

ish flanks in males and orange in females; the tail has alternating light and dark bands. Hatchlings are green in color and darken as they age (García and Ceballos 1994. *Guía de Campo de los Reptiles y Anfibios de la Costa de Jalisco, México*. Fundación Ecológica Cuixmala, A. C. Instituto de Biología, UNAM, México D.F. 184 pp.). This is the first report of albinism in this endemic Mexican species. Photographs of the specimen were deposited in the University of Texas at Arlington (UTADC 6980-82).

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GALLOTTIA GALLOTTI (Canary Lizard). NECTARIVORY. Hardly known a few decades ago, the phenomenon of lizards as pollinators and seed dispersers within insular systems has received increased attention in recent years, as demonstrated by the growing list of mutualistic interactions and studies on lizard ecology in oceanic islands (Hansen et al. 2007. *Am. Nat.* 169:534–542; Olesen and Valido 2003. *Trends Ecol. Evol.* 18:177–181).

Within the genus *Gallotia*, endemic to the Canary Islands (with seven described species), the omnivorous *G. galloti* is one of the best-studied members, reported as an important seed disperser (fleshy fruit represents >50% of its diet; Valido and Nogales 1994. *Oikos* 70:403–411), and which also consumes nectar from several plant species (Valido et al. 2002. *Acta Oecol.* 23:413–419; Valido et al. 2004. *J. Biogeogr.* 31:1945–1953). Herein, we add to this increasing list of *Gallotia*-plant interactions two new records of nectarivory and putative pollination by *G. galloti* on two Canarian endemics: *Canarina canariensis* (Campanulaceae) and the threatened *Lotus maculatus* (*Rhyncholotus* group; Fabaceae) on the island of Tenerife.

Between 8 and 31 March 2005, we recorded several visits of *G. galloti* (two juveniles and one adult male) to flowers of *C. canariensis* for nectar feeding in cleared sites in a laurel forest from northwestern Tenerife (Monte del Agua y Pasos, 630–760 m elev.). Most of the flowers visited by lizards were situated on the ground (on rocky substrate), facilitating access (Fig. 1). In only one case, a juvenile individual had to climb a flower resting on a tree branch, at ca. 1 m above the ground. All the interactions seemed to be legitimate, as the lizards had to contact stigmas and secondarily presented pollen on the style by inserting their entire heads into *Canarina* flowers to get to the nectar.

Our observations of *Gallotia*-*Lotus* interactions were made on the north coast of Tenerife (El Sauzal, approx. 10 m elev.). We used binoculars and video camera to observe the behavior of the lizards on and around the plants in a small, relict natural patch during three flowering periods (2006, 2007, and 2009). Between 26 and 30 March 2006, we monitored five plants during 12.5 h observation, in which 13 juvenile lizard individuals were detected. They visited a total of 28 flowers, but some of them made illegitimate visits ($N = 13$, 46.4%), since they tore apart one of the corolla lobes or chewed the calyx at the margin of its lobes to reach the nectar without contacting sexual organs. It was not until the 2009 monitoring that we could confirm legitimate visits by *Gallotia* adults, both female (Fig. 2) and male, as well as foraging movements between plants up to 6 m apart. In addition, *Lotus* flowers were visited for nectar by ants (Formicidae), solitary bees (Halictidae), the endemic butterfly *Cylyrius webbiana*

(Lycaenidae), and by an individual of the allochthonous micro-mammal *Mus musculus* (Muridae), but only the latter contacted floral reproductive organs.

Both plant species are considered to be bird-pollinated based on their floral characteristics (Dupont et al. 2004. *Funct. Ecol.* 18:670–676; Olesen 1985. *Bot. J. Linn. Soc.* 91:395–414), but bird visits have only been confirmed under natural conditions for *C. canariensis* (Valido et al. 2004, *op. cit.*; Rodríguez-Rodríguez and Valido 2011. *Amer. J. Bot.* 98:1465–1474). Therefore, our data are a stimulus for future assessments of the actual role of lizards in the reproduction of these plants. In the case of *C. canariensis*, this presumptive mutualistic interaction with *G. galloti* is expected to be favored at forest gaps and edges of roads crossing laurel forests, as road edges are proposed as dispersal corridors for this reptile (Delgado et al. 2007. *Biod. Conser.* 16:2949–2963). Introduced rodents *M. musculus* and *Rattus rattus* (Muridae), as well as the endemic gastropod *Plutonia lamarckii* (Vitrinidae), have also been observed feeding on nectar, although only the latter two are known for their herbivory effects on *Canarina* reproduction pattern, since they mainly consume floral reproductive tissues (Rodríguez-Rodríguez and Valido 2011, *op. cit.*).

Our observations on the relationship between *L. maculatus* and *G. galloti* during three consecutive years suggest that



FIG. 1. *Gallotia galloti* (male) approaching a *Canarina canariensis* flower to feed on nectar.



FIG. 2. *Gallotia galloti* (female) visiting *Lotus maculatus* flowers. By introducing the snout to reach the nectar, the reptile presses the keel down and consequently pumps the pollen out.

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PHOTO BY PEDRO FELIPE

the foraging behavior of this lizard is not a rare phenomenon. The high risk of extinction of this plant, catalogued as “critically endangered” (IUCN 2011. IUCN Red List of Threatened Species. Version 2011.1. www.iucnredlist.org), seems to be due to a combination of anthropogenic factors (e.g., introduced herbivores, intense collection, gardening, and habitat destruction), but some authors have also suspected that it could be a consequence of the extinction of past avian pollinators (Olesen 1985, *op. cit.*). According to this, bird visitation on *L. berthelotii*, another representative of the Canarian bird-flower element, has been recently recorded in non-native populations (Ollerton et al. 2009. *Naturwissenschaften* 96:221–232). But for *L. maculatus*, the only potential pollinator bird species that had been observed close to the plants of this natural patch was *Sylvia conspicillata* (Sylviidae), just once during ca. 30 h observation (F. Siverio, pers. obs.). This low arrival rate of a potential pollinating bird seems to be due to the absence of a shrubby corridor, apparently eradicated by human activity, between this species’ habitat and the isolated *Lotus* patch. If the *Gallotia-Lotus* interaction has occurred earlier or is a consequence of the restricted distribution of the plant is not possible to assess, but reality is that individuals of this sympatric lizard population are presently the most frequent flower visitors.

Some of the observations described here were made as part of the work for a documentary film series (Canarias, reductos de biodiversidad) on Canarian biodiversity conducted by Alas Cinematografía S.L. We thank Pedro Felipe and José J. Hernández for their valuable help in the field, as well as Jens M. Olesen and Benigno Padrón for reviewing an early draft of the manuscript.

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LEIOCEPHALUS CARINATUS (Northern Curly-tailed Lizard). **DIET.** A recent review documented that insular species of lizards are more likely to incorporate plant material (e.g., flowers, nectar, pollen) into their diets than mainland species (Olesen and Valido 2003. *Trends Ecol. Evol.* 18:177–181). *Leiocephalus carinatus* is commonly found on islands across the Bahamas and has been described as a mostly terrestrial species with a relatively diverse diet (Schoener et al. 1982. *Oecologia* 53:160–169). Schoener et al. (1982, *op. cit.*) investigated prey specimens from *Leiocephalus* lizards in the Bahamas and found that plant matter comprised up to 47.4% of their diet. Flowers and buds were commonly included. Here we report two observations of *L. carinatus* feeding on the epiphytic orchid *Cattleyopsis lindenii*.

On the morning of 26 May 2011, we observed an individual *L. carinatus* (>70 mm SVL) on a small island in the vicinity of Snake Cay, Great Abaco Island, Bahamas, consuming the flower of the orchid *C. lindenii*. The lizard climbed up a relatively thin tree trunk (ca. 3 cm diameter) before orienting itself in a lateral position in order to reach for the flower petals on a nearby branch (perch height: 94 cm; perch diameter: 1 cm). From this position, the lizard consumed most of the flower; only the base of the stigma was left on the inflorescence. A second observation was recorded on the afternoon of 27 May 2011. On this occasion, the lizard (a male, 130 mm SVL) was observed slowly moving across the ground and appeared to exhibit a searching behavior, in which it frequently stopped, assumed an alert posture, and slowly moved its head in different directions. After performing

one of these searches, the lizard quickly climbed up a tree trunk (ca. 5 cm diameter) to a height of 85 cm and tore one flower off the inflorescence of an orchid. After tearing off the flower, the lizard immediately returned to the ground, where it consumed the complete flower. While on the ground, the lizard repeatedly made exaggerated swallowing movements while engulfing the complete flower; this behavior lasted ca. 4 minutes. Although the lizards were not marked, the differences in SVL suggest that we observed two individuals.

On both of these occasions, the lizards climbed up perches in order to gain access to the flowers, and either consumed multiple petals or the complete flower. This suggests that the curly-tailed lizards were not eating the flowers as a byproduct of trying to catch an insect. Instead, *L. carinatus* might actively search for flowers as part of its diet. It has been suggested that lizards may act as pollinators for some species of plants (Olesen and Valido 2003, *op. cit.*), though in this case, by consuming the entire flower, *L. carinatus* may have an impact on the reproductive success of *C. lindenii*.

We thank M. Leal and D. Steinberg for encouraging us to report our observations and for reviewing the manuscript. We also thank the Bahamian Ministry of Agriculture and Bahamas Environment, Science, and Technology (BEST) Commission of the Ministry of the Environment for providing permits. These observations were made while participating on a Training Research Fellowship supported by National Science Foundation (DEB-0949357).

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LIOLAEMUS cf. ELONGATUS. TRAUMA SURVIVAL. The ingestion of unnatural food items can provoke multiple complications in an animal, such as gastrointestinal blockages, perforations, suffocation, and poisoning, often leading to death, but little scientific information is published on this subject. Published accounts on reptiles typically include larger taxa such as turtles, crocodiles, or large-bodied lizards (e.g., Gillett and Jackson 2010. *Biawak* 4:99–102; Trembath and Freier 2005. *Herpetofauna* 35:48–49). Observations on this subject in smaller lizards are

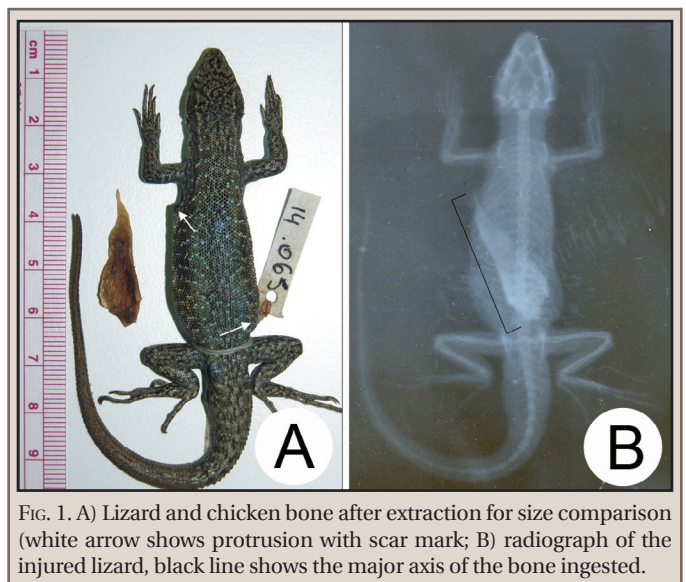


FIG. 1. A) Lizard and chicken bone after extraction for size comparison (white arrow shows protrusion with scar mark; B) radiograph of the injured lizard, black line shows the major axis of the bone ingested.