Habitat : Aquatic; rivers, paddy fields, swampy areas and on vegetation.

Distribution : INDIA : Manipur, Nagaland.

Elsewhere : Not known.



Fig. 149. *Hylarana tytleri* Theobald

75. *Odorrana chloronota* (Gunther, 1876)

(Figs. 150, 151)

Common name : Copper cheeked frog.

Diagnostic characters : Head as long as broad; nostril closer to snout; loreal region concave; internarial distance broader than interorbital space; head above flat; snout moderately round; tympanum large, round, centrally black; vomerine teeth in oblique series; tongue diamond shaped, bilobed. Forelimbs slender; fingers long, slender with slightly enlarged oval discs; hind limbs very long, TTA crossing much beyond snout; toes fully webbed except 4th toe; inner metatarsal tubercle present, outer absent. Dorsum green (brown in preserved specimen); dorsolateral glandular fold prominent; flanks and back of thigh with irregular blotches and network; limbs with dark brown cross bands; ventrum whitish.

Habitat : In and around hill streams.

Distribution : Assam, Meghalaya, Mizoram.

Elsewhere : Southern China; Indo China; Myanmar; Thailand.

Fig. 150. *Odorrana chloronota* (Gunther)Fig. 151. *Odorrana chloronota* (Gunther)

76. *Odorrana livida* (Blyth, 1856)

(Figs. 152, 153)

Common name : Green cascade frog.



Fig. 152. *Odorrana livida* (Blyth)

Diagnostic characters : Head as long as broad; nostrils closer to snout; tympanum very distinct with whitish circular rim; Forelimbs moderate, fingers free, subarticular tubercles prominent; tips of fingers and toes dilated into discs with a groove separating upper and lower part; hindlimbs long; TTA reach beyond tip of snout; toes fully webbed, feebly notched; inner metatarsal tubercle oval and flat; outer meta tarsal tubercle absent. Skin smooth; tympanic glandular fold ending in glandule. Dorsum green with or without few black spots; sides of head and belly dark brown; upper lip white; groin and back of thighs with yellow spots or marbling; lower part white or yellowish; throat and chest usually brown or speckled with brown. *O. livida* differs from *O. chloronota* in having a uniformly coloured dorsum (green with dark sides in *chloronota*), absence of transverse bars on the limbs, smooth skin with



Fig. 153. *Odorrana livida* (Blyth)

pustules dorsal to the cloaca (smooth dorsum, laterally granular in *O. chloronota*) and white mottling on the flanks (absent in *chloronota*).

Habitat : In and around hill streams.

Distribution : INDIA : Assam, Manipur, Meghalaya, Mizoram, Nagaland, Eastern Himalayas; West Bengal.

Elsewhere : China; Malaya Peninsula; Myanmar; Thailand; Vietnam; Yunnan.

Remarks : According to Frost (2009) it is restricted to Myanmar but by the differentiating characters (Bain *et al.*, 2003), *O. livida* can be separated from *O. chloronota* and it seems that both the species are occurring in North east India.

77. *Pterorana khare* Kiyasetuo and Khare, 1986

(Figs. 154, 155)

Common name : Khare's Gliding frog.

Diagnostic characters : Head broader than long; nostrils laterally placed equidistant to eyes and tip of snout; tympanum distinct; vomerine teeth narrow, oblique in position; tongue elongate, bifid; supratympanic fold distinct, ending in a large gland; a dark band from corner of eye to shoulder along tympanic fold; rudiment of web between fingers; fingers with swollen oblong discs; TTA reach nostril; toes fully webbed; a lateral expansion of skin from behind the tympanum to the posterior region including thighs measuring a maximum width of 12-14 mm in the middle when stretched; ventrally thorax and part of belly darker brown, remaining lighter; a distinct dorsolateral glandular fold from behind eye to groin. Dorsum slate dark brown, ventrally white.



Fig. 154. *Pterorana khare* Kiyasetuo and Khare (Male)



Habitat : Torrential Rivers and mountain streams.

Distribution : INDIA : Arunachal Pradesh, Manipur, Mizoram, Nagaland.

Elsewhere : Not known.

Fig. 155. *Pterorana khare* Kiyasetuo and Khare (Female)

Family RHACOPHORIDAE

78. *Chiromantis cherrapunjiae* (Roonwal and Kripalani, 1966)
(Figs. 156,157)

Common name : Cherrapunjee bush frog.



Fig. 156. *Chiromantis cherrapunjiae*
(Roonwal and Kripalani)



Fig. 157. *Chiromantis cherrapunjiae*
(Roonwal and Kripalani)
(Showing webbed hand)

Diagnostic characters : Head broader than long; nostril closer to tip of snout; tympanum fairly distinct; eyes prominent, directed upward and forward; fingers moderately long, nearly half webbed; tips of toes and fingers dilated into prominent semicircular discs; TTA reach tip of snout; toes 3/4th webbed. Dorsally pale green to dark green, lower jaw whitish; chest and abdomen gray to light brown; skin smooth; supratympanic glandular fold narrow, faint; abdomen faintly granulated.

Habitat : Pools, streams, open vegetation.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya.

Elsewhere : Not known.

79. *Chiromantis doriae* (Boulenger, 1893)
(Fig. 158)

Common name : Doria's tree frog.

Diagnostic characters : Head as long as broad; nostril closer to tip of snout; tympanum 1/2 the diameter of eye; fingers moderately long and free; tips dilated and round; toes long and slender, 2/3rd webbed; TTA reach tip of snout; both inner and outer metatarsal tubercles present. Dorsum dark grey to brown; two dorso-lateral folds; limbs dark brown with indistinct cross bars; skin smooth; ventrally white.



Fig. 158. *Chiromantis doriae* (Boulenger)

Habitat :
Vegetation.

Distribution :
INDIA : Arunachal Pradesh.

Elsewhere :
China; Indochina;
Myanmar, Thailand,
Vietnam.

80. *Chiromantis senapatiensis* (Mathew and Sen, 2009)
(Figs. 159-161)

Common name : Senapati's Tree frog.



Fig. 159. *Chiromantis senapatiensis*
Mathew & Sen



Fig. 160. *Chiromantis senapatiensis*
Mathew & Sen (Ventral view)

Diagnostic characters : Head broader than long; jaws white; supra tympanic fold prominent; tympanum round; nostril equidistant to eye and snout tip. Forelimbs slender; finger tips with enlarged, circum marginally grooved discs; discs on fingers larger than that on the toes; 4th and 5th fingers with rudiment of web. Hind limbs moderate; toes almost fully webbed; TTA reaching anterior corner of eye;



inner meta tarsal tubercle present; outer meta tarsal tubercle absent. Dorsum light brown; a vertebral dark band present; glandular fold laterally from snout to groin along eye and tympanum; a 'V' shaped mark below the eyes; dorsum smooth; ventrum white, granular.

Habitat : River bed.

Distribution : INDIA : Manipur.

Fig. 161. *Chiromantis senapatiensis* Mathew & Sen (Showing web on toe)

81. *Chiromantis shyamrupus* (Chanda and Ghosh, 1989)

(Fig. 162)

Common name : Shyamrup's Bush frog.

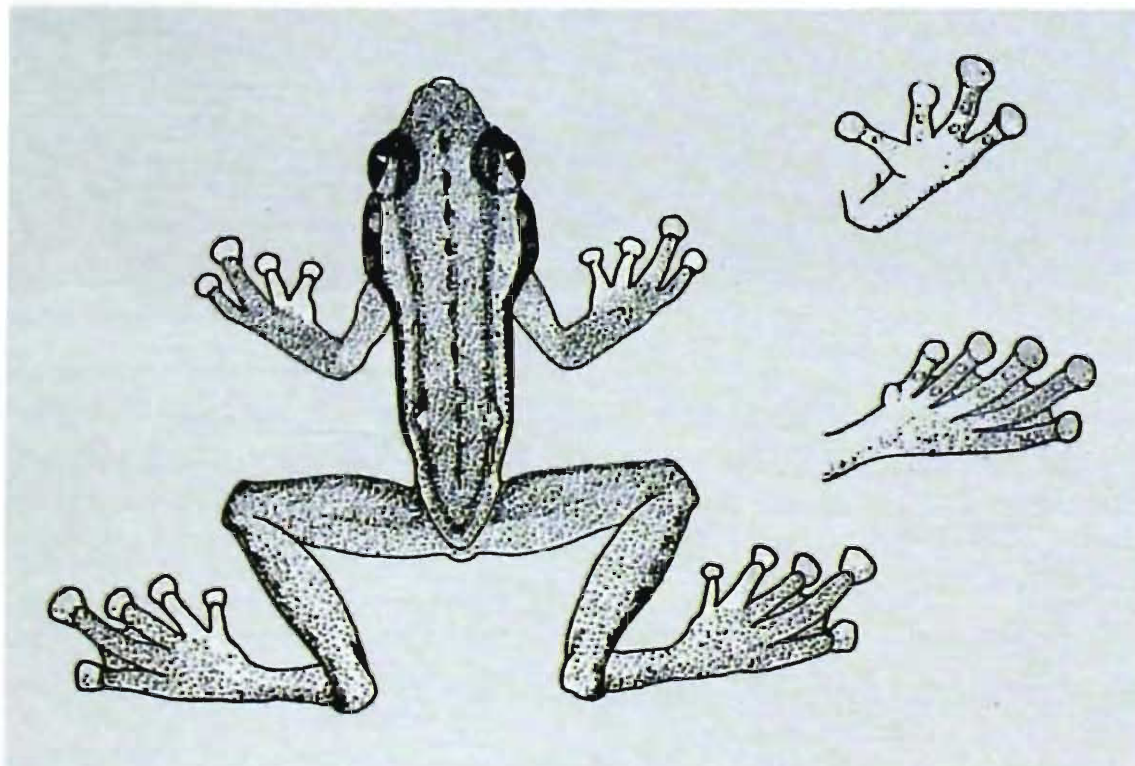


Fig. 162. *Chiromantis shyamrupus* (Chanda & Ghosh)

Diagnostic characters : Head as long as broad; nostrils closer to tip of snout; tympanum $2/3^{\text{rd}}$ the diameter of eye; fingers free with prominent round tips; TTA reach nostrils; toes more than $2/3^{\text{rd}}$ webbed, two distal phalanges of 4th toe free; both inner and outer metatarsal tubercles absent. Dorsum greyish to brownish; a dorso-lateral white band on either side; a dark narrow mid dorsal line; dorsum, chest and belly smooth.

Habitat : Forest area in and around aquatic habitat.

Distribution : INDIA : Arunachal Pradesh.

Elsewhere : Not known.

82. *Chiromantis simus* Annandale, 1915

(Fig. 163, 164)

Common name : Annandale's tree frog.



Fig. 163. *Chiromantis simus* (Annadale)
Photo : K. Deuti



Fig. 164. *Chiromantis simus* (Annadale)

Diagnostic characters : Head broader than long; nostrils closer to tip of snout than to eyes; fingers with suctorial discs; toes $2/3^{\text{rd}}$ webbed; subarticular tubercles moderately developed. Dorsum dark, ventrally yellowish; skin more or less smooth; throat and lateral sides covered with small tubercles and warts; abdomen and thighs granulate.

Habitat : Forest area in and around aquatic habitat.

Distribution : Assam, West Bengal.

83. *Chiromantis vittatus* (Boulenger, 1887)

(Fig. 165)

Common name : Boulenger's tree frog.

Diagnostic characters : Snout pointed; longer than eye diameter; canthus rostralis prominent; loreal region slightly concave; nostril closer to snout; tympanum distinct; fingers free; TTA reach between eye and tip of snout; toes more or less half webbed; a small prominent inner meta tarsal tubercle present. Dorsum orangish to brownish; limbs with dark cross bars, lower surface spotted with brown; dorsal surface with small wart or with oblique granular lines; a very narrow and faint mid dorsal line; ventral surface granular.

Habitat : Forest areas in and around aquatic habitat.

Distribution : INDIA : Arunachal Pradesh, Mizoram, Nagaland.

Elsewhere : China; Myanmar; Thailand; Vietnam.



Fig. 165. *Chiromantis vittatus* (Boulenger)

84. *Kurixalus naso* (Annandale, 1912)

(Figs. 166, 167)

Common name : Long snouted tree frog.

Diagnostic characters : Head rather broad; nostril nearer to tip of snout; tympanum distinct, $\frac{2}{3}$ rd the diameter of eye; fingers with rudimentary web; discs on fingers and toes well developed; sub articular tubercles well developed; TTA reach eye; toes fully webbed; inner metatarsal tubercle somewhat elongate, indistinct; outer metatarsal tubercle absent.



Fig. 166. *Kurixalus naso* (Annandale) (Male)

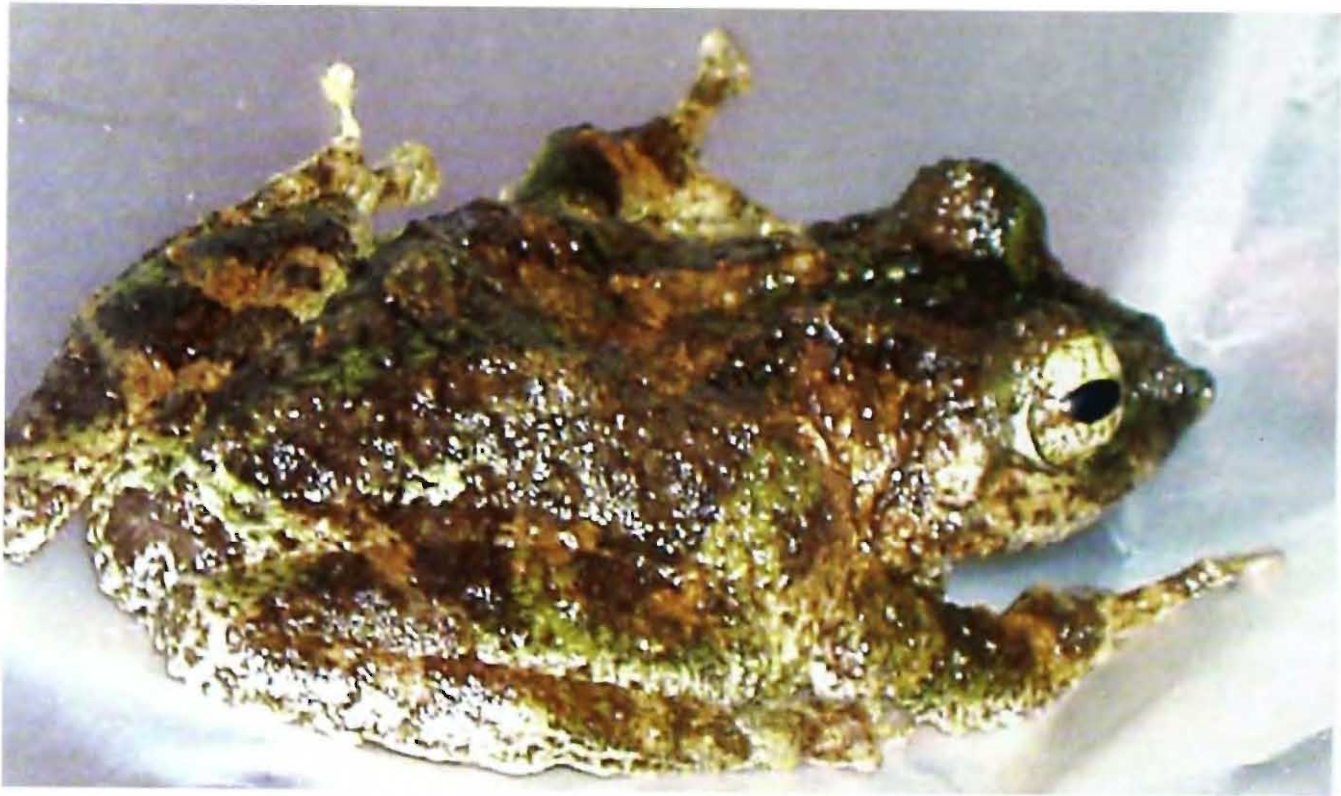


Fig. 167. *Kurixalus naso* (Annandale) (Female)

Dorsum purplish brown in females and greenish in males, irregularly marked with dark slate colour; irregular paler markings on the sides; limbs with irregular markings; fingers and toes barred with alternate brown and grey stripes; ventral surface dirty white; dark grey spots on throat and chest; a white spot on the sole in place of outer metatarsal tubercle.

Habitat : Forest near stream.

Distribution : INDIA : Arunachal Pradesh, Mizoram.

Elsewhere : China; Myanmar.

85. *Philautus andersonii* (Ahl, 1927)

(Figs. 168, 169)

Common name : Anderson's Bush Frog.

Diagnostic characters : Head broader than long; nostril closer to snout; tympanum distinct; fingers free with swollen tips; sub articular tubercles small, indistinct; palm and sole with moderately fleshy pad; TTA reach anterior corner of eyes;



Fig. 168. *Philautus andersoni* (Ahl)



Fig. 169. *Philautus andersoni* (Ahl)

toes webbed at base with prominent swollen tips. Dorsally brown to olive, ventral surface white to yellowish; dorsum smooth; flank and thigh with numerous small warts; supra tympanic fold present; ventrally smooth; inner and outer metatarsal tubercles small, indistinct.

Habitat : Bushes near aquatic habitat.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya, Mizoram.

Elsewhere : China; Myanmar; Tibet.

86. *Philautus annandalii* (Boulenger, 1906)

(Fig. 170)

Common name : Annandale's Bush Frog.

Diagnostic characters : Head broader than long; nostril equidistant to eye and tip of snout; tympanum distinct, as large as eye; fingers free; tips of fingers and toes dilated into round discs; sub articular tubercles not very prominent; TTA reach tip of snout; toes webbed at base; both inner and outer meta tarsal tubercles absent. Dorsally grey to brown, a dark bar connecting eyes; a dorso-lateral band from either side meeting on the groin; limbs with dark bands; ventrally greyish, spotted or marked with brown; skin smooth; supra tympanic glandular fold distinct; throat smooth; belly and ventral parts granulated.

Habitat : Bushes near aquatic habitat.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya, Nagaland, Eastern Himalayas.

Elsewhere : Bhutan; Nepal.



Fig. 170. *Philautus annandalii* (Boulenger)

87. *Philautus garo* (Boulenger, 1919)

(Fig. 171)

Common name : Garo Hills' Bush Frog.

Diagnostic characters : Head broader than long; snout pointed; inter orbital width broader than eye diameter; tympanum distinct; supratympanic glandular fold from eye to shoulder prominent; nostrils slightly closer to eye; tongue broad, thick, slightly notched; Forelimbs slender, fingers free, 1st finger shorter than 2nd; finger tips with dilated discs; Hindlimbs slender, TTA reaching anterior corner of eyes; toes webbed at base between 2nd, 3rd, 4th and 5th; subarticular tubercles prominent; an indistinct inner metatarsal tubercle, outer absent. A dark triangular patch starting along the middle of eyes; another dark patch starting from behind the eye and above the tympanum continue mid dorsally towards the groin where it bifurcates towards either side leaving the main band to continue to the vent; snout to front of eyes with a light yellowish patch; lateral sides of head dark brown; flanks yellowish; head dorsally with small and medium tubercles; flanks with small tubercles; throat and belly heavily and chest lightly speckled with brown; limbs with broad dark bands.

Fig. 171. *Philautus garo* (Boulenger)

Habitat : Bushes, meadows, forest floor.

Distribution : INDIA : Meghalaya.

Elsewhere : Not known

Remarks : Choudhury *et al.* (2001) and Ao *et al.* (2003) reported *P. garo* from Assam and Nagaland respectively without giving the species description or a photograph.

88. *Philautus kempiae* (Boulenger, 1919)

(Fig. 172)

Common name : Kemp's Bush Frog.

Diagnostic characters : Head broader than long; nostril equidistant to eye and tip of snout; tympanum hidden; fingers free; tips of fingers and toes with prominent discs; sub articular tubercles not very prominent; TTA reach tip of snout; toes webbed at base; both inner and outer meta tarsal tubercles absent. Dorsally grey to brown with blackish spots; a black cross bar between eyes and 'V' shaped mark on the back; limbs with irregular dark cross bars; upper lip with vertical bars; throat and belly almost white, spotted or marbled with brown; skin dorsally tuberculated; throat smooth, belly with minute granules.



Fig. 172. *Philautus kempiae* (Boulenger)

Habitat : Forest species.

Distribution : INDIA : Meghalaya.

Elsewhere : Not known.

89. *Philautus manipurensis* Mathew and Sen, 2009

(Figs. 173, 174)

Common name : Leimatak's Bush Frog.

Diagnostic characters : Head broader than long; snout obtusely pointed, slightly projecting beyond lower jaw; canthus rostralis prominent; loreal region concave; inter-narial space less than inter-orbital width; tympanum fairly distinct, depressed, $\frac{1}{3}$ rd the diameter of the eye, separated from the eye by about $\frac{3}{4}$ th its own diameter; inter-orbital width broader than upper eyelid; vomerine teeth absent. Forelimbs short, fingers moderate with rudiment of web; finger tips with well developed discs; 1st finger shorter than 2nd; subarticular tubercles prominent. Hind



Fig. 173. *Philautus manipurensis* Mathew & Sen

limbs moderately long; TTA reaching nostrils; toes almost $2/3^{\text{rd}}$ webbed; toe tips with distinct discs which are smaller than that of fingers; discs on fingers and toes white with circum-marginal groove; an indistinct inner metatarsal tubercle present, outer metatarsal tubercle absent. Dorsum smooth; tympanic region with few rounded tubercles; venter granular; a chocolate brown mark starting from the eyes above continue as a band towards the groin; head from snout to the beginning of eyes yellowish; flanks yellowish with irregular brown patches; ventrally dirty white speckled all over with brown, particularly on throat and chest.



Fig. 174. *Philautus manipurensis* Mathew & Sen

Habitat : The single specimen was collected from the bank of Tumzane river, Leimatak. Collection spot was the dried up river course and the specimen was taken from under pebbles and dry leaves by an uprooted tree shaded by bamboo growth. Serious efforts were made to collect additional material of this species from this particular spot and elsewhere in North-East India during the study period but no more material could be collected.

Distribution : INDIA : Manipur.

90. *Philautus namdaphaensis* Sarkar and Sanyal, 1985

(Figs. 175-177)

Common name : Namdapha Bush Frog.

Diagnostic characters : Head slightly broader than long; nostril equidistant to eye and tip of snout; tympanum fairly distinct; fingers free with round discs; subarticular tubercles on hand very distinct, that on feet indistinct; toes nearly $1/2$



Fig. 175. *Philautus namdaphaensis* Sarkar & Sanyal (Live specimen)



Fig. 176. *Philautus namdaphaensis* Sarkar & Sanyal (Preserved) Dorsal view



Fig. 177. *Philautus namdaphaensis* Sarkar & Sanyal (Ventral view)

webbed; inner meta tarsal tubercle prominent, outer meta tarsal tubercle absent; TTA reach between eye and nostril. Dorsum dark brown, speckled with irregular brown spots; a thin mid dorsal line from snout to vent; limbs with indistinct cross bands; a prominent, broad, white band between eye covering the anterior part of upper eyelids; thigh, tibia and groin laterally brownish with dark blotches, ventrally dirty white; dorsal skin more or less smooth or with minute scattered tubercles; belly and under surface of thigh granular; throat and upper surface of limbs smooth.

Habitat : Forest species, found among bushes and bamboo thickets.

Distribution : INDIA : Arunachal Pradesh, Meghalaya.

Elsewhere : Not known.

91. *Philautus sahai* Sarkar and Ray, 2006

(Fig. 178-180)

Common name : Arunachal's Bush frog.

Diagnostic characters : Head broader than long; snout rounded; canthus rostralis not very distinct; loreal region concave; nostrils equidistant to eye and tip of snout; inter orbital width more or less equal to eye diameter; tympanum distinct, $\frac{1}{2}$ the eye diameter. Limbs fairly stout ; fingers free; sub articular tubercles distinct; toes nearly $\frac{1}{2}$ webbed; TTA reaches middle of eye; inner metatarsal tubercle present; outer absent. Dorsum dark brown (in spirit) with faint light reddish brown blotches dorsally and on the hinder portion of back; upper and lower jaw with dark cross bars; venter dull white with light darker blotches/spots on the belly and limbs.

Habitat : Rotten tree trunk in the dense forest by the river bank.

Distribution : INDIA : Arunachal Pradesh.

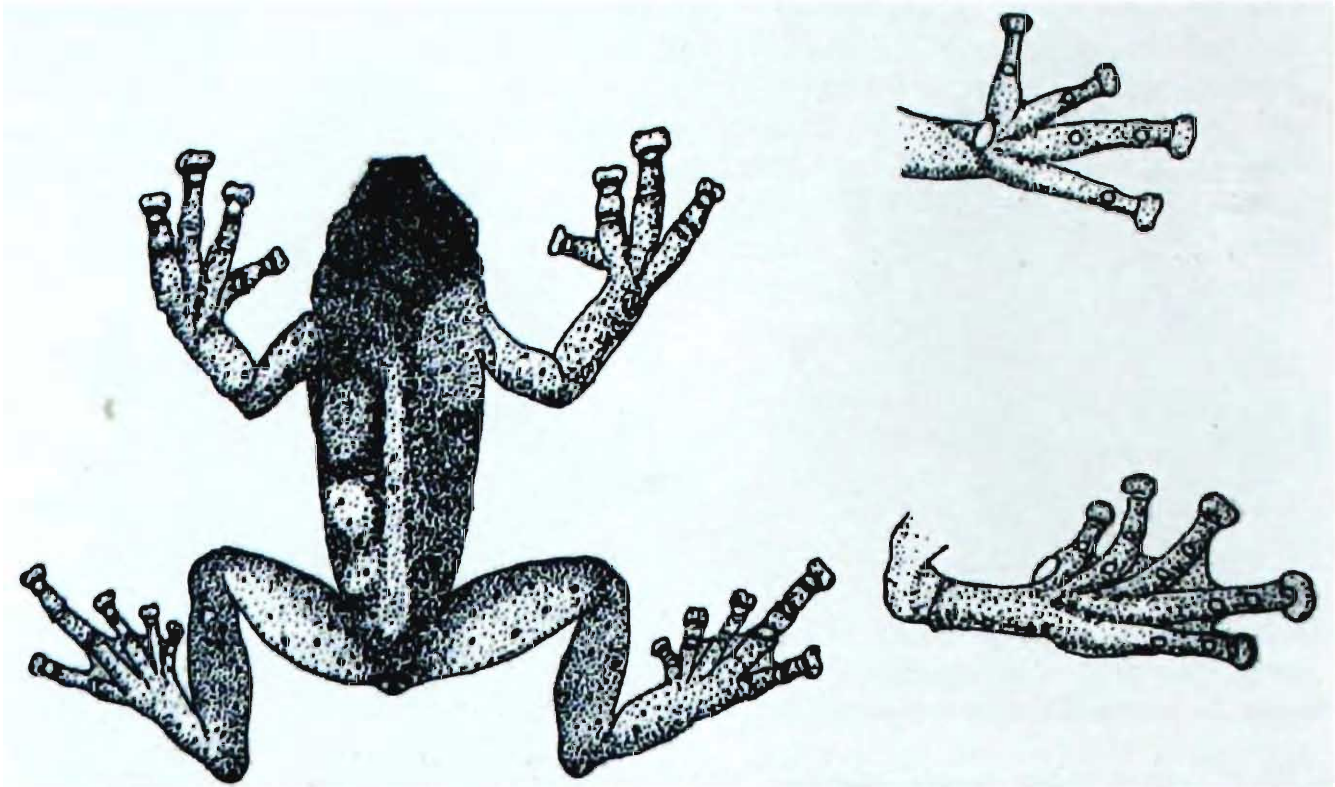


Fig. 178. *Philautus sahai* Sarkar & Ray



Fig. 179. *Philautus sahai* Sarkar & Ray
Photo : K. Deuti



Fig. 180. *Philautus sahai* Sarkar & Ray
Photo : K. Deuti

92. *Philautus shillongensis* Pillai and Chanda, 1973

(Figs. 181, 182)

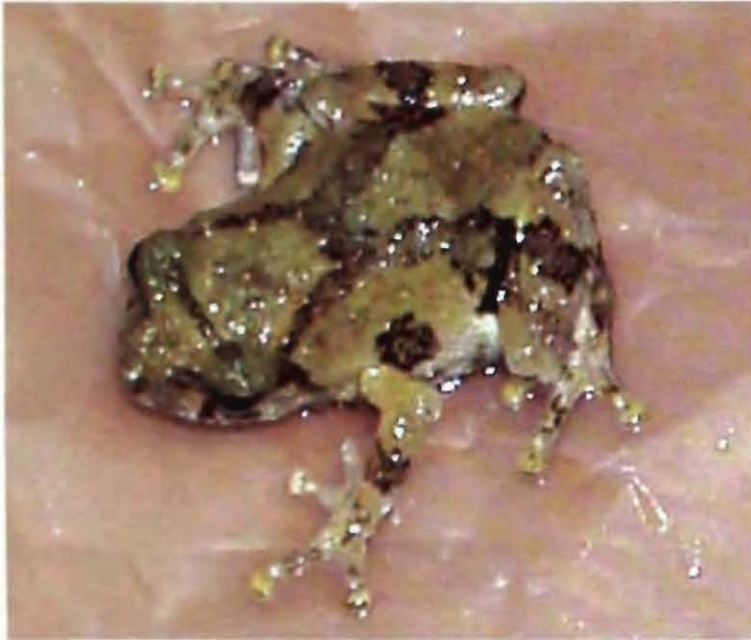


Fig. 181. *Philautus shillongensis* Pillai and Chanda

Common name : Shillong Bush Frog.

Diagnostic characters : Head broader than long; nostril dorso-lateral, equidistant to eye and tip of snout; tympanum fairly distinct, bordered by tympanic fold, $1/4^{\text{th}}$ to $1/3^{\text{rd}}$ the eye diameter; fingers with broad discs; rudiment of web between 3^{rd} and 4^{th} fingers; sub articular tubercles prominent; TTA reach eye or nostril; toes $1/4^{\text{th}}$ webbed, web rudimentary or almost absent between 1^{st} and 2^{nd} toes; both inner and outer meta tarsal



Fig. 182. *Philautus shillongensis* Pillai and Chanda

tubercles present. Dorsum light grey to dark brown or almost black; a dark band between eyes; irregular dark marking dorsally forming shape of 'H' (prominent in light coloured specimens); dark spots on flanks; dark broad bars on limbs; a black bar from eye to shoulder extending anteriorly to snout; jaws with dark bars; a lateral fold from axilla to groin and a distinct supra tympanic fold; anal region with a triangular dark spot; dorsum finely granular with round and conical tubercles, ventrally coarsely granular, speckled with brown.

Habitat : Forest species, found among bushes; also perianthropic.

Distribution : INDIA : Meghalaya, Mizoram.

Elsewhere : Not known.

93. *Polypedates assamensis* Mathew and Sen, 2009

(Figs. 183, 184)

Common name : Dappled Tree frog.

Diagnostic characters : Head as long as broad; canthus distinct; loreal region concave; snout long, protruding beyond lower jaw; nostril closer to tip of snout; inter orbital width broader than eye length; tympanum depressed, $\frac{2}{3}$ rd the diameter of eye; tongue moderate, thick, deeply notched; vomerine teeth in oblique series, closer to choanae than to each other; inter orbital width broader than inter narial space. Forelimbs moderate; fingers long, free; 1st finger shorter than 2nd; tips with well developed discs. Hind limbs long; TTA reaches between eye and nostril on the right and up to snout on the left; toes $\frac{2}{3}$ rd webbed; inner metatarsal tubercle prominent, conical; outer meta tarsal tubercle absent; subarticular tubercles moderate; thigh behind and flanks posteriorly with round yellowish spots. Dorsum brown, smooth, strewn with irregular, black spots, and without the hour-glass shaped mark; skin on head not co-ossified; a smooth, dark band from nostril to eye; thighs with cross bands on upper half and with round yellowish spots on the hinder region; upper jaw bordered with white band; limbs banded; venter off white



Fig. 183. *Polypedates assamensis* Mathew & Sen



Fig. 184. *Polypedates assamensis* Mathew & Sen
(Ventral view)

with irregular dark patches on thorax and abdomen; a dark band from snout to shoulder along nostril and eye.

Habitat : Collected at night from shrubs bordering the pool of water, accumulated during the monsoon showers, by the road side along with other common anuran species including *Polypedates leucomystax*. Forest land borders the other side of the road.

Distribution : INDIA : Assam (Known from type locality only)

94. *Polypedates leucomystax* (Gravenhorst, 1829)
(Figs. 185-188)

Common name : Six-lined Tree Frog.

Diagnostic characters : Head broader than long; skin on head ossified, rugose; snout acuminate; nostril closer to snout; upper lip white; tympanum distinct, $3/4^{\text{th}}$ the eye diameter; fingers minutely webbed; 1^{st} finger shorter than 2^{nd} ; finger tips with horse shoe shaped disc with circum marginal groove; toes $3/4^{\text{th}}$ or more webbed; TTA reach between eye and snout or beyond snout; inner metatarsal tubercle present, outer absent; Dorsum olive green to brown with faint longitudinal stripes; flanks and thighs with distinct black edged yellow spots or network; abdomen, belly and ventral part of thigh granulated.



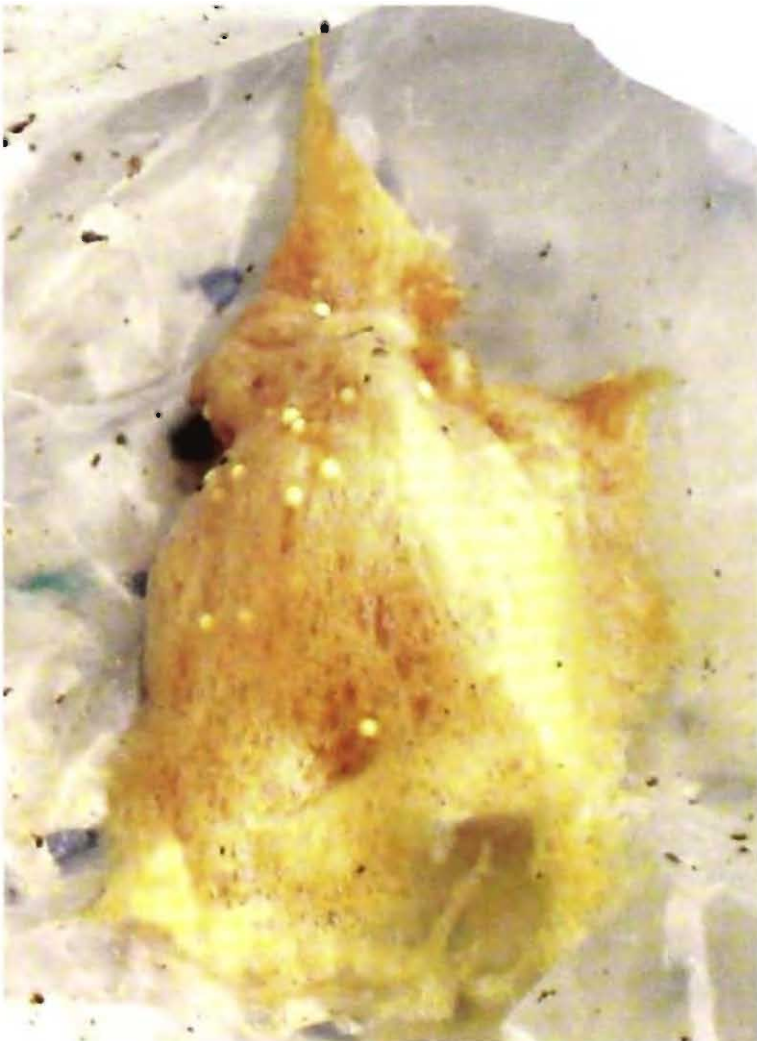
Fig. 185. *Polypedates leucomystax* (Gravenhorst)



Fig. 186. *Polypedates leucomystax* (Gravenhorst)



Fig. 187. Foam nesting in *P. leucomystax*



Habitat : Forest area in and around water bodies.

Distribution : INDIA : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Gujarat; Nicobar Islands; Sikkim; West Bengal.

Elsewhere : Borneo; China; Japan; Java; Malay Peninsula; Myanmar; Nepal; Philippines; Singapore; Sri Lanka; Sumatra; Taiwan; Thailand.

Fig. 188. Foam nest with few eggs (*P. leucomystax*)

95. *Polypedates maculatus* (Gray, 1833)
(Figs. 189, 190)

Common name : Spotted tree frog.



Fig. 189. *Polypedates maculatus* (Gray)

Diagnostic characters : Head broader than long, pointed; skin on head free; nostril nearer tip of snout; tympanum distinct, $\frac{3}{4}$ th or as large as the eye diameter; fingers with rudiment of web; 1st finger equals 2nd; tips of fingers and toes with horse shoe shaped distinct disc; toes $\frac{3}{4}$ th webbed; TTA reaches snout. Dorsum yellowish brown with or without spots and an hour glass shape on the head; ventrally yellowish.

Habitat : Forest species, in and around aquatic habitat.

Distribution : INDIA : Arunachal Pradesh, Meghalaya, Throughout India except Haryana; Punjab and Rajasthan.

Elsewhere : Bangladesh; Sri Lanka; Nepal.

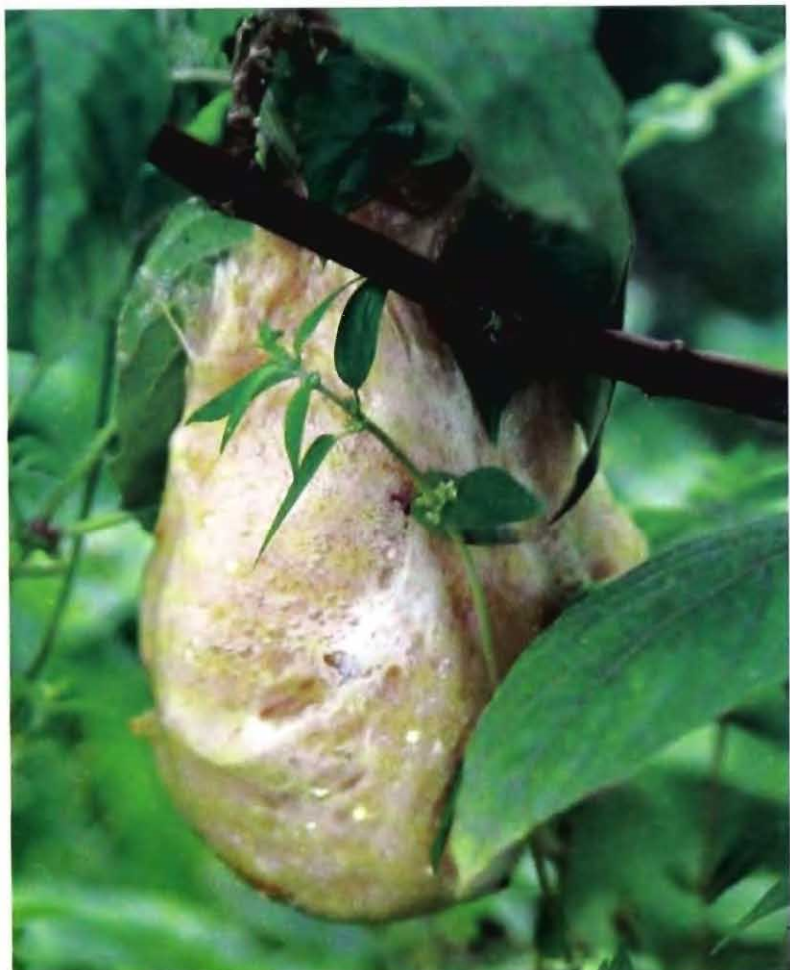


Fig. 190. Foam nest (*Polypedates*)

96. *Polypedates megacephalus* Hallowell, 1861

(Figs. 191-194)

Common name : Hour glass marked tree frog.

Fig. 191. *Polypedates megacephalus*
Hallowell (Juvenile)



Fig. 192. *Polypedates megacephalus*
Hallowell (Juvenile)

Diagnostic characters : Head broader than long; nostril lateral, closer to snout; upper and lower jaw blackish; skin on head free; tympanum $2/3^{\text{rd}}$ eye diameter, slightly depressed; tongue small; fingers free with prominent disc; toes $1/2$ webbed; subarticular tubercles prominent; inner metatarsal tubercle present, outer absent; tibia short; heels do not overlap; TTA reaches nostril or slightly longer. Dorsum with 3-5 longitudinal bands and few indistinct spots.

Habitat : Forest species, near water source.

Distribution : INDIA : Meghalaya, Nagaland.

Elsewhere : China; Japan ; Laos; Thailand; Vietnam.



Fig. 193. *Polypedates megacephalus*
Hallowell



Fig. 194. *Polypedates megacephalus* Hallowell

97. *Polypedates subansiriensis* Mathew and Sen, 2009

(Figs. 195-196)

Common name : Subansiri's tree frog.

Diagnostic characters : Head broader than long, depressed; vomerine teeth in oblique rows, closer to choanae than to each other; snout long; inter orbital width broader than internarial width and eye length; tympanum depressed, not sunk; supratympanic glandular fold prominent; skin on head loose; nostril closer to snout; upper lip with a white bordering line; tongue short, broad, of medium thickness, deeply notched. Forelimbs moderate; fingers free; 1st finger shorter than 2nd. Hind limbs long; TTA reaching snout; thighs with usual round yellow spots; limbs with cross bands; toe discs much smaller; toe tips not round; toes 3/4th webbed; inner metatarsal tubercle present, outer metatarsal tubercle absent. Dorsum minutely granular, venter broadly granular; dorsum with indistinct white (brownish-yellow in life) spots; a broad, smooth, darker band from eye to nostril; skin below this band granular; a black streak from nostril to shoulder along eye; hand and tarsus margined with white slightly raised dermal fringe.

Habitat : Forest area.**Distribution** : INDIA : Arunachal Pradesh (Known from type locality only)

Fig. 195. *Polypedates subansiriensis* Mathew & Sen
(Dorsal view)



Fig. 196. *Polypedates subansiriensis* Mathew & Sen
(Ventral view)

98. *Polypedates taeniatus* (Boulenger, 1906)

(Fig. 197)

Common name : Bengal whipping tree frog.

Diagnostic characters : Head longer; snout tip blunt; canthus distinct, angular; nostril closer to tip of snout; tympanum distinct; fingers free with well developed adhesive pads with grooves; sub articular tubercles distinct, conical; toes fully webbed with adhesive pads; TTA reach anterior corner of eye. Dorsum smooth to slightly rugose; hazel nut to reddish brown color with six dark brown longitudinal stripes; belly uniform creamish white.

Fig. 193. *Polypedates taeniatus* (Boulenger)

Habitat : Generally in grass land around Sal forest. Strictly nocturnal.

Distribution : INDIA : Assam.

Elsewhere : Bangladesh; Nepal.

99. *Rhacophorus appendiculatus* (Gunther, 1858)

(Fig. 198)

Common name : South East Asian Tree Frog.

Diagnostic characters : Head broader than long; snout sub triangular, nostril nearer to snout; tympanum $\frac{1}{2}$ the eye diameter; fingers $\frac{1}{3}$ rd webbed with well developed discs, discs almost the size of tympanum; sub articular tubercles very prominent; toes fully webbed; TTA reaches tip of snout; a small inner metatarsal tubercle. Dorsum smooth or with small warts, granular ventrally; cutaneous prominences on vent and tibio-tarsal joints; a cutaneous fringe along the inner edge of tarsus and forearm. Grayish above, legs indistinctly cross barred.

Fig. 198. *Rhacophorus appendiculatus* (Gunther)

Habitat : A forest dweller.

Distribution : Arunachal Pradesh.

Elsewhere : Borneo; Cambodia; Indonesia; Malaya; Myanmar; Philippines; Sumatra; Thailand; Vietnam.

100. *Rhacophorus bipunctatus* Ahl, 1927

(Figs. 199-203)

Common name : Double spotted red webbed Tree Frog.

Diagnostic characters : Head broader than long; supra tympanic fold prominent; nostril equidistant to tip of snout and eye; tympanum distinct, $\frac{2}{3}$ rd the diameter of eye; fingers and toes with prominent discs with circum-marginal groove; fingers webbed to disc except 1st finger; sub articular tubercles moderately large and prominent; TTA crossing front of eye; toes fully webbed; inner meta tarsal tubercle small, outer absent; a cutaneous flap above the vent and along the hind limb. Dorsum green; ventrally yellow; web on toes reddish-orangish; black spots on flanks; dorsal skin smooth; belly, lateral sides of body and thighs fully granulated.

Habitat : A forest species, found within the vicinity of water.

Distribution : INDIA : Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Tripura.



Fig. 199. *Rhacophorus bipunctatus* Ahl



Fig. 200. Habitat of *R. bipunctatus*



Fig. 201. *Rhacophorus bipunctatus*



Fig. 202. Foam nest of *Rhacophorus*



Fig. 203. *Rhacophorus bipunctatus* Ahl
(Live specimen)

101. *Rhacophorus htunwini* Wilkinson, Thin, Lwin, and Shein, 2005
(Figs. 204, 205)

Common name : Htun Win's tree frog.

Diagnostic characters : Head slightly longer than broad; snout pointed in dorsal view, gently slopes in lateral view to nostrils, nostrils closer to eye than tip of snout; canthus distinct, rounded, eye directed anterolaterally with horizontal pupil. Tympanum distinct and circular; weak supratympanic fold. Vomerine separated medially by a space equal to two times their width, and laterally in contact with anteromedial edge of choanae; choanae small; tongue deeply bifurcates posteriorly. Dorsal body surface smooth; ventral abdominal surface and region below thighs areolate; vent protrudes posteriorly, squared supracloacal fold medially notched. Arms short and slender; tips of fingers rounded with circummarginal grooves. Hands extensively webbed, narrow dermal fringe extends along lateral margin of fourth finger to base of hand. Hind limbs moderately long and slender; when adpressed to body, tibiotarsal articulation reaches beyond anterior edge of eye. Extensive yellow webbing between fingers; thick dermal fringe on forearm and foot, dermal



Fig. 204. *Rhacophorus htunwini* Wilkinson et al.

projection on heel; bright green dorsal colour (slate blue in alcohol); yellow in the outer portion of the iris; very faint crossbands on the limbs; reddish-orange foot webbing; two large black spots on each side of body. Pupil surrounded by light grayish brown horizontally rectangular iris, with yellow above and below, more so above. Yellow color extends posterior onto interior of orbit. Black thin line surrounds eye at margin with eyelid.



Fig. 205. *Rhacophorus htunwini* Wilkinson et al.

Habitat :
Undisturbed forest.

Distribution :
INDIA : Meghalaya.

Elsewhere :
Myanmar.

Remarks : Reported for the first time from India.

102. *Rhacophorus maximus* Gunther, 1858

(Figs. 206-208)

Common name : Large Tree Frog.

Diagnostic characters : Head broader than long; tympanum distinct, more than ½ the diameter of eye; nostril closer to tip of snout; fingers webbed, discs prominent; TTA reach eye or nostril; sub articular tubercles well developed; inner meta tarsal tubercle present, outer absent. Dorsum green; ventrally yellowish; dorsal skin smooth, ventral and lateral sides minutely granulated; toes fully webbed.



Habitat : A forest species, found within the vicinity of water.

Fig. 206. *Rhacophorus maximus* Gunther



Fig. 207. *Rhacophorus maximus* (Tadpole)



Fig. 208. *Rhacophorus maximus* (Juvenile)

Distribution : INDIA : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland.

Elsewhere : Bangladesh; China; Indonesia; Malaysia; Nepal; Thailand.

103. *Rhacophorus rhodopus* Liu and Hu, 1960

(Figs. 209-211)

Common name : Namdapha Tree Frog.

Diagnostic characters : Head broader than long; nostril equidistant to eye and tip of snout; tympanum not very prominent, about $\frac{1}{2}$ the diameter of eye;



Fig. 209. *Rhacophorus rhodopus* Liu & Hu (Dorsal view)



Fig. 210. *Rhacophorus rhodopus* Liu & Hu (Ventral view)

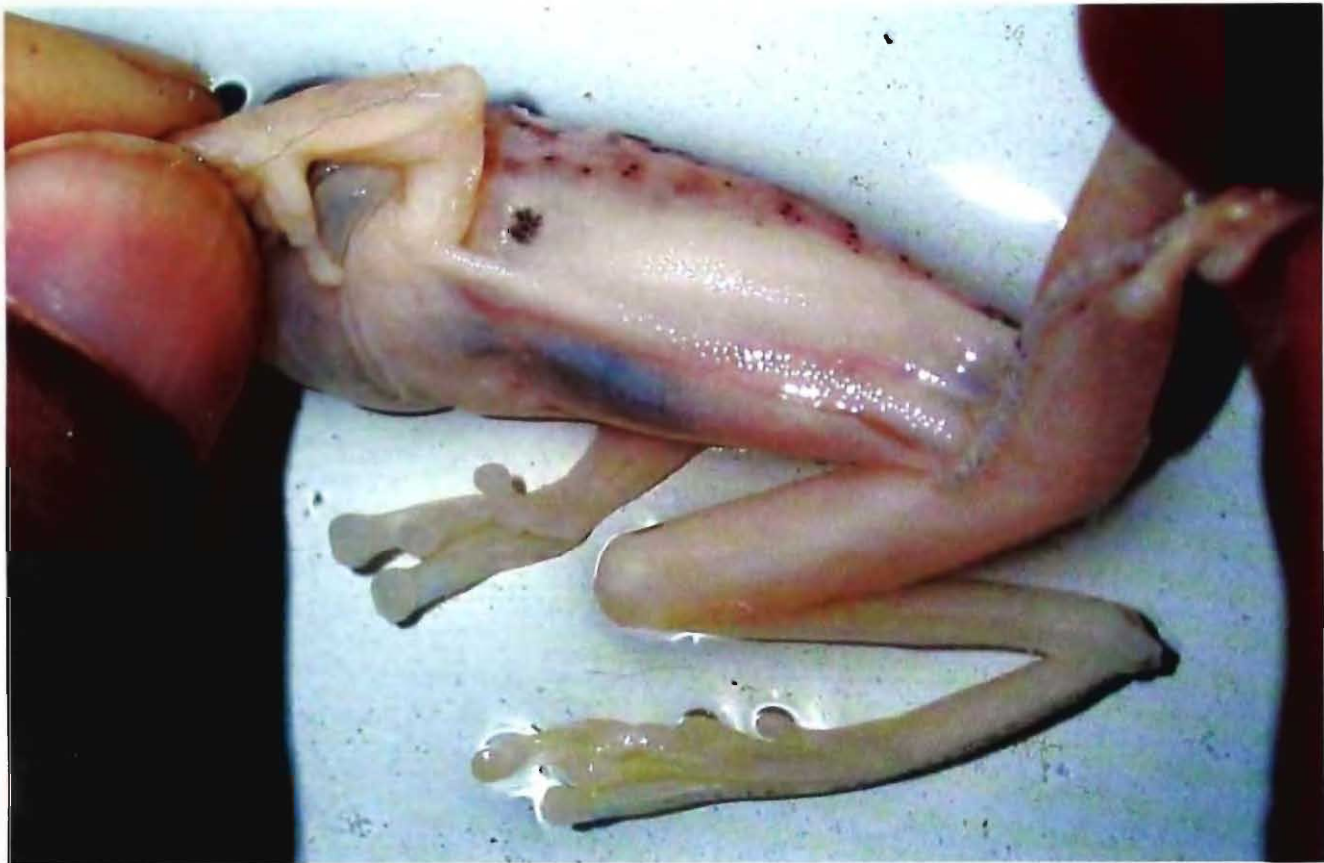


Fig. 211. *Rhacophorus rhodopus* Liu & Hu (Showing spot on armpit)

fingers partly webbed, with discs; sub articular tubercles well developed; a long prominent palmar wart laterally at the base of 1st finger; toes nearly fully webbed except 4th toe; TTA reach eye; a small feebly prominent inner meta tarsal tubercle; outer meta tarsal tubercle absent. Dorsum reddish brown intermixed with variable brown and black spots; limbs dorsally with faint cross bands; hind limbs ventrally reddish brown; a large more or less round black spot present on either side behind arm pit; ventrally brownish; dorsum including limbs scattered with microscopic warts; belly and lower surface of thighs granular, chest and throat smooth; supratympanic glandular fold present; a dermal fringe along the outer margin of forearm and 4th finger and along tarsus and 5th toe; transverse flap of skin above vent and heel.

Habitat : A forest species, found among bushes within the vicinity of water.

Distribution : INDIA : Arunachal Pradesh.

Elsewhere : Not known.

104. *Rhacophorus subansiriensis* Mathew and Sen, 2009

(Figs. 212, 213)

Common name : Ziro-Hapoli's Tree Frog.**Diagnostic characters** : Head broader than long; snout acutely pointed; nostril equidistant to eye and snout tip; interorbital width broader than internarial space; eye prominent; pupil horizontal; lips white; tympanum large, vertically oval, narrow towards the supratympanic glandular fold; faintly distinct; vomerine teeth oblique in position, closer to choanae than to each other; tongue large, moderately thick, deeply notched; supratympanic glandular fold bordering tympanum; canthus distinct. Forelimbs moderate; fingers extensively webbed; digit tips**Fig. 212.** *Rhacophorus subansiriensis* Mathew & Sen**Fig. 213.** *Rhacophorus subansiriensis* Mathew & Sen (Lateral view)

with enlarged circum marginal groove; narrow dermal fringe extends along lateral margin of 4th finger to base of hand. Hind limbs slender, TTA reaches nostrils; limbs with cross bands; toes fully webbed; thick dermal fringe from 5th toe extends along lateral edge of tarsus to heel projecting in a calcar on lateral edge of heel. Dorsum varies from brownish yellow to greenish yellow with dark irregular markings all over and indistinct pin head size black spots; limbs with dark cross bands; ventrally belly, forelimbs and web on fingers yellowish; hind limb and web reddish orange; laterally one large axillary spot on either side followed by two smaller spots; a thick dermal fringe from 5th toe extends along lateral edge of tarsus to heel projecting in a calcar on lateral edge of heel; vent with a square medially notched supra cloacal fold; ventrum areolated.

Habitat : Forest area and among bamboos.

Distribution : INDIA; Arunachal Pradesh.

105. *Rhacophorus suffry* Bordoloi, Bortamuli and Ohler, 2007.

(Figs. 214, 215)

Common name : Bordoloi's Tree Frog.

Diagnostic characters : Head moderate, as broad as long, flat above; body rather slender; snout rounded, protruding, longer than the horizontal eye diameter; canthus rostralis sharp and concave; inter orbital space flat, larger than upper eyelid; nostril closer to tip of snout; tympanum very distinct, rounded; forelimb thin, forearm not enlarged; fingers rather short, thick with discs having distinct circumventral grooves; fingers without dermal fringe and with well developed web; hind limbs thin, toes long and thin, webbing complete; subarticular tubercles prominent; inner meta tarsal tubercle present, outer absent. Skin on head smooth and with fine granules, dorsum with minute granules and skin folds; dermal fold on forearm, heel, tarsus, metatarsus and vent absent. Dorsum leafy green, upper part of flank leafy green lined with yellow; lower parts light green with few creamy white scattered spots; iris golden yellow; dorsal part of foot between 4th and 5th toes green, others orange red; throat creamy white, margin of throat light gray, chest and belly creamy white; thighs and webbing orange red.

Habitat : Banana plantation, areca nut tree and sugarcane plants neighbouring tea estate.

Distribution : INDIA : Assam.



Fig. 214. *Rhacophorus suffry* Bordoloi, Bortamuli & Ohler

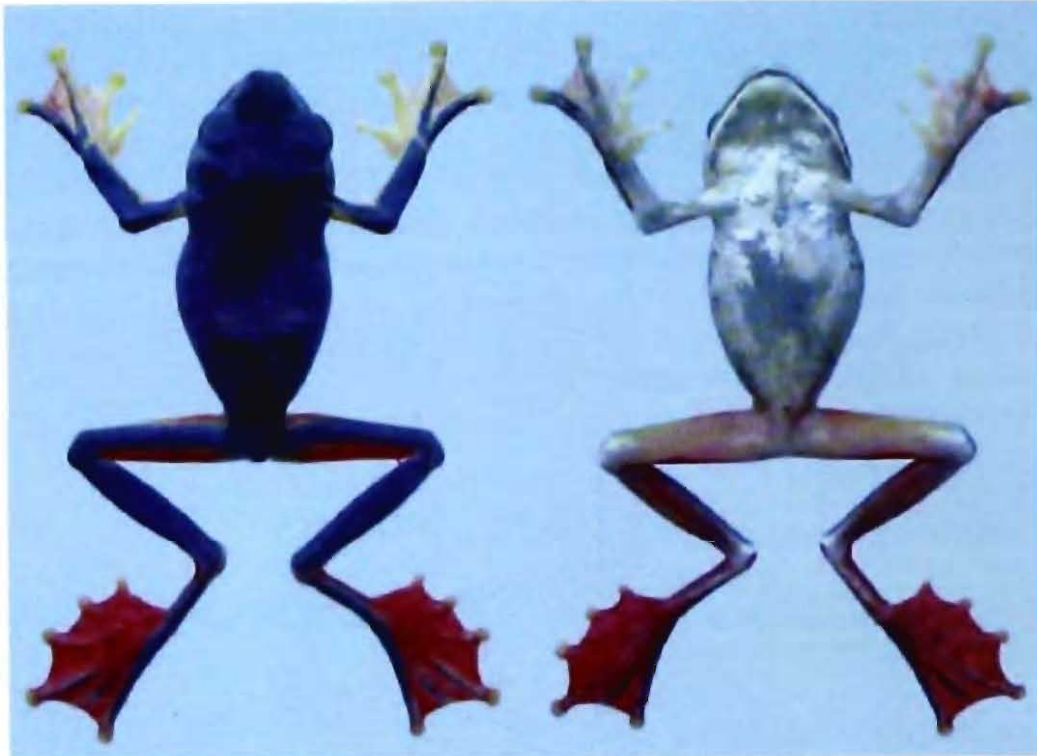


Fig. 215. *Rhacophorus suffry* (Dorsal and Ventral view)

106. *Rhacophorus taronensis* Smith, 1940
(Figs. 216, 217)

Common name : Gongshan Tree Frog.

Diagnostic characters : Head broader than long; tympanum large, $\frac{3}{4}$ th eye diameter; supratympanic glandular fold orange; nostrils closer to eye; tongue diamond shaped with distinct lobes; fingers half webbed except 1st and 2nd where webbing is at the base; toes fully webbed, distant phalange of 4th toe with marginal web; TTA reaches corner of eye; inner metatarsal tubercle present, outer absent. Dorsal skin granular; tips of fingers and toes with



Fig. 216. *Rhacophorus taronensis* Smith



large discs; dorsum beautifully coloured with orange and dark brown network; ventrally off white speckled all over with dark grey; flanks and thighs with various sizes of cream yellow spots.

Habitat : Arboreal, thick forest area.

Distribution : INDIA : Nagaland.

Elsewhere : China; Myanmar.

Fig. 217. *Rhacophorus taronensis* Smith (Ventral view)

107. *Rhacophorus translineatus* (Wu, 1977)

(Figs. 218, 219)

Common name : Translineate tree frog.

Diagnostic characters : Head triangular, slightly longer than broad; snout pointed with a small dermal appendage, protruding much beyond the lower jaw, canthus rostralis prominent, nostril lateral, equidistant to eye and snout tip; loreal region obliquely concave; tympanum distinct, half the eye diameter; supratympanic glandular fold distinct;



vomerine teeth oblique; tongue medium, diamond shaped, bilobed; tooth like projection on lower jaw at the base of tongue. Forelimbs on the elbow region with a row of minute glandular spots. Thigh with round creamish spots. Vent above with 4 pairs of distinct glandular tubercles and 2 pairs below. Hands almost fully webbed with black markings; toes fully webbed; web with distinct black marking; TTA crossing eye; calcar on tarsal joint claw shaped; inner metatarsal

Fig. 218. *Rhacophorus translineatus* Wu



Fig. 219. *Rhacophorus translineatus* Wu

tubercle present, outer absent. Dorsum reddish brown, smooth with chocolate coloured transverse bands from head to vent; belly granular; laterally with roundish oval spots; fore and hind limbs barred with black.

Habitat : Forest area near aquatic habitat.

Distribution : INDIA : Arunachal Pradesh.

Elsewhere : China.

108. *Rhacophorus tuberculatus* (Anderson, 1871)

(Fig. 220-222)

Common name : Tuberculate Tree Frog.

Diagnostic characters : Head slightly longer than broad, tympanum $2/3^{\text{rd}}$ the diameter of eye, more or less distinct; fingers broadly webbed; membrane between three outer fingers reaching the disc; toes incompletely webbed; TTA reaching anterior region of eye; tips of toes dilated into large prominent discs; sub articular tubercles more or less prominent; inner meta tarsal tubercle oblong, outer metatarsal tubercle absent; skin smooth, ventrally granular, intermixed with large round



Fig. 220. *Rhacophorus tuberculatus* (Anderson) - Dorsal view. Photo : K. Deuti



tubercles; supra tympanic glandular fold present. Dorsum uniform, deep brown; legs faintly cross barred; sometimes with violet spot on tip of snout, another before eye; a broad violet band with dark marking from the eye along the side to groin; brownish yellow below, with a blackish region round the vent short way along the thighs; tubercles of abdomen and thighs darker.

Habitat : In and around forest areas near aquatic bodies.

Distribution : INDIA : Arunachal Pradesh, Assam, Meghalaya, West Bengal.

Elsewhere : China.

Fig. 221. *Rhacophorus tuberculatus* (Anderson)
Ventral view. Photo : K. Deuti

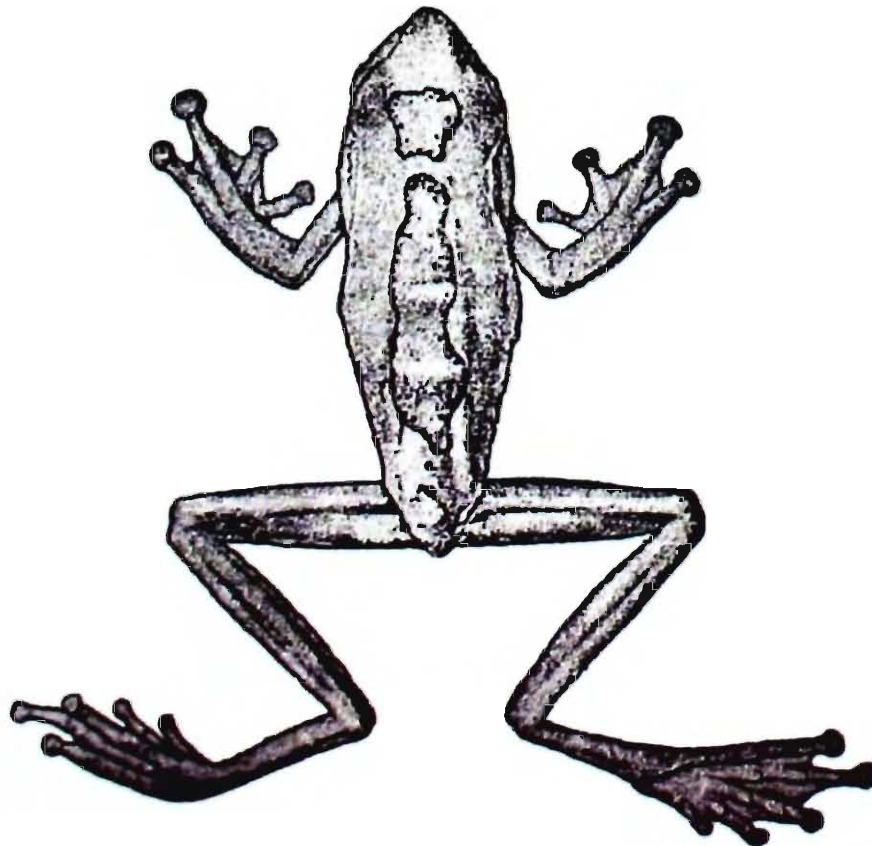


Fig. 222. *Rhacophorus tuberculatus* (Anderson)

109. *Theلودerma asperum* (Boulenger, 1886)

(Figs. 223-225)

Common name : Warty Tree Frog.

Diagnostic characters : Head broader than long; nostril closer to eye; tympanum distinct, slightly depressed; fingers free, tips dilated into round discs; subarticular tubercles not prominent; TTA nearly reaching nostril; toes $\frac{1}{2}$ webbed with prominent tips; both inner and outer meta tarsal tubercles present. Dorsum dark grey to brown; ventrally greyish to white; limbs dark brown with indistinct cross bars; skin more or less smooth, occasionally with microscopic tubercles on dorsum; ventral surface almost smooth.

Habitat : Stumps of bamboo internodes and holes in trees.

Distribution : Arunachal Pradesh, Assam, Nagaland.

Elsewhere : China; Indonesia; Malaya Peninsula; Myanmar; Thailand; Vietnam.

Fig. 223. *Theلودerma asperum* (Boulenger)

Photo : K. Deuti

Fig. 224. *Theلودerma asperum* (Boulenger)Fig. 225. *Theلودerma asperum* (Boulenger)

110. *Theلودerma moloch* (Annandale, 1912)

(Fig. 226, 227)

Common name : Eerie Tree Frog.



Fig. 226. *Theلودerma moloch* (Annandale) Photo K. Deuti

Diagnostic characters : Head little longer than broad; nostril little closer to snout; tympanum large, prominent, $2/3^{\text{rd}}$ the diameter of eye; fingers free with very large discs; sub articular tubercles small, prominent; TTA reach tympanum; toes $2/3^{\text{rd}}$ to $3/4^{\text{th}}$ webbed; web reaching the disc of all except the 4^{th} toe; a very small and indistinct inner meta tarsal tubercle; outer meta tarsal tubercle absent; dorsum with very prominent ridge like, more or less serrated warts which run longitudinally and obliquely; warts larger on neck and across shoulders where they form 'V' shaped figs; shorter warts on head and limbs; throat and ventral surface of limbs smooth; belly and sides coarsely granular. Dorsum grey with black spots, the larger warts buff; tympanum black; a large black and white diversified patch on each side between the fore and hind limbs and a white patch on the axilla ; thigh irregularly banded and marbled with black, white and grey; ventral surface black with a faint vermicular reticulation running all over the body.

Habitat : Jhoom fallow.

Distribution : INDIA : Arunachal Pradesh.

Elsewhere : China; Myanmar.



Fig. 227. *Theloderma moloch* (Annandale)

Order CAUDATA

Family SALAMANDRIDAE

111. *Tylototriton verrucosus* Anderson, 1871

(Fig. 228)

Common name : Himalayan Newt.

Diagnostic characters : Head depressed, tail vertically flattened, nearly as long as head and body; mid dorsal vertical ridge and cranial ridges on the head prominent; two rows of knob like porous glands, one on either side of the vertebral ridge; each row with 14-18 glands; limbs moderate, fingers and toes free, depressed; anal opening a longitudinal slit; under surface of the limbs and the lower edge of tail orange-yellow; dorsally dark brown; Total length 150-160 mm; tail 70-75 mm.



Fig. 228. *Tylototriton verrucosus* Anderson

Habitat : Pools, tanks with submerged aquatic vegetation; tea gardens; leaf litter; pasture lands.

Distribution : INDIA : Arunachal Pradesh, Manipur, Meghalaya. Sikkim, West Bengal.

Elsewhere : Nepal, Myanmar, Thailand, Vietnam, Western China.

Order GYMNOPIHIONA

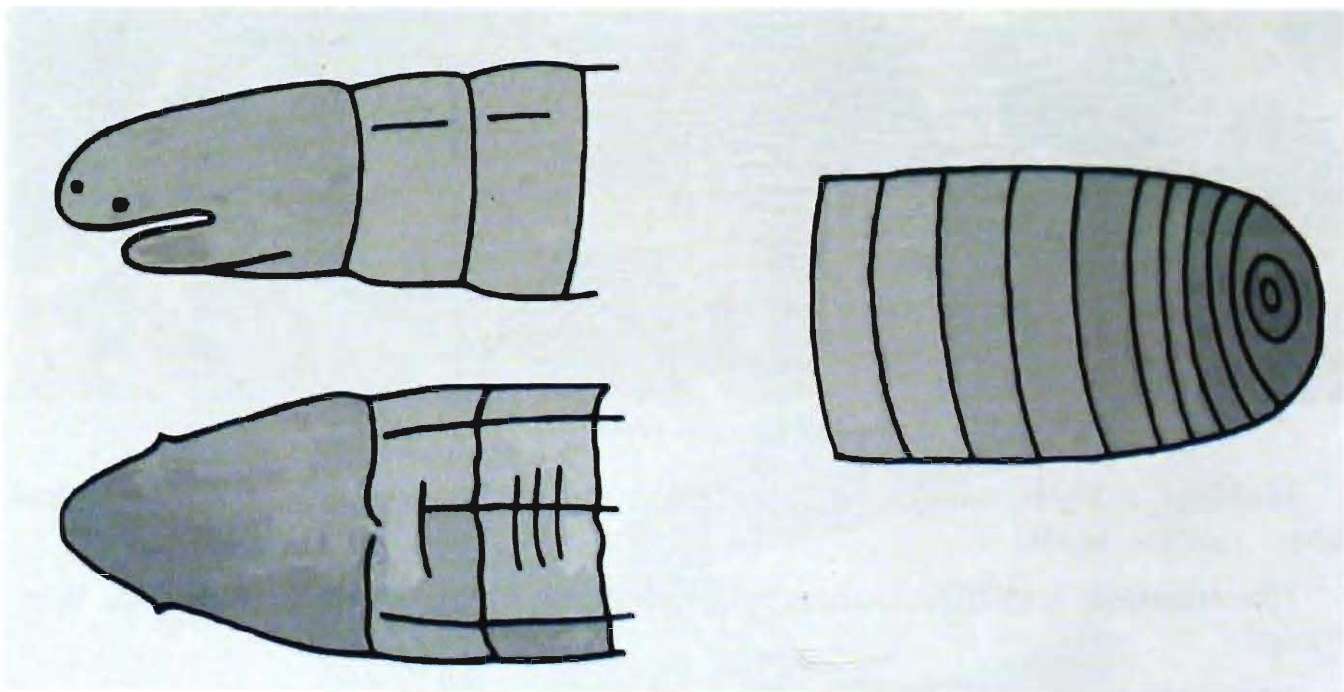
Family CAECILIIDAE

112. *Gegeneophis fulleri* (Alcock, 1904)

(Fig. 229)

Common name : Fuller's Caecilian.

Diagnostic characters : Head light brown, rest of the body chocolate brown to black; snout and lips yellowish; rings on body edged with black; eyes generally covered by skull bones, but seen when skin is removed; tentacle situated nearly half way between eye and nostril; vent transverse; tongue with two well defined narial plugs, partly surrounded by deep narrow grooves; scales present. Total length 220 mm, body gradually increasing in diameter from head to terminal region; maximum width 9 mm.

Habitat : Burrowing, worm like.**Distribution** : INDIA : Assam.**Elsewhere** : Not known.Fig. 229. *Gegeneophis fulleri* (Alcock)

Family ICHTHYOPHIIDAE

113. *Ichthyophis alfredii* Mathew & Sen

(Figs 230, 231)

Common name : Alfred's striped Caecilian.**Fig. 230.** *Ichthyophis alfredii* Mathew & Sen

Diagnostic characters : A fairly large specimen (Total length 176-330 mm) with 269-299 dorsal annuli and 262-295 ventral annuli; 5-7 annuli broken by vent, 5-7 post vent annuli. Head flat, pointed, longer than broad (Fig. 232); eye distinct, white, placed higher than the level of nostril; tentacular aperture nearer to eye than to nostril; rostral region concave; snout slightly projecting beyond mouth. Collars prominent; 1st nuchal groove distinct laterally and ventrally, dorsally incomplete; 2nd nuchal groove distinct ventrally, faint laterally, dorsally not indicated; 3rd nuchal groove dorsally and laterally distinct, incomplete ventrally. One dorsal transverse groove on 2nd collar. Dorsal annuli wavy, ventral annuli angular anteriorly, less angular posteriorly. A broad lateral stripe from head to tail separates dorsal and ventral side (Fig. 232). It expands at the collar and extends on to the lower jaw leaving the mental region free, thereby forming an arrow shape at the gular region.

Body folds regular, scales present on all annuli. Primary and secondary folds 299 dorsally and 292 ventrally including 6 annuli broken by vent and 6 post vent annuli. Tail narrows down to a pointed tip. Disc surrounding vent wider than long. The vent is overhung anteriorly, the aperture exposes part of the genitalia.



Fig. 231. Ventral view of *Ichthyophis alfredii* Mathew & Sen

Dorsally lavender, paler below. A broad creamish lateral stripe separates the dorsal and ventral side, extending anteriorly to tip of lower jaw except the mental region and partly to the upper jaw; posteriorly the stripe extends beyond vent but not touching the tip of tail. Lateral stripe broadens at the collar imparting an 'arrow shape' pattern at the gular region; a median longitudinal impression present on the gular region.

Habitat : The specimens were collected by digging out the forest floor strewn with stones at an altitude of 1119 m above msl. and also taken from paddy field by the side of Rongram river at an altitude of 416 m at Rongbang.

On handling this specimen it produced a fairly audible sound like a 'purr' or 'grunt' which could have been due to stress.

Distribution : Garo Hills, Meghalaya.

113. *Ichthyophis daribokensis* Mathew & Sen

(Figs. 232, 233)

Common name : Daribok's striped Ichthyophis.

Diagnostic characters : A fairly large specimen (Total length 155-315 mm) with 264-310 dorsal annuli and 263-304 ventral annuli; 4-7 annuli broken by vent, 4-7 post vent annuli. Head longer than broad, semi arched at nuchal region; eye moderate, slightly darker than dorsum, placed lower than nostril; tentacular aperture nearer to eye than to nostril. Nostril placed frontally, visible from above, rostral region convex; snout slightly projecting beyond. Collars prominent; 1st nuchal groove faint on dorsum, very distinct laterally and ventrally; 2nd nuchal groove very distinct laterally (upto the lateral stripe) and ventrally, dorsally not indicated; 3rd nuchal groove clear, distinct laterally, dorsally broken and overlapping and ventrally incomplete. Two faint dorsal groove on 2nd collar; dorsal annuli wavy, more so on the anterior region; ventral annuli angular anteriorly. A broad lateral stripe from head to tail separates dorsal and ventral side.

Body folds regular; scales present on all annuli. Disc surrounding vent round. Tail narrows down to a pointed tip.



Fig. 232. *Ichthyophis daribokensis* Mathew & Sen



Fig. 233. *Ichthyophis daribokensis* Mathew & Sen (Ventral view)

Dorsally glossy dark brown, paler below. A broad, even, yellowish lateral stripe separates the dorsal and ventral side, extending anteriorly to expand at the collar and faintly extend to lower jaw (Fig. 231). Posteriorly lateral stripe encircle the vent and extends slightly further laterally but not reaching the tip of tail.

Habitat : The specimens were dug out from under dry leaves and debris by the side of Rongram river; also from hillock of a cow herd's compound. These were also collected from under pile of stones, dug out from earth along with snakes; and picked up from rotten trunk of plantain. The altitude varied from 416 m to 1132 m above msl. The juveniles were collected from the muddy stream side along with two adult specimens.

Distribution : Garo Hills, Meghalaya.

115. *Ichthyophis garoensis* Pillai and Ravichandran, 1999

(Fig. 234, 235)

Common name : Garo Hills' Caecilian.

Diagnostic characters : This is a comparatively smaller species measuring a total length of 160-216 mm including 4.48-6.05 mm tail. Head flat, longer than broad; eye white, moderate, prominent, placed higher than nostril; tentacular aperture nearer to eye than to nostril; nostril placed frontally, visible from above, rostral region convex; snout slightly projecting beyond mouth; collars prominent, 1st nuchal groove distinct laterally, ventrally and either faintly or clearly distinct



Fig. 234. *Ichthyophis garoensis* Pillai & Ravichandran



Fig. 235. *Ichthyophis garoensis* (Ventral view)

dorsally; 2nd nuchal groove distinct laterally and either clearly or just indicated dorsally and ventrally; 3rd nuchal groove distinct laterally and dorsally, not clear ventrally; annuli wavy dorsally, ventrally angular.

Primary and secondary folds 282-287 dorsally and 276-286 ventrally including 4-5 annuli broken by vent and 6-7 post vent annuli. Tail with pointed tip. Disc surrounding vent oval to round; Body folds regular; scales present on all annuli.

Dorsally lavender, paler below. A broad lateral stripe separates the dorsal and ventral side, extending anteriorly to expand at the collar and form an 'arrow' shape pattern on the gular region. Posteriorly lateral stripe encircles the vent and extends slightly further laterally but not reaching the tip of tail.

Habitat : Plantation garden.

Distribution : INDIA : Assam, Meghalaya.

Elsewhere : Not known.

116. *Ichthyophis glutinosus* (Linnaeus, 1754)

(Fig. 236)

Common name : White bellied caecilian.

Diagnostic characters : Head little depressed, eyes visible below skin, tentacular aperture close to upper lip and closer to eye, a little elevated and



Fig. 236. *Ichthyophis glutinosus* (Linnaeus)

circular; nostrils lateral, closer to upper lip than eye; no narial plugs, tongue with longitudinal grooves; collars inconspicuous; not wider than head; 361 primary and secondary body folds of which 8 on tail; vent longitudinal; 4 folds broken by vent; dorsally and ventrally brown separated by a distinct lateral creamish stripe which extends anteriorly upto the collars and vent; each body fold is marked by a row of whitish glandules, vent surrounded with a patch of cream. A large species raching 400 mm.

Habitat : Plantation garden.

Distribution : INDIA : Assam.

Elsewhere : Sri Lanka.

Remarks : As per Frost (2009) this species has its distribution in Sri Lanka but Pillai and Ravichandran (1999) recorded it from Assam.

117. *Ichthyophis husaini* Pillai and Ravichandran, 1999

(Fig. 237, 238)

Common name : Husain' s Caecilian.

Diagnostic characters : Head relatively long, tentacular aperture elevated, closer to eye than to nostril; close to upper eye lid; eyes distinct, small with a circular pale ring around it; nostril almost at the tip of snout; tail ending in pointed

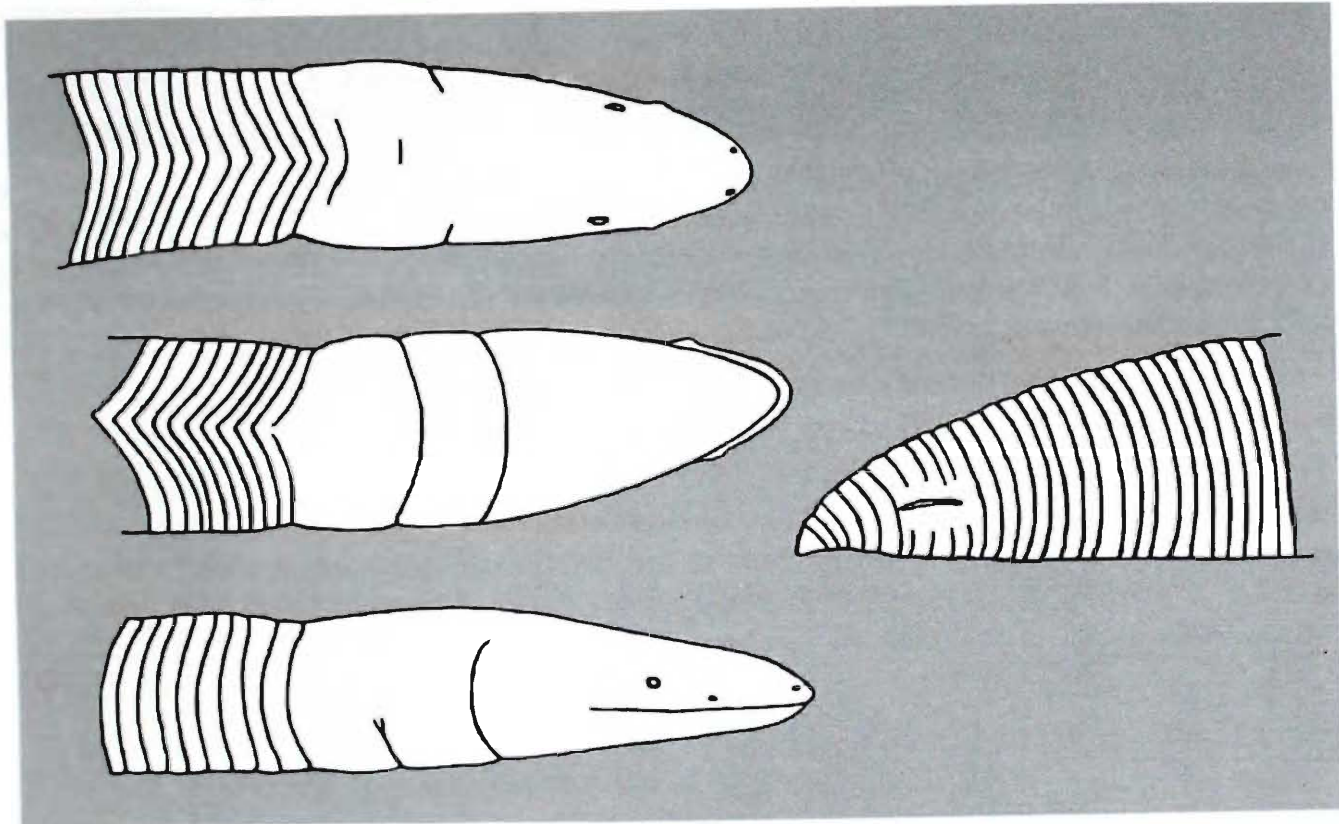


Fig. 237. *Ichthyophis husaini* Pillai & Ravichandran



Fig. 238. *Ichthyophis husaini* Pillai & Ravichandran

terminus; scales present. Fairly large specimen, 280 mm with about 297 body folds out of which 5 are on tail, 4 on vent; dorsally brown, ventrally lighter brown; no lateral stripe.

Habitat : Coffee garden, Plantation garden.

Distribution : INDIA : Meghalaya.

Elsewhere : Not known.

118. *Ichthyophis nokrekensis* Mathew & Sen

(Fig. 239-241)

Common name : Nokrek's Caecilian.

Diagnostic characters : A fairly large species (Total length 206-325 mm) with 269-300 dorsal annuli and 266-302 ventral annuli; 4-6 annuli broken by vent, 5-7 post vent annuli. Head longer than broad; arched at nuchal region (Fig. 232); eye moderate, prominent, placed higher than nostril; tentacular aperture nearer to eye than to nostril. Nostril placed frontally, visible from above, rostral region convex; snout slightly projecting beyond mouth. Collars prominent. The 1st nuchal groove faint on dorsum, prominent laterally and ventrally, broken and overlapping ventro



Fig. 239. *Ichthyophis nokrekensis* Mathew & Sen

laterally; 2nd nuchal groove distinct laterally and ventrally, dorsally not visible; 3rd nuchal groove distinct dorsally, laterally and ventrally except median region; one transverse groove dorsally on the 2nd collar; 1st nuchal groove fairly distinct on dorsum, very distinct laterally and ventrally; dorsal annuli wavy, more so on the anterior region; ventral annuli angular anteriorly; a narrow lateral stripe from collar to tail separates dorsal and ventral side.

Body folds regular; scales present on all annuli. Disc surrounding vent slightly oval. Tail narrows down to a pointed tip.

Dorsally glossy dark brown, paler below. A narrow, uneven, orangish yellowish lateral stripe (Fig. 231) separates the dorsal and ventral side, extending anteriorly



Fig. 240. Lateral stripe in *I. nokrekensis* (above) and *I. daribokensis* (below)



Fig. 241. Arched and flat' head in *I. nokrekensis* (above) and *I. alfredii* (below)

to expand at the collar. Posteriorly lateral stripe encircle the vent and extends slightly further laterally but not reaching the tip of tail.

Habitat : The specimens were dug out from under dry leaves, pile of stones and debris by the side of river-Rongram. The altitude varied from 416 m to 1132 m above msl. The juveniles were collected from the muddy stream side along with two adult specimens.

Distribution : Garo Hills, Meghalaya.

119. *Ichthyophis sikimensis* (Taylor, 1960)
(Fig. 242)

Common name : Sikkimese Caecilian.

Diagnostic characters : Head relatively narrow and long; tentacular aperture at the margin of upper lip, a little elevated, closer to eye than to snout; collars inconspicuous; vent with 4 folds, skin appears leathery; dark brownish above, pale below; lips and throat paler; nostril and tentacular aperture with cream patch around; no pale ring around eye; vent and its denticulation with a ring of cream colour.

Habitat : Plantation garden.

Distribution : INDIA : Eastern Himalayas, Kerala, Sikkim, West Bengal.

Elsewhere : Nepal.



Fig. 242. *Ichthyophis sikimensis* Taylor

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