

Some observations on communal nesting, nest-guarding, parental care, social organisation, and territoriality in wild *Gekko gekko* (Linnaeus, 1758) in Thailand

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The Tokay Gecko, *Gekko gekko* (Linnaeus, 1758), is a nocturnal and highly territorial lizard native to Southeast Asia, including Thailand (e.g., Cox et al., 1998; Cook-Price et al., 2025). It has been studied in captivity and some complex social behaviours otherwise rare among lizards have been identified (Bels and Russell, 2019; Verger et al., 2024; Szabo and Ringler, 2025; Szabo, 2026). These behaviours include biparental care, where both males and females coil around and aggressively defend their eggs; extended parental care, where juveniles reside with their parents for several months until they reach sexual maturity, forming temporary family groups; and communal nesting, where females share oviposition sites (Graves and Duvall, 1995). While these behaviours are well-documented through herpetoculture or in laboratory environments, reports from wild populations remain scarce and are often anecdotal (e.g., Grossmann, 2007; Obelgönnér, 2007; Ma and Carson, 2023).

In light of the frequent mention of behaviours like parental care and territoriality in captive *G. gekko*, it is unsurprising that Somma's (1990) extensive literature survey on parental behaviour in reptiles identified 18 sources for *G. gekko*, all but one from captive animals. The single exception was a comment in the photographic guide by Cox et al. (1998). Similarly, books provide photographic evidence of egg-guarding

in *G. gekko* but lack detailed ecological observations from the wild (e.g., Grossmann, 2007; Gaulke, 2011). This discrepancy highlights a significant gap in our understanding of these behaviours in natural settings.

In this paper, we present new field observations of *G. gekko* in Thailand, focusing on communal nesting, nest-guarding behaviour, parental care, social organisation, and territoriality. Our findings aim to bridge the gap between the well-known captive natural history and the largely unquantified social behaviours of this species in its native environment, thereby contributing to a more comprehensive understanding of its ecology and social structure.

Communal egg laying, nest-guarding, and territoriality. During 2009 and 2010, the first author documented communal egg-laying in a storage room of his home in Nikhom Song Kroh, Udon Thani Province (17.3559°N, 102.6521°E, elevation 219 m), totalling over 20 egg scars (representing at least ten previous clutches based on their specific in situ arrangement), two pairs of damaged eggs, and five developing eggs (Fig. 1A), for a total of at least 15 clutches by the end of the observation period. The developing eggs included three clutches (two, two, and one egg, respectively). Based on the presence of two pairs of recently laid, damaged eggs and three clutches of developing eggs (a total of five clutches), all similar in overall appearance and laid over a period of < 3 weeks, we can confirm that it was not a single female laying these clutches. *Gekko gekko* females can lay eggs every 30 days (Szabo and Ringler, 2025), and with a total of five clutches in near-simultaneous development (including the four damaged eggs) these eggs were likely laid by at least five females. Our observations further confirm that *G. gekko* females generally lay eggs in pairs (14 instances, 97% of eggs) but may also lay a single egg (one clutch). The eggs were attached to a flat, near-vertical wooden board that formed an A-shape with a second board that provided some cover for the clutches.

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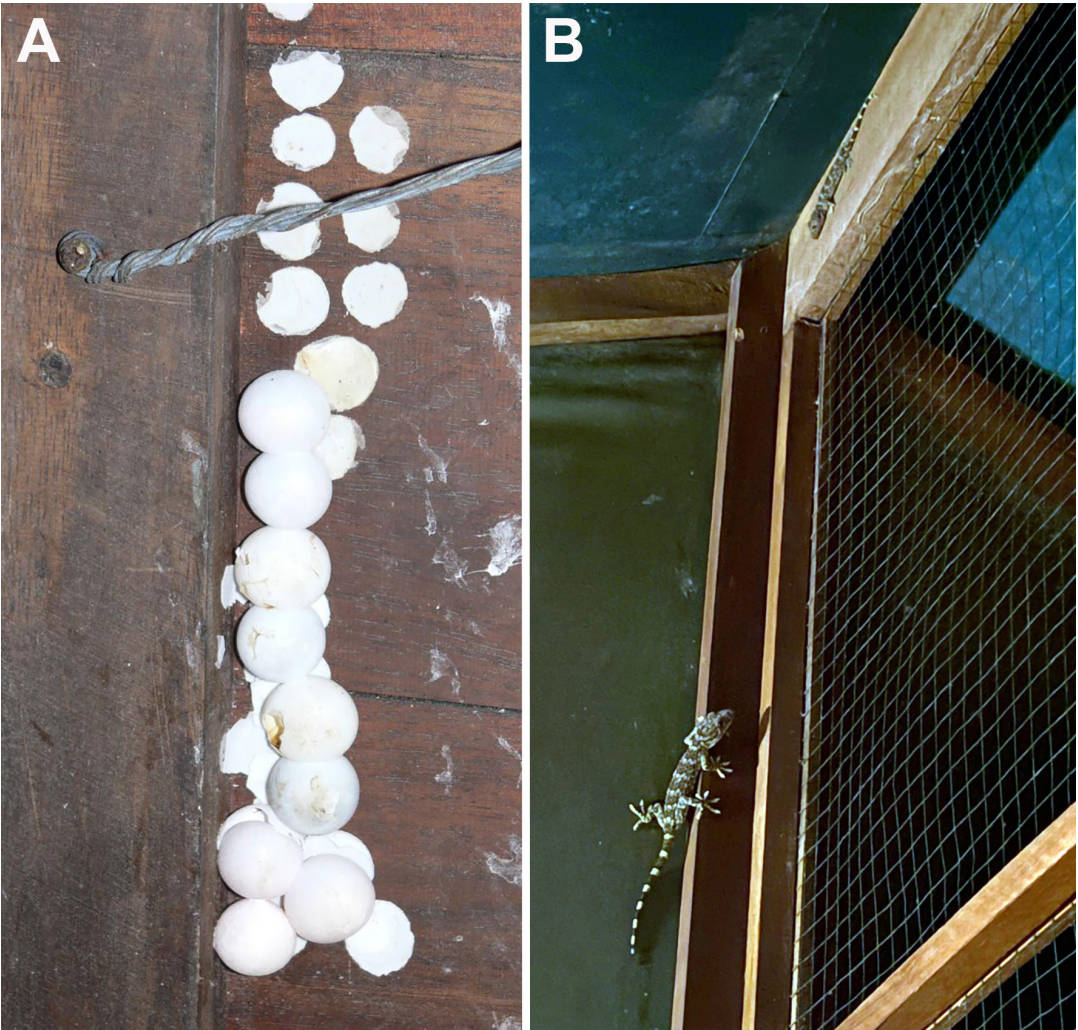


Figure 1. Observations of *Gekko gecko* in Thailand. (A) A communal nesting site in Udon Thani Province, showing evidence of at least 29 eggs. The bottom three eggs include a clutch of two eggs above a single, less-developed egg, suggesting that at least two females use this oviposition site. (B) An example of possible parental care in Surat Thani Province, with an adult (below) in close proximity of a juvenile (above). Photos by Michael Cota (A) and Isabel Kaiser (B).

The nest site was checked irregularly several times a week as part of regular household activities. Over time, whenever apparently viable eggs were present, an adult *G. gecko* of undetermined sex was invariably present in close proximity to the ovipositioning site. While it was not possible to determine how many individual adult geckos were involved, the apparent egg-guarding behaviour of a communal nest is noteworthy. Attending adults fled whenever the first author approached the nest site, which could be a distracting manoeuvre as opposed to a retreat for fear of predation (Plasman et

al., 2007). At each consecutive observation an adult was once again in attendance.

In the same residential complex, juvenile and adult *G. gecko* were active on two single-story structures (≤ 15 m apart), with the closest other buildings > 200 m distant. Tokay geckos at both buildings of the two-building residential complex were never observed to show any aggression towards each other. Over the observation period, territorial incidents were observed when an intruding adult could be seen on a building surface ordinarily occupied by a number of adults and

juveniles familiar to the first author. While it is not possible to be certain, we surmise that Tokay Geckos periodically arrived from other areas of the village, which would result in a short-lived stay by the intruder and a violent attack by the resident geckos, perhaps leaving the intruder severely injured. Violent territorial encounters of *G. gekko* have been reported previously, both in captivity (Borg and Borg, 1981) and in the wild (Kaiser and O'Shea, 2020), and while these appear to serve as examples of male–male territoriality, they may perhaps also function as protective measures against conspecific intruders by a social group whose adults are not just protecting an individual territory but a “home” area used by a small cohort.

Parental care. In 2005, the first author observed a *G. gekko* female with two hatchlings or juveniles near his residence in Khlong Song, Pathum Thani Province (14.0599°N, 100.6422°E, elevation 4 m) over a period of about one month. The trio emerged nightly from a damaged, leaning cinder-block wall at twilight, when the streetlamps turned on. With the adult female in the lead, the geckos moved from the top of the wall to a concrete utility and light pole. All proceeded up the pole and remained there for a while, likely to take advantage of the insect prey attracted by the light. Observations ended when the cinder block wall fell due to instability. The three *G. gekko* were apparently using exposed hollow spaces within the cinder block wall as a daytime refuge, and the female appeared to provide parental protection. An alternative scenario might be that older individuals might tolerate juveniles at a preferred feeding site, but confirmation of either option would require an experimental design. While an intimate type of care, where juveniles actively seek out the body of adults for protection, has been reported for both male and female parents (van de Hulst, 2001; Birgit Szabo, in litt.), the presumed parent in our observations merely accompanied her offspring during their nightly foraging. The behaviour of foraging near external building lights is common in geckos (e.g., Kaiser and Diaz, 2001; Perry and Fisher, 2006; Zozaya et al., 2015) and an accompanying parent might not only serve as a protector but also as a trainer (Szabo and Ringler, 2025; Chomik et al., 2026).

In June 2026, the second author made two observations of apparent parental engagement with juveniles that mirror the episodes reported for 2005. In Khao Sok Village, Surat Thani Province (8.9080°N, 98.5338°E, elevation 78 m), an adult *G. gekko* (SVL ca. 14 cm) was observed to reside in a wooden wall of a treehouse

lodging, where it could periodically be seen through an opening at the corner of the room. Each night during a three-night stay, a juvenile *G. gekko*, recognisable by its smaller size and a strongly banded tail, was observed in the same refugium. Both individuals were seen foraging together in the room bordered by the wall where they hid and could easily be photographed (Fig. 1B) because of their proximity.

The second observation occurred near the Khao Sok National Park Headquarters, Surat Thani Province (8.9163°N, 98.5274°E, elevation 73 m), where a large adult *G. gekko* (SVL ca. 18 cm) was observed on the wall of an ancillary building at the beginning of a night walk. This individual retreated into a crack between the wall and the roof when approached. Lower on the same wall, two juveniles were seen on the corner, both of which moved up the wall towards the adult when disturbed. At the end of the night walk, some 2 h later, the second author observed three *G. gekko* on the same wall, likely the same trio as observed earlier, but in closer proximity to each other.

Discussion

Our field observations from Thailand provide valuable and rare insights into the natural history of *G. gekko*, specifically regarding communal nesting, nest-guarding, parental care, social organisation, and territoriality in wild populations. These behaviours, while well-documented in captivity, have been reported only sporadically from natural settings. Our findings confirm that *G. gekko* can exhibit complex social behaviours in the wild that align with, and expand upon, existing knowledge from herpetoculture and experimental studies, highlighting the ecological relevance of these behaviours.

Communal nesting and nest-guarding. The observation of at least 15 clutches deposited over one breeding season at a single oviposition site in Udon Thani Province provides compelling evidence for communal nesting in *G. gekko*. While females of the species typically lay eggs in pairs (Grossmann, 2007), our observation of a single clutch with only one egg confirms that clutches of one egg occasionally occur, albeit at low frequencies. The presence of an adult gecko in close proximity to developing eggs throughout the observation period strongly implies nest-guarding behaviour. This aligns with findings from captive studies, where both parents have been observed coiling around and defending their eggs, presumably from the threat of human interference (Grossmann, 2007; Verger

et al., 2024; Szabo and Ringler, 2025). In a natural environment, the presence or action of a nest-guarding adult might be able to dissuade predators, such as snakes, from consuming eggs (e.g., Klauber, 1935; Broadley, 1979; Genter et al., 2026). The attending adult's flight when approached, followed by its fairly quick return, is not consistent with simple flight but more with a "distraction" or predator-avoidance strategy, as has been suggested for other egg-guarding reptiles (e.g., Plasman et al., 2007). These observations support the notion that nest-guarding is not merely an artifact of captive conditions but a genuine ecological strategy in wild *G. gecko*.

Parental care. The repeated observations of adults with juveniles provide some of the most detailed field evidence of possible post-hatching parental care in *G. gecko*. The 2005 observation of an adult female leading two juveniles on nightly foraging excursions to a streetlamp suggests that parental care extends beyond simple protection of the nest to include active guidance of offspring to profitable foraging sites. This is particularly significant because foraging near artificial lights is a common behaviour in geckos (Kaiser and Diaz, 2001; Perry and Fisher, 2006; Zozaya et al., 2015) that may be learned (Kobayashi et al., 2023). This interpretation is consistent with experimental work in Tokay Geckos, which has shown that the early social environment influences the expression of behaviour and cognition, including boldness and associative learning (Szabo and Ringler, 2025; Szabo, 2026). Specifically, individuals raised in a family group showed different behavioural responses compared to those raised in isolation, suggesting that parental presence shapes juvenile development (Szabo and Ringler, 2025; Szabo, 2026). The two observations from Khao Sok in 2026, where juveniles were seen in the same refugium as an adult and appeared to move towards the adult when disturbed, further reinforce the notion that adults provide protection to their offspring. This behaviour suggests that the adult may serve as a source of security and aligns with findings from other lizard species, such as White's skinks, *Liopholis whitii* (Lacépède, 1804), where offspring raised with their mother performed better in learning tasks, indicating that parental presence facilitates cognitive development (Munch et al., 2018). While our observations did not include the intimate hiding of juveniles under the parent's body reported by van de Hulst (2001) in captivity, they demonstrate that parental care in the wild can manifest as a less direct but still protective "accompaniment" during foraging.

Territoriality and social organisation. The territorial encounters observed at the Udon Thani site provide evidence for the intense territoriality of *G. gecko* in the wild, which is consistent with reports from both captive (Borg and Borg, 1981) and wild (Kaiser and O'Shea, 2020) settings. The pattern of established residents peacefully coexisting on adjacent buildings, but aggressively attacking unfamiliar intruders, suggests a structured social organisation where territories are defended against conspecifics from outside the residential animals. The severity of these attacks, sometimes resulting in injury, underscores the high stakes of territorial defence, which may be related to access to resources such as nesting sites, foraging areas, and mates. The presence of multiple adults and juveniles on the same buildings without aggression indicates that, within a stable group, tolerance is maintained, possibly through familiarity and individual recognition. This is supported by experimental work in tokay geckos, which has demonstrated that both sexes can chemically discriminate between familiar and unfamiliar mates using olfactory cues (Verger et al., 2024). Males, in particular, responded more strongly to the odour of a familiar mate, suggesting that chemical communication plays a crucial role in maintaining social bonds and territorial boundaries (Verger et al., 2024).

Synthesis and future directions. Collectively, our observations paint a picture of *G. gecko* as a socially complex lizard that exhibits communal nesting, extended parental care, social organisation, and territoriality in the wild. These behaviours appear to be not merely laboratory curiosities but integral to the ecology of these geckos. The consistency between our field observations and findings from captive and experimental studies suggests that tokay geckos are an excellent model for investigating the evolution of sociality and parental care in reptiles (While et al., 2014). However, many questions remain. Future research should focus on quantifying the frequency of communal nesting, determining the sex of attending adults, and investigating the duration and extent of parental care using mark-recapture studies and genetic analyses to determine relatedness and genetic sex (Szabo, 2026). Additionally, long-term studies are needed to understand the dynamics of territoriality and social group formation in wild populations. By bridging the gap between captive and field studies, we can gain a more comprehensive understanding of the ecological and evolutionary drivers of social behaviour in this iconic lizard.

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