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Miscellaneous Natural History Observations of Large-scaled Forest Lizards, *Calotes grandisquamis* Günther 1875 (Squamata: Agamidae)

S.R. Ganesh[1] and S.R. Chandramouli[2]

[1]Chennai Snake Park, Rajbhavan Post, Chennai 600022, Tamil Nadu, India (snakeranglerr@gmail.com)
[2]Department of Ecology and Environmental Sciences, School of Life Sciences, Pondicherry University, Puducherry 605014, India (findthesnakeman@gmail.com)

Photographs by the authors.

The Large-scaled Forest Lizard (*Calotes grandisquamis* Günther 1875) is a rare and little-known agamid lizard endemic to the Western Ghats of India (Smith 1935; Das 2002; Ganesh and Chandramouli 2013; Venugopal 2013). Little is known of its natural history. This species has been reported to be stenotopic, restricted to rather undisturbed forest tracts with structurally complex vegetation (Kumar et al. 2002; Ishwar et al. 2003; Venugopal 2010). Vijaya (1984) reported an instance of nesting in the wild. Herein we present information on intraspecific interactions, clutch size, oviposition, juveniles, color change, and roadkills based on field observations in the southern Western Ghats during 2007 to 2015.

At 1803 h on 23 May 2008 in Munnar (10.176°N, 77.107°E; 1,300 m asl), we noticed an adult male perched conspicuously on top of cardamom leaves, bending the stem over to gain a vantage point (Fig. 1). This male was head-bobbing and repeatedly expanding its gular sac. Although in ecdysis, this male was even more brightly colored than another nearby male observed interacting with a female. We suggest that the lone male was displaying its nuptial coloration in anticipation of attracting a mate. At 1815 h, we observed a pair perched on a cardamom plant. The male was about 0.5 m above the ground, whereas the female was 1.2 m above the ground on the same stem and facing the male (Fig. 1). The male was visibly brighter green compared to the darker female. The male was gaping and expanding its gular sac. The female retreated and, although pausing frequently, continued moving upward away from the advancing male. The pair climbed a nearby liana onto a tree and were lost from sight about 1825 h.

On 6 April 2015 in Sivagiri (9.260°N, 77.304°E; 1,200 m asl), we observed an adult female on the ground at a burrow/nest. When approached, it fled into nearby vegetation. The nest contained 8 eggs, four of them were visible and four others were buried partly under soil (Fig. 2). The mouth of the burrow measured 7 cm in diameter. The eggs were white and oval and appeared hard with calcareous shells, which is typical of the genus. Eggs were not measured to avoid handling but were estimated at about 2.5 cm in length. We also examined a preserved female (SVL 12 cm) at the Sacred Heart College in Kodaikanal that contained at least six near-term ova (Fig. 2). Vijaya (1984) reported 11 eggs inside a nest measuring 6 x 4 x 4 cm and ovipositioning in October on the windward slopes of the Ghats, whereas Chandramouli and Ganesh (2011) reported the latter during February on the leeward slopes. Those observations and the records herein of nesting and the presence of a juvenile in mid-April suggest that this species probably has an extended breeding seasons that might vary across disparate parts of its range.

At 1350 h on 9 April 2015 in Sivagiri, we observed a juvenile (SVL 7 cm) on a branch about 1.2 m above the ground. When first sighted, it was bright green with white transverse cross bars (Fig. 3). Slowly and apparently in response to our proximity (about 1 m), it changed to a drab sandy brown with feeble white bars (Fig. 3) and it tried to hide behind the branch. Similarly, at 1335 h on 5 June 2007 in Nelliampathy (10.533°N, 76.687°E; 1,000 m asl), we observed an adult male that was verdant green when first encountered, but presumably in response to our presence, it turned drab olive, with black temples, snout with deep red lips, and indistinct black crossbars on its trunk (Fig. 4). After we retreated to a distance of about 5 m, it reverted to its bright green dorsal color. Chandramouli (2009) described an apparently aberrant female with white crossbars in the Ponmudi Hills (8.681°N

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Fig. 1. An adult male Large-scaled Forest Lizard (*Calotes grandisquamis*) in ecdysis perched on top of cardamom leaves (top). A female (above) and male (below) Large-scaled Forest Lizard (bottom).

77.102°E, 100 m asl). Physiological color change has been documented previously in the genus *Calotes* (Jayasekara and Dharmarathne 2018) and Karthikeyan et al. (1993) reported stress-mediated color change in *C. nemoricola* when an individual that was drab brown when encountered in leaf-litter subsequently turned green inside a collecting bag.

On 8 March 2008 in the High Wavy Mountains (9.602°N, 77.313°E; 1,600 m asl), we found a road-killed individual (Fig. 5) on a blacktop road traversing cardamom plantations and patches of wet montane rainforest. Although flattened, it was fresh and limp, which allowed an accurate identification to species. However, the sex of the lizard could not be determined and its motivation for crossing the road

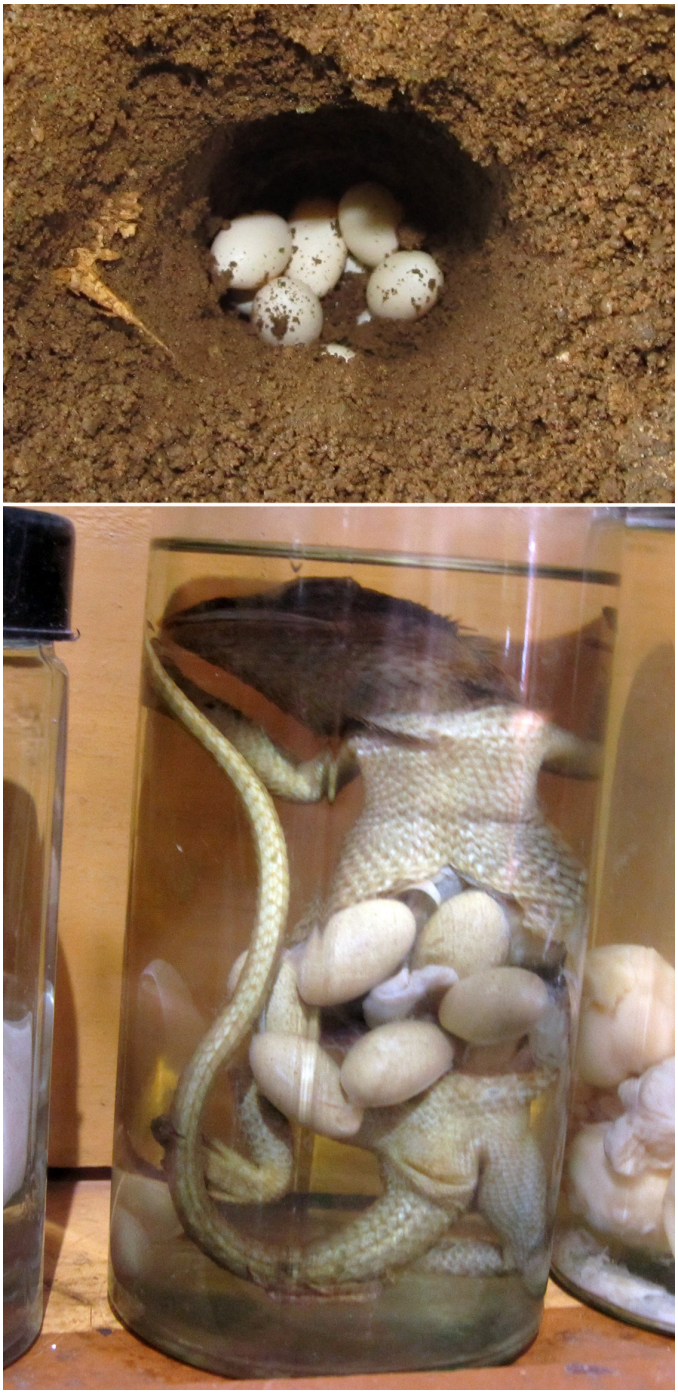

Fig. 2. Clutch of eight Large-scaled Forest Lizard (*Calotes grandisquamis*) eggs in a burrow (top). A preserved female Large-scaled Forest Lizard (SVL 12 cm) at the Sacred Heart College in Kodaikanal with at least six near-term ova (bottom).

Fig. 3. A juvenile Large-scaled Forest Lizard (*Calotes grandisquamis*) in a green-color phase when initially encountered (top) and in a brown-color phase apparently in response to our presence (bottom).

Fig. 4. An adult male Large-scaled Forest Lizard (*Calotes grandisquamis*) that was verdant green when first encountered turned drab olive with black temples, deep red lips, and indistinct black dorsal crossbars.

remains unclear. At 1945 h on 3 January 2011 in Anaimalai (10.469°N, 76.842°E; 800 m asl), we encountered an adult sleeping 1.4 m above the ground on a roadside plant during active night-time traffic (Fig. 5). Over a period of 10 min, neither our headlamps nor the occasional horns of passing vehicles (including some larger carriers) disturbed the sleeping lizard. Lizards of this species have been observed crossing roads although they were not represented in road-killed samples in a study done during May–June in the Anaimalai Hills (Vijayakumar et al. 2001). Bhupathy et al. (2011) reported on roadkills of herpetofauna in the High Wavys, but this species was not recorded. However, Chandramouli and Ganesh (2011) did mention a road-killed individual on a path bordering tea plantations. That and our observations suggest that this could be a cause of mortality not generally associated with this species.

Fig. 5. A road-killed Large-scaled Forest Lizard (*Calotes grandisquamis*) (top) and an adult sleeping on roadside vegetation (bottom).

Although *in situ* behavioral studies and ethograms ideally following the same and determinable individual are necessary to fully address the behavioral ecology of a species (e.g., Riley et al. 2007; Vitt and Pianka 2014), our anecdotal observations add to a piece-meal assemblage of different bits of data generated by observations of different individuals from throughout the species' range.

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