

# Nature Watch

## On the Trail of Skinks of the Western Ghats

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**In spite of being one of the most diverse group of lizards, skinks are relatively poorly known to most herpetologists. This article is an attempt to introduce readers to the fascinating world of skinks with an emphasis on diversity within the Western Ghats. Given their distribution and the unique history of the Indian subcontinent, I also pose some hitherto unasked questions on the origins of the endemic skinks of India.**

### Introduction

Skinks are lizards of the order Squamata (or scaly reptiles) and are the largest and the most diverse family of lizards living today. They are also the most widespread, occurring throughout most of the world, wherever lizards are found in general. They are believed to have evolved from within Squamates around 200 million years ago, which makes them one of the oldest lineages of extant lizards. However, as a group they are still relatively unknown and the dearth of studies in comparison to some of the studies on other lizard families is quite surprising. Members of this family have a smooth and slender body, and a forehead covered with enlarged scales. Skinks can employ tail autotomy (dropping the tail) as a means of defence against predators.

Skinks are a good model system for various facets of research due a number of reasons – they are highly diverse and account for more than 25% of the world lizard diversity. The diversity in skinks is not just in the sheer numbers, but even in their traits. Skinks have repeatedly undergone limb reduction to various degrees. Shifting from limbed to limbless forms is probably one of the most profound ecological and morphological transitions



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He is interested in the systematics and biogeography of Indian skinks and uses molecular tools to understand the historical events leading up to the current diversification patterns of Indian reptiles.

### Keywords

Skinks, Western Ghats, biogeography, Indian subcontinent.



<sup>1</sup> Pygopodids are an exclusively limbless family of geckos found in Australia and New Guinea.

<sup>2</sup> Anguids are distributed both in the old world and the new world but are not as diverse as skinks. However, like skinks, they too have undergone some degree of limb-reduction in select lineages within the family. Few of the species have short, strong limbs while others are completely limbless.

squamates have made. Apart from skinks, limblessness within just a family has also occurred in other lizards like the pygopodids<sup>1</sup> and anguids<sup>2</sup>. Skinks are even more remarkable because they have undergone some degree of limb-reduction in select lineages within the family, and these independent events of limb reduction provide an excellent system for studying the processes involved in evolution of traits and its related changes within the confines of one group or family.

Not only are skinks highly diverse themselves, but they are also diverse reproductively. They include oviparous, viviparous and ovoviviparous species. Their clutch sizes may also be variable. Some species show parental care and some are monogamous. Such variations within the family provide for an excellent model to study the adaptive significance of these traits.

Skinks are also ecologically important because in many parts of the world, they are the major predators of invertebrates, especially arthropods, forming an important strata as secondary and tertiary consumers in the food chain. Furthermore, skinks are also important because they themselves are facultatively or obligatory prey to several other groups of squamates.

While most skinks appear to be diurnal, or crepuscular to nocturnal, they may adjust their activity times within these two periods based on seasonal conditions. This commitment to one half of the day suggests that each group's physiology and behaviour may be adapted to environmental conditions.

Within the Indian subcontinent, there are approximately 45 species of skinks spread across 15 genera. However, only four of these genera are endemic to peninsular India. *Barkudia* and *Sepsophis* are scincines (subfamily Scincinae), which are found along the hills and the coast along the eastern margin of peninsular India. Both these lineages of skinks are limbless; *Sepsophis* is a monotypic genus (i.e., has a single species), and *Barkudia* has only two species. *Kaestlea* and *Ristella* are the other two endemic genera of skinks (subfamily Lygosominae) and are found in the

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central and southern Western Ghats. There are also other endemic skink species found in the Western Ghats which have congeners elsewhere in the Indian subcontinent.

The Western Ghats in Peninsular India forms one of the world's biodiversity hotspots. This 1600 km long chain of hills has a unique geological history of formation. This chain of hills is broken only by a 13 km gap (Palghat gap). There have been various attempts at subdividing the Western Ghats based on either its vegetation or its faunal composition. The hills south of the Palghat gap are generally referred to as the southern Western Ghats, and have the majority of high elevations peaks. North of the Palghat gap, the Nilgiris and its continuation in Karnataka are referred to as the central Western Ghats. The Northern Western Ghats in Goa and Maharashtra receive considerably less rainfall and the vegetation is largely composed of grasslands. Given the kind of topographic complexity, the Western Ghats exhibits a high level of heterogeneity in vegetation and therefore a lot of faunal diversity. This diversity is also observed among the skinks of the Western Ghats. In the following section, I briefly describe the skinks of the Western Ghats.

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## Endemic Skinks of the Western Ghats

### *Kaestlea*

*Kaestlea* is one of the endemic genera of skinks found in the Western Ghats. Based on current taxonomy, *Kaestlea* has five species all of which are restricted to the central and southern Western Ghats. The members of this genus were earlier placed in various other genera like *Mococa*, *Lygosoma*, *Leiolopisma* and *Scincella*. However, based on morphological grounds, they were finally assigned to a new genus, *Kaestlea*, in 2003. The etymology of the genus name is in honour of Werner Kästle, a German herpetologist. All the species of *Kaestlea* have bright blue tails, a character for which the function is still unknown. *Kaestlea*, like all skinks, have tails that can break away easily and regenerate subsequently. It is likely that the colour of the tail is used as a





**Figure 1 (left).**  
*Kaestlea travancorica*  
Credit: S P Vijayakumar



**Figure 2 (right).**  
*Ristella beddomii*  
Credit: Saunak Pal

defence mechanism so that the predator's attention is diverted by the twitching blue tail while the skink itself manages to escape. These skinks are generally found in the high elevation wet forests or grasslands. Not much is known about their natural history.

### *Ristella*

*Ristella* is the only other endemic genus from the Western Ghats. It currently consists of four species, with a slightly wider distribution than that of *Kaestlea*. These skinks are also called 'cat skinks' owing to their retractile claws. One of the species, *Ristella beddomii* is found in parts of the northern Western Ghats (northernmost being Castle Rock in Karnataka) all the way till the southern Western Ghats. Although it is possible that this species consists of multiple lineages within it, a thorough phylogenetic and systematic study is needed for further confirmation. These skinks can be frequently seen among leaf litter, often alongside streams in mid- to high-elevation mountains. Like *Kaestlea*, not much is known about their natural history.

**Figure 3.**  
*Dasia johnsinghi*  
Credit: Deepak V



### *Dasia*

*Dasia* is an exclusively arboreal genus distributed in South and Southeast Asia. In India, there are two species (*D. subcaerulea* and *D. johnsinghi*) found only in the Western Ghats, whereas much of the rest of the distribution is in Southeast Asia. *Dasia haliana* is the lone Sri Lankan species, earlier thought to have been found in the southern Western Ghats. Although *Dasia*



are known to have modified digital lamellae, they use their long claws to good effect in climbing trees. How the lamellae assist in climbing vegetation is still unclear. Because of their exclusive arboreal habits, they are secretive and therefore not much is known about their natural history.



### *Sphenomorphus dussumieri*

*Sphenomorphus* is one of the most speciose genera of skinks and, in fact, for long it has been a catch-all genus with more than 130 species! Most of the species in this genus are in Southeast Asia with four species being found in Northeast India. *Sphenomorphus dussumieri* is endemic to Southern India and found quite frequently in the plains of Kerala. The juveniles of this species are characterised by a bright red tail which generally fades towards adulthood. This species can be seen moving around leaf litter and near the roots of large trees. In some places, they are so common that they can be seen in aggregations of 10–15, basking on rocks even near human habitations.

### *Eutropis clivicola*

*Eutropis* is one of the most speciose genera in tropical Asia. All the members of this genus have a robust dorsum with well-developed limbs. *Eutropis clivicola*, however, is found only in mid to low elevations of the Western Ghats. This is a medium-sized skink that closely resembles the widespread species *Eutropis macularia* but can be easily identified because of its distinct dorso-vertebral line. They are generally found moving among leaf litter.



**Figure 4.**

*Sphenomorphus dussumieri*

Credit: S P Vijayakumar

**Figure 5.**

*Eutropis clivicola*

Credit: Saunak Pal





**Figure 6.**  
*Eurylepis poonaensis*  
Credit: Deepak V

### *Eurylepis poonaensis*

The genus *Eurylepis* earlier belonged to the cosmopolitan genus *Eumeces*, which is known to have a largely Palaearctic distribution. Based on cladistic analyses, *Eumeces* was broken down based on their geographical distributions, the Asian ones being *Eurylepis*. There are two species of *Eurylepis* in the Indian subcontinent: *E. taeniolatus* and *E. poonaensis*. *Eurylepis*

*taeniolatus* is largely restricted to the arid northwestern part of India wherein its distribution extends to the Palaearctic. *E. poonaensis* however, has a very restricted distribution in the northern Western Ghats and is known only from its type locality (the locality from where it was originally described from) and adjoining nearby areas in Pune, Maharashtra. *E. poonaensis* is a very rare skink and little is known about its natural history. It is one of the only three endemics of the subfamily Scincinae in peninsular India, the others being the monotypic *Sepsophis punctatus* and two species of *Barkudia*. Like *Sepsophis* and *Barkudia*, *E. poonaensis* also appears to be a burrowing skink, as is evident from the strong pointed snout and elongated body. However, unlike the former two genera, *E. poonaensis* possesses well-developed limbs with long claws which they probably use to make burrows.

**Figure 7.**  
*Lygosoma goaensis*  
Credit: Varad Giri



### *Lygosoma goaensis*

This is a little known skink from the northern Western Ghats. Unlike most other *Lygosoma* species which have an elongated body, *Lygosoma goaensis* has a robust dorsum. They can be seen among leaf litter and under rocks in mid-elevation forests in Goa and Maharashtra. *Lygosoma* is also another speciose genus with



more than 30 species found in India, Southeast Asia and even Africa. There are about nine known species of *Lygosoma* in India out of which seven are endemic. *L. goaensis* is the only known endemic from the Western Ghats. The only other *Lygosoma* from India which has a body structure like that of *L. goaensis* is *L. pruthi*, which is found in certain parts of the Eastern Ghats of Peninsular India.

Apart from these species of skinks which are found only in the Western Ghats, there are a few widespread species which can be seen there as well. Here are a few of these species:

### *Lygosoma punctata*

*L. punctata* is one of the most common species distributed across the Indian subcontinent except Northeast India. The juveniles of this species have a bright red tail which fades considerably with age. They are often seen in burrows and under rocks in dry areas or among leaf litter around the roots of large trees.

### *Lygosoma guentheri*

*Lygosoma guentheri* is endemic to Peninsular India and is found in the hills of central and northern Western Ghats, Central India and has also been reported in parts of the Eastern Ghats. They have a long body with the tail almost as long as or slightly shorter than the rest of the body. These skinks are generally found under rocks in clear areas in or around forests or grasslands. The *L. guentheri* from central Western Ghats are generally much darker

**Figure 8 (left).**

*Lygosoma punctata*

Credit: Saunak Pal

**Figure 9 (right).**

*Lygosoma guentheri*

Credit Saunak Pal



**Figure 10.***Lygosoma lineata*

Credit: Ishan Agarwal



in colour than the ones from the northern Western Ghats. They are often confused with *L. punctata* because of their similar colour and shape. *L. guentheri* unlike *L. punctata* is much more elongated and has a black dot on each scale, including on the ventral side of the body, even after attaining adulthood.

### *Lygosoma lineata*

*L. lineata* is endemic to peninsular India and is found largely in dry flat open areas or grasslands with lots of rocks. They are generally seen under rocks or among leaf litter. They have a thin vermiform body and the juveniles of this species may have a bluish tail.

### *Eutropis carinata*

**Figure 11.***Eutropis carinata*

Credit: Ishan Agarwal



*E. carinata* is one of the largest species of this genus and is known to be widespread all over the Indian subcontinent. They are generally found on the ground around rocks or bushes and, human habitation. On occasions they are also known to climb large trees where they remain inactive in tree holes or under the bark at night. It is likely that this species consists of more than one lineage, but detailed phylogenies are needed to reveal such a pattern as they are morphologically quite similar throughout the country.



**Figure 12.***Eutropis macularia*

Credit: Ishan Agarwal

***Eutropis macularia***

*Eutropis macularia* is another widespread species and is found throughout the Indian subcontinent. It was also earlier reported from Southeast Asia but recent studies revealed that they are quite different from the ones in the Indian subcontinent. Even within the Indian subcontinent, there may be multiple lineages within this species which requires detailed phylogeographic study. This species is also found commonly around human habitation and among leaf litter, often seen to be sympatric with *E. carinata*. The males of this species have a bright red-orange coloration on the throat in the breeding season, while the females are more drab coloured.

***Eutropis allapallensis***

*Eutropis allapallensis* is an endemic to Peninsular India and closely resembles *Eutropis macularia*. This species is often found sympatric with *E. macularia* among leaf litter and around bushes across its range. The males of this species have a yellow colouration on the throat.

**Figure 13.***Eutropis allapallensis*

Credit: Aniruddha Datta-Roy



**Figure 14.***Eutropis trivittata*

Credit: Deepak V.

***Eutropis trivittata***

This species is endemic to Peninsular India and is commonly seen among rocks in dry grasslands or edges of the forest. This species has 5 longitudinal stripes which extend along the whole length of the body till the base of the tail. The stripes are white, edged with black.

**The Biogeography of Skinks in Peninsular India**

Over the last few years, I have been carrying out my doctoral research on the biogeography and systematics of skinks using molecular phylogenetic tools. This has given me an opportunity to travel around the country and observe the remarkable diversity within this ancient family. Given their evolutionary history, I started with the question: why are there so many endemic species of skinks within the subcontinent and under what circumstances have these species become endemic within this vast and heterogeneous region? This question becomes even more interesting when we take into consideration the unique history of the Indian subcontinent itself. The subcontinent was attached to Africa, Madagascar and Seychelles till around 200 million years ago until it broke away and started drifting northwards. For about 30 million years, India was an isolated landmass slowly drifting towards Asia. The extended period of isolation and the fact that it travelled from the south of the equator must have had an impact on the biodiversity that the Indian landmass carried from Africa. Some Indian genera of skinks are quite speciose (for e.g., *Eutropis* and *Lygosoma*) and are represented by an impressive number of

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endemics species within the Indian subcontinent. As the Indian plate collided with the Asian landmass, there was an exchange of biota between them resulting in a few 'young' intrusive lineages entering India.

My work on *Eutropis* and *Lygosoma* suggests that, rather than being related to the African lineages, their ancestors came from Southeast Asia. Although the diversity of skinks in the Western Ghats appears to be relatively low compared to the rest of the Indian subcontinent, it is quite possible that the richness is severely underestimated owing to a lack of systematic surveys. Furthermore, *Kaestlea* and *Ristella* are endemic genera within the Western Ghats compared to the other speciose genera like *Eutropis* which have congeners elsewhere outside the Indian subcontinent. Many questions are as yet unanswered: Are *Kaestlea* and *Ristella* also a result of a young intrusion from Southeast Asia? Or do they have an independent evolutionary origin? Given the impressive heterogeneity at a landscape level within the Western Ghats, is the diversity of these two endemic genera underestimated?

We need to look for answers soon because much of the Western Ghats is under threat due to anthropogenic activities, despite its being one of the most heterogeneous and species rich regions of the world. Saving the forests of the Western Ghats becomes imperative because of the level of specificity some of the endemics have to their habitat. With the dearth of studies in the Western Ghats, a lot remains to be understood about diversity in this region.

### Suggested Reading

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