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★**Mechanisches Memorieren und Chiffrieren um 1430. (German) [Mechanical recording and enciphering around 1430]**

Johannes Fontanas Tractatus de instrumentis artis memorie.
Boethius: Texte und Abhandlungen zur Geschichte der Mathematik und der Naturwissenschaften [Boethius: Texts and Essays on the History of Mathematics and the Natural Sciences], 59.
Franz Steiner Verlag, Stuttgart, 2009. 167 *pp*. €38.00. *ISBN* 978-3-515-09296-8

This book contains a critical edition, with German translation, of a short Latin treatise which the authors call *Tractatus de instrumentis artis memorie*. It is the third part of the *Secretum de thesauro experimentorum ymaginationis hominum* by Johannes (or Giovanni) Fontana (ca. 1390–ca. 1455), who was born in Venice and studied in Padua. The text exists in a unique manuscript in Paris, where it is written in a simple code in which each Latin letter is represented by its own symbol. In the *Tractatus de instrumentis artis memorie*, Fontana describes twelve simple instruments which can be used as memory aids. For each instrument, the manuscript provides a figure which is photographically reproduced in the book under review. For example, Fontana's first instrument is called the *speculum* (mirror); it consists of five concentric rings which can be rotated around a central axis. On each of the rings, the letters of the alphabet are inscribed in order. Fontana suggests that an arbitrary combination of five letters (such as XROTA) can be remembered by turning the rings such that the letters X, R, O, T, A are on the radius of the instrument from the central axis to the left side.

The authors argue that the speculum and some other instruments in the text are way too complicated to serve as simple memory aids, and they conclude that Fontana wrote his text with cryptographic purposes in mind. The authors show that the speculum can be used for coding messages according to the polyalphabetic system published in 1586 by the French diplomat Blaise de Vigenère (1523–1596), somehow as follows. To encode any message using the key ROTA, install the word XROTA on the instrument as above. Then divide the message YABZ CDEF . . . into groups of four letters YABZ, CDEF . . . . Find the first letter Y on the outer ring (next to X), and encode it as the corresponding letter S (next to the letter R in the key) on the second ring. The letters Y and S are on the same radius of the instrument. Then the next letter A, which is three positions from X on the outer ring, is encoded as the letter R on the third ring, which letter is three positions from the key letter O in the third ring, and on the same radius as A on the outer ring. Continuing in this way the first group YABZ is encoded as SRXC. By repeating this process, this second group CDEF is encoded as WUAI, and so on. If the Vigenère key has n letters, $n+1$ rings are necessary on the speculum. The authors also describe in detail a similar application of Fontana's eighth instrument. They conclude that the Vigenère polyalphabetic system was already available around 1430, even though no explicit description of the system was given by Fontana or his contemporaries.

The book under review begins with a short biography of Fontana and a list of his extant and lost

works.

Reviewed by *Jan P. Hogendijk*