

# Improvement in *ex-situ* egg hatchability of Fijian ground frog *Platymantis vitianus* by laboratory incubation of egg masses, University of the South Pacific, Suva, Fiji

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## SUMMARY

Breeding of the endangered Fijian ground frog *Platymantis vitianus* coincided with the Fijian wet season (December/January) during captive management in a purpose-built outdoor enclosure at the University of the South Pacific, Fiji. Two fertile egg masses (around 40 eggs in each) were laid. A low hatchability of 10.8% (n = 40) was recorded for the first egg mass found, which was left in the outdoor enclosure to develop. The second egg mass was taken into the laboratory for incubation where hatching success was very much higher at 87.5% (n = 42). The hatchability difference was attributed to appropriate incubation techniques in the laboratory which reduced infection and hence mortality, of the eggs.

## BACKGROUND

The Fijian ground frog (locally known as dreli or botoniviti) *Platymantis vitianus* once occurred widely in Fiji, but is now restricted to the mongoose (*Herpestes*)-free islands of Ovalau, Gau, Taveuni and Viwa. As well as mongoose, introduced rats *Rattus* spp., cats *Felis catus* and marine toads *Bufo marinus*, have probably contributed to declines (Zug *et al.* 2004). Despite being listed as Endangered (IUCN 2004) and intense conservation efforts on its behalf, little is known about the reproductive biology of the Fijian ground frog. This study was the first *ex-situ* captive management research on *P.vitianus*. It discusses the incubation of their egg masses using a laboratory design that resulted in improved egg hatchability in comparison to natural incubation of an egg mass in an outdoor enclosure.

## ACTION

**Frog capture:** Ten wild Fijian ground frogs were caught under approval of the Animal Ethics Committee (AEC) of the University of the South Pacific (USP) Suva, Fiji Islands, for this study. They were hand caught at dusk (17:00-19:00 h)

within a selected natural habitat on Viwa Island (60 ha) which lies 30 km northeast of Suva and 0.95 km from Viti Levu.



**Figure 1.** Outdoor enclosure for *P.vitianus* built at the USP. (Photo: Edward Narayan)

**Outdoor enclosure:** The frogs were held collectively and managed for a year (beginning of 2006 to the beginning of 2007) at the USP in a purpose-built outdoor enclosure (Fig. 1). The enclosure (5 x 5 x 4 m) had natural materials

such as moist soil, rotting bamboo, rotting logs, coconut husk and leaf litter added as refugia and to recreate something approximating the frogs' natural habitat. House crickets *Achetus domesticus* were released into the enclosure at dusk (18:00-19:00 h) three times weekly as supplementary food, while ripe pawpaw *Carica papaya* fruit was placed *ad lib* inside the enclosure to attract wild insect prey items. The day/night cycle and temperatures were the same as natural ambient conditions. The enclosure was systematically searched for *P.vitianus* egg masses on a fortnightly basis at 18:00 h using a low light intensity hand-held torch.

Incubation of a first egg mass (found at an estimated two week incubation age on 25 December 2006) was monitored in the enclosure. Eventually a low hatchability of 10.8% ( $n = 40$ ) was recorded for these eggs.

**Laboratory incubation of *P. vitianus* egg mass:** A second egg mass of an estimated one week incubation age was subsequently discovered on 9 January 2007. This egg mass was transferred to the laboratory (Fig. 2). A protocol was developed for laboratory incubation of these eggs. This included: basic hygiene procedures such as wearing a sterile pair of non-powdered latex gloves before handling any eggs or refugia materials; rinsing each egg ( $n= 42$ ) in sterile de-ionized water five times (5-min interval per rinse) to remove any dirt particles; and autoclaving the refugia materials (including soil, bamboo and leaf litter) at a temperature of 100°C for 30 min. Furthermore, an inexpensive dried plastic container (30 cm x 20 cm x 15 cm), cleaned and sterilised by pre-rinsing with de-ionized water and dilute ethanol, was used for laboratory incubation of the egg mass. A sterilised bamboo substrate was placed inside the incubation container and the sterilised soil was spread evenly within this bamboo. Each egg was then replaced close to each other on top of the soil layer with a small amount of sterilised leaf litter used to cover the egg mass. The incubation container had a mesh lid and the whole set-up was placed near a shaded, partly opened laboratory window to ensure adequate ambient air circulation was provided.



**Figure 2.** Fertile *P. vitianus* eggs ( $n=42$ ) three weeks incubation age (Photo: Edward Narayan)



**Figure 3.** Three week old *P. vitianus* froglet (weight 0.135 g; snout-vent length 14 mm) placed on Fijian 10 cents coin (diameter 23 mm) for comparison (Photo: Edward Narayan)

## CONSEQUENCES

After three weeks of laboratory incubation (around four weeks total incubation time), 35 healthy *P. vitianus* froglets hatched from the egg mass incubated in the laboratory (Fig. 3). Hatchability of this egg mass was high (87.5%:  $n = 42$ ) in comparison to the one in the outdoor

enclosure (10.8%: n = 40). The hatchability difference was attributed to careful handling and appropriate incubation techniques in the laboratory. However, care needs to be taken when interpreting these hatching result as there was only a sample of two egg masses for comparison.

Work is ongoing to refine laboratory techniques. As a result of this ongoing study, advice on handling and care of *P.vitianus* egg masses can in future be provided to zoological parks and specified individuals wishing to preserve these

frogs in captivity, with perhaps a view to releases in the future to suitable areas of its native habitat.

## REFERENCES

IUCN (2004) IUCN Red List (2004) <http://www.redlist.org>

Zug G., Watling D. & Morrison C. (2004) *Platymantis vitiana*. In: IUCN (2006) *2006 IUCN Red List of Threatened Species*. IUCN, Cambridge, UK.

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