ABBt Seminar

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Raum 0.012 (5350|046) New Biology Building, Worringerweg 3

Applying game theory in cell biology

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The traditional concept of optimality, which is central to Darwinian theory, often fails because in co-evolutionary processes, organisms interfere with each other in a way that the optimum may not be attained. A mathematical framework that can cope with such situations and is an extension of optimization is provided by Game Theory. Two or more players (agents) try to maximize their "payoff" (fitness) by choosing from a set of strategies. The outcome for each of them depends not only on the own strategy but also on that chosen by the counterpart.

Besides the famous Prisoner's Dilemma and hawk-dove game, there are another 10 types of symmetric two-player two-strategy games. Moreover, there are a plethora of asymmetric games, some of which involve several players and/or several strategies. Usually, it depends on the parameter values, which game type is relevant for a specific system or process.

In this talk, I give an overview of several processes in cell biology that can adequately be described by Game Theory and, thus, be understood more profoundly. These processes include sequential cross-feeding among bacteria, the secretion of extracellular enzymes, metastasis of tumours, the production of bacteriocins and others. Potential applications in medicine and biotechnology are outlined.

References

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