



# Evaluating a Commonly Traded Frog (*Kaloula pulchra*) as a Vector for the Pathogenic Fungus, *Batrachochytrium salamandrivorans*

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## Introduction

- Globally, amphibian populations have experienced **rapid declines** due to a multitude of factors, one of which is a newly emerged pathogen that results in chytridiomycosis.<sup>1</sup>
- This fatal disease is caused by **two chytrid pathogens** known as *Batrachochytrium dendrobatidis* and *Batrachochytrium salamandrivorans* (henceforth referred to as Bd and Bsal, respectively).<sup>1</sup>
- While Bd has already been spread globally, **Bsal is only present in a few countries** in Asian and Europe (Figure 1). It has not been detected in North America; a continent that houses a vast number of amphibian species.
- The *Kaloula* genus is among the **top 30 amphibians imported into North America**. Chubby Frogs (*Kaloula pulchra*) are one of the most heavily traded species.<sup>3,4</sup> This amphibian is native to Southeastern Asia where Bsal is believed to originate and through the pet trade Bsal is likely spread through the amphibian pet trade.<sup>2</sup>

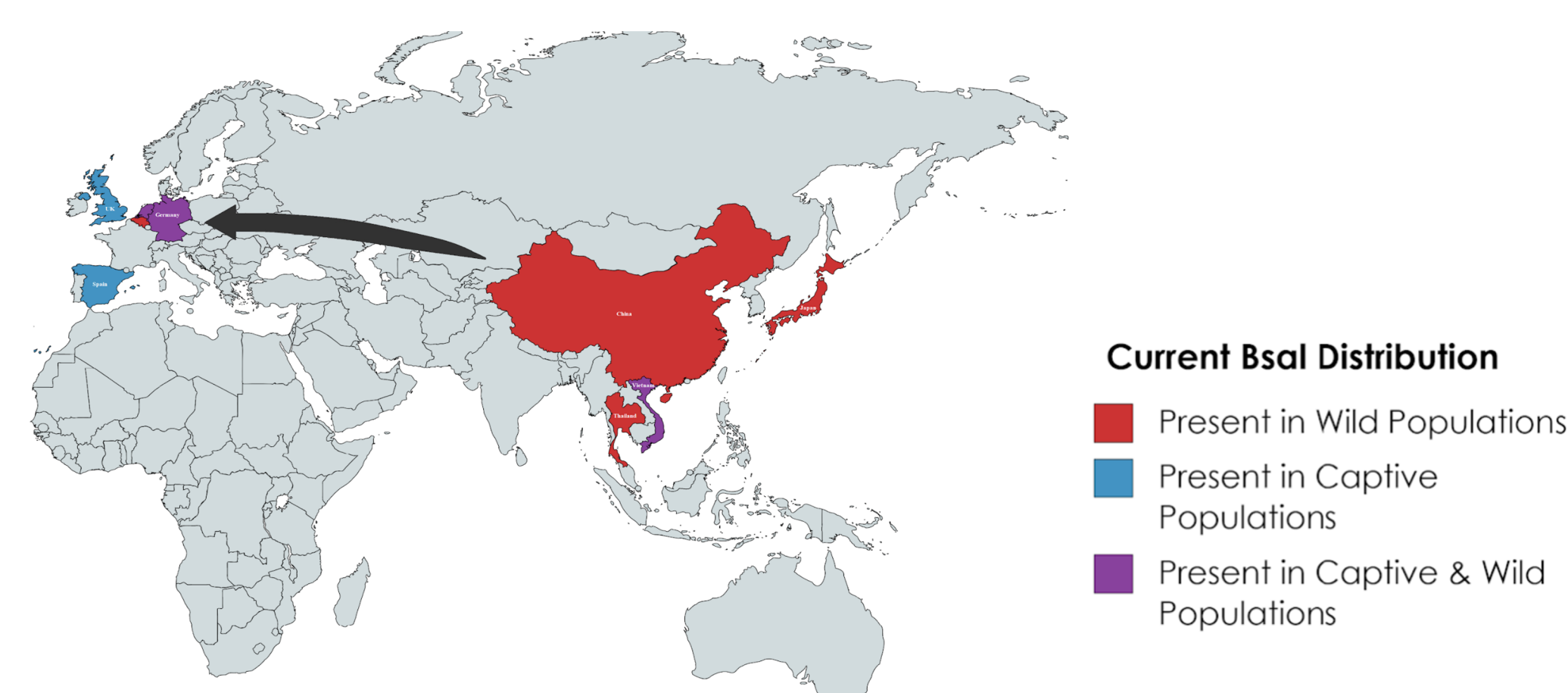


Figure 1. Presence of Bsal in Asia and Europe in 2019

## Research Questions

- Can the Chubby Frog (*Kaloula pulchra*) act as a vector for Bsal within the pet trade?
  - Are Chubby frogs susceptible to Bsal infection?
  - Do chubby frogs show clinical signs of Bsal chytridiomycosis?
- Do chubby frogs experience Bsal-related mortality?

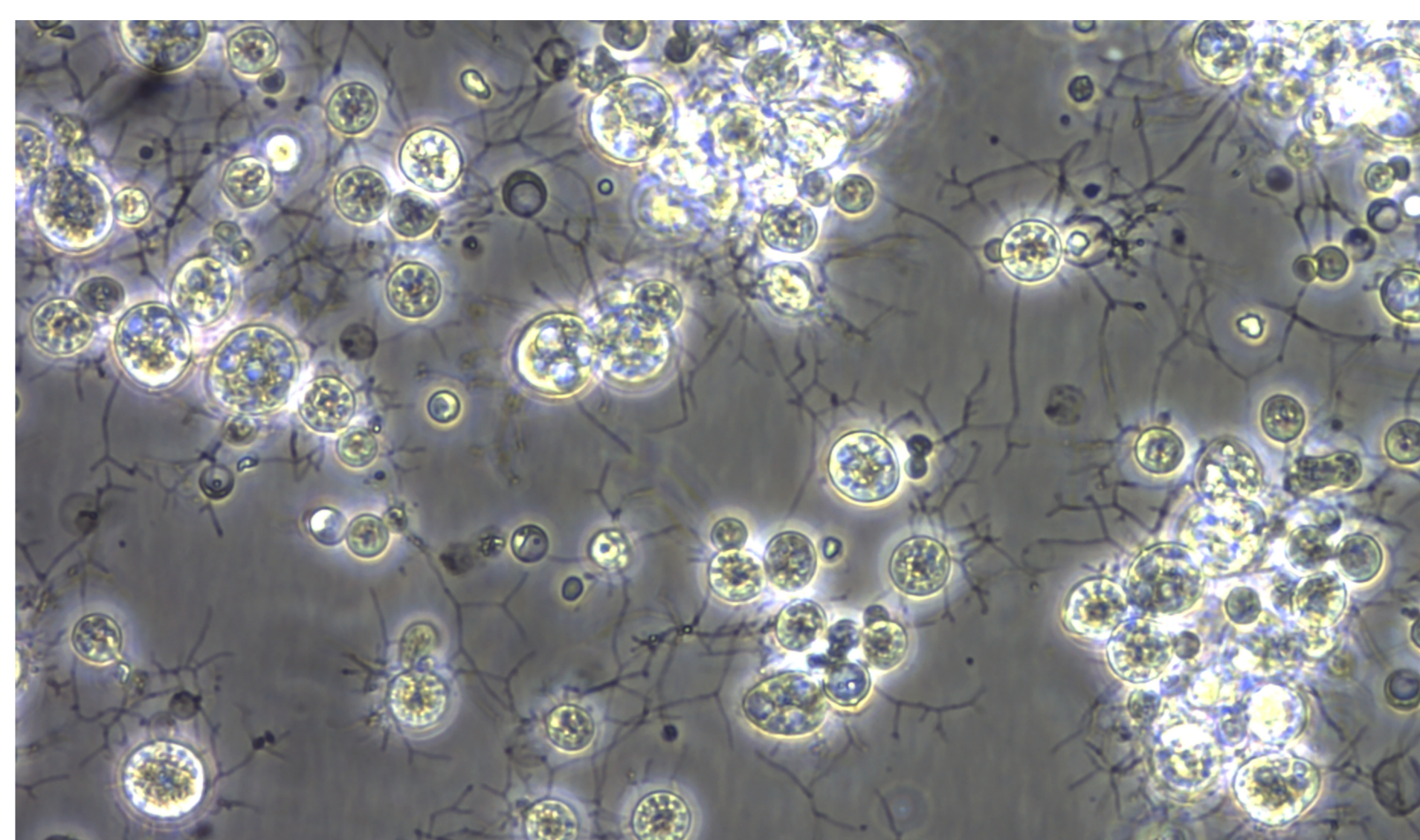


Figure 2. Bsal zoospores at 40x magnification

## Methods

- We tested 15 *K. pulchra* specimens
  - 12 received a single dose of 2,000,000 Bsal zoospores.
  - 3 were left unexposed to serve as a control group.
- The *K. pulchra* were monitored for 6 weeks and checked daily for clinical signs of disease, such as skin lesions, as well as mortality.
- To determine Bsal infection status, the specimens were swabbed every 6 days after inoculation and qPCR analysis will be used to analyze sample swabs.

## Results

- 10 out of the 12 exposed *K. pulchra* showed increasingly severe clinical signs of infection over the course of 6 weeks.
- Mortality (believed to be due to chytridiomycosis) was observed in 2 of 12 individuals.
- Survival in controls was 100% with no signs of infection.

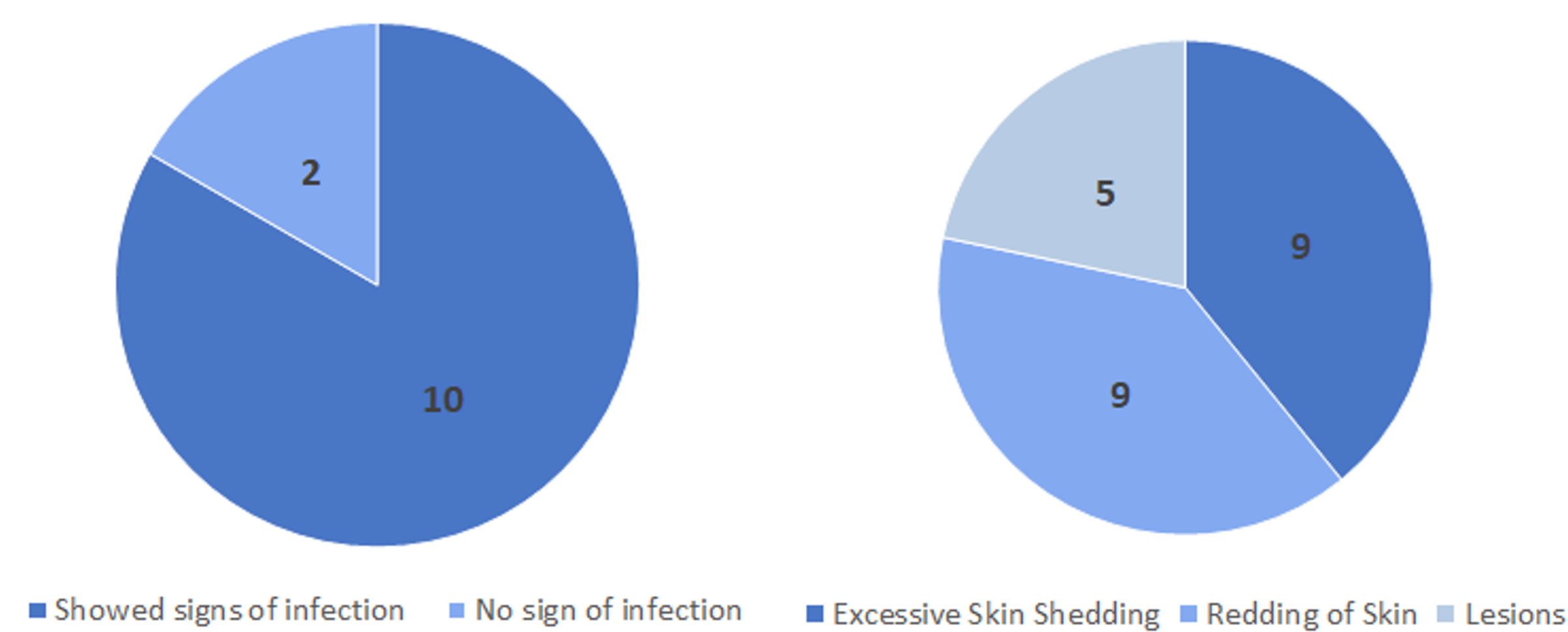


Figure 3. Number of individuals who showed clinical signs of Bsal

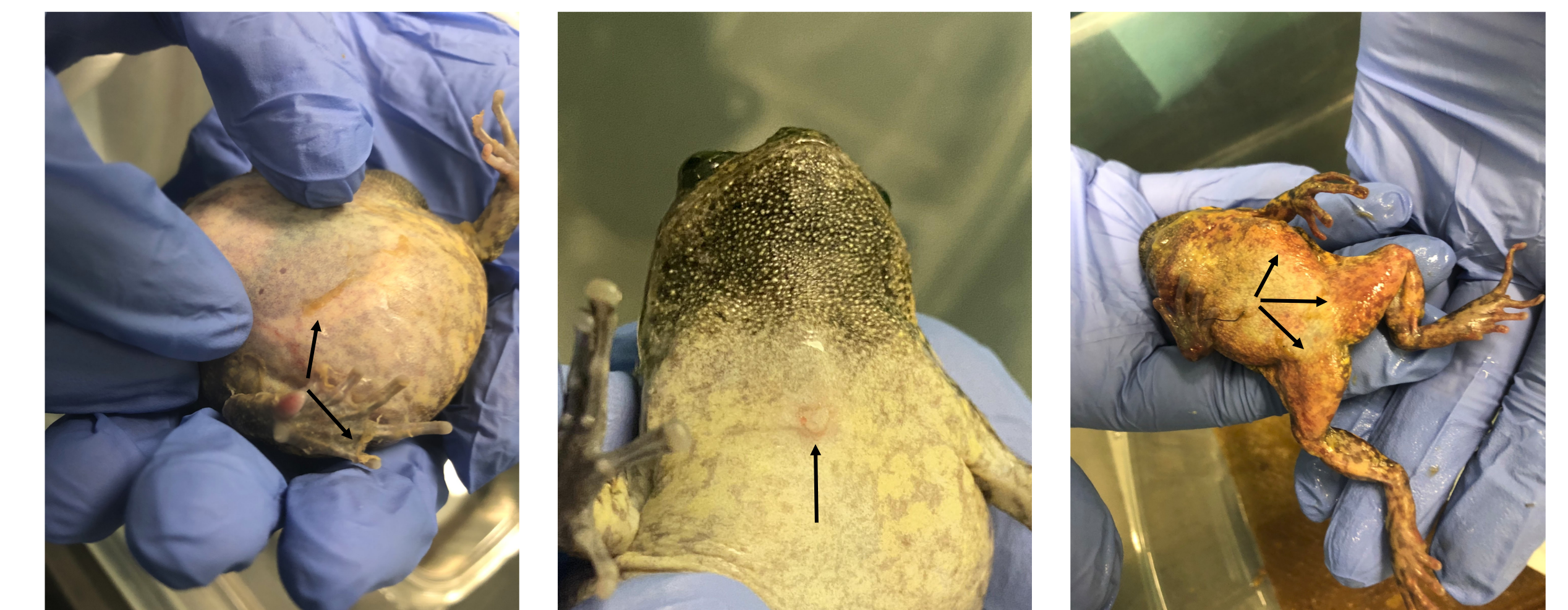
Figure 4. Number of infected individuals who showed each clinical sign



Figure 4. Chubby Frog preexposure to Bsal

## Clinical Signs of Disease

- Reddening of skin
- Excessive skin shedding
- Lesions



Excessive skin shedding

Lesions

Redding of skin

Figure 5. Photo displaying clinical signs of Bsal infection

## Discussion

- Preliminary analysis of clinical signs suggests that Chubby frogs are susceptible to Bsal infection and show clinical signs of chytridiomycosis with the infectious dose used in this experiment. The presence chytridiomycosis in the Chubby frogs may mean that the species are a vector for pathogens within the pet trade.
- Bsal infection status for experimental frogs has yet to be confirmed using qPCR analysis of skin swab samples.
- Some of the specimens exposed to Bsal were found to carry Bd prior to the experiment. The exposure to Bsal may have exacerbated the specimens with Bd leading to chytridiomycosis causing mortality.
- The presence of Bd in North America may indicate that when Bsal invades amphibian populations, Bsal's synergistic effects may lead to additional extirpation events previously unaccounted for.

## Significance

These results can be used to help develop policies and guidelines to prevent the spread of Bsal into North America via the pet trade.

## Acknowledgments

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