David L Nieland

Subject: Postdoc in Math Modeling of Zika-dengue epidemiology

Postdoc: Mathematical Modeling of Zika/Dengue Virus Epidemiology

PROJECT DESCRIPTION: We are searching for a postdoc interested in working on two NIH-funded projects that will build, test and refine stochastic, spatially explicit, simulation models that link insect population dynamics and genetics with human disease epidemiology. We are developing a city-scale model for the transmission of dengue virus, utilizing rich entomological, epidemiological and human movement data sets from a research collaboration focused in Iquitos, Peru. A major goal of the work is to predict the impacts of various interventions (such as conventional mosquito control, vaccines, and evolution-based novel transgenic mosquito management methods) on dengue.

The incumbent will lead modeling efforts to further develop and test the epidemiological component of our model and integrate that model with the entomological model. We are also interested in building simple spatial and non-spatial, deterministic models as heuristic tools for better understanding basic principles, but we are not looking for applicants who are only interested in working with simple, generic models.

An important part of these projects involves field experiments and epidemiological studies in Peru to acquire data that will inform the structure and parameterization of the models, and a large-scale mosquito control study to provide data against which model predictions will be tested. The person in this position will have the opportunity to travel to Peru to become more familiar with the epidemiological and entomological work ongoing at the field site and to assist in the design of experiments.

The funding for this postdoctoral position is through two NIH research grants. There will also be opportunities to work with students and faculty involved in NC State's Center for Genetic Engineering and Society (http://research.ncsu.edu/ges) and in the Research Training Group on Mathematical Biology (http://rtg.math.ncsu.edu) which focuses on questions relating to parameter estimation for biological models.

Qualifications: Training in ecological or epidemiological modeling and experience with development of computer simulation models. Experience in C++ would be highly desirable, as would be statistical skills.

To apply: email an inquiry letter and CV to Alun_Lloyd@ncsu.edu and Fred_Gould@ncsu.edu

For more details on the project see the following publications:

Magori, K., M. Legros, M. Puente, D. A. Focks, T. W. Scott, A. Lloyd, F, Gould. 2009. Skeeter Buster: a stochastic, spatially-explicit modeling tool for studying Aedes aegypti population replacement and population suppression strategies. PLoS Negl Trop Dis 3(9): e508. doi:10.1371/journal.pntd.0000508

Xu, C., Legros, M., Gould, F, Lloyd, A. L. 2010.Understanding Uncertainties in Model-Based Predictions of Aedes aegypti Population Dynamics. PLoS Negl.
Trop. Dis. 4(9): e830. doi:10.1371/journal.pntd.0000830

Legros, M., Magori, K., Morrison, A.C., Xu, C., Scott, T.W., Lloyd, A.L., Gould, F. 2011. Evaluation of location-specific predictions by a detailed simulation model of Aedes aegypti populations. PLoS ONE 6(7), e22701. doi:10.1371/journal.pone.0022701

Okamoto KW, Robert MA, Gould F, Lloyd AL (2014) Feasible Introgression of an Anti-pathogen Transgene into an Urban Mosquito Population without Using Gene-Drive. PLoS Negl Trop Dis 8(7): e2827. doi:10.1371/journal.pntd.0002827

Gould, F., K. Magori, Y. X. Huang 2006 Genetic strategies for controlling mosquito-borne diseases. American Scientist. 94 (3): 238-246.