Poster Session 1 – Population Dynamics

49 Rodent population dynamics: multimodality amplified by climatic fluctuations

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A mathematical model aimed at describing rodent population dynamics is proposed. The model takes into account the population age structure and density-dependent regulation of birth rate. It is revealed multimodality in the model proposed. This phenomenon consists in the existence of various dynamic modes under the same values of parameters, a transition to these modes determined by the initial conditions. In particular three modes: for example 1-, 3- and 4-cycles alternatively appear, which is noteworthy because both three-year and four-year cycles as well as fluctuations disappearance are observed in rodent populations. We proposed multimodality identification approach in real population. It is based on the model parameter estimates obtained for survey and the observation data of population dynamics. Modeling of the real bank vole population dynamics (*Myodes glareolus*) shows the model trajectory describes well enough the dynamics tendency but weakly captures the real values of the population size peaks. To improve the approximation quality a climatic factor was included in the model. This model study showed climatic factor influence leads to a change in form of dynamic mode attraction basins or model parameter values. As a result the population size is shifting from some mode attraction basin to the attraction basin of another one. In other words population dynamics can be described by the following scheme. In the current year with certain climatic conditions the population develops and tends to a stable mode. Next year with different climatic conditions this mode cannot be achieved or does not exist and the population adapting to new conditions tends to another stable mode. In particular the real dynamics of the bank vole can be represented by a sequence of alternating transients that give fluctuations with 3-, 6-, 7- or 14-year period under constant climatic conditions. This work is partially supported by the Russian Foundation for Basic Research (Project no. 18-04-00073) and the Fundamental Research Complex Program "Far East" (Project no. 18-5-051).

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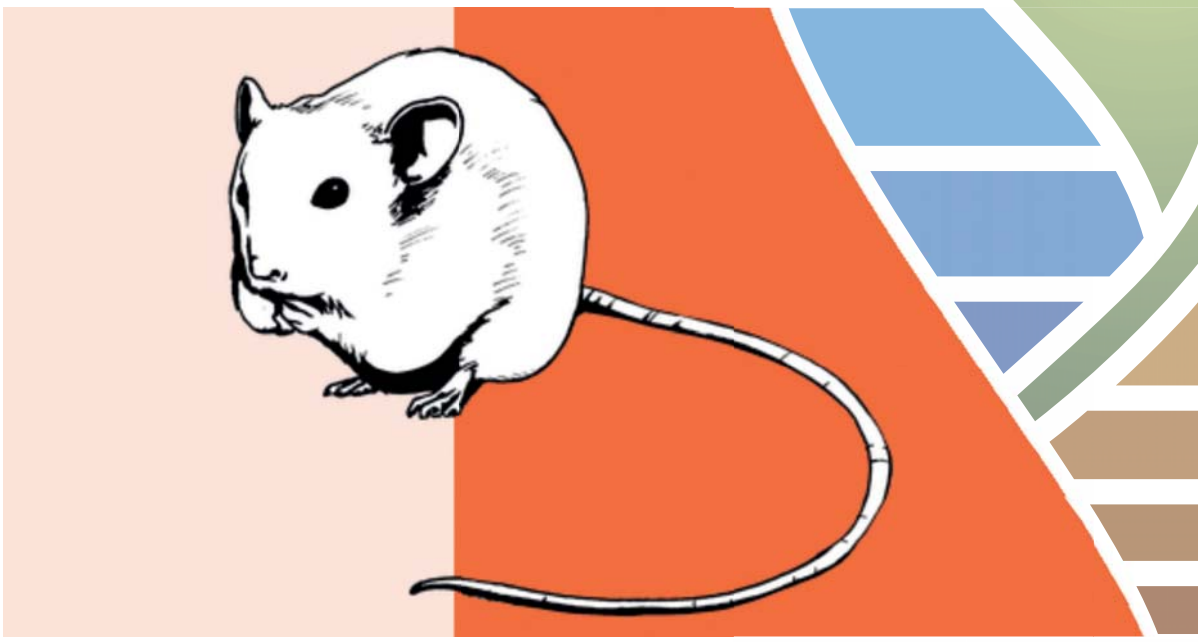

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