



The Indian Golden Gecko, *Calodactylodes aureus* (Beddome, 1870) in Tamil Nadu, India

The gekkonid lizard genus *Calodactylodes* Strand, 1926 is endemic to peninsular India and Sri Lanka (Bauer & Das, 2000). *Calodactylodes aureus* (Beddome, 1870), the first described species in the genus, was originally recorded from the Tirupati Hills, Andhra Pradesh state in India (Daniel *et al.*, 1986). In Andhra Pradesh, in addition to the type locality, it is recorded from the Araku Valley (Chettri & Bhupathy, 2010) and the Ananthagiri Hills (Sreekar *et al.*, 2010) both in the Visakhapatnam District, from Perantalapally in the Khammam District (Javed *et al.*, 2007; Sreekar *et al.*, 2010), from Maredumilli in the East Godavari District (Sreekar *et al.*, 2010), the Seshachalam Hills in Chittoor and Kadapa Districts (Guptha *et al.*, 2012) and the Tirumala Hills in Chittoor District (Nanda Kumar *et al.*, 2000). In Orissa state the species has been reported from Rayagada and Kalahandi Districts in the Niyamgiri Hills (Dutta *et al.*, 2005). Finally, in the state of Tamil Nadu the species has been recorded from the Balamathi, Valli Malai and Sathgar Hills in Vellore District, Nedumkunam Hill in Tiruvannamalai District and Shyed Basha Malai in Krishnagiri District (Bauer & Das, 2000; Rajashekhar & Nanda Kumar, 2007; Kalaimani & Nath, 2012).

The Indian Golden Gecko is a protected species and is included in Schedule I (Part II) of the Indian Wildlife (Protection) Act, 1972. In this paper, we discuss the current status of *C. aureus*, including its conservation, ecology, threats and recent distribution patterns from study locations at Melthiruvadathanur (Morambu), Karadi Parai and Sathanur Dam in Tiruvannamalai District, the Gingee Hills (7043.74 ha.) in Villupuram District and the Kailasagiri Hill (Ambur) in the Vellore District of Tamil Nadu state.

This paper is mainly based on the data collected by the authors during field visits totaling 47 days undertaken between December 2010 and April 2011. We searched all suitable habitats within a given area. At each site where the species was detected, an additional visit was made for the collection of ecological and population information. Surveys were conducted by daytime, but flashlights were used when necessary to spot the geckos. We recorded details of individuals (adults & juveniles), number of live (viable) unhatched eggs, egg-laying sites and cave habitats. The basic statistics, including the arithmetic mean and standard deviation were calculated for different variables and are given as $X \pm SD$. The presence of other lizard species was also noted. Species identification was based on Smith (1935).

Using the data from our second survey undertaken in March–April, 2011 a total of 515 individuals were recorded of which 46 were juveniles. The highest number of geckos (344 individuals) was recorded from the reserve forests of the Gingee Range, Villupuram Forest Division. In Tiruvannamalai District, the golden geckos were recorded on both non-residential private lands used by villagers for brick-making or small-scale agriculture and at Sathanur Dam (a tourism site). There were 108 individuals recorded from Melthiruvadathanur (Morambu) village in Thandrapattu taluk, 12 recorded from Karadi Parai and 34 recorded at Sathanur Dam (near the Crocodile farm). Seventeen were recorded at the Pilgrimage Centre at Kailasagiri (Table 1).

The species was encountered in rocky caves and in the crevices of large rock boulders during daytime (Fig. 1). The cave heights and lengths varied from 1.2–15 m and 0.5–17 m respectively. The rock boulder sizes varied from 1.5–15.5 m in height and 0.2–8 m in length. The distance from the nearest water

source varied between 0.5–125 m with 63% of sites within a 30-m distance. The geckos were encountered at an elevation range of 104–476 msl with 70 % of them at an elevation of less than 200 msl.



Figure 1: An adult *Calodactylodes aureus* at Siruvadi Reserve Forest, Gingee Range, Tamil Nadu.

A total of 242 egg deposition sites with hatched or unhatched eggs were found (Fig. 2). All surveyed caves and crevices where this species was detected had at least two egg deposition sites and the number of egg deposition sites varied from 2–30 at each site. The number of eggs in a cluster varied from 2 to 250+ in an egg deposition site. Eleven unhatched egg clusters, a total of 42 unhatched but viable eggs were observed during the study period. The eggs were found during both surveys, starting from December 2010 to April 2011. The number of unhatched but viable eggs in each cluster varied from 2–8 eggs. The size of the eggs ranged from 0.8 to 1.3 cm in diameter. The distance between the surface of the substratum (i.e., caves, crevices and boulders) and egg deposition sites ranged from 0.2 to 4.2 m, and 31% of deposition sites recorded were within one meter distance from the surface of the substratum. The sites where the eggs were attached to the roof of caves were 2.12±1.26 m above the ground level, while in the crevices, eggs clusters were 0.87±0.53 m above the ground level. The golden geckos were mostly (71.1%) found to lay eggs attached on the horizontal roof of caves and rock boulders with 28.9% of eggs laid on vertical rock surfaces.

Sympatric reptiles observed during the study included *Psammodromus dorsalis*, *Hemidactylus* sp., *Hemidactylus triedrus*, *Eutropis carinata* and *Lygosoma* cf. *punctatus*. Among these, *P. dorsalis* was more frequent than the others.

The present study confirms the presence of good breeding populations of *Calodactylodes aureus* in the Gingee, Sathanur Dam and Melthiruvadathanur (Morambu) areas of Tamil Nadu. The geckos were found in both vertical and horizontal crevices in the rocks and caves (Fig. 3). The temperature in these microhabitats was slightly less and the humidity higher than rocky surface areas as also reported by Rajashekhar & Nanda Kumar (2007). Comparatively large numbers of geckos were spotted in the caves where the moisture content was high and there was seepage of water from the rocks. Even though *Calodactylodes aureus* is distributed up to 1000 m a.s.l. in Andhra Pradesh and Orissa (Chettri & Bhupathy, 2010) we found all at low elevation except at Kailsagiri where the geckos were recorded at an elevation between 355–476 m a.s.l. The habitat characteristic of *Calodactylodes aureus* is very similar to the habitat of the Sri Lankan species, *Calodactylodes illingworthorum*, which is also found to occur between circa 125 to 800 m a.s.l, mostly in granite rock caves (Karunarathna & Amarasinghe, 2011).



Figure 2: Communal egg deposition sites at a rocky cave in Muttakadu Reserve Forest, Gingee Range.



Figure 3: A habitat of *Calodactylodes aureus*, Cave temple of Alaiyathi Amman at Siruvadi Reserve Forest, Gingee Range, Tamil Nadu.

According to Sreekar *et al.* (2010) this gecko prefers rocky areas with deep stream valleys. We also found that water is one of the essential aspects for choosing sites to live, as 63% of sites recorded were within 30-m distance of a water source. This may be related to prey abundance. Sreekar *et al.* (2010) reported that the gecko mainly feeds on insects and spiders.

The gecko has been reported to lay eggs in communal egg deposition sites on rocky surfaces (Bauer & Das, 2000; Javed *et al.*, 2007). In our study the eggs attached to the roofs of caves averaged more than two meters from the ground and the sites in which eggs were laid in crevices were less than one meter from the ground. This may be due to relatively lower predation pressure in crevices compared to the caves. Sreekar *et al.* (2010) found that sites that have eggs attached to roofs of caves averaging more than three meters from the ground and that sites in which eggs were laid in crevices had greater success relative to the eggs that were laid at a distance less than one meter from the ground. The gecko has been reported to lay eggs mostly on vertical rocks (Sreekar *et al.*, 2010) but we found that 71% of eggs were laid attached on the horizontal roof of caves and rock boulders. In a few sites eggs were laid at an older egg deposition site. Sreekar *et al.* (2010) found that viable eggs were only found during late June to September. In our study we noticed viable eggs between December 2010 and April 2011. This indicates that the egg

laying period may vary in different regions and can differ depending upon the climatic conditions, such as rainfall and humidity. In some places an unidentified species of sand wasp was found to make its nest on the previous egg marks of geckos.

We encountered the geckos in severely fragmented locations. A large number of individuals were recorded in the cave temples of Alaiyathi Amman, Duravapathy Amman, Durgai Amman and Pachai Amman in Siruvadi reserve forest of Gingee. With the exception of Melthiruvadathanur village and Kailasagiri Hill, the geckos were all spotted inside the reserve forests. At Melthiruvadathanur, the geckos were found on private land where the rock boulders were being blasted for stone quarrying.

The present study reveals that the distribution range of the Indian Golden Gecko is larger than previously known. This study adds new localities for this species at Gingee, Melthiruvadathanur village, Sathanur Dam and Kailasagiri Hill in Tamil Nadu. The species can be encountered in some other parts of Gingee and near Sathanur Dam. Due to undulating terrain and improper road networks we were not able to survey other places where the geckos may be found. Though commercial trade was considered as a major threat to this gecko (Molur & Walker, 1998), we did not come across any such instance.

Table 1: *Calodactylodes aureus* observed in Tamil Nadu from December 2010 to April 2011

District	Area	Status of Area	No. of individuals	
			1 st survey	2 nd survey
Villupuram	Muttakadu	Reserve Forest	36	110
	Siruvadi	Reserve Forest	80	119
	Pakkamalai East	Reserve Forest	72	115
Tiruvannamalai	Sathanur Dam, Thenpennai River	Holiday Destination	10	34
	Melthirvadathanur, (Morambu)	Private Land	44	108
	Karadi Parai	Private Land	4	12
Vellore	Kailasagiri (Ambur)	Pilgrimage Centre	20	17

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Literature cited

- Bauer, A. M. and I. Das, 2000. A review of the geckonid genus *Calodactylodes* (Reptilia: Squamata) from India and Sri Lanka. *Journal of South Asian Natural History*, 5 (1): 25–35.
- Beddome, R. H., 1870. Description of some new lizards from the Madras Presidency. *Madras Monthly Journal of Medical Science*, 1: 30–35.
- Chettri, B. and S. Bhupathy, 2010. Three little known reptile species from the Araku Valley, Eastern Ghats with notes on their distribution. *Journal of Threatened Taxa*, 2 (8): 1109–1113.
- Daniel, J. C., B. Bhushan and A. G. Sekar, 1986. Rediscovery of the Golden gecko *Calodactylodes aureus* (Beddome) in the Eastern Ghats of Andhra Pradesh. *Journal of the Bombay Natural History Society*, 83: 15–16.
- Dutta, S. K., B. Mohanty and P. P. Mohapatra, 2005. Niyamgiri unraveled. *Sanctuary Asia Magazine*, October: 56–59.
- Guptha, M. B., P. V. C. Rao, N. V. S. Prasad, S. R. S. C. S. Maddala, P. M. Babu and D. S. Reddy, 2012. Status of Herpetofauna in Seshachalam Biosphere Reserve, Eastern Ghats, Andhra Pradesh, India. *World Journal of Zoology*, 7 (2): 131–134.
- Javed, S. M. M., A. Waran and F. Tampal, 2007. On the occurrence of Golden Gecko *Calodactylodes aureus* in Papikonda Hills, Eastern Ghats, India. *Zoo's Print Journal*, 22 (6): 2727–2729.
- Kalaimani, A and A. Nath, 2012. A new locality and microhabitat usage by *Calodactylodes aureus* (Beddome, 1870) from Tamil Nadu, Eastern Ghats, Southern India. *Herpetotropicos*, 8 (1–2): 49–54.
- Karunarathna, D. M. S. S. and A. A. T. Amarasinghe, 2011. Natural history and conservation status of *Calodactylodes illingworthorum* Deraniyagala, 1953 (Sauria: Gekkonidae) in south-eastern Sri Lanka. *Herpetotropicos*, 6 (1–2): 5–10
- Molur, S. and S. Walker (eds.), 1998. *Report of the Workshop "Conservation Assessment and Management Plan for Reptiles of India"*. Zoo Outreach Organization and Conservation Breeding Specialist Group, Coimbatore, India: 175.
- Nanda Kumar V. N., K. M. V. Lakshmi, M. Rajasekhar, S. A. Basha, T. R. Krishna, 2000. Survey of golden gecko, habitat analysis and conservation in Tirumala Hills. *Ecology, Environment and Conservation*, 6 (4): 435–439.
- Rajshekhar, M. and N. V. Nanda Kumar, 2007. A new finding on the occurrence of golden gecko (*Calodactylodes aureus*) in the rock boulders near Vellore town. *The Bioscan*, 2 (1): 61–62.
- Smith, M. A., 1935. *The Fauna of British India, Including Ceylon and Burma. Reptilia and Amphibia Vol. II – Sauria*. Taylor and Francis, London: xiii+440+1pl.
- Sreekar, R., C. Srinivasulu, M. Seetharamaraju and C. A. Srinivasulu, 2010. Selection of egg attachment sites by the Indian Golden Gecko *Calodactylodes aureus* (Beddome, 1870) (Reptilia: Gekkonidae) in Andhra Pradesh, India. *Journal of Threatened Taxa*, 2 (11): 1268–1272.

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