



Amphibians of the Duars area of Northern West Bengal

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Abstract

To determine the diversity and distribution of amphibians in the duars region of northern West Bengal, two surveys were undertaken in 2014 and 2015 and 86 anuran amphibian specimens were collected belonging to 21 species, 15 genera and 5 families. The Bright frog (*Humerana humeralis*) and Point-nosed frog (*Clinotarsus alticola*) were two new records to the State of West Bengal. The detailed species accounts of these amphibian species along with their registration numbers, measurements, diagnostic features, colouration, habitat and distribution have been noted and this comprises the first comprehensive scientific document of the amphibians of the duars area of northern West Bengal.

Keywords: Anuran amphibians, adhesive discs, cornified ridges, duars, foam-nest, pedal tubercles, parotoid gland, subarticular tubercles, supratympanic fold

Introduction

Amphibians play a very important role in the food chain of both terrestrial and aquatic ecosystems and are widely considered to be useful as bio-indicators (Duellman and Trueb, 1986). Being important biotic components of both aquatic and terrestrial ecosystems (spending part of their life in water and the rest of their life on land) they help in recycling the nutrients from water to land and back (Serjeev, 1986). Amphibians in India are highly diverse with 384 species of which 344 species are anurans (Dinesh et al, 2015). Although many amphibians have been recently reported from different areas of India, the terai belt extending along the base of the Himalayas from Uttar Pradesh to Assam has been less surveyed. Although some portions of the State of West Bengal have been surveyed, the duars area of northern West Bengal has been under-studied, although it forms a bottle-neck between northern and north-eastern India and is only an extension of the terai belt with plenty of forest cover.

The duars area of northern West Bengal still teems with wild life. The evergreen and moist deciduous forests are home to wild elephants, leopards, tigers, Gaur, Sambhar, Spotted deer, Barking deer, Malayan giant squirrels, Jungle Cat, Leopard Cat, Rhesus macaques etc. The grasslands of northern West Bengal are home to Indian Rhinoceros, Hog deer, Indian hare, Hispid hare etc. There are more than 400 species of birds. Reptiles

like Land monitor lizards, yellow monitor lizards, Rock pythons, several species of non-poisonous and poisonous snakes like cobras, kraits and pit-vipers, many species of fresh-water turtles and a number of lizards including Tokay Geckos are seen.

The present project was undertaken to study the diversity and distribution of amphibians in the duars area of northern West Bengal. Two surveys (total duration of 33 days) were undertaken between 2014 and 2015 and 86 specimens of amphibians belonging to 21 species, 15 genera and 5 families were collected from the duars area of northern West Bengal. The detailed species accounts of these amphibian species along with their registration numbers, diagnostic features, colour, habitat and status and distribution have been noted. This forms the first comprehensive scientific document of the amphibians of the duars area of northern West Bengal.

Study Area

The word “Duars” comes from the Hindi word “duar” literally meaning door or gateway. It is used in the context of this area as it forms the entry gateway to the hilly Kingdom of Bhutan. The geographical extent of the duars area of northern West Bengal includes all the plain land area at the base of the Himalayas in Alipurduar, Cooch Behar, Jalpaiguri and Darjeeling districts of West Bengal and includes many protected areas (Buxa Tiger Reserve,

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Jaldapara National Park, Gorumara National Park, Chapramari Wildlife Sanctuary, Mahananda Wildlife Sanctuary and many associated Reserve forests) as well as many villages, towns, agricultural areas and wetlands.

Review of Literature

Although a number of common amphibian species are known from the terai belt from British days, in recent times, some more species have been reported. This includes *Polypedates taeniatus* from Uttar Pradesh (Ray, 1991) and *Fejervarya teraiensis* from Uttar Pradesh (Hegde, Roy and Lal, 2009) and the new species description of *Chirromantis dudhwaensis* from Uttar Pradesh (Ray, 1992). *Kaloula assamensis* was recently reported from Bihar (Deuti et al., 2013). *Polypedates taeniatus* was also reported from Assam (Ahmed and Dutta, 2000), *Fejervarya nepalensis*, *Fejervarya pierrei*, *Fejervarya teraiensis* and *Fejervarya syhadrensis* from Assam (Borthakur et al., 2007) and two new species were described from Assam. These are *Kalophrynus orangensis* (Dutta, Ahmed and Das, 2000) and *Kaloula assamensis* (Das et al, 2004). Later *Kalophrynus orangensis* was synonymized under *Kalophrynus interlineatus* by Ohler and Grosjean, 2005. Both these newly described species were later reported from Duars area of West Bengal, *Kaloula assamensis* by Paul, Biswas and Deuti, 2007a and *Kalophrynus interlineatus* by Paul, Biswas and Deuti, 2007b. Thereafter, Ohler et al, 2009 described a new species (*Minervarya chilapata*) from Chilapata Reserve Forest in duars area of northern west Bengal.

Objectives

- To determine the diversity (number of species) of amphibians in the duars area of northern West Bengal.
- To determine the taxonomic groups of the amphibians in the duars area of northern West Bengal (i.e., the number of Orders, Families and Genera these different species belong).
- To locate the different micro-habitats in which these amphibian species live (i.e., terrestrial, fossorial, aquatic, semi-aquatic, arboreal etc) in the duars area of northern West Bengal.
- To determine if there are any unreported species (new records) to West Bengal State, India or to Science from this part of the country.
- To photograph the different species.

Methodology

To determine the amphibian diversity of the duars area of northern West Bengal, two surveys were conducted in the duars areas of northern West Bengal, by a team of 3-4 amphibian researchers from Zoological Survey of India, Kolkata. The first survey was conducted from 28.05.2014 to 12.06.2014 in the Buxa Tiger Reserve and Chilapata forest area of Jaldapara National Park; the second survey was conducted from 07.08.2015 to 23.08.2015 in Gorumara National Park, Jaldapara National Park and Mahananda Wildlife Sanctuary. These surveys were conducted between June to August as the early monsoon season is the breeding season for most amphibian species.

- After reaching a particular locality the survey team conducts a surveillance survey during the daytime with a local field guide. This is to familiarize with the surrounding area and human communities, to determine the possible study and collection sites like streams, ditches, pools, ponds other wetlands etc.
- After locating the possible study and collection localities, the survey team visits these sites during the evening between 6 pm-11 pm.
- Often breeding calls of the different amphibian species help in locating the particular species.
- These species are then searched using powerful 4-cell torch lights and Petzl headlights. After locating them they are photographed in the field using a Nikon D7000 Digital SLR camera with a 105 Macro Lens while they are calling, mating or breeding.
- Then some of these species are collected as voucher specimens for the National Zoological Collections of the Amphibia Section of Zoological Survey of India, Kolkata by long-handle nets but often only by hand.
- The collected samples are kept in plastic containers, brought back to the field camp, anesthetized with chloroform and fixed in 4% formaldehyde solution. Before fixation, tissue samples are collected from liver or thigh muscles for DNA sequencing in the molecular taxonomy laboratory of ZSI.
- After keeping fixing, the preserved specimens are washed thoroughly with running tap water, stretched properly and injected with 70% alcohol. They are then preserved in rectified spirit and brought back to ZSI laboratory. Later these were transferred to 70% ethyl alcohol for permanent preservation.

Results

86 specimens of amphibians belonging to 21 species of 15 genera under 5 families were collected from duars area of northern West Bengal. The details on these species are provided below:

Systematic List of Amphibians from Duars Area of Northern West Bengal

The following families, genera and species are represented in the material studied.

Class AMPHIBIA

Order ANURA

Family 1: BUFONIDAE Gray, 1825

Genus 1. *Duttaphrynus* Frost *et al*, 2006

1. *Duttaphrynus melanostictus* (Schneider, 1799)
2. *Duttaphrynus stomaticus* (Lutken, 1864)

Family 2. MICROHYLIDAE Gunther, 1858

Genus 2. *Microhyla* Tschudi, 1838

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

Genus 3. *Kaloula* Gray, 1831

4. *Kaloula assamensis* Das, Sengupta, Ahmed and Dutta, 2004

Genus 4. *Kalophrynus* Tschudi, 1838

5. *Kalophrynus interlineatus* (Blyth, 1855)

Genus 5. *Uperodon* Dumeril and Bibron, 1841

6. *Uperodon globulosus* (Gunther, 1864)
7. *Uperodon taprobanicus* (Parker, 1934)

Family 3. DICROGLOSSIDAE Anderson, 1871

Genus 6. *Euphlyctis* Fitzinger, 1843

8. *Euphlyctis cyanophlyctis* (Schneider, 1799)

Genus 7. *Hoplobatrachus* Peters, 1863

9. *Hoplobatrachus tigrinus* (Daudin, 1802)

10. *Hoplobatrachus crassus* (Jerdon, 1853)

Genus 8. *Fejervarya* Bolkay, 1915

11. *Fejervarya syhadrensis* (Annandale, 1919)
12. *Fejervarya teraiensis* (Dubois, 1984)
13. *Fejervarya nepalensis* (Dubois, 1975)
14. *Fejervarya chilapata* (Ohler, Deuti, Grosjean, Paul, Ayyaswamy, Ahmed and Dutta, 2009)

Family 4. RANIDAE Batsch, 1796

Genus 9. *Hydrophyllax* Fitzinger, 1843

15. *Hydrophyllax leptoglossa* (Cope, 1868)

Genus 10. *Hylarana* Tschudi, 1838

16. *Hylarana tytleri* Theobald, 1868

Genus 11. *Humerana* Dubois, 1992

17. *Humerana humeralis* (Boulenger, 1887)

Genus 12. *Clinotarsus* Mivart, 1869

18. *Clinotarsus alticola* (Boulenger, 1882)

Family 5. RHACOPHORIDAE Hoffman, 1932

Genus 13. *Polypedates* Tschudi, 1838

19. *Polypedates teraiensis* (Dubois, 1987)

Genus 14. *Chiromantis* Peters, 1854

20. *Chiromantis simus* (Annandale, 1915)

Genus 15. *Raorchestes* Biju *et al*, 2010

21. *Raorchestes annandalii* (Boulenger, 1906)

The detailed species accounts of these amphibian species are given below along with their scientific names, common names, original citations, measurements with registration numbers, diagnostic features, colour, secondary sexual characters, habitat and status and distribution (remarks) in the duars area of northern West Bengal.

Species Accounts

Family BUFONIDAE

1. *Duttaphrynus melanostictus* (Schneider, 1799)

1799. *Bufo melanostictus* Schneider, *Hist. Amph. Nat*, 1: 216.

Common Name: Common Indian Toad (English).

Specimens examined: 8 ex: A 11936 from Buxa Fort, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°45'323"N, 89°34'868"E) collected on 31.v.2014; A 11942 from Rajabhatkhawa, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°36'839"N, 89°31'929"E) collected on 04.vi.2014; A 11955- A 11956 from Mendabari, Chilapata forest, Jalpaiguri district, West Bengal (26°36'687"N, 89°23'996"E) collected on 09.vi.2014; A 12430-A 12431 from Ramsai, Gorumara National Park, Jalpaiguri district, West Bengal (89°23'996"N, 88°84'692"E) collected on 09-10.viii.2015; A 12432 from Mahananda Wildlife Sanctuary, Jalpaiguri district, West Bengal (26°34'632"N, 89°24'276"E) collected on 14.viii.2015 and A 12433 from Hollong, Jaldapara National Park, Jalpaiguri district, West Bengal (26°63'324"N, 89°30'635"E) collected on 19.viii.2015. The measurements of the toads collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11936	76.11	21.74	30.47	9.72	5.82	9.21	9.94	5.87	30.41
A11942	82.76	23.16	31.66	10.82	6.27	8.62	10.57	6.23	30.76
A11955	55.54	17.95	22.78	8.02	3.88	6.53	6.95	4.42	21.39
A11956	67.58	21.87	28.70	9.54	5.15	8.28	9.38	6.21	28.14
A12430	65.48	13.43	23.16	8.53	5.23	5.48	6.62	3.70	23.46
A12431	48.34	9.56	17.65	6.87	4.87	4.87	5.35	2.10	17.87
A12432	52.74	10.65	18.56	7.28	5.12	4.97	5.64	2.37	18.74
A12433	76.47	14.63	24.43	9.75	7.56	6.12	7.54	4.87	25.94

Size: 45-115 mm (snout-vent length).

Distinguishing features: Medium to large sized toads readily identified by the rough skin and black-tipped horny warts on the upper (dorsal) side. The lower (ventral) side is coarsely granular except the throat and the chin. Head is broader than long and with cornified (bony) ridges. Snout is rounded. Nostril is nearer to the tip of the snout than the eye. Tympanum is distinct, circular or oval and nearly two-third the diameter of the eye. Parotoid glands are elliptical and bean-shaped. Fingers are without webbing. Toes are almost two-third webbed with two segments of the fourth toe free. Both the inner and outer metatarsal tubercles on the sole of the feet are equal in size. The males have a single external vocal sac.

Colour: Dorsal side brownish-grey or blackish with yellowish or reddish markings and often with a double series of warts down the middle. The horny warts on the dorsum are black-tipped. Cornified (bony) ridges on head also black. Ventral side is yellowish. The vocal sac in

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A12465	51.64	9.25	17.76	6.24	5.32	4.97	5.63	2.57	17.84

males are bluish-black during the breeding season.

Habitat: Found in all the duars area of the northern West Bengal over leaf-litter on the forest floor, below logs, stones, rocks, debris in secondary forests, plantations, villages, gardens in towns etc beside near rain-water pools and also on the banks of ponds and ditches. They hide in moist holes and huddle together in crevices of tree-trunks. Except during the breeding season they spend the day in any convenient cranny which is cool and dark.

Remarks: Very common throughout the duars area of northern West Bengal. Terrestrial and nocturnal, they have limited powers of hopping and usually walk. They are usually solitary but congregate during the breeding

season near water-bodies. The species is a prolific breeder laying a few thousand eggs in long translucent strings which is entwined round the stems of aquatic plants. The tadpoles are black and are gregarious. Juveniles wander on land during mornings and afternoons, if the air-temperature is sufficiently low.

Reported earlier from West Bengal (Sarkar, Biswas and Ray, 1992) and Deuti (1995).

2. *Duttaphrynus stomaticus* (Lutken, 1862)

1862. *Bufo stomaticus* Lutken, *Vidensk. Meddr. Dansk. Naturhist. Foren.*, Ser 2, 4: 305.

Common Name: Marbled Toad (English).

Specimens examined: 1 ex: A 12465 from Kodalbasti forest, Jalpaiguri district, West Bengal (26°38'023"N, 89°21'927"E) collected on 15.viii.2015. The measurements of the toad collected are given below in millimeters:

Size: 42-86 mm (snout-vent length).

Distinguishing features: Medium-sized toads readily identified by the overall texture of the skin. The skin lacks the horny warts typical of the Common Indian toads. There are several irregular flat warts on the upper side. The lower side is coarsely granular except the throat and the chin. Head is broader than long and without any bony ridges. Snout is rounded. Ear-drum is distinct, circular or oval and nearly half the diameter of the eye. Parotoid glands are elongated and elliptical but not bean-shaped.

Colour: Dorsal side brownish or olive-yellow or olive-grey with or without darker markings. Ventral side including the upper lip is whitish.

Habitat: Seen near water bodies especially during the breeding season (June to August).

Remarks: The species is rare in most of the duars area of northern West Bengal. They are terrestrial and nocturnal. However during the breeding season they can be seen moving around during the day near water bodies. Breeding occurs between June and August and the call of the male is distinctive and can be easily distinguished from that of the Common Indian Toad (*Duttaphrynus melanostictus*). Reported earlier from West Bengal (Sarkar, Biswas and Ray, 1992) and Deuti (1995).

Family MICROHYLIDAE

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

1841. *Engystoma ornatum* Dumeril and Bibron, *Erp. Gen.*, 8: 745.

Common Name: Ornate narrow-mouthed Frog (English).

Specimens examined: 7 ex: A 11938 from Jayanti, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°36'931"N, 89°31'570"E) collected on 02.vi.2014; A 11945 from Rajabhatkhawa, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°36'839"N, 89°31'929"E) collected on 04.vi.2014; A 11967 – A 11968 from Mendabari, Chilapata forest, Jalpaiguri district, West Bengal (26°36'687"N, 89°23'996"E) collected on 10.6.2014; A 12434 from Hollong, Jaldapara National Park, Jalpaiguri district, West Bengal (26°63'324"N, 89°30'635"E) collected on 20.viii.2015; A 12466 from CC Line Beat, Chilapata forest, Jalpaiguri district, West Bengal (26°36'847"N, 89°21'086"E) collected on 18.viii.2015 and A 12467 from Madarihat, Jaldapara National Park, Jalpaiguri district, West Bengal (26°65'962"N, 89°31'508"E) collected on 19.viii.2015. The measurements of the frogs collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11938	20.80	4.95	5.96	3.30	2.36	2.38	2.05	hidden	8.35
A11945	19.36	5.16	6.33	2.24	1.83	1.82	2.32	hidden	10/51
A11967	21.03	5.68	6.36	3.21	1.91	1.95	2.48	hidden	11.12
A11968	19.67	5.64	6.35	3.03	1.95	1.99	2.42	hidden	11.74
A12434	23.67	5.82	7.53	4.35	2.48	2.25	2.60	hidden	11.93
A12466	20.39	5.18	6.52	3.53	1.80	2.31	2.05	hidden	10.26
A12467	21.31	4.36	6.55	3.25	1.54	2.48	2.00	hidden	10.64

Size: 18-27 mm (snout-vent length).

Distinguishing features: Small-sized, vividly patterned, squat and active frogs with bulging eyes. The head is rather small with a narrow pointed snout which projects beyond the mouth. Ear-drum is indistinct. Fingers are slender and do not bear webbing. Tips of the fingers and toes are flattened and blunt but the fingers and toes do not bear enlarged discs. Rudiment of webbing between the toes. Two small but distinct and oval inner and outer pedal tubercles are present. The skin is smooth.

Colour: Upperside is light brown to bronze with distinct dark brown diamond-shaped marking over the back, beginning between the eyes, narrowing behind the head and widening above the shoulder, then narrowing again and finally broadening out. A dark streak extends along the sides from behind the eye to the shoulder. Limbs are with dark cross bars. The belly is dull white and the throat and chest are black in breeding males.

Habitat: They normally move about and feed amongst grass, herbs and bushes growing on moist soil and under fallen bamboo leaves on the banks of ponds and lakes. They generally tend to stay under the cover of a stone or log and leaf litter. They occur throughout the year in towns, forests and agricultural lands in the duars area.

Remarks: Very common throughout the duars area of northern West Bengal. Their numbers and calls become prominent after a heavy shower during the monsoons. Can call very loud and jump tremendously when compared to its small size. Breeding commences just after the arrival of the monsoon rains. Several males can be heard calling from evening near temporary rain-water pools. However the call is ventriloquistic and makes location of the small frog quite difficult. Reported earlier from West Bengal (Sarkar, Biswas and Ray, 1992) and Deuti (1995).

4. *Kaloula assamensis* (Das, Sengupta, Ahmed and Dutta, 2004).
2004. *Kaloula assamensis* Das, Sengupta, Ahmed and Dutta, *Hamadryad.*, **29**: 101-103.

Common Name: Assam Painted Frog (English).

Specimens examined: A 10590 and A 10591 from Bong basti forest village, Chilapata forest, Jalpaiguri district, West Bengal (26°35'834"N, 89°23.879"E) collected on 10.ix.2006 and 23.ix.2006 respectively. The measurements of the frogs collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A10590	32.95	7.35	9.65	4.60	3.25	3.15	4.35	hidden	11.60
A10591	30.65	7.15	9.40	4.35	3.10	3.05	4.15	hidden	11.15

Size: 30-43 mm (snout-vent length).

Distinguishing features: A small-sized, colourful, stout-bodied, short-legged frog. Head is small, broader than long but indistinct from neck. Snout is rounded. The ear-drum is hidden. Eyes are quite large, pupil is circular. Inter-orbital region is flat. A distinct supra tympanic fold extends from the posterior corner of eyes to base of fore limb. Fingers are free of web, finger tips are slightly

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A10402	33.61	8.62	11.85	4.95	3.29	4.44	4.27	3.32	14.48

dilated. Toes are half webbed, toe tips are slightly rounded. Webbing reaches tips of all toes as a narrow sheath except on fourth toe where it is to the medial tubercle. A pointed inner and an oval outer pedal tubercle are present on the toes. Upper side is granular. Abdomen is coarsely granular.

Colour: Upper parts pale brown with a dark-edged bright yellow vertebral stripe, starting from tip of the snout and terminating near the vent, where it becomes less distinct. Two black-edged broad dark brown lateral patches, commencing from behind the eyes to the groin. Upper surfaces of fore and hind limbs is pale brown and not banded, belly and abdomen whitish.

Habitat: Under herbaceous moist vegetation within evergreen forests and wet grasses in grasslands, which they can climb from 0.3-1.0 meter above the ground especially when the ground gets water-logged.

Remarks: So far known only from Chilapata Reserve Forest in Jalpaiguri district of northern West Bengal (Paul,

Biswas and Deuti, 2007a). Elsewhere from Orang National Park, Majbat, Sirajuli and Nameri Wildlife Sanctuary in Darrang and Sonitpur districts of Upper Assam and Bongaigaon district of lower Assam (Talukdar, Soud and Deuti, 2007) besides from Pakke (Pakhui) Wildlife Sanctuary in Arunachal Pradesh. Although Sengupta *et al.*, (2009) mentioned that this species is restricted to the northern banks of the Brahmaputra River and the Bhutan foothills, Deuti *et al.*, 2012 also reported it from Valmiki Tiger Reserve in Bihar.

5. *Kalophrynus interlineatus* (Blyth, 1855)

2000. *Kalophrynus orangensis* Dutta, Ahmed and Das, *Hamadryad.*, **25**(2): 67-74.

Common Name: Orang Sticky Frog (English).

Specimens examined: 1 ex: A 10402 from Bong basti, Chilapata forest, Jalpaiguri district, West Bengal (26°35'834"N, 89°23.879"E) collected on 13.x.2006. The measurements of the frog collected are given below in millimeters:

Size: 35-38 mm (snout-vent length).

Distinguishing features: A small-sized, stocky, elongated frog with a narrow waist. Head is wider than long and with a pointed snout projecting beyond the lower jaw. Eyes are small with a circular pupil. Inter-orbital region is flat. Ear-drum is distinct with a distinct supra-tympanic fold from posterior angle of eye to base of fore limb. Fingers are without webbing, the finger tips are rounded. Fleshy tubercles are present on the palm. Toes are webbed at the base. Toe tips are rounded. Inner and outer pedal tubercles are present. Upper parts are granular with glandular skin. Abdomen and inner side of thighs are coarsely granular.

Colour: Upper parts deep reddish brown or creamish. Sides of head and body darker than upper parts. A deep brown inverted Y-shaped mark begins from between the eyes, bifurcating on shoulder and extending diagonally on both sides of the vent to the hindlimbs. Limbs with dark bars and blotches. Belly yellowish-cream.

Habitat: Found in grasslands adjacent to forest or close to trees bordering grassland.

Remarks: So far known only from Chilapata Reserve Forest in Jalpaiguri district of northern West Bengal (Paul, Biswas and Deuti, 2007b). Elsewhere from Orang National Park in Darrang district of Assam (Dutta, Ahmed and Das, 2000) as *Kalophrynus orangensis* which was later synonymised under *Kalophrynus interlineatus* by Ohler and Grosjran, 2005.

6. *Uperodon globulosus* (Gunther, 1864)

1864. *Cacopus globulosum* Gunther, *Rept. Brit. India*: 416.

Common Name: Balloon Frog (English).

Specimens examined: 2 ex: A 11937 from Rajabhatkhawa, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°36'839"N, 89°31'929"E) collected on 02.vi.2014 and A 12438 from Kodalbasti forest, Jalpaiguri district, West Bengal (26°38'023"N, 89°21'927"E) collected on 16.viii.2015. The measurements of the frogs collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11937	49.91	9.57	14.44	6.61	4.52	3.72	7.97	hidden	18.39
A12438	52.62	9.62	14.32	6.62	3.35	3.83	6.42	hidden	20.80

Size: 40-76 mm (snout-vent length).

Distinguishing features: A medium-sized, plump burrowing frog with small beady eyes. The head is small. Snout is rounded. The nostril is equidistant between the tip of the snout and the eye. The ear-drum is not exposed. Fingers are without webbing. Tips of the fingers and toes are rounded but do not bear discs. The hind limbs are short. Toes are with rudimentary webbing. Two large and shovel-shaped inner and outer pedal tubercles are present.

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A12435	49.30	7.41	14.65	5.00	3.75	4.08	5.13	hidden	14.83
A12436	45.82	9.37	14.85	5.46	3.25	4.24	4.52	hidden	18.59

Skin is soft and soggy above and bears a fold on the rear end of the head that may extend over the shoulder. The skin on the anal region is coarse and may be wrinkled on the belly.

Colour: Greyish-grey or reddish-brown above and dirty brown below turning to bright yellow during the breeding season.

Habitat: Largely open forest and forest fringes including villages and farms and even suburban areas.

Remarks: They are nocturnal and burrowing in habit and are rarely seen except when they come out to breed. They are excellent burrowers using the strong pedal tubercles on the hind legs to quickly disappear underground. Feeding schedule is perhaps restricted to the breeding season in early monsoon. They hop or walk clumsily on land. On being disturbed, they inhale air into their enormously distensible lungs while keeping the head downwards and the two sides of the abdomen swells like a balloon. During this time, a sticky white fluid is secreted. Reported earlier from West Bengal (Sarkar, Biswas and Ray, 1992) and Deuti (1995).

7. *Uperodon taprobanicus* (Parker, 1934)

1934. *Kaloula pulchra taprobanica* Parker, *Monogr. Frogs Fam. Microhylidae*: 86-87.

Common Name: Painted Frog, Indian Painted Frog, Painted Kaloula (English).

Specimens examined: 2 ex: A 12435 from Ramsai, Gorumara National Park, Jalpaiguri district, West Bengal (26°78'403"N, 88°84'692"E) collected on 11.viii.2015 and A 12436 from Madarihat, Jaldapara National Park, Jalpaiguri district, West Bengal (26°65'962"N, 89°31'508"E) collected on 20.viii.2015. The measurements of the frogs collected are given below in millimeters:

Size: 28-58 mm (snout-vent length).

Distinguishing features: Medium-sized, colourful, stocky-built, stout-bodied, short-legged frog. Head is broader

than long, snout is rounded. Nostril is nearer to the tip of the snout than to the eye. The ear-drum is hidden. Fingers are without webs, the tips of the fingers bear short well-developed triangular discs. Toes are about one-third webbed and terminated with dilated triangular discs. Inner pedal tubercle is well-developed, large and shovel-shaped. Outer pedal tubercle is small. Skin is wrinkled on the belly but granular on the throat and underside of the thighs.

Colour: The upperside is blackish-brown with deep red irregular patches margined with black. These patches form a dark reddish lateral band running on each side from the eyes to the groin. The belly is grayish, finely spotted with brown. In breeding males, the throat is black.

Habitat: Village areas at the edge of forests. Breeds in dirty water ponds and pools near to cowsheds.

Remarks: Uncommon in the duars area. The species is very colourful. They are terrestrial, burrowing and nocturnal, emerging from their burrows during the early monsoon and are often seen to climb up trees,

Common Name: Skittering Frog, Skipping Frog, Skipper Frog (English).

Specimens examined: 8 ex: A 11950 from from Jayanti, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°36'931"N, 89°31'570"E) collected on 07.vi.2014; A 11951 from Mahananda Wildlife Sanctuary, Jalpaiguri district, West Bengal (26°34'632"N, 89°24'276"E) collected on 11.viii.2015; A 11952 from CC Line Beat, Chilapata forest, Jalpaiguri district, West Bengal (26°36'847"N, 89°21'086"E) collected on 09.vi.2014; A 11957- A 11958 from Mendabari, Chilapata forest, Jalpaiguri district, West Bengal (26°36'687"N, 89°23'996"E) collected on 10.vi.2014; A 12439 from Kodalbasti forest, Jalpaiguri district, West Bengal (26°38'023"N, 89°21'927"E) collected on 14.viii.2015; A 12440 from Madarihata, Jaldapara National Park, Jalpaiguri district, West Bengal (26°65'962"N, 89°31'508"E) collected on 19.viii.2015 and A 12468 from Dhupjhora, Gorumara National Park, Jalpaiguri district, West Bengal (26°78'756"N, 88°84'078"E) collected on 09.viii.2015. The measurements of the frogs collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11950	53.04	18.88	20.57	8.79	3.92	5.47	3.36	4.87	29.66
A11951	53.84	16.95	20.18	9.34	3.73	6.65	3.08	4.58	28.78
A11952	59.72	19.43	20.76	9.71	3.69	5.85	3.32	4.64	29.86
A11957	60.31	18.76	20.74	9.32	4.37	5.78	3.53	5.48	31.02
A11958	49.26	16.98	18.79	8.46	3.49	5.76	4.56	4.19	25.59
A12439	33.28	11.63	12.29	5.85	1.69	3.16	1.57	2.71	16.72
A12440	42.74	12.06	13.89	6.88	4.34	4.41	2.13	3.14	19.50
A12468	38.07	10.00	13.13	5.41	3.60	4.21	2.99	3.58	20.11

where they are found in holes in tree-trunks, infested with ants, about one and a half meters above the ground. They descend from these tree holes and hollow trunks climbing down backwards. When dug up, they inhale air and swell up like a ball, keeping the head down and secreting a white slimy fluid through pores in the skin. They hop slowly but swim well. The call is distinctive and seems like the grating of a coconut. Reported earlier from West Bengal (Sarkar, Biswas and Ray, 1992) and Deuti (1995).

Family DICROGLOSSIDAE

8. *Euphlyctis cyanophlyctis* (Schneider, 1799)

1799. *Rana cyanophlyctis* Schneider, *Hist. Amph. Nat.*, 1: 137.

Size: 30-70 mm (snout-vent length).

Distinguishing features: Medium-sized aquatic frogs, normally seen floating in open water. The eyes are placed above the head and protrudes out of the water when the frog is floating. Snout is rounded. Nostril is equidistant between the tip of the snout and the eye and projects upwards. Fingers are without webbing, the tips of the fingers are pointed. Toes are fully webbed, appearing more like that of ducks. Skin on the back is smooth but some small warts are present. A prominent skin fold runs from behind the eye to the shoulder. Belly is smooth with a single row of porous warts on each flank.

Colour: The dorsum is dark olive-brown or grayish-brown or grayish-black with darker rounded spots on the back

and stripes on the limbs. Belly is white with black spots on the flanks. The vocal sacs in males are bluish and visible on either side of the throat when the males call.

Habitat: Found in all types of water-bodies in the duars area especially the permanent ones with standing water. The species is also seen in rain-pools and puddles. They spend most of their time in the water or in the vicinity of water-bodies.

Remarks: One of the commonest frogs of the duars area. They float passively in water with only the nostrils projecting above the surface but when disturbed, can skip smoothly over the water for some distance and then float above the surface with the hind legs held outstretched and parallel. While calling, the inflated bluish-white vocal sacs of the male project through slits on the floor of the mouth. The call is distinctive and can be heard throughout the year. The eggs are laid in a frothy mass in standing water. Reported earlier from West Bengal (Sarkar, Biswas and Ray, 1992) and Deuti (1995).

9. *Hoplobatrachus tigerinus* (Daudin, 1802)

1802. *Rana tigerina* Daudin, *Hist. Nat. Rain. Gren. Crap., Quarto*, 1: 42.

Common Name: Bull Frog, Indian Bull Frog (English).

Specimens examined: 5 ex: A 11943 from from Rajabhatkhawa, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°36'839"N, 89°31'929"E) collected on 04.vi.2014; A 11946 from Alipurduar, Alipurduar district, West Bengal (26°44'939"N, 89°34'135"E) collected on 05.vi.2014; A 11962 from from Mendabari, Chilapata forest, Jalpaiguri district, West Bengal (26°36'687"N, 89°23'996"E) collected on 10.vi.2014; A 12441 from CC Line Beat, Chilapata forest, Jalpaiguri district, West Bengal (26°36'847"N, 89°21'086"E) collected on 18.viii.2015 and A 12469 from Ramsai, Gorumara National Park, Jalpaiguri district, West Bengal (26°78'403"N, 88°84'692"E) collected on 12.viii.2015. The measurements of the frogs collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11943	49.84	18.26	17.08	10.26	4.35	6.04	2.65	4.84	28.44
A11946	62.66	24.72	23.04	13.18	4.68	7.34	4.55	4.58	36.43
A11962	41.22	15.66	14.62	8.53	3.32	5.17	2.43	2.94	24.36
A12441	85.64	28.27	31.44	14.90	7.36	10.03	3.86	6.90	38.98
A12469	54.12	15.41	16.84	9.62	5.25	5.66	2.51	3.35	29.64

Size: 60-150 mm (snout-vent length).

Distinguishing features: Large frogs with smooth skin and longitudinal glandular folds on the back. They are quite bulky with long and muscular limbs. Head is somewhat pointed and projects beyond the mouth. A skin fold runs from behind the eye to the shoulder. Fingers are without webbing, the tips of the fingers and toes are not sharply pointed. Toes are extensively webbed but the webbing does not reach to the tip of the fourth toe. Belly is smooth with no porous warts on the flanks. Vocal sacs in males are external and blue in colour.

Colour: Yellowish or olive-green with darker leopard-like spots and patches. A yellowish median stripe runs from the tip of the snout to the vent. A broad white band runs along the side. The breeding males turn bright lemon yellow.

Habitat: Found among grasses and bushes and inside hollows at the edge of ponds, ditches and canals. Seen frequently on the edges of water bodies during breeding season into which they leap headlong at the least sign of danger.

Remarks: Very common species in the duars area. They are solitary creatures, which aggregate only during the breeding season. In the non-breeding season, they are silent and difficult to locate but with the appearance of the rainy season their highly resonant call can be heard throughout the night. Croaking loudly the males await the arrival of the females. The eggs are laid in ponds and ditches where they float first but sink later. The tadpoles are bottom-feeders. Reported earlier from West Bengal (Sarkar, Biswas and Ray, 1992) and Deuti (1995).

10. *Hoplobatrachus crassus* (Jerdon, 1853)

1853. *Rana crassa* Jerdon, *J. Asiat. Soc. Beng.*, 22: 531.

Common Name: Jerdon's Bull Frog (English).

Specimens examined: 3 ex: A 11944 from 23 mile watch tower, Buxa Tiger Reserve, Alipurduar district, West Bengal

(26°44'268"N, 89°34'019"E) collected on 04.vi.2014; A 11947 from South Raidak, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°44'608"N, 89°33'922"E) collected on 06.vi.2014; A 11964 from Mendabari, Chilapata forest, Jalpaiguri district, West Bengal (26°36'687"N, 89°23'996"E) collected on 10.vi.2014. The measurements of the frogs collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11944	58.52	17.58	20.52	9.82	4.47	6.09	3.26	4.12	31.46
A11947	63.88	18.83	21.49	10.61	3.08	5.93	3.15	4.43	32.17
A11964	56.75	19.36	21.74	11.96	5.76	5.45	3.27	4.61	28.56

Size: 40-86 mm (snout-vent length).

Distinguishing features: Medium to large-sized flabby-shaped frogs with numerous interrupted glandular longitudinal folds on the back and flanks. Snout is somewhat pointed and projects beyond the mouth. Tympanum is large and distinct, nearly equal to the diameter of the eye. Fingers are without webbing but the toes are almost fully webbed. Legs are comparatively shorter than those of the Indian Bull frog. A large shovel-shaped inner pedal tubercle is present but the outer pedal tubercle is absent. Belly is smooth.

Colour: Greyish or greyish-brown with darker patches on the back. The undersides are white with deep brown stripes or bars on the upper jaw in front of the eyes and on the lower jaw. The legs are cross-barred with deep brown or black stripes or blotches. The vocal sacs in the males are external and turn black at the time of breeding.

Habitat: They spend the day hiding inside crevices on elevated banks of ponds and ditches. They are found during breeding season in temporary rain-water pools.

Reg No and Sex	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11948	28.19	8.43	9.39	5.23	2.79	3.35	2.08	1.60	14.47
A11949	27.41	7.99	8.48	5.32	2.78	3.12	1.82	1.91	12.86
A11960	25.49	9.30	8.11	5.07	2.77	3.38	2.07	1.68	15.43
A11961	23.65	7.82	8.01	5.15	2.54	3.10	1.99	1.61	12.25
A11963	22.30	7.63	7.47	4.68	2.31	3.19	1.32	1.45	11.75
A12448	25.81	7.28	8.41	5.11	2.61	3.15	2.12	1.67	15.79
A12449	21.32	5.76	6.69	2.66	2.23	2.31	1.97	1.37	11.35
A12470	29.23	7.01	8.02	4.29	2.26	3.07	2.56	1.70	16.40

Remarks: The species is quite common in the duars area. They are terrestrial, nocturnal and also burrow in

the ground. Reported earlier from West Bengal (Sarkar, Biswas and Ray, 1992) and Deuti (1995).

11. *Fejervarya syhadrensis* (Annandale, 1919)

1919. *Rana limnocharis syhadrensis* Annandale, *Rec. Ind. Mus.*, **16**: 121-125.

Common Name: Small Cricket Frog (English).

Specimens examined: 8 ex: A 11948 from South Raidak, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°44'608"N, 89°33'922"E) collected on 06.vi.2014; A 11949 from Kumargram, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°43'136"N, 89°34'513"E) collected on 07.vi.2014; A 11960 – A 11961 from Mendabari, Chilapata forest, Jalpaiguri district, West Bengal (26°36'687"N, 89°23'996"E) collected on 09.vi.2014; A 11963 from Mahananda Wildlife Sanctuary, Jalpaiguri district, West Bengal (26°34'632"N, 89°24'276"E) collected on 11.viii.2015; A 12448 from Kodalbasti forest, Jalpaiguri district, West Bengal (26°38'023"N, 89°21'927"E) collected on 16.viii.2015; A 12449 from Lataguri, Gorumara National Park, Jalpaiguri district, West Bengal (26°79'573"N, 88°85'523"E) collected on 12.viii.2015 and A 12470 from Medla, Gorumara National Park, Jalpaiguri district, West Bengal (26°78'441"N, 88°86'386"E) collected on 11.viii.2015. The measurements of the frogs collected are given below in millimeters:

Size: Snout-vent length: 27-32 mm (males) and 29-40 mm (females).

Distinguishing features: Small to medium-sized mostly terrestrial frogs. Head is longer than broad. Snout is pointed and projects beyond the mouth. The ear-drum is distinct. Fingers are without webs. The hind limbs are short and the webbing is less on the toes. A prominent skin-fold runs from behind the eye to the shoulder. Some short and interrupted longitudinal glandular folds are present on the back. Belly is smooth.

Colour: Olive-brown above usually with darker markings which assume irregular patterns. A pale yellow vertebral stripe is present along the back and the lips and limbs are barred. The underside is white except on the throat, which is black in breeding males.

Habitat: Prefers vicinity of water without being really aquatic. They can be encountered far away from water-bodies in open grassland, forest floor and plantations.

Remarks: One of the commonest species found throughout the duars area. Partly diurnal but only calls nocturnally. Males call in the evening and night and are easy to locate. Also reported from Assam (Borthakur et al., 2007).

12. *Fejervarya teraiensis* (Dubois, 1984)

1984. *Rana teraiensis* Dubois, *Alytes*, 3: 150.

Common Name: Terai Cricket Frog (English)

Specimens examined: 5 ex: A 11935 from Buxa Fort, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°45'323"N, 89°34'868"E) collected on 31.v.2014; A 11959 from Mendabari, Chilapata forest, Jalpaiguri district, West Bengal (26°36'687"N, 89°23'996"E) collected on 09.vi.2014; A 12445 – A 12446 from Kodalbasti forest, Jalpaiguri district, West Bengal (26°38'023"N, 89°21'927"E) collected on 16.viii.2015 and A 12447 from CC Line Beat, Chilapata forest, Jalpaiguri district, West Bengal (26°36'847"N, 89°21'086"E) collected on 19.viii.2015. The measurements of the frogs collected are given below in millimeters:

Reg No and Sex	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11935	50.13	14.12	15.19	8.35	3.83	5.82	2.79	3.43	25.31
A11959	52.95	16.20	18.26	9.47	4.23	5.65	3.42	3.67	29.74
A12445	46.79	15.77	16.98	7.87	3.91	4.72	2.73	2.98	23.56
A12446	48.18	15.06	16.03	8.27	3.86	3.97	3.16	3.58	24.69
A12447	46.05	13.18	16.07	7.44	4.01	5.38	3.32	3.65	24.46

Size: 35-52 mm (snout-vent length).

Distinguishing features: Small to medium-sized mostly terrestrial frogs with interrupted glandular folds on the skin. Nostril is nearer to the tip of the snout than the eyes. The snout is somewhat pointed and projects beyond the mouth. Eyes are large but the ear-drum is two-third the diameter of the eye. A distinct supra-tympanic fold extending from behind the eye to the shoulder. Fore and hind limbs are moderately sized. Fingers and toes are elongated. Tips of the fingers and toes are rounded. The sub-articular tubercles are distinct and rounded. Skin on the ventral side is smooth.

Colour: Dorsum olive-brown with blackish brown patches and streaks. A blackish-brown bar between the eyelids. Upper lip with distinct blackish brown bars. Hind limbs with cross-bars. Eyes with a golden rim but the pupil is black. Ear-drum yellowish. The ventral side is whitish.

Habitat: Leaf litter on the forest floor especially near wetlands but also seen in grasslands and breeds in small rain pools.

Remarks: One of the commonest species found throughout the duars area. Earlier reported from West Bengal (Deuti and Ayyaswamy, 2008). Also reported from Assam (Borthakur et al., 2007) and Uttar Pradesh (Hegde, Roy and Lal, 2009).

13. *Fejervarya nepalensis* (Dubois, 1975)

1975. *Rana nepalensis* Dubois, *C.R. Seances Soc. Biol., Paris*, 281: 1720.

Common Name: Nepal Cricket Frog (English)

Specimens examined: 3 ex: A 12442 from from Hollong, Jaldapara National Park, Jalpaiguri district, West Bengal (26°63'324"N, 89°30'635"E) collected on 18.viii.2015; 12443 from Sisamara, Jaldapara National Park, Jalpaiguri district, West Bengal (26°58'581"N, 89°27'781"E) collected on 18.viii.2015 and A 12444 from CC Line

Beat, Chilapata forest, Jalpaiguri district, West Bengal (26°36'847"N, 89°21'086"E) collected on 19.viii.2015. The measurements of the frogs collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A12442	36.23	9.87	13.18	5.74	2.35	4.55	2.29	3.02	19.13
A12443	36.04	8.30	9.90	5.35	3.07	3.12	2.20	2.03	17.93
A12444	33.57	8.43	9.39	5.35	3.14	3.60	2.28	2.10	19.45

Size: 30-40 mm (snout-vent length).

Distinguishing features: Small-sized mostly terrestrial frogs with few interrupted glandular folds on the skin.

Reg No and Sex	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11965	20.92	6.14	6.22	3.64	2.13	2.15	1.58	1.22	10.89
A11966	21.32	6.29	6.47	3.72	2.22	2.66	1.76	1.38	11.32
A12450	23.64	6.92	7.19	3.81	2.41	2.92	1.91	1.49	11.67

Nostril is nearer to the tip of the snout than the eyes. The snout is somewhat pointed and projects beyond the mouth. Eyes are large but the ear-drum is half the diameter of the eye. A distinct supra-tympanic fold extending from behind the eye to the shoulder. Fore and hind limbs are moderately sized. Fingers and toes are elongated. Tips of the fingers and toes are rounded. The sub-articular tubercles are distinct. Skin on the ventral side is smooth.

Colour: Dorsum olive-brown with blackish brown streaks. Hind limbs with cross-bars. Eyes with a golden rim but the pupil is black. Ear-drum yellowish. The ventral side is whitish.

Habitat: Leaf litter on the forest floor. Breeds in small rain pools from where males are heard calling.

Remarks: One of the commonest species found throughout the duars area. Also reported from Assam (Borthakur et al., 2007).

14. *Fejervarya chilapata* (Ohler, Deuti, Grosjean, Paul, Ayyaswamy, Ahmed and Dutta, 2009)

2009. *Minervarya chilapata* Ohler, Deuti, Grosjean, Paul, Ayyaswamy, Ahmed and Dutta, *Zootaxa*, **2209**: 43-56.

Common Name: Chilapata rain-pool Frog (English).

Specimens examined: 3 ex: A 11965 – A 11966 from Mendabari, Chilapata forest, Jalpaiguri district, West Bengal (26°36'687"N, 89°23'996"E) collected on 10.vi.2014 and A 12450 from Bong basti, Chilapata

forest, Jalpaiguri district, West Bengal (26°35'834"N, 89°23.879"E) collected on 14.viii.2015. The measurements of the frogs collected are given below in millimeters:

Size: Snout to vent length: 18.6-20.9 mm (males) and 23.8-25.1 mm (females).

Distinguishing features: A small-sized frog with moderately slender body. Head slightly longer than broad. Snout pointed and protruding beyond mouth. Nostril rounded, closer to eye than to tip of snout. Ear-drum round, less than half of eye diameter. Arm strong but shorter than hand. Fingers thin and short. Tips of fingers bluntly rounded but not enlarged. Fingers are without webbing. Hind limbs are elongated, shank longer than thigh. Toes long and thin. Tips of toes are rounded but not enlarged. Rudimentary webbing on all toes. Snout, sides of head, anterior part of back and flanks smooth. Posterior part of back with indistinct glandular warts. Latero-dorsal folds are absent but light latero-dorsal bands are present in that position. Fejervaryan line present on side of belly. A skin-fold above ear-drum present from eye to above shoulder. Forelimbs and thigh smooth, shank with glandular warts. Rictal glands present as two small glands posterior to mouth.

Colour: Head and body greyish beige with a light yellow vertebral line. Upper flank grayish beige, lower part grayish-brown. Ear-drum dark grayish-brown. Upper lip with a horizontal golden-white line. Forearm, thigh, shank and foot light orange with indistinct grey brown bands. Chest and belly whitish. Vocal sacs denser grey.

Habitat: Forest floor of evergreen and moist deciduous forest with good canopy cover in the duars area of northern West Bengal.

Remarks: This species was very recently described in 2009 from Chilapata forest. So far known only from the forests of Chilapata and Kodalbasti Ranges of Jaldapara National Park in Alipurduar and Jalpaiguri districts of northern West Bengal.

Family RANIDAE

15. *Hydrophyllax leptoglossa* (Cope, 1868)

1868. *Hylorana leptoglossa* Cope, *Proc. Acad. Nat. Sci. Philadelphia.*, **20**: 140.

Common Name: Long-tongued Frog (English).

Specimens examined: 9 ex: A 11940-A 11941 from Dima Beat, Buxa Fort, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°37'410"N, 89°31'328"E) collected on 03.vi.2014; A 11969-A 11971 from Mendabari, Chilapata forest, Jalpaiguri district, West Bengal (26°36'687"N, 89°23'996"E) collected on 10.vi.2014; A 12452-A 12453 from CC Line Beat, Chilapata forest, Jalpaiguri district, West Bengal (26°36'847"N, 89°21'086"E) collected on 18.viii.2015; A 12454-A 12455 from Kodalbasti forest, Jalpaiguri district, West Bengal (26°38'023"N, 89°21'927"E) collected on 15-16.viii.2015. The measurements of the frogs collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11940	44.33	14.12	15.74	7.81	4.87	5.74	4.27	4.18	25.81
A11941	43.66	12.03	14.62	7.67	4.59	5.63	3.89	4.46	23.54
A11969	47.51	16.04	16.31	8.46	5.64	5.52	5.11	4.52	27.14
A11970	46.87	13.54	13.86	7.82	5.17	5.58	3.72	4.02	23.53
A11971	45.75	11.66	15.60	8.39	4.95	5.84	4.58	4.12	24.64
A12452	53.63	16.21	17.45	8.95	5.61	5.64	4.24	4.67	29.31
A12453	48.67	13.22	14.86	8.26	4.66	5.97	3.64	5.16	25.62
A12454	46.63	15.26	13.51	8.05	5.48	5.94	4.24	3.93	26.28
A12455	42.24	13.51	12.62	7.46	4.82	5.41	4.11	3.78	24.28

Size: 40-55 mm (snout-vent length).

Distinguishing features: Medium-sized frog with smooth skin and long legs. Body is elongated. The snout is pointed and projects beyond the mouth. The nostril is nearer to

the snout tip than the eye. The ear-drum is quite large as big as the diameter of the eye. No supra-tympanic fold but two very distinct dorso-lateral folds run from above the eyes on both side of the body up to the groin. There is a distinct and elongated rictal gland. Fingers and toes are slender and elongated. Fingers without webbing but toes are partly webbed. Tips of fingers and toes are rounded. Sub-articular tubercles on the fingers and toes are large and distinct.

Colour: Dorsal side deep brown with small black dots. The distinct dorso-lateral folds are also deep brown. Lateral sides and flanks blackish-brown. Ear-drum chocolate brown. Eyes with a golden rim but the pupil is black. Upper lip white and so is the rictal gland. Fore and hind limbs brown with chocolate brown spots and patches. Hind limbs with dark brown cross bars. Ventral side white.

Habitat: Found in all the wetlands in the duars area both inside forests as well as around villages and towns. Also seen on the forest floor among leaf litter.

Remarks: One of the commonest species found throughout the duars area.

16. *Hylarana tytleri* Theobald, 1868

1838. *Hylorana tytleri* Theobald, *J. Asiat. Soc. Bengal*, **37** suppl: 7-88 + iii pp, 4 pl.

Common Name: Reed Frog (English).

Specimens examined: 1 ex: A 12451 from Mendabari, Chilapata forest, Jalpaiguri district, West Bengal (26°36'687"N, 89°23'996"E) collected on 10.vi.2014. The measurements of the frog collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A12451	37.13	12.49	12.36	8.05	4.72	5.61	4.80	3.63	21.56

Size: 35-45 mm (snout-vent length).

Distinguishing features: A small to medium-sized semi-aquatic frog with smooth skin, long legs with digital disks

(26°36'687"N, 89°23'996"E) collected on 14.viii.2015 and A 12589 from Jalpaiguri town, Jalpaiguri district, West Bengal collected by S.P. Pandey on 29.viii.2015. The measurements of the frog collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A12456	68.19	23.08	21.43	11.47	7.56	8.16	6.26	5.43	38.39
A12589	72.57	23.54	21.82	11.51	7.16	8.13	7.24	5.72	38.56

on the fingers and toes without circum-marginal groove. Body is elongated and torpedo-shaped. The snout is pointed. The nostril is nearer to the snout tip than the eye. The ear-drum is quite large as big as the diameter of the eye. No supra-tympanic fold but two dorso-lateral folds run from above the eyes on both side of the body up to the groin. Fingers and toes are slender and elongated. Fingers without webbing but toes partly webbed. Tips of fingers and toes with rounded disks.

Colour: Dorsum light green with two golden-yellow bands on each side of the body. The upper one running from above the eye on up to the groin. The lower one from the upper lip to below the ear-drum up to the belly. The area in between the two bands is chocolate-brown. The eyes are black with the upper portion golden-yellow. The ear-drum is flesh-coloured. The ventrum is white.

Habitat: Floating weeds inside wetlands are its preferred habitat. Also seen on emergent reed beds and vegetation on the banks of the wetlands.

Remarks: Rare in the duars area of northern West Bengal. The little frog nicely camouflages among the green weeds and reed stems in the wetlands. The breeding season is throughout the monsoons when it emits a chirping call.

17. *Humerana humeralis* (Boulenger, 1887)

1887. *Rana humeralis* Boulenger, *Ann. Mus. Civ. Stor. Nat. Genova*, Ser. 2, 5: 420.

Common Name: Bright Frog (English).

Specimens examined: 2 ex: A 12456 from Mendabari, Chilapata forest, Jalpaiguri district, West Bengal

Size: 65-75 mm (snout-vent length)

Distinguishing features: A medium to large-sized frog with a flattened body and two distinct dorso-lateral folds on both sides of the body. The head is longer than broad with a comparatively pointed snout, projecting beyond the lower jaw. The eyes are large, the ear-drum two-thirds that of the diameter of the eye. The inter-narial distance is greater than the inter-orbital distance. The canthus rostralis and loreal regions are flattened and so is the inter-orbital region. There is a distinct large and elongated rectal gland. The fore and hind limbs are elongated and the fingers and toes are long. Fingers are without any webbing but the finger tips are with small discs. The toes are almost fully webbed with two phalanges of the fourth toe free of webbing. The skin is smooth dorsally and laterally. The throat and abdomen are smooth and so is the ventral surface of the thigh.

Colour: Dorsum light brown with small black spots. Dorso-lateral folds also brown. Lateral side and flanks green. Ear-drum pinkish. Eyes with a golden rim. Pupil black. Upper lip with a white streak. Rectal gland also white. Fore and hind limbs light brown. Hind limbs dotted with brown. Ventral side whitish. Webbing on toes dark brown.

Habitat: Small wetlands including ponds and ditches inside tropical evergreen forests.

Remarks: This is the first record of this species from West Bengal.

18. *Clinotarsus alticola* (Boulenger, 1882)

1882. *Rana alticola* Boulenger, *Cat. Batr. Sal. Coll. Brit. Mus.*, Ed. 2: 62.

Common Name: Point-nosed Frog (English).

Specimens examined: A 11939 from Rajabhatkhawa, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°36'839"N, 89°31'929"E) collected on 03.vi.2014. The measurements of the frog collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11939	48.87	17.63	13.56	8.88	4.29	5.46	5.04	3.93	28.67

Size: 45-55 mm (snout-vent length).

Distinguishing features: 1 ex: A medium-sized frog and with a highly pointed snout. The body is flattened above with a flat inter-orbital region. The head is longer than wide. Nostril is very near to the tip of the snout than to the eye. The eyes are large. The ear-drum is distinct and about two-third the diameter of the eye. The fore limbs are long and slender. The fingers are long and without webbing. The tips of the fingers bear rounded discs. The hind limbs are long. The toes are elongated and with webbing but the web do not reach the tip of the fourth toe. The tips of the fingers bear rounded discs. The skin is smooth both dorsally and ventrally.

Colour: Dorsum is deep brown. The pupil is black with a golden rim. Ventral side is white. Webbing on the toes is

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11999	66.43	21.53	22.97	11.08	5.63	5.91	5.88	5.76	35.61
A12000	49.48	14.61	15.91	8.84	5.41	5.72	6.34	3.95	25.77
A12001	61.68	22.47	22.55	12.09	5.92	6.78	8.79	4.91	35.80
A12002	51.76	17.93	16.91	9.26	5.37	7.44	7.18	4.56	27.62
A12003	46.96	16.57	16.45	8.92	5.14	6.03	6.71	4.05	27.04
A12461	47.77	15.87	15.12	8.07	3.87	4.98	6.29	3.67	26.41
A12462	49.29	12.93	15.35	8.48	3.89	4.89	5.78	3.92	27.44

chocolate brown as is the ear-drum.

Habitat: Evergreen and semi-evergreen forest floor on the leaf litter and near ponds and streams. The tadpoles are very large and found in the streams.

Remarks: This is the first record of this species from West Bengal.

Family RHACOPHORIDAE

19. *Polypedates teraiensis* (Dubois, 1987)

1987. *Rhacophorus leucomystax teraiensis* Dubois, *Alytes*, 5: 81-82.

Common Name: Terai Tree Frog (English).

Specimens examined: 7 ex: A 11999 from Dhupjhora, Gorumara National Park, Jalpaiguri district, West Bengal

(26°78'756"N, 88°84'078"E) collected on 10.viii.2015; A 12000 from Garati, Gorumara National Park, Jalpaiguri district, West Bengal (26°79'573"N, 88°85'523"E) collected on 10.viii.2015; A 12001 from Madarihat, Jaldapara National Park, Jalpaiguri district, West Bengal (26°65'962"N, 89°31'508"E) collected on 19.viii.2015; A 12002 from Sisamara, Jaldapara National Park, Jalpaiguri district, West Bengal (26°58'581"N, 89°27'781"E) collected on 20.viii.2015; A 12003 from Kodalbasti forest, Jalpaiguri district, West Bengal (26°38'023"N, 89°21'927"E) collected on 16.viii.2015; A 12461 from Mendabari, Chilapata forest, Jalpaiguri district, West Bengal (26°36'687"N, 89°23'996"E) collected on 11.viii.2015 and A 12462 from Mahananda Wildlife Sanctuary, Jalpaiguri district, West Bengal (26°34'632"N, 89°24'276"E) collected on 12.viii.2015. The measurements of the frogs collected are given below in millimeters:

Size: Snout-vent length: 35-55 mm (male), 50-75 mm (female).

Distinguishing features: Medium to large-sized, slim, narrow-waisted tree frogs with slender elongated limbs and goggling eyes. Snout is somewhat pointed and projects a little beyond the mouth. The ear-drum is distinct and almost as large as the eye. Fingers are with rudimentary webbing. Toes

are almost half-webbed with two segments of the fourth toe free. Tips of fingers and toes are dilated into flattened spherical adhesive discs. Skin on the back is smooth but granular on the belly and underside of the thighs. The single vocal sac is clearly visible when the males call.

Colour: The overall colour is dark brown to grayish-yellow with a distinct chocolate-brown band extending from the tip of the nostril on both sides of the head, passing through the eyes, up to the middle of the belly. There are 4-6 longitudinal lines on the dorsum. The ventrum is white. The limbs are cross-barred.

Habitat: On trees, bushes and shrubs and in the breeding season sometimes on the ground beside ponds, ditches etc.

Remarks: A very common tree-frog in the duars area seen on trees and bushes about 1-4 meters above the ground. Lays eggs in pendulous foam-nests over hanging water in which the tadpoles fall and develop.

20. *Chiromantis simus* (Annandale, 1915)

1915. *Chirixalus simus* Annandale, *Rec Indian Mus.*, **11**: 345.

Common Name: Annandale's Tree Frog (English).

Specimens examined: 4 ex: A 11953-A 11954 from Mendabari, Chilapata forest, Jalpaiguri district, West Bengal (26°36'687"N, 89°23'996"E) collected on 09.vi.2014; A 12463 from Kodalbasti forest, Jalpaiguri district, West Bengal (26°38'023"N, 89°21'927"E) collected on 14.viii.2015 and A 12464 from CC Line Beat, Chilapata forest, Jalpaiguri district, West Bengal (26°36'847"N, 89°21'086"E) collected on 15.viii.2015. The measurements of the frogs collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11953	24.93	7.11	7.16	3.21	2.13	3.43	3.11	1.64	12.27
A11954	24.07	6.43	7.49	2.84	1.93	2.32	2.89	1.69	11.99
A12463	23.12	6.54	7.24	3.38	2.34	3.44	3.34	1.41	12.37
A12464	27.42	6.96	8.24	3.93	2.68	4.14	3.72	1.82	13.82

Size: Snout-vent length 20-24 mm (males) and 27-30 mm (females).

Distinguishing features: Head is broader than long and the snout-length is almost equal to the diameter of the

eye. Nostrils are nearer to the tip of the snout than to the eye. Pupil is horizontal. The inter-orbital space is flat and broader than the upper eyelid. The inter-orbital length is almost equal to the eye diameter. The ear-drum is about half the eye diameter. The limbs are long and slender. The first and the second fingers are opposable to the third and fourth. The fingers are with a rudiment of webbing. The sub-articular tubercles of the fingers and toes are well-developed. The discs of the fingers are smaller than the ear-drum. The toes are almost fully webbed. The discs of the toes are smaller than those of the fingers. The skin is smooth on the dorsum but granular on the abdomen and under the thighs. A supra-tympanic fold extends from the eye to the shoulder.

Colour: Dorsum brownish to pale buff with several indistinct longitudinal dark lines and some scattered black spots. Limbs pale brownish. Ventral side white.

Habitat: Found in evergreen and moist deciduous forests near grasslands and small water bodies. Arboreal keeping to lower branches of trees. Call is ventriloquistic and can be heard from a long distance.

Remarks: A very common little tree-frog in the duars area seen on low trees and bushes about 1-3 meters above the ground. Lays eggs in small pendulous foam-nests over hanging small pools of water in which the tadpoles fall and develop. Earlier reported from West Bengal (Deuti et al., 2000).

21. *Raorchestes annandalii* (Boulenger, 1906)

1906. *Ixalus annandalii* Boulenger, *J. Asiat. Soc. Bengal.*, Ser. 2, 2: 385.

Common Name: Darjeeling Bush Frog (English).

Specimens examined: 4 ex: A 11931-A 11934 from Buxa Fort, Buxa Tiger Reserve, Alipurduar district, West Bengal (26°45'323"N, 89°34'868"E) collected on 29-30.v.2014. The measurements of the frogs collected are given below in millimeters:

Reg No	Snout-vent length	Head length	Head width	Snout length	Inter-narial length	Eye diameter	Inter-orbital length	Tympanum diameter	Tibial length
A11931	21.42	5.55	6.93	3.06	2.26	3.21	2.53	1.39	10.38
A11932	20.84	5.32	6.81	3.03	2.19	3.12	2.42	1.34	9.66
A11933	19.74	5.37	6.67	3.01	2.22	2.86	2.46	1.26	9.02
A11934	20.22	5.29	6.74	3.04	2.16	3.05	2.64	1.31	9.24

Size: 16-23 mm (snout-vent length).

Diagnostic features: This is the smallest frog in the hills of the duars area of northern West Bengal. It is arboreal with digital pads on both fingers and toes and a slender body. Snout is pointed and distinctly projecting over the lower jaw. Eyes are large but the inter-orbital space is slightly broader than the upper eyelid. Ear-drum is very small but distinct. Males have a large, thin-walled sub-gular vocal sac which is equal to the body size when fully inflated. Fingers free of web. The tips of the fingers have truncated small pads. Toes have small truncated adhesive pads with a small amount of webbing. Skin on the upper and lower sides of the body is smooth but the sides of the body between the fore and hind limbs as well as on the belly and under the thighs are granular. A strong glandular skin fold runs from behind the eye to the shoulder.

Colour: Dorsum is greyish-brown with a light bar between the eyes and a light broken stripe from the posterior corner of the eye to the groin. Limbs have darker stripes. Ventrums are yellowish-white with some brown speckles, dots and marblings. During the breeding season the underside of the thighs of males become intensely red.

Habitat: Bushes and shrubs growing on the hill-sides from about 500 meters to higher elevations. Rarely descends to the ground.

Remarks: Smallest but common frog found in the lower hilly areas of the duars area of northern West Bengal. Reported earlier from West Bengal (Sarkar, Biswas and Ray, 1992).

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Conclusion

The amphibian fauna of the duars area of northern West Bengal was found to be quite rich with at least 21 species belonging to 15 genera under 5 families of Anurans (2 species of Bufonidae, 5 species of Microhylidae, 7 species of Dicroglossidae, 4 species of Ranidae and 3 species of Rhacophoridae).

The significant contribution of this study is that 2 species were recorded for the first time from the State of West Bengal. These included the Bright Frog (*Humerana humeralis*) and the Point-nosed Frog (*Clinotarsus alticola*) both belonging to the Family Ranidae. This proves that the wildlife and flora rich duars area of northern West Bengal which is contiguous with the terai belt of northern India still has the potential to reveal more unreported amphibian and reptilian species as well as new species to Science as witnessed recently in 2009 with the discovery of *Fejervarya chilapata* from that region.

Acknowledgements

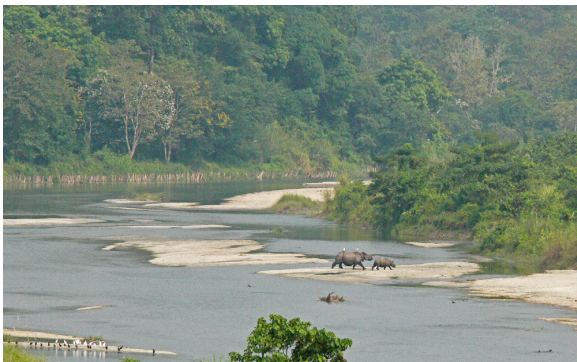
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PLATE 1



01. Bhandari river at Chilapata Reserve Forest.



02. Murthi river at Gorumara.



03. Bania river at Chilapata.



04. Chukchuki Lake at Gorumara.



05. Wetland inside Chilapata forest.



06. Forest of Chilapata.



07. Common Toad (*Duttaphrynus melanostictus*).



08. Marbled Toad (*Duttaphrynus stomaticus*).



09. Ornate narrow-mouthed Frog (*Microhyla ornata*)



10. Assam Painted Frog (*Kaloula assamensis*)



11. Orang Sticky Frog (*Kalophrynus interlineatus*)



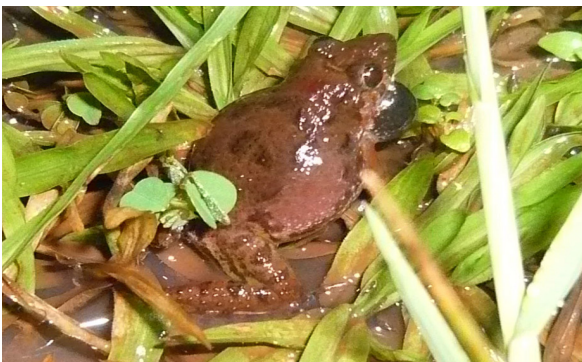
12. Balloon Frogs (*Uperodon globulosus*) mating.



13. Indian Painted Frog (*Uperodon taprobanicus*).



14. Jerdon's Bull Frog (*Hoplobatrachus crassus*).



15. Syhadra Cricket Frog (*Fejervarya syhadrensis*).



16. Terai Cricket Frog (*Fejervarya teraiensis*).



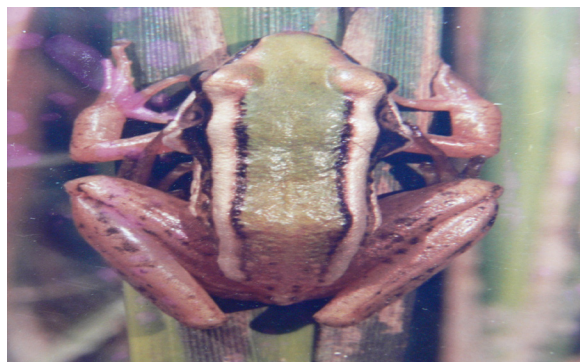
17. Nepal Cricket Frog (*Fejervarya nepalensis*).



18. Chilapata rain-pool Frog (*Fejervarya chilapata*).



19. Long-tongued Frog (*Hydrophyllax leptoglossa*).



20. Reed Frog (*Hylarana tytleri*).



21. Bright Frog (*Humerana humeralis*) - a new record to West Bengal.



22. Point-nosed Frog (*Clinotarsus alticola*) - a new record to West Bengal.



23. Terai Tree Frogs (*Polypedates teraiensis*) making foam-nest.



24. Annandale's Tree Frog (*Chiromantis simus*) mating.