

Preface and Acknowledgments

In the early 1980s of the twentieth century, which is now a little less than 40 years ago, and in response to the uproar that the introduction of Punctuated Equilibria theory had caused within evolutionary biology, John Maynard Smith invited paleontologists to join what he called, the “high table” of evolutionary theory. In the 1970s, Niles Eldredge and Stephen J. Gould provided convincing theoretical arguments as well as empirical data that the Modern Synthesis was incomplete because its founders had not adequately incorporated the study of life’s evolution above and beyond the differential distribution of genes across populations through time.

They defined macroevolutionary research by arguing that species are real biological individuals that have a clear beginning, lifespan, and ending in time, and furthermore proved that the fossil record evidences that species demonstrate long periods of stasis where no apparent morphological change occurs, which are interspersed by rapid speciation events that follow a branching pattern. When the fossil record does not give proof for intermediate life forms, then instead of assuming the incompleteness of the fossil record as Darwin and Neodarwinians did, they suggested to understand the gaps as data, and to postulate that no intermediates existed when none are found. Because species are understood as real biological individuals, speciation and extinction events are also understood as real phenomena that require scientific investigation.

Researching morphological stasis, species and above species phenomena such as (mass) extinctions and speciation events, large-scale evolutionary trends, and major transitions across all domains of life; or mapping the various units, levels, and mechanisms whereby life evolves as well as the hierarchical nature there exists between these units, levels, and mechanisms; require an epistemic incorporation of fields such as developmental biology, ecology, systematics, and biophysics. Most of all, it requires a change in scholarly research attitudes, a willingness to transcend classic field-specific disciplinary boundaries that remain focused on reductionist, gene-centered theoretical accounts, in favor of complexity-focused, holistic epistemic stances.

In recent years, the heated aura that surrounded these often polemic debates that associated with the introduction of micro- versus macroevolutionary stances

appears to have cooled down a bit. The explosive entrance of macroevolutionary areas of research has cleared room for what we can characterize as an almost silent integration of the major claims first put forth by macroevolutionary scholars into standard evolutionary research. One can safely say that evolutionary biologists in both micro- as well as macro-oriented fields today accept that species are real biological entities with an important evolutionary role to play, and research on the evolutionary and abiotic causes that underlie constraints, stasis, extinction, and speciation has never ranged so “high” at the “evolutionary table”. Indeed, these topics defined the talks of many of the lectures of the speakers that were invited to present their work at the Darwin 2009 bicentennial that was organized at the University of Chicago.

One of us, Nathalie Gontier, attended that conference as an audience participant. What amazed me was that the topics introduced by macroevolutionary scholars ranged so high, while at the same time, little attention and credit was given to where these ideas stemmed from and in which context they had originated. During that same period, and with a grant from the European Marie Curie fellowships, I held a one-year visiting research position at the American Museum of Natural History in New York, under the supervision of Niles Eldredge, with the goal to perform theoretical research on punctuated equilibria theory in particular, and how macroevolutionary theory in general is applicable within the sociocultural sciences. For many years, the Museum has set a crucial scene for the development of evolutionary theory, both in what regards its micro- as well as macroevolutionary stances, not in the least by employing scholars such as Niles Eldredge and Stephen J. Gould as well as Ernst Mayr.

At that moment in time, by on the one hand reading these scholars’ important works that lie at the basis of micro- and macroevolutionary stances as well as on the other hand having the experience to attend the excellently organized Darwin commemoration where I had the chance to discuss many of these ideas with my contemporaries, I felt scholars from my generation had lost the roots of these significant ideas. From there grew the idea to edit a book on the matter, as well as to provide dissemination and outreach activities on the specificities of macroevolutionary research outside the classic paleontological and biogeographical disciplines where they were first introduced, and to highlight how macroevolutionary-oriented scholars have contributed to a richer conceptualization as well as demonstration of life’s evolution.

To obtain these goals, and back in Belgium, I started with writing out these ideas in the form of a grant proposal which I submitted to the John Templeton Foundation. The proposal, that had as goal to investigate the importance of both macroevolution as well as reticulate evolution for the Extended Synthesis within the field of evolutionary biology, as well as the impact these new areas of research have on the growing sociocultural evolutionary sciences, was accepted by the Foundation and was successfully executed at the Applied Evolutionary Epistemology Lab (<http://appeel.fc.ul.pt>), at the Portuguese University of Lisbon in 2012–2013. I hereby want to thank again the staff of the Templeton foundation and, in particular, Paul Wason as well as Kevin Arnold and Drew Rick-Miller,

my program officers. I am grateful to the project's team, including Olga Pombo as well as Márcia Belchior, Francisco Carrapiço, Luís Correia, Larissa Mendoza Straffon, Marco Pina, and Emanuele Serrelli; and I want to express my gratitude toward the Portuguese Gulbenkian Foundation and Ciência Viva Agency for their enthusiasm and efforts in helping me to bring my ideas on outreach and knowledge dissemination into action during what turned out to be a crazily busy year.

Together, we organized a session on how macroevolutionary theory transcends the Modern Synthesis for the 2013-meeting for the American Association for the Advancement of Science (<http://appeel.fc.ul.pt/sub/eve/dir/aaas/aaas2013.html>) that among the speakers had Alycia Stigall who also contributed to this volume; a session for the 2012-meeting of the American Anthropological Association that partially focused on cultural macroevolutionary theories and methodologies (<http://appeel.fc.ul.pt/sub/eve/dir/aaa/aaa2012.html>); two international evolution schools for pre- and postdoctoral university students with modules on macroevolution (<http://evolutionschool.fc.ul.pt>) taught, among others, by Ilya Tëmkin and Folmer Bokma who also contributed to this volume as well as the conference on Micro and Macro, Horizontal and Vertical Evolutionary Patterns (<http://evolutionarypatterns.fc.ul.pt>); a public conference on evolution with special sessions for teenagers (<http://evolutionconference.fc.ul.pt>); we conducted several video interviews with the scholars who participated in the activities (<https://www.youtube.com/user/appeellisboa>); and we concretized my multiple book ideas further, including this one on macroevolution. I am grateful to Emanuele for having accepted my invitation to co-edit the book.

We are very much indebted and grateful to the numerous scholars we encountered along our paths, who gave us advice and guidance, encouragement, and critique. In particular, we want to thank Wallace Arthur, Quentin Atkinson, Michael Benton, Luis Borda de Agua, Rituparna Bose, Dan Brooks, Mike Bruford, Jorge Carneiro, Maurizio Casiraghi, Lounes Chikhi, Alex de Voogt, Charbel Niño El-Hani, Claus Emmeche, Douglas H. Erwin, Frietson Galis, Root Gorelick, Ronald Jenner, Fiona Jordan, Bruce Lieberman, Paulo Madrugá, Octávio Mateus, Daniel McShea, Richard P. Meisel, Alex Mesoudi, Sérgio Moço, Ana Noronha, Samir Okasha, Mark Pagel, Octávio Paulo, Telmo Pievani, Anna Marie Prentiss, Luís Paulo N. Rebelo, Luis Mateus Rocha, Michael Ruse, Ana Sanchez, David Sepkoski, Artur Santos Silva, Rui Silveira, Andrej Spiridonov, Ian Tattersall, Inês Tomé, Derek Turner, Rosalia Vargas, Davide Vecchi, Emílio Rui Vilar, Tyler Volk, Matthew Joseph Walsh, Richard Watson, and Jon Umerez.

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This book on macroevolution is neither a handbook for beginning scholars for which there exist numerous excellent works written by paleontologists, nor a work aimed toward philosophers and historians of science to exclusively highlight the history and epistemology of macroevolutionary ideas. This book highlights some of the most important research topics that macroevolutionary scholars have introduced into the evolutionary sciences, including debates on how microevolution differs from macroevolution; what the nature is of evolutionary stasis, extinction,

speciation; how we can define and measure evolutionary rates; how we can model biological hierarchies; how biophysics, ecology, evo-devo, genetics, and systematics shed new light on life's major patterns, trends and transitions, its origination, extinction and diversity; how macroevolutionary theory transcends biology and is applied within the sociocultural sciences; and how all the latter requires us to reconceptualize the very nature of evolutionary research in light of an extended synthesis.

We are enormously grateful toward the authors who found the time to contribute a chapter for the book, as well as the scholars who, behind the scenes, were willing to peer-review the chapters. We hope the reader will find as much enlightenment on the subject of macroevolution as we did editing the volume.

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