The Iconography of Animal-to-Human Blood Transfusions

PERNILLE LETH-ESPENSEN

This article turns our attention to the surprising fact that the first blood transfusions in the 17th century were performed with animal blood. These animal-to-human blood transfusions were prohibited soon after their introduction but returned in the 19th century. The author analyses various illustrations of these transfusions from both periods and discusses the complex physiological and symbolic conceptions of blood revealed by these illustrations.

Today, blood transfusion is a standard procedure in medicine, and even one of the most common procedures. When did this praxis originate, and how was it understood and portrayed? The first recorded blood transfusions to humans were performed in France in 1667. Surprisingly, the transfused blood was not human, but blood from lambs and calves. Several animal blood transfusions were performed in the late 1660s in France, England, Italy, and Germany, until it was banned in France in 1670, only a few years after its introduction. The praxis was thereafter discontinued in most other countries (Sahlins, 2017, p. 242; Maluf, 1954, p. 65, Berner, 2020, p. 18). Blood transfusion was put on hold for 150 years, until James Blundell (1790-1878) introduced human-to-human transfusion in 1818, which was further developed during the 19th century. Nevertheless, animal-to-human blood transfusion experienced a resurgence from the early 1870s onwards, where hundreds of transfusions were performed (Berner, 2020, pp. 20-30).

In the 17th as well as the 19th century, animal blood transfusions were the subject of great public attention and discussion, and a number of illustrations of the procedure were created in both periods. In one of the most famous depictions of a 17th-century blood transfusion, a man is receiving a transfusion from a lamb (Ill. 1). The revival of animal blood transfusion in

the late 19th century was also debated and illustrated. The most well-known illustration from this period is Jules Adler's painting (1892) of a young woman receiving a blood transfusion from a goat (Ill. 10).

How were blood transfusions presented in these illustrations? What do the representations tell us about the conception of blood – and of the body – which made animal-to-human blood transfusion thinkable? I will argue that, in both periods, the representations are complex and that physiological and symbolical ideas of blood are interweaved. Christian symbolism is very prominent in the 17th-century illustrations, whereas cultural and eroticized conceptions of women play a large role in the 19th-century representations. Furthermore, the 17th-century depictions combine two, seemingly contradictive, physiological conceptions of blood and of the body.

The history of blood transfusion, including animal blood transfusion, is well described in the history of medicine (Zimmermann and Howell, 1932; Maluf, 1954; Pelis, 1997; Roux, Saï, and Deschamps, 2007; Sahlins, 2017; Kibbie, 2019; Berner, 2020), and we furthermore possess a range of primary sources regarding blood transfusion from the operators themselves (e.g., Denis, 1667; King, 1667; Sculteti, 1671; Purmann, 1705; Hasse, 1874; Bernheim 1891). The illustrations of blood transfusions have also received some academic attention (Berner, 2020; Zwijnenberg, 2017; Sahlins, 2017; Lefrère and Danic, 2009; Roux, Saï, and Deschamps, 2007), but deserve a more thorough analysis combining the history of medicine and culture with art historical perspectives. Before delving into the images, I will describe the early history of blood transfusion.

The Iconography of 17th-Century Blood Transfusions

17th-Century Blood Transfusion in France

The first recorded European blood transfusions were performed in the 17th century. In 1628, the British physician William Harvey (1578-1657) had discovered the circulation of blood and published it in his *Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus* (*On the Movement of*

the Heart and Blood in Animals), and it was this discovery that made blood transfusions thinkable (Berner, 2020, p. 18; Maluf, 1954, p. 61). The first documented blood transfusions from animals to humans were performed by the French physician Jean-Baptiste Denis (1635-1704) in collaboration with the surgeon Paul Emmerez (16?-1690). Being the physician of King Louis XIV, Denis held a prominent position in French society. During the period between June 1667 and January 1668, Denis performed five transfusions with blood from lambs and calves to humans. Two of the five patients died, but three survived and were considered cured (Sahlins, 2017, p. 242). The first patient was a young man of fifteen or sixteen who was suffering from an obscure fever. His blood had been drawn 20 times, and he was in a state of exhaustion and apathy. After receiving nine ounces of lamb's blood, his condition improved. The second transfusion was performed on a healthy man for the sake of the experiment, and he received a financial compensation (Denis, 1667, pp. 501-504). The third transfusion, this time with calf's blood, was on a moribund man who died shortly after the transfusion. I will return to the fourth transfusion in a moment. The fifth transfusion was on a paralytic woman. She had previously been bled five times, and after receiving 12 ounces of lamb's blood, her paralysis allegedly disappeared (Roux, Saï, and Deschamps, 2007, p. 209). According to professor of history Peter Sahlins (b. 1957), animal blood transfusion was discussed in many spheres of society at the time and was the subject of controversy (Sahlins, 2017, p. 41). The controversy reached its apex when one of the transfused patients died. The fourth patient was Madame de Sévigné's (1626-1626) former valet Antoine de Mauroy (c 1633-1668), who suffered from mental problems. He had received two blood transfusions with calf's blood, which had gone well, according to Denis. When his madness returned a few months later, Mauroy's wife pressured Denis to perform a third transfusion. Mauroy died and his wife quickly buried the body before an autopsy had been performed. She then accused Denis of the death of her husband at the Paris court (Sahlins, 2017, p. 244-245). It was discovered, however, that Mauroy's wife had poisoned him with arsenic, and Denis was exonerated. Although Denis was acquitted of charges, blood transfusions became prohibited in France at the appeal court in 1670 (Sahlins, 2017, p. 245). According to Peter Sahlins, an important component of the controversy around blood

transfusion was academic rivalry between different fractions of scientists in 17th-century France (Sahlins, 2017, pp. 244-245).

17th-Century Blood Transfusion in Britain

In the second half of the 1660s, transfusion was furthermore part of a scientific competition between England and France, and other experiments had been leading up to the transfusion from animals to humans.[1] After Harvey's discovery, blood became a research subject (Sahlins, 2017, p. 245). In 1656, Christopher Wren (1632-1723) – who is probably better known as the architect of Saint Paul's Cathedral in London – had injected wine into the veins of a dog and thereby made it drunk (Maluf, 1954, p. 60). The British physician Richard Lower (1631-1691) had already made a blood transfusion between two dogs in Oxford in 1665, and argued that he was the first to propose a transfusion from animals to humans. Some months after Denis's first animal-to-human transfusion, Lower performed, in collaboration with surgeon and physician Edmund King (1630-1709), a blood transfusion on November 23, 1667. The recipient was a student in theology at Cambridge, Arthur Coga (1645- ?), who was paid 20 shillings as a compensation. Coga suffered from mental problems, as his brain was considered "a little too warm" (Maluf, 1954, p. 65). One of the main reasons for blood transfusion today is blood loss caused by injury, surgery, or childbirth. Other indications are diseases causing problems with the production of blood cells or liver problems that disturb the making of certain blood parts.[2] Lack of blood was not the main reason for the 17th-century blood transfusions, as the transfusions were often preceded by bloodletting. The transfusions were performed to treat a variety of diseases, including mental problems. In fact, one of the main indications for the transfusion of blood was the presumed potential mental health effects (Zimmermann and Howell, 1932, p. 420). It was believed that the qualities or temperament of a person was determined by their blood (Maluf, 1954, p. 64), and that this could be improved through transfusion. A docile lamb was thus chosen as the donor to Coga to calm his mind.[3]

Lower proposes experiments with exchanging the blood of opposites: "'tis intended that these tryals shall be prosecuted to the utmost variety the

subject will bear: As by exchanging the blood of Old and Young, Sick and Healthy, Hot and Cold, Fierce and Fearful, Tame and Wild Animals, and, that not only of the same but also of differing kinds." (Maluf, 1954, p. 64). Denis similarly wrote: "Great advantages will follow upon the mixture of different bloods". (Denis, 1667, p. 492). From a modern perspective, it is surprising that animal-to-human transfusions were performed before human-to-human transfusion. But following Lower's and Denis's quotes above, the difference, not the likeness, between donor and recipient was the argument for the effect of the transfusion. Denis furthermore argued that animal blood was more suited than human blood because it was morally less corrupted (Sahlins, 2015, p. 31). He writes:

> 'Tis easie enough to judge, That the blood of Animals is less full of impurities, than that of men; because debauchery and irregularity in eating and drinking, are so ordinary to them, as to us. Sadness, Envy, Anger, Melancholy, Disquiet, and generally all the Passions, are as so many causes which trouble the life of man, and corrupt the whole substance of the blood: Whereas the life of Brutes is much more regular, and less subject to all those miseries, which we ought to consider as sad consequences of the prevarication of our first Parents. That if 'tis a rare chance to find ill blood in the Veins of Beasts; 'tis almost impossible not to find some corruption in that of Men, how healthful soever they seem to be. Yea, even in Children yet sucking, it is not wholly unblamable; because, having been nourisht with the blood and milk of their Mothers, they have suckt corruption together with their nourishment. (Denis, 1667, pp. 499-500)

Denis thus believed that the moral habitus of the donor was present in the blood. Even the blood of babies could have been corrupted through the milk they had received from their mothers. Denis presented three further arguments as to why animal-to-human blood transfusion was to be preferred. He argued that arterial blood is better suited than venous blood, but as opening an artery poses a greater risk to the donor than opening a vein, it is too risky to use human donors. He then compares animal-to-human blood transfusion with drinking the milk and eating the flesh of animals. Finally, he argues that with an animal donor, it is possible to affect the blood through the way it is fed (Denis, 1667, p. 500).

Peter Sahlins points out that Denis's argument for the use of animal blood represented a clash between new and old conceptions of the body.

Denis was trained at Montpellier Medical School, which had a medical program strongly inspired by the philosopher René Descartes (1596-1650) and his mechanistic physiology. Harvey had compared the heart to a hydraulic pump (Harvey, 1906 [1628]), and Descartes had taken the machinic metaphor further by comparing the body to a clock (Descartes, 2006 [1637], p. 42). On the one hand, Denis was inspired by Descartes's view of the body as a machine. On the other hand, as is shown in the quote above, Denis was influenced by Christian symbolism and by the idea of *theriophilia*, which entailed that animals were on a moral higher ground than humans. This clashed with Descartes's ideas that animals had no souls and were different from humans (Sahlins, 2017, p. 247).

Iconography of Early Blood Transfusions

These 17th-century blood transfusions were depicted in a few illustrations. The four depictions I have come across are from medical treatises and thus had a scientific and didactic purpose. Ill. 1. is included in the medical treatise *Grosser und gantz neugewundener Lorbeer-Krantz, oder Wund Artzney ... Zum andern Mahl vermehrt heraus gegeben* by the German surgeon Matthäus Gottfried Purmann (1648-1721) from 1705 (1692). Purmann was the first to perform blood transfusions in Germany in collaboration with the surgeon Balthasar Kaufmann, and they performed four transfusions in 1668 (Frölich, 1888). They "healed" a leper, but did not succeed in curing two scorbutic soldiers and a fisherman who had a "devouring" eruption (Zimmerman and Howell, 1932, p. 419).

In the illustration, we see a man positioned in a chair while receiving a direct blood transfusion from a lamb with a doctor standing behind him. The illustration is remarkable for several reasons. Today, we are accustomed to experiments being performed in a clinical environment, whereas this setting looks homely. The table resembles a dinner table covered by a tablecloth with a heart pattern and fringes. The lamb occupies the most prominent part of the composition just left to the center. In the later depictions of animal-to-human blood transfusions, the animal is fixated and often reclining with the head tilted back. But in this illustration, the lamb is sitting on the table and looking directly, and somewhat skeptically, at the viewer

ILL. 1.
Purmann, Matthias Gottfried: *Grosser und gantz neugewundener Lorbeer-Krantz, oder Wund Artzney ... Zum andern Mahl vermehrt heraus gegeben*, 1705. The illustration is positioned between page 272 and 273 in the third part of the book. Frankfort and Leipzig, Widow & heirs of M. Rohrlach, Leignitz. Wellcome Collection. Public Domain.

(Lefrère and Danic, 2009, p. 1010). It is surrounded by tubes and connected to the recipient by a pump, while a stick is protruding beside its neck. Apart from this paraphernalia, it does not seem affected by the process. The man

ILL. 2.
Jan and Hubert van Eyck: *Adoration of the Mystic Lamb*, detail, Ghent Altarpiece, Saint-Bavo's Cathedral, 1432. www.artinflanders.be, photo Dominique Provost, contractual restrictions.

receiving the blood transfusion seems more in pain than the lamb and is looking away in discomfort, and the doctor observes the experiment in a concentrated manner. The lamb is the only figure in the image with eye contact with the viewer. The tablecloth appears to be clean, as no blood is spilt on it, and blood is only visible in the protruding vein of the recipient. In the upper left corner of the illustration, a range of pumps are shown, which underlines the fact that the illustration is part of a medical treatise.

Peter Sahlins has pointed to the similarity between the lamb in this illustration of a blood transfusion and depictions of the Lamb of God, *Agnus Dei*, in Christian imagery, such as the Ghent Altarpiece (1432) by the brothers van Eyck (Sahlins, 2023). In the central panel of this altar, the *Adoration of the Mystic Lamb*, a lamb is positioned on the altar with blood

ILL. 3.
Matthias Grünewald: *Isenheim Altarpiece*, 1512-1516, wings closed, detail of the crucifixion motif of the central panel. Unterlinden Museum, 269 × 307 cm. Oil on panel. Public Domain.

flowing into a chalice (Ill. 2). Sahlins's remark may be further developed. The stick protruding beside the body of the lamb in Purmann's illustration underscores the resemblance to the Lamb of God, which is often depicted carrying a cross or a small flag (Ill. 3). The symbolism of using a lamb as the donor was not lost on one of the first recipients, Arthur Coga. After the blood transfusion, Coga declared in Latin: "*Sanguis ovis symbolicam quandam facul-tatem habet cum sanguine Christi, quia Christus est Agnus Dei*" (the blood of sheep has symbolic power like the blood of Christ, for Christ is the Lamb of God) (Groom, 2018, p. 18). In a later letter to Richard Lower, Coga complained that the blood transfusion had turned him into another species and signed it *Agnus Coga* (*Coga the Sheep*) (Groom, 2018, p. 19). The comical potential of this experiment was later explored

by the playwright Thomas Shadwell (1642-1692), who, in the 1676 play *The Virtuoso*, satirizes animal-to-human blood transfusion as well as other experiments performed at The Royal Society.[4] One of the protagonists in *The Virtuoso* thus receives a blood transfusion from a lamb. After the transfusion, he begins to grow wool in great quantities, bleats, and a tail emerges from his anus (Shadwell, 1676, p. 56).

In the illustration, we furthermore notice a small rectangular object, a shallow bowl, and a scarf. What role do these objects play in the transfusion? I will argue that these three objects point to the practice of bloodletting/venesection, which was often performed before a blood transfusion. The bowl resembles a bleeding bowl and the scarf a tourniquet, both used in venesection (Porter, 1999, pp. 189-190). The small rectangular object is the most mysterious. However, on closer inspection it resembles a lancet case, which was a relatively small container with foldable lancets that were used as a surgical tool, and venesection was one of the most common uses (Davis and Appel, 1979, pp. 10-11). It is remarkable that venesection was still performed although it was a practice which formed part of the Roman doctor Galen's (129-c. 216 AD) view of the body, which I will return to in a moment. Another intriguing detail is the heart pattern on the tablecloth. Is it merely a decoration, or does it have a symbolic meaning? It could point to the importance of the heart as the center for the circulation of blood. For us today, this seems trivial. But Galen had argued that blood was produced in the liver, and this was the common belief until Harvey's treatise in 1628. Galen believed that there were two types of blood with different functions: the darker venous blood which originated in the liver and provided nourishment and growth, and the brighter arterial blood which flowed from the liver through the heart and contained spirituous air, which supplied the body with vitality. Galen did not know that blood circulated, instead he thought that both venous and arterial blood were expended by the body (Porter, 1999, p. 211). Until Harvey, Galen's view of the body was dominant. Galen had developed his model inspired by the Greek doctor Hippocrates's (460 BC-370 BC) conception that health consists of a balance between the four bodily humors (blood, black bile, yellow bile, and phlegm), and that disease was the result of an imbalance between these. The four humors were connected to the four elements (fire, earth,

ILL. 4.
Detail from of the panels of the golden chapel of the Church of Saint-Gervais-et-Saint-Protais, Paris, France. Representing the sacred radiant heart of Jesus Christ, 1630. Photo: Châtillon. CC BY-SA 4.0.

air, and water) and correlated to the four primary qualities (hot, dry, cold, and moist). Blood was considered moist and hot, yellow bile hot and dry, black bile dry and cold, and phlegm cold and moist. The four humors were furthermore connected to the four temperaments, the four seasons, and the four ages of man. Imbalance between the humors could be balanced by for instance diet, bloodletting, vomiting, and purging. Galen thus recommended bloodletting for many disorders, even for blood loss (Porter, 1999, pp. 75-77). The depiction of hearts on the tablecloth may thus be a way of emphasizing the primacy of the heart in the circulation of blood that Harvey had established. That they now believed in Harvey's *cardiocentric* (heart-centered) conception of the body, instead of Galen's *hepatocentric* (liver-centered) conception[5] (Orlandi et al., 2018).

In addition, the heart is also a Christ symbol, as the sacred heart of Jesus is a subject of devotion in Catholicism. This devotion originated in the Middle Ages, but became more prominent in the late 17th century (By-

num, 2007, p. 14; Morgan, 2008, p. 5). The heart pattern on the tablecloth may thus both be a reference to Harvey's conception of blood circulation and a symbol of Christ. Furthermore, the table with tablecloth has altarlike connotations, especially in combination with the other references to Christ and the Eucharist.

The illustration of a blood transfusion in Purmann's dissertation thus refers to both new and old physiological conceptions of the body in combination with clear Christian connotations.

Frontispiece of Pietro da Cortona's *Tabulae Anatomicae*

The connection between blood transfusion and the motif of the heart is also found on the frontispiece of the book *Tabulae Anatomicae* (*Anatomical Tables)* (Ill. 5), which consists of engravings based on anatomical drawings created by the artist Pietro da Cortona (1596-1669). Cortona's drawings were created in 1618, but the *Anatomical Tables* were not printed until 1741. As the first documented blood transfusion was performed almost 50 years after Cortona's drawings, it is thus most likely that the illustration for the frontispiece was created later than the rest of the drawings.[6] I have not been able to find indications as to the person having created the frontispiece in the research literature on the *Anatomical Tables* (Roberts and Tomlinson, 1992, p. 273; Kemp, 1976; Norman, 1986; Moe, 1995; Măgureanu, 2014), besides that it was probably commissioned by the printer of the tables, Gaetano Petroli, who as a surgeon might have been interested in transfusion (Moe, 1995, p. 80). On the left side of the frontispiece, a half-naked man is receiving a blood transfusion from a lamb. He is holding it tight in his arms, and the lamb is surrounded by tubes. He is sitting on a pedestal of classical architecture in a position which seems quite uncomfortable. In anatomical atlases from Andreas Vesalius's *Fabrica* (1543) onwards and until the early 19th century, anatomical figures were often placed in a mythological or biblical setting, and were frequently positioned in relation to archaeological fragments, positioned as well-known sculptures, or appearing in vignettes (Wagner, 2017, pp. 3-5). On several frontispieces of anatomical tables from this period, anatomical figures or skeletons are shown with classical architecture as a backdrop,[7] and this frontispiece thus follows a

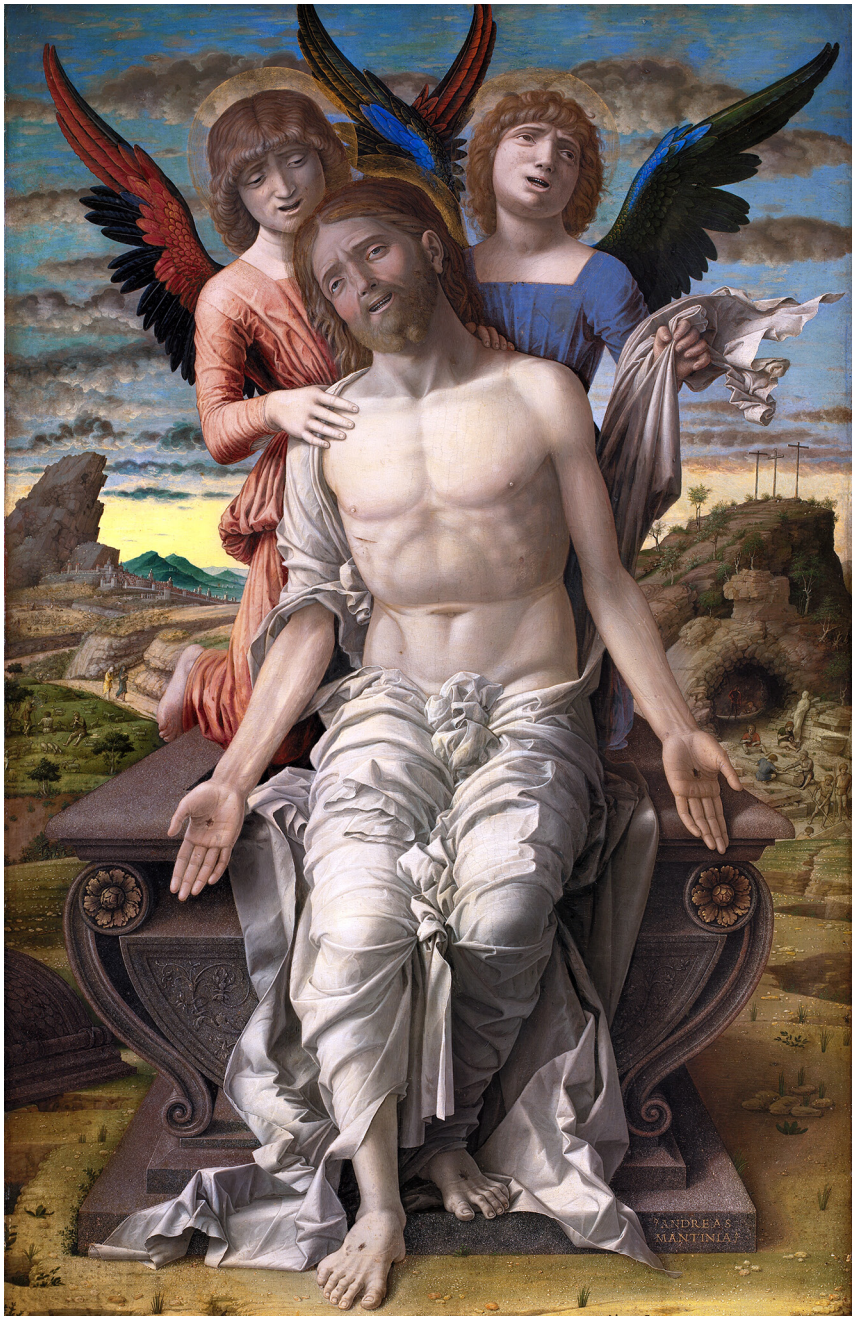
ILL. 5.
Frontispiece (detail) of *Tabulae Anatomicae*, containing engravings based on drawings by Pietro di Cortona. Published in 1741 by Gaetano Petrioli. Artist behind frontispiece is unknown.

more general trend. Both pose and background of the seated figures seem to draw specifically upon Michelangelo's so-called *Ignudi* on the ceiling in the Sistine Chapel. Below the scene is written *Transfusio*, thereby underlining what we are looking at. On the right side of the frontispiece, we see a woman opening her chest and showing us her heart, and below her is written *Fons Sanguinis* (source of blood). Both Purmann's illustration and this frontispiece thus display a heart motif adjacent to a blood transfusion scene, thus stressing the importance of the heart in the new conception of the body that had been introduced with Harvey's treatise.

ILL. 6.
Illustration from, Joannis Sculteti: *Appendix, Armamenturium chirurgicum,* 1671, p. 28.

Anonymous Illustration of a Blood Transfusion

The Christian symbolism is also prominent in the very first illustration of a transfusion from 1667 (Ill. 6). It was anonymous and printed in relation to a copy of Jean Denis's description of a transfusion. The illustration was later reprinted in the 1671 edition of the surgeon Joannis Sculteti's treatise *Armamenturium chirurgicum* (Sahlins, 2017, pp. 258-9; Sculteti, 1671, p. 28). The iconography is significant. The recipient of the transfusion is sitting in the center of the image. He is simultaneously having a venesection and receiving a blood transfusion, while a doctor and a surgeon are supervising each procedure. The blood spurts with a gravity-defying curve into the bleeding bowl, which is held by the surgeon on the left side of the image. Both doctor and surgeon are clad in contemporary clothes. In contrast, the recipient is a half-naked muscular figure only wearing a loin cloth and slippers. This depiction resembles a well-known figure in religious art: Christ as *Suffering Redeemer or Man of Sorrows* (Ill. 7). The recipient's bleeding



ILL. 7.
Andrea Mantegna: *Christ as the Suffering Redeemer*, 1495-1500, National Gallery of Denmark. Tempera on panel, 78 × 48 cm. Public domain.

ILL. 8.
The Mass of Saint Gregory, created by an unknown artist in Cologne, late 15th century, The Fitzwilliam Museum. Tempera with gold on linen, point of the brush and black ink, 20,7 × 20,3 cm, (accession number: 4004). Credit: Photograph © The Fitzwilliam Museum, University of Cambridge.

body further underscores the Christian connotations. Christian imagery became increasingly bloody in early modern Northern Europe, according to professor emerita in medieval history Caroline Walker Bynum (b. 1941). In her book *Wonderful Blood*, she writes: "The so-called imago pietas or Man of Sorrows, first represented as an apparently dead figure upright in his tomb peacefully displaying wounded hands and side, became increasingly a bold and living man, spouting cascades of blood." (Bynum, 2007, p. 3). The illustration bears strong resemblance to the iconography of the legend

of the Mass of St. Gregory, a popular motif in art in the late Middle Ages. According to the legend, Pope Gregory I was reading mass by the altar, when Christ as Man of Sorrows appeared in a revelation, and blood from his five wounds streamed into the chalice (Ill. 8). The blood spurting from the patient's right arm into the bleeding bowl in the transfusion scene, seems to echo the blood spurting from Christ's wound in the right side of his body into the chalice in illustrations of the Mass of St. Gregory (Ill. 6 and 8).[8]

Interestingly, it is not only illustrations of blood transfusions that draw upon Christian imagery, the reverse is also the case. In John Barnes's *The Christian's Pocket Companion* (1764), blood transfusion is used as a metaphor for the connection with Christ. In an interpretation of the passage "One of the Soldiers with a Spear pierced his Side, and forthwith came thereout Blood and Water" from the Gospel of John (29:34), Barnes describes how the blood from Christ's wound is transfused directly into the heart of the faithful:

> The Wound in our blessed Saviour's Side ought to be most dear and amiable to us, since it was from this mysterious Opening of his Heart after he was dead, that the Sacraments of Life proceed. It is not sufficient that our blessed Saviour wash us; he must likewise feed and renew us. O wonderful Transfusion of the Blood of God, from the Head into the Members, from his natural into his mystical Body, from the Side of Jesus into the Christian's Heart! (Barnes, 1764, p. 368; Kibbie, 2019, p. 33).

In Barnes's text, transfusion is thus used as a state-of-the-art metaphor to describe the direct bodily connection between Christ and the devoted.

Part conclusion

Let us return to the illustrations.[9] How is blood represented? These depictions show several conceptions of blood simultaneously. The illustrations build upon the idea of blood circulation, and blood is thus considered a substance that is possible to transfuse. The center of circulation is the heart, not the liver, as Galen has argued. Although Harvey's conception of the body had replaced Galen's, it is interesting that two of the illustrations still show a bloodletting procedure. Galen's recommendations regarding

bloodletting were thus still present in the image and the medical culture at the time, although Galen's physiological model had largely been abandoned. Even Harvey continued to believe that bloodletting was a useful treatment to cure diseases (Bell, 2016, p. 121), and bloodletting continued into the 19th century (Davis and Appel, 1979, p. 15). Denis argued that blood transfusion enables balancing hot blood with cold blood and vice versa (Denis, 1667, p. 492). Lower similarly argued that it was the difference between the blood of donor and recipient which might have curative effects. These ideas are traceable to the humoral theory of curing through balancing opposites. As blood played a fundamental role in both Galen's and Harvey's physiological models, two conceptions of the body are thus present at the same time, even though they for us seem almost incompatible.

Blood was furthermore seen as a substance which contained the qualities, temperament, or moral status of someone, and the aim of the transfusions was to transfer these qualities.

In addition, the Christian symbolism is very prominent in two of the illustrations. Blood had strong religious connotations, and the illustrations might have been influenced by the large number of religious paintings with blood pouring from the body of Christ and blood as a salvation of humankind through the sacrament of the Eucharist. As blood transfusion was made illegal in France in 1670, and later in England, it was also a controversial surgical procedure, which was advocated by some and opposed by others. Could the religious connotations in the illustrations also be a way of legitimizing blood transfusion?

The 19th-Century Revival of Animal Blood Transfusions

The History of the 19th-Century Revival of Lamb Blood Transfusion

The comeback of blood transfusions in the 19th century was mainly the achievement of the doctor James Blundell (1790-1878). After experiencing a woman dying from postpartum hemorrhage, heavy blood loss in relation to giving birth, Blundell prompted the idea of blood transfusion between

humans. He had seen the physician John Henry Leacock transfusing blood between dogs, and after experimenting with animal blood transfusions himself, Blundell performed the first human-to-human blood transfusion in 1818. The patient died, but in the 1820s both he and others conducted a range of successful blood transfusions (Berner, 2020, p. 21). During the next decades, physicians experimented with both direct and indirect blood transfusions using different kinds of apparatuses (Berner, 2020, pp. 21-24). Around 1870, blood transfusion had become a more common procedure (Berner, 2020, p. 25).

Blundell ridiculed blood transfusions between different species, and the scientists Jean Baptist André Dumas (1800-1884) and Jean Louis Prévost (1790-1850) also argued that interspecies transfusion was dangerous, after having performed several transfusion experiments between species (Berner, 2020, p. 27). Nevertheless, animal blood transfusions returned in the 1870s. A couple of patients in the US and Italy had received a blood transfusion with lamb's blood in 1871 and 1872, but it was following the experiments of the German doctor Oscar Hasse (1837-1898) that it gained more widespread use. Hasse had read the doctor Franz Gesellius's (1840-1900) history of blood transfusion, including 17th-century animal blood transfusion. Hasse already had experience with the transfusion of human blood, but in 1873 he decided to transfuse lamb's blood to a young girl suffering from diphtheria and bronchial catarrh – possibly inspired by Gesselius's historical account. He deemed it successful, and by spring 1874 he had transfused 40 patients in total (Berner, 2020, p. 34). The blood was seen as life-giving and oxygen rich (Berner, 2020, pp. 29-30). In 1874, he published the book *Die Lammblut-Transfusion beim Menschen* (Berner, 2020, p. 33). Hasse's praxis soon spread over most of Europe and the US, and hundreds of transfusions were performed (Berner, 2020, p. 11).

Illustration 9 is the interior frontispiece of Hasse's book. We see a young girl sleeping in bed with her face turned away. Just beside her, on a small table, a lamb is reclining and constricted by cords, and the veins of the lamb and the girl are connected by a tube. The scene looks very peaceful, it almost seems as if the girl is holding the lamb as a pet or a teddy bear. The docile lamb and the innocent looking young girl still have some Christian connotations. It furthermore draws upon the figure of the sick

ILL. 9.
Inside cover page of *Die Lammblut-Transfusion beim Menschen: erste Reihe: 31 eigene Transfusionen umfassend* / von Oscar Hasse. Source: Wellcome Collection. Public Domain.

girl or young woman, which was a subject of fascination in both paintings and literature in the late 19th century. Several artworks depicting this motif were exhibited at the Salon in Paris and it was also a popular theme among Nordic artists (Jensen, 2021, pp. 11-15). The frontispiece illustration from Hasse's book thus plays into 19th-century gender conventions. I will return to the figure of the sick girl below in the analysis of Adler's painting.

One of the most popular indications for lamb blood transfusion was tuberculosis (Berner, 2020, chap. 4), but some doctors almost considered it a panacea, and it was used as a cure for pellagra, cancer, epilepsy, and mental conditions (Berner, 2020, p. 11). Why was lamb's blood used? The doctors argued that it was possible to use blood from lambs, because the blood cells were smaller. One doctor stated that he did not know how transfused blood could cure a pulmonary disease, but that many remedies in medicine were used even though one did not know why they worked (Berner, 2020, pp. 63-64).

Many transfusions with lamb's blood were performed in the early 1870s, but it was controversial. One of its most passionate opponents was the Danish physiologist Peter Ludvig Panum (1820-1885), who argued against it and ridiculed the practice (Berner, 2020, p. 109). By the end of 1875, the evidence was not favorable. Furthermore, the doctors became affected by the public critique of lamb's blood transfusions, and by 1876 it was generally discontinued. After several hundred transfusions had been performed, it went out of fashion relatively quickly (Berner, 2020, pp. 140, 146).

Jules Adler's Transfusion de sang du chèvre

Fifteen years later, however, another doctor took up animal-to-human blood transfusion, but with a different reasoning. The doctor Samuel Bernheim (1855-1915), a specialist in tuberculosis, made blood transfusions with the blood of goats (Bernheim, 1891). As a result of German physician and bacteriologist Robert Koch's (1843-1910) discovery of the tubercle bacillus and Louis Pasteur's (1822-1895) research in immunology, the conception of blood had changed once more. Bernheim's idea was to transmit the animals' immunity to the disease as a sort of vaccine and thereby cure the patients. He treated more than 90 patients. In order to communicate his achievements, he commissioned the young French realist artist Jules Adler (1865-1952) to paint it, and the painting *Transfusion de sang du chèvre* was shown at the Paris Salon in 1892 (Ill. 10), where it received great acclaim and won an award (Berner, 2020, pp. 159-161). The previous images I have discussed are book illustrations, while this is a large oil painting; the medium and the context of reception are thus quite different.

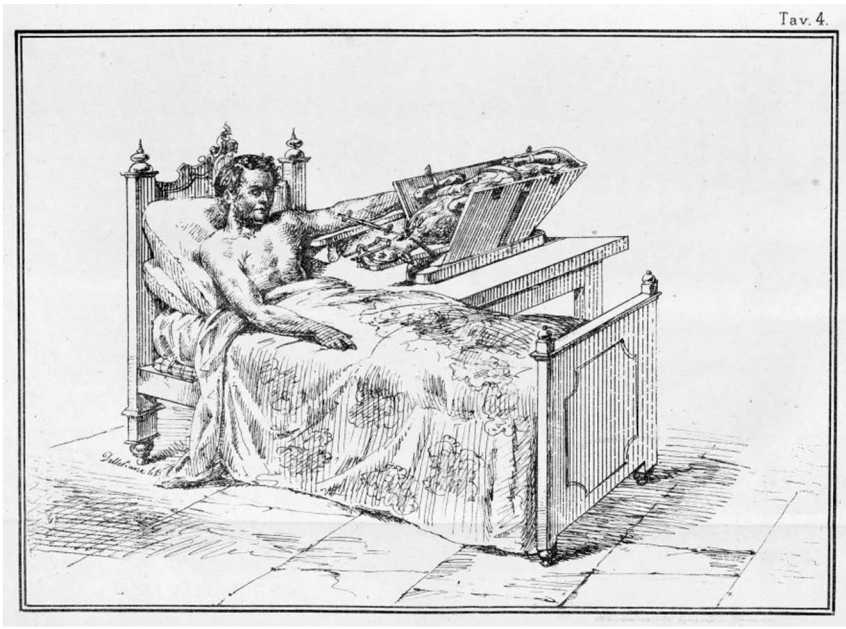
In Adler's painting, a young woman is reclining in the foreground while receiving a blood transfusion from a goat. She is positioned on a hospital bed with white sheets and pillows and wearing a white dress. She is almost as pale as the linen surrounding her. Around her we see five male doctors and surgeons. The doctor in the black suit in the middle rising above the rest is Bernheim himself. In the background, at the window, we note the only other woman in the scene, probably a nurse.

To a modern viewer, the setting looks like an intermediate between a laboratory, a hospital, and a slaughterhouse. Different types of glassware

ILL. 10.
Jules Adler: *Transfusion de sang du chèvre*, 1892. Musée d'Histoire de la Médecine, Paris. 129, 5 × 195,6 cm. Oil on canvas. © Musée d'histoire de la médecine | Université Paris Cité.

such as test tubes and laboratory paraphernalia are positioned on tables and shelves. The goat is placed on a slaughter bench diagonally to the image plane, and its blood is dripping on the table and on the woman's arm and the sheets. None of the figures in the painting are returning the viewer's gaze. The doctors and surgeons are all focused on the experiment: some look at the woman, while others look at the goat or at a pocket watch. The patient looks very weak, she is clasping the bed with her hand, her eyes are almost closed, and her lips slightly parted. The axes of the bed, the slaughter bench, and the tables form a lozenge composition into the image space, which underlines the dynamism and drama of the scene.

The illustrations of blood transfusions we have encountered in the 17th century all depicted men having a transfusion. Most recipients in the 17th century were men, but at least one woman received a transfusion (Roux



ILL. 11.
Alessandria asylum. Illustration from: G. L. Ponza: "La trasfusione del sangue negli alienate" in *Archivio Italianoper le Malattie nervose e particolarmente per le Alienazioni mentali vol. 12*, 1875.

et al., 2007, p. 209). In contrast, most of the 19th-century illustrations depict female recipients. In the 17th-century illustrations, the male recipients are awake and sitting or standing, while most of the female recipients in the 19th-century depictions are reclining and unconscious or sleeping. I have found one 19th-century illustration with a male recipient of a transfusion with animal blood (Ill. 11). The way he is represented is very different from the representations of female recipients. There are no doctors in the room, he is awake, sitting rather than reclining, and observing the experiment (Berner, 2020, p. 93).[10]

The pose of the young woman in Bernheim's painting seems familiar, as it draws upon a familiar figure from the history of art: the reclining Venus (e.g., Titian's *Venus of Urbino*, Giorgione's *Sleeping Venus*, or Manets *Olympia*). Like the Venuses, she is reclining on white sheets. The work thus

inserts itself in the tradition of depicting reclining women as an erotic figure. She is positioned very close to the observer in the image space, which is enhanced by the surrounding doctors, who visually push her to the foreground and almost offer her to our gaze.

As described above, the sick girl was a familiar motif in the late 19th century. Especially in the 1880s, many paintings with sick girls and women were presented at the Salon, and a large part of these paintings depicted girls suffering from tuberculosis (Jensen, 2021, pp. 11-15). In both paintings and literature tuberculosis was romanticized and also eroticized (Latimer, 1990, pp. 1021-1022). Some doctors even argued that women and men suffering from pulmonary tuberculosis had an increased sexual drive (Benedek, 1971, pp. 328-336). Not only the sick girl/young woman was subject to fascination, this also extended to the dead and dying young woman, as professor in literature Elisabeth Bronfen (b. 1958) has argued in her book *Over her Dead Body* (Bronfen, 1992, p. 3). Adler's painting is thus part of the 19th-century fascination and romanticization of the figure of the sick and tuberculous girl. The erotic aspects of the young woman in Adler's painting are further enhanced by her naked arms and neck, by her pose, which Zwijnenberg (2017, p. 130) compares to Bernini's sculpture of the ecstasy of Saint Theresa, by her pelvis which is turned towards the viewer, and by the dripping animal blood.

Connotations of Blood Transfusion in the 19th Century

How might a 19th-century viewer have looked at this scene? In order to understand the cultural context the painting was received in, I will touch upon how blood transfusion (mainly human-to-human) was presented in 19th-century literature. In contrast to today, blood transfusions were typically performed as a direct transfusion from donor to recipient, which also affected the way in which it was understood. The main indication for a blood transfusion was postpartum hemorrhage, and it was in many cases the husband, a relative, a servant, or the doctor himself who became blood donor. Being a recently developed and cutting-edge procedure, blood transfusion was the subject of great interest in medical news, in the periodical press, and in literature. Professor of English Ann Louise Kibbie has

shown how blood transfusion thus played a key part in the plot in several 19th-century novels and short stories by creating a connection between or transferring qualities from donor to receiver (Kibbie, 2019, p. 92). In William Delisle Hay's novel *Blood: A Tragic Tale* (1888) the entire personhood of the male donor, including gender, is transfused to the female receiver. Most of these stories focus on human-to-human blood transfusion, but in the short story "Blood: A Tale" (1886) by Edith Nesbit (1858-1924) and Hubert Bland (1855-1914), a woman receives a transfusion with cat's blood, which gradually turns her into a cat (Kibbie, 2019, pp. 114-117). In several short stories and novels, blood transfusion from husband to wife was furthermore presented as a sort of consummation of the marriage, as sexual intercourse, e.g., in Bram Stoker's *Dracula* (1897) (Kibbie, 2019, pp. 198-199). The multiple blood transfusions Lucy Westenra receives in *Dracula* are thus jokingly described as a sort of polyandry by one of the protagonists (Stoker, 2013 [1897]), p. 179; Kibbie, 2019, p. 200). In the 19th century, blood transfusion could thus have sexual connotations. A painting of a young woman having a blood transfusion from a goat must have appeared transgressive at the time, considering the sexual connotations of transfusion and the cultural idea that transfusion might transfer qualities from one organism to another.[11]

As most doctors were male in the 19th century, the figure of the male doctor treating a female patient was a common scenario (Berner, 2020, p. 108) with its own power dynamic. Kibbie writes about the dynamics of this relation in *Dracula* "This equation, which emphasizes the male characters' penetration of the passive body of the woman, accords with a feminist reading of the gender dynamics embedded in Victorian medical treatment of women, in which the practitioner uses his professional expertise to underwrite what is essentially a violent (and often eroticized) assault on the helpless female body." (Kibbie, 2019, p. 198). Blood transfusion is a prominent example of the asymmetrical gender dynamics of Victorian medicine, as fluid from a male donor flows into the female recipient. Adler's painting of five male doctors collaborating on penetrating the veins of a young woman with a needle to allow goat's blood to flow through her veins, underlines the asymmetrical and eroticized relation between the female patient and the male doctor(s) in the period. The blood dripping on her

arm and sheets could be interpreted as a symbolic deflowering. Whereas the lamb is a symbol of Christ, the symbolism of the goat is more ambiguous. In Ancient Greek and Rome, it was a symbol of fertility and lust through its connection to the lustful Greek god Pan, who is half human, half goat (Stefánsson, 2009; Comte, 1994, pp. 156-157). In early modern Europe, the Inquisition believed that the goat was one of the common guises of the devil, and witches were often depicted as flying naked on goats, facing backwards, in engravings of witches Sabbath's, e.g., in works by Hans Baldung Grien (c.1484-1545) and Albrecht Dürer (1471-1528) (Schuyler, 1987, p. 23-24; Machielsen, 2020, p. 2). A woman receiving a blood transfusion from a goat may thus evoke some of these cultural connotations.

Blood transfusions furthermore entered into the 19th-century Victorian fascination with the figure of the vampire (Cameron and Karpenko, 2022, p. 1). Transfusions play a central role in several vampire novels, such as *Dracula* and Mary Braddon's "Good Lady Ducayne" (1896) (Kibbie, 2019, chap. 6; Cameron, 2022; Stephanou, 2013). For a 19th-century viewer, Adler's painting might evoke connotations to the figure of the vampire.

Both Hasse's and Bernheim's illustrations draw upon the figure of the sick girl and both show a reclining and passive woman. But the presentations are quite different. While Hasse's picture illustrated a medical book, Adler's painting was shown at the Paris Salon and to a much broader audience. While Hasse's illustration underlines a peaceful flow of blood from one organism to another, the scene in Adler's painting is much more dramatized and explicitly erotic. The Christian connotations have almost disappeared in Adler's painting and much more gendered connotations are presented instead.

In the 19th-century representations, bloodletting is no longer shown in the illustrations of blood transfusion. It had gone out of favor in the second part of the 19th century.[12]

In the medical community, it was no longer believed that blood could transfer characteristics from one person to another, although this idea was common in literature at the time, as we have seen above. However, according to sociologist Boel Berner (b. 1945), the medical community still believed that blood had life giving potential and could transfer vitality from one body to another (Berner, 2020, p. 149).

Concluding remarks

Blood transfusions from animals to humans have thus been performed in more than one historical period, with blood from different animals, with different scientific reasoning, and as a cure for a variety of conditions, e.g., mental illnesses, tuberculosis, pellagra, cancer, and epilepsy.

The illustrations all show that blood is both a physiological and a symbolic substance. The illustrations of blood transfusions from animals to humans in both the 17th and the 19th centuries demonstrate how the physiological understanding of blood is weaved together with its symbolic connotations. They reveal how cultural conceptions regarding religion and gender permeate scientific illustrations and science. Whereas blood transfusion had strong Christian overtones in the 17th century, the gendered and sexualized connotations became more prominent in the 19th century and played into a fascination with the figure of the sick girl or woman.

The illustrations from the 17th century furthermore show that different, and even contradicting, conceptions of blood were in play at the same time. As blood played a key role in both Galen's and Harvey's physiology, the representation of blood reveals the underlying physiological model. The fact that references to both are present in the same image(s) shows that the development from one physiological paradigm to another is complex and does not happen overnight.

One of the turning points in the history of blood transfusion was the discovery of blood types in 1901 by doctor and immunologist Karl Landsteiner (1868-1943), which won him the Nobel Prize in 1930. When looking into failed blood transfusions Landsteiner discovered that mixing blood of some individuals caused clumps in the blood. Another important development was the finding of the anticoagulant properties of citric acid in 1914-1915, which prevented blood clotting in relation to transfusion and laid the ground for the development of blood banks. Blood transfusion became a common procedure in hospitals with the creation of blood banks shortly before World War II (Porter, 1999, pp. 590-591).

This history of blood transfusion prompts a reflection on our view upon this procedure today. Is blood only a biological substance or is it affected by the personality or even moral habitus of the donor? Considering the history of blood and its symbolism, the degree to which blood has

become a neutral product in medicine today is remarkable. This might be due to the fact that transfusion is rarely performed directly from one individual to another, but instead with anonymous blood from a blood bank. The focus is on blood groups and screening the blood from diseases such as HIV or hepatitis.

However, the 17th-and 19th-century idea that moving living material from one body to another might transfer qualities and temperament from donor to receiver is still to be found today, albeit in a new form. It is not uncommon among patients who have received an organ donation to feel that it affects them psychologically and to feel a connection to the donor (Shildrick, 2008). We are thus still negotiating a more machinic understanding of blood and organs as spare parts with an idea of the body as an integral part of our personhood.[13]

Pernille Leth-Espensen, Ph.D., researcher, Aesthetics & Culture, Aarhus University. Her field of research is the relation between art, science, and technology, which she has addressed from different perspectives and periods. She has written on bio art, art addressing the history of clocks, the doll as animated image, the relationship between art and nature, and the iconography of banknotes. Currently, she is working on the relation between plants and colonialism in Danish paintings from the 19th century. Some related publications: "I grænsezonen mellem liv og død" in Teknokroppen*, Fuglsang Kunstmuseum, 2023; "Udforskninger af den åbne krop – Det posthumane i biokunsten" in* Turbulens*, 2022; "Posthuman Temporalities in Science and Bioart" in* The Bloomsbury Handbook to Posthumanism*, Bloomsbury, 2020; "Celler til salg. Kunstneriske fortolkninger af vævsøkonomier" in* Kultur og Klasse 124: Handel*, 2017.*

SUMMARY

The Iconography of Animal-to-Human Blood Transfusions

The first blood transfusions to humans were performed in the 17th century. Surprisingly, these transfusions were performed with animal blood. This article addresses illustrations of animal-to-human blood transfusions from the 17th as well as the 19th century and discusses the complex conceptions of blood that they reveal. The author argues that in both periods the illustrations are multilayered and combine physiological conceptions of blood with distinctive symbolic overtones. The 17th-century illustrations have strong religious connotations, whereas the 19th-century depictions reveal a

gendered and erotized idea of the female body. In addition, it is argued that a couple of the 17th-century illustrations draw upon apparently contradictory physiological conceptions of blood by making references to both the then new idea of blood circulation and to the humoral theory of Antiquity.

NOTER

1 The physician to the Pope, Guglielmo Riva (1627-1677), also conducted several blood transfusions from 1667 onwards (Berner, 2020, p. 18).

2 University of Rochester Medical Center: https://www.urmc.rochester.edu/encyclopedia/content.aspx?contenttypeid=135&contentid=315 (accessed January 25, 2023).

3 In Britain, Richard Lower performed the second blood transfusion at The Royal Society, which had been formed a few years earlier in 1660. He published the transfusion in the newly founded journal *Philosophical Transactions*, the first journal devoted entirely to science. Animal-to-human blood transfusions were thus not a fringe phenomenon, they took place in the very heart of the new scientific development. Lower furthermore played an important role in the history of medicine, as he was the first to discover that blood changed color when it left the lungs and that the lungs supplied the blood with something that changed it (Larner, 1987, p. 207). However, oxygen was not discovered until the 1770s (Maluf, 1954, p. 64; Porter, 1999).

4 The term *virtuoso* in the 17th century denoted a group of gentlemen scientists or art connoisseurs; members of The Royal Society were thus called virtuosi. For the complex meaning of the term in 17th-century Britain, see Houghton, 1942.

5 The heart was also connected to blood in Galen's conception of the body, but the liver played a more central role, as Galen believed that it produced the blood (Porter, 1999, p. 76).

6 Is it possible that Pietro da Cortona created the frontispiece of the book already in 1618 with the rest of the drawings, and is it thus an evidence of the introduction of blood transfusion at an earlier point in time? It cannot be ruled out, but it is not very likely. There had been accounts of drinking blood from Antiquity onwards, but no evidence that it was administered parentally. Already in the early decades of the 17th century, there were suggestions to do a blood transfusion, but no proof that it was conducted (Maluf, 1954, pp. 59-60). The female figure showing her heart, and the inscription *Fons sanguinis* below, furthermore point to a creation after the discovery of the circulation of blood. Harvey began to introduce the idea of blood circulation in lectures in 1616, but his book was first published in 1628 (Zimmerman and Howell, 1932, p. 417). Another possibility is that Pietro da Cortona created the illustrations for the frontispiece after the first blood transfusions in 1667 and

before his death in 1669. This cannot be ruled out either, but despite many hours of investigation into the question who created this frontispiece, I have not found any conclusive evidence. Furthermore, it is believed that only the plates 1-19 and 27 inside the *Tabulae Anatomicae* are based on drawings made by Cortona, while plate 20-26 are not (See Măgureanu, 2013-2014, p. 253).

7 For other examples, see Moe, 1995.

8 A dog is depicted as the donor even though dogs were not used as donors to humans. A rope is tied arounds its jaws, and it is tied to both the ceiling and the floor. It is depicted in a manner which is probably more realistic than the lamb in Purmann's illustration, but it seems very cruel and painful. How come the illustrator has depicted a dog? Stray dogs were used as guinea pigs in several scientific experiments. As described previously, Lower had transfused blood between different species of dogs, and Christopher Wren had injected wine into a dog's bloodstream (Maluf, 1954, pp. 62-64). A possible explanation might thus be that the illustrator by mistake had intermixed descriptions of Lowers experiments with blood transfusions between dogs with descriptions of animal-to-human blood transfusion.

9 An additional illustration of animal-to-human blood transfusion can be found on the frontispiece of the French doctor and naturalist Georges Abraham Mercklin's (c. 1644-1702) *Tractatio Medico Curiosa De Ortu Et Occasu Transfusionis Sanguinis*, 1679. In this illustration we see a man receiving a blood transfusion from an animal, probably a calf. He is standing and the animal is lying on a table. Below are shown two blood transfusions between humans, even though it had not been practiced at the time (Mercklin, 1679).

10 I have come across two additional illustrations. The French journal *La Science Illustrée* also published an illustration of a woman receiving a blood transfusion from a goat in 1891 (Figuier, 1891, pp. 296-297). The French chocolate company Carpentier created a range of illustrations in order to disseminate medical knowledge. One of these illustrations shows a woman receiving a transfusion from a goat: https://www.lookandlearn.com/history-images/M250576/A-woman-receiving-a-blood-transfusion-from-a-goat.

11 Illustrations were also made of blood transfusions between humans, most of which show a male donor and a female recipient (Lefrére and Danic, 2009, pp. 1011-1016; Kibbie, 2019, pp. 18-19).

12 Bloodletting is still used today, but for a very limited number of conditions (Davis and Appel, 1979, p. 1).

13 Animal-to-human blood transfusions were also taken up in the performance artwork *Que le cheval vive en moi* (*May the Horse Live in Me*), 2011, by artist duo Art Orienté Objet, where the artist Marion Laval-Jeantet (b. 1964) received a blood transfusion from a horse. To be able to go through with the transfusion she prepared her body in the months beforehand by regularly receiving horse immunoglobulins (antibodies). Afterwards she did a commu-

nication ritual with the horse. Laval-Jeantet expressed that during and after the performance she was both physiologically and mentally affected by the horse blood: "I had the feeling of being extra-human […] I was hyper-powerful, hyper-sensitive, hyper-nervous and very diffident. The emotionalism of an herbivore. I could not sleep. I probably felt a bit like a horse." (Debatty, 2011). Interestingly, the description resembles some of the 17th-century accounts of being mentally affected by the animal blood. In contrast to the 17th- and 19th-century examples I have discussed above, Laval-Jeantet did not inject the horse blood for medical purposes; instead, it was a way to relate to the horse. See also Zwijnenberg, 2017.

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