

Captive management of newly hatched Fijian ground frog *Platymantis vitianus* froglets: lessons learnt from an unanticipated invertebrate predator invasion, Suva, Fiji

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SUMMARY

Five newly hatched froglets of the endangered Fijian ground frog *Platymantis vitianus* were transferred into a glass laboratory aquarium upon hatching, following egg-laying by adult frogs during the wet season in a purpose-built outdoor enclosure at the University of the South Pacific, Fiji. During captive management of the froglets, their body weight and food supply in the aquarium were closely monitored. All five froglets were successfully raised to 37 days old, at which time the aquarium was invaded by brown house ants *Pheidole megacephala*. This event was probably caused by excess ripe fruit, placed within the glass aquarium to attract small flies as food for the froglets, attracting the ants. The ants predated all five froglets. Future *ex-situ* designs for rearing *P.vitianus* froglets may consider incorporating measures such as aquatic protective barriers to prevent ants and other unwanted terrestrial invertebrates from entering captive-rearing aquaria and other enclosures.

BACKGROUND

The Fijian ground frog (locally known as dreli or botoniviti) *Platymantis vitianus* once occurred widely through the Fijian archipelago, but is now restricted to the mongoose (*Herpestes*)-free islands of Ovalau, Gau, Taveuni, and Viwa. As well as mongoose, other introduced animals such as rats *Rattus* spp., cats *Felis catus* and marine toads *Bufo marinus*, have probably contributed to declines (Zug *et al.* 2004). *P.vitianus* is currently listed as endangered (IUCN 2004). Captive breeding of *P.vitianus* was successful after almost one year of intensive captive breeding research at the University of the South Pacific (USP) (Narayan *et al.* 2007). The current study was a significant component of *P.vitianus* captive breeding research undertaken at the USP and is the first example of captive rearing of newly hatched *P.vitianus* froglets. This paper discusses the captive management of the froglets in the laboratory using an inexpensive aquarium set-up. An invasion by predatory ants that caused froglet mortality in captivity served as an

important lesson for future *P.vitianus* rearing attempts.

ACTION

Study site: Five newly hatched *P.vitianus* froglets (captive-hatched on 29 December, 2006) were transferred into a glass aquarium in a laboratory at USP, Suva (Fiji Islands) for captive-rearing. This study was conducted under approval of the university Animal Ethics Committee (AEC).

Laboratory aquarium: The aquarium used to rear the five froglets was 46 x 32 cm square x 41 cm high, with glass sides and base. A removable top was made which comprised a wooden framed lid covered with a fine (1 mm gauge) nylon mesh to allow good ventilation. The floor of the aquarium was covered to 5 cm depth with a moist soil substrate. A pot containing two plants, *Palaquium hornei* (Sapotaceae) and the palm *Heterospathe phillipsii* (Arecaceae), was added

and the soil covered with small pieces of rotting logs and decaying leaf litter to mimic natural habitat. All of the substrate items had beforehand been sterilized in an autoclave set at 100°C for 15 min. Distilled water was sprinkled into the glass aquarium three times daily: 08:00 (dawn), 12:00 and 20:00 h (dusk) to maintain a high moisture level. Ripe fruit (banana, pawpaw and pineapple) that attracted small insects (mainly Pacific fruit fly *Bactrocera xanthodes* and *B. distincta*) as food for the froglets was placed in the glass aquarium *ad-lib*. The substrate and fruit items were removed and replaced on a weekly basis to reduce the risk of spreading diseases to the froglets.

Froglet biometrics: Body weight and snout-vent length to the nearest millimeter were recorded at about 5-day intervals throughout the captive-rearing period in order to monitor froglet growth. As a precautionary measure, a nitrile examination glove (100% powder free) was used while handling the froglets. The snout-vent length was recorded by carefully placing each froglet on a sterilized transparent ruler and reading off the measurement accordingly (Fig.1). The weight of each froglet was recorded by placing each froglet into a sterile Petri dish and weighing on a digital pan balance (± 0.001 g).



Figure 1. Snout-vent measurement of a *P.vitianus* froglet using a sterilized plastic ruler, 3 January 2007.

CONSEQUENCES

Early captive rearing: All five *P.vitianus* froglets were successfully raised to 37 days old in the glass aquarium. All maintained their body weight and, on average, weight and snout-vent length gradually increased during this captive management period (Table 1).

Table 1. Average weight and length of *P.vitianus* froglets (n = 5) during captive-rearing at USP.

Date	Average weight (g)	Snout-vent length (mm)
29/12/06 (hatch date)	0.098	8
03/01/07	0.106	8
08/01/07	0.109	8
13/01/07	0.113	9
18/01/07	0.117	9
23/01/07	0.119	10
03/02/07	0.121	10

***P.vitianus* froglet behaviour:** The froglets were nocturnal in habits. During daylight hours they were frequently observed in a group sheltered under cover of the rotting log material (Fig. 2). They were capable of climbing the glass surface of the aquarium, so a secure lid was essential.

Ant invasion: On 4 February 2007, the aquarium was invaded by brown house ants *P.megacephala* during the night, entering via the meshed-lid. This unanticipated entrance may have been caused because of placing excess (four) ripe pawpaw into the aquarium, these fruits attracting the ants. Despite their small size (minor workers approximately 2 mm long and major workers 3-4 mm long) the ants predated all five of the 37 day-old froglets on the night of invasion, leaving only few remains of the froglets that were found the following morning.



Figure 2. The five *P.vitianus* froglets grouped on the moist aquarium substrate, 8 January 2007.

Discussion and conclusions: The ant *P.megacephala*, believed to be native to southern Africa, is now widespread throughout temperate and tropical zones of the world. Evidence exists of reductions in vertebrate populations where this ant is extremely abundant. They are omnivorous and will kill and eat invertebrates, and have also been known to consume small vertebrates e.g. bird hatchlings (ISSG 2006).

The unanticipated invasion by *P.megacephala* at USP after just over one month of captive rearing

of the froglets is an important lesson learnt in the *ex-situ* conservation of *P.vitianus*. This experience is the catalyst to improve the aquarium design, for example, incorporating an aquatic barrier to prevent *P.megacephala* from entering. It may be that invasion by *P.megacephala* may be contributing to declines of extant *P. vitianus* populations in the wild, in addition to the known threat posed by introduced vertebrate predators, thus contributing to their overall endangerment.

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