Comparative Genomic Analysis of Regeneration and Musculoskeletal Evolution

The research of the Kusumi Lab is focused on studying the evolution and function of genes that control spinal regeneration and development in vertebrates.

Project 1: Evolutionary Genomics and Bioinformatics

The laboratory is collaborating with the Smithsonian Tropical Research Institute (STRI) in Panama to study the remarkable adaptive radiation of *Anolis* lizards in Central America. With over 375 species of *Anolis* lizards, the Caribbean is a unique natural laboratory for evolutionary genomic analysis to identify the gene regulatory changes that account for the morphological and developmental diversity in these lizards. Working with collaborators at TGen, we are undertaking next-generation genomic and bioinformatic analysis efforts of *Anolis* lizards in Panama, starting with the grass anole, *A. auratus*, and the slender anole, *A. apletophallus*. Students with previous experience in bioinformatic techniques, including use of R-based statistical tools, UNIX/Linux-based sequence analysis tools, Python or PERL scripting language are encouraged to apply.

Project 2: Regeneration and Development

Our research on regeneration focuses on the remarkable ability of lizards to regenerate musculoskeletal and neural tissues to form a new tail. Recently, genome sequence of the green anole lizard *Anolis carolinensis* has been published and the lab has created a new genome annotation for this model organism. The laboratory is working to generate biological and bioinformatic resources for studies of regeneration in
the lizard, towards development of future regenerative medical therapies. Students with previous experience in molecular techniques, including quantitative RT-PCR, RNA extraction and cDNA synthesis, histological and anatomical analysis are encouraged to apply.

Students with interest development, regeneration, genomics, evolution, or bioinformatics are encouraged to apply. Students will be expected to learn and apply current molecular and bioinformatic techniques and learn to use UNIX-based bioinformatic tools for comparative genome and transcriptome analysis. Students involved in the STRI project could apply for fellowships to conduct field research in Panama. Research or class experience in molecular biology, genetics, developmental biology, herpetology, or computer science is preferred.

At least a one-year commitment (at 10 hours/week or greater) is required to receive the necessary training to work on these projects. Please contact Dr. Kusumi with any questions.

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