

New record of *Lepidodactylus lugubris* (Squamata: Gekkonidae) from Amazonas, Brazil, and notes on its feeding biology in urbanized environment
Novo registro de *Lepidodactylus lugubris* (Squamata: Gekkonidae) para o Amazonas, Brasil, e notas sobre sua biologia alimentar em ambiente urbanizado

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Abstract: We report the first documented record of the mourning gecko, *Lepidodactylus lugubris*, from the state of Amazonas, Brazil, expanding its known distribution within the Brazilian Amazon. Additionally, we provide observations on the feeding behavior of this species in urban environments of Belém, Pará. Individuals were frequently observed feeding on the nectar of various plant species, as well as on sugary artificial foods. These observations confirm the species' dietary plasticity and its ability to exploit anthropogenic food sources, which may facilitate its establishment and persistence in urbanized areas.

Keywords: Brazilian Amazon. Common smooth-scaled gecko. Gekkota. Mourning gecko.

Resumo: Relatamos o primeiro registro documentado da lagartixa *Lepidodactylus lugubris* no estado do Amazonas, Brasil, ampliando sua distribuição conhecida na Amazônia brasileira. Além disso, apresentamos observações sobre o comportamento alimentar dessa espécie em ambientes urbanos de Belém, Pará. Indivíduos foram frequentemente observados alimentando-se do néctar de diversas espécies de plantas, bem como de alimentos artificiais açucarados. Essas observações confirmam a plasticidade alimentar da espécie e sua capacidade de explorar fontes de alimento de origem antrópica, o que pode facilitar seu estabelecimento e persistência em áreas urbanizadas.

Palavras-chave: Amazônia brasileira. Lagartixa-de-parede. Gekkota. Osga.

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INTRODUCTION

Gekkonidae is the largest family of geckos, comprising about 60 genera and 1,734 species distributed in all biogeographic regions, but they are most numerous in tropical regions (Han et al., 2004; Gamble et al., 2008, 2015; Midtgaard, 2025). Until now, three species of Gekkonidae have been recorded from the Brazilian Amazon, but two of them, *Hemidactylus mabouia* (Moreau de Jonnès, 1818) and *Lepidodactylus lugubris* (Duméril & Bibron, 1836), are introduced species from the Old World (Ávila-Pires, 1995; Hoogmoed & Ávila-Pires, 2015; D'Angiolella et al., 2021). The only native species currently known from the region is *Hemidactylus palaichthus* Kluge, 1969 (Ávila-Pires, 1995). To date, no studies have provided evidence that these two invasive gecko species are directly responsible for declines in native species in Brazil.

The mourning gecko (*L. lugubris*) is native to coastal regions of the Indian and Pacific Oceans, where it is widely distributed (Hoogmoed & Ávila-Pires, 2015). It is a small, predominantly parthenogenetic gecko whose females reproduce clonally, producing genetically identical offspring without the need for males (Radtkey et al., 1995; Arteaga et al., 2022). This reproductive strategy enables single individuals to establish new populations with remarkable ease (Radtkey et al., 1995). This species is nocturnal and highly adaptable, occupying a broad range of habitats including coastal forests, urban areas, and human dwellings (Liebgold et al., 2019; Arteaga et al., 2022). Its diet is equally flexible, consisting of small arthropods, nectar, and occasionally artificial sugary food sources (Arteaga et al., 2022; Palheta et al., 2025).

These biological traits—parthenogenesis, dietary plasticity, behavioral flexibility, and tolerance to disturbed environments—make *L. lugubris* one of the most successful invasive reptiles worldwide. As a result, it has independently colonized multiple countries across the Americas, from Florida to northern Brazil, as well as several Caribbean islands, primarily via maritime cargo transport and possibly also by air transport (Hoogmoed & Ávila-Pires, 2015; Behm et al., 2019; Nania et al., 2020; Urrea et al., 2020).

Despite its wide distribution, this species was only recently recorded in Brazil, in the Brazilian Amazon (state of Pará) and the Atlantic Forest (state of Bahia) (Hoogmoed & Ávila-Pires, 2015; D'Angiolella et al., 2021; Bandeira & Missassi, 2022). The mourning gecko is found mainly in gardens, backyards and inside of residences in urban environments (Hoogmoed & Ávila-Pires, 2015), but there is little information about the feeding behavior of this species in these environments (D'Angiolella et al., 2021; Palheta et al., 2025). Given this knowledge gap, our study aims to document feeding events of *L. lugubris* in an urban area of the Brazilian Amazon, characterize the types of food items consumed, and evaluate the behavioral contexts in which these events occur.

MATERIAL AND METHODS

The specimens reported in this paper were observed in two localities of the Brazilian Amazon: 1) The research *Campus* of the *Instituto Nacional de Pesquisas da Amazônia* (INPA), an urban area of the city of Manaus, state of Amazonas, and 2) five places in the city of Belém, state of Pará (Table 1). Belém and Manaus are situated in the eastern and central sectors of the Brazilian Amazon Basin, respectively, and both exhibit a humid equatorial climate (Af, Köppen classification) characterized by high precipitation, persistently elevated humidity, and minimal thermal seasonality (Peel et al., 2007).

The specimen from INPA was not collected, but it was photographed with an Olympus Tough T-4 camera. The specimens from Belém were photographed with a Canon 70D with a 100 mm f/2.8 macro lens and a Speedlite 600ex flash, as well as with mobile phone cameras, and no individuals were collected. The observations were made opportunistically by the authors and two additional observers between 2017 and 2023. Since the specimens were not marked and the observations were made sporadically, it is not possible to determine whether the records from the same locality correspond to a single individual or to multiple ones.

Table 1. Locations, dates, and diel periods of feeding events of *Lepidodactylus lugubris* documented in urban environments of Belém City, state of Pará, Brazil.

Feeding behaviour	Locations	Coordinates	Date	Diel period	Figure
Feeding on nectar of ambarella flower (<i>Spondias dulcis</i>)	Third floor veranda of residence A	1° 25' 32.0" S 48° 29' 13.8" W	31/V/2017	Night	1C
Feeding on nectar of jungle geranium flowers (<i>Ixora coccinea</i>)	Garden of residence B	1° 25' 51.1" S 48° 27' 11.7" W	13/V/2020	Dusk	1D
Feeding on extrafloral nectaries on the stem of an American sicklepod (<i>Senna obtusifolia</i>)	Garden of residence B	1° 25' 51.1" S 48° 27' 11.7" W	12/XII/2020	Dusk	1E
Feeding on nectar of milkvine flower (<i>Matelea denticulata</i>)	Garden of residence B	1° 25' 51.1" S 48° 27' 11.7" W	17/VII/2023	Dusk	1H
Feeding on extrafloral nectaries on the pitcher of tropical pitcher plant (<i>Nepenthes</i> sp.)	Garden of residence C	1° 21' 58.6" S 48° 26' 43.9" W	04/II/2024	Night	1F
Feeding on extrafloral nectaries on a branch of an inga tree (<i>Inga</i> sp.)	Garden of residence C	1° 21' 58.6" S 48° 26' 43.9" W	28/VI/2025	Night	1G
Feeding on cake crumbs	Inside residence A	1° 25' 32.0" S 48° 29' 13.8" W	22/IX/2018	Night	2A
Feeding on chocolate milk	Inside residence A	1° 25' 32.0" S 48° 29' 13.8" W	2017	Night	-
Feeding on sweetened coffee	Inside residence B	1° 25' 51.1" S 48° 27' 11.7" W	2020	Night	-
Feeding on banana	Inside residence B	1° 25' 51.1" S 48° 27' 11.7" W	20/X/2020	Day	2F
Feeding on fruit juice inside a glass cup	Inside residence D	1° 26' 53.6" S 48° 27' 32.9" W	2018	Night	2B
Feeding on honey	Inside residence D	1° 26' 53.6" S 48° 27' 32.9" W	2018	Night	2G
Feeding on grape jelly	Inside residence D	1° 26' 53.6" S 48° 27' 32.9" W	2018	Night	-
Feeding on jaboticaba wine	Inside residence E	1° 26' 1.50" S 48° 27' 23.3" W	04/XI/2020	Night	2D-2E
Feeding on grape wine	Inside residence E	1° 26' 1.50" S 48° 27' 23.3" W	2020	Night	-
Feeding on beer	Inside residence E	1° 26' 1.50" S 48° 27' 23.3" W	2020	Night	-
Feeding on melted ice cream	Waterfront complexes (Estação das Docas)	1° 26' 53.5" S 48° 30' 0.28" W	11/IV/2020	Night	2C
Licking the feces of a palm tanager (<i>Thraupis palmarum</i>)	Outdoor area of residence B	1° 25' 51.1" S 48° 27' 11.7" W	23/XI/2020	Night	-



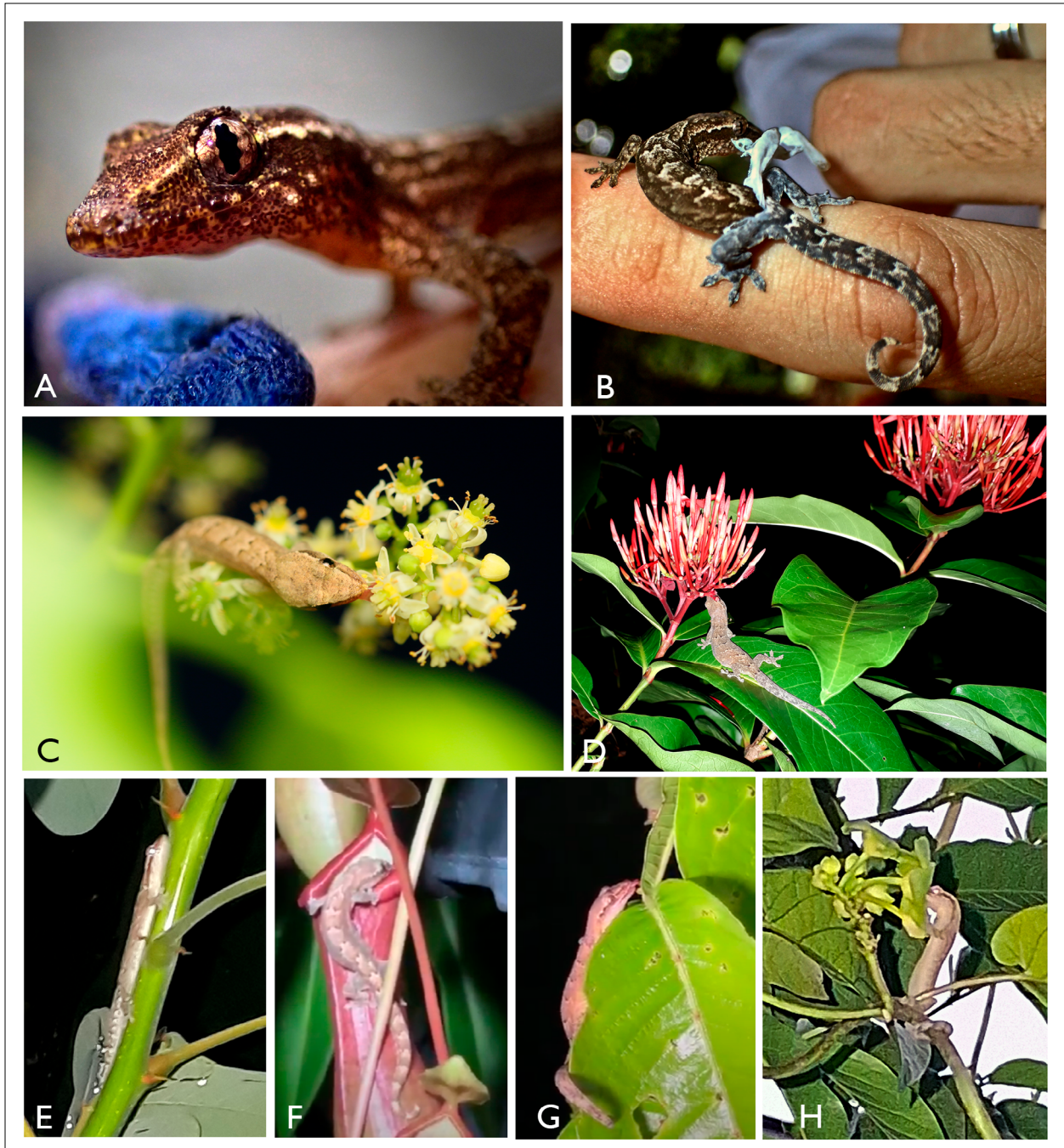


Figure 1. A-B) New record of *Lepidodactylus lugubris* from state of Amazonas, Brazil; C-H) New record of feeding events of *Lepidodactylus lugubris* on floral and extrafloral nectar sources in urban environments in the Belém City, Pará, Brazil: C) feeding on nectar of ambarella (*Spondias dulcis*) on the third floor veranda of a residence at night; D) feeding on nectar of jungle geranium flowers (*Ixora coccinea*) in a garden at night; E) feeding on extrafloral nectaries on the stem of an American sicklepod (*Senna obtusifolia*) in a garden at dusk; F) feeding on extrafloral nectaries on the pitcher of a tropical pitcher plant (*Nepenthes*) in a garden at night; G) feeding on extrafloral nectaries on a branch of an inga tree (*Inga* sp.) in a garden at night; H) feeding on nectar of a milkvine flower (*Matelea denticulata*) in a garden at dusk. Photos: C. A. Perez (A, B), C. A. C. Favacho (C, F, G), F. S. Carvalho-Filho (D, E, H).



Figure 2. Feeding events of *Lepidodactylus lugubris* on artificial and natural food sources in urban environments in Belém City, state of Pará, Brazil: A) feeding on cake crumbs; B) feeding on fruit juice inside a glass cup; C) feeding on melted ice cream; D-E) feeding on jaboticaba wine; F) feeding on banana; G) feeding on honey. Photos: C. A. C. Favacho (A), F. S. Carvalho-Filho (C, F), J. H. Viana (D, E), L. J. Guerreiro (B, G).

RESULTS AND DISCUSSION

At INPA, one specimen of mourning gecko was found under tree bark during the daytime, about 08:30 a.m., in front of a building in an area with sparse vegetation on 28th April 2017 (Figures 1A-1B). It was shedding its skin when it was found (Figure 1B). This is the first documented record of this species in the state of Amazonas and the second record from the Brazilian Amazon, where it had been recorded only in the state of Pará (Hoogmoed & Ávila-Pires, 2015; D'Angiolella et al., 2021; Palheta et al., 2025). Manaus is located about 1,294 km from Belém, if following a straight line, and the aerial and fluvial trade between these cities is intense. This may have favored the dispersal of the mourning gecko, as this species is primarily spread through transport on boats (Nania et al., 2020). However, considering that Manaus is one of the main commercial centers of the Brazilian Amazon region, receiving cargo from many parts of the world, it is possible that the population of *L. lugubris* from Manaus may have been established independently from that of Pará.

Specimens from Belém were observed six times feeding on nectar of native and exotic plants at dusk and during the night in 2017 and 2025 (Table 1). One individual was observed feeding on the nectar of the exotic ambarella flower, *Spondias dulcis* (Figure 1C), located in a vase on the third floor veranda of a residence. Other specimens were observed licking nectar from milkvine flowers, *Matelea denticulata* (Figure 1H), from extrafloral nectaries on the stem of American sicklepod, *Senna obtusifolia* (Figure 1E), on a branch of an inga tree, *Inga* (Figure 1G), an exposed nectary (a flower with a dropped corolla tube) of exotic jungle geranium, *Ixora coccinea* (Figure 1D) and from the exotic pitcher of a tropical pitcher plant, *Nepenthes* (Figure 1F), all of which were in gardens (Table 1).

Geckos are essentially carnivorous, feeding mainly on invertebrates (predominately insects and arachnids) (Bauer, 2013). However, some species also feed on sugary substances such as the nectar of flowers (Taylor & Gardner, 2014) and honeydew produced by insects (Fölling et al., 2001), including the mourning gecko, that has been

previously observed feeding on nectar (Perry & Ritter, 1999; Nafus, 2012; Palheta et al., 2025). Like the mourning gecko, ambarella is a species from Asia that has been introduced in many parts of the world (Mitchell & Daly, 2015), and it is found in gardens, plantations, and secondary forests. Both ambarella and the mourning gecko are found together in some localities along their distribution; thus, this plant may be a source of nectar for mourning geckos in Brazil and in other parts of the world where they co-occur. The species of the genus *Spondias* are pollinated by Hymenoptera, mainly bees (Roubik et al., 1986; Nadia et al., 2007), but it is possible that the mourning gecko is a secondary pollinator, as suggested by studies on other plant species (Perry & Ritter, 1999; Nafus, 2012). Several lizard species have been documented acting as occasional or even effective pollinators, including multiple geckos, which visit flowers to feed on nectar and inadvertently transfer pollen (Olesen & Valido, 2003; Romero-Egea et al., 2023). This broader ecological pattern strengthens the hypothesis that *L. lugubris* may also contribute to the pollination of *Spondias* species when nectar foraging occurs.

In the city of Belém, *L. lugubris* have also been observed feeding on grape jelly, jaboticaba and grape wines (Figures 2D-2E), beer, sweetened coffee, chocolate milk, melted ice cream (Figure 2C), artificial and natural fruit juices (Figure 2B), industrialized honey (Figure 2G), and cake crumbs (Figure 2A) in residences during the night under artificial light. Arteaga et al. (2022) and Palheta et al. (2025) likewise reported a comparable feeding behavior for this species, although they did not provide photographic records. To reach some of these food items, the specimens were observed entering cups, bottles, and climbing dirty dishes inside of sinks, even in the presence of humans in illuminated environments (Figure 2).

In addition to sugary artificial products, *L. lugubris* was also observed feeding on fruits in the urban area of Belém. Some specimens have been observed feeding on partially peeled bananas and pineapples during the daytime and at night. On one of these occasions, the first author observed a

mourning gecko walking on the floor, for about two meters, to reach a banana placed close to it on a work table at 10:00 am (Figure 2F). The mourning gecko did not appear intimidated by the presence of the observer; it climbed up the table leg and reached the banana. This observation suggests that mourning geckos, like other species of Gekkonidae, may possess well-developed nasal chemosensory abilities, as the individual was able to locate a banana located at least two meters away (Schwenk, 1993). One specimen was also observed licking the feces of a palm tanager (*Thraupis palmarum* (Wied, 1821)) on a glass window during the night. It is possible the specimen was attracted to the feces since they contained fragments of undigested papaya pulp.

As observed in this study and in others already published (Short & Petren, 2008; Sakai, 2019), *L. lugubris* shows low aversion to human presence, and this behavior may be linked to the species' broad distribution as animal–human interactions become increasingly close. Indeed, *L. lugubris* is often described as a 'human-commensal' gecko, thriving in synanthropic environments and exploiting anthropogenic habitats (Carranza & Arnold, 2006; Behm et al., 2019). This pattern of commensalism and urban-habitat colonization is well documented also for the invasive tropical house-gecko *H. mabouia* (Bonfiglio et al., 2006; Sousa et al., 2017). Given the clear ecological parallel between *L. lugubris* and *H. mabouia*, similar future scenarios can be suggested for the studied species, as human-dominated landscapes expand and human–animal contact intensifies, *L. lugubris* may broaden its geographical range further, especially in human-dominated areas.

The availability of sugary food resources in urban environments may play a key role in facilitating the establishment of *L. lugubris* in human-dominated areas. Food waste and the presence of sweet residues in kitchens, garbage sites, and commercial areas provide abundant and predictable resources for foraging. Combined with the species' low aversion to human presence, these conditions may significantly enhance its ability to occupy and persist within buildings. As *L. lugubris* readily exploits

anthropogenic food sources and tolerates frequent proximity to humans, its expansion in urban structures is likely to intensify, reinforcing its status as a successful invasive species in anthropogenic habitats.

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AUTHORS' CONTRIBUTION

F. S. Carvalho Filho contributed to conceptualization, data curation, investigation, methodology and writing (original draft, review and editing); and C. A. C. Favacho contributed to conceptualization, investigation, methodology and writing (review and editing).

