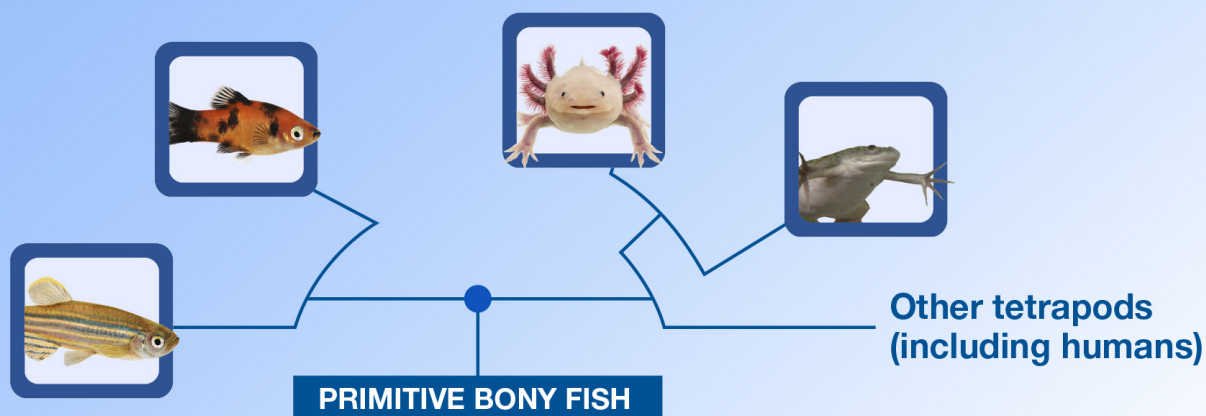


# ORIP

OFFICE OF RESEARCH  
INFRASTRUCTURE PROGRAMS



## AQUATIC MODELS

Centers and Research Resources

<https://orip.nih.gov>

### ORIP'S MISSION

*The Office of Research Infrastructure Programs (ORIP) enhances biomedical research in all disease areas and across basic, translational, and clinical research through its support of research infrastructure and resource programs. ORIP grants enable biomedical researchers to purchase state-of-the-art instruments; validate and disseminate research models, materials, and genetic stocks; and establish specialized research resource centers. ORIP also supports training and career development of individuals with DVM/VMD degrees, as well as predoctoral veterinary students.*



## OVERVIEW

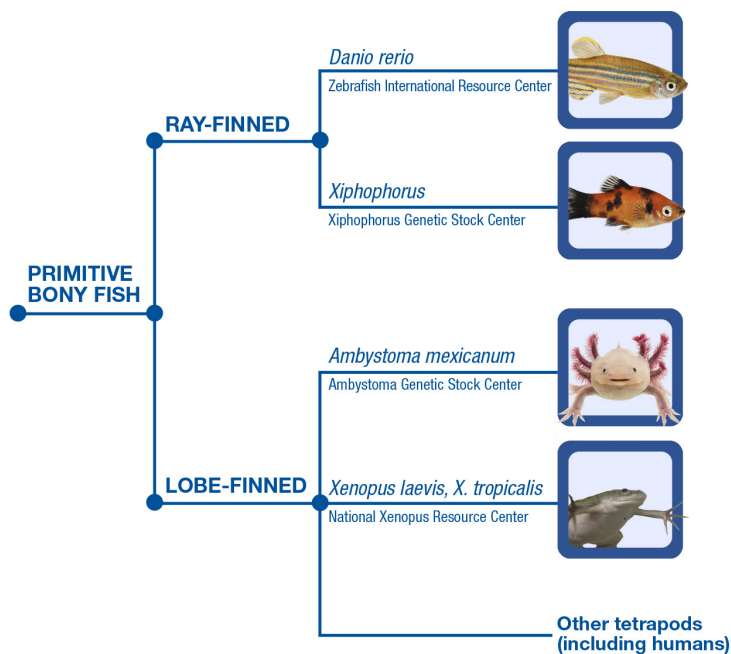
ORIP's Division of Comparative Medicine (DCM) funds a variety of centers and research resources grants that support laboratory animals to study human health and disease. The centers develop, characterize, maintain, cryopreserve, and distribute wild-type strains, mutants, and transgenic and inbred lines of different species. ORIP is committed to ensuring that scientists have access to important laboratory animals, including aquatic models. Aquatic model centers and research resources supported by DCM are further described at <https://orip.nih.gov/comparative-medicine/programs/vertebrate-models#aquatics>.

## HOW AQUATIC MODELS ADVANCE TRANSLATIONAL RESEARCH

During the past century, aquatic animal species—including fish (such as zebrafish and *Xiphophorus*), salamanders (such as *Ambystoma*), and frogs (such as *Xenopus*)—have demonstrated their utility as powerful models for studying human development, behavior, genetics, and disease because humans and aquatic species share related genetic information (Figure 1). Because of their short developmental cycles, small sizes, and transparent eggs, aquatic species offer unique advantages to researchers. At the molecular level, researchers can take advantage of orthologous, paralogous, and novel genes and the expression of these genes to obtain information about species-specific evolutionary survival adaptations (fitness). By studying these differences and the preserved commonalities between species, scientists can understand the roles that genes play in adapting and surviving the environment. One example is tissue (limb) regeneration in salamanders, a capability lost in humans.

Using aquatic models, researchers can identify functions of specific genes, allowing them to better understand the underlying basis of health and diseases in people. More than 20 Nobel Laureates in Medicine and Physiology have used at least one of these species in their research, emphasizing the contribution of these species to the advancement of scientific knowledge. A summary of these and other species' contributions to medical discoveries can be found at <https://fbresearch.org/medical-advances/nobel-prizes/>.

The scientific relevance of each species is based on the shared aspects of biology, physiology, and genetics with humans, as well as the opportunities that they offer to create better models of human disease.



**Figure 1.** Simplified diagram of the evolutionary relationship of *Danio rerio*, *Xiphophorus*, *Ambystoma mexicanum*, *Xenopus* (all located at ORIP's supported centers), and other tetrapods (including humans).

## RESOURCE CENTERS

### The Zebrafish International Resource Center

([www.zebrafish.org](http://www.zebrafish.org)) is a stock center for wild-type and mutant strains of zebrafish (*Danio rerio*). It also offers pathology services, diagnosis, and treatment of infection by opportunistic pathogens affecting zebrafish.

### The Ambystoma Genetic Stock Center

([www.ambystoma.org](http://www.ambystoma.org)) maintains a collection of Mexican axolotls (*Ambystoma mexicanum*), unique among vertebrates for their ability to regenerate numerous tissues and body parts.

### The Xiphophorus Genetic Stock Center

([www.xiphophorus.txstate.edu](http://www.xiphophorus.txstate.edu)) maintains animals from 54 pedigreed parental lines representing 24 species, including distinct interspecies hybrids.

### The National Xenopus Resource

([www.mbl.edu/xenopus](http://www.mbl.edu/xenopus)) serves as a stock center for various transgenic, mutant, and inbred *Xenopus laevis* and *X. tropicalis* animals.

## CONTACT FOR MORE INFORMATION

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