

## Clarifying the distributional records for *Hemiphyllodactylus typus* (Bleeker, 1860) from Central Oceania

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The Indo-Pacific Slender Gecko (*Hemiphyllodactylus typus*) is a widespread, although difficult to detect, gecko found across the South Pacific from Papua New Guinea to Pitcairn Island (Ineich, 1992; Gill, 1993a; Bauer, 1994; Zug, 2010). Recently Zug (2010; fig. 14; referred to below as Z10) reviewed the systematics of the genus and presented a more current map of this species range (see also Heinicke et al., 2011; fig. 2; = H11), which had previously been mapped by Bauer (1994; fig. 29; = B94) and Crombie and Pregill (1999; fig. 8; = CP99). In our survey of the Samoan lizard fauna, we discovered that there were previously unreported specimens of *H. typus* for Samoa. Further, that all recently mapped distributions of this species had omissions or inaccuracies. In this paper, we correct these errors and examine its distribution pattern in the central portion of its Pacific Basin range.

Our review of the distributional data revealed that the only valid Oceania (non-Asian) island populations of *H. typus* north of the equator certified by voucher specimens are those from Hawai'i, where it is known from the six largest islands (Z10; HerpNet queried 8/31/12). Previously *H. typus* was reported to occur in Palau (Bauer, 1994; Crombie and Pregill 1999). That population is now recognized as the bisexual species *Hemiphyllodactylus ganoklonis*, and *H. typus* is probably absent from Palau (Republic of Belau) (Z10). *H. typus* was also mapped by four studies (B94, CP99, Z10, H11) as occurring in Enewetak Atoll, based initially on the record from Lamberson (1987). Crombie and Pregill

(1999) map this location, but point out that this record is based on a misidentification of USNM 205534-535 (which they referred to *Lepidodactylus* sp.; now correctly identified as *Lepidodactylus moestus* from Alembel (Vera) Island, Enewetak Atoll). Importantly, this locality record for *L. moestus* is the only one for *L. moestus* from this atoll, and only the third record from the Marshall Islands (see Crombie and Pregill, 1999, fig 9). Both Fisher (in 1993) and Ivan Ineich (in 1990) examined all *Lepidodactylus* specimens at the USNM to confirm species identifications, but since these two specimens were identified as *Hemiphyllodactylus typus* in the collection at that time, they were omitted in Ota et al. (1995) where *L. moestus* was resurrected. Recent surveys of many remote parts of the Caroline Islands by Don Buden (pers. comm.) have not detected *H. typus*, nor have two decades of intensive work in the Mariana Islands by many investigators (Reed, pers. comm.). This geographic pattern in *H. typus* now is the same as for *Hemidactylus garnotii*, as it only also occurs only in Hawai'i to the north of the equator, and is absent from Micronesia. In Bauer (1994) *H. garnotii* was mapped as occurring in Pohnpei, but this specimen (CAS 160111) is actually the first record of *Hemidactylus frenatus* from Pohnpei (Buden, 2000).

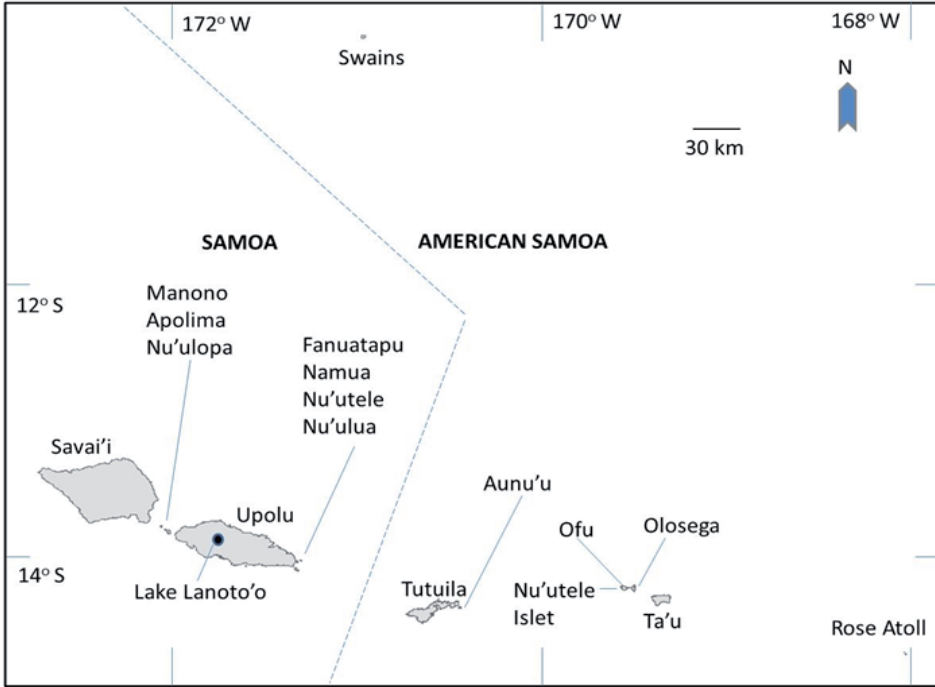
The first records of *Hemiphyllodactylus typus* from the Cook Islands were reported in Gill (1998) and are SDNHM 67822-67824, all from Rarotonga Island collected in 1988/1989. SDNHM 67823 is from Nikao (as suggested by Gill 1998), and was collected by Gerald McCormack; although the data with the specimen are not correct (T.J. Case, unpub. field notes). This species has been collected from Rarotonga several additional times (Fisher and Emilio Bruna in 1994, unpub. data; Tony Whitaker on two trips since 2000, pers. comm.), but still it has not been found on any other islands in the Cooks. Zug (2010) mapped the species from Rarotonga Island (based on Gill 1998, pg. 61), but in his Appendix 2 refers these same three specimens to Mangaia Island, which is not accurate, and it remains unknown from that island (Crombie and Steadman, 1986; Gill, 1998).

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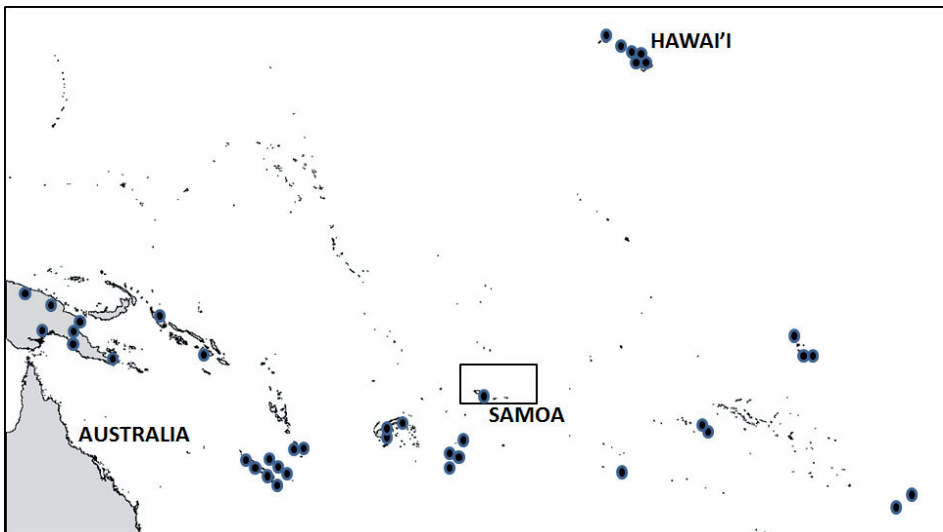
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**Figure 1.** Map of islands, islets, and atoll of Samoa and American Samoa. Lizard surveys have been conducted historically on all of the named localities. The locality record we document for *Hemiphyllocladylus typus* is marked with the circle.



**Figure 2.** Distribution of *Hemiphyllocladylus typus* in the oceanic Pacific. Box inset is map range for Figure 1. Note lack of records from west of Hawai'i and north of Papua New Guinea, indicating its absence in Micronesia.

The lizard fauna of Samoa and American Samoa consists of 14 species total (Schwaner, 1980; Gill, 1993b). The fauna of American Samoa (7 islands; Figure 1) was the focus of intensive surveys conducted by Terry Schwaner during 1976-78 and is summarized in several papers (Schwaner, 1980; Amerson et al., 1982); 13 lizard species were found to occur there (Schwaner, 1980; see also Schwaner and Ineich, 1998). During this survey Schwaner vouchered more than 2,000 lizards from all seven major islands, and the islet Nu'utele (Figure 1); in spite of the thoroughness of his survey, he found no *H. typus* in American Samoa (Schwaner, 1980). The known lizard fauna (13 species) of Samoa was summarized previously by Gill (1993b). In that paper he reported records for five of the nine islands/islets, and recent collections made by him in 1991, and Fisher in 1988 and 1990 (Gill 1993b).

In 1992, Zug and Ivan Ineich conducted a brief survey in Samoa (Sept. 24-27) and collected 65 specimens of 11 lizard species (Zug and Ineich unpub. data). Unique to their collection were three sets of gecko eggs (2 per clutch; measurements in mm as follows: 7.5x6.0, 7.9x6.0; 7.3x6.0, 8.2x6.0; 6.7x6.0, 7.0x6.3) that Ineich collected in a tree fern near Lake Lanoto'o (13.9105°S; 171.8276°W; 760m a.s.l.) on Upolu Island on Sept. 24, 1992 (Figure 1). They retained these eggs and brought them back to the Smithsonian Institution, Washington, D.C., USA. Two eggs hatched, one on Nov 12-13, 1992 (svl 18 mm), and one on Jan 9-11, 1993 (svl 17.5 mm), and were identified as *H. typus* (USNM 345102-103). The remaining eggs were spoiled and were discarded. USNM 345102 was identified in the Appendix 2 of Zug (2010) as from Samoa but was not mapped in that paper. A search through HerpNet (8/31/12) identified an additional record of *H. typus* from Samoa (no specific locality listed; SMNS 192) collected by Kramer in 1895 and housed at State Museum of Natural History Stuttgart, Germany (Staatliches Museum für Naturkunde Stuttgart). Although we have not yet confirmed this identification, the Zug and Ineich records suggest this voucher is likely *H. typus* as well. An important aspect of the Lake Lanoto'o record is its elevation of about 760m a.s.l., which is the highest for this species in the Pacific region. Most records are at lower elevation (<200m a.s.l.; although CAS 192984-988 are from about 760m a.s.l. in Papua New Guinea).

More recently (2009-2010), Fisher, Uili, and Enoka intensely surveyed the Aleipata Islands (four islands), east of Upolu Island (Figure 1), for which no lizard records existed (Fisher et al. unpub. data). In these

surveys and an intensive survey from sea level to over 1,700 m elevation on Savai'i (2012), we observed over 1,000 individual lizards of 13 species, but saw no *H. typus*. Due to the highly secretive nature of this species, further targeted surveys around Upolu Island are recommended so that the distribution and status of *H. typus* in Samoa can be clarified.

### Summary

Based on the lack of museum and literature records, *Hemiphyllodactylus typus* has never been reported from Micronesia, and in the remaining islands of Oceania north of the equator, it is present only in Hawai'i, a distributional pattern it shares with *Hemidactylus garnotii* (Figure 2). We demonstrate that Rarotonga Island is the only locality in the Cook Islands where this species occurs. Lastly, this species is now known from Samoa, only definitely from Upolu Island, but it is extremely difficult to detect and known from only three specimens. Of over 3,000 lizards seen across 17 islands/islets of the Samoan Archipelago during recent surveys (1976-2012), no additional *H. typus* have been found, making it the least detected lizard species in this island group, but bringing the Samoan lizard fauna to 15 species. It now shares the same general distribution in the Pacific Basin as *Hemidactylus garnotii*, both of which are consistent with recent (last 200 years) human shipboard transport (Zug 2010).

**Acknowledgements.** We would like to thank Ivan Ineich and Czarina Iese for field work support and their comments on the manuscript. Funding for recent expeditions around Samoa has come from Conservation International/CEPF to SPREP. The Ministry of Natural Resources and Environment, Samoa has supported our lizard field work in many ways and in particular support from ACEO Faleafaga Toni Tipamaa has been vital to this work.

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