REPTILES & AMPHIBIANS

Effects of Invasive Tropical House Geckos (*Hemidactylus mabouia*) on Electrical Equipment: New Evidence of Damage to Televisions and Other Electrical Risks

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Although awareness of the impact of invasive geckos to biodiversity and as human commensals has increased recently, a general tolerance of house geckos and a low awareness of associated risks are pervasive in tropical and subtropical regions (Borroto-Páez and Reyes Pérez 2020b), with almost no effort made to control or mitigate their populations. Although reports of reptile-related damage to electrical equipment and circuits are rare (e.g., Fritts and Chiszar 1999; Chang et al. 2013; Borroto-Páez and Reyes Pérez 2020b), such incidents should be reported in order to raise awareness and avoid them and also as part of a general assessment of the full impact of invasive reptiles.

Seven species of geckos have been introduced to Cuba, four of which are largely commensal house geckos in the genus *Hemidactylus*; the Tropical House Gecko (*H. mabouia*) is the most abundant and widely distributed of these in both urban and rural settings (Borroto-Páez et al. 2015), indeed it is among the world's most widely distributed and invasive lizards (Rödder et al. 2008; Weterings and Vetter 2018).

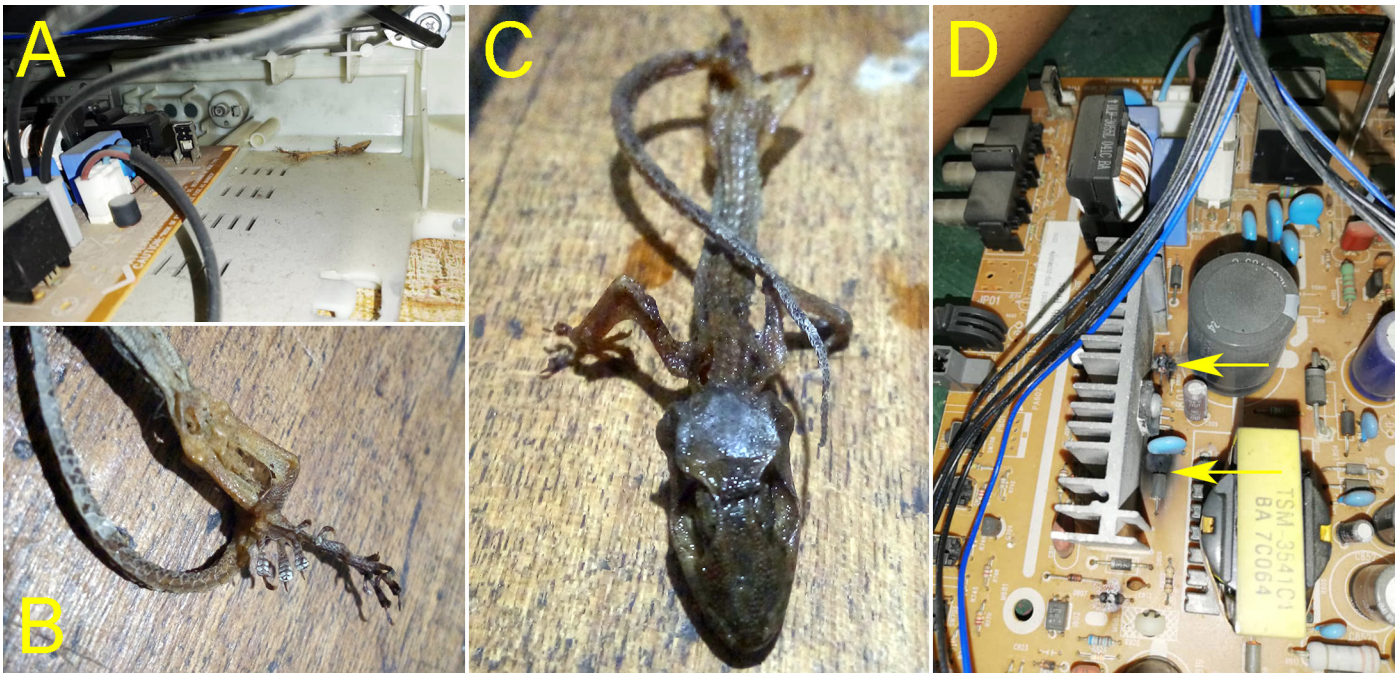

Fig. 1. The mummified remains of a Tropical House Gecko (*Hemidactylus mabouia*.) in a Daewoo television in Víbora Town, La Habana Province, Cuba (A), the lamellae on toes (B), the skull of the mummified gecko (C), and the yellow arrows indicating sites on the circuit plate burned after a short circuit presumably triggered by the gecko. Photographs by Javier Blanco, electrician (A, D) and Rafael Borroto-Páez (B, C).

Reptiles & Amphibians ISSN 2332-4961

Invasive geckos like species of *Hemidactylus* have been linked to negative effects on ensembles of native reptiles through competition and predation (Hanley et al. 1998; Powell 2003; Borroto-Páez and Reyes Pérez 2019, 2020a) and by introducing parasites and acting as potential vectors for diseases (Murphy and Myers 1993; Goldberg et al. 1998; Goldberg and Bursey 2000; Jiménez Quirós 2014; Weterings et al. 2019; Borroto-Páez et al. 2020). However, damage to electrical appliances has been poorly studied (e.g., Chang et al. 2013; Borroto-Páez and Reyes Pérez 2020b). For example, damage caused by geckos to air conditioners in Australia can cost over a thousand dollars and can ultimately lead to the total destruction of houses by fire (Withey 2011; Electro Systems 2020; Energy Safe Victoria 2020).

In previous reports on electrical damage in Cuba, Borroto-Páez and Reyes Pérez (2020b) identified 68 instances of gecko-induced damage to electrical appliances, 45 of them involving television sets. Other damaged appliances were air conditioners, computers (PC monitors, PC power sources, and motherboards), washing machines, audio sets, microwave ovens, and one instance of a lamp.

In general, however, damage to electrical equipment is not linked to geckos and is rarely published, limiting our knowledge of the true impact level of these invasive geckos. Since 2018 we have been surveying and examining the information available from the workshops of electrical technicians who repair domestic electrical appliances in Habana, collecting preliminary information on house-gecko damage from 19 of 22 interviewees to date, including three affected by damage without the involvement of an electrician.

The reported damage to electrical appliances is from short circuits resulting from live animals crawling over control panels, electrical plates, and on the primary source of the TV circuit plate, but other damage can also occur (Chang et al. 2013; Borroto-Páez and Reyes Pérez 2020b). These actions often electrocute the geckos and lead to decomposition or mummification accompanied by a loss of fluid; alternatively, live lizards seeking refuge in an appliance deposit moisture-containing excrement that can oxidize electrical components over time (Borroto-Páez and Reyes Pérez 2020b).

In October 2020, one of our collaborating electrical technicians reported a new instance of equipment damaged by the internal presence of a Tropical House Gecko (Fig. 1). The mummified gecko was identified by examination of toe lamellae and the skull. The television was a Daewoo 21-inch model DTQ-2130SSFM with a short circuit in the primary source of the TV circuit plate. Although the gecko was not at the site of damage, it probably had been moved when the TV was handled. The cost to owners of televisions with this type of damage is 500–1000 CUP (1 USD = 24 CUP, Cuban Pesos).

From December 2018 to December 2020, we collected 51 reports of televisions damaged by geckos (one involving an Ashy Geckolet, *Sphaerodactylus elegans*) (Borroto-Páez and Reyes Pérez 2020b) from interviews with 19 electricians and three other persons.

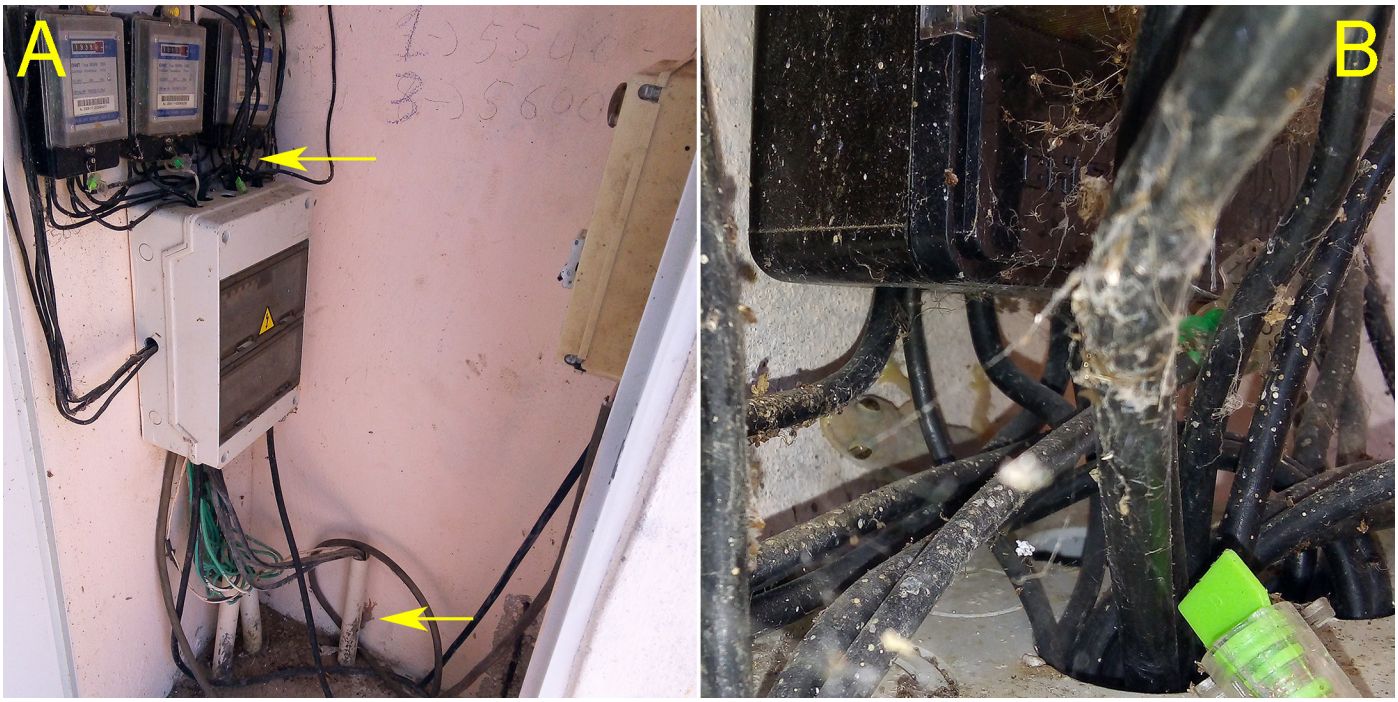

Fig. 2. Two adult Tropical House Geckos (*Hemidactylus mabouia*) in an electrical meter room (0.71 m^3) of a building in Corralillo Town, Villa Clara Province, Cuba (A), and a closer view of the gecko hiding between electric meter cables (B). Photographs by Rafael Borroto-Páez.

This type of damage occurs more frequently in older generation CRT (cathode-ray tube) TVs (45 incidents) than in newer LED TVs (six reports). While CRT TVs are less frequently used in Cuba, many lower-income families still have them. CRT TVs have more internal space and produce and dissipate more heat than LED TVs and thus are built with vents through which geckos can enter.

Electrical risks, however, are not limited to televisions and other small appliances. For example, an electrical meter room in a building with eight apartments in Corralillo, Villa Clara Province, Cuba, provides ideal habitat for house geckos (Fig. 2). In fact, geckos can complete entire life cycles in such spaces, exploiting resident arthropods or by taking sporadic, rapid excursions into adjacent areas. This particular room was used by at least four different individuals (2 adults, one subadult, and one juvenile) during August 2020. The high density of 5.63 individuals/m^3 in this reduced space can result in electrical hazards. When disturbed, the geckos hid in the electrical meter or entered fuse cases where they could short circuit any open fuses. The inhabitants of the building have never associated any electrical problems with the presence of geckos and they were unaware of the possible risks until we alerted them to the problem.

Also, geckos can occupy even very small spaces or reside in improperly installed electrical devices. For example, a gecko had laid an egg in the base of a wall lamp and we have observed house geckos hiding in the socket of this lamp when it was without a lightbulb (Fig. 3). A house gecko in the empty socket of a table lamp, in fact, had produced a short circuit (Borroto-Páez and Reyes Perez 2020b). Other examples include electric logs and outlets with gaps in covers allowing entry by nesting geckos (Fig. 4). Interviews with residents of Corralillo identified two additional unreported cases

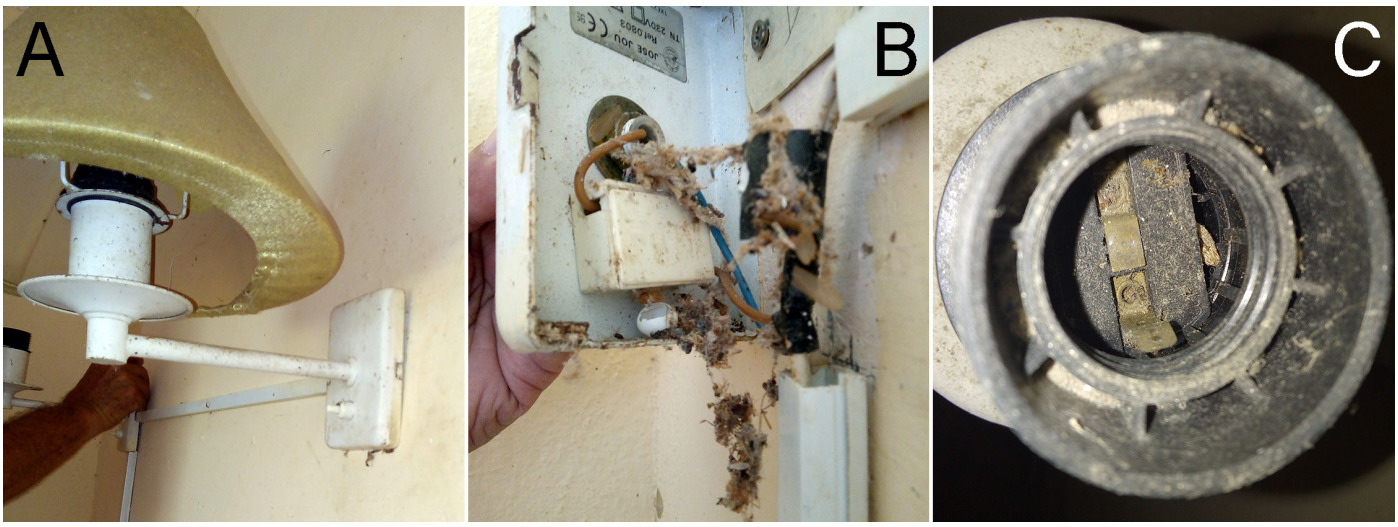

Fig. 3. The support base of a wall lamp used as a nest and refuge by a Tropical House Gecko (*Hemidactylus mabouia*) (A); the support base of the wall lamp with a hatched egg (B); and an open socket of the lamp without a lightbulb can provide refuge for geckos, thereby risking an electrical short circuit (C). Photographs by Rafael Borroto-Páez.

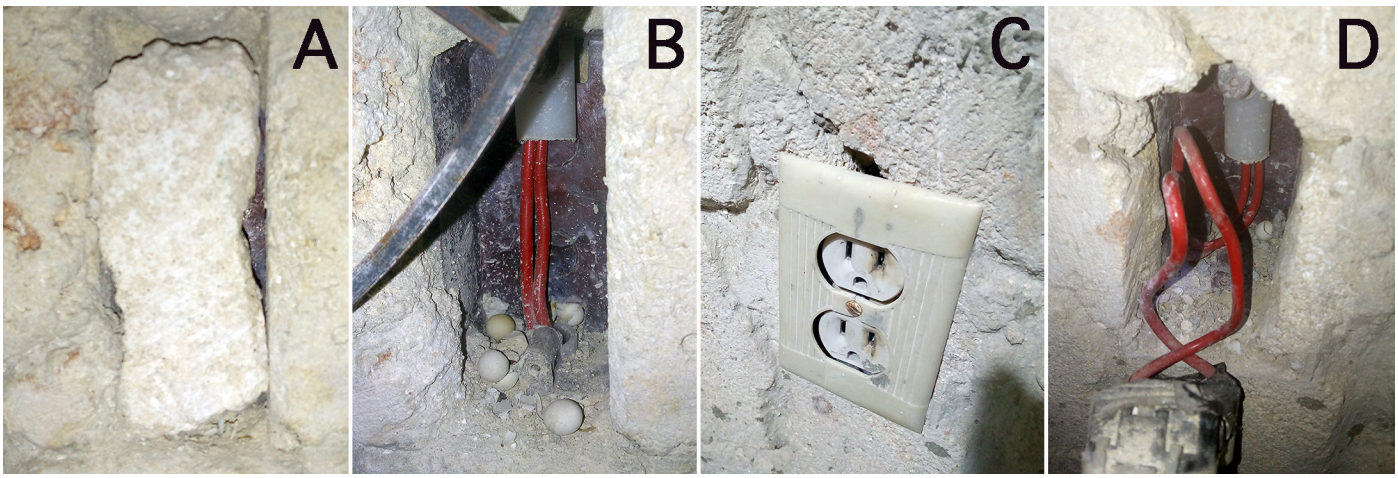

Fig. 4. An electric log (A) and an outlet (C) with gaps in covers that allowed access to nesting Tropical House Geckos (*Hemidactylus mabouia*) in Víbora Town, La Habana Province, Cuba. Note the eggs and eggshells (B & D). Also note the burn caused by a short circuit in the outlet that was never linked to the presence of house geckos. Photographs by Rafael Borroto-Páez.

of damage caused by house geckos (*Hemidactylus* sp.), one to the control panel in the water turbine room of the Elguear Hotel and another in an agricultural area.

Such a relatively low frequency of reports might reflect the limited association of electrical damage with the presence of geckos; nevertheless, three reports from the same electrical technician occurred within 20 months after we began our surveys in only one area of Habana (10 de Octubre Municipality). Those and other reports of damage to televisions suggest that many additional incidents would have been reported if the link to geckos had been recognized earlier.

Residents of few countries consider commensal house geckos more than an occasional nuisance, much less an electrical risk. Australia is a notable exception, recognizing the risks posed by geckos and establishing standard recommendations for the safe removal of animals and nests and sealing any gecko-accessible areas to stop further infestation and avoid damage (e.g., Energy Safe Victoria 2020).

Acknowledgements

We thank the electrical appliance repair technicians and other people surveyed for the information they provided, and especially Javier Blanco of the TV repair workshop "RGB," in Víbora, La Habana, for continuing to provide evidence of gecko-induced damage to televisions.

Literature Cited

Borroto-Páez, R. and D. Reyes Pérez. 2019. Competitive interference between the endemic Cuban Green Anole (*Anolis porcatus*) and invasive Tropical House Geckos (*Hemidactylus mabouia*). *Reptiles & Amphibians* 26: 43–46.

Borroto-Páez R. and D. Reyes Pérez. 2020a. Predation by a Cuban Treefrog (*Osteopilus septentrionalis*) and a domestic cat (*Felis catus*) on Tropical House Geckos (*Hemidactylus mabouia*) in central Cuba, with a review of predation and vertebrate prey of Tropical House Geckos. *Reptiles & Amphibians* 27: 120–128.

Borroto-Páez, R. and D. Reyes Pérez. 2020b. Damage to televisions and other electrical appliances by invasive and native geckos in Cuba. *Reptiles & Amphibians* 27: 50–53.

Borroto-Páez, R., R. Alonso Bosch, B.A. Fabres, and O. Alvarez García. 2015. Introduced amphibians and reptiles in the Cuban Archipelago. *Herpetological Conservation and Biology* 10: 985–1012.

Borroto-Páez, R., C. Martínez Rivera, and D. Reyes Pérez. 2020. Mites (*Geckobia hemidactyli*, Actinedida: Pterygosomatidae) in Tropical House Geckos (*Hemidactylus mabouia*) in Cuba: A review with new distribution records. *Reptiles & Amphibians* 27: 1–8.

Chang, C-W., J-J. Mao, and G. Norval. 2013. Damage to air conditioning units caused by geckos. *Reptiles & Amphibians* 20: 143–145.

Electro Systems. 2020. Geckos invading your homes electric systems can be disastrous. Electro Systems, Brisbane, Queensland, Australia. https://www.electrosystems.com.au/electricians-blog/geckos-invading-your-homes-electrical-systems-can-be-disastrous.

Energy Safe Victoria. 2020. Ensuring electrical safety in Victoria: Extending the prohibition on certain models of RCBOs. Regulatory Impact Statement, Energy Safe Victoria, Southbank, Victoria, Australia. https://www.vic.gov.au/sites/default/files/2020-05/Prohibition-of-Supply-of-Compact-RCBOs-under-the-Electricity-Safety-Act-1998-RIS.pdf.

Fritts, T. and D. Chiszar. 1999. Snakes on electrical transmission lines: Patterns, causes, and strategies for reducing electrical outages due to snakes, pp. 89–103. In: G.H. Rodda, Y. Sawai, D. Chiszar, and H. Tanaka (eds.), *Problem Snake Management: The Habu and the Brown Treesnake*. Cornell University Press, Ithaca, New York, USA.

Goldberg, S.R. and C.R. Bursey. 2000. New helminth records for one teiid and four gekkonid lizard species from the Lesser Antilles. *Caribbean Journal of Science* 36: 342–344.

Goldberg, S.R., C.R. Bursey, and H. Cheam. 1998. Gastrointestinal helminths of four gekkonid lizards, *Gehyra mutilata, Gehyra oceanica, Hemidactylus frenatus* and *Lepidodactylus lugubris* from the Mariana Islands, Micronesia. *Journal of Parasitology* 84: 1295–1298. https://doi.org/10.2307/3284696.

Hanley, K., K. Petren, and T.J. Case. 1998. An experimental investigation of the competitive displacement of a native gecko by an invading gecko: No role for parasites. *Oecologia* 115: 196–205. https://doi.org/10.1007/s004420050508.

Jiménez Quirós, R. 2014. Riesgo potencial para la salud humana por Salmonella proveniente del geco casero introducido (*Hemidactylus frenatus*) en dos regiones de Costa Rica. Unpublished Tesis de Magister Scientiae, Universidad Nacional, Heredia, Costa Rica.

Murphy, T.J. and A.A. Myers. 1993. A review of *Salmonella* infections in reptiles with particular reference to Gekkonidae. *Amphibia-Reptilia* 14: 357–371. https://doi.org/10.1163/156853893X00057.

Powell, R. 2003. Species profile: Utila's reptiles. *Iguana* 10: 36–38.

Rödder, D., M. Solé, and W. Böhme. 2008. Predicting the potential distributions of two alien invasive house geckos (Gekkonidae: *Hemidactylus frenatus, Hemidactylus mabouia*). *North-Western Journal of Zoology* 4: 236–246.

Weterings, R. and K.C. Vetter. 2018. Invasive house geckos (*Hemidactylus* spp.): Their current, potential and future distribution. *Current Zoology* 64: 559–573.

Weterings, R., M. Barbetti, and H.L. Buckley. 2019. Hypothesis: Do invasive house geckos exacerbate dengue fever epidemics? *Biological Invasions* 21: 3533–3543. https://doi.org/10.1007/s10530-019-02066-x.

Withey, A. 2011. Gecko air-conditioner damages cost thousands. Australian Broadcasting Corporation, 31 May 2011. https://www.abc.net.au/news/2011-06-01/gecko-air-conditioner-damage-costs-thousands/2740370.