# Record of the First Captive-Breeding Event of *Platymantis insulatus* (Brown and Alcala, 1970), A Critically Endangered, Karst-Obligate, Direct-Developing Frog (Amphibia: Anura) in the Philippines[1]

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**Key Words**: amphibian conservation, amphibian decline, amphibian reproduction, ex-situ conservation, *Platymantis insulatus*

**Abstract:** We present a record of the first captive breeding event of *Platymantis insulatus* (IUCN Critically Endangered). Field surveys and animal collections were conducted in Gigantes Island, Iloilo, in the Visayas during 2021 and 2022. The collected frogs were then transported to the ex-situ site in Laguna in Luzon. All *P. insulatus* underwent quarantine prior to pairing. After 14 months in captivity, the first successful hatching occurred on October 17, 2022, from a clutch of 26 eggs, yielding 21 neonates. This event was not only the first for the species but also the second instance of any platymantine being deliberately bred in captivity for conservation. This event demonstrates the feasibility of developing ex-situ conservation measures for this species and other threatened platymantine species.

## Introduction

*Platymantis insulatus* (Figure 1A) is currently the only amphibian species in the Philippines designated by the International Union for the Conservation of Nature as "Critically Endangered" (IUCN SSC Amphibian Specialist Group, 2018), primarily because it is a karst-obligate habitat specialist and has a highly limited natural range of approximately 21 km$^2$. Moreover, the limestone forests and caves they inhabit are being damaged and destroyed by clear-cutting, guano extraction, cave vandalism, and limestone quarrying (IUCN SSC Amphibian Specialist Group 2018). *Platymantis insulatus* are direct developers; unlike many species of frogs, they do not have a free-swimming tadpole stage. The species is endemic to the limestone caves and forests of the Gigantes Islands chain (Bucol et al. 2010). The female lays her eggs on land, and the embryos develop within the egg, hatching out as fully developed froglets (Figure 1B). The now-inoperative

[1] Received on May 23, 2026. Accepted on June 25, 2026. Last revisions received on August 31, 2026.
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https://blaypublishers.com/wp-content/uploads/2026/09/Greenhawk_et_al.P._insulatus_captive_breeding.pdf
Electronically available on September 6, 2026.

Project Palaka focused on in-situ and ex-situ conservation efforts for *P. insulatus* from 2020 until 2025.


Figure 1. *Platymantis insulatus*, the Gigantes Limestone Frog. A. Adult gravid female photographed in the field. Adult frogs: approximately 43 mm. B. Neonate hatched in captivity in October 2022. Neonate frogs: ranged between 4-6 mm. Due to the delicate nature of the neonates and their status as Critically Endangered, we did not attempt to measure them until four days after hatching. Photo credits: A. Jayson Madlao. B. Norman Greenhawk.

## Methods

*Animals*

On August 17-19, 2021, and January 22-February 28, 2022, 72 individuals were collected from the islands of Gigantes Norte and Gigantes Sur, Gigantes Islands, Iloilo. A total of four collection sites were chosen, two on each island. Collection sites were selected from areas with significant abundance and were far enough apart to not put excessive pressure on the population at any one location. Frogs were transported individually, in containers filled with sterile, moistened powdered coconut shell, from the Gigantes Islands to the ex-situ facility in Laguna Province in Luzon.

*Quarantine*

Upon arrival at the captive facility in Laguna province, the frogs were placed individually in quarantine setups, which consisted either of a 10-gallon glass aquarium with custom screen tops or 20-liter clear plastic storage boxes, with custom made soft mesh lids. Substrate consisted of a moistened paper towel. Plastic hides were fabricated from polyvinyl chloride (PVC) pipes designated for potable water use, to allow the frogs to feel secure while facilitating easy visual

observation. Quarantine setups also contained a shallow water basin, as well as a basin of Lightweight Expanded Clay Aggregate (LECA) or pumice stone, which was also filled with water. Water was changed daily. The enclosures were misted twice daily. Cuttings of plants, such as *Cordyline* sp. (Asparagaceae) and *Tradescantia* sp. (Commelinaceae) were provided for additional hides. All plants were disinfected prior to use, by way of soaking for 10 minutes in a 10% bleach solution and thereafter rinsing the plants in sterile water before allowing them to air dry on paper towels on a sterilized surface in the facility. Paper towels were changed every other day. Once a week, frogs were removed from their quarantine enclosures and placed in sterilized plastic terraria while the quarantine enclosures were thoroughly cleaned and sterilized with a bleach solution. All frogs remained in quarantine for 45 days.

*Housing*

Breeding frogs were housed in pairs, one male and one female, in a 20-gallon glass aquarium with a custom-built screen mesh lid (Figure 2A). Rows of aquariums were kept side-by-side on metal industrial shelving units. The aquariums were designed to mimic the unique conditions of the karst hills of Gigantes.


Figure 2. Early project setups for *Platymantis insulatus*. A. Adult setup. Adult frogs remained in the hollow clay hide (arrow) during the day. B. Neonate/juvenile setup, arrows point to frogs. Photo credits: Norman Greenhawk.

During our fieldwork, our team observed that Gigantes Sur experienced regular rain throughout the day, usually in the morning, mid-afternoon, and early evening. However, owing to the limestone substrate, water drains quickly, and there is a distinct "drying out" period between rains. To achieve a similar effect in captivity, a false bottom was fashioned for each tank, allowing for water to drain quickly. Each tank had a drainage hole drilled on the bottom at one end of the tank, and the tank was rested at a slight angle.

This allowed for a self-contained, quickly draining water/misting system. The misters were on timers, and were scheduled to turn on at 5:00, 12:00, 17:00, and 20:00. Excess water would drain through the false bottom, exit the drain, and fall into a PVC gutter on the underside of each shelf, which then returned the water to the misting basin. The water was filtered with a UV filter, a biological filter, and was changed once a week.

Two substrates were used in the tanks. 50% of the tank was covered in coconut husk chips, to serve as the "forest floor" part of the tank. This area also contained potted plants and a clay hide. 50% of the tank was covered in LECA to mimic the quickly draining limestone. All tanks included a water basin, live plants, and stacked slate rocks or clay pots to provide cover for the frogs. Temperatures were kept at between 21–25°C and maintained with air-conditioning. Lighting was achieved through use of fluorescent tube lights on timers. Lights turned on at 7:00 and turned off at 17:00.

*Feeding Schedule*

Adult frogs were fed three times weekly on 1/4-1/2" (~ 6-13 mm) captive-bred crickets (*Gryllus bimaculatus* and *Gryllodes sigillatus*, Orthoptera), newly emerged superworms (the larval stage of the darkling beetle, *Zophobas morio*, Tenebrionidae), dubia cockroach nymphs (*Blaptica dubia*), and termites (various species, wild harvested, Isoptera), dusted with a 50/50 powder of calcium and vitamins (obtained from Reptical™ and Reptivite™).

## Results

*Breeding Event*

Males began calling within a week of arrival at the facility, while still in quarantine, and females were already showing egg development within two months in captivity; however, successful breeding did not take place until the frogs had been in captivity for 14 months. On several instances before the successful breeding event, Project Palaka staff found infertile eggs laid in the tanks during morning inspection.

On 17 October 2022, during the regular morning check on the frogs, Project Palaka staff observed three already-hatched neonates in the tank of an adult pair.

The clutch of eggs had been laid at the base of a small rubber tree, *Ficus* sp. (Moraceae) that had been placed in the tank. This plant was removed and placed in a large plastic terrarium, along with the three already-hatched neonates. The clutch continued to hatch until 20 October 2022, at which time we slowly removed the clutch and counted the eggs: 26 total eggs laid, with two unfertilized eggs and three neonates dying within the egg or during hatching. A total of 21 neonates successfully hatched from this breeding event.

*Neonate setup and care*

Neonates were initially placed in plastic terrariums with a moistened paper-towel bottom. After one week, they were moved to a sterilized 10-gallon glass aquarium tank with a secure mesh lid (Figure 2B). They were maintained on the same moist paper towel substrate, with sterilized plastic hides constructed from 4" diameter plant pots that had been cut in half, stacked flat rocks, fresh plant cuttings (*Cordyline* sp. and *Tradescantia* sp.), and water bowls filled with sterilized lava rock to prevent drowning.

For the first two months, neonates were fed daily on a diet of pinhead crickets, dusted with a 50/50 mixture of Reptocal™ calcium supplement and Reptivite™ vitamin supplement. Thereafter, feeding was reduced to three days a week, with crickets of increasing size offered as the frogs grew. Neonates were misted thrice daily and kept at the same temperature as the adults. Mortality will be explored in a forthcoming paper, but two neonates born from this batch survived for over three years in captivity.

## Discussion

This note is intended to document the first captive breeding of the critically endangered frog, *P. insulatus*. Detailed analyses of husbandry parameters, subsequent breeding events, and challenges are beyond the scope of this report and will be addressed separately in a forthcoming paper that analyzes the results of all ex-situ efforts undertaken by Project Palaka for the duration of the project. The reporting of this event was delayed due to severe project disruption.

Prior to Project Palaka's efforts with *Platymantis insulatus*, the only known instance of captive breeding of a platymantine species was that of *P. vitiana*, the Fijian Ground Frog (Narayan et al. 2009). The successful efforts to breed *P. vitiana*, as well as our success in breeding *P. insulatus*, suggest that captive breeding may be a feasible conservation tool for other threatened species of *Platymantis*.

## Ethics and Permits

All activities undertaken by Project Palaka were undertaken with all necessary permits and government agency approvals, to the best of our knowledge.

As Project Palaka was a conservation project, all activities with live animals were conducted with the utmost care, and with the animals' well-being as the paramount concern. All activities conducted were conducted in accordance with Philippine law, international conservation standards, and IACUC standards.

**Acknowledgments**

We want to thank our supporters and funders: the National Geographic Society (Project: NGS-75423C-2), Synchronicity Earth, Mandai Nature, Amphibian Ark, the Asian Species Action Partnership, Stiftung Artenshutz, the US Fulbright, the Philippine American Education Foundation, IUCN Green Life Action Fund, and our individual sponsors, J. LaGarde, C. Dudzic, R. Holland, J. Seidel, and F. Jarvis. We want to thank the communities, Barangay Captains, and Kagawads of Gigantes Islands for supporting our efforts, as well as the Local Government Unit (Mayor's office) of Carles, Iloilo, Panay Island and the Philippine Department of the Environment and Natural Resources. We thank J. Manulat, J. Madlao, J. Hisu-an, and A. Carsola for their contributions during fieldwork in collecting the frogs. We sincerely thank three anonymous reviewers that took the time to review this paper and provide valuable critiques and feedback. We acknowledge that the initial phase of the ex-situ project was housed in the UPLB MNH Hortorium building, and we further acknowledge the involvement of relevant UPLB MNH personnel in the initial phases of Project Palaka.

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