PERIODICITY OF MASS EXTINCTIONS — COMPUTER MODELLING OF THE EVOLUTION OF ECOSYSTEM

Summary

Twenty years ago, after analysing palaeontological data, Raup and Sepkoski suggested that mass extinctions on Earth appear cyclically with a period of approximately 26 million years (My). To explain the 26My period, a number of proposals have been made involving, e.g., astronomical effects, increased volcanic activity, or the Earth's magnetic field reversal, none of which, however, has been confirmed. Here we describe computer simulations of a spatially extended discrete model of an ecosystem and show that the periodicity of mass extinctions might be a natural feature of the ecosystem's dynamics and not the result of periodic external perturbations. In our model, periodic changes of the diversity of an ecosystem and some of its other characteristics are induced by the coevolution of species. In agreement with some palaeontological data, our results show that the longevity of a species depends on the evolutionary stage at which the species was created. Possible further tests of our model are also discussed.