

## ORIGINAL ARTICLE

# New distributional ranges of endangered *Latidens salimalii* Thonglongya, 1972 (Chiroptera: Pteropodidae) from Western Ghats, peninsular India

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## ABSTRACT

Salim Ali's Fruit Bat *Latidens salimalii* is a rare endangered bat species endemic to the humid mountains of southern Western Ghats, peninsular India. Here we report new distributional range of *L. salimalii* from Wayanad hills (60km north-west of the nearest known locality) and two new roosting sites in Anamalai hills of southern Western Ghats. We also report the lowest altitude of 312msl where the species is found, and suggests further surveys to understand its actual distribution and changes to populations.

## INTRODUCTION

The family Pteropodidae (also referred to as 'pteropodids') medium to large size bats restricted to the Old World countries (Mickleburgh et al. 1992). They are primarily frugivorous, but some species also consume nectar, flowers, pollen and leaves (Aziz et al. 2021). They act as pollinators and seed dispersers, both important roles in forest regeneration (Corlett 1998, Kunz et al. 2011).

India is home to 134 species of bats with 17 endemics (Srinivasulu et al. 2024). The family Pteropodidae is represented by 12 species, including the monotypic Salim Ali's Fruit Bat *Latidens salimalii*, an endemic species restricted to the humid mountains of southern Western Ghats (Srinivasulu & Srinivasulu 2020). The cave-roosting species has been found at mid elevation (600-1750msl) in colonies of up to 800 individuals (Raman et al. 2021). Currently, the species is known only from few localities in southern Western Ghats such as Nilgiri (Raman et al. 2020), Anamalai (Wordley et al. 2016, Raman et al. 2021), Periyar-Meghamalai (Thonglongya 1972, Singaravelan & Marimuthu 2003, Agoramoorthy & Hsu 2005), and Agastyamalai (Vanitharani et al. 2004). This species is highly sensitive to disturbance and is endangered due to hunting and climate change (Raman et al. 2020, Srinivasulu & Srinivasulu 2020). Aside from a few observations on their distribution and basic ecology, most aspects of the natural history of *L. salimalii* remain unexplored.

Here we present information on the expansion of the distributional range of *L. salimalii* that we have encountered during an ongoing study on the community ecology of

bats across elevational gradients of the Western Ghats. Diagnostic characters of the species are provided to confirm identification.

## MATERIAL AND METHODS

Monthly bat sampling was conducted in south Wayanad Reserved Forest (site 1) and Sholayar Reserved Forest (sites 2 & 3) from January 2022 to July 2024 (Fig. 1). The Wayanad landscape constitutes a highly undulating terrain dominated by dense forest, interspersed agricultural crops such as paddy, tea, coffee, cardamom and rubber (John et al. 2020). The sampling site was adjacent to the Nilambur North Forest Division, Wayanad Wildlife Sanctuary and Mudumalai Tiger Reserve. Elevation ranges from approximately 700–2100msl, the average annual rainfall is 2,322mm, and average temperature ranges from 18 to 29°C. The Sholayar Reserved Forest, which is part of the Anamalai hills bordered by the Parambikulam Tiger Reserve and Anamalai Tiger Reserve. The area is predominantly evergreen forest, and the elevation ranges from 200 to 1,200 square meters. The area receives a mean annual rainfall of 3,300mm, and temperature ranges from 13 to 29°C.

Bats were sampled using four-shelf mist nets of 30mm mesh size and 12m width laid in trails adjacent to water bodies. The mist nets were opened from 18.00-21.00hrs and inspected at every five minutes intervals. We also sampled bats from caves using hoop nets of diameter 45cm, attached to a telescopic pole. Once captured, standard morphometric measurements were recorded using digital callipers of 0.1mm accuracy, and on-site identification of bat species was conducted using digital photography and identification keys (Bates & Harrison 1997, Raman et al. 2021). Handling

times of captured bats were kept short to minimise stress and were released at the sampling site. We obtained the necessary study permits and adhered to all precautions and standard protocols while sampling bats (Sikes et al. 2011).

## RESULTS

Three new records of *L. salimalii* from the southern Western Ghats were found in the present study (Table 1, Fig. 1). The first capture record of *L. salimalii* was on 21 October 2023 at 20.35hrs, an adult female was caught in a mist net from Mundakai, Wayanad hills (site 1, 11°28'51.20"N, 76°8'39.10"E, 1035msl, Fig. 2). Subsequent observations were from two adjoining sites close to perennial streams, located inside wet evergreen forests of Sholayar Reserved Forest. The site 2 was a huge crevice on a granite rock having a width of 15m and height of 12m (10°15'42.35"N, 76°48'16.88"E, 418msl). There were 110–120 bats in the colony, and they were closely packed. The site 3 was a cave roost with an entrance at 5m from the ground level (10°14'54.82"N, 76°48'45.75"E, 312msl). We were only able to count 12 individuals in the cave due to the difficulty of access.

### Systematic account

#### Family Pteropodidae

#### *Latidens salimalii* Thonglongya, 1972

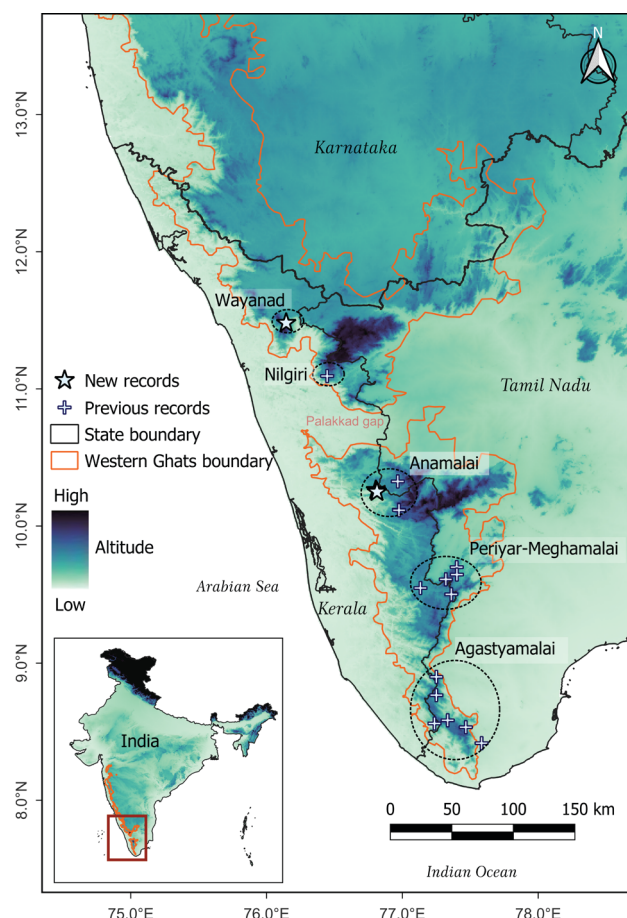
**Diagnosis.** Unlike the other medium sized fruit bats of the Western Ghats (*Cynopterus sphinx*, *Cynopterus brachyotis*, *Eonycteris spelaea* and *Rousettus leschenaultii*), *L. salimalii* does not have an external tail. A single pair of upper and lower incisors also distinguishes *L. salimalii* from other known fruit bats from the Indian subcontinent (Bates & Harrison 1997).

**Description.** All bats that we sampled fitted the recorded characteristics of *L. salimalii* (Bates & Harrison 1997). These bats had forearm length of (Mean±SD) 68.9±0.4mm, head to body length of 110.3±0.6mm, hind foot length of 13.1±0.3mm, ear length of 16.9±0.4mm, tibia length of 32.0±0.6mm and a body mass of 70.2g. The dorsal pelage is dark brown to grizzled black with soft and dense pale hairs. A summary of the morphological characters is provided in Table 1.

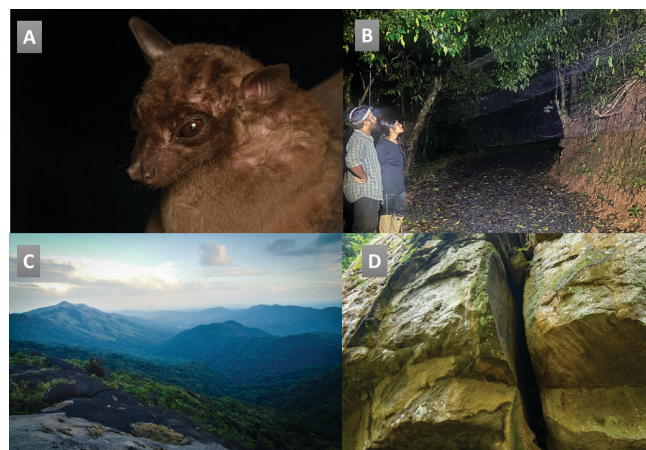
**Habitat.** The Site 1 was inside a cardamom plantation bordered by evergreen forest on either sides with an aerial distance of nearly one kilometre to the nearest forest. Following observations from site 2 and site 3 were from wet evergreen forests of Sholayar, separated by Edamalayar reservoir.

**Note.** The present report from Wayanad hills is now the northernmost distributional range of the species (60 km north-west of the nearest known locality), and the observation from Sholayar is the lowest elevation (312 msl) ever recorded. In Wayanad, the species was found to coexist with other fruit bats, including *C. sphinx*, *C. brachyotis*, and *R. leschenaultii*. Our sampling also recorded a few insectivorous bats, specifically *Hipposideros pomona*, *Hipposideros speoris*, *Rhinolophus indorouxii* and

*Rhinolophus lepidus*. Engagements with local people have also shown that the cave bats, including *L. salimalii* are a source of food for the indigenous communities. Our present observation significantly improves the understanding of its distributional range and the bat activity in human modified landscape.



**Fig. 1** - Map showing the distributional ranges of *Latidens salimalii* in southern Western Ghats. Star indicates new records (present study) and cross indicates previous records (Raman et al. 2020, 2022).



**Fig. 2** - *Latidens salimalii* Thonglongya, 1972. A: Lateral view of *L. salimalii* sampled from Wayanad B: Mist net survey in Wayanad C: Aerial view of the habitat of *L. salimalii* in Sholayar D: Roosting site of *L. salimalii* in Sholayar. Pictures Nithin Divakar.

**Table 1** - Location details and external measurements (in mm) of *Latidens salimalii* recorded from southern Western Ghats.

Site	Location	Lat (N)	Lon (E)	Alt (msl)	Habitat	Sex	Age	Forearm length	Head body length	Ear length	Tibia	Hind foot	Remarks
1	Mundakai, Wayanad	11°28'51.20" N	76° 8'39.10" E	1,035	Cardamom plantation	F	A	68.4	109.6	16.4	31.4	12.7	Captured in mist net, Northernmost distribution record
2	Sholayar, Anamalai	10°15'42.35" N	76°48'16.88" E	418	Wet evergreen forest	M	A	69	110.4	17	32.4	13.2	Crevices roosting, colony size:110-120
3	Sholayar, Anamalai	10°14'54.82" N	76°48'45.75" E	312	Wet evergreen forest	M	A	69.2	110.8	17.2	32.3	13.3	Cave roosting, Count 12, Lowest elevation recorded

## DISCUSSION

The southern Western Ghats is a critical bat hotspot and Anamalai was identified as suitable habitats for *L. salimalii* (Raman et al. 2022). The present observation from Sholayar (part of Anamalai) has a similar vegetation type and located close to other locations where the species has been previously reported (Wordley et al. 2016, Raman et al. 2020). The species is known to occur in the mid-elevation evergreen forests and adjoining coffee and cardamom plantations of southern Western Ghats (Srinivasulu & Srinivasulu 2020). Recent modelling studies showed that *L. salimalii* is a narrow-range species with approximately 10,000sq.km as its potential suitable habitat (Raman et al. 2020, 2022). Therefore, finding the species from the Wayanad landscapes is expected, given the habitat and preferred elevation of the region. Despite previous efforts to document bat diversity in the Wayanad landscape, we were only able to sample one individual during the last two years of monthly mist-netting. Therefore, it is likely that the species is rare in this area or may have a seasonal occurrence. Additionally, the present capture record was from a private cardamom plantation, and there could be a possible threat due to pesticide application (Sethi et al. 2022).

All the roosting colonies of *L. salimalii* so far reported from the Western Ghats were between the elevational ranges of 460-1600msl (Bates et al. 1994, Singaravelan & Marimuthu 2003, Vanitharani et al. 2004, Agoramoorthy & Hsu 2005, Raman et al. 2021). Therefore, the present observation from Sholayar (312msl) marks the lowest elevation that the cave-roosting of the species has ever recorded, which highlights the significance of low elevation evergreen forests in supporting rare species. Large scale forest conversion and quarries in this region convert most of the ecologically sensitive regions into landslide-prone areas (Kuriakose et al. 2009), which often result in land change in the region (John et al. 2020). Since most of the species' roost caves are known to occur in riparian habitats, the recent landslides in the region may have caused damage to these roost sites, warranting further field investigation.

In India, only 12 species (8%) of bats including the *L. salimalii* were protected by the Wild Life (Protection) Amendment Act of 2022. The present record from Wayanad is 60 km northwest of the nearest known locality and marks the northernmost distributional range. Additionally, the observation from Sholayar is at the lowest elevation, indicating its elevational distributional range is wider than previously considered. Recent modelling studies also highlighted that 40% of the suitable habitat of *L. salimalii* remains outside the protected area network (Raman et al. 2022). These observations also highlight the need to evolve strategies for the conservation of the species outside protected areas, including the modified plantations. Considering the difficulties in finding the species, we suggest to undertake further surveys in low to mid-elevation evergreen forests and contiguous plantations with closed canopy to understand its actual distribution, habitat characteristics, population status and threats (if any) faced by this elusive bat species.

## CONCLUSION

*L. salimalii* is a rare bat species found in the Indian subcontinent. Understanding the geographical distribution and habitat choice of such species is crucial for conservation efforts, ecosystem management, and predicting responses to environmental changes. Our present report documents the northernmost distributional range and the lowest elevation at which the species has ever been recorded. This contributes significantly towards the basic understanding of its distributional ranges and use of human modified habitats. We recommend further surveys in unexplored regions to understand the actual distribution and changes in populations.

## CONFLICT OF INTERESTS

The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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