dann nachträglich die Linienmuster, z. T. Farbauftragungen u. a. Zusätze, auf diese Abdrücke aufgebracht und Gussfehler entfernt? Insgesamt bekommt man durch diesen ausgezeichnet bebilderten (leider auf einem kontrastschwachen LuxoArt Samt-Papier gedruckten) Band einen vielseitigen Überblick über die Tübinger Sammlung, die rund 400 mathematische Modelle beinhaltet, sowie deren Entstehungszusammenhang und die wichtigsten Protagonisten jener von Brill und Klein initiierten Bewegung, Mathematik mithilfe von Modellen anschaulich zu machen. Das Buch enthält insgesamt 400 Abbildungen – davon zeigen ca. 300 Abbildungen mathematische Modelle, darunter auch Modelle aus anderen Sammlungen und Ländern, z. B. aus Japan und den USA. Die professionellen Photographien bringen auch die ästhetischen Qualitäten der Modelle voll zur Geltung. Ferner werden einige Schnittmuster für Papiermodelle, Werbeanzeigen der Hersteller, Inventarlisten und Ausschnitte aus Lehrbüchern wiedergegeben, in denen auf derartige Modelle verwiesen wird. Am Ende findet sich noch eine ausführliche Zusammenstellung einschlägiger Literatur sowie unpublizierter Quellen (S. 371–377). Für dieses Buch wurden erstmals historische Inventare der Münchener Modell-Sammlung (TU München) und der Tübinger Sammlung herangezogen sowie die Kassenamtsbücher der Universität Tübingen, wodurch sich nicht nur neue Zuschreibungen und Datierungen einzelner Modelle und Serien ergaben, sondern auch wichtige Hinweise auf die Preise, die Hersteller und Verleger der Modelle. Eine solche, auf handschriftlichen Quellen basierende wissenschaftshistorische Arbeit lag bislang zu keiner einzigen Sammlung mathematischer Modelle in Deutschland vor und verdient daher besondere Beachtung. Der beeindruckende Band sollte von allen mathematischen und allen wissenschaftshistorischen Fachbibliotheken angeschafft werden und dürfte mit seinem günstigen Preis auch eine breitere Öffentlichkeit ansprechen.

1 Zu denken ist insbesondere an die 1986 erschienene Dokumentation *Mathematischer Modelle* von Gerd Fischer (Vieweg Verlag). Weitere Literaturhinweise finden sich in den Abstracts einer Oberwolfacher Tagung von 2015 über „History of Mathematics: Models and Visualization in the Mathematical and Physical Sciences", online unter http://www.ems-ph.org/journals/show_abstract.php?issn=1660–8933&vol=12&iss=4&rank=4 (letzter Zugriff am 21.10.2018).

2 Zum Wechselspiel von Mathematik und Kunst sowie zur Ästhetik mathematischer Modelle siehe z. B. Lynn Gamwell: *Mathematics and Art. A Cultural History*, Princeton: Princeton Univ. Press, 2015 sowie Johannes Böhm & Erhard Quaisser: *Schönheit und Harmonie geometrischer Formen*, Berlin: Akademie Verlag, 1991.

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Edouard I. Kolchinsky
The Unity of Evolutionary Theory in the 20th Century Divided World.
Nestor-Historia St. Petersburg 2014. 823 P. ISBN: 978-5-4469-0301-6

Edouard Kolchinsky is arguably the best-known historian of biology in Russia. For many years, he was a director of the St. Petersburg branch of the Nikolai Vavilov Institute for the History of

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Science and Technology (Russian Academy of Sciences). Kolchinsky's special concentration has always been on the historical and theoretical issues of evolutionary biology. The 800 pages long volume is the result of many years of comparative studies into the growth of evolutionary theory.

The objective of the book is to demonstrate that evolutionary biology took similar paths in German lands, Russia/USSR and English-speaking countries despite of their political and socio-cultural differences. Correspondingly, the book is divided into four voluminous parts, one of which is of introductory character, whereas three others deal with the growth of Darwinian thought in the three mentioned cultural spaces.

The first part discusses the social-cultural aspects of the growth of evolutionary theory in the 20th century. Kolchinsky claims that of all natural sciences, biology is the most susceptible to ideological manipulations as exemplified by the racial hygiene in Germany and Lysenkoism (an anti-scientific movement named after Trofim Lysenko and supported by Joseph Stalin) in the USSR. In spite of this, evolutionary biology in all three language areas operated with the same choice set, which included, for example, orthogenesis (Leo Berg, Daniele Rosa), neo-Lamarckism (Ludwig Plate, Trofim Lysenko, Edward Drinker Cope), neo-catastrophism (Karl Beurlen, Dmitry Sobolev) or the Darwinian Synthesis (Julian Huxley, Ernst Mayr, Bernhard Rensch, Ivan Schmalhausen, Georgy Gause). Kolchinsky claims that the concept of "totalitarianism" does not reflect the real relationships between science and the state in Nazi Germany and the USSR. Social-political environment influenced the development of biology in various countries, but the process was of mutual nature. Kolchinsky advocates an inclusive approach proving that science and politics were resources for each other. For example, in Nazi Germany biology not only suffered under repressions and ideological control, but also served as a source of racial ideology.

The second part is devoted to the Evolutionary Synthesis within the Anglo-American "language space". Kolchinsky begins with Darwin, and then goes on to the neo-Darwinism of Francis Galton and Alfred Russel Wallace and further to the diversification of Darwinism to the end of the 19th century accompanied by attempts to merge it with theology and neo-catastrophism. The rediscovery of Mendelian laws, the growth of mutationism (e. g., Hugo de Vries), experimental studies of natural selection and mathematical modelling of gene frequencies in populations contributed to the establishment of the necessary "prerequisites" for the occurrence of the Modern Synthesis.

To properly synthesize genetics and Darwinism one needed a person with a strong background in both natural history and genetics, who was equally skilled in methods and concepts developed in the English-speaking world and outside of it. Such a person was Theodosius Dobzhansky, who became the first "architect" of the Synthesis. British "co-architects" as well as Ernst Mayr, George Ledyard Stebbins and George Gaylord Simpson enriched the Synthesis by bringing biodiversity, botany and paleontology in the context of new Darwinian approaches into discussion. There were also "heretical" attempts to bring genetics and evolution together such as in the theory of "hopeful monsters" by Richard Goldschmidt.

The crucial step in the growth of evolutionary theory was the institutionalization of the Modern Synthesis in the USA, which resulted in the establishment of the most influential research institutions, societies, periodical conferences and journals. With institutionalization came major theoretical issues. For example, in 1935 Dobzhansky articulated a problem of speciation, which became a foundation for joint efforts among geneticists, naturalists, experimentalists, and experts in systematics. At the 1939 American Association for Advancement in Science Columbus meeting, Theodo-

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sius Dobzhansky, Julian Huxley and Alfred Emerson founded the interdisciplinary Society for the Study of Speciation. The major objective of the Society was to coordinate the efforts of various biological disciplines to discuss the problem of speciation. The Society included about 275 members representing botany, zoology, microbiology, anthropology, morphology, cytology, genetics, ecology, paleontology, comparative zoopsychology, paleontology, comparative physiology, population biology and systematics. Although the Society was short lived, the very fact of its existence was an important step towards the establishment of "Synthetic" agenda. In 1946 a new journal "Evolution" was founded and a year later (1947) an international conference on genetics, paleontology and evolution was organized in Princeton (New Jersey). Mayr, Dobzhansky and Simpson were at the core of initial institutionalization processes in the USA.

At that time, the Modern Synthesis was institutionalized only in the English-speaking countries, while German and Russian evolutionists only created an "invisible college" of the Synthesis. In the USSR, the synthetic movement was forcefully interrupted by the ideological intervention and the growth of Lysenkoism. By the beginning of the 1930s, Russian speaking genetics had made a significant contribution to the future Synthesis by assembling genetics, biometry and field studies. For the first time research on the genetic structure of the wild populations of Drosophila were conducted and several crucial concepts were coined. For example, Alexander Serebrovsky introduced the concept of a "genofond", Sergey Chetverikov determined the significance of genetic environment (entire gene pool of the population) for evolution, Nikolai Dubinin and Dmitry Romashov described "genetic-automatic" processes (genetic drift). Yet, it was genetics that suffered most under lysenkoist attack, which coincided temporally with Stalin's "Great Purge" (mass terror of 1937–1938). The number of biologists persecuted only at the *All-Union Institute of the Plant Breeding* exceeds the number of all repressed, emigrated, and killed biologists during the whole period of the Third Reich in Germany (p. 368). The years of mass repressions and flourishing of Lysenkoism also coincided with the growth and institutionalization of the Synthesis in the USA and England, which resulted in the retardation of the soviet science. The fact that the very term "synthetic theory of evolution" was coined by Nikolai Bukharin in 1932 was completely forgotten. The major book of Dobzhansky remained unknown to the broad audience and no reviews on the book were published in the USSR. Dobzhansky's book was first mentioned by Ivan Schmalhausen in 1946 when the US was still seen as an ally of the USSR. After the Second World War, the repression of biologists became even stronger. The Lysenko-inspired infamous session of the *All-Union Academy of Agricultural Sciences of the Soviet Union* (1948) marked the new wave of repressions. Thousands of biologists lost their positions. The Modern Synthesis was represented in the USSR by a number of scientists, but the institutionalization of the Synthesis failed because Stalin's regime supported "creative Darwinism" (Lysenkoism).

In Germany, the entire first half of the 20th century was a time of permanent crisis. Wars, revolutions and the Nazi regime radically influenced the course of evolutionary theory. Biologists actively participated in the growth of Social Darwinism and eugenics. In 1904, Alfred Ploetz and Ernst Rüdin founded a new journal "Archive of Racial and Social Biology" (Archiv für Rassen und Gesellschaftsbiologie) and one year later (1905) the Society for Racial Hygiene (Gesellschaft für Rassenhygiene). The latter encouraged their members not only to carry out research on racial hygiene, but also to practice it in the everyday life: "In that way racial hygiene became an essential, respectable part of the biomedical sciences" (p. 509). Anthropology, genetics and evolutionary theory were presented in this context as sciences applicable for solving socio-political problems.

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The immediate successor of Ernst Haeckel in Jena, Ludwig Plate, was also a member of the editorial board of the "Archive". In evolutionary theory, he attempted to synthesize selectionism and genetics proceeding from the principles he called "old-school Darwinism". Old-school Darwinians are believed to have followed Darwin and Haeckel in combining various evolutionary mechanisms such as natural selection, inheritance of acquired characters or orthogenesis. Old-school Darwinism opposed to neo-Darwinian claims that natural selection is the only directive force in evolution. A more modern research agenda was suggested by Nikolai Timofeeff-Ressovsky in Berlin, who contributed to the growth of population genetics and molecular biology. By the end of the 1930s Timofeeff-Ressovsky had become one of the leading champions of the Evolutionary Synthesis in Germany. In 1943, he, among others, contributed to the volume edited by Gerhard Heberer on the evolution of the organisms. The book was an analogy of the "New Systematics" edited by Julian Huxley and included representatives of the majority of biological disciplines including, for example, zoology (Bernhard Rensch, Victor Franz), genetics (Hans Bauer), ethology (Konrad Lorenz), paleontology (Johannes Weigelt), and even philosophy of biology (Hugo Dingler). This volume is the best proof that there was a full Modern Synthesis in Germany, which developed partly independent from its English and Russian versions.

In general, the situation in German biology was controversial: "There is an evident paradox in the relationships of biology and state power in the Third Reich: the anti-intellectual racist regime widely relied upon modern science and therefore promoted its development" (p. 574). Biology in the Nazi Germany was not simply well functioning, it also achieved significant gains, despite the repressions of scientists.

In that way Kolchinsly comes to his major conclusion that although the establishment of the Modern Synthesis appears as a result of many independent processes, various biological disciplines, various methods and countries with very different socio-political circumstances, the resulting theoretical system became consequent and similar in all three (English, Russian, German) realms. The unity of the evolutionary theory was determined by the unifying logic within which research objectives were posed.

To sum up, the book is a valuable compendium of the history and evolutionary biology in the 20th century. Its evident strength is the attempt to equally embrace English, Russian and German-speaking biology. All national traditions are described thoroughly with many novel details and knowledge of the newest secondary literature. In this respect, the book is unprecedented. Critically is to remark that the reader remains alone in making conclusions about the consequences of this analysis for the general philosophy of science. Yet it is understandable that the author tried to avoid making this more than 800 page long tome even more voluminous by including philosophical issues. We only hope that such an "additional" book will appear in the future.

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