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The discovery of a camera obscura in Jan Vermeer van Delft's painting *The Art of Painting*

Literature on Vermeer van Delft has long been aware of the fact that the painter used a camera obscura when working on his paintings. His friendship with Antoni van Leeuwenhoek (1632–1723), the famous researcher and inventor of microscopes and lenses, must certainly have influenced this productive interlinking of art and science. After Vermeer's death in 1675 at the age of 43, Leeuwenhoek was declared the official executor of his estate by the town. Recently, among these disordered papers, notes, definitely written by Vermeer, have been found. [...] These notes deal with the problematic issue of using mechanical devices to assist drawing and reproduction in painting, ... These optical devices were not just studio paraphernalia for Vermeer, and thus he understood the view of the camera obscura as being the place where consciousness and world meet as image [...].¹

This admittedly fictitious report, announced in 1991 by the journal *Jahresring*, was an adept parody of a long-term goal of research on the art of painting of Vermeer: to discover *proof* that the artist made use of a camera obscura during the planning and execution of his paintings. Since this cannot be proven by any concrete evidence in Vermeer's paintings, the supporters of this theory have repeatedly resorted to speculation.



Fig. 1. Jan Vermeer, *Girl with a Red Hat*, oil on canvas, about 1655, Washington, National Gallery of Art. Detail: lions head of the chair armrest

With regard to the optical effects in Vermeer's paintings, the painter David Hockney states that these could not have been perceived by the naked eye alone, and so concludes that Vermeer '[must] have seen these objects through a lens before he could possibly painted have them!'²

In 1928, Reginal Howard Wilenski pointed out the 'photographic effects' in Vermeer's paintings,³ and Alpheus Hyatt-Major perceived signs that a camera obscura had been used from the combination of colours, the blurred outlines, the disproportionate depth of focus, and from the highlights.⁴ Indeed, there are numerous elements in the foreground of the paintings of Vermeer that are blurred: for example, the lion's head on the arm of chair in the painting *The Girl with the Red Hat* (fig. 1). In *The Guitar Player* (fig. 2) the cloth covering the player's knee in the foreground is blurred, whereas the cloth at her waist is more sharply defined. The contrast between the relatively sharp focus of the guitar and the blurred representation of the hands

playing the instrument is also odd. This painting points most clearly to the use of a camera



Fig. 2. Jan Vermeer, *The Guitarplayer*, oil on canvas, about 1667/72, London, Kenwood House

obscura since it shows photographic effects most strikingly. In *The Art of Painting* (fig. 3) similar phenomena can be observed in the grey material hanging from the table that appears to be more blurred than the cloth of the muse's dress, which is actually behind the table. The hand of the painter, a blurred spot of colour, creates a strong contrast to his carefully painted clothes. In 1964, Charles Seymour Jr. investigated the 'dots of heavily loaded pigment', a regularly discussed phenomenon, that are present, for example, in the *View of Delft* (1660/61, The Hague, Mauritshuis). According to Seymour and Daniel A. Fink, these blurred sections of Vermeer's paintings can be explained by the painter having used a simple portable camera obscura that could not be put into focus, or only with a negligible effect.⁵ Nevertheless, Vermeer did not use the camera obscura to facilitate the drawing of perspective; instead he

wished to make use of the effects it produced.⁶ Philip Steadman suggest that there could also have been a camera obscura that was large enough to enter on the back wall of a room in Vermeer's house. However, he does not exclude the possibility that Vermeer could have made use of a smaller camera obscura during later stages of the painting process.⁷

The next section has the aim of gradually directing our gaze towards the portrayal of a camera obscura, not previously perceived, in Vermeer's painting *The Art of Painting*. 1) The comprehensive literature on this work usually only describes the carpet-like curtain in the left third of the painting as being a massive unique element in the foreground of the picture that has the function of drawing the viewer into the



Fig. 3. Johannes Vermeer, *The Art of Painting*, about 1665/66, Vienna, Kunsthistorisches Museum

pictorial space. The lower part of this curtain is decorated with floral patterns. However, in one of the upper folds of the cloth a figure can be observed (fig. 4). This figure, which is turning its

half-concealed head to the right, is dressed in a light-blue upper garment and a dark skirt. These transposed colours make reference to the clothes



Fig. 4. Johannes Vermeer, *The Art of Painting*. Detail: female figure and beaker

of the model. The individual leaves in the well-illuminated section above this figure led Svetlana Alpers to perceive this as a representation of the painter's model, including the laurel wreath.⁸ Directly to the right, next to the figure's skirt, a second leg in what appears to be trousers can be ascertained, and is probably the leg of a man. This may explain the direction of the female figure's gaze: it is an expression of affection for this second person. Very close observation also shows that in another, almost vertical, fold of cloth above the dark edge of the curtain there is an impish, grinning head wearing a laurel wreath (fig. 5) that has not been commented upon in literature on Vermeer to date.⁹ 2) In 1968 Albert Flocon concluded from his reconstructed drawing that the upper left-hand corner was a curtain – an interpretation that has been largely accepted since.¹⁰ The painting was restored over a period of several years during the 1990s; however this corner has remained very dark. Also, the lighting in the Kunsthistorisches Museum in Vienna unfavourably illuminates this section, and a glass pane has been placed over

the painting. Nevertheless, closer observation of the corner shows that it should *not* be interpreted as part of the tapestry curtain. The edge of the curtain corresponds exactly with the place where the woven face also ends. Therefore, in contrast to typical paintings of curtains of this time, which created the impression that they were a constituent element of the pictorial space, this curtain does not reach right to the end of the pictorial space at the edge of the painting.



Fig. 5. Johannes Vermeer, *The Art of Painting*. Detail: laureate head

Albeit with difficulty, four objects can be discerned in this corner: on the left, there is a long object with flowing contours, perhaps a scarf, underneath this, there is a wooden tankard (fig. 6);¹¹ above the tankard is an angular object that is initially hard to identify; and lastly there is a dark square box with two cords hanging down from it, and a dot within a light circular line that is presumably the reflecting lens of a portable, box-shaped camera obscura (figs 7a–c). If we presume that the height of the wooden tankard is between 20 and 25 cm, then we can calculate a similar measurement for the length of the sides of the camera obscura that hangs above the tankard. Therefore this could be a portrayal by Vermeer of a camera obscura in the form of a cube-shaped box with sides of around 20 to 25 cm in length and a lens aperture of around 4 to 5 cm.¹² A comparison can be made with a camera obscura comprehensively described by Johann Zahn (1641–1707) in 1685 (fig. 8).¹³ The camera

had movable retractable tubes and was around 75 hundredths of a Roman foot wide and about two foot long. If we define a Roman foot as 30 cm in length, then Zahn's camera would be roughly 22.5 cm high and wide and the



Fig. 6. Author, female figure, beaker, laureated head and camera obscura clarified in a draft

equivalent of 60 cm long.¹⁴ Therefore, the measurements calculated here for the camera obscura in Vermeer's painting are quite realistic. With regard to the operation of the camera obscura, it should be noted that large tent-like camerae obscurae as well as very small portable ones that could be fitted into wine glasses were constructed in the 17th century. Furthermore, the projections of the camera obscura could be reproduced either standing upright, and the right

way round.¹⁵ These qualities facilitated the practical use of the camera obscura by artists.¹⁶ In addition to the other discoveries made in the 'open' corner and in the tapestry curtain, the oddly positioned box, identifiable as a camera obscura, is potentially conducive to the understanding of the painting.

Although the girl modelling for the artist, and who is generally interpreted as Clio, is endowed with three attributes – a laurel wreath, a trumpet and a book¹⁷ – only the head and shoulders of Clio can be seen in the painting on the easel. If painted, the trumpet would lie beyond the realm of the painting; the laurel wreath is the only element to be clearly and visibly represented. The particular emphasis on this attribute – on the model's head, in the painting on the easel in front of the artist, and on the head in the curtain – is unlikely to be coincidental: three laurel wreaths in a painting that deals neither with a mythological nor a historical theme, nor a courtly motif and also not a religious scene must have a particular significance. The head with the

Fig. 7a. Johannes Vermeer, *The Art of Painting*. Detail: camera obscura and laureated head - The position of the camera obscura is bordered white

Fig. 7b. The light-dark values are optimised

Fig. 7c. The inverting of the photo makes the position of the camera obscura clear



laurel wreath and woven figure of a woman in the curtain take on a new meaning when viewed in connection with the artist, who is only seen from the back and the mask lying on the table; this creates a link from the artist to the model, then from this position to the table, then via the mask to the head with laurel wreath, and then to the female figure in the curtain and then finally back to the artist. This directing of our gaze towards the head with laurel wreath and so towards the camera obscura thus raises the question of whether this head is a self-portrait of Vermeer, the front view of the artist who is sitting with his back to us. The laurel wreath thus gains meaning, without this analysis, it would be difficult to assign it a function within the painting: Vermeer is using it to create a 'poetical symbol for the continuation of history'¹⁸ and reinforces this symbol through its representation in the painting on the easel.

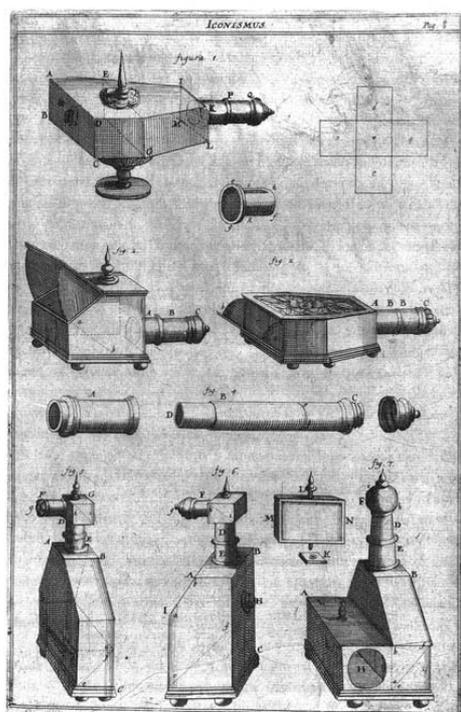


Fig 8. Camera obscurae had a lot of different forms. Johannes Zahn, *Oculus artificialis teledioptricus sive telescopium*, Nürnberg 1702 Göttingen, Niedersächsische Staats- und Universitätsbibliothek

The meaning of this painting has always been controversial, and this new observation brings with it further problematic issues. Van Gelder thought it was a 'glorification of painting'¹⁹ whereas Badt understood the painting as a 'little invective against some of his contemporaries and fellow painters who ceremoniously presented themselves, and the audience who admired their symbolism and allegorical apparatus, and as a glorification of the real, the near, and the insignificant, which had also been of use to the art of Vermeer.'²⁰ Hulten even thought it was a 'modest, but very sophisticated joke about the stilted history painting of the courtly Baroque'²¹ and Asemissen also interpreted *The Art of Painting* as a comment on the doctrine that placed historical painting above all other genres, since Vermeer portrays the relevant muse, but has, in fact, painted a genre scene.²²

The camera obscura has been positioned in the painting in such a way that its location seems unsuitable for practical use; however this location is indeed conducive to the understanding of the painting. The camera obscura is a device that can be used to represent domestic Dutch interiors; however it provides no particular advantage when painting great historical scenes. The camera obscura enables the painter to place emphasis upon, and to present to his contemporaries, a world that receives less little attention from the strict canon of genres. It allows the play of light on shiny, rough and dull surfaces; this empirical measurement of light and shadow facilitates the reproduction of subtle nuances, perspective, the observation of reflections, the characteristics of light, and of radiance, etc. *En bref*: painting is

used to translate an abstract world back into the reality of objects. In contrast to the usual modus operandi of his fellow painters, Vermeer has deliberately left part of the curtain open, in order to *reveal* what has been carefully concealed.²³ Science, as an element of this *revealing*, is not merely a new model for art, it is much more its organ of communication. The artist sits with his back to us, thus removing himself from the gaze of the viewer; our view is indirect and almost furtive and occurs via the camera obscura. The camera obscura is an almost imperceptible presence here and is the mediating instance between the real Vermeer and his painted world. It is also the instrument that creates a connection between the painted world of Vermeer and the real world of the viewer. This optical device reveals a view of the place where, in the words of Peter Weibel, consciousness and world meet as image.²⁴

¹ Peter Weibel, Institute for New Media at the Städel School in Frankfurt/Main edited a scholarly treasure of the first rank, VERMEERS GESAMMELTE SCHRIFTEN (Vermeer's collected writings) under the patronage of the Rijksbureau voor Kunsthistorische Dokumentatie, in *Jahresring* 38, 1991, 358. For more on Leeuwenhoek and Vermeer see *Johannes Vermeer. Der Geograph und der Astronom nach 200 Jahren wieder vereint*, exh. cat. Städel, Frankfurt/Main 1997, 23–30; Svetlana Alpers, *Kunst als Beschreibung. Holländische Malerei des 17. Jahrhunderts*, Cologne 1998, 77, 162 ff. and Philip Steadman, *Vermeer's Camera. Uncovering the Truth Behind the Masterpieces*, Oxford 2001, 45–52.

² *Geheimnis Wissen. Verlorene Techniken der Alten Meister wieder entdeckt von David Hockney*, Munich 2001, 58.

³ Reginald Howard Wilenski, *An Introduction to Dutch Art*, New York 1929, 284–286. See also Charles Seymour, Jr., Dark chamber and light-filled room. Vermeer and the camera obscura, in *Art Bulletin* 46, 1964, 323–331.

⁴ A. Hyatt-Major, The photographic eye, in *Bulletin of the Metropolitan Museum of Art*, 1946, 15–26.

⁵ Seymour (see note 3), 327; Daniel A. Fink, Vermeer's use of the camera obscura. A comparative study, in *Art Bulletin* 53, 1971, 493–505.

⁶ It has been proven that the perspectival construction of the painting was done with nails and thread; the projection of a camera obscura would not have been required. See exh. cat. Städel (note 1), 31–34 and Arthur K. Wheelock,

Vermeer. Das Gesamtwerk, exh. cat. Washington/The Hague 1996, 67–79.

⁷ Steadman (see note 1), 89, fig. 51 and 103 ff. Steadman convincingly shows, using a photographic reconstruction and a drawing, that the glass ball that hangs from the timbered ceiling in the *Allegory of Faith* is reflecting a large camera obscura, 108, fig. 53.

⁸ Alpers (see note 1), 286.

⁹ The head is probably within the internal section of the tapestry since the cloth of the curtain is portrayed as having been folded over at least twice. With regard to its position on the edge of the curtain, if the cloth were unfolded it would point towards an empty area on the left, which would not make any meaningful contribution to the pictorial composition of the tapestry curtain.

¹⁰ Albert Flocon, *Clio chez le peintre*, in *Entretiens art psychanalyse*, Paris 1968, 345–356.

¹¹ See the wooden tankard in Frans van Mieris' *A Tavern Scene* (1658, Mauritshuis, The Hague).

¹² Alan A. Mills thinks that the use of a camera obscura with a lens diameter of around 4 cm is also feasible. Alan A. Mills, Vermeer and the camera obscura: some practical considerations, in *Leonardo* 31/3, 1998, 213–218.

¹³ Johann Zahn, *Oculus artificialis teledioptricus sive telescopium ex abditis rerum naturalium et artificilium etc. adeoque telescopium*, Würzburg 1685/86.

¹⁴ Thus it approximately corresponds to a Dutch camera obscura from the beginning of the 18th century that is kept in the Museum Boerhaave in Leiden. See exh. cat. Städel (note 1), 83–85.

¹⁵ For more general information on the camera obscura see Helmut und Alison Gernsheim, *The History of Photography from the Earliest Use of the Camera Obscura in the Eleventh Century up to 1914*, London 1955; John H. Hammond, *The Camera Obscura. A Chronicle*, Bristol 1981; Martin Kemp, *The Science of Art. Optical Themes in Western Art from Brunelleschi to Seurat*, New Haven/London 1990; Ulrike Hick, *Geschichte der optischen Medien*, Habilitation thesis, Munich 1999. For more specific information on Vermeer and the camera obscura, see Seymour (note 3); Heinrich Schwarz, Vermeer and the camera obscura, in *Pantheon* 24, 1966, 170–182; Fink (note 5); Wheelock (note 6); Ivan Gaskell and Michael Jonker (ed.), *Vermeer Studies* (Studies in the History of Art, 55, National Gallery of Art), Washington 1999; and Steadman (note 1).

¹⁶ For more information on the use of the camera obscura to facilitate painting, see Jean-François Nicéron, *La Perspective Curieuse*, Paris 1652; Samuel van Hoogstraten, *Inleyding tot de Hooge Schoole der Schilderkunst*, Rotterdam 1678; Johannes Vermeer: *Der Geograph. Die Wissenschaft der Malerei*, exh. cat. Staatliche Museen Kassel, Kassel 2003, 45–47.

¹⁷ Hermann Ulrich Asemissen, Jan Vermeer. *Die Malkunst. Aspekte eines Berufsbildes*, Frankfurt/Main 1988, 35 f.; Hans Sedlmayr, Der Ruhm der Malkunst, in *Festschrift für Hans Jantzen*, Berlin 1951, 170 f.; Karl G. Hulthen, For more on Vermeer's painting of the studio, see *Konsthistorisk Tidskrift* 18, 1949, 90–98, here, 92; J. G. van Gelder, and Jan Vermeers Clio, in *Oud Holland*, 66, 1957, 44 f.

¹⁸ Hermann Ulrich Asemissen/Gunter Schweikhardt, *Malerei als Thema der Malerei*, Berlin 1994, 160.

¹⁹ Van Gelder (see note 17), 16.

²⁰ Kurt Badt, *Modell und Maler von Jan Vermeer. Probleme der Interpretation. Eine Streitschrift gegen Hans Sedlmayr*, Cologne 1961, 111.

²¹ Hulthen (see note 17), 92.

²² Asemissen (see note 17), 59.

²³ It is noteworthy that Badt has already discussed this aspect: 'Now the curtain has been pulled and folded back, and it allows our gaze to see something that is normally hidden, whose intimacy has the function of keeping something hidden from prying eyes; but which also reveals,' Badt (see note 20), 112 f.

²⁴ Weibel (see note 1).