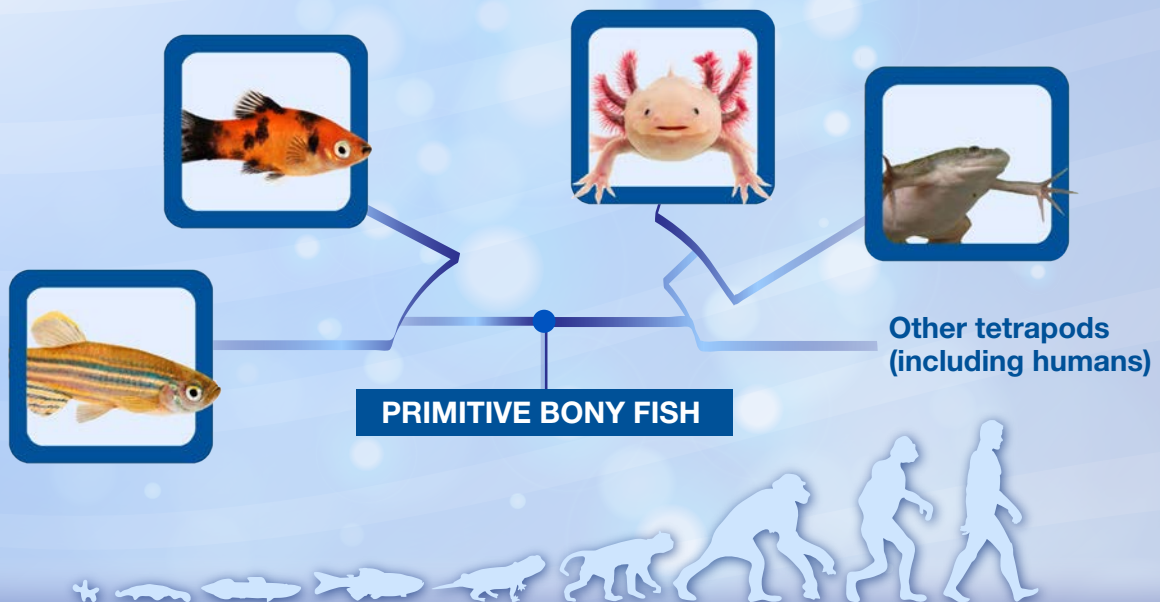


# ORIP

OFFICE OF RESEARCH  
INFRASTRUCTURE PROGRAMS



## AQUATIC MODELS

Centers and Research Resources

[orip.nih.gov](http://orip.nih.gov)

[twitter.com/NIH\\_ORIP](https://twitter.com/NIH_ORIP)

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## 2024

### ORIP'S MISSION

ORIP advances the NIH mission by supporting infrastructure for innovation. This support is focused on research resources, including animal models for human diseases, cutting-edge scientific instrumentation, construction and modernization of research facilities, and research training opportunities for veterinary scientists. Through continued engagement with NIH institutes, centers, and offices and the biomedical research community, ORIP empowers and expands existing programs and develops new initiatives to support NIH research at the forefront of scientific progress.



## OVERVIEW

ORIP's Division of Comparative Medicine (DCM) funds grants for a variety of centers and research resources that support laboratory animals to study human health and disease modeling.

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 [ORIP's Research Resources Directory](#).

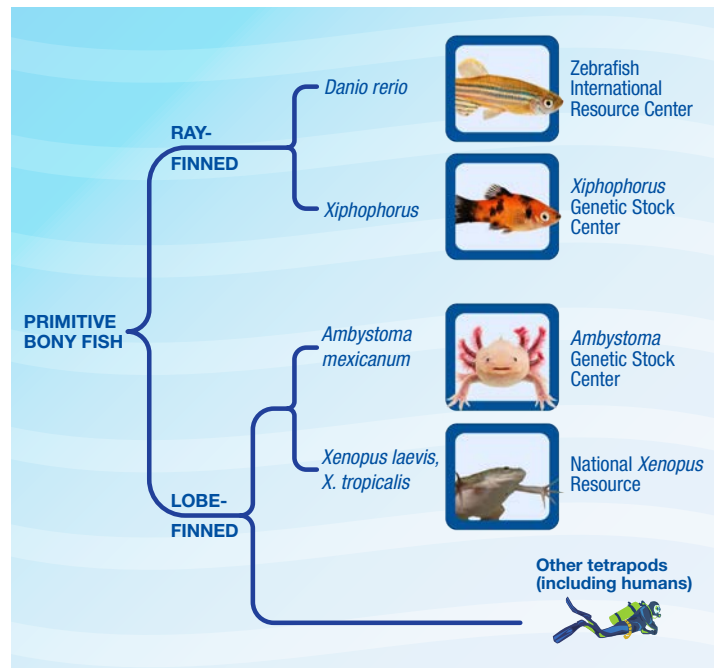
## AQUATIC MODELS ADVANCE TRANSLATIONAL RESEARCH

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 embryos, 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 to and surviving in 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. So far, more than 10 Nobel laureates in Medicine or 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 the [Foundation for Biomedical Research's Nobel Prizes](#) page.

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 for human disease.



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

## RESOURCE CENTERS

### The *Ambystoma* Genetic Stock Center

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

### The National *Xenopus* Resource

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

### The *Xiphophorus* Genetic Stock Center

[xiphophorus.txst.edu](http://xiphophorus.txst.edu) houses a collection of 24 of the 26 species of the freshwater genus *Xiphophorus*, including northern swordtails, southern swordtails, and platyfish. They are livebearing fish that retain their eggs inside the body and give birth to live, free-swimming young.

### The Zebrafish International Resource Center

[zebrafish.org](http://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.