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★ **Algèbre—éléments de la vie d’Alexandre Grothendieck. (French) [Algebra—elements of the life of Alexander Grothendieck]**

Second edition.

Éditions Allia, Paris, 2017. 143 pp. ISBN 979-10-304-0062-5

Alexandre Grothendieck (1928–2014) was, without any doubt, one of the most influential mathematicians of the twentieth century. A far from complete list of his accomplishments would include introducing or significantly developing topological tensor products, nuclear spaces, abelian categories, étale cohomology, the Grothendieck-Riemann-Roch Theorem, schemes, K-theory, and the Weil conjectures (Grothendieck proved three of the four conjectures). Dieudonné said of the young Grothendieck: “He is 20 years old and already the equal of Banach.”

Grothendieck viewed his work in mathematics as defining a new way to look at mathematics, and as a new way of speaking about mathematics. “Mathematical reality is invisible because we do not have words to name it. My work is above all a creation of language.” A famous example of this language creation is his Tôhoku paper which reconceptualized homological algebra [Tôhoku Math. J. (2) **9** (1957), 119–221; MR0102537].

Grothendieck was also someone who held very strong political beliefs. Although living in France for most of his life, he was in fact stateless until 1980 (when he applied for French citizenship, being then past the age of military service). Grothendieck was well known for his radical ecology views. Grothendieck stated that “industrial society and the cancer cell share the same philosophy—that of unlimited growth”. In 1970 he started the ecological group *Survivre* and was an editor of its bulletin until resigning in 1972. He quit his appointment to the IHES (Institut des hautes études scientifiques, which is similar to the Institute for Advanced Study) because some of its funding came from military contracts. His political beliefs also impacted his teaching. In 1971, when teaching a course on Barsotti-Tate groups at the Collège de France, he announced that the first few class meetings would be devoted to the theme “Science and technology in the current evolutionary crisis: will we continue to do scientific research?”

A biography of Grothendieck is therefore a challenge, having to navigate between his problematic family life, his wondrous contributions to mathematics, his political activities, and the final twenty-three years of life spent alone in a small village in the Pyrenees. The book under review, by Yan Pradeau, is an attempt to write a biography of Grothendieck that attempts to give a balanced portrayal of the man. The author considers this work to be a hybrid text, having features of both a biography and a novel. The structure of the work is basically chronological, but at the same time Pradeau attempts to paint a portrait of this challenging individual. In the end the portrait so obtained shows us someone who is engaging, but also often bewildering. After all, what other mathematician has been arrested at an International Congress of Mathematicians? Pradeau also is honest in discussing Grothendieck’s shortcomings. He fathered children with several different women. He once said: “The mother is a certainty, I am only a hypothesis.”

This work is by no means comprehensive. The book is in sextodecimo size ($4 \times 6 \frac{3}{4}$ in.) and is only 141 pages long. It is not an academic biography; there are few footnotes and references. The many quotes are given without citation. The author quickly surveys the life of Grothendieck in 19 chapters. The book opens with a telling scenario. Grothendieck comes upon a student demonstration during the May 1968 protests and ends up being a speaker at the demonstration.

The biography is aimed at the general reader. Pradeau mentions the mathematical

highlights of Grothendieck's career, e.g., his work on the Weil conjectures, but he prefers to discuss Grothendieck's sometimes acrimonious interactions with fellow mathematicians such as Henri Cartan, Dieudonné, Schwartz, Weil, and Deligne. Given the author's clear exposition, any reader moderately fluent in French can appreciate the work. For a deeper analysis of the mathematics of Grothendieck, a good place to start is the collection of essays edited by Leila Schneps [*Alexandre Grothendieck: a mathematical portrait*, Int. Press, Somerville, MA, 2014; MR3236918].

There are various biographical resources that the reader can consult. A good place to start is the article by Winfried Scharlau [Notices Amer. Math. Soc. **55** (2008), no. 8, 930–941; MR2441525], and the two articles [Notices Amer. Math. Soc. **63** (2016), no. 3, 242–255; MR3445163; Notices Amer. Math. Soc. **63** (2016), no. 4, 401–413; MR3444660]. A four-volume biography of Grothendieck, written by Scharlau and Schneps, is currently in progress. The first volume [W. Scharlau, *Who is Alexander Grothendieck? Part 1: Anarchy*, translated from the German, Norderstedt Books on Demand, 2011] is available.

The first chapter of Pradeau's work ends with a pessimistic description of the progress of Grothendieck's life after 1968: "Then like a ball rolling down a slope, slowly at first and then faster and faster, Grothendieck detaches himself. He gets rid of the world."

{For the first edition see [Y. Pradeau, *Algèbre: éléments de la vie d'Alexander Grothendieck*, Éditions Allia, Paris, 2016].}

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