Séminaire de biophysique

“Game theory in a prebiotic RNA system”

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Game theory is a tool that has widely been used to explain evolutionary phenomena within biology. By evaluating strategies (*i.e.*, phenotypes) interacting within a population, game theory modeling can describe the survival and cooperation of strategies, population dynamics, and ultimately the dynamics of evolution. Within our lab, we are developing a system that extends the principles of game theory into a purely chemical system. Through the manipulation of the *Azoarcus* group I intron ribozyme at the internal guide sequence (IGS) and target recognition tag, multiple phenotypes (strategies) can be realized. Our initial experimental design evaluates two strategy interactions and the outcome is analyzed within a payoff matrix. Results to date have shown that our RNA “players” can interact and produce payoff matrices that demonstrate strategy domination, coexistence and even well known games such as the prisoner’s dilemma. Furthermore, these game outcomes can be modified through altering reaction conditions and/or RNA sequences (genotype). By understanding the thermodynamic variables underlying the success and survival of a RNA strategy, we look to expand our knowledge of how and why these chemical systems form more complex networks. We propose that a better understanding of how chemistry builds complexity will lead to an understanding of how a transition to biology could take place.