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Unusual nesting behaviour in reptiles: egg-laying in solitary wasp mud-nests by the island endemic Annobon dwarf gecko (*Lygodactylus thomensis wermuthi* Pasteur 1962)

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Abstract. In this work we describe and discuss the first record of a reptile species using the constructions of solitary insects as egg-laying substrata. Annobon dwarf geckoes (*Lygodactylus thomensis wermuthi*) were found to lay eggs in mud-nests of solitary wasps in Annobon Island, Equatorial Guinea. This unusual nesting association may be common in the studied gecko, since we found seven gecko clutches in wasp nests situated at different locations, while no other nesting substrata were found for this taxon.

Key words: Annobon dwarf gecko, egg-laying, wasp nest, island endemic, Gulf of Guinea.

Reptile nest-site selection can have major impacts on maternal and offspring fitness through the influence of nest environment on fungal infections (Tracy 1980), embryos thermal stress (Angilletta et al. 2000), and hatchling traits such as size, colour, locomotor performance, behaviour and sex (Deeming & Ferguson 1991, Rhen & Lang 1995). Big nests of social insects are a special type of substratum used by some reptile species that take advantage of the microclimatic and/or security conditions created by these colonial constructions (reviewed in Riley et al. 1985). Several species of tropical lizards, amphisbaenians and snakes are known to lay eggs inside termite and ant nests (Riley et al. 1985, Ota et al. 1989, Andrade et al. 2006, Knapp & Owens 2008), with some of these reptile species probably being obligate in their nesting association with social insects (Riley et al. 1985). However, no nesting association between reptiles and solitary insects has been published to date.

Here we describe for the first time the nesting association between a reptile and a solitary insect, discovered in Annobon Island (Equatorial Guinea).

Annobon is a tiny (17 km^2) volcanic island situated in the Gulf of Guinea at more than 350 km from African mainland and 150 km from the nearest island (São Tomé). The steep relief of the island strongly influences the distribution of the four vegetation formations present in Annobon: dry grasslands in the north and south coasts give way to a tropical dry forest, which is gradually substituted by tropical wet forest in higher altitudes, with cloud forest covering the highest summits (Heras et al. 2002). Despite the reduced size of the island, at least five endemic reptile taxa are found in it (Jesus et al. 2003).

The Annobon dwarf gecko (*Lygodactylus thomensis wermuthi*, Gekkonidae) (Fig.1) is an endemic subspecies of the Gulf of Guinea dwarf gecko, which is also present in the is-

lands of São Tomé (*L. t. thomensis*) and Príncipe (*L. t. delicatus*) (Jesus et al. 2006). This diurnal species is widespread in Annobon dry and wet forests, foraging on trunks, branches and in the forest floor (authors, unpublished data).

In November 2008, at the end of Annobon dry season, we located several eggs of the Annobon dwarf gecko in two abandoned mud-nests constructed by solitary wasps of the family Sphecidae or Eumenidae. These gecko-occupied nests (Fig.2) were found attached to huge rocks in tropical dry forest at two different localities more than 1 km apart: near the north-east shore of the Apot Lake at 290 meters

Figure 1. Adult *Lygodactylus thomensis wermuthi* in wet forest of Annobon Island (photo by I. Rodríguez-Prieto).

Figure 2. Solitary wasp mud-nest in Annobon Island. White dwarf gecko eggs are partially visible in two of the nest chambers (photo by I. Rodríguez-Prieto).

in altitude (November 11th 2008), and near the island's west coast at 100 meters in altitude (November 17th 2008). Each nest, situated at a height of approximately 1 meter from the ground, was composed of 5-6 independent chambers. There were 2 eggs in each occupied chamber, with 3-4 chambers occupied by gecko eggs per nest. We collected and incubated in captivity four eggs in order to confirm identification. Eggs were 6 mm in length and were glued together in pairs as is usual in many *Lygodactylus* species (Bruse et al. 2005). Two Annobon dwarf gecko hatchlings emerged 12 days after collection, each hatchling measuring 13 mm of snout-vent length. The fact that eggs were glued together in pairs suggests that clutch size of Annobon dwarf gecko is similar to the usual clutch size found in other *Lygodactylus* species: two eggs (Branch 1998). This means that each mud-chamber was probably used as a laying site by one dwarf-gecko female, with several females using each wasp nest.

We did not find any more dwarf gecko nests in the island, so we can not determine whether wasp nests are a secondary nest-site substratum or the main substratum used by Annobon dwarf-geckos. Nonetheless, egg-laying in wasp mud-nests seems to be common in this gecko given that we found this association in two distant locations of the island, with several females attending each wasp nest, while no other nesting substrata were found for this taxon during three months of herpetological work in Annobon. Mud-nests could constitute a safe refuge from egg predators like the Annobon skink (*Mabuya ozorii*) (authors, obs. pers.). Alternatively, mud-nests could provide a thermal and/or humidity stable environment beneficial for embryo development (Riley et al. 1985). Nonetheless, this finding highlight a new link in the island ecological web, and this link could be of potential significance for the ecology and conservation of the endemic Annobon dwarf gecko. Further research is needed in order to elucidate the ecological determinants and implications of this unexpected association, and whether this nesting behaviour is also common in other *Lygodactylus* populations or it is an uncommon commensalism uniquely evolved in the isolated ecosystem of Annobon Island.

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