

Three Color Variants in the Malabar Pit Viper (*Trimeresurus malabaricus*)

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Photographs by the senior author.

The Western Ghats of India and nearby Sri Lanka are a global hotspot of biodiversity (Brooks et al. 2007). The Malabar Pit Viper (*Trimeresurus malabaricus*) is endemic to the higher elevations of the southern Western Ghats in southwestern India. This pit viper appears to be very secretive and is known to occur only near forest streams in the mountains (Smith 1943). The tropical rainforests of the Western Ghats, with an annual average rainfall >550 cm (220 in), currently provide ideal habitats, but are rapidly being degraded. This snake is typically green with a black pattern, especially on the tail. Although it is venomous, the Malabar Pit Viper is not considered lethal, probably because the venom lacks the enzyme hyaluronidase (Gowda et al. 2006). Other than some taxonomic and phylogenetic work (Malhotra and Thorpe 2004, Uetz and Hallermann 2009), little is known about this species, including its natural history.

Many snakes are variable in color and pattern, and such color morphs are popular with captive breeders. For example, Russell's Vipers (*Daboia russelii*) in southern India may be either melanistic or albinistic (Thorpe et al.



Map of southern India showing the Western Ghats and the study area in the Bisale Forests.



Habitat in the study area consists of tropical rainforest.



The most common color morph of the Malabar Pit Viper (*Trimeresurus malabaricus*) showing the distinct tail pattern.

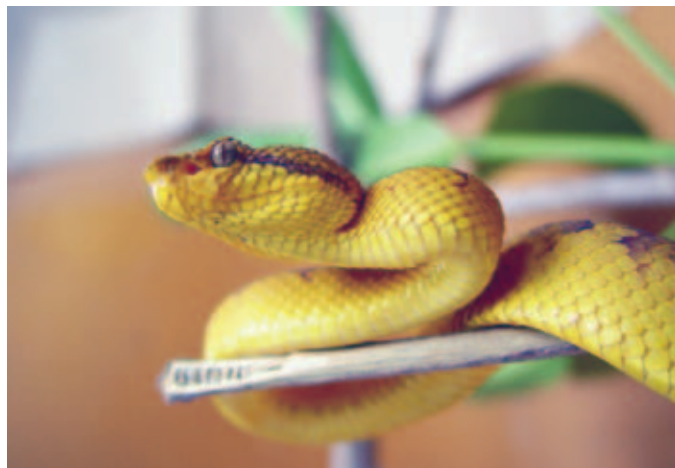
2007). However, color variants of Indian pit vipers are poorly documented. Here we report three color variations in sympatric Malabar Pit Vipers.

During the period 1999–2005, we observed 126 individuals of *T. malabaricus* to examine morphological variation and record natural history data. The study area, Bisale Forests (12°15'N, 75°33'E; elevation 800–1,000 m above sea level), is located along the western slopes of the Western Ghats near the borders of Dhakshina Kannada and Hassan districts in the southern state of Karnataka. The snake's habitat in this area is threatened by the proposed Gundia Dam project, which would inundate large areas of the forest and dramatically modify surrounding areas. We observed three distinct color morphs in the same geographic area. The first is the common form with a light green ground color and distinct dark markings. The second variant has only a faint pattern on a red ground color and the third has a bright yellow ground color with a faint but clearly discernible pattern. Tail markings are distinct in all variations, with the clear dark pattern probably used to lure prey.

These snakes employ an ambush prey-procuring strategy, which suggests that variations in color and pattern might facilitate crypsis. However, other than the pattern in the common morph serving to break up the snake's outline, we observed no correlations between snake color and background color or pattern, which was generally green (foliage) and occasionally black (snakes lying on rotting logs).



Markings on the red color morph of the Malabar Pit Viper are very indistinct.



The yellow variant of the Malabar Pit Viper has a faint but clearly discernible pattern.



The distinct tail pattern is conserved in the yellow color variant.

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