
Article

Combining Codicology and X-Ray Spectrometry to Unveil the History of Production of Codex germanicus 6 (Staats- und Universitätsbibliothek Hamburg)

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1. Introduction

The investigation of physical properties and chemical composition generates important data for answering cultural-history questions that cannot be solved by historical and philological methods alone. In its individual materiality, each manuscript is the result of a wide variety of influences. The ‘life’ of a manuscript starts with its production, followed by the use and storage of the manuscript, and is finally characterized by its treatment during restoration. Some of these characteristics are still in existence and may provide insights into the production process and history of a manuscript.

Codex germanicus 6, which consists of a compilation of twelve different texts, is an excellent example of a manuscript with a complex history. It is a plain, 614-page manuscript without illuminations and was created around 1450. Most of the twelve different texts are composed in Middle High German. The entire manuscript was written and rubricated by a scribe who called himself Jordan – of whom little else is known – and was intended for his personal use, as he conveyed in two colophons on pages 365 and 560.

The combination of classic codicology and scientific analysis, i.e. advanced codicology, should assist in clarifying the chronology of the production process.

The most important prerequisite for investigating historical objects is the use of techniques that are non-destructive or only require minimal sampling. The unchanged sample should preferably still be available for further study after it has been analysed. X-ray fluorescence analysis is one of the most suitable methods for obtaining qualitative and semi-quantitative information on a great diversity of materials and is a convenient technique for the investigation of inorganic compounds. In this article, we present preliminary results from XRF examinations of the red inks at relevant points in

the manuscript, especially at points where one text ends and another begins.

2. Codicological analysis

According to codicological research, the sequence of the texts in Cod. germ. 6 does not correspond to the order in which they were penned. Table 1 shows where the individual texts are positioned within the codex (under ‘Text index’) and the order in which they were transcribed (under ‘Evidence about the order of transcription of the texts’). The last column summarizes the questions we have attempted to answer in this paper.

The codex begins with two *Meisterlieder: König Artus’ Horn and Luneten Mantel*. They were obviously added after the codex was bound since a sheet has been inserted (page 5/6) so that they could be placed before the beginning of the *Parzival* text on page 8. The index, written by the same scribe, has also been placed before the texts. It only mentions texts 3, 5, 6, 8, 9, 10 and 11. However, text 7 appears seamlessly between texts 6 and 8 in the middle of quire 24, indicating that Jordan most likely forgot to note it in the index. This is plausible since texts 6 and 7 have the same title in the codex (*Von dem Soldane*). It is noteworthy that texts 4 and 12 are very short and also could have been forgotten by Jordan. Alternatively, they could have been penned after the index was composed.

Text 3, entitled *Parzival*, is dated to 2 February 1451 in a colophon which concludes the text of the romance. *Artusnotiz* – text 4 – appears on the same page and could have been added later since it is extremely short. The last page of the quire is blank. The next quire begins with text 5, the Arthurian romance *Wigalois*, which also has a colophon dating completion of the text to 11 November 1451. It is

Table 1: Structure of Codex germanicus 6

Quire	Pages*	Title	Text index	Evidence about the order of transcription of the texts	To clarify
1	2a–4a	König Artus' Horn ¹	1	Before: 2, After: 3, 5, 6, 7, 8, 9, 10, 11	Before or after 4/12?
1	4a–6b	Luneten Mantel ²	2	Before: ?, After: 1, 3, 5, 6, 7, 8, 9, 10, 11	Before or after 4/12?
1-15	8a–365a	Parzival ³	3	Before: 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12	
15	365a	Artusnotiz ⁴	4	Before: ?, After: 3	Added later?
16-23	367a–560a	Wigalois ⁵	5	Before: 1, 2, 6, 7, 8, 9, 10, 11, 12, After: 3	Before or after 4?
23-24	560a–567a	Sultansbrief Abul Nasr ⁶	6	Before: 1, 2, 7, 8, 9, After: 3, 5, 10	Before or after 4/11/12?
24	567a–569a	Sultansbrief Almansor ⁷	7	Before: 1, 2, 8, 9, After: 3, 5, 6, 10	Before or after 4/11/12?
24	569a–575b	Der König im Bad ⁸	8	Before: 1, 2, 9, After: 3, 5, 6, 7, 10	Before or after 4/11/12?
24	576–587a	Friedrich ⁹	9	Before: 1, 2, After: 3, 5, 6, 7, 8, 10	Before or after 4/11/12?
25	589a–610b	Jeanne d'Arc ¹⁰	10	Before: 1, 2, 6, 7, 8, 9, 11, 12, After: 3, 5	Before or after 4?
25	611a–612b	Lüttich ¹¹	11	Before: 1, 2, 12, After: 3, 5, 10	Added later?
25	612b	Notabile ¹²	12	Before: ?, After: 3, 5, 10, 11	Added later?

Quire formula: (VI+1)¹³ + (VI)¹⁶⁹ + (VII)¹⁸³ + (VI)²⁶⁷ + (VII)²⁸¹ + (VI)²⁹³ + (VII)³⁰⁷.

* Letters 'a' and 'b' correspond to the left and right columns.

¹ This *Meisterlied* is about a test of fidelity at the court of King Arthur and originates from the end of the 14th century or the first half of the fifteenth century; cf. Schanze 1985, 69–70.

² The second *Meisterlied* deals with another test of fidelity at the court of King Arthur and was presumably written in the first half of the 15th century; cf. Schanze 1985, 1068–1069.

³ An Arthurian romance by Wolfram von Eschenbach written between 1200 and 1210; cf. Bumke 2004, 19–21.

⁴ A short note containing biographical information about King Arthur.

⁵ An Arthurian romance by Wirnt von Grafenberg written between 1210 and 1220; cf. Wennerhold 2005, 80.

⁶ Letter from the Egyptian sultan Abul Nasr to Antonio Fluvian de Rivière from 1426; cf. Putzo 2002, 64.

⁷ A fictitious letter from the Babylonian sultan Almansor to the Roman Pope, the emperor and all kings; cf. Putzo 2002, 64.

⁸ Narration in couplets about a king who loses everything, but returns to the throne after experiencing catharsis. It originates from the second half of the 13th century.

⁹ This text lists the order of entry at the coronation of Emperor Friedrich III in Rome in 1452; cf. Putzo 2002, 64. This is the most recent text in Cod. germ. 6.

¹⁰ These 22 pages contain diverse documents (such as letters) on the life of Jeanne d'Arc, who lived from 1412–1431.

¹¹ This text presents the articles of the peace treaty between the Bishop of Lüttich (Johannes VIII von Heinsberg) and the town of Lüttich in 1408.

¹² This note tells of a woman who gave birth to an animal form in Strasbourg in 1412.

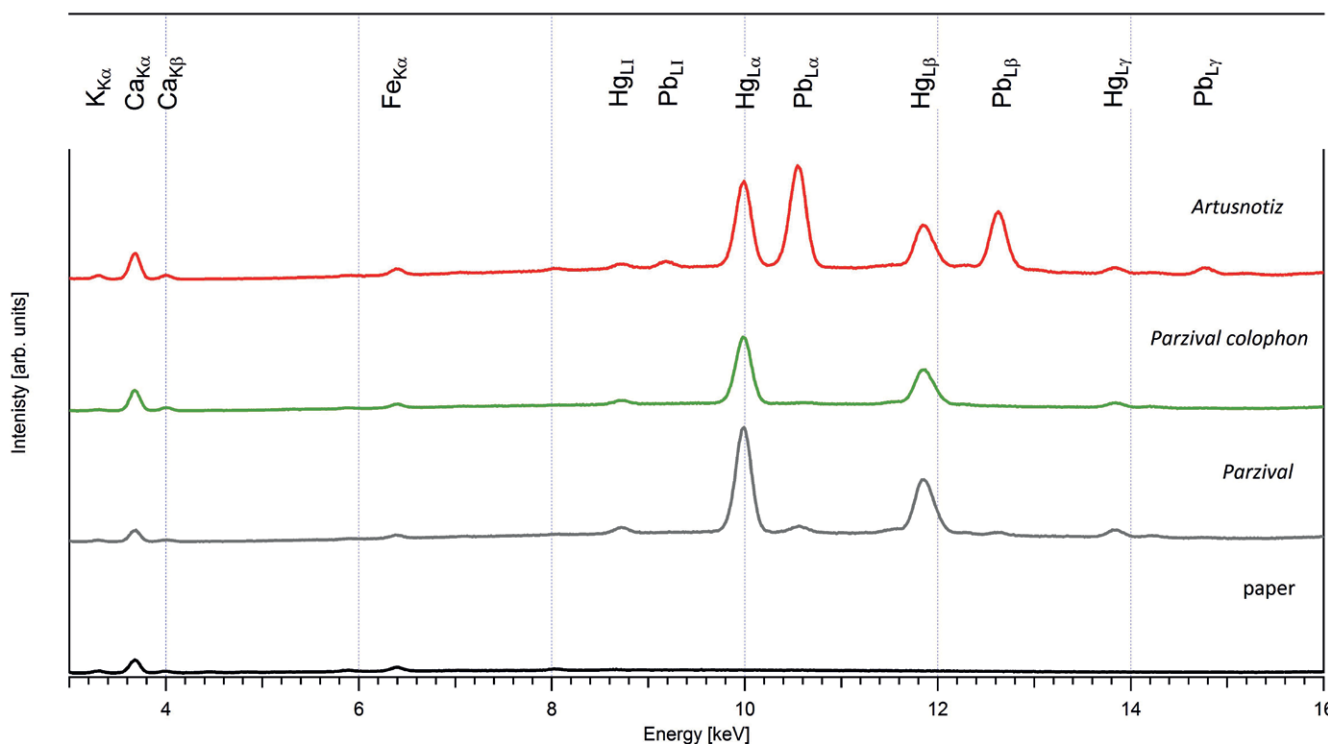


Fig. 1: Excerpt from the XRF spectra collected from the paper and selected red inks.

thus certain that *Parzival* was transcribed before *Wigalois*. There is no indication that the remaining texts in the two last quires of the codex were penned before the two Arthurian romances, *Parzival* and *Wigalois*. It is therefore most likely that the two longer texts in the codex were the first to be transcribed.

There are, however, two factors indicating that quire 25 was transcribed before quire 24. Firstly, the 25th quire is very likely to have initially been a senion, but appears in the bound manuscript as a 7-bifolium quire: it is enclosed by a double sheet (p. 587/588 and 613/614) so that the last text of quire 24 could end on page 587. Page 588 is blank, and the first text of the 25th quire begins on page 589. Secondly, the 24th quire and the double sheet added around quire 25 show watermarks that differ from those in the other quires in Cod. germ. 6.

This suggests that the first text of the 25th quire, text 10, was initially placed after *Wigalois*, which is text 5. This text nearly completes quire 25, leaving only two pages. On these pages we find two short texts (11 and 12) that could easily have been added later. Furthermore, we can conclude that text 11 was written before texts 1 and 2 were added since it is listed in the index of the codex, whereas texts 1 and 2 are not.

Text 6, the first letter from the sultan, comes after the *Wigalois* text, starting in quire 23 and ending in quire 24. If

quire 24 is indeed the last quire of the codex, it is likely that all the texts in this quire were penned in consecutive order.

Codicological analysis employed in this research led to an almost complete reconstruction of the transcription of Cod. germ. 6. The remaining questions that could not be resolved by classical codicology alone concern short texts (4, 11 and 12), which could have been added at a later stage. We recently demonstrated that expanding codicology to include physical and chemical analysis of writing materials offers new possibilities for studying the history of manuscripts. Expanded codicology includes information ranging from simple recognition of the ink typology by visible and infrared reflectography to determination of the chemical composition using complex analysis methods.¹³ Ink composition in particular is used to help reconstruct the chronology of the texts. The method is based on the observation that a change in the scribe's hand is often accompanied by a change in the ink composition. Moreover, handmade inks in the Middle Ages were never completely reproducible, with the result that different batches of ink prepared with the same recipe display sufficient differences to be detected by chemical analysis.

¹³ Cf. Rabin et al. 2012.

3. X-ray fluorescence analysis

To take X-ray fluorescence measurements, we used a commercial, transportable (though not portable) ARTAX micro-XRF spectrometer (made by Bruker Nano GmbH) specially designed for archeometric studies in situ.¹⁴ It consists of a low-power, air-cooled X-ray tube, polycapillary optics resulting in a beam spot of 70 µm in diameter, an electro-thermally cooled Xflash detector and a CCD camera for sample positioning. All measurements were taken using a 30 W low-power Mo tube operated at 50 kV and 600 µA and with an acquisition time of 20 s (live time). Peak fitting and semi-quantitative data evaluation were conducted using Bruker's SPEKTRA software.

Fig. 1 presents an example of the spectra collected in this work. The elements K, Ca and Fe are present in the paper and constitute a constant background. Hg and Pb correspond to the red inks. We observe practically only Hg in the red inks

used for rubrication of *Parzival* and its colophon, whereas the inks used in *Artusnotiz* have a large amount of Pb.

4. Results

With the aid of XRF, six different kinds of red ink have been distinguished to date in Cod. germ. 6. The majority of the red inks analysed show cinnabar with lead contamination below 10% – the red ink in one text had more lead (Pb) than mercury (Hg), however. In other words, this ink has a different chemical composition than the rest of the red inks and is most probably a mixture of minium and cinnabar. This particular red ink has been found in text 4, *Artusnotiz* – one of the three texts in Cod. germ. 6 that could conceivably have been added at a later date. Ink analysis suggests that text 4 was not written at the same time as the colophon of *Parzival*. On the basis of the codicological study, we believe that this was, in fact, the last text to be penned. To validate our thesis, it is necessary to consider the positioning of *Artusnotiz* in the manuscript.

Table 2: Summary of the red inks tested in our study.

Text	Title	Use in the text	Pb/Hg	Ink no.
2	Luneten Mantel	Rubrication	0.07±0.007	1
3	Parzival	Rubrication	0.06±0.006	1
3	Parzival	Colophon	0.01±0.001	2
4	Artusnotiz	Rubrication	1.24±0.12	3
5	Wigalois	Rubrication	0.3±0.03	4
5	Wigalois	Colophon	0.29±0.03	4
6	Sultansbrief Abul Nasr	Heading	0.09±0.01	5
10	Jeanne d'Arc	Last passage	0.07±0.007	1
11	Lüttich	Rubrum	0.032±0.003	4
11	Lüttich	Rubrication	0.1±0.01	5
12	Notabile	Heading	0.045±0.005	6
12	Notabile	Rubrication	0.07±0.007	1

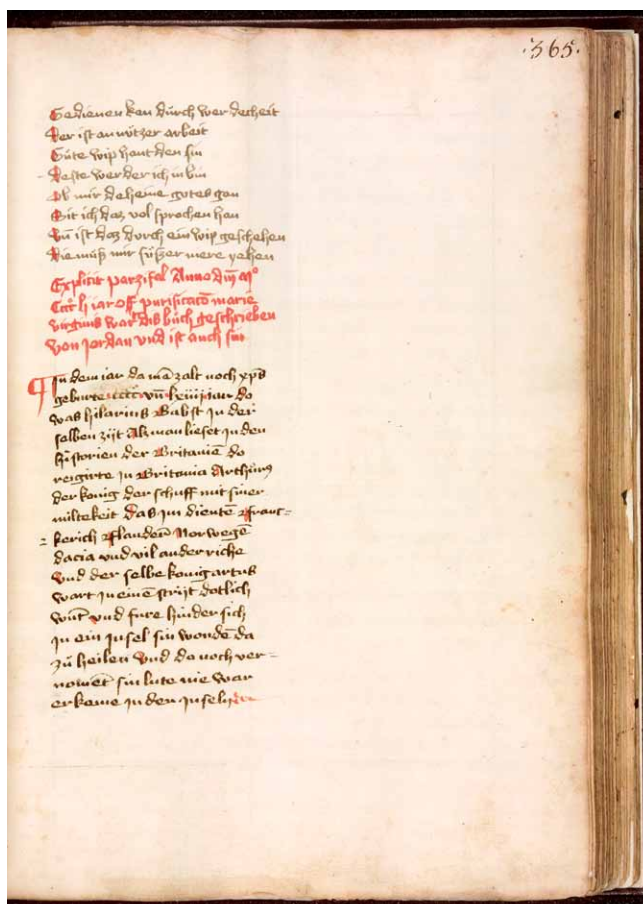


Fig. 2: Page 365 of Cod. germ. 6.

¹⁴ Cf. Bronk et al. 2011.

Fig. 2 shows page 365 of Cod. germ. 6 featuring the text of *Artusnotiz*.¹⁵ We are concerned here with the 17 lines at the bottom of the page, which are separated by an alinea. The first eight lines are the last verses of *Parzival*, and the following four lines constitute the colophon written in red ink. Since *Artusnotiz* is positioned directly after the colophon, we can be certain that it was written after *Parzival*. The measurements for the black ink also indicate that the verses of *Parzival* on this page and the text of *Artusnotiz* were written in different inks. Furthermore, the red ink used for respective rubrication of the two texts is not identical. This makes it extremely probable that *Artusnotiz* was transcribed after *Parzival* had been written and rubricated, otherwise both texts would most likely have been rubricated with the same red ink.

Based on the codicological examination, there are two other texts besides *Artusnotiz* which could be the last ones to have been transcribed, namely text 2 and text 12 – the *Meisterlied Luneten Mantel* and *Notabile*. Interestingly, the measurements show that these two texts were rubricated with the same red ink. Exactly this sort of ink was found in two other passages in the codex as well: in the last paragraph of text 9 and in the rubrication of *Parzival*. As mentioned above, *Artusnotiz* was transcribed after *Parzival* had been written and rubricated. Since texts 2 and 12, are rubricated with the same ink as *Parzival*, we can conclude that *Artusnotiz* was the last text added to Codex germ. 6.

5. What new insights can be derived from this conclusion?

- The results of the examination using XRF spectrometry show that *Artusnotiz* was not transcribed immediately after *Parzival*. It can be assumed on this basis that *Artusnotiz* was not combined with *Parzival* in the original manuscript given to Jordan to copy draft, but that he deliberately decided to add the short text.
- Since the composition of the red ink used in *Artusnotiz* differs considerably from all the other red inks detected in Cod. germ. 6, it is quite possible that the short, 17-line text was added quite some time after completion of the penultimate text. It is not even possible to rule out that Jordan added *Artusnotiz* after the manuscript had been bound.

- When a text as short as *Artusnotiz* is added to a manuscript, it is possible that it simply served as a filler. It is not very likely that this applies to *Artusnotiz* in Cod. germ. 6, however, since the following page, 366 (which is the last one of the 15th quire), is blank. Jordan could have written *Artusnotiz* or another short text on this blank page, but he chose not to. He most likely wanted to position *Artusnotiz* in relation to the text of *Parzival*. What could have been the purpose of placing the texts in this way?

Artusnotiz tells us that in 464, King Arthur ruled *Franckerich* (France), *Flandern* (Flanders), *Norwegen* (Norway), *Dacia* and lots of other kingdoms. It subsequently gives an account of how the king was mortally wounded and went to an island to recover and of how his people never knew whether or not he would return. This is an abridged passage from the *Chronicon pontificum et imperatorum* by Martin von Troppau, a chronicle with a rich tradition which synoptically renders the reigns of popes and emperors.¹⁶ Jordan quite obviously tried to historicize the text of *Parzival* by incorporating *Artusnotiz* immediately after *Parzival*. The very different data collected from the red ink measured in *Artusnotiz* makes it likely that it was added after the manuscript had been bound. The fact that Jordan added something (that he probably discovered subsequently) to a manuscript that was actually already finished shows that historicizing *Parzival* was extremely important to him.

This example shows us that the first XRF study of Cod. germ. 6 was able to help answer a number of codicological questions. However, the new findings which indicate that there were seven different red inks used in the manuscript without a proper system also raise a few additional questions, especially with regard to the date of transcription of texts 11 and 12. Further research will help us gain greater insight into the complicated history behind the creation of this codex.

¹⁵ It is possible to view a scan of Cod. germ. 6 online. For more information, see below under 'References'.

¹⁶ Von den Brincken 1987, 161–162.

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PICTURE CREDITS

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- Permanent link to the scan of Codex germanicus 6: <http://resolver.sub.uni-hamburg.de/goobi/HANSh496> or: www.sub.uni-hamburg.de > Digitalisierte Bestände > Abendländische Handschriften > Sammelhandschrift: Meisterlieder – Wolfram von Eschenbach ‘Parzival’ – Wirnt von Grafenberg ‘Wigalois’ – Chronikauszüge – Kleinepik