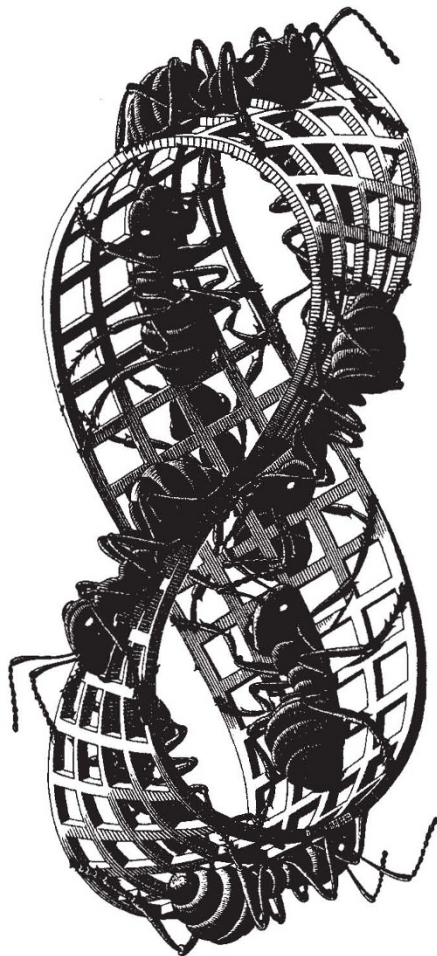


# Strip-tease

Desmond King-Hele

**Möbius and his Band: Mathematics and Astronomy in Nineteenth-Century Germany.** Edited by J. Fauvel, R. Flood and R. Wilson. Oxford University Press: 1993. Pp. 172. £19.50, \$29.95.

THE real subject of this book is best exposed by slyly altering the title to 'Möbius and his band of fellow-German



From *Möbius and his Band*

**Möbius Strip II** by M. C. Escher (1963).

mathematicians and astronomers'. We are presented with six essays on German mathematics and astronomy in the nineteenth century, as the subtitle correctly indicates. The essays are loosely centred on Möbius, but "this is not a biography of Möbius", as the first sentence of the preface declares. The catchy title *Möbius and his Band* is not only misleading but also wrong, because the essay on topology by Norman Biggs shows that the Möbius band is not really his, having been described a little earlier by J. B. Listing, a pioneer of topology and pupil of Gauss.

All this may seem carping criticism, but it is symptomatic of a sense of confusion and repetition that permeates the book. The preface boldly makes a virtue of

necessity, admitting that Möbius was "not outstanding in any particular way, but was a serious, competent, professional scholar" and was therefore "a good mirror of his time". The trouble is that the six contributors have to refer to Möbius from time to time, in deference to the plan of the book, and they often find only a blank. For example, Ian Stewart, in his wide-ranging survey of "Möbius's modern legacy" remarks that "historical recognition is at best a fickle thing, but in this case its absence is appropriate. . . . To put it bluntly, he was a bit of a plodder." (In the United Kingdom today he would probably be one of the many unemployed scholars.) Allan Chapman, at the end of his essay on the development of astronomy in Germany and elsewhere during Möbius's lifetime, outlines the blank more politely (or perhaps sarcastically?), by saying that Möbius "would have been intimately acquainted with the developments discussed above. . . in which his own observatory would have played a part". Certainly it would have been bizarre if he had been unaware of progress in astronomy; and Möbius was not a bizarre man.

If Möbius seems to be 'the man who wasn't there', where was he? Born in 1790 near Leipzig, August Möbius became a student at Leipzig University in 1809, and in 1816 was appointed 'extraordinary professor' in astronomy. This was a "lowly form of academic life", as John Fauvel remarks in his introductory essay: it meant that he could charge fees for lecture courses. As "he was not an especially charismatic teacher", students apparently only "came to his courses when he advertised them as free". After 28 years, in 1844, he became a full professor, and in 1848 director of the Leipzig Observatory. He described the Möbius band in 1858 and died in 1868. Although he made little impact in astronomy, apart from writing two popular books, he was a good mathematician and wrote three notable books.

The first of these, in 1827, was on the 'barycentric calculus', the main subject of Jeremy Gray's engaging essay on "Möbius's geometrical mechanics". Möbius helped in pioneering several fruitful concepts in projective geometry, including duality and homogeneous coordinates. His name is also attached to a function, an inversion formula, a transformation and a net, all clearly explained by Gray. His other two books were on celestial mechanics (1843) and the theory of circular transformations (1855). These were substantial achievements, and helped to transform him into a man who was there: certainly he was there at Leipzig University between 1809 and 1868.

Even if some intellectual defects lurk within, the book looks good: it sports an attractive multicoloured jacket, and is well illustrated, with many photographs of places and instruments, and a nice gallery

of engravings of German mathematicians. There are also numerous mathematical diagrams, all clear and relevant, and the many mathematical equations and expressions are well set out. It is the text that has deficiencies, in particular too many repetitions. The meagre known details of Möbius's life are inevitably repeated *ad nauseam*, but the repetition extends to more peripheral matters: on page 3 we are told that Napoleon's defeat of Prussia at Jena in 1806 sparked a Prussian cultural renaissance; the same story is repeated on page 10, and again on page 23. These repetitions would have been picked up if there had been a proper index, but in fact the 'index' is only a list of personal names; it is therefore difficult to guess which essay will cover a particular topic.

When all this is said, however, the book is a useful history of some aspects of German astronomy and mathematics in the nineteenth century, especially as seen in relation to modern advances. □

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## Air raid

Len Goodwin

**Disease Transmission by Insects: Its Discovery and 90 Years of Effort to Prevent It.** By James R. Busvine. Springer: 1993. Pp. 361. DM98, \$69, £38.50.

AIR travel adds a new dimension of mobility to the earthbound, enhancing speed, range and precision; it is easy to see that when insects evolved, parasitic organisms benefited from being carried on the feet and in the guts of flying arthropods to new environments and hosts. It is more difficult to imagine how, as a result of small random mutations, some of them could have developed their highly sophisticated life cycles, using a particular species of insect as an intermediate host.

Most parasites live at peace with their natural hosts, doing them little harm. But when a new, susceptible animal invades their territory they may kill, and human intrusion into the wilderness has led to epidemics of yellow fever, trypanosomiasis, malaria and many other lethal diseases. It took a long time before the idea that diseases might be carried by insects was taken seriously, but over a score of years around 1900, causative organisms and their vectors were identified and their life cycles elucidated.

James Busvine recounts the stories of these discoveries and of the pioneers — of many nations — who made them, and pays tribute to the scientists' ingenuity, imagination and courage. They were fully