

# Cohabitation, change in habitat use, and locality records for skinks and some geckos in the Society Islands, French Polynesia

Przemysław Zdunek<sup>1</sup>

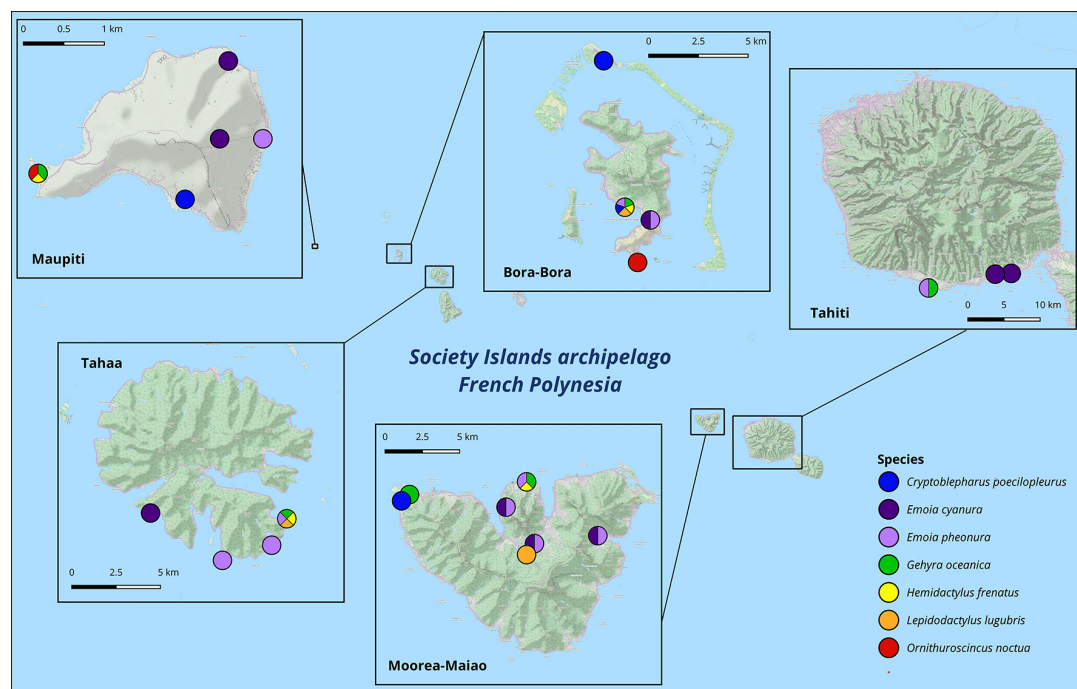
French Polynesia comprises 118 islands, including high-elevation volcanic islands and low-lying coral islands, that are grouped into five distinct archipelagos: Society, Tuamotu, Gambier, Austral, and Marquesas (Gargominy, 2003). Only two lizard families have representatives in the Society Islands: Gekkonidae and Scincidae (Ineich, 2016). These lizards are able to use a broad range of habitats, including those that have been modified by human development (Ineich and Blanc, 1988; Zug, 2013). Tourism and the expansion of built-up areas at the expense of forest habitats doubtlessly have a continuing impact on the existence of geckos and skinks on these islands, especially given the limited island area and the lizards' selective occurrences within islands (Langkilde et al., 2003; Tapper, 2006; Smith et al., 2012; Dotte and Kahn, 2017). However, the specifics of how human disturbance influences gecko and skink ecology in French Polynesia are still unknown.

I carried out observations on five islands in the Society Archipelago (Bora Bora, Maupiti, Moorea, Tahaa, Tahiti) from 4–18 September 2020 (Fig. 1). Each observed lizard was photographed and only records allowing positive identification were selected. Over 100 observations were obtained, and no animal was manipulated. I divided records by habitat (Table 1), including: arboreal (occurrence in trees and/or in the forest), littoral (coast, proximity to the beach), and modified (buildings, walls, home interiors, fences). Species names follow the most current taxonomy, including the adoption of *Emoia cyanura* (Lesson, 1828) for blue-tailed and *E. pheonura* Ineich, 1987 for brown-tailed Polynesian species of *Emoia* (Ineich, 2009, 2011, 2016), as well as placement into the genus *Ornithuroscincus* Slavenko et al., 2021 of the species *O. noctua* (Lesson, 1828), which until recently was a member of the genus *Lipinia* Gray, 1845.

On the basis of my observations, there appears to be a tendency among these species to overlap in habitat preferences (i.e., the expected strict divisions of habitats is not sustained but blurred) and there exists previously undocumented cohabitation (microsympatry). For example, the mottled snake-eyed skink *Cryptoblepharus poecilopleurus* (Wiegmann, 1836) is generally considered a littoral habitat specialist (Ineich and Blanc, 1988; Horner, 2007), but I document here that it may share modified habitats with *Emoia pheonura* (Fig. 2A, B). Such microhabitat overlap is particularly common on the most developed islands in terms of tourism and infrastructure (i.e., Bora Bora). In addition, the diurnal skinks share these same locations with the nocturnal geckos *Gehyra oceanica* (Lesson, 1826) and *Hemidactylus frenatus* Duméril & Bibron, 1836 (Fig. 2C, D). Blom (2015) observed on other French Polynesian islands (Austral: Raivavae, Rurutu, Tubuai; Society: Moorea; Tuamotu: Fakarava, Rangiroa) that *C. poecilopleurus* preferred arboreal rather than littoral habitats, which may also be due to human activity.

Despite the fact that *E. cyanura* and *E. pheonura* often share habitats, the former is much more common in forest habitats than the latter. Another difference is their thermoregulation, with *E. cyanura* inactive during rainy and cloudy weather, whereas the less photophilic *E. pheonura* continues its activities even on days with inclement weather (Ineich, 2016). In some cases, *E. cyanura* selected habitats that overlapped with those also used by *E. pheonura*, particularly those in proximity of human habitats, but this is not so common (pers. obs.). Records of *E. pheonura* on Tahaa indicated that these lizards might be adapting to life inside human habitats (Fig. 3A, B), which may serve them as a refuge against predators and offer a reliable food source in the form of insects. The same dependence can be observed in house geckos that hunt at night in the same locations (Fig. 3C, D). Due to their nocturnal lifestyle, it is more difficult to precisely determine the occurrence of geckos in natural habitats, where they are not so easy to observe as when hunting for insects attracted by artificial light sources (Fig. 4) (Brown et al., 2002).

<sup>1</sup> Association de Protection du Refuge des Tortues, 2920 Route de Paulhac, 31660 Bessières, France; and NATRIX Herpetological Association, ul. Opolska 41/1, 52-010 Wrocław, Poland. E-mail: zdunek.komodo@gmail.com



**Figure 1.** Map of the Society Islands archipelago in French Polynesia, showing colour-coded locations for the species observed on the five visited islands. Map created by Aleksandra Kolanek using base maps from [www.thunderforest.com](http://www.thunderforest.com) and data from [www.osm.org](http://www.osm.org).

More numerous observations may provide a more comprehensive view of the impact island urbanization has on the ecology of skink and gecko populations and their habitat use. While sharing habitats can increase competition between species for food and territory (Downes and Shine, 1998; Petren and Case, 1998), modified habitats may provide sufficiently broad niches to allow multiple species to fill them. On small, heavily impacted islands, it does not appear sufficient to consider only the natural environment when developing local conservation strategies, but modified habitats, for better or worse, must also be taken into account.

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## References

Blom, M.P. (2015): Habitat use and new locality records for *Cryptoblepharus poecilopleurus* (Squamata: Scincidae) from French Polynesia. *Herpetology Notes* **8**: 579–582.

Brown, S., Lebrun, R., Yamasaki, J., Ishii-Thoene, D. (2002): Indirect competition between a resident unisexual and an invading bisexual gecko. *Behaviour* **139**(9): 1161–1173.

Dotte-Sarout, E., Kahn, J.G. (2017): Ancient woodlands of Polynesia: a pilot anthracological study on Maupiti Island, French Polynesia. *Quaternary International* **457**: 6–28.

Downes, S., Shine, R. (1998): Heat, safety or solitude? Using habitat selection experiments to identify a lizard's priorities. *Animal Behaviour* **55**: 1387–1396.

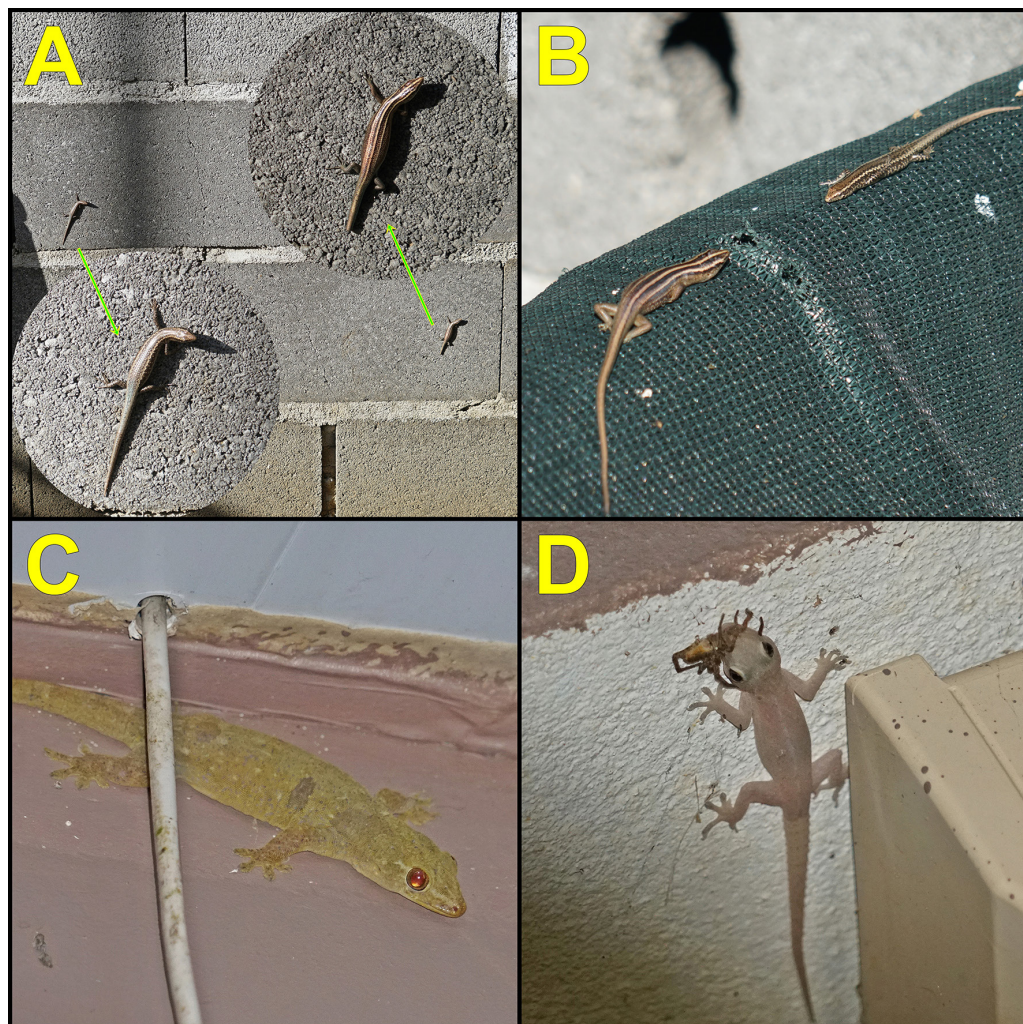
Gargominy, O. (2003): Biodiversité et Conservation dans les Collectivités Françaises d'Outre-Mer. Paris, France, Collection Planète Nature, Comité Français pour l'UICN.

Horner, P. (2007): Systematics of the snake-eyed skinks, *Cryptoblepharus* Wiegmann (Reptilia: Squamata: Scincidae) – an Australian-based review. The Beagle, Records of the Museums and Art Galleries of the Northern Territory, Supplement 3: 21–198.

Ineich, I. (2009): Inventaire herpétologique de l'île de Maïao, Archipel de la Société (Polynésie Française). *Bulletin de la Société Herpétologique de France* **130–131**: 51–63.

Ineich, I. (2011): Amphibians and reptiles. In: *The Natural History of Santo*, p. 187–236. Bouchet, P., Le Guyader, H., Pascal, O., Eds., Paris, France, Muséum National d'Histoire Naturelle.

Ineich, I. (2016): Reptiles terrestres et marins des îles Marquises: des espèces communes mais des populations isolées. In: *Biodiversité Terrestre et Marine des Îles Marquises, Polynésie Française*, p. 365–390. Galzin, R., Duron, S.-D., Meyer, J.-Y., Eds., Paris, France, Société Française d'Ichtyologie.



**Figure 2.** Cohabitation between skinks and geckos in the same microhabitat on Bora Bora, Society Islands, French Polynesia. (A) *Cryptoblepharus poecilopleurus* (left) sharing a modified habitat with *Emoia pheonura* (right). (B) *Cryptoblepharus poecilopleurus* (right) and *E. pheonura* (left) thermoregulate together on a fence. (C) *Gehyra oceanica* hunting at night. (D) *Hemidactylus frenatus* eating an arachnid.

Ineich, I., Blanc, C.P. (1988): Distribution des reptiles terrestres en Polynésie Orientale. Atoll Research Bulletin **318**: 1–75.

Ineich, I., Zug, G. (1991): Nomenclatural status of *Emoia cyanura* (Lacertilia, Scincidae) populations in the Central Pacific **4**: 1132–1136.

Langkilde, T., O'Connor, D., Shine, R. (2003): Shelter-site use by five species of montane scincid lizards in south-eastern Australia. Australian Journal of Zoology **51**(2): 175–186.

Petren, K., Case, T.J. (1998): Habitat structure determines competition intensity and invasion success in gecko lizards. Proceedings of the National Academy of Sciences of the USA **95**(20): 11739–11744.

Slavenko, A., Tamar, K., Tallowin, O.J.S., Kraus, F., Allison, A., Carranza, S., Meiri, S. (2021): Revision of the montane New

Guinean skink genus *Lobulia* (Squamata: Scincidae), with the description of four new genera and nine new species. Zoological Journal of the Linnean Society **zlab052**: 1–59

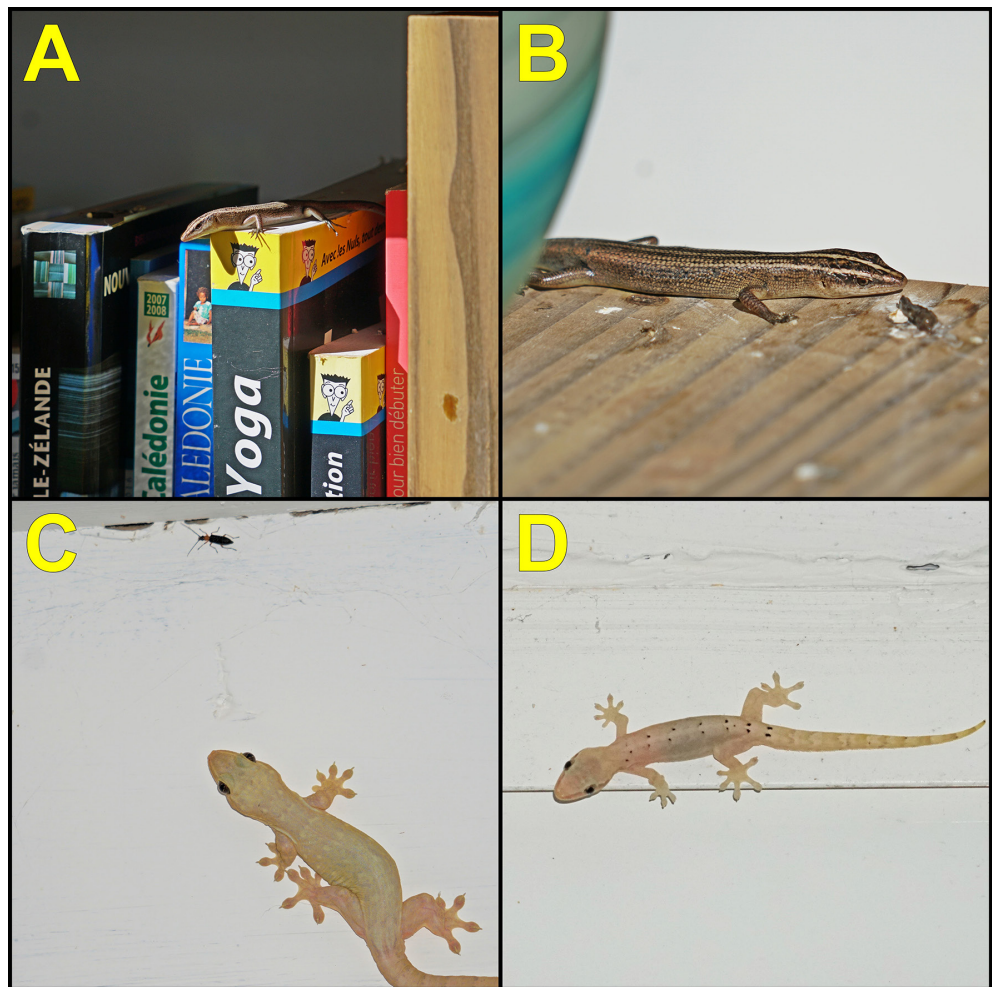
Smith, M., Cogger, H.G., Tiernan, B., Maple, D., Boland, C.R., Napier, F., et al. (2012): An oceanic island reptile community under threat: the decline of reptiles on Christmas Island, Indian Ocean. Herpetological Conservation and Biology **7**: 206–218.

Tapper, R. (2006): Wildlife Watching and Tourism: A Study on the Benefits and Risks of a Fast Growing Tourism Activity and Its Impacts on Species. Bonn, Germany, United Nations Environment Programme. 68 pp.

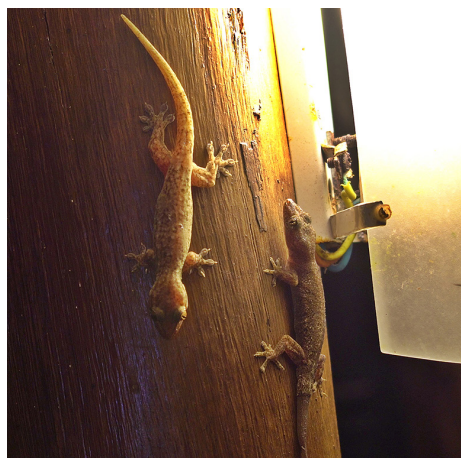
Zug, G. (2013): Reptiles and Amphibians of the Pacific Islands. A Comprehensive Guide. Berkeley, California, USA, University of California Press.

**Table 1.** Observations on geckos and skinks on each visited island. Abundance is determined by the number of individuals observed during 1-hour searches and indicated by plus signs as follows: 1–2 individuals observed (+); 3–5 individuals observed (++), > 5 individuals observed (+++).

Species	Locality	Abundance	Habitat	Cohabitation	Latitude	Longitude
<b>Bora Bora</b>						
<i>Cryptoblepharus poecilopleurus</i>	Vaitāpē	+++	Modified	<i>E. pheonura</i>	16.515°S	151.742°W
<i>Cryptoblepharus poecilopleurus</i>	Mute Island	+	Littoral	-	16.446°S	151.752°W
<i>Emoia cyanura</i>	Āmanahune	++	Arboreal	<i>E. pheonura</i>	16.521°S	151.730°W
<i>Emoia pheonura</i>	Vaitāpē	+++	Modified	<i>C. poecilopleurus</i>	16.515°S	151.742°W
<i>Emoia pheonura</i>	Āmanahune	+++	Arboreal	<i>E. cyanura</i>	16.521°S	151.730°W
<i>Gehyra oceanica</i>	Vaitāpē	+++	Modified	<i>H. frenatus</i> , <i>L. lugubris</i>	16.515°S	151.742°W
<i>Hemidactylus frenatus</i>	Vaitāpē	+++	Modified	<i>G. oceanica</i> , <i>L. lugubris</i>	16.515°S	151.742°W
<i>Lepidodactylus lugubris</i>	Vaitāpē	+	Modified	<i>G. oceanica</i> , <i>H. frenatus</i>	16.515°S	151.742°W
<i>Ornithuroscincus noctua</i>	Fare Manava	+	Modified	-	16.541°S	151.736°W
<b>Maupiti</b>						
<i>Cryptoblepharus poecilopleurus</i>	Marae Vaiahu	+	Littoral	-	16.453°S	152.257°W
<i>Emoia cyanura</i>	Teurafaatiu	+++	Arboreal	-	16.446°S	152.253°W
<i>Emoia cyanura</i>	Pétroglyphes	+++	Arboreal	-	16.437°S	152.252°W
<i>Emoia pheonura</i>	Petei	+	Modified	-	16.446°S	152.248°W
<i>Gehyra oceanica</i>	Espace Beach	+++	Modified	-	16.450°S	152.274°W
<i>Hemidactylus frenatus</i>	Espace Beach	+	Modified	-	16.450°S	152.274°W
<i>Ornithuroscincus noctua</i>	Espace Beach	+	Littoral	-	16.450°S	152.274°W
<b>Moorea</b>						
<i>Cryptoblepharus poecilopleurus</i>	Hauru Beach	++	Littoral	-	17.497°S	149.914°W
<i>Emoia cyanura</i>	Papetoai	+++	Arboreal	<i>E. pheonura</i>	17.501°S	149.848°W
<i>Emoia cyanura</i>	Papetoai	++	Arboreal	<i>E. pheonura</i>	17.524°S	149.830°W
<i>Emoia cyanura</i>	Vai'are	++	Arboreal	<i>E. pheonura</i>	17.519°S	149.790°W
<i>Emoia pheonura</i>	Vai'are	+++	Arboreal	<i>E. cyanura</i>	17.519°S	149.790°W
<i>Emoia pheonura</i>	Papetoai	+	Arboreal	<i>E. cyanura</i>	17.501°S	149.848°W
<i>Emoia pheonura</i>	PaoPao	+	Modified	-	17.485°S	149.835°W
<i>Emoia pheonura</i>	Papetoai	+	Arboreal	<i>E. cyanura</i>	17.524°S	149.830°W
<i>Gehyra oceanica</i>	Haapiti	+	Modified	-	17.493°S	149.909°W
<i>Gehyra oceanica</i>	PaoPao	+++	Modified	<i>H. frenatus</i>	17.485°S	149.835°W
<i>Hemidactylus frenatus</i>	PaoPao	+++	Modified	<i>G. oceanica</i>	17.485°S	149.835°W
<i>Lepidodactylus lugubris</i>	Papetoai	+	Arboreal	-	17.531°S	149.835°W
<b>Tahaa</b>						
<i>Emoia cyanura</i>	Ruutia	+++	Littoral	-	16.658°S	151.520°W
<i>Emoia pheonura</i>	Vaitoare	+++	Modified	-	16.661°S	151.448°W
<i>Emoia pheonura</i>	Vaitoare	+	Littoral	-	16.675°S	151.456°W
<i>Emoia pheonura</i>	Niua	+	Modified	-	16.683°S	151.482°W
<i>Gehyra oceanica</i>	Vaitoare	++	Modified	<i>H. frenatus</i> , <i>L. lugubris</i>	16.661°S	151.448°W
<i>Hemidactylus frenatus</i>	Vaitoare	+++	Modified	<i>G. oceanica</i> , <i>L. lugubris</i>	16.661°S	151.448°W
<i>Lepidodactylus lugubris</i>	Vaitoare	+	Modified	<i>G. oceanica</i> , <i>H. frenatus</i>	16.661°S	151.448°W
<b>Tahiti</b>						
<i>Emoia cyanura</i>	Mataiea	++	Arboreal	-	17.759°S	149.389°W
<i>Emoia cyanura</i>	Papeari	++	Arboreal	-	17.758°S	149.368°W
<i>Emoia pheonura</i>	Papara	+	Littoral	-	17.777°S	149.476°W
<i>Gehyra oceanica</i>	Papara	+++	Modified	-	17.777°S	149.476°W



**Figure 3.** Cohabitation between skinks and geckos in the same microhabitat on Tahaa, Society Islands, French Polynesia. (A) and (B) *Emoia pheonura* using books and furniture during thermoregulation. (C) *Gehyra oceanica* on the prowl at night, hunting for beetles. (D) *Lepidodactylus lugubris* (Clone A light morph) looking for insects.



**Figure 4.** *Gehyra oceanica* (left) and *Hemidactylus frenatus* (right) hunting insects attracted by the light on Moorea, Society Islands, French Polynesia.