

Assessment of Herpetofauna : Diversity,
Distribution, Ecological Requirements
and Responses to Human Activities
in GHNP and WLSs

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HISTORICAL BACKGROUND

The herpetofauna (amphibians and reptiles) of India is represented by 690 species (215 species of amphibians and 475 species of reptiles). The amphibian fauna is represented by all the living orders (salamanders, caecilians and frogs and toads). Similarly, the reptilian fauna includes 31 species of turtles, 186 species of lizards, three crocodylians and 255 species of snakes (Dutta: unpublished data). The maximum faunal diversity has been reported from Western Ghat ranges and the northeastern India. So far as the high altitude herpetofauna is concerned, few publications list the species, specifically from the eastern and western himalayan region (Verma and Sahi, 1995; Tilak and Mehta, 1977; Gruber, 1981; Tilak and Roy, 1985; Tilak and Mehta, 1983; Acharji and Kripalini 1951; Boulenger, et al., 1907). Waltner (1991) for the first time listed the species found in the himalayan region and also provided their altitudinal ranges.

Due to cold climate, inaccessible habitat and lack of expertise, the herpetofauna of Himalayan region is poorly studied. Except, faunal list of low elevation areas of Jammu and Kashmir and some parts of Himachal Pradesh, it has not been possible to study other biological aspects of herpetofauna. For the first time, the present study provides a preliminary list of species observed at the GHNP and other eco-development areas. Due to short duration of study, it has not been possible to record all the species from GHNP. Hence, a compiled list of species which are supposed to occur in the GHNP has been included in the present report. In addition, all the species known to occur in the Western Himalayan region has also been listed in the report. Photographs of some of the species obtained during the study period provides a visual clue to future identification of species.

AIMS AND OBJECTIVES

- Review existing publications, if any, pertaining to the topic .
- Determine species composition of amphibian and reptile communities in different ecosystems as indicators of biodiversity in GHNP and WLSs.
- Suggest strategy/ techniques to determine abundance of species.
- Recommendations.

HERPETOFAUNAL COMPOSITION OF GHNP AND ECO-DEVELOPMENT AREAS

AMPHIBIANS

FAMILY: BUFONIDAE

GENUS: *BUFO* LAURENTI, 1868

BUFO HIMALAYANUS GUNTHER, 1864 (Figs. 1 & 2)

(Himalayan toad)

Bufo melanostictus var. *himalayanus* Gunther 1864, Reptiles of British India, pp. 422.

Bufo himalayanus Boulenger, 1882, Fauna of British India, pp. 505.

Characters

Largest *Bufo* of India. Occipital region deeply concave, with supra-orbital ridges; snout short, blunt; interorbital space broader than the upper eyelid; tympanum small and indistinct. First finger shorter than second; toes half to two-third webbed, with single subarticular tubercles; inner and outer metatarsal tubercles present; without tarsal fold. The arthro-metatarsal articulation reaches the anterior border of the eye or the tip of the snout. Dorsum with irregular, distinctly porous warts; parotid glands prominent, large, elongated. Live colouration brown. Males without vocal sacs.

Distribution: India- Sikkim, Meghalaya, Arunachal Pradesh, West Bengal, Uttar Pradesh, Jammu and Kashmir and Himachal Pradesh. Outside: Nepal.

Remark: This is the most common species of amphibians of GHNP and is commonly available in the eco-development areas. The species possesses defensive behaviour and when handled, they secrete a corrosive fluid both from the parotids and warts on the dorsum. It is suspected that, the species is exposed to residual effects of pesticides and fertilizers used in the apple orchards which is one of the major habitats of the species. In addition, the breeding grounds of the species should be protected from contamination.

BUFO STOMATICUS LUTKEN, 1862 (Fig. 3)**(Marbled toad)**

Bufo stomaticus Lutken, 1862, 305.

Characters :

Without bony ridges on head; snout short, blunt; interorbital space flat, broader than the upper eyelid; tympanum distinct, round, two thirds the diameter of the eye. First finger equals the second or slightly larger; toes two-third or half webbed, with single subarticular tubercles; inner and outer metatarsal tubercles present; with a tarsal fold. The tarso-metatarsal articulation reaches between the shoulder and the eye. Dorsum with irregular flat warts; parotid glands large, elliptical and flat. Live colouration brownish or olive-grey above, with black spots or marbled with dark; venter white or with brown patches. Males with a subgular vocal sac.

Distribution: India- Assam, West Bengal, Orissa, Bihar, Maharashtra, Karnataka, Kerala, Tamil Nadu, Punjab, Haryana, Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh and Western and Eastern Himalayas up to an altitude of 6000ft. Outside: Sri Lanka (introduced). The species extends from eastern Iran and southern Afghanistan to Sind (Pakistan), Nepal, the southern corner of the Arabian Peninsula. Sclater's record from Myanmar apparently was based on a misidentification.

Remark: The species lives in sympatry with *B. himalayanus*. Hence, like the later, both the habitat and breeding grounds should be protected.

GENUS: AMOLOPS COPE, 1865**AMOLOPS FORMOSUS (GUNTHER, 1875) (Fig. 4-6)****(Beautiful stream frog)**

Polypedates formosus Gunther, 1875, Proc. Zool. Soc. London, pp. 573, pl. 64, fig. B.

Amolops formosus Dutta, 1997, 1997 Amphibians of India and Sri Lanka (Checklist and Bioliography), pp. 112-113.

Characters:

Head as long as broad or slightly broader than long, depressed; snout round, projecting beyond mouth; canthus rostralis obtuse; loreal region oblique, concave; nostril equidistant from the eye and from the tip of the snout or a little greater than the width of the interorbital space; tympanum distinct, diameter less than the diameter of the eye. Fingers long, with large discs, broader than long, with circum-



marginal groove; first finger smaller than the second, tips swollen; subarticular tubercles prominent. Hind limb long, the tibio-tarsal articulation reaching the nostril or the tip of the snout, the heels overlapping when folded at right angles to the body; tibia shorter than the forelimbs, as long as or slightly longer than the foot. Toes with large discs, smaller than discs on fingers; fully webbed; outer metatarsals separated to the base; subarticular tubercles distinct; without tarsal fold; inner metatarsal tubercle oval, flat; no outer metatarsal tubercle.

Dorsal skin smooth; with supra-tympanic fold; venter granular. Live colouration bright green, with irregular black patches on head and dorsum; limbs with black bars; hinder side of thigh marbled with black. Venter brown or marbled brown and whitish. Males with internal vocal sacs; with strong nuptial pad on inner side of first finger.

Distribution: India- Western and Eastern Himalayas; West Bengal; Himachal Pradesh; Uttar Pradesh; Meghalaya Assam and Sikkim. Outside- Nepal.

Remark: Due to secretive behaviour, the species is not easily available in GHNP. However, one specimen has been collected from near a hill stream at Kharoncha (Tirthan Valley). The species breeds in the hill streams and tadpoles have been collected during July. They possess a large sucker which is used in attaching to rocks in the fast flowing streams.

GENUS: *RANA* LINNAEUS, 1758

RANA VICINA STOLICZKA, 1872 (Fig. 7-12)

(Stoliczka's frog)

Rana vicina Stoliczka, 1875, Proc. Asiatic Soc. Bengal, pp. 130.

Characters:

Head broader than long, depressed; snout rounded, slightly projecting beyond the mouth; canthus rostralis obtuse; loreal region oblique; nostril nearer to eye than snout; inter-narial distance greater than inter-orbital distance; tympanum indistinct.

Fingers obtuse, first equals to second; subarticular tubercles distinct. Hind limb long, tibio-tarsal articulation reaching tip of snout; heels overlapping when the limbs are folded at right angles to the body; tibia longer than foot. Toes with swollen tips, entirely webbed; subarticular tubercles well developed; inner metatarsal tubercle narrow, no outer metatarsal tubercle.

Dorsal skin smooth, with tubercles on flanks; a transverse fold across head behind eye; with a supra-tympanic fold.

Live colouration brick red, olive or light brown, with whitish dorsal tubercles; black patch from tip of snout to eye; lips black; hind limbs with dark bands; venter yellowish-white or pinkish-white. Males without secondary sexual characters.

Distribution: India- Jammu and Kashmir, Himachal Pradesh and Uttar Pradesh. Outside: Pakistan.

Remark: This species bears resemblance to *Nanorana pleskei*. The species has been recorded from Sai Ropa and Rolla (Tirthan Valley) and Shangarh. The species is aquatic in nature and is quite active during night times. The species breeds during June and July when the tadpoles are found in the streams.

REPTILES

LIZARDS:

FAMILY: AGAMIDAE GRAY, 1825

GENUS: LAUDAKIA GRAY, 1845

LAUDAKIA TUBERCULATA (HARDWICKE & GRAY, 1827) (Fig. 13)

(Kashmir rock agama)

Characters:

Head is depressed, elongated, tympanum is large and distinct. Dorsal colour is dark-olive brown with numerous dark-brown spots on either side of a lighter vertebral line. In adults the spots are replaced by a dark-brown and yellowish colouration; upper side of head is light brown; throat and chest are brownish, profusely spotted with dark blue; belly is whitish. Males during the breeding season acquire beautiful and brilliant shades of bright yellow, orange bluish-black, purple and black on shoulders, breast, flanks, underparts and throat. Upper head scales unequal, convex, smooth or may be keeled; nostril is situated below the canthus rostralis, pointing outwards; 10-12 upper labials; median dorsal scales are almost equal, rounded, hexagonal, imbricate, keeled, 10-15 across the middle of back; scales on the flanks quite smaller, with a few scattered, separated, enlarged keeled scales; ventral scales smooth, equal in size to the large dorsal scale; gular scales are much smaller than the ventral scales; gular sac is not formed; skin of the neck region is much loose. Limbs moderately strong, toes longer, compressed fifth toe extending beyond the first toe, the hind-limb reaches to the ear or the eye. Tail depressed, longer than the head and body, annulated, oval in the transverse section, the upper portion is with strongly keeled, almost equal scales, more than 40 round the thickest portion. Male with 6 or 7 rows of collapse



preanal scales; an elongated patch of enlarged scales on the middle of belly. Standard length 140 mm; tail length 250 mm.

Distribution: India - Western Himalayas (Kashmir, Northern Punjab, Himachal Pradesh and northern Uttar Pradesh). Outside: Afghanistan, Pakistan and Nepal.

Habits and habitat: The species is terrestrial, inhabiting the holes, crevices and such other rocky structures. In most of the localities of the range these agamas can be seen basking on rocks, more commonly between the altitudes of 300-700 meters; during the early hours of the day. The species is omnivorous and its food mainly comprises the insects like ants, small orthopterans, lepidopterns and other insects; it also has a liking towards the vegetable food like tender leaves, flowers and seeds of wild plants. Breeding season is from May to August. It lays 7-20 eggs in a single clutch.

Status: Not endangered.

FAMILY: SCINCIDAE

GENUS: SCINCELLA MITTLEMAN, 1950

SCINCELLA HIMALAYANUS (GUNTHER, 1864) (Figs. 14-16)

(Himalayan ground skink)

Characters:

This is a small skink with an iridescent bronze dorsum, with indistinct lighter and darker markings; many individuals are with a dark-brown vertebral stripe; lateral stripe is of brass colour and is having irregular margin; there is a broad, dark-brown stripe emerging from snout and reaching up to the proximal part of tail through eye and upperside of the forelimbs; this lower broad stripe is bordered below by a narrow, irregular, white stripe edged with black; distal body protein is bronzy, with numerous light and dark-brown spots; top of the head and upperside of the limbs are bronzy, with dark dots all over; belly is bluish-white. The lower eyelids are with semitransparent disc; devoid of supranasals; four supraoculars; supraciliaries 6-8; six to seven labials; frontonasal and rostral wider than long; snout is bluntly pointed; ear-opening is oval, smaller than eye; frontoparietals paired; prefrontals are generally separated from each other; body scales are smooth, in 24-30 rows at middle of the body, the four median series of dorsal scales are nearly two times larger than the lateral scales; a pair of very large preanal scale is present; tail is 1½ times longer than the head and body; limbs are short, digits long, sub cylindrical, 14-

20 smooth or obtusely keeled lamellae beneath the fourth toe. Standard length 65 mm; tail length 93 mm.

Distribution: India - Kashmir, Himachal Pradesh (Simla), Uttar Pradesh (Garhwal, Allahabad, Mussooree, Nainital). Outside- Pakistan, Nepal and southern Turkistan.

Habits and habitat : The species prefers damp areas or open grass lands between 400 to 1200 meters, also available in lake sides, banks of rivers and gardens. The species is insectivorous and viviparous (produces 3 or 4 young at a time).

Status: Very common in certain areas of its range.

FAMILY: GEKKONIDAE GRAY, 1825

GENUS: CYRTODACTYLUS GRAY, 1827

CYRTODACTYLUS STOLICZKAI (STEINDACHNER, 1869)

(Karakoram bent-toed gecko; Kashmir Rock gecko)

Gymnodactylus stoliczkai, 1869, Steindachner, Reise Novara. Rept., pp. 15, pl. 2, fig. 2.

Characters:

Small and grey coloured nocturnal gecko, with a series of dark brown white edged cross bars on the back. Flanks, head, tail and limbs speckled with black; labials with alternate black and white bars and belly dirty white or pale yellow. Large head, snout depressed, with small rounded tubercles. Eyes large with vertically elliptical pupil. Upper labials 9-11, lower labials 8-9, postmentals 2. Body depressed, dorso-ventrally flattened, with indistinct lateral fold. Body and limbs covered above with small, rounded subimbricate or juxtaposed scales intermixed with numerous large rounded, feebly keeled tubercles. Belly with 30-39 rows of small, rounded, subimbricate scales. Hind limbs reach to axilla; digits short and thick; subdigital lamellae well developed. Tail shorter than head and body, depressed, swollen at the base, tapers to a point, covered with small flat scales. Males without preanal or femoral pores.

Distribution: India- Ladakh and Kashmir and Himachal Pradesh. Outside-Pakistan.

Remark: The species is quite agile and prefers to live under stones, crevices and rocks. Occasionally, they enter into houses and are nocturnal in nature.

SNAKES:**FAMILY: COLUBRIDAE COPE, 1893****GENUS: AMPHIESMA*****AMPHIESMA PLATYCEPS* (BLYTH, 1854) (Fig. 17)****(Eastern keelback)***Tropidonotus platyceps* Blyth, 1854, J. Asiatic Soc. Bengal 23: 297.**Characters:**

Maxillary teeth 19 to 21, last two enlarged; nostril lateral; 1 pre-ocular; 8 supralabials, 3rd, 4th and 5th touching the eye. Body slended; scales in 19 rows, distinctly keeled. Hemipenis extending to the 8th caudal plate, not forked. Colouration variable. Olive brown above, with small black spots; sometimes with a dorso-lateral series of white spots; frequently two white black-edged parallel lines, or an elliptical mark on the nape, or a white black-edged streak on each side of the head, or a black line near eye; lips white or yellow, belly yellowish, with or without blackish dots, bordered with bright red in life; frequently a black line or a series of elongated black spots along each side of belly; lower surface of tail mottled with black; throat sometimes black.

Distribution: Western and Eastern Himalayas.

Remark: The species has been recorded from the hill streams and on several occasions they have been observed at night in the pine forests near streams. The snake is docile in nature and sometimes confused with *Xenochrophis piscator*.

GENUS: PTYAS FITZINGER, 1843***PTYAS MUCOSUS* (LINNAEUS, 1758)****(Indian rat snake)***Coluber mucosus* Linnaeus, 1758, Mus. Ad. Frid, pp. 37, pl. 23.*Ptyas mucosus* Gunther, 1864, Reptiles of British India, pp. 249.**Characters:**

Maxillary teeth 20 to 25. Scales in 17, 18 or 19: 17 or 16:14 rows, smooth or the median rows more or less distinctly keeled. The vertebrals may or may not be slightly enlarged. Hemipenis extending to 10th-12th caudal plate, not forked, the folds at the tip being much finer than those proximally, the spines being thick and fleshy and terminating in a spicule.

Live colouration olive green to brown, yellowish or greyish above, with irregular and strongly marked black cross-bars on the posterior half of body; yellowish-white below, the posterior ventrals and subcaudals edged with black; lips and throat white, the scales edged with black.

Distribution: Throughout India. Outside- Sri Lanka, Pakistan, Afghanistan, Nepal, Bangladesh, Myanmar and southern China.

Remark: This is one of the common species of on-poisonous snakes found in the Eco-development areas of GHNP. The major food item being small mammals, toads and birds.

FAMILY: VIPERIDAE BONAPARTE, 1840

GENUS: AGKISTRODON BEAUVOIS, 1799

AGKISTRODON HIMALAYANUS (GUNTHER, 1864) (Fig. 18)

(Himalayan pit viper)

Halys himalayanus Gunther, 1864, Reptiles of British India, pp. 393, pl. xxiv, fig. A.

Characters:

Snout not pointed, not turned up at the end; internasals broader than long, smaller than the prefrontals, nasal more or less divided into an anterior and a posterior part; canthal shield reaching the upper surface of head; three large inferior temporals, the scales above small; 5-7 supralabials, the first and second sometimes united with one another, the last two united with the temporals. Scales strongly keeled in 21:21:17 rows.

Hemipenis extending to 6th-10th caudal plate forked opposite third-sixth; the extreme tip is calyculate, the remainder spinose, the spines being small at the distal end, very large and few in number at the bifurcation; some of them extend beyond the fork.

Live colouration brown, with dark brown or black spots or wavy cross-bars, sometimes indistinct; the interspaces between the cross bars sometimes whitish; a dark temporal stripe from eye to angle of mouth, sometimes extending to the neck; upper lip light brown with dark spots; brown below, uniform or speckled with black and white.

Distribution: India- Western Himalayas.

Remark: This is the most common poisonous snake of the Himalayan region and is quite docile in



nature. When handled, they do not attempt to bite. The snake is viviparous and five to seven young are produced at a time. During winter, the snake hibernates.

RECOMMENDATIONS

1. Detailed herpetofaunal assessment of both Eco-development areas and GHNP is necessary.
2. The present project should not be an end in itself. As mentioned by Negi (1996: Consultancy report # 2), after the end of the project, specific fresh projects (on faunal assessment/ assemblage) should be executed by competent organizations/ individuals, in association with the authority of GHNP.
3. Forest officials/ personels should be trained through Workshops (conducted by GHNP authority, using expertise from outside) to know about their herpetofauna. The Workshops should stress on survey, collection and preservation techniques for assessment of fauna. The Park authority is advised to consult with either ZSI or individual experts to train their research personnels regarding handling of amphibians and reptiles.
4. The Park administration can appoint permanent Research Officers/ Field biologists, having wildlife background. These scientists will accumulate data on fauna and flora of GHNP and such data will help long term conservation programme.
5. Year long monitoring (during various seasons) for atleast 5 years is needed to assess the species composition and diversity in all the three valleys and eco-development areas.
6. Specific Workshops should be conducted in eco-development areas to create awareness among people regarding conservation of herpetofauna.
7. Pesticides and fertilizers used in the orchards should be screened properly and their residual effect on microfauna should be assessed, because amphibians being the major predators of insects, are susceptible to the residual effects of pesticides which might be available with the soil fauna and insects.
8. A Biodiversity Museum of GHNP may be set up at the Interpretation Centre located at Sai Ropa and most of the important fauna and flora may be maintained there for reference by future researchers.
9. Blind mythological beliefs of residents about snakes, lizards and frogs is one of the reasons about their ignorance of these animals. Hence, brochures and stickers on herpetofauna may be made and distributed among the residents to create awareness.

INDIAN AMPHIBIANS AND REPTILES : DISTRIBUTION IN WESTERN HIMALAYAN REGION (above 2000 mts)

AMPHIBIANS

FAMILY: PELOBATIDAE

GENUS: *SCUTIGER*

Scutiger occidentalis

Distribution: Kashmir Himalayas (2680-2750 mts).

FAMILY: BUFONIDAE

GENUS: *BUFO*

Bufo himalayanus

Distribution: Whole over Western Hilmayas.

Bufo latastii

Distribution: Kashmir Himalayas (2680-3500 mts) and Himachal Pradesh (Reckong Peo).

Bufo stomaticus

Distribution: Throughout Western Himalayas.

Bufo viridis

Distribution: Kashmir Himalayas and Himachal Pradesh.

FAMILY: RANIDAE

GENUS: *AMOLOPS*

Amolops formosus

Distribution: Western Himalayas and GHNP.

GENUS: *RANA*

Rana vicina

Distribution: Western Himalayas and GHNP.

REPTILES

LIZARDS

FAMILY: GEKKONIDAE

GENUS: *CYRTODACTYLUS*



Cyrtodactylus lawdarnus

Distribution: Kashmir Himalayas (2680-3520 mts)

Cyrtodactylus stoliczkai

Distribution: Kashmir Himalayas (2680-3520 mts).

Cyrtodactylus montium salsorum

Distribution: Kashmir Himalayas(3520 mts)

FAMILY: AGAMIDAE

GENUS: LAUDAKIA

Laudakia tuberculata

Distribution: Kashmir Himalayas and GHNP.

Laudakia himalayana

Distribution: Kashmir Himalayas (2720-3520 mts).

GENUS: PHRYNOCEPHALUS

Phrynocephalus reticulatus

Distribution: Kashmir Himalayas (3520 mts).

Phrynocephalus theobaldi

Distribution: Kashmir Himalayas (2680-3520 mts).

FAMILY:SCINCIDAE

GENUS: SCINCELLA

Scincella himalanum

Distribution: Kashmir Himalayas (1650-3520 mts), GHNP.

Scincella ladacense

Distribution: Kashmir Himalayas (2700 mts).

SNAKES

FAMILY: COLUBRIDAE

GENUS: COLUBER



Coluber rhodorachis

Distribution: Kashmir Himalayas (610-3520 mts).

GENUS: *ELAPHE*

Elaphe hodgsonii

Distribution: Kashmir Himalayas (1010-2720 mts).

GENUS: *PTYAS*

Ptyas mucosus

Distribution: Kashmir Himalayas (245-2680 mts), GHNP.

GENUS: *AMPHIESMA*

Amphiesma platyceps

Distribution: Kashmir Himalayas and GHNP.

FAMILY: VIPERIDAE

GENUS: *AGKISTRODON*

Agkistrodon himalayanus

Distribution: Kashmir Himalayas.



PROBABLE SPECIES SUSPECTED TO OCCUR IN GHNP AND ADJOINING LOCALITIES OF ECO-DEVELOPMENT AREAS

AMPHIBIANS

PELOBATIDAE

GENUS: *SCUTIGER*

Scutigera occidentalis

BUFONIDAE

GENUS: *BUFO*

Bufo viridis

Bufo latastii

LIZARDS

FAMILY: GEKKONIDAE

GENUS: *CYRTODACTYLUS*

Cyrtodactylus lawdarnus

FAMILY: AGAMIDAE

GENUS: *LAUDAKIA*

Laudakia himalayanus

GENUS: *SCINCELLA*

Scincella ladicense

SNAKES

COLUBRIDAE

GENUS: *COLUBER*

Coluber rhodorachis (non-poisonous)

GENUS: *ELAPHE*

Elaphe hodgsoni (non-poisonous)



GENUS: *BOIGA*

Boiga multifasciata (non-poisonous)

GENUS: *LIO PELTIS*

Liopeltis rappi (non-poisonous)

GENUS: *AMPHIESMA*

Amphiesma stolata (non-poisonous)

GENUS: *LYCODON*

Lycodon striatus (non-poisonous)

REFERENCES

- Acharji, M. N. and M. B. Kripalini 1951. On a collection of reptilia and batrachia from the Kangra and Kulu Valleys, Western Himalayas. Rec. Indian Mus. 49: 182-184.
- Annandale, N. 1917. The occurrence of *Rana pleskii* Gunther in Kashmir. Rec. Indian Mus. 13: 417-418.
- Boulenger, G. A., N. Annandale, F. Wall and C. T. 1907. Reports on a collection of batrachia, reptiles and fish from Nepal and the western Himalayas. Rec. Indian Mus. 1: 149-157.
- Chabanaud, P. 1914. Reptiles et Batraciens. In: Mission dans les provinces centrales de l'Inde et dans la region occidentale de l'Himalayas, pp. 1-13.
- Gruber, U. 1981. Notes on the herpetofauna of Kashmir and Ladakh. British J. Herpetol. 6: 145-150.
- Kastle, W., H. H. Schleich and K. B. Shah 1993. Contributions to the biology of *Japalura tricarinata* and *J. polygonata* (Sauria: Agamidae). J. Bombay nat. Hist. Soc. 90: 223-262.
- Sahi, D. N. and P. L. Duda (?). Eco-geographical distribution and present status of herpetiles in Kashmir Himalayas. In: Advances in fish and wildlife ecology and biology, pp. 289-297.
- Tilak, R. and H. S. Mehta 1977. Report on a collection of amphibians from district Kangra, Himachal Pradesh. Newsl. Zool. Surv. India 3(4):196-198.
- Tilak, R. and H. S. Mehta 1983. On a collection of amphibians of the Sirmour district (Himachal Pradesh). Res. Bull. (Sci.) of the Punjab Univ. 34: 157-166.
- Tilak, R. and P. Roy. 1985. Description of a new species of the sub-genus *Rana (Paa)* Dubois from Chakrata Hills, district Dehra Dun, Uttar Pradesh, India (Ranidae: Anura). Zool. Anz. 215(3/4): 231-239.
- Tilak, R., A. K. Sarkar and H. S. Mehta 1977. On the occurrence of *Bufo viridis* Laurenti in Kinnaur district (H. P.) (Bufonidae: Anura). Newsl. Zool. Surv. India 3(1):29-30.
- Verma, A. K. and D. N. Sahi 1995. The amphibian fauna of Jammu and Kashmir state, India. Cobra 20: 2-6.
- Waltner, R. C. 1991. Altitudinal ecology of *Agama tuberculata* Gray in the Western Himalayas. Misc. Publ., Mus. Nat. Hist., Univ. of Kansas 83: 1-74.



Fig. 1 *Bufo himalayanus* (adult, with grey colour)



Fig. 2 *Bufo himalayanus* (juvenile, with brown colour and dark pathces)



Fig. 3 *Bufo stomaticus* (adult)



Fig. 4 Dorsal aspect of *Amolops formosus*



Fig. 5 Side view of *Amolops formosus*



Fig. 6 Ventral aspect of *Amolops formosus* tadpole, showing sucker and mouth with beak and teeth rows.



Fig. 7 *Rana vicina* (adult male)



Fig. 8 *Rana vicina* (ventral aspect)



Fig. 9 Dorsal aspect of *Rana vicina* (without limbs)

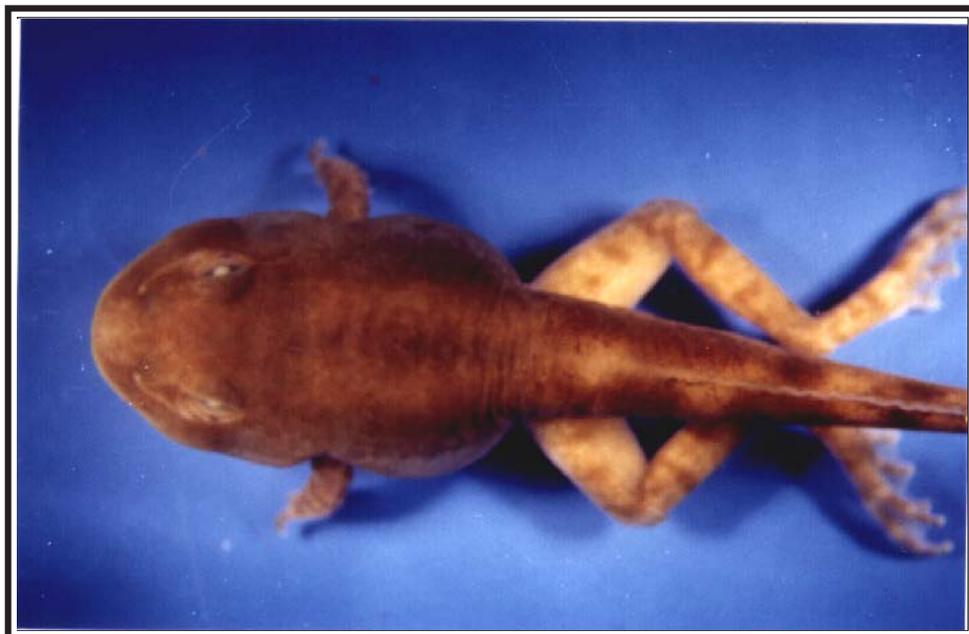


Fig. 10 Dorsal aspect of *Rana vicina* (with both limb)

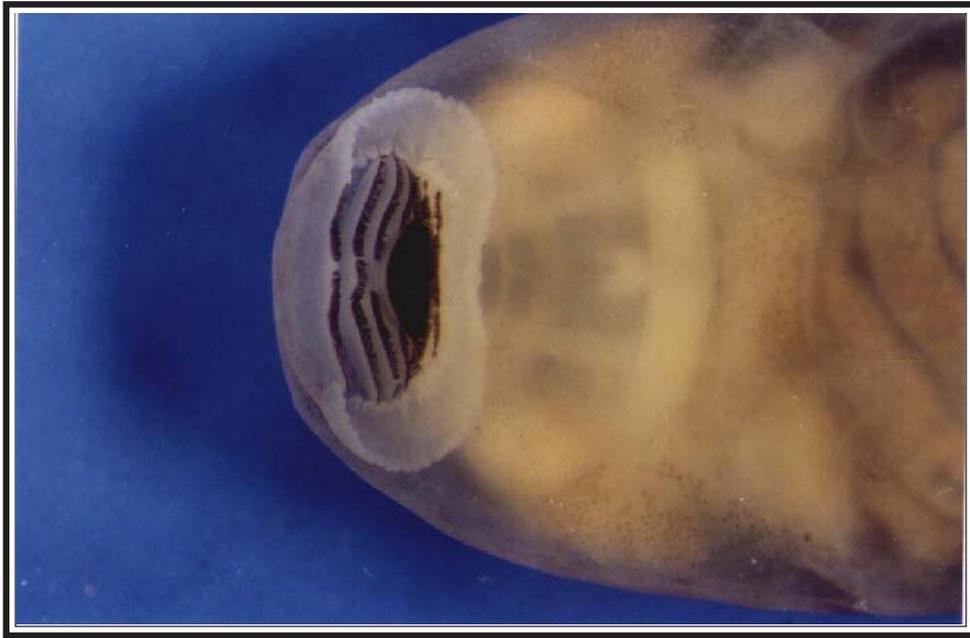


Fig. 11 Ventral aspect of *Rana vicina* tadpole, showing mouth with lips and beak



Fig. 12 Side view of tail of *Rana vicina* tadpole, showing round tail tip



Fig. 13 *Laudakia tuberculata*



Fig. 14 *Scincella himalayanus* (adult male, with interrupted dorsal stripes)



Fig. 15 *Scincella himalayanus* (gravid female, with dorsal longitudinal stripes)



Fig. 16 *Scincella himalayanus* (juvenile)



Fig. 17 *Amphiesma platyceps*



Fig. 18 *Agkistrodon himalayanus*