

From the Editor

Complexities

A (male) colleague of mine has an imposing poster on the wall of his office of a mathematician whose work has been fundamental for him in his professional life. It is of Emmy Noether (1882–1935), one of the foremost algebraists of the early part of the twentieth century. Her name has become an adjective in the language of algebra with the naming of Noetherian rings, over even noetherian rings in lower case. There is an Emmy Noether lecture given by a prominent woman mathematician at the International Congress of Mathematicians, held every four years. Yet she could not be given a paid post at The University of Göttingen. Members of the Senate argued ‘what will our soldiers think when they return to the University to find that they are expected to learn at the feet of a woman’. Professor David Hilbert replied ‘the Senate is not a bathhouse’. But the Senate would not give way. Lectures were announced under the name of Professor Hilbert but delivered by Fräulein Noether. She was forbidden to teach when the Nazis came to power and left for the United States of America in 1933, where she taught at Bryn Manor, a then unknown ladies’ college, where she gathered the ‘Noether girls’ around her to replace the ‘Noether boys’ of Göttingen.

Emmy Noether was not the first woman mathematician. Sophie Germain (1776–1831) experienced the opposition of her family when she tried to study mathematics. They took away her fire, her light, and her clothes to force her from her books. Sophie waited until everyone else slept, wrapping herself in her covers to study by the light of candles. She sent submissions to the great Gauss under the pseudonym of Monsieur Le Blanc. Imagine Gauss’ surprise when he discovered the identity of his correspondent!

Ada Lovelace (1815–1852) worked with Charles Babbage on digital computers a century before their invention. She is described as the first hacker! Sonia Kovalevsky, born in 1850 in Russia, read her re-acquired algebra book secretly at night after her father had confiscated it.

In the past, mathematics was regarded as unfitting for women. The University of Cambridge did not grant degrees to women until 1948. Princeton did not admit women to its graduate programme in mathematics until 1968. Thankfully, things have changed since those days. But by how much? It is said that girls now outshine boys in school and, according to figures in



this book, 43% of students on undergraduate degree courses in mathematics in the US are women. The percentage of women on US graduate programmes ('postgraduate' in the UK) drops to 30%. But what about university teachers? Women are very much in the minority there, as any undergraduate will testify. This book asks why this is so. This book is compiled by members of the *Association for Women in Mathematics* (AWM) in the US. Its many contributors are largely, but not wholly, AWM members; one male contributor was spotted! The special problems women face as mathematicians are tackled head on, and helpful advice is given, much of it also relevant to male students. Inevitably, most of the contributions are in a US context, although there is an international survey. Curiously, warmer countries have a significantly greater proportion of mathematicians who are women than colder ones. Discuss! Hence, perhaps, the rather enigmatic title.

As well as biographies past and present, this book contains articles by women doing mathematics in industry and commerce as opposed to in academic life. Curiously, again, they seem to fare much better here. For many readers, these will be the most interesting contributions in the book. Working mathematicians describe their work in government and administration, computer science, aerospace, the oil industry, publishing, national security, biomedical research, and communications.

There is much in this volume for all students of mathematics, but obviously it is written to encourage women to take up, and to stick at, a career in mathematics. About the time this book arrived at the *Mathematical Spectrum* office, an announcement came of the 2005 'Women in Mathematics' day, organized by the *London Mathematical Society*.

We have come a long way since the days of pioneering women like Sophie Germain and Emmy Noether. Not that they saw themselves as pioneers. They merely wanted to work in the subject that they loved.

As a postscript, one of the contributors writes of the birth of her love of mathematics in her second year at school. She noticed that the numbers in the 9-times table, 9, 18, 27, 36, 45, 54, 63, 72, 81, 90, all had digits which added up to 9, and wondered why. Now there's a thought!

Reference

- 1 B. A. Case and A. M. Leggett (eds), *Complexities: Women in Mathematics* (Princeton University Press, 2005).