A reassessment of the type locality of the giant rat *Solomys salamonis* (Rodentia : Muridae) from the Solomon Islands

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Abstract. The Solomon Islands support a diverse and highly endemic rodent fauna. Most species are poorly known and rarely encountered. *Solomys salamonis* is one such endemic species known only from the holotype collected in 1881. The type locality for the species has been repeatedly confused in the literature, and this uncertainty has hampered attempts to evaluate the status of the species. I reassessed the type locality based on review of the published literature and records and archives of the Australian Museum, Sydney. My review indicates that the type locality is Ugi Island, not Florida Island as widely reported in the recent literature. A subsequent, preliminary survey on Ugi Island failed to confirm the presence of the species; however, the occurrence of some original forest on Ugi Island encourages further detailed surveys to determine whether *S. salamonis* is still extant.

Additional keywords: extinct, Florida, Ugi Island.

Introduction

The Solomon Islands are one of the world's centres of endemism for insular rodents (Amori *et al*. 2008). The archipelago is a double chain of north-west to south-east trending islands located to the east of New Guinea and comprises almost 1000 islands dominated by the six larger islands of Choiseul, Guadalcanal, Makira, Malaita, New Georgia and Santa Ysabel (Fig. 1). These remote, large islands have supported intra-archipelago speciation with small evolutionary radiations of rodents representing the widespread Australo-Papuan genus *Uromys* (three species) and the endemic genus *Solomys* (five species) (Flannery 1995).

All species of Solomon Island rodents are rarely encountered and known from few specimens spread amongst museum collections. One such species is *Solomys salamonis*, known only from the holotype (Australian Museum A11257) collected by Alexander Morton of the Australian Museum in 1881 and formally described as a new species (Ramsay 1883). The skull (cranium and mandible) is now the only part of the holotype by which this species is known, the specimen preserved in alcohol having been misplaced some time before the 1930s (Troughton 1936). There is little doubt that the specimen represents a distinct taxon, as indicated in the original description (Ramsay 1883), the subsequent redescription by Troughton (1936), and recent faunal works and systematic compendia (Musser and Carleton 1993, 2005; Flannery 1995). External and cranial features are distinct from the other four described species of *Solomys*. According to Troughton (1936), the unique cranial features of *S. salamonis* include a wider zygomatic plate, broader mesopterygoid fossa, relatively smaller and more transparent bullae, a comparatively broad and straight-sided interorbital, and palatal foramina constricted in their anterior third. Ramsay (1883) stated that the skin was light ashy-grey with long black guard hairs and small ears. The tail was slightly longer than the head–body length. Ramsay's (1883) illustration of the hindfoot portrays it as particularly wide but short, with relatively long digits and large plantar pads, features indicative of arboreal habits, as documented for other species of *Solomys* (Flannery 1995).

Worldwide, insular rodents have suffered great rates of extinction in the modern era (Amori *et al*. 2008). In the Solomon Islands, several species (including *S. salamonis*) are considered extinct (Flannery 1995; Amori *et al*. 2008). However, according to analyses by Fisher and Blomberg (2012), at least two of these species (*Uromys imperator* and *U. porculus*) have high probabilities of rediscovery given the scarcity of biological surveys within their range.

Confusion over the geographic source of the holotype of *S. salamonis*, whether collected on Ugi Island or Florida Island, has added uncertainty about the continued existence of the species. Ugi Island is small (4200 ha) and lies just north of the larger Makira Island (Fig. 1), and Florida Island (36 800 ha, now better known as Ngella) is in the central province, some 210 km north-west of Ugi Island (Fig. 1).

Although the orginal paper presented at the *Proceedings of the Linnean Society of New South Wales* January 1882 (Ramsay 1883) identified Ugi Island as the type locality, this was soon corrected to Florida Island in an erratum slip placed at the beginning of the *Proceedings* for August 1882. Troughton (1936) believed the type locality was Ugi Island, but Florida Island was

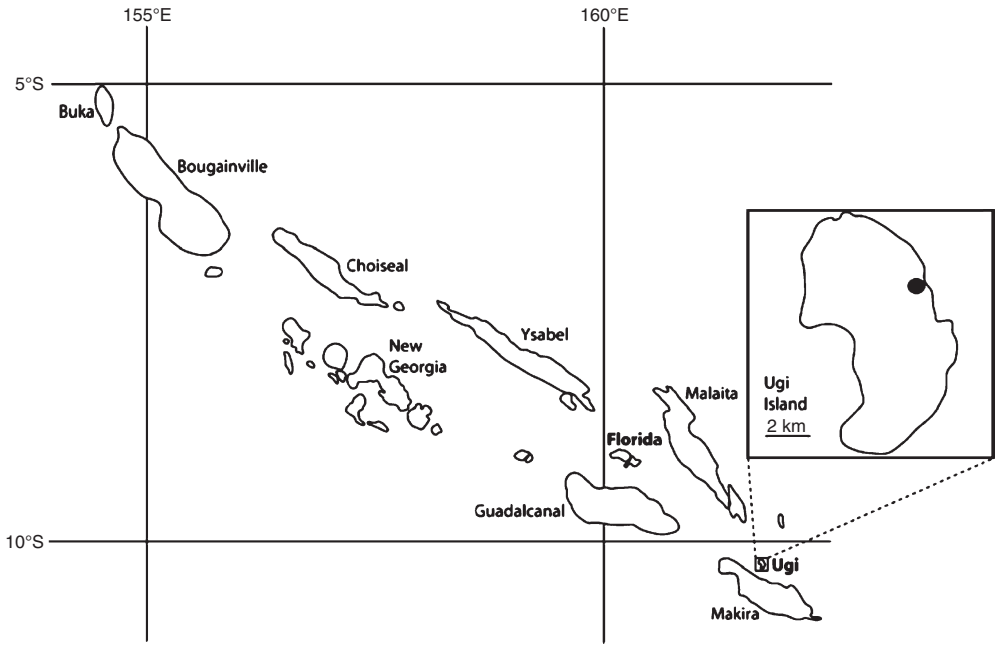

Fig. 1. Map of the Solomon Islands indicating main islands of the archipelago and the locations of Florida and Ugi Islands. The solid black circle on the inset map identifies the location of spotlight surveys undertaken on Ugi Island.

given as the locality by Flannery and Wickler (1990) and Flannery (1995), a precedent followed by others (Musser and Carleton 1993, 2005; Leary *et al*. 2008).

This study resolves the contradictions surrounding the type locality of *Solomys salamonis* through reassessment of collecting accounts in the published literature and unpublished reports of the Australian Museum. I also present the results of a brief survey on Ugi Island to establish the likelihood of the species occurring there.

Methods

A search of the published literature and archives and records of the Australian Museum, Sydney, was undertaken to establish the circumstances surrounding collection of the holotype of *Mus salamonis* Ramsay (A11257). Principal sources utilised were: Morton's (1881) field report to the Australian Museum board; Ramsay's (1883) original species description of *Solomys salamonis* (presented at the January 1882 *Proceedings*); Morton's (1883) subsequent published account of his voyage to the Solomon Islands (presented at the January 1882 *Proceedings*); Thomas' (1888*a*) publication on six new mammals from the Solomon Islands; Thomas' (1888*b*) publication on the collections of mammals from the Solomon Islands obtained by C. M. Woodford; Troughton's (1936) redescription of *Solomys salamonis*; Flannery and Wickler's (1990) publication on Quaternary murids from Buka Island; and Flannery's (1995) species profile of *S. salamonis*.

A preliminary visit to Ugi Island was made on 4–6 December 2012, to search for giant rats. Spotlight surveys were conducted between 1900 and 2300 hours on the nights of 4 and 5 December by 2–4 observers for a total of 12 person-hours. Spotlighting was undertaken in primary lowland forest and mature coconut (*Cocos nucifera*) plantations using 210–220-lumen LED torches (H14 and P17, LED Lenser, Solingen, Germany). The spotlighting survey location (57 L 801058, 8867186) is indicated in Fig. 1.

Results and discussion

Morton's 1881 and 1883 accounts

As a passenger of the *H.M.S. Cormorant*, Alexander Morton, Assistant Taxidermist and Collector for the Australian Museum, travelled to the Solomon Islands and collected the specimen that Ramsay (1883) designated as the holotype of *Mus salamonis*. The primary purpose of the *H.M.S. Cormorant*'s voyage was in response to the alleged murder of Lieutenant Bower and crew of the *H.M.S. Sandfly* by inhabitants of Florida Island. *H.M.S. Cormorant* was dispatched to the Solomon Islands from Sydney, Australia, on 16 April 1881. During this voyage, Morton visited both Ugi and Florida islands. The ship was stationed at Ugi Island between 27 April and 12 May. From there, it proceeded to Florida Island, arriving on 18 May and departing sometime after 25 May, and arriving back at Ugi Island on 13 August. It finally departed from Ugi Island on 10 July 1881, heading to New Caledonia (Unknown 1881).

In his initial report to the Australian Museum, Morton (1881) does not directly reference collection of any rodents. In regard to his time at Florida Island, he stated that his collections were limited because of the short time there and the island being in 'a state of siege'. In reference to his Florida Island collection, Morton stated: 'I did not succeed in adding many specimens to my collection, I was however fortunate enough in securing a fine specimen of a crocodile and a shark new to the museum, also a few birds and land shells'.

Morton added that on Ugi Island he collected 50 species, including ~200 specimens of birds, several new and rare fresh and saltwater fishes, 14 human skulls, a collection of corals, stone axes, and a large number freshwater and land shells.

Ramsay's (1883) description of *salamonis* (presented to the *Proceedings* in January 1882) made clear reference, in both title and text, to Ugi Island as the type locality. However, an erratum slip was subsequently placed in the Society's *Proceedings* for August 1882 (Volume 7, Issue 2), which changed the type locality to Florida Island (Laurie and Hill 1954). The erratum (obtained from the N.H. (Doc) Fisher Geoscience Library, Canberra) reads: 'Page 43, line 12, for Island of Ugi read, Island of Florida, and on p. 44 line 17, for Ugi read Florida'.

Morton (1883) elaborated the account of his voyage to the Solomon Islands in the same *Proceedings* as the description of *salamonis* by Ramsay (1883). Towards the end of this paper (1883: 63), Morton made a statement about his return to Ugi Island. 'The 'Cormorant' then returned to Ugi [from Florida Island] and finding that by remaining here I should have more opportunities of collecting, I took up my quarters onshore with Mr. Stephens where I remained until the return of the Cormorant from her cruise among the islands'. In this passage, Morton referred to a 'Mr. Stephens', being Mr John Stevens, a resident trader in the Solomon Islands of whom Golden (1993, p. 270) noted: 'It is clear that between 1870 and the time of his death, Stephens resided always at Ugi' and furthermore, 'He lived at Ugi for about 23 years and died there in about 1893'.

Following his remark about residing with Stephens, Morton went on to detail the collection of items he clearly described as being from Ugi Island in his original report to the Australian Museum (Morton 1881). In the paragraph immediately after this he also stated: 'Mammals were very scarce, an opossum *Cuscus orientalis*, the species common throughout the islands, and a rat, an undescribed species of *Mus* being the only species obtained'. Hence, these reports by Morton, the original collector, clearly reveal that the collecting locality for *salamonis* was, in fact, Ugi Island, not Florida Island.

In his review of the important collections made by C. M. Woodford, Thomas (1888*b*) repeatedly cited Florida Island as the collection locality for *S. salamonis*, apparently misled by the erratum. Again, the locality was altered by Troughton (1936), who in his redescription of *S. salamonis*, observed that Thomas (1888*b*) had misquoted the type locality, that its location was perfectly clear from the original description by Ramsay (1883) and the expedition report by Morton (1883), and that the collection locality was actually Ugi Island. Most recently, Flannery and Wickler (1990) and Flannery (1995) referenced the species description (Ramsay 1883) and the subsequent erratum and again reverted the type locality to Florida Island on the basis of the latter. Flannery and Wickler (1990) also incorrectly quoted Thomas (1888*a*) as having referenced a further seven specimens of *S. salamonis* collected from Florida Island. Musser and Carleton (2005: 1498) and Leary *et al*. (2008) present the type locality as Florida Island, almost certainly following Flannery (1995) and perpetuating the mistake in the recent literature.

Central to the confusion is the erratum slip placed at the beginning of the second part of the Society's *Proceedings*, August 1882. It is unclear who authored the erratum slip and why, when it is clear from the account given in the January 1882 *Proceedings* (Morton 1883) that the collection locality was Ugi Island. Unfortunately, we may never know the details of what transpired following publication of the original species description and leading to the publication of the erratum slip. Except for the erratum, all original information sources concur that the collection locality for 'the undescribed species of *Mus*' is Ugi Island, not Florida Island.

Field survey of Ugi Island

Ugi Island (4200 ha) is much smaller than Florida Island (36 800 ha) and would thus seem less likely to support a large arboreal rodent. No rodents were observed during spotlight surveys on Ugi Island, undertaken on the nights of 4 and 5 December 2012. Most local informants seemed unfamiliar with rodents being present on the island. However, several relayed that rodents are present and reported they were often observed in coconut palms eating young coconuts. This I believed most likely to be *Rattus rattus*, a species that is extremely common on nearby Makira (T. Lavery, pers. obs.). However, if the commensal *R. rattus* is indeed present on Ugi Island, I expect residents would be more familiar with rodents than was apparent.

This correction of the type locality raises hope that *S. salamonis* persists in the Solomon Islands. Florida Island has been heavily logged (Flannery 1995), and unsuccessful surveys for *S. salamonis* in 1987 and 1991 (reported by Flannery 1995) led to the suspicion that the species was extinct (Flannery 1995; Amori *et al*. 2008). In contrast, primary forest on Ugi Island remains relatively intact. The island contains ~697 ha of land that has been converted to copra (*Cocos nucifera*) plantations (Solomon Islands Government Rural Development Division 2001), but much of the remaining island area retains lowland forest.

Conclusions

A review of available literature provides strong argument that Ugi Island is the type locality for *S. salamonis*. Because *S. salamonis* was collected from Ugi Island, an island where original forest remains, this raises hope that it may still persist and certainly warrants further targeted surveys using arboreal trapping techniques and spotlight searches.

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