Spatial patterns generated by simultaneous cooperation and exploitation favour the evolution of altruism

Atsushi Yamauchi , Minus van Baalen , Maurice Sabelis

PII: S0022-5193(17)30574-X
DOI: 10.1016/j.jtbi.2017.12.027
Reference: YJTBI 9309

To appear in: *Journal of Theoretical Biology*

Received date: 19 June 2017
Revised date: 22 December 2017
Accepted date: 27 December 2017

Please cite this article as: Atsushi Yamauchi , Minus van Baalen , Maurice Sabelis , Spatial patterns generated by simultaneous cooperation and exploitation favour the evolution of altruism, *Journal of Theoretical Biology* (2017), doi: 10.1016/j.jtbi.2017.12.027

Highlights

- In kin selection theory in the evolution of social behaviors, the relatedness between players is influenced by the spatial structure of the population.
- Generally, it has been pointed out that 'viscosity' of population is unlikely to promote altruism evolution. We consider that more complex interactions produce specific spatial patterns, which could alter a process of kin selection on the space.
- Thus, we theoretically studied the joint evolution of altruism and resource exploitation in a spatially structured population.
- The analysis indicates that the joint evolution can form regularly-arranged cluster structures, which creates a new 'level of selection', and significantly promotes the altruism evolution.
- Our analysis also suggests an important relationship between niche theory and multilevel selection, two important concepts in ecology and evolutionary biology.