NIMBioS
National Institute for Mathematical and Biological Synthesis

NIMBioS Interdisciplinary Seminar

3:30 p.m.*, Tuesday, April 21, 2015

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“Functional responses and how they evolve by natural selection”

The functional response is a fundamental concept in theoretical biology. By definition, it is the number of prey eaten by a predator per unit of time. Most often, as in the pioneering work by Holling and co-workers in the 1950s, the functional response is a function of prey density, but in the mid 1970s DeAngelis and Beddington et al. independently put forward the idea that it could depend on the predator density as well. The purpose of this talk is twofold: Firstly, I present a mechanistic derivation, based on assumptions concerning individual behaviour of predator and prey, of the DeAngelis-Beddington functional response. Surprisingly, it turns out that the dependence on the predator density in the DeAngelis-Beddington functional response is a consequence of prey behaviour and not of predator behaviour. Proponents of the functional response have previously argued that competition among predators should be reflected in the functional response. A great advantage of the mechanistic derivation is that all parameters in the functional response reflect individual traits that are subject to natural selection. In the second part of my talk, I use adaptive dynamics to investigate possible evolutionary outcomes of natural selection on one of the parameters, viz. "timidity" of the prey, that is, its readiness to seek refuge. It turns out that the results depend on whether the predator-prey system remains at equilibrium or whether it exhibits cycles. As a matter of fact, typical predator-prey cycles that can be observed in nature could be the result of natural selection.

Location: Room 205 at NIMBioS, Claxton Education Bldg, 1122 Volunteer Blvd.

**Join us for refreshments at 3 p.m.*

The seminar will be live streamed. Visit http://www.nimbios.org/videos/livestream.
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The National Institute for Mathematical and Biological Synthesis (NIMBioS) brings together researchers from around the world to collaborate across disciplinary boundaries to investigate solutions to basic and applied problems in the life sciences. NIMBioS is sponsored by the National Science Foundation with additional support from The University of Tennessee, Knoxville

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