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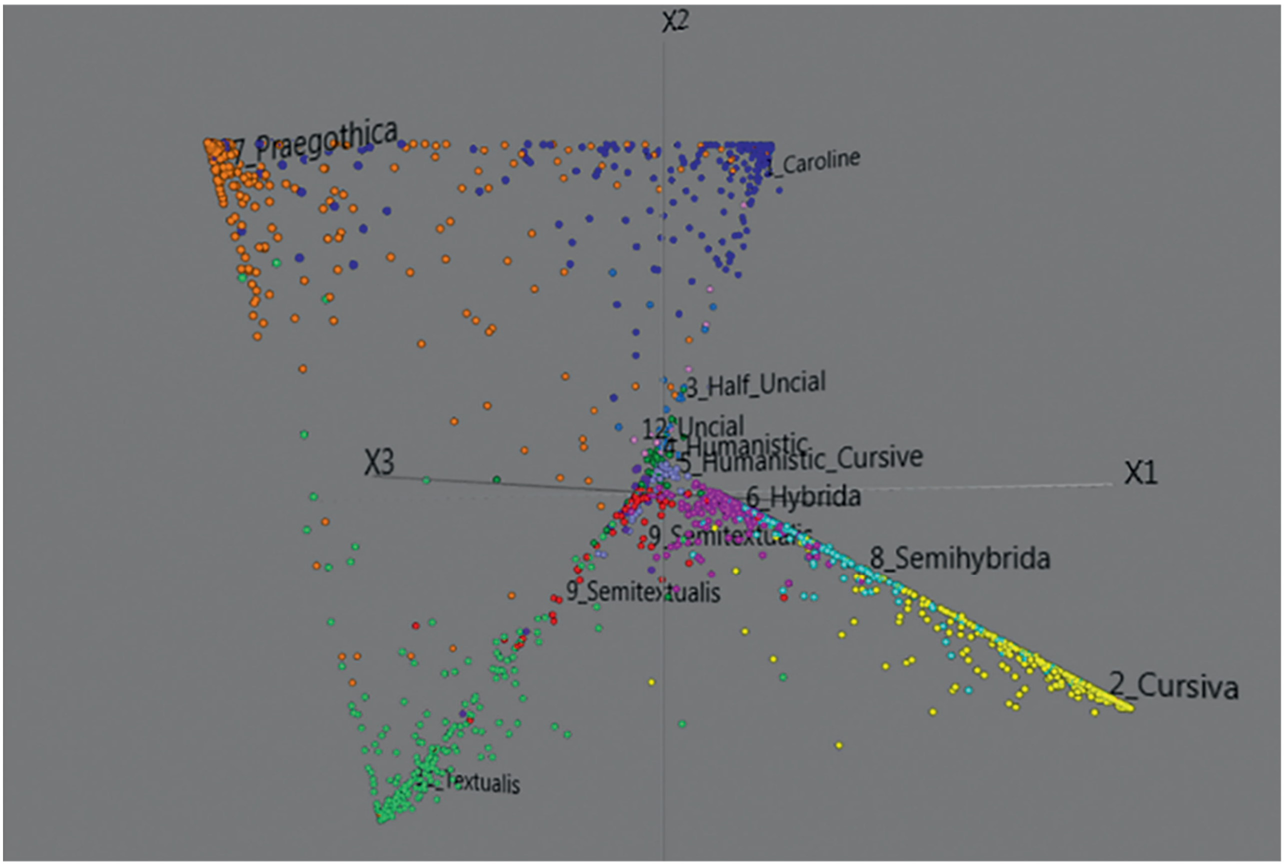

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Edited by Oliver Hahn, Volker Märgner, Ira Rabin, and H. Siegfried Stiehl

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Article

'Dürer's Young Hare' in Weimar – A Pilot Study

Oliver Hahn, Uwe Golle, Carsten Wintermann, and Ira Rabin | Berlin, Hamburg, Weimar

Abstract

The investigation of physical properties and chemical compositions produces data that is important for answering questions that cannot be solved by historical and philological methods alone. The results presented in this study show the degree to which scientific investigations can supplement and in part amend research on cultural history. Using scanning X-ray fluorescence spectroscopy and additional techniques, the non-invasive investigation of the 'poor-quality' copy of Albrecht Dürer's famous work *Young Hare* (Ger. *Feldhase*) shifts the *Weimar Hare* back into the focus of art historians' interest and could lead to a re-evaluation of this drawing.

Keywords

Non-invasive investigation, imaging techniques, scanning X-ray fluorescence, drawings, Albrecht Dürer

Fig. 1: Copy of *Young Hare* by Albrecht Dürer; Klassik Stiftung Weimar, inv. no. 507379, present state of the drawing.

Fig. 2: Overlaying the *Young Hare* from Albertina Museum (Albertina, Vienna, inv. no. 3073, red colour) with the Weimar copy (blue colour).

1. Introduction

The Weimar Classics Foundation preserves a coloured drawing on parchment that is generally regarded as a low-quality copy of the *Hare* drawn by Albrecht Dürer (1471–1528) and now on show at Vienna's Albertina Museum (Fig. 1). The drawing displays Albrecht Dürer's monogram. Hans Hoffmann (*c.* 1530–1592), Joris Hoefnagel (1542–1600), Jacob Hofnagel (1573–1632/1633) and possibly Giuseppe Bossi (1777–1813) are discussed as possible draftsmen. The dendrochronological investigation of the beechwood panel on which the parchment is mounted shows that the tree was felled no earlier than 1543. In Figure 2, we overlay two images of the Weimar drawing and the Vienna drawing to illustrate that the Weimar copy has exactly the same dimensions as the Vienna *Hare*.

The *Hare* that Grand Duke Carl August of Saxony-Weimar-Eisenach received from Giuseppe Bossi's heir in 1817 calls for special consideration, mostly because it is one of two alleged copies of the *Hare* from Albertina that were drawn on parchment. The second known copy on parchment is on sale in Cologne (Kunsthaus Lempertz 2008). A similar drawing on paper, but in a much better state


Figs. 3a, b: Infrared reflectography of the 'Weimar Young Hare', ~1000 nm, camera: X71, Microbox without a filter. Left (a): IR image; right (b): IR false-colour image.

of conservation than the Weimar one, is in Paris.[1] According to art-historical research, the two copies on parchment are very similar; even the bristly hair along the contours seems to correspond. According to Christof Metzger, the fur structure and the construction of the 'delicate animal' display certain schematisms that make both copies distinct from the original (Metzger 2014 and 2016).

The Weimar sheet is considered to have been proven to be a precise replica (Metzger 2016) that was produced in the following way: the artist transferred the original drawing onto transparent parchment and then painted it with opaque pigments. This required access to Dürer's original, which considerably limits the circle of its possible creators.

We will first consider the provenance of the drawing from the legacy of Giuseppe Bossi. How did it come to be part of the Weimar inventory? After the early death of the artist, art collector and art historian Giuseppe Bossi (1777–1815), whom we will only introduce briefly in this article, strong interest developed in his oeuvre.

Giuseppe Bossi led an extraordinary life. He studied painting at the Accademia di Brera in Milan and became a famous copyist. He performed nature studies (and even dissected bodies in an attempt to grasp how they functioned), he collected art objects along with books and manuscripts for his own library and, finally, he composed poems and wrote treatises. His collection of art objects came to form the core stock of two different museums: The Archaeological Museum in Milan and the Graphic Collection of the Gallerie dell'Accademia in Venice (Zanaboni 2016).

In the summer of 1817, Grand Duke Carl August of Saxe-Weimar-Eisenach (1757–1828) decided to take a trip to Switzerland and northern Italy. One of his most important destinations was Milan. The documents about this journey have been lost, so it is no longer possible to say why precisely Milan aroused Carl August's interest. Perhaps it was due to his acquaintanceship with the Frankfurt and Milanese banker Heinrich Mylius (1769–1854), who then introduced the Grand Duke from Weimar to the Director of Milan's Coin Collection, Gaetano Cattaneo (1771–1841). Cattaneo offered the Grand Duke first choice of some items from Bossi's legacy. Here, too, we have no precise information about the offerings. But it is a fact that the Grand Duke acquired Giuseppe Bossi's carton from 'Parnassus', along with what is called the 'Lucide' – a bundle of three tracings made by Bossi copying Leonardo's *Last Supper*, an acquisition that reflects the Weimar court's fascination with Leonardo da Vinci at that time. The objects were sent from Milan to Weimar. To Carl August's great pleasure, Cattaneo was able to obtain five additional items from Bossi's heirs, including the 'Weimar Dürer Hare', which arrived in Weimar on 13 November 1817 along with the

[1] 'Lièvre couché, tourné vers la droite', Musée du Louvre, inv. no. RF 29072; see Ministère de la culture, *POP*: *la plateforme ouverte du patrimoine* <https://www.pop.culture.gouv.fr/notice/joconde/50350228452>.

Figs. 4a, b: Element distribution images of iron (Fe) and lead (Pb). Left (a): iron; right (b): lead.

other items. Even now, it is still not clear how this drawing came to be in Bossi's possession.

The drawing was already subjected to several individual examinations to determine its colorants. The investigations revealed chalk, white lead, ochre and carbon black as colorants, all of them materials that were already in use in the sixteenth century. In addition, in this first investigation, a conspicuously high zinc content was detected in several spots. Here, additional X-ray imaging scans were performed to clarify whether a zinc-containing pigment was used for the drawing. If this was the case, it might have been zinc white, which would indicate that the drawing was not executed before the first third of the nineteenth century (Hahn 2018).

All in all, the drawing is poorly preserved; the surface is very dark, in part abraded, and it displays mould stains, possibly from water damage. Some sections are no longer discernible (see Fig. 1). Material-science investigations that emphasise imaging techniques should therefore reveal something about the process of the drawing's development (the production of the copy) and form the basis of a re-evaluation of the object. In addition, we wish to illuminate the 'fate' of the drawing to understand the bad state of its preservation.

2. Methods and imaging techniques

Scientific procedures have become an established component of the examination of cultural artefacts and of the development of preservation concepts. Many devices fulfil the conditions of non-destructive analyses, so investigations can be carried out without taking any samples. In particular, imaging techniques like computed tomography, radiography and multi-spectral imaging analysis are increasingly being used to give visibility to contents that are invisible to the naked eye, like preliminary drawings, alterations and inner structures. The resulting 'new pictures' can give us deeper insights into the production process, the structure or the state of preservation. They also document the changes an object has been subjected to.

2.1 Infrared reflectography (IRR)

The wavelengths useful in examining cultural artefacts with infrared light are generally divided into 'near IR', or NIR (700–1000 nm), and 'mid-IR', or MIR (1000–3000 nm). Many materials exhibit different visual appearances under specific wavelengths of IR radiation, absorbing, transmitting or reflecting the radiation. Materials that absorb IR radiation appear dark, those that transmit it are transparent and those that reflect it appear to be white, although the appearance of a material can change with different IR wavelengths. What is most important in these investigations is the performance of certain inks and drawing media. Carbon inks, graphite, charcoal and metal points all absorb IR strongly, while plant inks and iron-gall ink absorb shorter-wavelength IR and become increasingly transparent under longer wavelengths

Fig. 5a: Detail of Dürer's Young Hare from the Albertina.

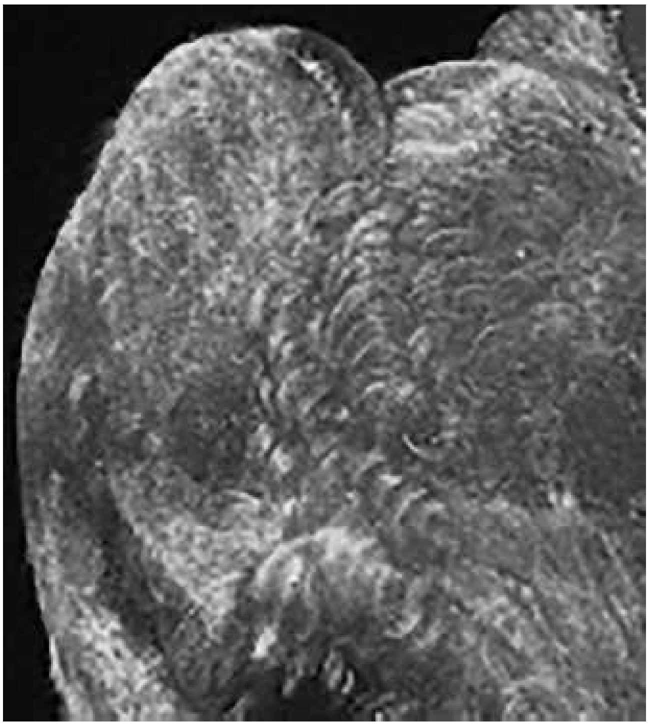

Fig. 5b: Detail of the element distribution image of the lead (Pb) in the Hare from the Klassik Stiftung Weimar.

(Mrusek, Fuchs and Oltrogge 1995). In general, the method was established to reveal underdrawings in paintings in the 1960s (Asperen de Boer 1969), given that many underdrawings were executed with charcoal or metal points.

2.2 X-ray fluorescence analysis (XRF)

X-ray fluorescence analysis (RFA) is a classic method for non-destructively examining the elemental composition of materials, in particular in the field of cultural heritage (Mantler and Schreiner 2000; Mommsen et al. 1996; Klockenkämper 1997; Vandenabeele et al. 2000; Hahn, Reiche and Stege 2006). According to Lahanier, Preusser and Van Zelst 1986, the ideal procedure for analysis should be non-destructive, fast, universal and versatile. It is widely known that the sample is exposed to high-energy X-rays during the measurement. The radiation interacts with the material, whose excited atoms now emit their characteristic radiation. A suitable detector detects this X-ray fluorescence, providing information about the material's elemental composition. The energy of the emitted X-rays is characteristic of a specific chemical element, and the intensity of the signal permits conclusions to be made about the amount present. Using this procedure, an analysis of organic materials is either impossible or only possible to a very limited degree.

In the current investigation, the coloured drawing from Weimar was not subjected to any individual measurements, but analysed with an X-ray fluorescence portal scanner. The RFA scan was conducted with the Jet Stream made by the company Bruker Nano GmbH with rhodium X-ray tubes (Alfeld et al. 2013). During the examination, the probe, which contains the excitation tube (Rh, 50 kV, 0.6mA), two cameras and the detector (Flash™ detector), moves above the object at high speed (diameter of the excitation spot: 50–600 µm, step width: 25–200 µm; dwelling time: 2–900 ms per point). This produces a complete cartography of the various elements, 'element distribution images', within the various sections. The device is conceived in such a way that the measurements are conducted in an ambient atmosphere. The penetration depth of the radiation is between 10_{-6} and 10_{-1} cm, depending on the matrix (Hahn-Weinheimer et al. 1995).

Additional techniques were used for the investigation of the drawing, namely VIS spectroscopy (Fuchs and Oltrogge 1994) and FTIR in diffuse reflection (DRIFTS) (Steger et al. 2019).

3. Results and discussion

3.1 Infrared reflectography (IRR)

Figure 3a below displays the IR image that was taken at ~1000nm. It is obvious that the black colorant strongly

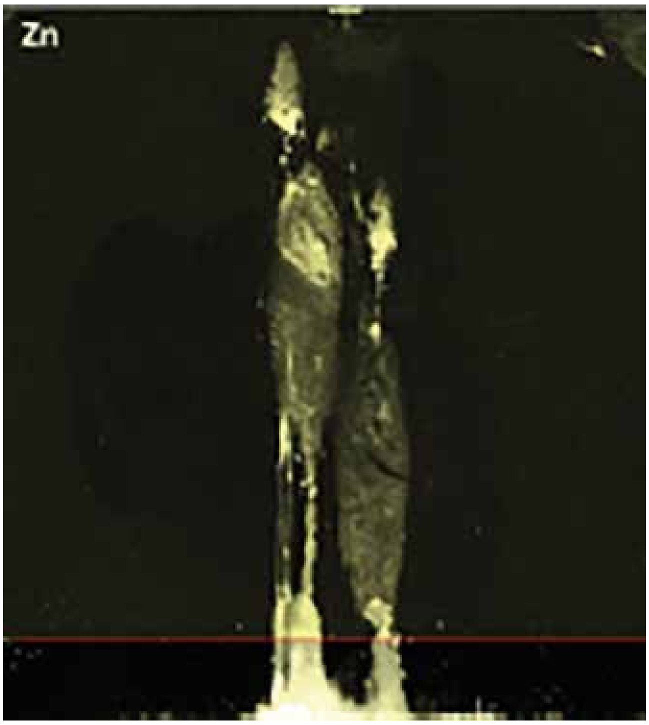

Fig. 6: Element distribution image of zinc (Zn).

absorbs the infrared light and could be identified as carbon black. The other colorants lost their opacity. Taking into account the XRF, the DRIFTS and the VIS results, the colorants have to be considered to be various ochres (iron oxide pigments), lead white and chalk. These pigments were widely used in the fifteenth, sixteenth and seventeenth century and thus provide little evidence that the *Weimar Hare* was produced in the sixteenth century. However, the beechwood panel on which the parchment is mounted shows that the tree was felled in the middle of the sixteenth century.

The most important result, however, is that there is no evidence of a preliminary sketch. This is a very important indication about the production of this object. The absence of any preliminary drawing supports the assumption that this drawing is a copy that was prepared by tracing the original drawing onto transparent parchment and then it was painted with opaque pigments afterwards. In contrast to the Albertina *Hare* with the monogram 'AD' that was executed in carbon ink, the monogram 'AD' of the Weimar copy disappears under infrared light – apparently, it was executed with iron-gall ink. The NIR false-colour image in Figure 3b reveals the damage to the drawing. Many areas were abraded – this effect was possibly caused by water damage. Vertical 'structures' become obvious, especially in the lower part of the drawing. Infrared false-colour photography is generally used for the tentative identification of pigments and the discovery of retouching. Congruously, with the help of references, this technique confirms the assumption that, unlike the Vienna drawing, the monogram was written in iron-gall ink.

3.2 X-ray fluorescence analysis (XRF)

The most important results were obtained with X-ray fluorescence analysis. Figures 4a and b show element distribution images of iron (Fe) and lead (Pb). A comparison with the image in Figure 1 makes it clear that the drawing of the fur was much more delicately executed than is visible to the viewer today. This precision is no longer visible in the drawing due to the picture's poor state of preservation.

A closer look at the element distribution images reveals – even to a layperson – that this drawing cannot be a pure copy of Dürer's *Young Hare* despite it having the same dimensions (see Figs 5a, b). The painter's interpretation of the fur is quite different, for one thing. The *Hare* in the Albertina Museum depicts the individual hairs of the animal as straight lines, which probably comes closer to reality, whereas the hairs in the *Weimar Hare* are curled. This indicates that the Weimar drawing differs considerably from the Vienna one (Mildenberger 2018). It may, in fact, have been copied from an earlier drawing by Albrecht Dürer. This is pure hypothesis, though, and awaits verification by comparative art-historical analyses.

Finally, the distribution image of zinc (Zn; Fig. 6) explains the poor state of the drawing's preservation. A substance – probably a paint containing zinc white – ran across the central section of the drawing and damaged it; the streaks and smears can be seen clearly on the element distribution image. Conversely, this picture also shows that no pigment containing zinc was used on large parts of the drawing. The presence of the element is likely to be due to damage, the traces of which were removed inadequately; overall, it had a powerful deleterious effect on the drawing. It is noteworthy that the *Hare* must have experienced this dramatic damage while in the Weimar collection as the appearance of zinc from zinc white paint indicates the earliest possible use was in the 1840s, i.e. around 25 years after the *Hare* had been added to the collection.

4. Conclusion

The results presented here show the degree to which scientific investigations can supplement and in part amend historical research. Precise imaging techniques can expand our access to material artifacts because they afford insights into the history of such objects, that are subject to constant change in general. In the meantime, the discovery of preliminary sketches and evidence of corrections and alterations have been established in art history. Processes of corrosion and ageing that gradually alter cultural artifacts and rob them of their original colourfulness are under controversial discussion, however. In this case, material science can provide us with an impetus to correct accustomed ways of seeing things.

The poor state of preservation of the 'Dürer Hare' in Weimar ensured that the drawing had the reputation of being a 'poor-quality' copy for many years. Knowledge derived from material analysis coupled with other results – comparing the dimensions of the drawings in Vienna and in Weimar, for example – shifts the *Hare* back into the focus of art historians' interest and could eventually lead to a re-evaluation of the work. In this context, it could clearly be demonstrated that the drawing was damaged at least 25 years after its arrival in Weimar; in 1817, its state of preservation must have been considerably better.

A number of questions still remain unanswered. Needless to say, the copy cannot possibly be any older than the original. However, why does the *Weimar Hare* display a painting concept apparently older than (or simply different to) the execution of the fur in the *Vienna Hare*? Making such an accurate copy – and transferring its dimensions so well, for instance – will have required access to Dürer's original drawing. How did this drawing become part of Giuseppe Bossi's collection? These and other questions still have to be addressed and resolved by art historians.

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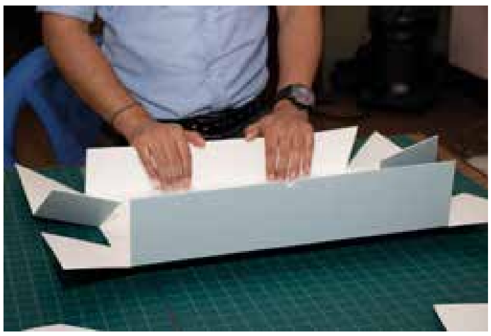

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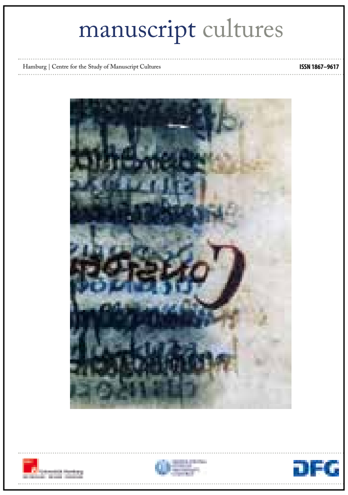

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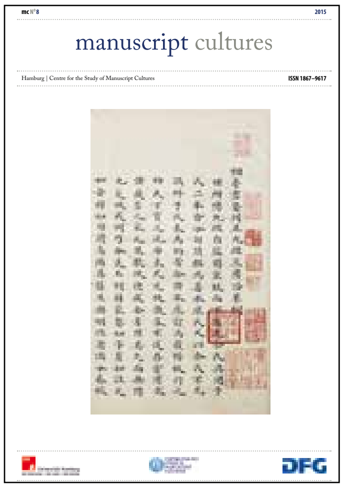

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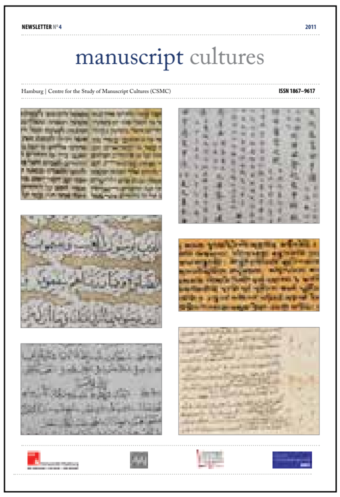

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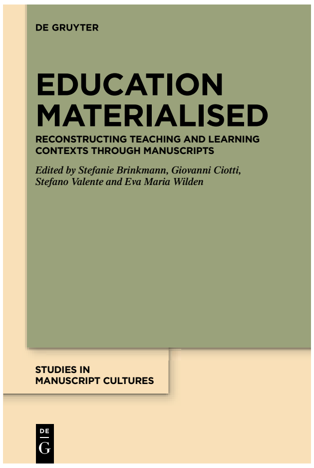

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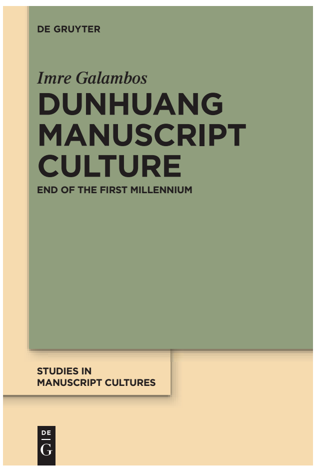

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21 – *Disiecta Membra Musicae: Studies in Musical Fragmentology*, edited by Giovanni Varelli

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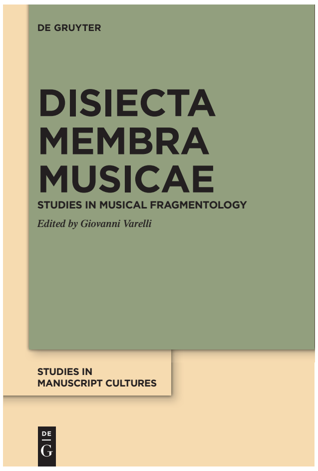
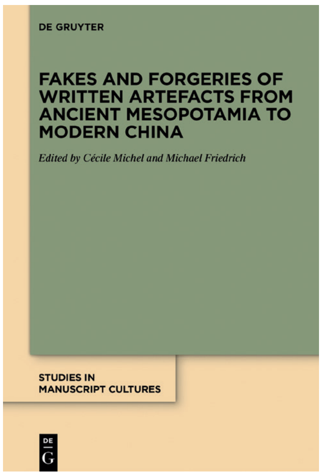


Although fragments from music manuscripts have occupied a place of considerable importance since the very early days of modern musicology, a collective, up-to-date, and comprehensive discussion of the various techniques and approaches for their study was lacking. On-line resources have also become increasingly crucial for the identification, study, and textual/musical reconstruction of fragmentary sources. *Disiecta Membra Musicae. Studies in Musical Fragmentology* aims at reviewing the state of the art in the study of medieval music fragments in Europe, the variety of methodologies for studying the repertory and its transmission, musical palaeography, codicology, liturgy, historical and cultural contexts, etc. This collection of essays provides an opportunity to reflect also on broader issues, such as the role of fragments in last century's musicology, how fragmentary material shaped our conception of the written transmission of early European music, and how new fragments are being discovered in the digital age. Known fragments and new technology, new discoveries and traditional methodology alternate in this collection of essays, whose topics range from plainchant to *ars nova* and fifteenth- to sixteenth-century polyphony.

20 – *Fakes and Forgeries of Written Artefacts from Ancient Mesopotamia to Modern China,* edited by Cécile Michel and Michael Friedrich

New release



Fakes and forgeries are objects of fascination. This volume contains a serie of thirteen articles devoted to fakes and forgeries of written artefacts from th beginnings of writing in Mesopotamia to modern China. The studies empha sise the subtle distinctions conveyed by an established vocabulary relating t the reproduction of ancient artefacts and production of artefacts claiming t be ancient: from copies, replicas and imitations to fakes and forgeries. Fake are often a response to a demand from the public or scholarly milieu, or eve both. The motives behind their production may be economic, political, reli gious or personal – aspiring to fame or simply playing a joke. Fakes may be revealed by combining the study of their contents, codicological, epigraphi and palaeographic analyses, and scientific investigations. However, certain fa mous unsolved cases still continue to defy technology today, no matter hov advanced it is. Nowadays, one can find fakes in museums and private collec tions alike; they abound on the antique market, mixed with real artefacts tha have often been looted. The scientific community's attitude to such objects calls for ethical reflection.

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