

**STANDARD OPERATING PROCEDURE**  
**ENVIRONMENTAL ENRICHMENT FOR FROGS AND TOADS**  
**USED IN RESEARCH AND TEACHING**

**1.0 PURPOSE:**

- 1.1 This standard operating procedure (SOP) describes the methods for environmental enrichment of frogs and toads (*Anura*) used for research and teaching purposes.
- 1.2 These methods are intended to improve the well-being of these animals by increasing species-specific behaviors and reducing maladaptive behaviors.
- 1.3 This SOP is part of the UGA Environmental Enrichment Program that fully complies with the requirements of the National Research Council, *Guide for the Care and Use of Laboratory Animal*, ed8 available at <http://grants.nih.gov/grants/olaw/Guide-for-the-Care-and-Use-of-Laboratory-Animals.pdf> and the Animal Welfare Act and Regulations: Public Law 99-198 – The Improved Standards for Laboratory Animal Act available at <http://www.nal.usda.gov/awic/legislat/awa.htm> .

**2.0 STANDARDS:**

2.1 Natural Behavior:

Frogs are a diverse largely carnivorous group of short-bodied, tailless amphibians composing the order *Anura*. The use of the term “frog” versus “toad” has no taxonomic justification. All members of *Anura* are frogs, but only members of the family *Bufo* are considered “true toads.” In more common language, the term “frog” generally refers to aquatic or semi-aquatic species with smooth, moist skin. Whereas, the term “toad” generally refers to terrestrial species that have dry, warty skin. However, there are numerous exceptions to this rule. (Lips et al., 2010) Frogs live in a variety of habitats, from aquatic to terrestrial and also underground or completely arboreal. The skin of a frog is glandular, with secretions ranging from distasteful to toxic. The skin is semi-permeable, making them very susceptible to dehydration. They also tend to easily absorb toxins in their environment. Most frogs are strictly carnivorous, feeding on a wide variety of invertebrates that exist in their natural habitat. However, there are a few species that exist on fruit. Frogs produce a wide range of vocalizations, particularly for breeding or to fend off predators. Frogs are very social animals and tend to cluster with each other. Frogs startle easily and prefer locations where they can hide or camouflage themselves. Frogs are also very sensitive to vibrations and have excellent hearing.

2.2 Environmental enrichment must be evaluated by taking into account the following:

- 2.2.1 The Natural Behavior and needs of frogs and toads (see above)
- 2.2.2 Social Enrichment – Housing of compatible conspecifics offers a high level of enrichment. Every effort will be made to house social species. If social housing is not possible, animals should be housed in a manner that allows for as much tactile, auditory, visual or olfactory contact as possible. Social housing is a recognized and important part of the Environment Enrichment Program but should not be viewed as the sole means of meeting the enrichment needs of animals.
- 2.2.3 Physical Enrichment (devices, toys, etc) – Physical enrichment can be an important part of the Environmental Enrichment Program. However the selection of physical enrichment should take into account the safety of the device, its ability to stimulate and maintain the animal’s interest and its impact on the research

being conducted. Physical enrichment should be carefully monitored to assess its impact of the goals of increasing natural behaviors.

2.2.4 Activity/Food Enrichment – Activity/food enrichment can be an important part of the Environmental Enrichment Program. However, the selection of activity/food enrichment should take into account the health of the animal, the limitations of its confines and its impact on the research being conducted. Any activity/food enrichment should be planned in consultation with the Attending Veterinarian (AV) and the Principal Investigator (PI).

2.3 The enrichment program is carried out by University Research Animal Resources (URAR). Specific needs and requirements should be communicated to the Assistant Director of the Animal Resources (AR) Unit.

2.4 Unless specifically justified by the PI in the Animal Use Proposal (AUP), all animals will receive enrichment. It is recognized that animal enrichment can be a research variable. In caring for the psychological well-being of animals, it is important to recognize limitations and use a balanced approach in providing the best possible care and allowing for the expression of species-typical behavior within a functioning research environment.

2.5 Abnormal Behaviors:

The Environmental Enrichment Program is a dynamic process. Ongoing evaluation is a necessary component to meeting the goal of more species-specific natural behaviors. University Research Animal Resources (URAR) will regularly monitor all enrichment, in part, by looking for stereotypical behaviors that might indicate animal stress or maladaptation to the laboratory environment.

Abnormal behaviors in frogs includes:

- Excessive secretion of skin poisons
- Anorexia
- Frequent startling and jumping into cage
- Lack of vocalization
- Display of color, particularly on the underbelly, to warn of toxicity

When these behaviors are observed, URAR will evaluate the need for additional environmental enrichment. All changes to enrichment will be approved by the AV and the PI. Enrichment changes will be made for all animals on study, in order to minimize research variability, even if all of the animals are not showing the stereotypical behavior.

### **3.0 PROCEDURES:**

3.1 Social Enrichment – Frogs will be group housed if possible. Until proven otherwise in the literature, it will be assumed that chelonians are social species.

3.2 Physical Enrichment for Aquatic Frogs - in order of preference

3.2.1 Water enrichment large enough to swim and a structure for resting or hiding as appropriate for the species.

3.2.2 Hiding box with regular misting

- 3.3 Physical Enrichment for Terrestrial Frogs (commonly known as Toads) - in order of preference
  - 3.3.1 Hiding box
  - 3.3.2 Natural plants for hiding
- 3.4 Physical Enrichment for Burrowing Frogs- in order of preference
  - 3.4.1 Structure for burrowing
  - 3.4.2 Natural soil at least 8” deep for burrowing
- 3.5 Physical Enrichment for Arboreal Frogs- in order of preference
  - 3.5.1 Tree branches for climbing with leaves for hiding
  - 3.5.2 Other climbing structures with natural colors to encourage camouflage
- 3.6 Activity/Food Enrichment - in order of preference
  - 3.6.1 Live prey (e.g. worms, mollusks, beetles) – provided weekly – particularly important for active predators

#### **4.0 RECORDS:**

The Animal Care Staff will log provision of enrichment daily according to their facility specific documentation records.

#### **5.0 DEFINITIONS AND REFERENCES:**

##### 5.1 Definitions:

- 5.1.1 Animal Use Proposal (AUP): a detailed written description of the procedures involving the use of animals in a research or instructional project.
- 5.1.2 Attending Veterinarian (AV): the veterinarian responsible for the health and well-being of all laboratory animals used at the institution
- 5.1.3 Enrichment: a method of providing animals with the opportunity to behave as they do in the wild, playing, foraging, grooming, and interacting in other ways with one another.
- 5.1.4 Principal Investigator (PI): the scientist who plans and coordinates all phases of the research or instructional work and the protocol.
- 5.1.5 Standard Operating Procedure (SOP): a set of standardized instructions for dealing with routine laboratory procedures

##### 5.2 References:

Animal Welfare Act and Regulations: Public Law 99-198 – The Improved Standards for Laboratory Animal Act (<http://www.nal.usda.gov/awic/legislat/awa.htm>)

Brown, M.J and Nixon, R. (2004) *Enrichment for a captive environment – The Xenopus laevis*. Animal Technology and Welfare

Lips, L. et al. (2010) *Atelopus zeteki: IUCN Red List of Threatened Species*. IUCN

Mueller, L. (2006) *Hyla versicolor: Animal Diversity Web* at [http://animaldiversity.ummz.umich.edu/accounts/Hyla\\_versicolor/](http://animaldiversity.ummz.umich.edu/accounts/Hyla_versicolor/)

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Szcodronski, T. (2006) *Bombina orientalis: Animal Diversity Web* at  
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