

# Preface

The year 2009 was celebrated worldwide as Darwin year, 200 years after Charles Darwin's birth and 150 years after the appearance of his seminal book *On the Origin of Species*. Countless contributions in both the scientific and popular media revived the ongoing controversy between Darwinism and modern evolution theory on one hand and creationism – devoid of any scientific basis – on the other. The discussions were often polemic and varied in their degree of objectiveness. This inspired us to suggest a comprehensive survey of recent achievements in understanding evolution from a purely scientific point of view.

The contributions are from internationally known experts from various disciplines, writing about evolutionary theory from the perspective of their own fields, ranging from mathematics, physics, and cosmology, to biochemistry and cell biology. The concentration on natural sciences means that only some aspects of cultural evolution are covered. Seemingly simple questions are posed, concerning the origin of life, the origin of the universe, the concept of self-organization without the need for external interference, the probability of life coming into existence “by chance”, and the role of contingency as compared to necessity; but instead of simple and premature answers being proposed, the questions are refined and specified until an answer can be arrived at using tools from the natural sciences. Scientific challenges correspond to reducing a complex problem by breaking it up into parts, finding common underlying mechanisms in the plethora of phenomena, or reproducing evolutionary processes in lab experiments or computer simulations; deeper insight and involvement in these challenges usually go along with fascination, amazement, and, finally, respect for the outcome of evolution in its full variety. We hope to contribute to all these aspects with our compilation of progress in the theory of evolution.

The book is addressed to readers with a background in life sciences and interest in mathematical modeling, or with a mathematical background in modeling and an interest in biological applications.

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