
Ecosystem downwardly affects adaptive evolution

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Abstract

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Darwin's theory of evolution asserts that the population of organisms evolves automatically, if the population contains heritable phenotypic variation of organisms and if their capabilities of survival and/or reproduction are different in a given environment. The theory presupposes (i) the existence of variation of organisms' heritable phenotypes, (ii) the probabilistic process that types of less fit organisms are replaced by the fittest, and (iii) an selective environment in which natural selection operates on variants. However, these assumptions are black boxes in the theory, suggesting that the theory is incomplete as a scientific theory. Accordingly, it is needed to develop a comprehensive theory that can give a predictive explanation for (i) creativity of new heritable phenotypes, (ii) mechanistic processes of replacement and coexistence of variants, and (iii) the creation and maintenance of selective environments, respectively, to clarify the black boxes. In this talk, I argue that these three processes can be understood and explained by referring to the processes at higher levels of the organization of hierarchical biological systems, such as meta-population/community and ecosystem. I conclude that community/ecosystem downwardly affects adaptive evolution by restricting the creation of new heritable variants via gene flow and inter-demic mixing, by working as a mechanistic device (machine) for replacement and coexistence of variants, and by creating selective environments for component populations.

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