NOTE

Seychelles endemic geckos are feeding on honeydew excreted by Derbidae planthoppers

Les geckos endémiques des Seychelles se nourrissent de miellat sécrété par les cicadelles Derbidae

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Résumé - Les observations de quatre espèces de geckos endémiques des Seychelles se nourrissant de miellat sécrété par des cicadelles Derbidae également endémiques des Seychelles sont décrites. Il est conclu que le miellat peut être une ressource de sucre clé pour ces geckos dans les forêts de palmiers natifs de l'archipel.

Mots-clés - *Ailuronyx*, Alimentation, Intéraction trophique, Ouest de l'Océan Indien, *Phelsuma*

Sugar constitutes a key nutrient in the diet of omnivorous lizards that consume plant material, and is mainly obtained from flowers, fruits, and nectar (Cooper & Vitt 2002). An additional and increasingly recognized source of sugar for lizards is honeydew (Evans *et al.* 2015). Honeydew is a carbohydrate-rich waste product excreted by Hemiptera insects that feed on plant sap (Dhami *et al.* 2011) and therefore represents a secondary plant-derived sugar source, offering energetic benefits comparable to those of floral nectar (Evans *et al.* 2015). Interestingly, lizard consumption of plant-derived sugar, such as fruits and nectar, is generally higher on islands than on the mainland (Godinez-Alvarez *et al.* 2004), with 63% of fruit-eating and 95% of flower-visiting lizard species being found on islands (Olesen & Valido 2003). Likewise, multiple observations of lizards feeding on honeydew have been reported from island systems (Fölling *et al.* 2001, Towns 2002, Bauer *et al.* 2006, Okamoto & Jono 2023).

The Seychelles archipelago, in the Western Indian Ocean, harbours a rich diversity of endemic reptiles (Labisko *et al.* 2022). Many of Seychelles endemic lizards consume sugar-rich plant resources such as pollen, fruits and nectar (Cheke 1984, Roesch *et al.* 2024), and play key ecological roles such as in pollination (Kaiser-Bunbury *et al.* 2017) and seed dispersal (M. A. Roesch pers. obs). However, comprehensive information on the diet and trophic interactions of many Seychelles lizards remains limited.

Here, I describe and present video evidence (https://www.youtube.com/watch?v=OliEs3L7pI0) of four Seychelles endemic geckos feeding on honeydew excreted by Derbidae planthoppers. The Seychelles hosts a highly diverse planthopper fauna (infraorder Fulgoromorpha), comprising around eight families and 59 species (Holzinger *et al.* 2008). Most Derbidae planthoppers in the Seychelles are endemic and are associated with native palm species (Löcker *et al.* 2009).

All observations were made on Praslin Island, within the Praslin National Park (4.33° S, 55.74° E) at circa 200 m elevation. On 10 July 2024, at 20:42 h, I observed an adult *Ailuronyx tachyscopaeus* (Gerlach & Canning, 1996) on the stilt roots of the endemic *Verschaffeltia splendida*, licking honeydew excreted by an adult planthopper (Fig. 1A). The planthopper moved its abdomen to excrete honeydew, depositing droplets directly onto the snout of the gecko positioned behind it. The gecko licked the honeydew as soon as it was deposited. This behaviour was observed for approximately five

minutes, during which the gecko remained in the same position and continuously licked honeydew from its snout when deposited.

On 14 October 2024, at 22:21 h, I made a similar four-minute observation of another adult *A. tachyscopaeus* licking honeydew, this time from a nymph of a planthopper found on the trunk of a mature endemic *Lodoicea maldivica* (Fig. 1B). On the same palm at the same location on the trunk, I also observed two other gecko species feeding on planthopper honeydew. This involved an adult *Phelsuma sundbergi sundbergi* (Rendahl, 1939) on 15 October 2024 at 14:26 h (Fig. 1C), and an adult *Ailuronyx seychellensis* (Duméril & Bibron, 1836) on 23 October 2024 at 21:25 h (Fig. 1D). Both individuals fed for over five minutes, remaining still as they licked honeydew droplets deposited on their snouts by the planthoppers.

Finally, on 26 January 2025 at 11:14 h, I observed an adult *Phelsuma astriata semicarinata* (Cheke, 1982) licking honeydew from several planthoppers positioned on the stilt roots of *V. splendida* (Fig. 1E). The observation lasted for about three minutes.

Honeydew is an important sugar source for a wide variety of fauna, including insects, birds, mammals and lizards (Gardner-Gee & Beggs 2013). My observation of four gecko species feeding on planthopper honeydew, comprising both diurnal and nocturnal taxa, suggests that honeydew can be a key sugar resource for endemic geckos in the Seychelles. The extensive feeding duration was recorded until the geckos or planthoppers moved away due to human presence and would have likely lasted longer without disturbance. The visit of the same location on the trunk of *L. maldivica* by different taxa further highlights the attractiveness of this food source. Furthermore, my observations were made during both the dry (October) and wet (January) seasons, suggesting that planthopper honeydew is consumed year-round by the geckos. Compared to ephemeral flowers, fruits, and nectar, honeydew can therefore be a highly advantageous resource when its availability is temporally reliable and spatially predictable. The strong site fidelity exhibited by honeydew-feeding geckos (Fölling *et al.* 2001, Evans *et al.* 2015) suggests a possible strategy to minimize foraging costs and, consequently, reduce energy expenditure.

In Madagascar, endemic geckos, including species of the genera *Phelsuma*, *Lygodactylus*, *Blaesodactylus* and *Geckolepis*, have also been documented feeding on planthopper honeydew (Fölling *et al.* 2001, Jono 2015). Interestingly, some of these gecko species actively induced honeydew secretion by using specific head movements, prompting planthoppers to deposit droplets onto their snouts (Fölling *et al.* 2001). In contrast, none of the geckos in my observations exhibited any such movements to stimulate honeydew excretion. However, their positioning was similar, geckos consistently

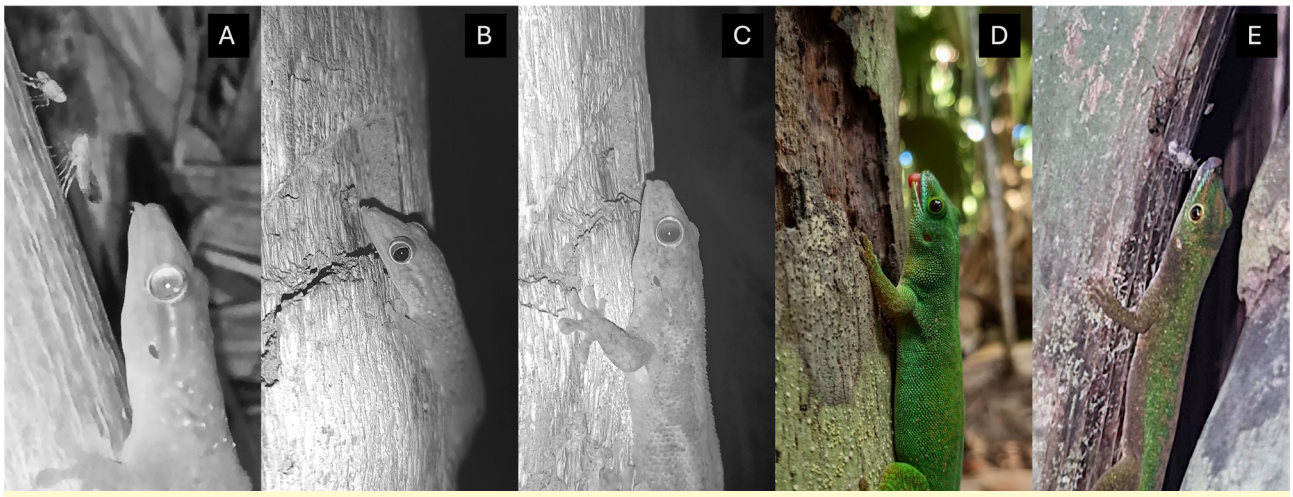

Figure 1 - Seychelles endemic geckos feeding on honeydew excreted by Derbidae planthoppers. *Ailuronyx tachyscopaeus* on the stilt root of *Verschaffeltia splendida* (A), *A. tachyscopaeus* on the trunk of Lodoicea maldivica (B), *Phelsuma sundbergi sundbergi* (C) and *Ailuronyx seychellensis* (D) on the trunk of *L. maldivica*, and *P. astriata semicarinata* on the stilt root of *V. splendida* (E).

Figure 1 - Geckos endémiques des Seychelles se nourrissant du miellat excrété par les cicadelles Derbidae. *Ailuronyx tachyscopaeus* sur une racine aérienne de *Verschaffeltia splendida* (A), *A. tachyscopaeus* sur un tronc de *Lodoicea maldivica* (B), *Phelsuma sundbergi sundbergi* (C) et *Ailuronyx seychellensis* (D) sur un tronc de *L. maldivica*, et *P. astriata semicarinata* sur une racine aérienne de *V. splendida* (E).

perched directly behind the planthopper's abdomen to receive the excreted droplets onto their snout. In Madagascar, Fölling *et al.* (2001) described the interaction as interspecific trophobiosis, whereas our observations, and studies from New Zealand and Japan (Evans *et al.* 2015, Okamoto & Jono 2023), reported no insect response, suggesting trophic commensalism. Whether planthoppers benefit from such interactions with geckos remains unexamined.

My observations were made on endemic palms, which are the main hosts for Seychelles Derbidae planthoppers (Löcker *et al.* 2009). Among these, *L. maldivica* is a keystone species within Seychelles palm forests, supporting a wide variety of both vertebrate and invertebrate fauna. Its pollen has been identified as an important food source for endemic *Phelsuma* and *Ailuronyx* geckos (Roberts 2009). The honeydew-feeding behaviour observed in this study further highlights the ecological role of *L. maldivica* in sustaining endemic gecko populations.

Moreover, these observations were made within Praslin National Park, where a control programme targeting the invasive ant *Anoplolepis gracilipes* was initiated in 2021 (SIF 2021). Prior to this intervention, observations of Hemiptera insects were rare and abundance of arboreal geckos were low (Kaiser-Bunbury *et al.* 2014). My observations on the presence of planthoppers and geckos, and their interactions, may therefore represent signs of recovery in response to control efforts. Similar patterns have been documented in New Zealand, where increased interactions between geckos and honeydew-secreting scale insects were observed following the removal of invasive mammals (Towns 2002).

The biology and ecology of planthoppers in the Seychelles remain poorly known. Further research is needed to investigate their host plants, abundance, and distribution to better quantify the importance of endemic palm forests for these insects, as well as to assess their vulnerability to invasive alien species. Additionally, studies should aim to quantify the extent to which geckos and other animals feed on planthopper honeydew, to increase our understanding of trophic relationships in the Seychelles palm forest habitat. Finally, to better understand the dietary importance of planthopper honeydew, a comparative investigation of its nutritional composition is warranted.

REFERENCES

Bauer A. M., Jackman T., Sadlier R. A. & Whitaker A. H. (2006). A new genus and species of diplodactylid gecko (Reptilia: Squamata: Diplodactylidae) from northwestern New Caledonia. *Pacific Science*, **60**: 127–135.

Cheke A. S. (1984), Lizards of the Seychelles. *In*: Stoddart D.R. (ed), *Biogeography and ecology of the Seychelles Islands*. Dr W. Junk Publishers, The Hague: 331–360.

Cooper Jr W. E. & Vitt L. J. (2002). Distribution, extent, and evolution of plant consumption by lizards. *Journal of Zoology*, **257**(4): 487–517.

Dhami M. K., Gardner-Gee R., Van Houtte J., Villas-Boas S. G. & Beggs J. R. (2011) Species-specific chemical signatures in scale insect honeydew. *Journal of Chemical Ecology*, **37**: 1231–41.

Evans A. E., Towns D. R. & Beggs J. R. (2015). Relative importance of sugar resources to endemic gecko populations in an isolated island ecosystem. *New Zealand Journal of Ecology*, **39**(2): 262–272.

Fölling M., Knogge C. & Böhme W. (2001). Geckos are milking honeydew-producing planthoppers in Madagascar. *Journal of Natural History*, **35**(2): 279–284.

Gardner-Gee R. & Beggs J. R. (2013). Invasive wasps, not birds, dominate in a temperate honeydew system. *Austral Ecology*, **38**(3): 346–354.

Godinez-Alvarez H. (2004). Pollination and seed dispersal by lizards: a review. *Revista Chilena de Historia Natural*, **77**: 569–577.

Holzinger W. E., Löcker H. & Löcker, B. (2008). Fulgoromorpha of Seychelles: a preliminary checklist. *Bulletin of Insectology*, **61**(1): 121–122.

Jono T. (2015). Feeding behavior on tree sap and planthopper-derived honeydew by a fish-scale gecko (*Geckolepis* sp.) in a dry forest of Madagascar. *Current Herpetology*, **34**(1): 85–88.

Kaiser-Bunbury C., Cuthbert H., Fox R., Birch D. & Bunbury N. (2014). Invasion of yellow crazy ant *Anoplolepis gracilipes* in a Seychelles UNESCO palm forest. *NeoBiota*, **22**: 43–57.

Kaiser-Bunbury C. N., Mougal J., Whittington A. E., Valentin T., Gabriel R., Olesen J. M. & Blüthgen N. (2017): Ecosystem restoration strengthens pollination network resilience and function. *Nature*, **542**(7640): 223227.

Labisko J., Maddock S. T., Rocha S. & Gower, D. J. (2022). Cryptic lineages among Seychelles herpetofauna. *In*: Monroe A.K. & Mayo S. J. (eds), *Cryptic Species: Morphological Stasis, Circumscription, and Hidden Diversity* (Systematics Association Special Volume Series). Cambridge University Press, Cambridge: 350 pp.

Löcker H., Löcker B. & Holzinger W. E. (2009). Revision of the Derbidae of Seychelles Islands (Insecta: Hemiptera: Fulgoromorpha). *Zootaxa*, **2221**(1): 1–26.

Olesen J. M. & Valido, A. (2003). Lizards as pollinators and seed dispersers: an island phenomenon. *Trends in ecology & evolution*, **18**(4): 177-181.

Okamoto K. & Jono T. (2023). Feeding behaviour on honeydew excreted by the Leucaena Psyllid, *Heteropsylla cubana*, by the Hokou Gecko, *Gekko hokouensis* Pope, 1928, on Iriomote Island, Ryukyu Archipelago, Japan. *Herpetology Notes*, **16**: 619–621.

Roberts V. (2009). Habitat preferences and niche partitioning among endemic geckos (Genus: *Ailuronyx*). MSc Thesis, University of East Anglia, UK: 52p.

Roesch M. A., Latsha J. & Appoo J. (2024). Nocturnal feeding observation of a Seychelles Sucker-tailed Gecko, *Urocotyledon inexpectata* (Stejneger, 1893), on the nectar of Seychelles Pitcher Plant, *Nepenthes pervillei*. *Herpetology Notes*, **17**: 735–738.

SIF (2021). Yellow crazy ant baiting SOP v2.0. Seychelles Islands Foundation, Victoria, Seychelles. Unpublished: 32p.

Towns D. R. (2002). Interactions between geckos, honeydew scale insects and host plants revealed on islands in northern New Zealand, following eradication of introduced rats and rabbits. *In*: Veitch C. R. & Clout M.N. (eds), *Turning the Tide: The Eradication of Invasive Species*, Gland, Switzerland, IUCN SSC Invasive Species Specialist Group: 329–335.

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