

## A case of facultative aggregation in the oriental garden lizard *Calotes cf. versicolor* Daudin, 1802 (Squamata: Agamidae)

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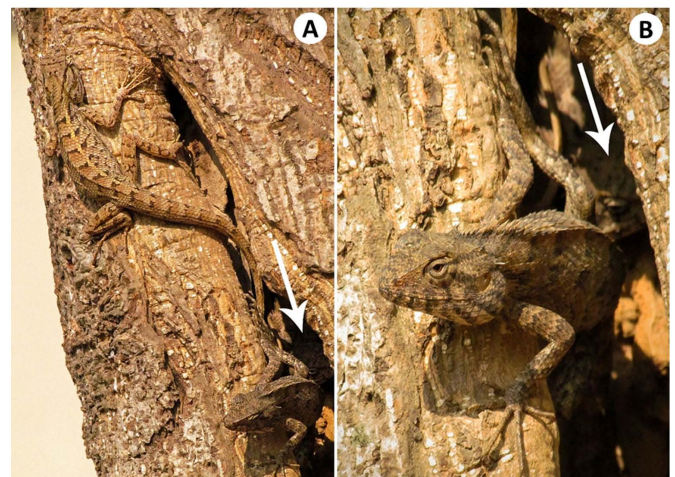
The evolution of sociality in animals has long fascinated biologists (Wilson, 1975). The simple act of initiating and maintaining contact with conspecifics may have been a precursor of complex social behaviours (Rabosky et al., 2012). There have been a significant number of longstanding studies on the evolution of social behaviours among birds, mammals, and certain insect orders (Wilson, 1975) while for reptiles such studies are much more recent (Graves & Duvall, 1995; Gardner et al., 2015; Whiting & While, 2017).

Over 94 species of reptiles belonging to 22 families are reported to show some form of aggregation or group living (Gardner et al., 2015). This number constitutes a minute proportion of the 9000+ extant species of reptiles. Aggregations are defined as “a group of conspecifics, composed of more than just a mated pair or a family, gathered in the same place but not intentionally organised or engaged in cooperative behaviour” (Wilson, 1975).

Here, we report an aggregation of *Calotes cf. versicolor* (Daudin, 1802) in Bolpur, Birbhum district, West Bengal state, India. On 12th December 2011, 11:00 h, an individual was spotted basking just outside a tree hole; subsequently, a second individual was seen emerging and a close-up photograph revealed the presence of a third individual inside the same tree hole (Fig. 1).

The individuals were provisionally identified as *Calotes cf. versicolor* by observing the laterally compressed body, distinctly keeled dorsal scales pointing backwards and upwards, absence of fold or groove in front of the shoulder, a continuous nuchal and dorsal crest, and two well-separated supratympanic spines (see Smith, 1935). Furthermore, we suspect one of the individuals to be an adult female based on the following secondary sexual characters - shorter nuchal and dorsal spines than males, absence of gular sacs, dorsum with dark crossbars on the lateral sides, and paired light yellow dorsolateral stripes running along the body length. (Pal et al., 2018; Smith, 1935). The sex of the other two individuals could not be determined.

Refuge sharing is particularly interesting as *C. versicolor* is popularly known to show agonistic behaviour towards conspecifics; adult male-male fights are common, and female-female aggression has also been observed in juveniles (Pandav et al., 2007; Ammanna et al., 2013; Ammanna, 2015; Barnes & Tipprapatkul, 2019). However, a “dear enemy” phenomenon was suggested by Ammanna et al. (2013) based on their intraspecific interaction studies on



**Figure 1.** Three *Calotes cf. versicolor* sharing a hollow in a tree - **A.** Female basking on the trunk, a second individual coming out of the hollow and a third individual within the hollow (indicated by white arrow) **B.** Close up of the tree cavity showing the second individual and a third individual (indicated by white arrow)

captive specimens. They reveal the presence of differential aggression towards familiar and non-familiar conspecifics, where the specimens showed reduced aggression towards familiar individuals and the familiarity dissipated after 30 days of physical separation. While this may have led to the mutual tolerance between the three individuals reported in this article, the cause for the aggregation in the tree hole may be associated with thermoregulation and predator avoidance. The average temperature in Bolpur during the winter months is around 15 °C with night time temperatures dropping well below that (Nandi et al., 2001). In such situations, the tree cavity provides relatively insulated protection from low temperatures, high winds, and predators when compared to their general nocturnal habit of sleeping exposed on plants and trees with the body pressed against the substratum (Khan & Mahmood, 2004). A congregation in reptiles may also augment inclusive fitness by increased warmth and protection from predators (Graves & Duvall, 1995).

The extent of such aggregations and conspecific tolerance in *C. versicolor* and allied taxa remains unexplored. Questions on the proximate causes and benefits of such aggregations in terms of collective fitness should be investigated using experimental studies.

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