

Hollings, Christopher, *Mathematics Across the Iron Curtain: A History of the Algebraic Theory of Semigroups*. Providence: American Mathematical Society, 2014. Pp. xi + 441. ISBN 978-1-4704-1493-1. £79.95 (hardback).

Christopher Hollings's debut book covers everything you ever wanted to know about the algebraic theory of semigroups (up to 1970). That is both the book's greatest strength and the reason most historians of science can safely leave it on the shelf. Thematically, it treats a topic (modern algebra) and period (the mid-twentieth century) that historians of mathematics have only recently begun to pursue in depth, and does so with care and insight.

Methodologically and stylistically, the book represents a traditional strand of what is sometimes called maths history (think of it as natural history for mathematics) informed by recent scholarship in the history of science but still very much distinct from that cousin discipline, and those unfamiliar with such methods and style may find the result difficult to parse.

Above all, *Mathematics Across the Iron Curtain* is an impressive feat of mathematical bibliography. Hollings has scoured the published literature on the algebraic theory of semigroups—a major branch of research in semigroup theory (itself a small branch of modern algebra related to group theory, among other topics) that coalesced over the first two decades after the Second World War—as well as a wide range of memoirs, obituaries, surveys, and other retrospective works pertinent to the theory and its progenitors, including many difficult-to-access sources from the former Soviet Bloc. His chapters, organized both chronologically and thematically, are dominated by blow-by-blow surveys of significant works of algebraic semigroup theory, mingled with capsule biographies (ranging in length from a paragraph to a full chapter section) of major figures and wider-reaching systematic comments and comparisons to peripheral material. Most notable in this regard is a

meritorious effort to excavate the life and work of Anton Kazimirovich Sushkevich, an obscure mathematician based in Kharkov, Ukraine, whose interwar writing was marginal to most of the early history of semigroup theory but was later claimed to be the first example of semigroup theory as such.

The book is rich in detail but sparse in context, with respect both to mathematical and to broader historical developments. Context, however, is not the main goal here. Rather, this is the kind of largely internalist history that thrills or vexes the academic descendants of those mentioned (see the respective reviews by mathematicians in MathSciNet (MR3222721) and zbMATH (Zbl 1317.20001)) while tending to leave others cold. Hollings is particularly adept at identifying and distilling important theoretical developments and conceptual distinctions (a highlight is chapter 6, on the Rees Theorem), and his technical discussions exemplify traditional maths history at its finest: plying historical materials to develop a rigorous mathematical account of algebraic semigroup theory as it was studied and presented at mid-century. That this is foremost a mathematical book is evident in a narrative that slips frequently into the conventional first-person present-tense voice of mathematical exposition.

Unless you are the rare reader whose work touches on this book's specific theories and individuals (in which regard it will surely be the definitive reference), the first and last body chapters (numbered 2 and 12) represent the bulk of the volume's interest. Chapter 2 surveys "Communication between East and West," and is unusual among such surveys both in its (non-exclusive) emphasis on mathematics and the comparative nuance of the Soviet side of the analysis in contradistinction to a more monolithic and thinly-sketched American and Western European story. More recently, Hollings has greatly elaborated and revised this chapter into a hundred-page stand-alone monograph, *Scientific Communication Across the Iron Curtain* (Springer, 2016), which may serve as a helpful corrective amidst the West-dominated Western literature on the topic. Chapter 12 tracks the institutional consolidation of

algebraic semigroup theory through monographs, seminars, and conferences, and culminates with the 1970 launch of a dedicated journal, *Semigroup Forum*.

While the book's subtitle is apt and amply justified, there is much less to underwrite the Cold War story implied in the title. Principally, Hollings's meticulous bibliographic work illustrates just how *little* semigroup theory crossed between East and West, or even beyond the borders of individual nations or institutions, and Hollings is well-attuned to the itineraries and reception histories of those works that did indeed travel. A paucity of archival research and limited direct engagement with the much more extensive literature on Cold War sciences other than mathematics often leaves Hollings sidestepping or merely speculating about matters about which current scholarship has a fair amount to say. Mostly these speculations jibe with what others have documented, but sometimes (as with Hollings's interpretation of language barriers in publication) the account would have benefited from more familiarity with unpublished primary sources and a wider range of relevant secondary analyses. As a work of history (as opposed to a work in the distinct field of maths history, by whose standards Hollings has undeniably succeeded), *Mathematics Across the Iron Curtain* is a reminder that disciplinary divides come in many forms, in the past and present alike.

MICHAEL J. BARANY

*Princeton University*