

Source program of periodicity evolution in periodical cicadas

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Method Article

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Abstract

Periodical cicadas (*Magicicada* spp.) in the USA are famous for their unique prime-numbered life cycles of 13 and 17 years and their nearly perfectly synchronized mass emergences. Because almost all known species of cicada are non-periodical, periodicity is assumed to be a derived state. A leading hypothesis for the evolution of periodicity in *Magicicada* implicates the decline in average temperature during glacial periods. During the evolution of periodicity, the determinant of maturation in ancestral cicadas is hypothesized to have switched from size dependence to time (period) dependence. Here, we build an individual-based model of cicadas under conditions of climatic cooling to explore the fixation of periodicity. In our model, under cold environments, extremely long juvenile stages lead to extremely low adult densities, limiting mating opportunities and favouring the evolution of synchronized emergence.

Procedure

Using the computer program attached to this protocol: 1. Set up climatic changes 2. Set up individuals 3. Set up ambient environment The C++ code can be accessed by saving the following link (which is a cpp file): "Source program of periodicity evolution in periodical cicadas":http://www.nature.com/protocolexchange/system/uploads/3859/original/Supplementary_document_1.cpp?1439974786

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [supplement0.cpp](#)