

Evolutionary dynamics of growth strategy in game-theoretical situation in cannibalistic amphibians

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Cannibalism is commonly observed in a wide variety of animal species. Especially in amphibian larvae, a cannibalistic morph characterized by its large head width is known. The cannibalistic morph has an advantage in cannibalism as it has a larger mouth, but a recent study found that natural enemy more often predated individuals of the cannibalistic morph than those of the typical morph. As relative head sizes of interacting individuals determine occurrence of cannibalism, the situation is game-theoretical. We constructed a simple model of cannibalism that describes growth dynamics of body shape. When the probability of cannibalism when the difference in head size of interacting individuals is small is not very large, evolutionarily stable strategy (ESS) of growth schedule exists. In such case, the growth curve is more balanced when predation pressure is larger and population density is smaller. However, there is no ESS when the probability is larger, that is, slight difference in head size is enough for cannibalism. In such case, our computer simulation of evolutionary dynamics revealed that dominating growth strategy changes cyclically.

