

## *Limnonectes kirtisinghei*, a new species of ranid frog from Sri Lanka

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### Abstract

A new species of ranid frog, *Limnonectes kirtisinghei*, hitherto confused with and referred to *L. greenii* (in part), is described from Sri Lanka. *Limnonectes kirtisinghei* is distinguished from *L. limnocharis* (Gravenhorst, 1829) by the presence of uninterrupted dorsal ridges (vs. interrupted dorsal ridges) and from *L. murthi* (Pillai, 1979) by the absence of two patches bearing papillae on the breast. It is also distinguished from *L. greenii* (Boulenger, 1904), which it resembles closely, by the following characters: prominent cutaneous fringe along the inner side of first toe of adults and Gosner stage 40 tadpole absent (vs. present in *L. greenii*); and outer metatarsal tubercle distinct, rounded or oval (vs. minute or indistinct). *Limnonectes kirtisinghei* has a wide distribution throughout the wet zone (altitude approximately 150-1370 m) of western, southern, central (including the Knuckles Range) and eastern (including Moneragala) Sri Lanka (vs. 1710-2135 m in the central hills for *L. greenii*). In the interests of stability we designate as lectotype the syntype of *Rana greenii*, MCZ 15361.

### Introduction

*Limnonectes greenii* (Ranidae) sensu lato was considered to be (Dutta, 1985; Kirtisinghe, 1957) a relatively common frog widely distributed throughout the wet zone of Sri Lanka. In the course of a survey of the Sri Lankan amphibian fauna, we found that the frogs referred to this taxon actually comprise two species: *L. greenii* sensu stricto is restricted to the highest mountains of the central massif, ca. 1710 m altitude and above; the "*L. greenii*"-like frog found elsewhere in Sri Lanka is in fact an undescribed species, which we describe and name below.

### Material and methods

Nomenclature follows Dubois (1992). Altitudes are given in metres above mean sea level. Sex was determined by dissection and the presence of nuptial pads.

**Abbreviations.** ED, horizontal diameter of the orbit; EN, distance between anterior-most point of orbit and middle of nostril; ES, distance between anterior-most point of orbit and tip of snout; FEL, femur length, taken as distance between vent and knee; FL, finger length, taken as distance between posterior margin of most proximal subarticular tubercle and tip of finger; HIL, hind-

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limb length, the length of the outstretched hindlimb, from vent to tip of longest toe; HL, head length, taken as distance between angle of jaws and snout-tip; HW, head width (measured across angle of jaws); IO, interorbital width (least distance between the upper margins of orbits); LAL, lower arm length, taken from elbow to wrist; SVL, snout-vent length, measured from tip of snout to vent; TBL, tibia length, taken as distance between knee and heel with both tibia and tarsus flexed; TL, toe length, taken from posterior margin of proximal subarticular tubercle and tip of toe; TYH, horizontal diameter of tympanum; TYV, vertical diameter of tympanum; UAL, upper arm length, taken as distance between axilla and elbow; UE, upper eyelid width (greatest width of the upper eyelid); TOW, greatest width of tongue; TNL, tongue length (taken from posterior edge to anterior margin); NUP, nuptial pad; PAT, palmar tubercles; IMT, inner metatarsal tubercle; OMT, outer metatarsal tubercle.

The material referred to is deposited in the following institutions. Australian Museum (Sydney), AMS; Museum of Comparative Zoology (Harvard), MCZ; Natural History Museum (London), BMNH; National Museum of Sri Lanka (Colombo), NMSL; Zoological Reference Collection, National University of Singapore, ZRC; Wildlife Heritage Trust of Sri Lanka, WHT.

*Limnonectes kirtisinghei* n. sp.

Figure 1

**Holotype.** Male, 32.3 mm SVL, AMS R 148272; Sri Lanka: Moray Estate, Rajamally, near Mousakelle, alt. 1370 m (06°48'N, 80°31'E); coll. K. Manamendra-Arachchi and D. Gabadage, 16 March 1995.

**Paratypes.** Female, 40.8 mm SVL, AMS R 148276; Sri Lanka: Namunukula Group near Passara, alt. 1370 m (6°54'N, 81°07'E); coll. K. Manamendra-Arachchi and D. Gabadage, 17 October 1994. Female, 40.4 mm SVL, ZRC; Sri Lanka: Koskulana near Panapola (Sinharaja Rain Forest), alt. 460 m (06°25'N, 80°27'E); coll. D. Gabadage, 09 April 1994. Males, 26.2, 32.6 mm SVL, AMS R 148275 and AMS R 148274; Sri Lanka: Koskulana near Panapola (Sinharaja Rain Forest), alt. 460 m (06°25'N, 80°27'E); coll. D. Gabadage and S. Dharmasiri, 03 November 1994. Male, 30.2 mm SVL, ZRC; Sri Lanka: Waitalawa near Urugala (Knuckles), alt. 915 m, (07°19'N, 80°49'E); coll. R. Pethiyagoda, 25 September 1994. Male, 25.9 mm SVL, ZRC, and Male, 31.7 mm SVL, AMS R 148273, Sri Lanka: Koskulana near Panapola (Sinharaja Rain Forest), alt. 460 m (06°25'N, 80°27'E); coll. K. Manamendra-Arachchi and D. Gabadage, 11 July 1993. Female, 40.7 mm SVL, ZRC; Sri Lanka: Usgala, Ambagahakanda (near Maliboda), alt. 700 m (06°52'N, 80°26'E); coll. P.B. Karunaratne, 11 January 1995. Female, 34.6 mm SVL, WHT01117; Sri Lanka: Kumaradola Group (Moneragala), alt. 305 m (06°53'N, 81°22'E); coll. M. M. Bahir and D. Gabadage, 16 November 1995. Subadult, 23.1 mm SVL, WHT0808; Sri Lanka: Bambarakanda, Kalupahana (near Belihul Oya), alt. 1070 m (06°46'N, 80°50'E); D. Gabadage, 18 October 1994. Subadult, 20.4 mm SVL, WHT0919; Sri Lanka: Silverkanda (Deniyaya), alt. 760 m (06°23'N, 80°37'E); K. Manamendra-Arachchi and D. Gabadage, 17 September 1994. Female, 39.8 mm SVL, NMSL AR 13(a); Sri Lanka: Laggala (Knuckles), alt. 1220 m (07°33'N, 80°44'E); M.M. Bahir and D. Gabadage, 25 October 1995. Female, 37.0 mm SVL, NMSL AR 13(b); Sri



Figure 1. *Limnonectes kirtisinghei*, AMS R 148272, holotype, SVL 32.0 mm, dorso-lateral view.



Figure 2. *Limnonectes limnocharis* from Sri Lanka, 27.8 mm SVL, WHT0870.

Lanka: Morningside (near Rakwana), alt. 1060 m (06°24'N, 80°38'E); D. Gabadage, 25 September 1995. Juvenile, 16.2 mm SVL, WHT01017; Sri Lanka: Bulutota, alt. 760 m (06°28'N, 80°38'E); D. Gabadage, 25 September 1995. Male, 32.5 mm SVL, WHT01116; Sri Lanka: Kanneliya (Galle), alt. 150 m (06°15'N, 80°20'E); M.M. Bahir and D. Gabadage, 02 November 1995. Female, 41.8 mm SVL, 13.2 mm SVL (tadpole), WHT01118; Sri Lanka: Kotagala, alt. 1220 m (06°56'N, 80°37'E); D. Gabadage, 10 November 1995. Female, 33.0 mm SVL, WHT01126; Sri Lanka: Parawalatenna (Kitulgala), alt. 150 m (06°59'N, 80°24'E); M.M. Bahir and D. Gabadage, 21 December 1995. Male, 39.1 mm SVL, WHT01127; Sri Lanka: Ramboda, alt. 1310 m (07°04'N, 80°42'E); M.M. Bahir and D. Gabadage. Female, 43.7 mm SVL, WHT01130; Sri Lanka, Opata, Kanneliya Forest, Galle, alt. 213 m (06° 14' N, 80° 24' E); M.M. Bahir and D. Gabadage, 10 January 1996.

### Diagnosis

*Limnonectes kirtisinghei* is distinguished from *L. limnocharis* (Gravenhorst, 1829) by the presence of uninterrupted dorsal ridges (vs. interrupted dorsal ridges) (Fig. 2) and from *L. murthi* (Pillai, 1979) by the absence of two patches bearing

Table 1. Measurements of the holotype (AMS R 148272, 32.3 mm SVL) and means of eight paratypes (AMS R 148276, 1 ex., 40.8 mm SVL; ZRC, 1 ex., 40.4 mm SVL; AMS R 148275, 26.2 mm SVL; AMS R 148274, 32.6 mm SVL; ZRC, 1 ex., 30.2 mm SVL; AMS R 148273, 1 ex., 31.7; ZRC, 1 ex., 25.9 mm SVL; ZRC, 1 ex., 40.7 mm SVL) of *Limnonectes kirtisinghei*, and eight examples of *L. greenii* (WHT0437, 35.0-39.1 mm SVL) expressed as percentages of head length.

|                               | <i>Limnonectes kirtisinghei</i> |           |      | <i>L. greenii</i> |      |
|-------------------------------|---------------------------------|-----------|------|-------------------|------|
|                               | Holotype                        | Paratypes | s.d. |                   | s.d. |
| Eye diameter                  | 37.9                            | 39.8      | 3.2  | 34.0              | 1.6  |
| Eye to nostril distance       | 18.9                            | 19.3      | 1.2  | 17.7              | 0.9  |
| Eye to snout-tip distance     | 42.4                            | 38.9      | 0.9  | 40.7              | 1.7  |
| Femur length                  | 114.4                           | 125.5     | 6.4  | 117.8             | 5.0  |
| Finger length I               | 26.5                            | 26.2      | 1.5  | 21.9              | 2.2  |
| Finger length II              | 20.5                            | 23.2      | 1.2  | 22.3              | 1.6  |
| Finger length III             | 34.1                            | 34.4      | 1.7  | 32.7              | 1.6  |
| Finger length IV              | 28.0                            | 26.4      | 1.7  | 25.2              | 1.5  |
| Hindlimb length               | 452.3                           | 441.8     | 21.0 | 411.1             | 23.3 |
| Head width                    | 88.6                            | 89.5      | 3.3  | 90.2              | 2.7  |
| Interorbital width            | 21.2                            | 18.5      | 1.1  | 17.9              | 1.8  |
| Lower arm length              | 61.4                            | 54.9      | 2.8  | 57.9              | 4.0  |
| Snout-vent length             | 244.7                           | 247.5     | 7.3  | 242.7             | 11.2 |
| Tibia length                  | 158.3                           | 141.3     | 7.4  | 128.5             | 8.6  |
| Toe length I                  | 24.2                            | 22.1      | 1.0  | 19.3              | 1.2  |
| Toe length II                 | 34.9                            | 32.8      | 3.1  | 28.9              | 2.5  |
| Toe length III                | 57.6                            | 56.0      | 3.2  | 51.6              | 4.1  |
| Toe length IV                 | 95.5                            | 90.6      | 3.9  | 86.7              | 6.0  |
| Toe length V                  | 56.1                            | 55.7      | 2.8  | 47.5              | 5.8  |
| Tympanum diameter(Horizontal) | 15.2                            | 16.7      | 0.8  | 21.8              | 1.4  |
| Tympanum diameter (Vertical)  | 18.9                            | 18.3      | 0.9  | 20.3              | 1.2  |
| Upper arm length              | 50.0                            | 51.0      | 2.1  | 55.0              | 4.2  |
| Upper eyelid width            | 20.5                            | 19.7      | 1.4  | 18.4              | 1.2  |
| Tongue length                 | 60.6                            | 61.9      | 8.5  | 60.8              | 6.4  |
| Tongue width                  | 29.6                            | 41.9      | 6.0  | 41.2              | 1.8  |

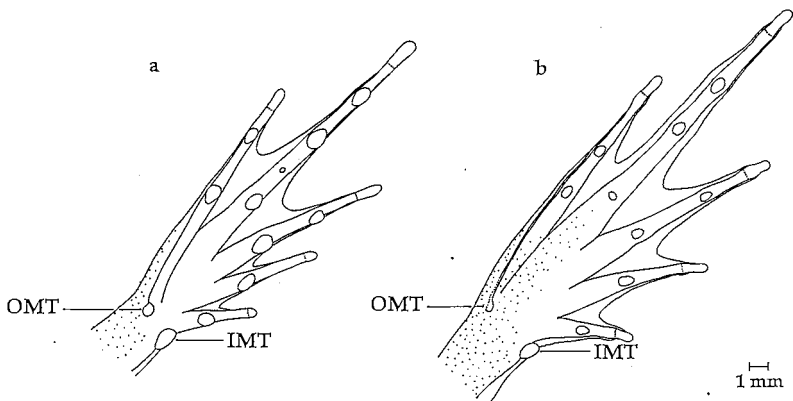


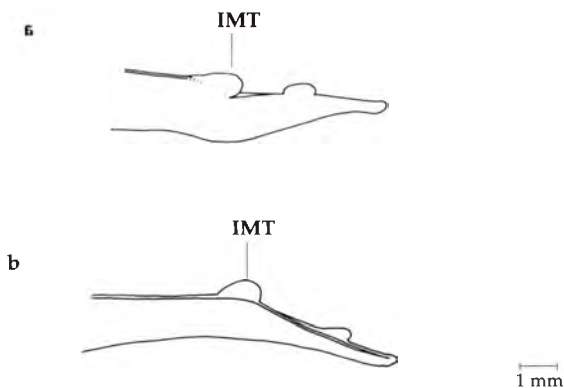
Figure 3. Ventral view of right foot of (a) *Limnonectes kirtisinghei*, AMS R 148272, holotype, SVL 32.3 mm; and (b) *Limnonectes greenii*, WHT0437, SVL 38.3 mm.

papillae on the breast. It is also distinguished from *L. greenii* (Boulenger, 1904), which it resembles closely, by the following characters: prominent cutaneous fringe along the inner side of first toe of adults (Fig. 3) and Gosner stage 40 tadpole absent (vs. present in *L. greenii*); outer metatarsal tubercle distinct, and rounded or oval (vs. minute or indistinct); all subarticular tubercles larger than the respective tubercles of *L. greenii*—e.g. length of penultimate subarticular tubercle of fourth toe subequal to length of inner metatarsal tubercle (vs. subequal to half the length of inner metatarsal tubercle in *L. greenii*); inner metatarsal tubercle not elevated when viewed laterally (Fig. 4) (vs. elevated); tympanum vertically oval (vs. horizontally oval or rounded); mature individuals small, males 25.9–39.1 mm SVL (vs. 35.0–41.8 mm SVL), females 33.0–43.7 mm SVL (vs. 44.4–46.2 mm SVL); eye diameter large, 36.3–45.9% of HL (vs. 34.0–35.7%); hind limb long, mean 441.8% of HL (range 415.4–474.1%) (vs. mean 411.1%, range 358.3–443.8% of HL in *L. greenii*).

### Description of holotype

For morphometric data see Table 1. Male. Head longer than wide, HW 88.6% of HL; HL 40.9% of SVL; mandible with symphyseal tubercle; two external vocal sacs; snout smoothly rounded in lateral view, slightly pointed in dorsal view; nostril rounded, with a fleshy outer margin (the margin indistinct anteriorly) and a rounded tubercle posteriorly (Fig. 5), dorsolaterally orientated, nearer to eye than to snout-tip. Canthus rostralis indistinct, smooth; loreal region oblique, concave; internarial area flat. Eye large, ED 37.9% of HL, greater than distance between eye and nostril (BN 50.0% of ED). Interorbital region flat. Upper eyelid width less than interorbital width (UE 96.4% of IO). Tympanum vertically oval (TYH 80.0% of TYV; 40.0% of ED), almost touching the angle of the upper jaw. Supratympanic fold fleshy but not prominent, commencing from behind the posterior margin of the orbit and continuing over the tympanum, terminating a little beyond the insertion of the forelimb. Tongue large, bifid and free posteriorly, longer than wide (TW 48.8% of TL). Vomerine teeth in two groups, each side with about 7 exposed teeth, the two groups separated from each other by a distance of 54.5% of the length of each group. Choanae oval, each 81.8% the length of the vomerine teeth group, separated from each other by a gap 344.4% the length of each choana. Upper jaw with retrorse teeth. Cloacal opening directed posteriorly, slightly below the upper level of thighs. Dorsum with 6 uninterrupted longitudinal ridges between posterior level of upper eyelid and vent. Fine and pointed white-tipped tubercles scattered all over the body surface and side of head; large white-tipped tubercles around the vent, knee, tibiotarsal articulation, tarsi and outer edge of fifth toe. Posterior surface of thighs with indistinct granules.

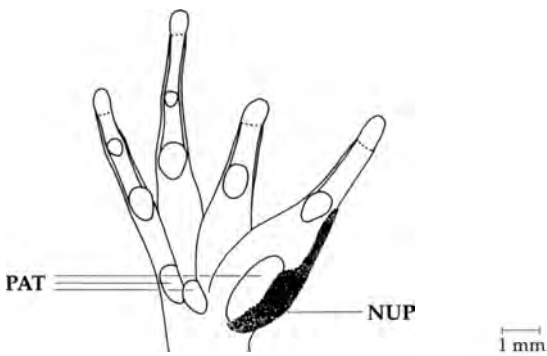
Subarticular tubercles on hand small, oval, the proximal tubercles larger than the distal tubercles. Fingers with rudimentary webbing, the second to fourth with indistinct dermal fringes on both sides; fringe on first finger only on outer side. A well developed, velvety nuptial pad on base and inner side of first finger. Three palmar tubercles (Fig. 6). Upper arm short (UAL 20.4% of SVL), lower arm relatively thick and long (LAL 25.1% of SVL). Outer metatarsal tubercle oval and smaller than the inner; inner metatarsal tubercle oval, and slightly compressed. Subarticular tubercles on toes large and oval. A very small tubercle between penultimate and antepenultimate subarticular tuber-



**Figure 4.** Lateral view of first toe and inner metatarsal tubercle of right foot of (a) *Limnonectes kirtisinghei*, AMS R 148272, holotype, SVL 32.3 mm; and (b) *Limnonectes greenii*, WHT0437, SVL 38.3 mm.



**Figure 5.** (a) Lateral view of tadpole of *Limnonectes greenii*, WHT01129, 19.8 mm SVL and (b) *L. kirtisinghei*, WHT01118, 13.2 mm SVL; both Gosner stage 40.



**Figure 6.** *Limnonectes kirtisinghei*, AMS R 148272, holotype, SVL 32.3 mm, ventral view of right hand.

cles on fourth toe. Tarsal ridge extends to inner metatarsal tubercle. Webbing to between tip and distal subarticular tubercle on outer side of first toe; to distal subarticular tubercle on inner side and between tip and distal subarticular tubercle on outer side of second toe; to penultimate subarticular tubercle on inner side and distal subarticular tubercle on outer side of third toe; to penultimate subarticular tubercle on inner side and between distal and penultimate subarticular tubercle on outer side of fourth toe; and between distal subarticular tubercle and tip on inner side of fifth toe. Outer edge of fifth toe with feebly-defined cutaneous fringe. Second to fifth toes with distinct dermal fringes on both sides, dermal fringe on first toe only on outer side. Fourth toe long (60.3% of TBL). Digital formulae: fingers,  $3>4>1>2$ ; toes,  $4>3>5>2>1$ .

**Measurements** (in mm): ED, 5.0; EN, 2.5; ES, 5.6; FEL, 15.1; FL I, 3.5; FL II, 2.7; FL III, 4.5; FL IV, 3.7; HIL, 59.7; HL, 13.2; HW, 11.7; IO, 2.8; LAL, 8.1; SVL, 32.3; TBL, 20.9; TOL, 8.0; TOW, 3.9; TL I, 3.2; TL II, 4.6; TL III, 7.6; TL IV, 12.6; TL V, 7.4; TYH, 2.0; TYV, 2.5; UAL, 6.6; UE 2.7.

**Description of paratypes** (8 ex., AMS R 148276, 40.8 mm SVL; ZRC, 40.4 mm SVL; AMS R 148275, 26.2 mm SVL; AMS R 148274, 32.6 mm SVL; ZRC, 30.2 mm SVL; AMS R 148273, 31.7 mm SVL; ZRC, 25.9 mm SVL; ZRC, 40.7 mm SVL); see also Table 1. Dorsum with 4-10 discrete, uninterrupted longitudinal ridges, comprising oval and rounded tubercles. White-tipped tubercles scattered dorsally, around the vent and on hind limbs, more prominent in mature males. Hinder side of thighs and around the vent granular or tuberculated. Webbing to between tip and distal subarticular tubercle on outer side of first toe; to distal subarticular tubercle on inner side and between tip and distal subarticular tubercle on outer side of second toe; to penultimate or between penultimate and distal subarticular tubercle on inner side and distal or between distal subarticular tubercle and tip on outer side of third toe; to distal or penultimate subarticular tubercle on inner side and distal or between distal and penultimate subarticular tubercle on outer side of fourth toe; and to distal or between distal subarticular tubercular and tip on inner side of fifth toe. Finger and toe tips rounded. Male with two external vocal sacs; distinct nuptial pad on base and inner side of first finger, velvety in texture. Supratympanic fold not prominent, extending from behind eye to a little beyond the insertion of the fore limb; tympanum distinct, vertically oval, TYH 36.0-48.9% of ED. Eye diameter large, ED 36.3-45.9% of HL. Nostrils rounded, with fleshy outer margin (the margin indistinct anteriorly) and with or without one or two small tubercles on both anterior and posterior ends. Eye to nostril distance (EN) subequal to nostril to snout-tip distance.

**Colouration.** In life, brown on dorsal surface with oval or rounded patches in darker brown. With (in 18 examples examined) or without (2 ex.) mid-vertebral band, bright chestnut to pale yellow in colour. Both lips with 4-5 wide, dark brown bands or blotches. Supratympanic fold black. Dorsal surface of fore limb with 2-4, thigh with 4 or 5, tibia with 5 and tarsi with 4 bands or oval patches in dark brown. Inner side of lower arm with a dark band. Ventrally pale yellow. Throat, breast and underside of thigh and tibia with dark speckles in some specimens.

**Description of tadpole** (Gosner stage 40; cf. Fig. 5a for illustration of tadpole of *L. greenii*). Head and body oval in both dorsal and lateral view (Figs. 5b &

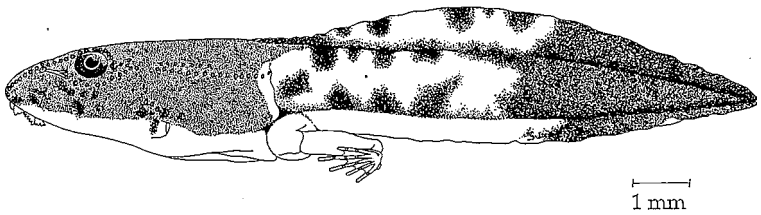


Figure 7. Lateral view of the tadpole of *Limnonectes kirtisinghei* in Gosner stage 40 (WHT01118), SVL 13.2 mm.

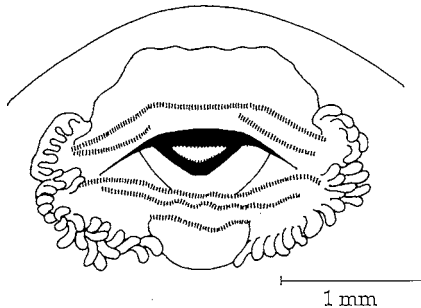


Figure 8. Oral apparatus of the tadpole of *Limnonectes kirtisinghei* in Gosner stage 40 (WHT01118), SVL 13.2 mm.

7). Body slightly depressed (depth 70.3% of width). Snout smoothly rounded. Oral apparatus present, subterminal (Fig. 8). Dental formula 2/3; outer upper row of horny teeth marginal and uninterrupted, inner upper row interrupted medially by a wide space; all three rows on lower lip uninterrupted, the lowest the shortest. Both beaks totally keratinized, similar in size, and with acute serrations on edges; margin of anterior beak straight; posterior beak U-shaped, located very close to anterior beak. Labial papillae on outer end of upper lip and in two series at the sides of the lower lip. Narial opening circular, margin smooth in dorso-lateral view, nearer to the eye than the tip of snout, EN 45.2% of ES; internarial distance equal to EN. Eye rounded in dorso-lateral view, ED 48.4% of ES. Interorbital area flat, IO 51.6% of ES. Lateral line pores visible, extending from snout, between the nares and around the orbit (excluding the preorbital area); two parallel series of pores extending along the side, the upper one with 7 and the lower with 16 pores (Fig. 7). Anterior base of dorsal fin with 7 pores. A group of 5 pores above spiracular tube.

Spiracular tube short, directed backwards, opening nearer to the base of tail than the tip of snout. Cloacal opening forming a short tube (9.1% of SVL), attached to the right of the mid-ventral line (ventral fin). SVL 39.8% of total length. Toes webbed, webbing to between tip and distal subarticular tubercle on outer side of first toe; to distal subarticular tubercle on inner side and be-



tween tip and distal subarticular tubercle on outer side of second toe; to between distal and penultimate subarticular tubercle on inner side and distal subarticular tubercle on outer side of third toe; to between distal and penultimate subarticular tubercle on both inner and outer sides of fourth toe and to between tip and distal subarticular tubercular on inner side of fifth toe. Toe tips rounded. Subarticular tubercles oval or rounded. Outer edge of fifth toe with feebly-defined cutaneous fringe. Second to fifth toes with distinct dermal fringes on both sides, dermal fringe on first toe only on outer side. Fourth toe long. Digital formulae: toes, 4>3>5>2>1. Outer metatarsal tubercle oval and smaller than the inner; inner metatarsal tubercle oval and slightly compressed. Tail pointed, its upper crest deeper than the lower, depth of tail 29.0% of tail length.

Measurements of tadpole (WHT01118): body width 7.4 mm; cloacal tube length 1.2 mm; depth of body 5.2 mm; depth of tail 5.8 mm (with both upper and lower fins); distance between spiracle opening to tip of snout 7.2 mm; ED 1.5 mm; EN 1.4 mm; ES 3.1 mm; FEL 4.5 mm; internarial distance 1.4 mm; IO 1.6 mm; SVL 13.2 mm; tail length 20.0 mm; TBL 4.2 mm; Total length 33.2 mm.

**Colour in alcohol.** Back and sides of body dark brown. Anterior half of tail spotted with dark brown; posterior half uniform dark brown. Lower surface of head, body and lower area of anterior half of tail unpigmented.

### Biology

*Limnonectes kirtisinghei* appears to be restricted to the wet zone of Sri Lanka (>2500 mm rainfall per annum), having been recorded between altitudes of approximately 150-1370 m in the hills of western, southern, central (including the Knuckles Range) and eastern (including Moneragala) Sri Lanka (Fig. 9). It was found in the margins of shaded, narrow, shallow, slow-flowing streams, under grass tussocks in marshes, on leaf debris, sand banks and rocks on sides of streams, where it sometimes occurred in sympatry with the ranid frogs *Limnonectes corrugatus* (Peters, 1863), *Nannophrys ceylonensis* (Günther, 1868) and *Rana temporalis* (Günther, 1864).

Gravid female with mature eggs, 40.8 mm SVL, AMS R 148276, 17 Oct. 1994; egg diameter 1.4 mm; bicoloured, yellow and brown. Gravid female with mature eggs, 40.4 mm SVL, ZRC, 09 Apr. 1994; egg diameter 1.3 mm, bicoloured, yellow and brown. Juvenile, 15.4 mm SVL, WHT0905, 07 Apr. 1995. Juveniles, 19.4 mm, 14.9 mm SVL, WHT0919, 17 Sep. 1994. Juvenile, 16.2 mm SVL, WHT01017, 25 Sep. 1995. Juveniles, 11.4 mm, 12.3 mm, 11.6 mm, 13.1 mm SVL, WHT01118, 10 Nov. 1995. Tadpoles, 13.2 mm, 13.2 mm SVL, WHT01118, 10 Nov. 1995.

### Etmology

The species name is a patronym honouring Parakrama Kirtisinghe (1903-1981), the Sri Lankan herpetologist.

### Discussion

Originally described as distinct species, *Rana greenii* Boulenger, 1904 was considered a subspecies of *R. limnocharis* by Annandale (1917) and subsequently by Kirtisinghe (1957). Dubois (1984; 1986) however, recognised it as a valid species and referred it to the subgenus *Fejervarya* Bolkey, 1915. The material

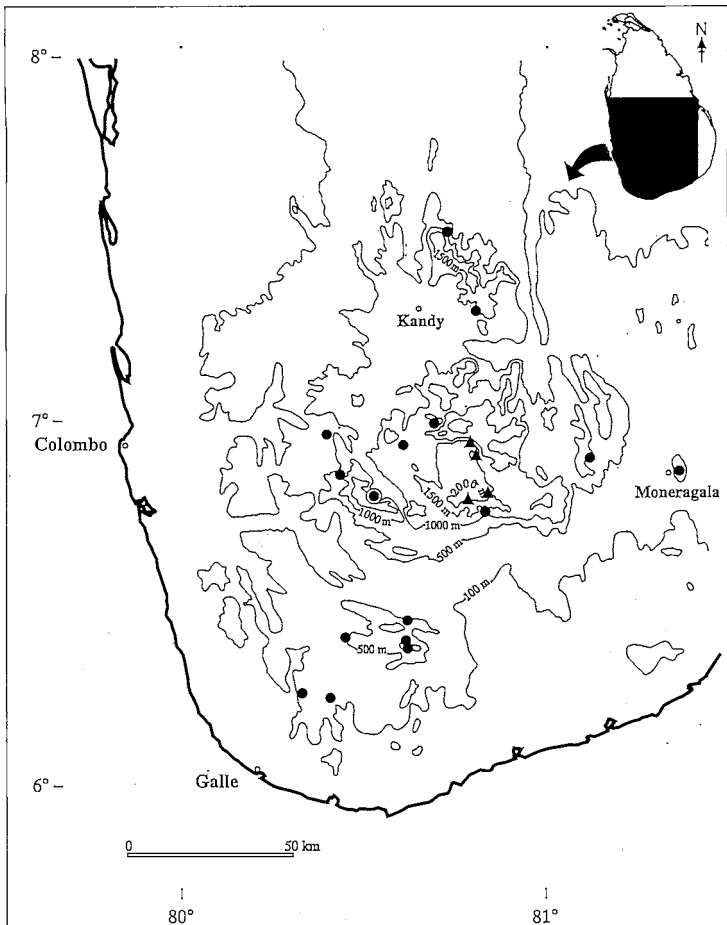


Figure 9. Distribution of *Limnonectes kirtisinghei* • (type locality indicated by ⊙) and *L. greenii* ▲ in the central hills of Sri Lanka.

examined by Kirtisinghe has not been traced by us, but we consider it possible that the specimens he referred to *L. greenii* were in fact at least in part *L. kirtisinghei*. We are confident however, that *L. kirtisinghei* is a valid species because it is readily and consistently diagnosed from *L. greenii* (and other Sri Lankan ranids).

Boulenger (1904) gave the type locality of *Rana greenii* as "Ceylon" (= Sri Lanka), written as "Punduloya" on the label of the syntype series (BMNH 60.3.19.11.00; 53.3.31.38-39; 76.3.21.17; 69.7.24.8-9; MCZ 15361). We found only *L. kirtisinghei* at Pundaluoya (07°01'N, 80°40'E, altitude 1500 m), which is about 20 km from the nearest location at which we have collected *L. greenii* (Nuwara Eliya). We observed also that *L. kirtisinghei* is commonly found in man-modified habitats, whereas *L. greenii* has been found to occur only in relatively undisturbed areas. It would appear therefore that *L. greenii* and *L. kirtisinghei* were sympatric in Punduloya at the time the type series of *L. greenii* was col-



Figure 10. Lectotype of *Limnonectes greenii*, MCZ 15361. Photograph: Indraneil Das.

lected (ca. 1860), *L. greenii* having been extirpated from that locality as a result of the widespread clearing of the forests of the area for tea cultivation in the second half of the 19th century. The possible sympatry of the two taxa further supports our case for the specific status of the new taxon.

We are satisfied with the identity of *L. greenii*, of which Indraneil Das (pers. comm.) has been kind enough to examine the syntype at the MCZ and provide us with a description consistent with our diagnosis of the two species. We attempted to ascertain whether all the specimens in the syntype series at the BMNH were in fact *L. greenii*, or whether some of them could have been *L. kirtisinghei*. Unfortunately, repeated inquiries from that institution resulted in no reply. In the interest of stability we therefore designate the MCZ syntype of *L. greenii* (MCZ 15361) as the lectotype of *Rana greenii* Boulenger, 1904 (Fig. 10).

*Limnonectes greenii* is now restricted to the highest areas of the central massif of Sri Lanka, the lowest point at we have recorded it being Nuwara Eliya (alt. 1710 m). The species is however, relatively common in the Horton Plains (06°48'N, 80°48'E, altitude 2135 m).

### Comparative material

*Limnonectes greenii*: (all from Sri Lanka), WHT0437, 38.3 mm (♂), 38.7 mm (♂), 38.9 mm (♂), 37.5 mm (♂), 37.5 mm (♂), 39.1 mm (♂), 35.0 mm (♂), 37.3 mm (♂) SVL, Nagrak Division, Nonpareil Estate (adjoining Horton Plains), (06°46'N, 80°47'E), alt. 2135 m; WHT01026, 32.2 mm, 25.8 mm, 24.2 mm, 20.5 mm, 18.5 mm, 20.5 mm, 18.0 mm, 16.8 mm, 16.7 mm, 14.3 mm, WHT01129, 19.8 (tadpole), 41.8 mm (♂), 46.2 mm (♀), 44.4 mm (♀) SVL, Hakgala (near Nuwara Eliya), (06°55'N, 80°49'E), alt. 1830 m; WHT0977, 19.4 mm, 22.6 mm, Ohiya (Railway Station), (06°49'N, 80°50'E), alt. 1800 m. WHT01128, 37.5 mm

( $0^{\circ}$ ), Nuwara Eliya, ( $06^{\circ}57'N$ ,  $80^{\circ}47'E$ ), alt. 1710 m.

*Limnonectes limnocharis*: (all from Sri Lanka), WHT0834, 30.0 mm SVL, Waitalawa near Uragala (Knuckles), alt. 915 m; WHT0918, 29.1 mm SVL, Galge (between Kataragama and Buttala), alt. 90 m; WHT0818, 29.3 mm SVL, Attidiya-Bellawila, alt. 8 m; WHT0886, 25.7 mm SVL, Kanneliya (Galle), alt. 150 m; WHT0868, 31.4 mm SVL, Moray Estate, Rajamally (near Mousakelle), alt. 1370 m; WHT037, 30.7 mm SVL, Pallekele, (near Kurunegala), alt. 150 m; WHT0835, 28.4 mm SVL, Lahugala (near Potuvil), alt. 30 m; WHT0776, 24.6 mm SVL, Elamalawala (Labugama), alt. 150 m; WHT0792, 28.0 mm SVL, Kumaradola Group (Moneragala), alt. 305 m; WHT0791, 28.5 mm SVL, Ritigala, alt. 460 m; WHT01027, 27.6 mm SVL, Siyambalakotuwa Wewa, Kiriyanakali (near Mundel), alt. 20 m; WHT01043, 34.1 mm SVL, Udawalawe, alt. 100 m; WHT0870, 27.8 mm SVL, Pussella Estate (Parakaduwa), alt. 60 m.

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