New information and reappraisals concerning some alien and indigenous snake records from the Federated States of Micronesia and the Mariana Islands

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Abstract

New information is presented on old records of four species of snakes from four different islands in Micronesia. A record of *Dendrelaphis caudolineatus* from Saipan is re-examined and the specimen re-identified as *D. philippinensis*, and a snake from Pohnpei previously recorded only as an unidentified species of *Dendrelaphis* is identified as *D. punctulatus striolatus*. Additionally, we provide supplementary data on the circumstances surrounding the records of a brown tree snake, *Boiga irregularis*, from Chuuk, and a yellow-bellied sea snake, *Hydrophis platurus* (*Pelamis platura*), from Kosrae.

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Introduction

Few species of snakes are known from the western Pacific islands that make up the Federated States of Micronesia (FSM) and the Marianas Islands, compared for example with the species-rich herpetofaunas of the larger islands of South-East Asia to the west (Das 2010). The breeding land-snake fauna of the FSM consists solely of three species of blind snakes (Typhlopidae), including *Ramphotyphlops braminus*, an Asiatic species that has been inadvertently introduced widely throughout the world (McDiarmid et al. 1999, Wallach 2008) and two recently described congeners, *R. hatmaliyeb* and *R. adocetus*, known only from the Ulithi Atoll islands, Yap, and Ant Atoll, Pohnpei, respectively (Wynn et al. 2012). The Mariana Islands have *R. braminus* and *Boiga irregularis*, brown tree snakes (Rodda et al. 1991, Vogt and Williams 2004). Brown tree snakes were introduced to Guam from the Solomon Islands during or shortly after World War II and have since been implicated in the decline and extinction of many of the island’s native birds and lizards (Rodda et al. 1999, Rödder and Lötters 2010, Kahl et al. 2012). They also are responsible for “damage to electrical power infrastructure, loss of pet and domestic animals, human envenomations, higher costs of shipping from Guam, and threats to the tourism industry” (Rodda and Savidge 2007: 310). Brown tree snakes have been recorded elsewhere in the Marianas on Saipan and Tinian (Rödder and Lötters 2010), and on Rota (Pacific Island Alien Snake Database, accessed online June 2012), but breeding is undocumented in their non-native range outside of Guam. The only other records of snakes from the Marianas and the FSM are of a few alien stowaways and occasional sightings of sea snakes (Wiles 2000, Reed in Neuman-Lee 2011, Buden and Taborosi in prep.).

Among the records of snakes from the FSM and the Marianas are some for which supplementary information surrounding the circumstances of their collection has only recently come to light, and others whose identifications need to be made or reassessed. We herein identify
a species of *Dendrelaphis* from Pohnpei hitherto identified only to genus, re-identify another *Dendrelaphis* recorded on Saipan, and provide supplementary information on a brown tree snake, *Boiga irregularis*, recorded in Chuuk, and yellow-bellied sea snake, *Hydrophis platurus*, recorded from Kosrae.

**MATERIALS AND METHODS**

Information on specimen records was obtained from data files in the Division of Amphibians and Reptiles, National Museum of Natural History, Smithsonian Institution (USNM), as well as from gray literature (e.g. government documents and newsletters), unpublished photographs, and notes and recollections of the contributing authors. Mensural and meristic data used in *Dendrelaphis* species comparisons are from Van Rooijen and Vogel (2012).

**RESULTS**

**Alien Species**

**Colubridae**

*Boiga irregularis* (Bechstein, 1802)

Brown tree snakes have been recorded twice in the Federated States of Micronesia. One found dead on a cargo container originating from Guam and being offloaded at the seaport in Pohnpei on 3 November 1994 was deposited in Smithsonian collections and cataloged as USNM 339786 (Buden 2000). Another was reported in an FSM press release as being found on the deck of a cargo ship from Guam while it was docked at the harbor in Weno, Chuuk, on 25 February 2008 (FSM Public Information Office 2009). No additional information was given in the press release, and none has been reported in the scientific literature. One of us (S. Robert) was present during the initial investigation and recalls that the snake (~1.0-1.2 m long) was found dead and believed to have been crushed to death when the ship weighed anchor at the last port of call in Guam. It was identified as a brown tree snake by Konrad Englberger (Secretariat of the Pacific
Community, Quarantine Consultant) from photographs (e.g. Figure 1A) taken at the site. The snake was in an advanced state of decomposition when found and was taken to the Chuuk Quarantine Incinerator for disposal.

*Dendrelaphis philippinensis* (Günther, 1879)

A gravid female snake of the genus *Dendrelaphis* was collected alive in Saipan by D. Stinson in May 1990. It was identified as *D. caudolineatus* and thought to have arrived in ship’s cargo from the Philippines that was being stored near where the snake was captured (Fritts et al. 1990, McCoid and Stinson 1991). In light of a recent revision of the *D. caudolineatus* complex (Van Rooijen and Vogel 2012), K. de Queiroz re-examined the fluid-preserved specimen (USNM 300567, Figure 1B), along with a photograph that was taken at the time of capture, before the specimen was preserved. In coloration and pattern, the specimen most closely resembles *D. terrificus* from Sulawesi, and, to a somewhat lesser degree, *D. philippinensis* from the Philippines, particularly the more brightly colored examples from South Luzon and Catanduanes (see Van Rooijen and Vogel 2012). In number of ventrals, the Saipan specimen (174) is at the lower range limit for *D. terrificus* (174-181), and slightly above the range limit for *D. philippinensis* (161-172), but well within the range of the latter species if one outlier specimen with 179 ventrals (Van Rooijen and Vogel 2012) is included. In number of subcaudals, the Saipan specimen (108) is at the upper range limit for *D. philippinensis* (94-108), but well above the limit for *D. terrificus* (94-102). In relative tail length, the Saipan specimen (0.29) is closer to *D. philippinensis* (0.25-0.29) than to *D. terrificus* (0.26-0.27). A Principal Component Analysis of all those characters that distinguish *D. terrificus* from *D. philippinensis* (fide Van Rooijen and Vogel 2012), shows the Saipan specimen positioned closer to *D. philippinensis* (Figure 2).

*Dendrelaphis philippinensis* is endemic to the southern Philippine Islands, including Basilan,
Mindinao, Cebu, Bohol, Leyte, Samar, Polillo, Kalokot, Cantanduanes, and southeastern Luzon (Rooijen and Vogel 2012).

*Dendrelaphis punctulatus striolatus* (Peters, 1867)

Another specimen of the snake genus *Dendrelaphis* (Fig. 1C) was collected at Kolonia Elementary School grounds on Pohnpei during the late 1980s. It was kept as a fluid-preserved specimen at the College of Micronesia-FSM for several years before being deposited in Smithsonian collections (USNM 506906). The circumstances surrounding its collection are unclear. Buden (2000) and Buden et al. (2001) recorded it as having been found alive, based on information received during the mid-1990s from a quarantine officer who indicated that the specimen was alive when first encountered by a groundskeeper cutting grass at the school. By contrast, Fritts (in Jaffe 1994, and Fritts et al. 1999), who first reported on the specimen and identified it as a *Dendrelaphis*, was told that it was found dead.

The poor condition of the specimen and the uncertainty of the taxonomy of *Dendrelaphis* precluded identification as to species when the specimen was first reported. The potential source population of *Dendrelaphis* nearest to Pohnpei is in Palau. Palau tree snakes (also known as Palau racers), are currently treated as a subspecies, *D. punctulatus striolatus*, of common tree snakes (also known as Australian or green tree snakes), which occur in Australia and New Guinea. But ongoing studies of Indo-Australian and Oceanian populations of *Dendrelaphis* point to the Palau population as being a separate species (Van Rooijen et al. unpublished data). A re-examination of the Pohnpei specimen by K. de Queiroz affirms that it matches well with material from Palau in USNM collections and fits the description of the Palau form given by Peters (1867). We provisionally refer the Pohnpei specimen to the subspecies *D. punctulatus striolatus* pending formal taxonomic changes within this group.

Native Species
Hydrophiidae

*Hydrophis platurus* (formerly *Pelamis platura*) (Linné, 1766)

Based on the results of a molecular phylogenetic analysis, Sanders et al. (2013) recently proposed merging the genus *Pelamis* and seven other hydrophiid genera all under the genus *Hydrophis*. Yellow-bellied sea snakes are widespread throughout the tropical and subtropical Pacific and Indian Oceans (David and Ineich 1999, Heatwole 1999, Sheehy et al. 2012), but there are few records from the FSM (Buden 2000, 2007), and only one known voucher specimen from Kosrae (USNM 495585). That specimen is recorded as having been donated by Tom Fritts, received from Lew Brooks, and cataloged in October 1995, but the name of the collector, the collection date, and specific locality are lacking. However, in a Brown Tree Snake Update (a discontinued newsletter that had limited distribution and is not readily available in most libraries), under the subheading Pelagic Sea Snake Found on Kosrae, Federated States of Micronesia, Kosaka et al. (1992) remarked on a yellow-bellied sea snake that was found alive on a beach near a freshwater inflow at Mosral, Malem, Kosrae, on 4 March 1992. The snake was preserved in alcohol by staff of the Kosrae Division of Agriculture and Forestry and forwarded to the US Fish and Wildlife Service. Inasmuch as Fritts, who was employed by the USFWS, did not donate any other *Pelamis* specimens from Kosrae to the Smithsonian collections, it seems reasonable to infer that the specimen referred to in the newsletter is USNM 495585. This is the only known documented record of *H. platurus* from Kosrae.

**DISCUSSION**

Of the four species whose records are reviewed here, only *Hydrophis platurus* is indigenous to the area in greater Micronesia where it was found. It is completely pelagic, feeding and reproducing at sea. Land records, or even those from shallow, inshore waters, are scarce and probably involve weak, injured, or storm-driven individuals. In the FSM, *H. platurus* has been
recorded only from Kosrae, Pohnpei, Nukuoro Atoll, and Losap Atoll (Buden 2000, 2007). The three other records reviewed in this study represent extralimital occurrences of known invasive (Boiga irregularis), or potentially invasive (Dendrelaphis philippinensis, D. punctulatus striolatus) species. The occurrence of these different species from three different sources underscores the vulnerability of Pacific islands to invasion by alien species—Boiga irregularis reaching Pohnpei almost certainly from Guam, D. philippinensis arriving on Saipan probably from the Philippines (likely South Luzon or immediately adjacent areas, where the most vividly colored examples of this species are found), and D. punctulatus striolatus reaching Pohnpei from Palau.

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Figure 1. *Boiga irregularis* found dead on a cargo ship at Weno, Chuuk, FSM (A), *Dendrelaphis philippinensis* (USNM 300567) found alive on Saipan, Commonwealth of the Northern Mariana Islands (B), and *D. punctulatus striolatus* (USNM 506906) found in Kolonia, Pohnpei, FSM (C).
Figure 2. Ordination of 10 *Dendrelaphis terrificus* from Sulawesi, 29 *D. philippinensis* from the Philippines, and the specimen from Saipan along the first two principal components based on a Principal Component Analysis of those characters that distinguish *D. terrificus* from *D. philippinensis* (ventrals, subcaudals, tail-length; Van Rooijen and Vogel 2012).
Literature Cited


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