

Developmental Integrative Biology

Developmental integrative biology—the study of organisms developing across all levels of biological organization—is a rapidly transforming field that fundamentally affects all areas of biology. UNT researchers working in this discipline are making groundbreaking discoveries at molecular and organismal levels, especially in the area of developmental physiology, where the major unifying principles of development, genetics, physiology and evolution are studied and identified. A concentration on the synthesis of these areas has significant potential to expand the field; researchers generate a more complete understanding of how the physiological systems of animals develop and populations evolve. Diverse animal models are used to study a range of phenomena — from physiological genomics relating to developmental processes, to the interactions of genes and environment. UNT is making substantial investments in new faculty, support staff, training opportunities, and infrastructure to advance developmental integrative biology research to national prominence.

- **New, LEED-Gold certified, Life Science Complex houses state-of-the-art “open” research laboratories and offices for multidisciplinary discovery in developmental physiology and genetics, biochemistry, molecular biology and plant sciences**
- **Dedicated research aquatics laboratories incorporate separate freshwater and saltwater facilities, including one of the largest zebrafish facilities in the nation**
- **Science Education Alliance (SEA) site for the Howard Hughes Medical Institute**
- **Research focus among distinguished faculty and international collaborators includes the influence of environmental stress and oxygen availability on developing animals; cardiovascular and respiratory developmental physiology; and comparative genomics**

Representative Faculty

Warren Burggren, Provost and Vice President for Academic Affairs; and Professor of Biological Sciences: *physiology of embryonic heart, lungs and kidneys and their integrated regulation using lower vertebrate, avian and mammalian embryos*

Dane Crossley, Assistant Professor of Biological Sciences: *developmental cardiovascular physiology focusing on interactions between environmental stress and cardio-respiratory maturation*

Qunfeng Dong, Assistant Professor of Biological Sciences and Computer Science and Engineering: *bioinformatics and biological data analysis*

Edward Dzialowski, Associate Professor of Biological Sciences: *developmental cardiovascular and respiratory physiology focusing on perinatal and postnatal changes in circulation and respiration in birds*

Jannon Fuchs, Professor of Biological Sciences: *developmental neuroscience with a focus on neuronal cilia and the effects of sensory experience on the functional organization of neurotransmitter systems*

Michael Hedrick, Professor of Biological Sciences: *development and evolution of respiratory rhythm generation in the brainstem of vertebrates*

Ione Hunt von Herbing, Associate Professor of Biological Sciences: *bioenergetics of growth and development and the effects of environmental change on metabolism using marine and freshwater fishes*

Pudur Jagadeeswaran, Professor of Biological Sciences: *physiology and genetics of adult and developmental hemostasis and thrombosis using the zebrafish model*

Pamela Padilla, Associate Professor of Biological Sciences: *developmental genetic responses to anoxia and hypoxia; and embryogenesis and gonad function using C. elegans and zebrafish models*



Select Research Resources

Life Sciences Complex

www.biol.unt.edu/lsc

The new, state-of-the-art, LEED-Gold certified building houses biochemistry, developmental physiology and genetics, molecular biology and plant science, with “open research” laboratories, offices and meeting spaces to promote exchange of expertise across areas. It provides unmatched opportunities for contemporary studies in developmental integrative biology, with a dedicated research aquatics lab incorporating separate fresh water and saltwater facilities to utilize a variety of freshwater and marine experimental model organisms.

TALON: High-Performance Computing System

citc.unt.edu/hpc/talon

This new computing research facility is unique to the region and features a high-performance supercomputer consisting of computing clusters with 1900 processor cores supported by high-speed networks, high performance disk storage, and advanced software.

Comparative and Evolutionary Developmental Physiology Lab

web.me.com/dcrosse/crossley_unt/welcome.html

A comparative approach is used in investigating the cardiovascular system of several vertebrate groups, including amphibians, reptiles, and birds to discover the patterns of developmental physiology that unify vertebrates and isolated periods of developmental susceptibility to environmental stress.

Zebrafish Genetics Lab

www.biol.unt.edu/~jagadeeswaran

Research uses molecular genetic tools to study hemostasis, a vertebrate specific function of paramount importance, and thrombosis using the zebrafish model. Screening tools identify hemostatic mutants in combination with chemical mutagenesis methods; mapping and positional cloning methods are used to identify novel genes.

Developmental Physiology Lab

www.biol.unt.edu/~burggren

Research focuses on the development of physiological processes in animals, including amphibians, reptiles, fishes, birds and the nematode *C. elegans*. Specific investigations explore the ontogeny of regulation of the physiological systems along the life continuum of eggs, embryos, larvae/fetuses and adults.

Fundamental Neuroscience Laboratories

www.biol.unt.edu/~schwark/funneurolab/home.htm

The combined labs provide the facilities and techniques necessary to conduct sophisticated studies in developmental physiology, with a focus on neurotransmitter systems and neuronal cilia. Research includes histology, electrophysiology, pharmacology, image analysis, cell culture and small animal surgery.

Contributing Research Cluster:

Developmental Integrative Biology

developmentalbiology.unt.edu

