thought in the philosophy of mathematics which made considerable contributions to the foundations of mathematics on the basis of Kant and Fries after 1900.

A general objection to the volume is that a reinterpretation of foundational conceptions in the philosophy of mathematics cannot be confined to published texts, but must seek out the sources themselves. The traditional presentations are already based on certain selections and judgements. Independent evaluation and the search for new sources would appear to be a more productive approach for the philosophy of mathematics as well.

The History of Mathematics in Finland 1828–1918. By Gustav Elfving. The History of Learning and Science in Finland 1828–1918, Vol 4. Helsingfors (Societas Scientiarum Fennica). 1981. 195 pp.

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The author, Gustav Elfving, was born in 1908 in Helsingfors and died in 1984. Elfving defended his doctoral thesis in 1934, and was a university lector at the Swedish university Åbo Akademi in Åbo (Finland) from 1933 to 1938 before assuming the Swedish Chair of Mathematics at the Helsingfors University. This valuable book, the result of Elfving's painstaking research on the history of mathematics in Finland, is the last to come from his hand. It is part of an ongoing series on the history of science in Finland during the period 1828–1918, which coincides approximately with the period of autonomy under the Tsar of Russia, beginning with Finland's separation after many centuries as a part of Sweden to its full independence in 1917.

In these 90 years an amazing evolution in mathematics took place in Finland, represented by names like Mittag-Leffler, Mellin, the Neovius-Nevanlinna family (Finland's answer to the Bernoullis), and Ernst Lindelöf. Before this period, only one mathematician (primarily an astronomer) who hailed from the province of Finland is worthy of mention: Anders Lexell, a native of Åbo, who succeeded Euler as a member of the Imperial Academy of Sciences in St. Petersburg.

For most of us, it is hard to comprehend the isolation that a pioneer in Finnish mathematics had to overcome in those days. The first professor of mathematics in Helsingfors, Nathanaël af Schultén (whose work spanned the years 1826 to 1855), left Åbo Akademi to make his obligatory study trip to Paris; the travelling time was 33 days! His interests lay in irrational and transcendental numbers, and in continued fractions. At that time he was the only professor of mathematics in Finland. The subsequent upswing in mathematics in Finland was due to the efforts of five men of considerable distinction: af Schultén himself, L. Lorenz Lindelöf (whose work spanned the period 1857–1874), Gösta Mittag-Leffler (1877–1881), Edvard R. Neovius (1883–1900), and Ernst Lindelöf (1903–1938).

Lorenz Lindelöf (chapter 4) observed a total eclipse of the sun in Spain and gave talks in Aberdeen and Oxford on the calculus of variations; these talks, expanded into the book *Leçons de calcul des variations* (Paris, 1861), qualified him for the chair of mathematics. His second field of interest was analytical geometry, and his textbook *Lärobok i analytisk geometri* (1864) has been a classic for mathematical instruction throughout Finland. Elfving himself, in the 1920s, studied the same copy of this book that his father had used in the 1870s!

The first Nordic mathematical association, the Finnish Mathematical Society, was founded in 1868. Plans were repeatedly discussed for the publication of a journal and Lindelöf worked to develop a Finnish terminology for the translation of his textbook. Several of his terms have since been abandoned, yet many modern Finnish mathematical expressions were adopted from Lindelöf's work.

Gösta Mittag-Leffler's period in Finland (chapter 6) brought a breath of fresh air from Europe into Helsingfors. In 1882 he married Signe Lindfors, who has a Swedish Finlander, and strengthened his relations with Finland for the remainder of his life. The most well known of Mittag-Leffler's students was Hjalmar Mellin, whose research focused on the so-called Mellin transformation and hypergeometric functions. He also tried to refute Einstein's theory of relativity, which he considered logically untenable. His speculations took a metaphysical turn, finally leading him to an almost visionary state in which he thought himself able to draw prophetic conclusions about the universe and its destiny.

Edvard E. Neovius (1823–1888), a major-general in the Russian army, was the first of the mathematicians in the famous Neovius-Nevanlinna family (the name change was an expression of Finnish nationalism) belonging to the time period of the book. No fewer than 23 of the Neovius family became soldiers! Moreover, the family was related to the Lindelöfs; Edvard E. Neovius was Lorenz Lindelöf's brother-in-law. Edvard E. taught mathematics at the Cadet School and wrote books. He was convinced that intelligent beings lived on Mars, and made a detailed plan for communicating with Martians using signals of four different lengths. He had three mathematical sons: Lars Th. (known as Nevanlinna after 1906), Otto W. (ditto), and Edvard R. Neovius (1851–1917). The last-mentioned was the foremost of the Neovius-Nevanlinna family members (later, naturally, surpassed by the world-famous Rolf). Seven students of Edvard R. acquired doctoral degrees.

Chapter 10 carries the expressive title "Two Outsiders." Johan Dahlbo (1859–1923), a penniless brooder who taught in elementary schools, presented a thesis, *Uppränning till mathematikens historia i Finland från äldsta tider till Stora ofreden*, which was in fact the first—Elfving's is the second!—book on the history of mathematics in Finland (also before 1828). However, his thesis was rejected, although in Elfving's opinion "it appears to be a quite impressive piece of work." The second "outsider," Hjalmar Magnus Eklund (1880–1937), was a pioneer in the domain of mathematical logic. Unlike Russell, who rejected as logically illegitimate sets that contain themselves as elements, Eklund took another approach based on an analogy with continued fractions.

In chapter 11, Elfving presents a thorough picture of the distinguished mathematician Ernst Lindelöf (1870–1946), a son of Lorenz Lindelöf. In 1907, Ernst became one of the editors of *Acta Mathematica*, and he organized the Congress held in Helsingfors in 1922. He had a great number of friends throughout Europe, including Poincaré, Picard, and Borel. His name is connected with Picard's method, existence proofs for differential equations, analytic continuation, entire functions, and the calculus of residues (his *Calcul des résidus* appeared in 1905). "Lindelöf's principle" is widely known, and his series of textbooks (all written in Swedish) remains unsurpassed. Associates of Lindelof were the statistician J. W. Lindeberg (chapter 12), and the "Strindberg-like," gifted, but always overworked Severin Johansson (chapter 13), who was appointed professor at the *new* Åbo Akademi, a Swedish-language university founded in 1918. After 1907, a number of young mathematicians appeared, all of them inspired by Lindelöf. Representing the theory of functions were Poukka, Hintikka, Helenius, Iversen, Myrberg, V. Väisälä, and in the forefront, Rolf and Frithjof Nevanlinna. There were also R. J. Backlund in analytic number theory, K. Väisälä in algebra, Nils Pipping in algebraic number theory, Kivikoski in geometry, and Nyström in numerical analysis.

The last decade covered by this history was a time of resistance against Russification, followed by World War I, the Russian Revolution, and, finally, the Finnish civil war of 1918. A gifted student, Lindfors, was killed on the White side; whereas the above-mentioned logician Eklund was involved on the Red side. However, in mathematics this decade was a time of growth and promise.

Summing up, Elfving's history is an overwhelmingly rich study of a previously undocumented area, restricted in time and place, in the history of mathematics. It is a flawless and meritorious example, both in style and substance, of a "local" history of mathematics.

Die Entstehung des Mathematiklehrerberufs im 19. Jahrhundert: Studien und Materialien zum Prozeß der Professionalisierung in Preußen (1810–1870). By Gert Schubring. Bielefelder Beiträge zur Ausbildungsforschung und Studienreform, Bd. 2. Weinheim/Basel (Beltz). 1983. 325 S.

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Obwohl dieses Werk bereits vor längerer Zeit erschien und ich es schon selbst kurz vorgestellt habe, soll es hier ausführlicher besprochen werden, vor allem, weil mit diesem Buch eine neuartige Erforschung der Geschichte des mathematischen Unterrichts und des Mathematiklehrerberufs beginnt. Das Neue dieser fachspezifischen Untersuchungen besteht zum einen darin, daß ganz bewußt versucht wird, das Fach Mathematik in den Rahmen der nationalen Spezifik und des