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Education

2015 -   UNIVERSITY OF GRONINGEN
            PhD candidate in Ecology; Evolutionary models on species assemblage

2008 - 2010 HONG KONG UNIVERSITY
            Master of Philosophy in Mathematics; Epidemic models of virus infection

2004 - 2008 BEIJING NORMAL UNIVERSITY
            Bachelor in Mathematics

Work Experience

2010 - 2015 CHONGQING UNIVERSITY OF TECHNOLOGY & SCIENCES
            Lecturer in Department of Mathematics and Physics

Research Interests

A major challenge in ecology is the need for a better theoretical framework for understanding how species assemblages (ecological communities) arise, why some are species-rich and others species-poor, and why some species are present or dominant whereas others are not. I am interested in how to construct theoretical models to mimic the evolutionary processes and invent efficient tools with explanatory power to the evolutionary issues. The main method I take to study research questions is to construct mathematical models. Maximizing likelihood of models is the standard way to understand the performance of models. However, if models show nonlinear and high dimensional structure, thus, prevent analytical formulation, I exploit simulation approach to explore the behavior of the model. Furthermore, a series of likelihood-free methods (Approximate Bayesian Computation method variants) is a widely used tool to infer model parameters of this type.

Research Projects: Current and Planned

1   INFERRING LOCAL DIVERSITY-DEPENDENCE
        It is still hotly debated that whether there exists ecological limit to diversity. A diversity-dependent diversification model has been developed to infer diversity-dependent signal. However, the model ignores local information. In this project, we aim to model the evolutionary processes incorporating the local details and explore that if we can still detect the local diversity-dependence.

2   INFERRING THE EFFECT OF COMPETITION ON TRAIT EVOLUTION
        Ecology and evolution jointly help to form the pattern of traits of species. We aim to construct an eco-evolutionary model combing both ecological interaction and evolutionary history to describe how traits of species evolve under environmental adaptation and species interaction. Paper to be submitted soon.

3   A SPATIAL PHYLOGENETIC JANCEN-CONNELL EXTENSION TO THE NEUTRAL THEORY OF SPECIES DIVERSITY

The neutral theory of species diversity opens a new window to explain species assembly. However, the neutral assumption that all changes in distribution and abundance occur because of purely random variation in births, deaths, migration and speciation violates the recognition from decades of experiments studying hundreds of species pairs. Here, we focus on tree species and develop a spatial phylogenetic Jansen-Connell extension to the neutral theory. We aim to explore to what extent the additional mechanism indeed affects species assembly.

Research Publications

2018   L.Xu & R.S.Etienne. Detecting local diversity-dependence in diversification. *Evolution*, 2018 Jun;72(6):1294-1305. doi: 10.1111/evo.13482.

Grant

2015 - 2019 PhD project is funded by China Scholarship Committee (CSC).

Affiliations

The International Society for Evolution, Medicine, & Public Health

Academic Activities

Nov, 2017 The 2017 Congress of the European Society for Evolutionary Biology: Poster presentation

Mar, 2018 The First Conference of the Netherlands Society for Evolutionary Biology (NLSEB): Poster presentation

Aug, 2018 Joint Congress on Evolutionary Biology: Poster presentation

Programming Skills

R   Packages: SDDD; ggradar2.

Python   ABC-SMC algorithm; Deep learning algorithm.

Others   More programming details can be found on my website: xl0418.github.io