

All of life is a game, and evolution by natural selection is no exception. Games have players, strategies, payoffs, and rules. In the game of life, organisms are the players, their heritable traits provide strategies, their births and deaths are the payoffs, and the environment sets the rules. The evolutionary game theory developed in this book provides the tools necessary for understanding many of Nature's mysteries. These include co-evolution, speciation, and extinction as well as the major biological questions regarding fit of form and function, diversity of life, procession of life, and the distribution and abundance of life. Mathematics for the evolutionary game is developed based on Darwin's postulates, leading to the concept of a fitness generating function (G-function). The G-function is a tool that simplifies notation, and plays an important role in the development of the Darwinian dynamics that drive natural selection. Natural selection may result in special outcomes such as the evolutionarily stable strategy or ESS. An ESS maximum principle is formulated, and its graphical representation as an adaptive landscape illuminates concepts such as adaptation, Fisher's Fundamental Theorem of Natural Selection, and the nature of life's evolutionary game.

Thomas L. Vincent is Professor Emeritus of Aerospace and Mechanical Engineering at the University of Arizona. His main research interests are in the areas of nonlinear control system design, optimal control and game theory, and evolution and adaptation of biological systems. He has 153 publications, including 79 journal articles and 8 books.

Joel S. Brown is a Professor of Biology at the University of Illinois at Chicago. His main research interests lie in applying concepts from natural selection to behavioral, population, and community ecology with applications to conservation biology. Specific interests include the ecology of fear that studies the ecological and evolutionary implications of the non-lethal effects of predators on prey. He has 102 publications, including 88 journal articles.