Numerical experiments on variation of species diversity in size-dependent evolutionary system

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Many phenomenological researches have done to discuss the development of life and gave us many explanations of some biological events. Meanwhile, we still do not understand the mechanisms of diversification or extinction of species under several circumstances. Numerical simulations are absolutely necessary to discuss and answer these questions. However, unfortunately no numerical model for meaningful discussion of ecology is available at the present stage, and few studies have investigated the dynamics of numerical models. So, in this study, we consider the appropriate ecosystem model and discuss the feature of it. We focused on the evolutionary patterns of hypothetical communities in computer simulations and discuss what will play the important role in diversification and stabilization of the ecosystem. By adopting the size-dependent evolutionary system for numerical experiments on variation of species diversity in the food web system, I derived a particular evolutionary pattern: (1) rapidly decrease of species diversity like mass extinction, (2) rapidly increase like mass explosion, (3) rapidly decrease like natural selection, which was observed especially in larger parameter dimension model, then (4) equilibrated state that maintained over the long term. And I confirmed that size-dependent evolutionary system is stable whereas size-independent evolutionary system raises the fluctuation and extinction of species diversity. The results implied that considering the size-dependent system would be essential in establishing food web numerical model.