明治大学グローバルCOEプログラム【現象数理学の形成と発展】

第7回 MEE SEMINAR

MATHEMATICAL ECOLOGY & EVOLUTION

2009年10月6日(火) 14：40～16：10

明治大学生田キャンパス第二校舎A館：A207

小田急小田原線　「生田駅」から徒歩10分
又は「向ケ丘遊園」駅北口から「明治大学正門前」行きバスで10分終点下車
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October 6, 2009. 14:40～16:10　　Meiji Univ. Ikuta campus A207

The evolution of phenotypic traits in a predator-prey system subject to Allee effect

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Abstract:

Background: The outcomes of predator-prey interactions often depend on phenotypic traits which influence or indicate their interactive ability, such as body size, weight, and skin color. It is observed that natural selection by the prey on the predator favors predator phenotypes best able to consume the prey, whereas selection by the predator on the prey favors prey phenotypes least likely to be killed, which may lead to a cyclic type of 'arms race'.

Question: How do the phenotypic traits of predator and prey evolve when prey population is subject to Allee effect?

Methods: We use the theory of Adaptive Dynamics and the evolutionary model is constructed from a deterministic approximation of the stochastic process of mutation and selection.

Results: Firstly, it is found that predator and prey will evolve to a continuously stable strategy if the Allee effect of prey is strong. However, if the Allee effect of prey is not strong enough, then prey population will undergo evolutionary branching. Secondly, we find that evolutionary suicide can occur deterministically on prey population if prey individuals undergo asymmetric competition and are subject to Allee effect. Thirdly, we show that the evolutionary model with symmetric interactions admits a stable limit cycle. Evolutionary cycle is a likely outcome of the process, which depends on the strength of Allee effect and the mutation rates of predator and prey.

参加自由です。皆様のお越しをお待ちしております。

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