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Short Communication

Evidence of a communal nest of *Kentropyx calcarata* (Squamata: Teiidae) in the Atlantic Forest of northeastern Brazil

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Communal nesting (or communal egg-laying, joint nesting, colonial nesting, communal oviposition, egg dumping) has evolved several times independently in Squamata (Graves and Duvall 1995). Most squamate species nest solitarily and it is not clear what causes communal nesting. Rand (1967) suggested relative scarcity of suitable oviposition sites as a possible cause. However, communal nesting occurs in areas where nesting sites seem abundant, such as the Amazon rainforest (Magnusson and Lima 1984, Vitt *et al.* 1997, Lantyer-Silva *et al.* 2012). Also, some laboratory studies have demonstrated that nesting squamates actively seek sites where eggs have been deposited previously (Plummer 1981, Brown and Shine 2005, 2007), thereby rendering Rand's hypothesis controversial. Other hypotheses argue that communal nesting is adaptative and results in fitness benefits to the hatchlings (Doody *et al.* 2009). According to the latter hypothesis, females will actively select oviposition sites that contain eggs in preference to other available, but empty; their offspring are thought to benefit in some way from communal incubation. Radder and Shine (2007) suggested that communal incubation enhanced offspring body size and locomotor speed in the scincid lizard *Bassiana duperreyi* (Gray, 1838). This study indicated that communally incubated eggs took up less water, but these smaller eggs yielded larger hatchlings than singly incubated eggs.

Kentropyx calcarata Spix, 1825 is a forest-dwelling teiid lizard distributed through eastern Amazonia, the Atlantic Forest, and in riverine forests (gallery forests) of the Cerrado (Vitt 1991, Ávila-Pires 1995, Nogueira 2006). This species also occurs in relicts of montane and submontane forests (known as "brejos de altitude," or simply "brejos") surrounded by open vegetation in the Caatinga Region of Brazil

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(Borges-Nojosa and Caramaschi 2003). This heliothermic lizard is found in primary and secondary forests in open and sunny spots, as well as near streams, in clearings caused by fallen trees, and along forest edges. *Kentropyx calcarata* deposits its eggs in nests in the sand (Vitt 1991), in rotten trunks (Magnusson and Lima 1984), or in living bromeliads (Lantyer-Silva *et al.* 2012). The species produces from three to 10 eggs per clutch (average: 5.63 ± 1.23 eggs per clutch; Vitt 1991, Werneck *et al.* 2009). Only two records of communal nesting have been reported for this species. Magnusson and Lima (1984) found more than 800 eggs, including intact eggs and hatched egg shells in a tree stump in the Amazon area. And Lantyer-Silva *et al.* (2012) found 26 eggs distributed in three bromeliads in the Atlantic Forest; 19 were empty egg shells. Here, we provide the third report of a possible communal nest for *K. calcarata* and describe the communal clutch size, offspring development time, and measurements of the eggs and newborn lizards.

On 25 January 2012, during the dry season in the region, we found a fresh egg clutch of *Kentropyx calcarata* in a fragment of Atlantic Forest near the city of Maragojipe, Bahia, in northeastern Brazil (12°55'16" S, 38°52'10" W, datum: SAD69). As we walked along an abandoned trail in the forest, we observed a *K. calcarata* jump from a tree stump and flee quickly into the forest. We then found a clutch of 20 eggs in a natural hole of the stump (Figure 1). Of these 20 eggs, 11 were intact, and nine were empty; this suggests that these eggs had already hatched. The eggs in the tree-stump cavity were subject to direct sun light because of the position of the entrance to the cavity. We collected the fresh eggs to incubate in laboratory. After one week, the development of one egg was evaluated; the presence of only a few blood capillaries indicated that the eggs probably were laid shortly before we found them. We incubated the eggs in a closed receptacle provided with vermiculite and kept them at constant temperature (25.5°C) and humidity (75%).

The tree stump containing the eggs was 25.0 cm high and had an external diameter of 6.5 cm. The internal chamber was 12.6 cm deep and 3.0 cm in diameter. The measurements of the 11 eggs (mean ± SD, range) were: length, 18.7 ± 0.6 mm, 17.3–19.7 mm; width, 13.4 ± 0.9 mm, 12.0–14.9; and fresh weight, 2.0 ± 0.06 g, 1.9–2.1. These eggs are much smaller than those found by Vitt (1991) in the Amazon Basin and approximate the size of a shelled egg in the oviduct shortly before deposition (Vitt 1991). The eggs were white and oval, and had a flexible, coriaceous shell. Seven of the nine empty eggshells were found around the tree stump and two at the bottom of the cavity with the fresh eggs. This suggests that the female might have removed the eggshells from the cavity before laying the new eggs.

The incubation period of the 10 remaining eggs (mean ± SD) was 49.5 ± 6.6 days. All eggs were fertile and hatched within two weeks (four on the 44th day; two on the 51st day, two on the 55th day, and the others on the 56th and 58th days). This incubation period in the Atlantic Forest is much shorter than the maximum incubation period of 83 days in the Amazon Basin (Vitt 1991). The measurements of the 11 hatchlings (mean ± SD, range) on the day they hatched were: total length 100.8 ± 2.3 mm, 98–106 mm; snout–vent length 33.0 ± 2.1 mm, 30–36 mm; tail length 67.9 ± 2.3 mm, 65–67.9 mm; and weight 1.04 ± 0.05 g, 1–1.1 g; these data are similar to the values reported by Vitt (1991) and Lantyer-Silva *et al.* (2012).

A female *Kentropyx calcarata* can produce from three to 10 eggs per clutch (average, 5.6 ± 1.2; Vitt 1991, Werneck *et al.* 2009). We found 11 intact eggs and nine eggshells (20 in total); thus, the nest could be a communal. Although it also is possible that all the intact eggs found in this study were of a single clutch, such large clutch size for this species has never been reported. Also, we noted a time gap of seven days between the first peak of hatchlings (44th day) and the second (51st day), even though they were maintained in the same conditions during

Figure 1. Tree stump containing a communal nest found in the Atlantic Forest of Brazil, in the city of Maragojipe, state of Bahia; front (**A**) and top view (**B**) of the stump, showing the eggs. Newborn *Kentropyx calcarata* hatched from the communal nest (**C**).

incubation; this suggests that there may have been more than one egg deposition event in this nest. The presence of old eggshells in the stump may indicate reuse of the nest site; perhaps female *K. calcarata* actively seek sites where eggs have been deposited previously, a behavior that is common in communal nesting species (Plummer 1981, Brown and Shine 2005, 2007).

It is important to mention that we cannot ignore the possibility of the nest reported in this study having been used for multiple clutches deposition done by the same female. Genomic information derived from the tissues of the newly hatched lizards will inform the hypothesized use of an oviposition site by multiple females,

The voucher specimens of the lizards were deposited in the Coleção Herpetológica da Universidade de Brasília, and their tissues are housed in the Reptiles and Amphibians Tissue Collection of this university.

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