

ORIP

OFFICE OF RESEARCH
INFRASTRUCTURE PROGRAMS



Invertebrate Models

Centers and Research Resources

orip.nih.gov

twitter.com/NIH_ORIP

Program Contact:

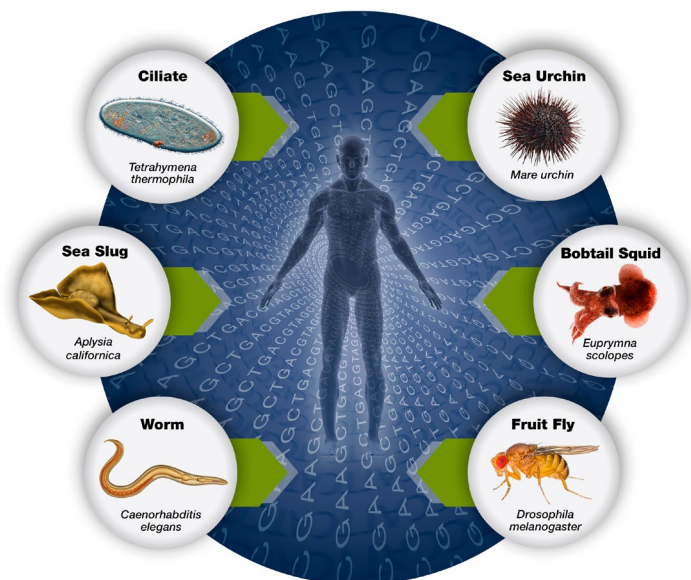
Sige Zou, Ph.D.
sige.zou@nih.gov
301-435-0749

2021

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.

RESEARCH CHALLENGES AND POSSIBILITIES



Advancements in genome, microbiome, and imaging research have highlighted the impact of genetic variants, microbiota, and cellular networks on human health and diseases. Diverse and relevant animal models and research tools are needed to understand the causal effects of such factors.

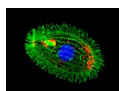
ORIP-supported invertebrate centers and research resources are meeting these needs by generating, maintaining, and distributing appropriate invertebrate models, tissues, research tools, and applications to the biomedical research community.

Invertebrate models are ideal for biomedical research owing to their short life cycles, simple culture conditions, and number of genes homologous to human genes. Invertebrate models have contributed to advances in human medicine and led to 14 Nobel Prizes in Physiology or Medicine since 1933.

Nobel Prizes for Research Using Invertebrate Models

Ciliate:	Catalytic properties of RNA (1989) Telomeres (2009)
Sea Urchin:	Cell cycle regulators (2001)
Squid:	Ionic mechanisms underlying nervous conduction (1963) Genetic regulation and apoptosis (2002)
Worm:	RNA interference (2006) Green fluorescent protein (2008)
Sea Slug:	Synaptic function in learning and memory (2000)
Fruit Fly:	Chromosomes in heredity (1933) X-ray induced mutations (1946) Genetic control of embryonic development (1995) Organization of the olfactory system (2004) Innate immunity (2011) Circadian rhythm (2017)

CENTERS AND RESEARCH RESOURCES



The National *Tetrahymena* Stock Center (Cornell University). Collects, maintains, and distributes wild-type, mutant, and genetically engineered strains of *Tetrahymena* and provides genetic services and training.



A Resource for Developmental Regulatory Genomics (Carnegie Mellon University). Produces resources and tools for studying genomic control of spatial gene expression during embryonic development in sea urchin.



National Resource for *Aplysia* (University of Miami). Provides laboratory-reared *A. californica* at all life stages (eggs to adults). Studies effects of aging on behavior, neuronal function, and gene expression.



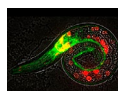
***Vibrio* Virulence Determinants in a Benign Colonization** (University of Hawaii at Manoa). Studies specific binary symbiosis between *V. fischeri* and its squid host and develops approaches and technologies for understanding the complex host-microbe interactions.



***Caenorhabditis* Genetics Center** (University of Minnesota). Acquires, maintains, and distributes approximately 21,000 genetic stocks of *C. elegans*.



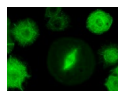
Center for *C. elegans* Anatomy (Albert Einstein College of Medicine). Provides ultrastructure information on *C. elegans* by assembling an anatomical atlas during development and aging. Improves electron microscopy (EM) and histochemistry technology and provides training in modern EM techniques.



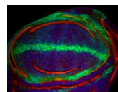
WormGUIDES (Yale University–led consortium). Develops super-resolution imaging and computational technologies for studying spatial dynamics of cell position and morphologies during development in *C. elegans*. Builds an atlas of embryonic neurogenesis and integrates informatics resources on cell lineage, structure, and genomic and genetic data.



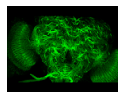
Bloomington *Drosophila* Stock Center (Indiana University). Collects, curates, maintains, and distributes more than 71,000 genetically defined fly strains. Provides scientific and technical support.



***Drosophila* Genomics Resource Center** (Indiana University). Collects and distributes reagents and materials for *Drosophila* genomics research. Refines and supports emerging genomic and cell culture technologies.



The Transgenic RNAi Project Resource for Modeling Human Disease (Harvard Medical School). Generates, provides, and characterizes *Drosophila* RNAi and CRISPR stocks for over 3,000 fly genes orthologous to human disease-associated genes for uncovering disease mechanisms and potential therapeutic targets.



A Comprehensive Human cDNA Library for Functional Gene Replacement in *Drosophila* (Baylor College of Medicine). Generates and provides a library of epitope-tagged human cDNAs of genes conserved between *Drosophila* and human, and transgenic flies with epitope-tagged human cDNA for studying functions of human gene variants.