bibliographical essays, meanwhile, direct readers to classic works by Thomas Kuhn, Arthur Koestler, Walter Pagel and Pierre Duhem, but feature relatively few works from the last ten years. Since it offers a clear introduction to both early modern ideas and the arguments of influential historians, this book would no doubt be of use for students approaching these materials for the first time, but it also occludes some important historiographical debates. Throughout the text, Waddell uses terms such as the 'Scientific Revolution' and 'witchcraft', employing them unproblematically to define and analyse events in history, despite the fact that many historians have challenged their suitability. These debates are neither new nor obscure, and Waddell's decision not to acknowledge them is surprising and may limit his book's value in the classroom as an introduction to modern approaches to the study of science, magic and religion.

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Elena Aronova, *Scientific History: Experiments in History and Politics from the Bolshevik Revolution to the End of the Cold War*

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The deep past is everywhere today. Just as new discoveries purporting to reveal hidden truths of our biological and psychological existence fill bestseller lists, historians continue to fret over how to constructively engage with this phenomenon. Elena Aronova argues that 'the history of the history of science *itself* is instructive for today's repositioning of history vis-à-vis the sciences', revealing interdisciplinary contexts, techniques and political programmes of prior interactions (p. 6, original emphasis). *Scientific History* searches for these encounters in the Soviet socialist project. Ranging from 1880s Paris to mid-1960s Moscow, the book is bursting with different connections, but its locus is the Second International Congress of the History of Science, organized in London in 1931. Aronova follows historians, geneticists and librarians radiating towards and away from this conference in six discrete chapters. Ultimately, the book hinges upon the different political functions that they saw their histories of science serving.

Chapter 1 traces the influence of Auguste Comte's vision of progress-as-synthesis behind *fin de siècle* attempts to unify science through the history of science. It focuses on Henri Berr, who laid the groundwork for the *Annales* school and founded the International Center of Synthesis in 1925. Aronova argues Berr and George Sarton were motivated by the internationalist and pacifist possibilities of the history of science. Chapter 2 covers the Russian valence of this synthesizing impulse. Here, Nikolai Bukharin operates as the Marxist counterpart to Berr. Bukharin oversaw the Soviet Commission on the History of Knowledge after his demotion by Stalin in 1930, and was a star participant at the 1931 London congress. Aronova persuasively argues throughout

the book that this conference marked a watershed, particularly in Britain. Biologist John Randal Baker recalled it as the moment 'when the movement against pure science and against freedom of science was first brought to Great Britain by the Soviet delegation', (p. 136) while J.D. Bernal, Julian Huxley and Joseph Needham were inspired, and felt vindicated.

Bukharin's speech at the 1931 congress positioned the Marxist unification of science as being radically different than any synthesis hitherto attempted. His specific ideas as to the role of history in this were vague. Yet Boris Hessen's conference paper on the material conditions for Newton's discoveries gave one tantalizing example of what was possible, and Aronova reminds us that Hessen provided the framework for Robert Merton's foundational *Science, Technology, and Society in Seventeenth Century England* seven years later.

Chapter 3 shifts to the research of Nikolai Vavilov, the forgotten 1920s 'Mendeleev of Biology' and another congress participant. Through 'genogeography', Vavilov applied his 'law of homologous series of variation' (grouping species by observed growth regularities) to classify and map the global distribution of tens of thousands of plants. Vavilov built the most sophisticated seed vault in the world. In the spirit of deep history, his 'geography of genes' sought to offer a 'detailed history not only of domestic livestock but also of man' (p. 77). Aronova speculates that Vavilov's approach made a great impression on the *Annales* school. Aronova also ties Vavilov's extensive expeditions in Central Asia to Bolshevik geopolitics, suggesting that he acted as a broker for Soviet spies and diplomats. This point deserved its own chapter, and extrapolation to the wider cast of characters.

Chapter 4 focuses on Julian Huxley's evolving political sympathies. How, Aronova asks, did these shape his own synthetic project of scientific humanism? The shock of learning about Vavilov's 1943 death in a Saratov prison, and the incredible Moscow encounter between Huxley and Lysenko's anti-Mendelian pseudoscience in 1945 – nicely retold by Aronova – propelled Huxley into becoming a Cold War theorist of 'two camps' in science as the first director of UNESCO.

Chapter 5 examines UNESCO's History of Mankind project in the 1950s, treating it as Big History in action. Aronova echoes the scholarly consensus that although the final product had a muted reception, the project itself created a rich ecosystem of specialized journals, several of which advanced a unique and enduring critique of Eurocentric world-history narratives. The Soviet Union only applied to join UNESCO in 1954, but Aronova works to demonstrate that its strategic internationalism fostered a subaltern and non-Western perspective within the Mankind project. This point complements a new burst of research into how Soviet and East European scientists engaged decolonization through their research.

Chapter 6 is utterly fascinating. Aronova retells how library sciences entrepreneur Eugene Garfield exported his indexing technology to the Soviet Union during the post-sputnik 'information crisis' in US academia. In one proof of concept, Garfield both mapped and modeled pathways in the history of genetics, from Mendel to Matthaei, fusing citational metrics, the genealogical paradigm of intellectual history and early network science to offer a tool that could predict future scientific trends. J.D. Bernal saw his project as far ahead of its time: opening up 'a new dimension', which would allow the 'polydimensional graph on the progress of science to be mapped out for the first time' (p. 140). Garfield seemed to return the history of science to its *fin de siècle* founding vision of synthetic unity. But he also became a millionaire in the process by helping to sell an IBM 360/40 computer alongside his indexing techniques to the All-Union Institute of Scientific and Technological Information in Moscow.

This chapter felt worthy of an entire monograph, particularly regarding the 1960s and 1970s Soviet afterlives of cybernetic-inspired bibliometrics. Aronova briefly mentions Gennadii Dobrov's innovative research at the Kiev Institute of Cybernetics, and the

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Soviet Academy of Science's Special Commission on Cybernetic Applications for Historical Research in 1968, but leaves these as threads for future historians to explore. Most intriguingly, Aronova suggests that Soviet researchers realized that Garfield's approach, and the notion of 'world information circuits', might offer a possible means of exploring why Soviet scientific research seemed to lag behind or exert limited influence, and a way to overcome this.

Aronova closes with contemporary Russia. Big History, she writes, is enormously popular because it offers 'alternative histories' that provide value and meaning in post-Soviet Russia. Aronova cites the New Chronology movement of Anatolii Formenko, and Armenian cybernetician Akop Nazaretyan's Euro-Asian Center for Megahistory and Systems Forecasting in Moscow (and, one might add, the 1990s efflorescence of Russian science fiction) – in both cases examples of intellectuals already pursuing a Big History approach during perestroika.

Aronova's decision to all but exclude cybernetics from her account is interesting given its underlying importance in Chapter 6, though the work of Eglė Rindzevičiūtė and Jenny Andersson on Soviet and East European cybernetic forecasting pairs very nicely with the book. Given that (geo)political stakes are consistently placed front and center by Aronova, I was also curious how the influential 'biosphere' imaginaries of V.I. Vernadskii and Lev Gumilev – and wider Soviet debates about human–nature interactions – fit within her story. Finally, one wonders what Aronova would make of the 1970s, when global debates about sociobiology raged, and environmental movements that scholars of the Soviet sphere are now investigating became avowedly political. Each of these queries, however, is only indicative of just how stimulating *Scientific History* is. In brilliantly wrangling quite different stories and archives together, Aronova's own *longue durée* of the Soviet history of science shines unexpected light on our world today and represents an exciting scholarly contribution.

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