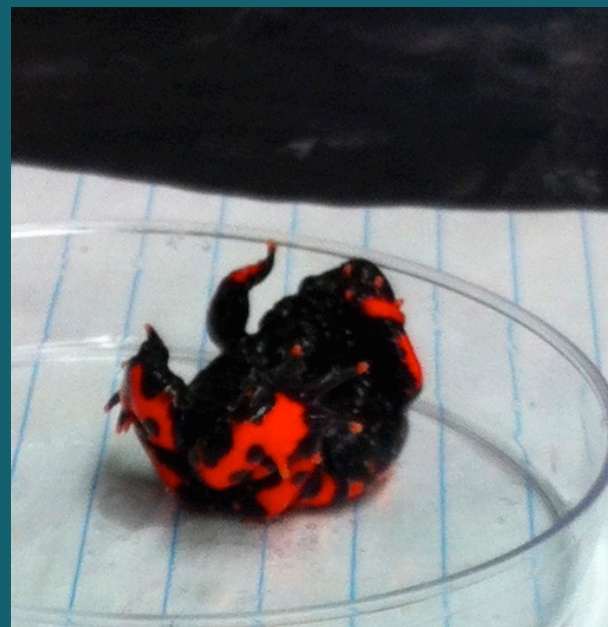


# Unken Donuts: Sexual Dimorphism and Ontogenetic Effects on the Unken Reflex

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Many reptiles and amphibians exhibit defensive posture reflexes. *Bombina orientalis* exhibits a variation called the unken reflex, in which the back is arched to show their orange ventral coloration. Here, we investigate the effects of sex, environment, and captive rearing on this behavior.

**Bombina orientalis go through a wide range of motion before they demonstrate a full unken response posture.**



Bombina orientalis, also known as fire-bellied toads, are indigenous to Korea, northeastern regions of China, and areas along the Russian border, inhabiting forested and paddy environments in these regions. To better understand differences in the unken reflex, as well as defense posture mechanisms in general, differences between sex, rearing, and habitat were examined in the frogs.

## Experimental Design and Results:

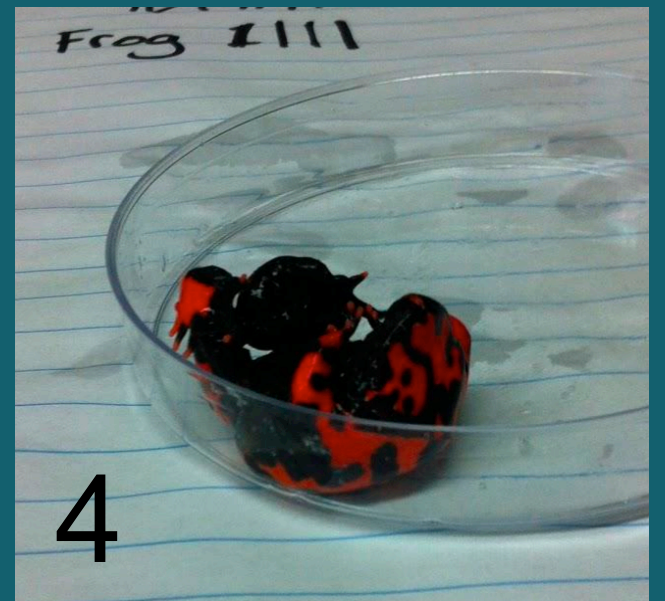
**Hypothesis:** Different demographic groups will display the unken reflex to varying degrees. Specifically we propose that lab raised frogs will have less of a response compared to wild caught frogs.

**We attempted to induce the unken reflex in 40 adult *Bombina*.**

**20 male, 20 female.**

**20 from paddy environment, 20 from forest.**

**20 wild caught, 20 F1 lab raised.**



**Figure 1: Observed unken responses with behavioral scores.**

**After inducing the unken reflex by repeatedly tapping the scapular region, the frog's response was scored.**

- 0: No response**
- 1: Immobility**
- 2: Minimal unken**
- 3: Partial unken**
- 4: Full unken**

# Results:

Figure 2: Females were found to be more likely than males to exhibit a full unken (Chi-square,  $p=0.0156$ ).

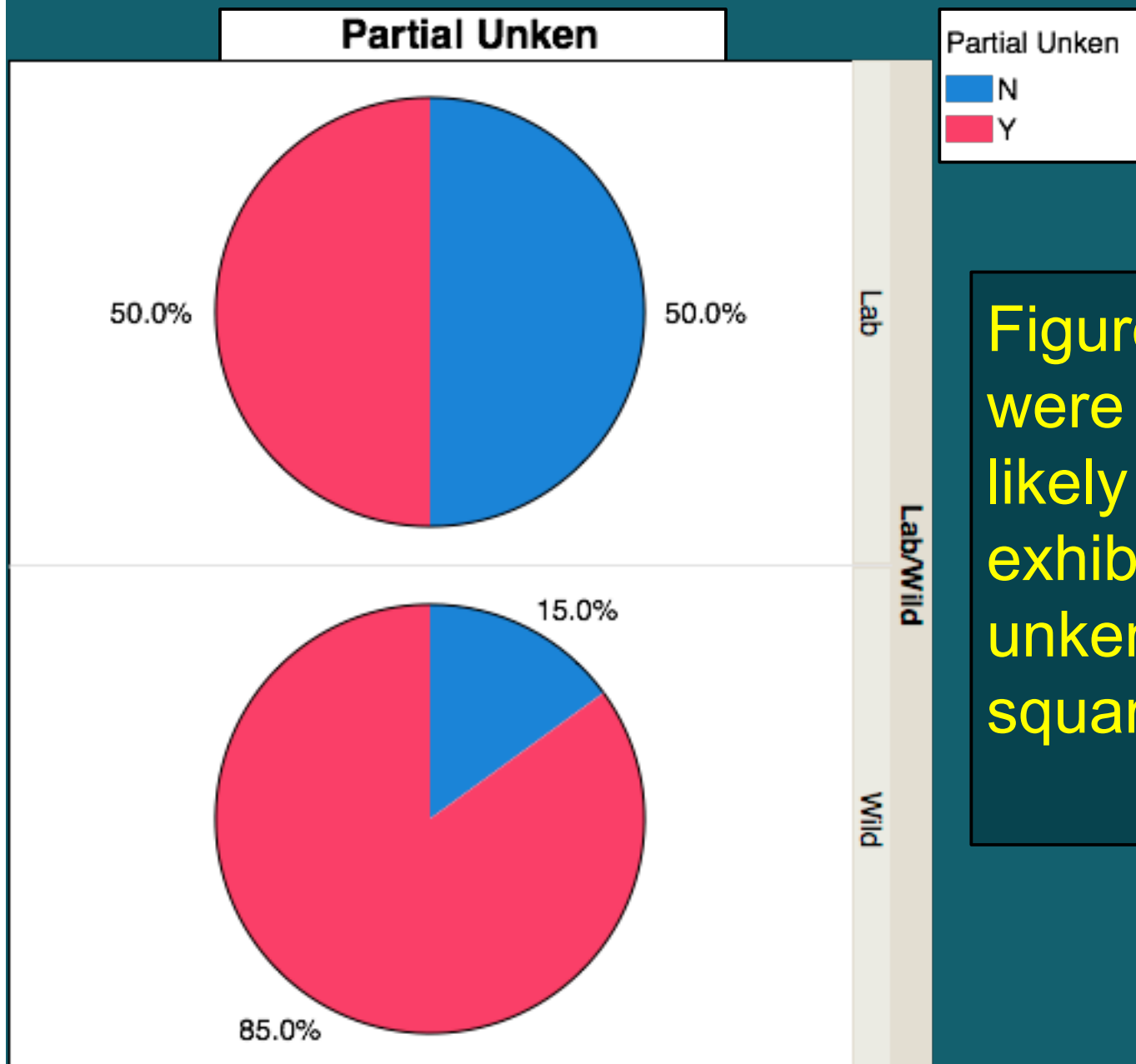
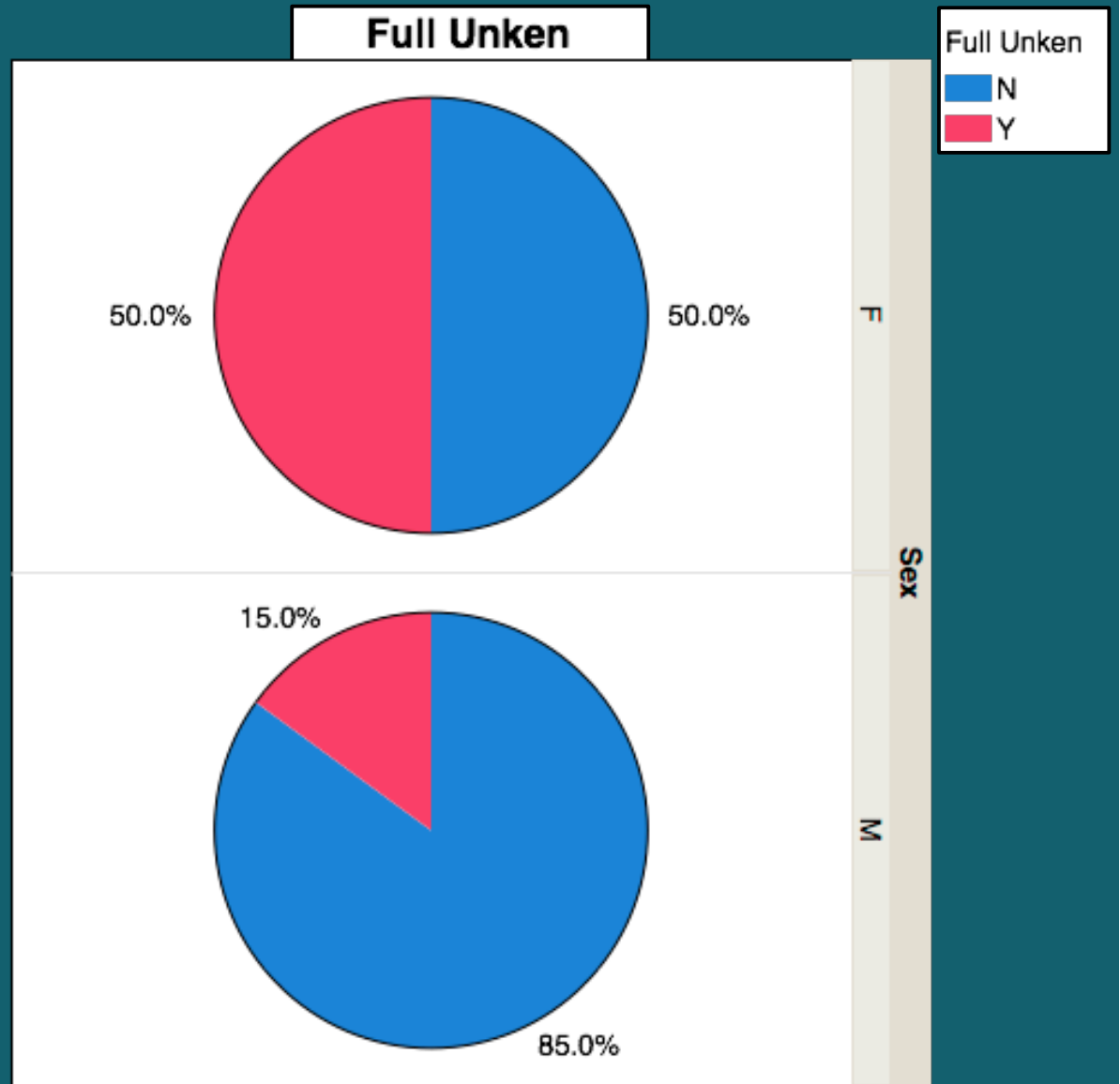


Figure 3: Wild frogs were found to be more likely than lab raised to exhibit a partial or full unken response (Chi-square,  $p=0.0156$ ).

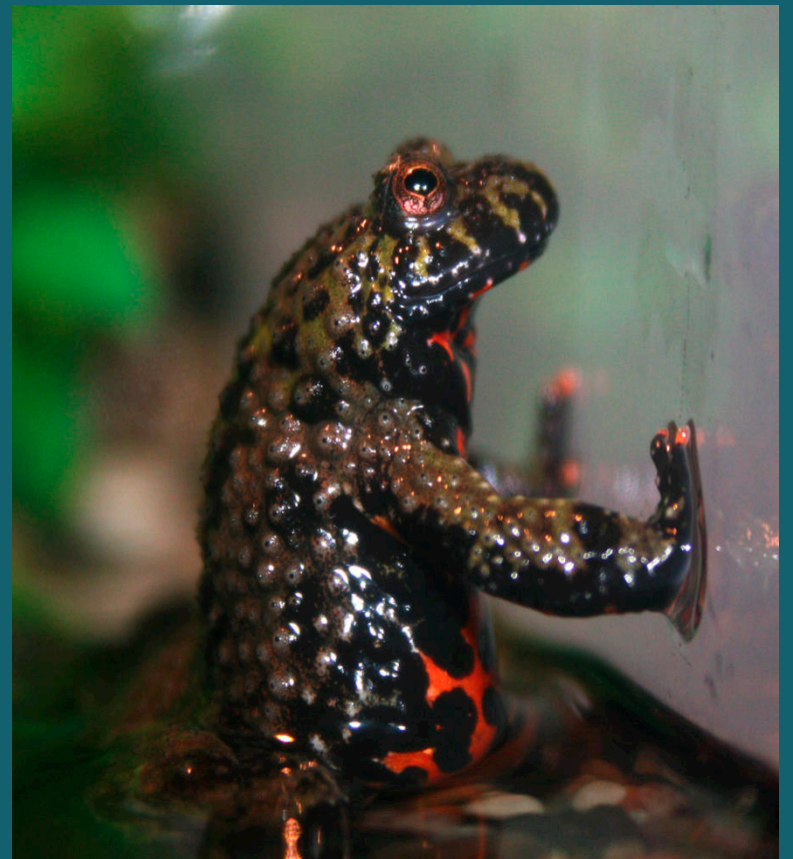
No difference was found between paddy and forest frogs.

## Conclusions:

The degree to which frogs exhibit the unken reflex is sexually dimorphic and is effected by developmental conditions. Captive rearing leads to a decreased unken reflex.

## Future Directions:

- **Hormonal effects**
- **Morphological effects**
- **Age stage differences**
- **Different stimulation techniques**
- **Individual experience**
  - **High and low exposure**



## References:

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