

# The scalpel and the brush

## Anatomy and art from Leonardo da Vinci to Thomas Eakins<sup>1</sup>

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C. P. Snow has pointed to the growing split in the modern world between the arts and the sciences. Snow's "two cultures" were united in the Renaissance when the new study of human anatomy was a meeting ground for both artists and scientists.<sup>1</sup> In fact, the first students of anatomy were the 15th century artists who had been encouraged by the art theorist Leon Batista Alberti to study the science of anatomy as a foundation for the depiction of the human form.

Leonardo da Vinci moved from observation of the outer man—movement, expression, and gesture—to anatomical research in collaboration with one of the greatest anatomists of his day, Marc Antonio della Torre. In Florence and Milan, Leonardo participated in some 30 human dissections from 1483 until 1515 when Pope Leo forbade him access to a hospital.<sup>2</sup> He placed his draftsmanship in the service of his scientific studies, compressing the information yielded from several dissections into each anatomical drawing. That his original intention may have been to publish his drawings as an anatomy textbook is

suggested by his introduction to the reader: "This plan of mine of the human body will be unfolded to you just as though you had the natural man before you. . . ."<sup>3</sup> Yet, in the course of his studies, he seems to have expanded his original purpose to a broader demonstration of the workings of the human body than would be suitable to a textbook on anatomy. Leonardo's approach as philosopher-anatomist to the human body in the context of the universal system of creation may have deterred him from trying to codify his drawings into a textbook format for publication.

Although Leonardo's drawings preceded Vesalius's illustrated *Fabrica*, they remained hidden in his notebooks. Only his friends were aware of his achievement. The physician and mathematician, Gerlamo Cardano, whose father, Fazio, was a friend of Leonardo's, hailed the artist's pioneering efforts in anatomical art when he said in his *De subtilitate* of 1553:

The painter in as much as he must imitate everything must know everything, including some of the latest inventions. The painter must be a philosopher, an architect, and himself versed in dissection. An illustration of which consists in that most distinguished imitation of the entire human body which several years ago Leonardo da Vinci had begun and nearly brought to perfection: yet the master of the entire work was yet wanting

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ANDREAE VESALII  
BRUXELLENSIS, SCHOLAE  
medicorum Patavinæ professoris, de  
Humani corporis fabrica  
Libri septem.

CVM CAESAREAE  
Majest. Galliarum Regis, ac Senatus Veneti gra-  
tia & privilegio, ut in diplomatis eorundem continetur.

B A S I L E A E.



and the investigator of the nature of things, and this is Vesalius.<sup>4</sup>

Cardano's support of the artist and scientist working together in the investigation of the human body was not shared by 16th century humanists who disdained illustrated texts. Vesalius, a humanist trained in the tradition of Galen, met with opposition from more conservative Galenists like Jacobus Sylvius who denounced Vesalius's illustrated textbook. One feature of the *Fabrica* that was objected to was the accompanying plates which according to Sylvius broke with Galen's traditional dislike for pictorial aids. A further point of objection was the detailed illustration of human anatomy. Though Galen may have used human cadavers, most of his observations were based on the study of apes. Galen had maintained that human dissection was not necessary and that such investigations would be of no particular value to the scholar who had dissected the body of an ape. Until the 16th century, Galen's writings on animal dissections were the major source of human anatomical knowledge for the medical profession.

With the publication in 1543 of his human anatomy, Vesalius challenged the authority of Galen's anatomical work. Unlike many of the medical professors of the Middle Ages who unquestioningly followed Galen's tracts, and whose demonstrators used the cadaver merely to support the ancient authority, Vesalius took part himself in the dissection and interpretation of the findings. When these did not concur with Galen's, he did not blame the discrepancies on the pathological condition of the corpse, as his predecessors had been wont to do. Instead, he complained that Galen's tracts "described the structure, not of humans but of apes,"<sup>5</sup> and he set about to remedy the situation with the publication of his *De Humani Corporis Fabrica*.

This book, based on original research and observation rather than on ancient authority, fittingly shows the author in the role of experimenter and teacher on the title page illustration (Fig. 1). The medical professor, who in earlier portrayals of a public anatomy lesson, was always seated at a lectern while the dissection was performed by a demonstrator, has here stepped down from his podium and becomes the demon-

strator himself. Vesalius had his dissections recorded in illustrations which were most probably executed by Flemish artist Jan Stephan van Kalkar (1499–1546). Although the identity of Vesalius's illustrator is still not certain, the tradition has grown up, with the support of Harvey Cushing, that the artist's self-portrait, sketchbook in hand, appears in Vesalius's audience on the title page.<sup>6</sup> The fine woodcuts in the *Fabrica* show the influence of Renaissance art. Unlike earlier anatomical illustrations which were hardly more than diagrams, Kalkar posed his figures in classical attitudes, taking on the stance of ancient statuary.

It was an ancient statue, the famous *Laocoön*, which became the subject of a satirical print in support of Vesalius during the controversy that erupted in medical circles after the publication of the *Fabrica*. The *Laocoön Cartoon* (Fig. 2), a woodcut caricature of the Hellenistic marble statue as a group of apes, was inspired by the Galenists' attack on the new anatomy. Its message was aimed at the critics of Vesalius, especially Jacobus Sylvius who had published a pamphlet rebuking Vesalius for ignoring the authority of Galen. In defense of Galen, Sylvius asserted that any errors found in Galen's work were the result of the change of human anatomy since classical times. To Vesalius's supporters, Sylvius's insistence that mankind had once had the simian features described in the writings of Galen hardly accorded with the evidence of classical statuary. Statues like the *Laocoön* were visual proof that the anatomy of ancient men had not changed through the centuries from Galen's time. The *Laocoön Cartoon* is thus a visual joke, showing how the ancient priest of Troy and his sons would have looked if Sylvius's defense of Galen's anatomical descriptions were valid. The artist, in transforming the ideal figures of the marble into a group of grotesque apes like those dissected by Galen, used classical art in support of Vesalius's new illustrated text. In the second edition of the *Fabrica* (1555), Vesalius referred to his dispute with Sylvius in a woodcut illustrating the initial "V." The picture of Apollo flaying Marsyas is a direct attack on Sylvius who represents the sylvan Marsyas flayed by the victorious Apollo, a symbolic image of Vesalius's victory over his critic recorded under his own initial letter.<sup>7</sup>

The illustrations of flayed figures, so profuse

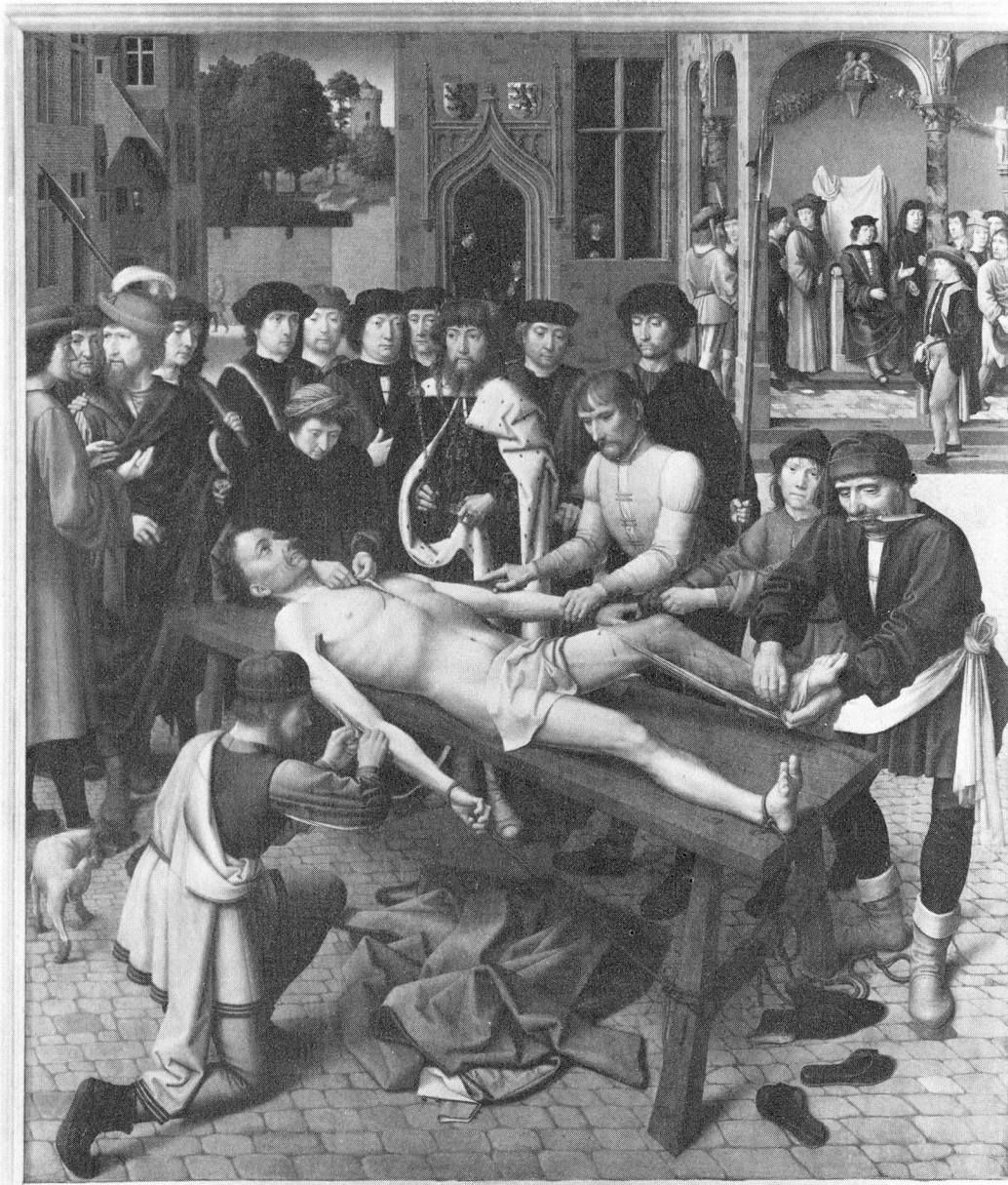
Fig. 1. Jan Stephan van Kalkar, *Vesalius Teaching Anatomy*. Woodcut title page from the first edition of Vesalius's *De Humani Corporis Fabrica*, 1543. Courtesy of The Historical Division of the Cleveland Health Sciences Library.





Fig. 2. Niccolo Boldrini after Tüüan, *Caricature of the Laocoön Group*. Woodcut. New York, Metropolitan Museum of Art, Rogers Fund, 1922.





**Fig. 3.** Gerard David, *Flaying of the Unjust Judge*, 1498. Oil on panel. Bruges, Musée Communal. Copyright © A. C. L. Brussel.

in *Fabrica*, were frequently evident in the sculptures and paintings of the 15th and 16th century. Gerard David's secular painting *The Flaying of the Unjust Judge* (1498) (Fig. 3) is an example of such a work. It was probably one of the sources of Rembrandt's famous *The Anatomy Lesson of Dr. Tulp* (1632) (Fig. 4). It is quite possible that Rembrandt knew of *The Flaying of the Unjust Judge*, for a picture of the *Judgement of Cambyses* from which the subject derived was listed in the

1628 inventory of the anatomy theatre in Leyden.<sup>8</sup>

Not only may the David picture have been useful to Rembrandt in composing the group portrait with Dr. Tulp, but also the relationship between the moralizing punishment picture and the anatomy lesson may not have been lost on him. Dissection ordinarily had a punitive aspect in the 17th century when the object of public anatomy sessions was usually a criminal who had







just been executed. The dissection was part of a public performance, preceded by the execution and followed by the surgeons' guild banquet and parade, both of which were financed by tickets sold to the anatomy lesson. Combined with the medical learning acquired from such dissection was the idea of the retribution of society on the criminal. The magical idea of the dissection as an annihilation of the criminal spirit reflects the practice following execution when the criminal was drawn and quartered to prevent any evil influences from remaining to harm society. The association of medical learning with punishment was officially recognized in 1482 when Pope Sixtus issued a brief in support of the medical faculty of the University of Tübingen which sought access to the bodies of condemned criminals for anatomical research.<sup>9</sup> Indeed, this official permission is reflected in Vesalius's frontispiece where the body is that of a woman executed in Padua.<sup>10</sup> Furthermore, in two of his initial letters, Vesalius pays tribute to the gallows as a provider of bodies for the anatomist: the "L" shows putti cutting down men from the gibbet, and the "O" depicts them receiving a severed head from the scaffold.<sup>11</sup>

In Rembrandt's *The Anatomy Lesson of Dr. Tulp*, the body of the anatomical subject, an executed criminal, is the pivot of the composition. The strong diagonal position of the body recalls the unjust judge in David's painting. The position of the man with the knife relates to the judge in the same manner as Dr. Tulp to the cadaver. Compared with earlier Dutch anatomy lessons in which row upon row of observers lined up in yearbook fashion around the cadaver or skeleton, Rembrandt's first group portrait has a much stronger dramatic focus. The sharp diagonal composition and the contrast of light and shadow lend excitement and drama to the scene and unite the group of faces following the words and gestures of Dr. Tulp. Dr. Tulp's lecturing on the hand and forearm recalls the tradition of Galen who thought of the study of the hand as the highest form of anatomy. The hand was viewed by Galen as the epitome of the wisdom of God in creation, and in its dissection, the anatomist demonstrated both his understanding of its complexities and the dexterity of his own fingers. Vesalius

made a bow to Galen's view in the half-length portrait of himself in the *Fabrica* (Fig. 5) shown demonstrating on the hand and forearm.

In Rembrandt's painting, an anatomical plate is put in the place of the actual arm of the cadaver. The moment depicted precedes the anatomy lesson, when Dr. Tulp, in his formal discourse, justifies anatomical study as illuminating God's gift to man in the hand's flexor-tendons, which he indicates on the anatomy plate at the same time as he moves his own left hand to demonstrate its dexterity. Schupbach, who has recently analyzed the emblematic meaning of the painting, relates it to the Delphic theme of Know Thyself, previously used as an emblem with *memento mori* overtones in earlier Dutch anatomy pictures. In Rembrandt's painting, however, a double emblem appears: Know Thyself refers not only to man's mortality, but also to the knowledge of God through his presence in the human body, especially, as the Galenists believed, in the hand. Tulp's metaphysical interpretation of anatomy as a lesson in the divine creation of man is balanced in the painting against the older and more pessimistic *vanitas* interpretation of Know Thyself visible in the gesture of a second figure, a surgeon who appears at the apex of the group (and was originally hatted like Tulp) pointing down at the criminal corpse and reminding the viewer of man's mortality. That the painting depicts two aspects of the Delphic motto is supported by Tulp's words in a poem by Caspar Barleaus, written in 1639 for the new anatomy theater in Amsterdam:

Evil men, who did harm when alive,  
do good after their deaths:

Health seeks advantages from  
Death itself.

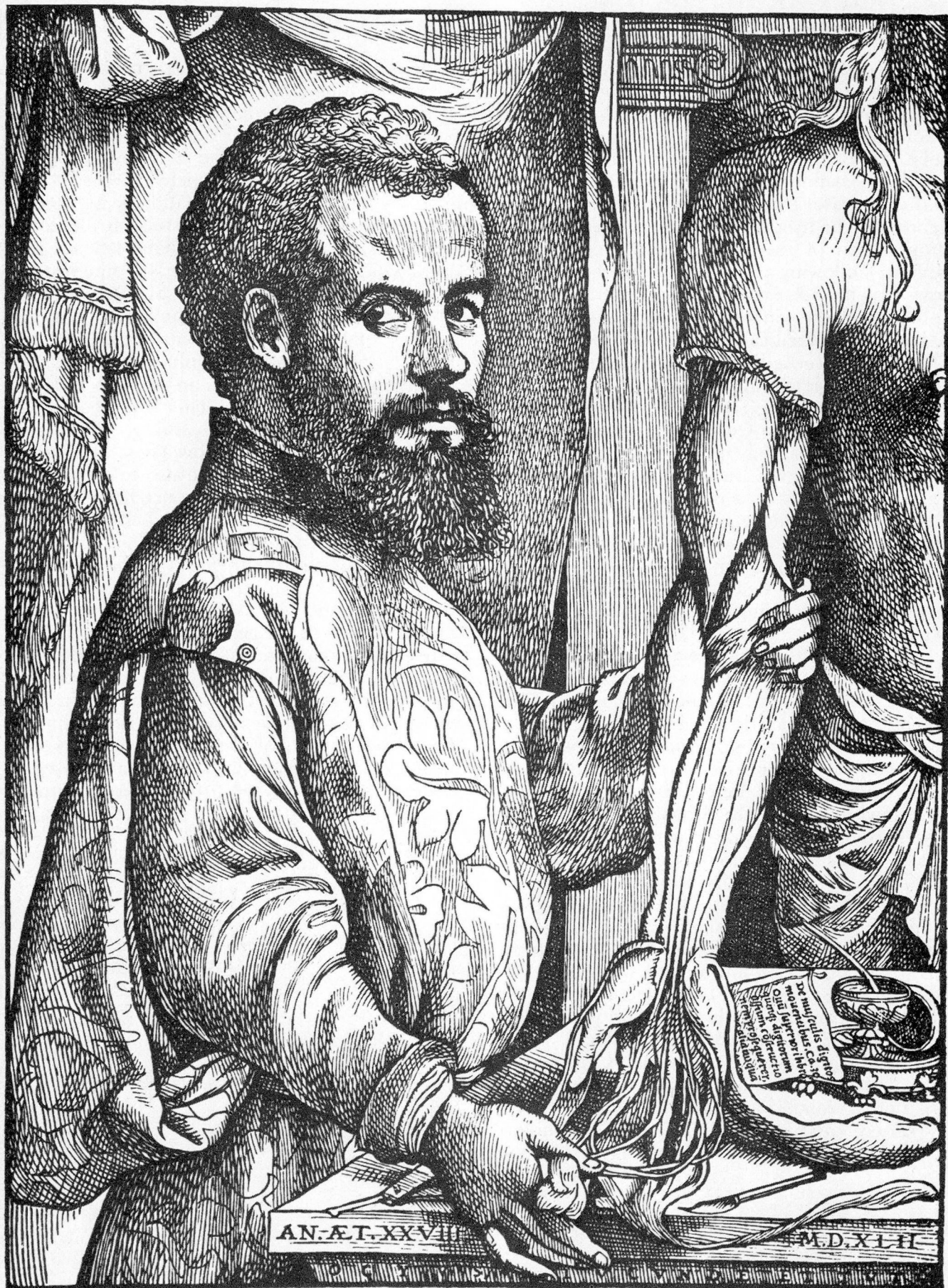
Dumb integuments teach. Cuts of  
flesh, though dead,  
for that very reason forbid us to  
die.

Here, while with artful hand he slits  
the pallid limbs,  
speaks to us the eloquence of  
learned Tulp:

"Listener, learn yourself! and while  
you proceed through the parts,

Fig. 4. Rembrandt van Rijn, *The Anatomy Lesson of Dr. Tulp*, 1632. Oil on canvas. The Hague, Mauritshuis.







believe that, even in the smallest,  
God lies hid."<sup>12</sup>

Rembrandt was able to combine emblematic and realistic elements so effectively in this group portrait that the overall impression of the work is startling realism. The suggestion of on-the-spot observation so important for the dramatic impact of *The Anatomy Lesson of Dr. Tulp* was achieved again in the 19th century in the work of a young American painter named Thomas Eakins. Eakins, an ardent admirer of Rembrandt's work, shows the fruits of his study in *The Gross Clinic* (c. 1875) (Fig. 6).

In its insistent realism, Eakins' portrait of a surgeon at work creates the impression of an on-the-scene record. To emphasize the authenticity of the scene, Eakins painted a portrait of himself seated in the amphitheatre (on the far right edge of the canvas) with sketchbook in hand (Fig. 7). This self-portrait supported the view that the painting is a factual record of the scene. Yet Eakins had surely looked at pictures of earlier anatomy lessons in preparing his composition. In fact, the self-portrait<sup>13</sup> of the artist at an anatomy lesson harks back to the title page of Vesalius's *Fabrica*. What has eluded many scholars who have written about *The Gross Clinic* is that the insertion of Eakins' self-portrait in the anatomy theater is a bow in the direction of Vesalius's illustrator, Jan Stephan van Kalker, whose presumed portrait appears with sketchbook in hand as though recording the scene with his own eyes. At the same time that Eakins compared himself with Vesalius's illustrator, he was casting Dr. Gross in the role of the Vesalian teacher. Dr. Gross's *Elements of Pathological Anatomy* had won him an international reputation, and the operation he is shown performing is one that he had published in his textbook, *A System of Surgery*, which was required reading for his students.<sup>14</sup> Dedicated to the improvement of American medical education through a stronger foundation in scientific research, Dr. Gross's active efforts in the advancement of medicine made him a fitting figure as a Vesalian teacher-physician.<sup>15</sup>

By his self-portrait in Dr. Gross's audience, Eakins demonstrated his own intense interest in

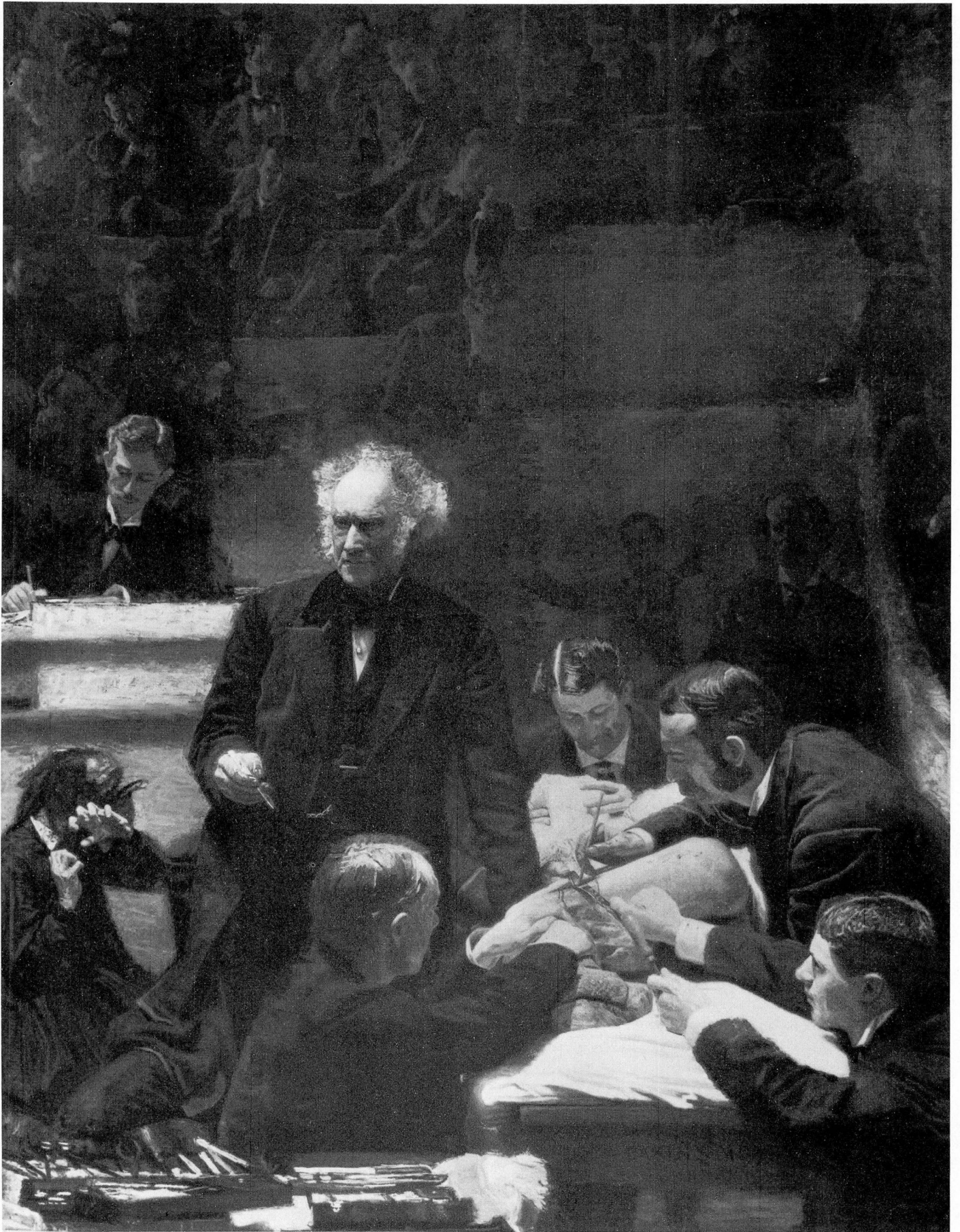
medicine; he may actually have seen Dr. Gross at work in the operating theatre and in the lecture hall. In 1864, when he was just starting to study art, Eakins also attended classes at the Jefferson Medical College.<sup>16</sup> In fact, he may have been undecided whether to pursue medicine or art, and his decision in favor of art was made by 1866 when he set off for Paris to study under Gerôme.

Here Eakins' interest in anatomy continued under the encouragement of Gerôme, who believed in the observation of hospital dissections as a foundation for the student of art. Eakins may have attended the lectures of the famous Parisian surgeon, Dr. Alfred A. L. M. Velpeau (1795–1867). But whether or not he saw the great French surgeon at work, he must have known of the famous painting (later satirized by Daumier), *The Anatomy Lesson of Doctor Velpeau* (Fig. 8), painted by Feyen-Perrin in 1864.<sup>17</sup> In both its spatial composition and the relationship between the surgeon and his assistants, this painting was probably the principal source of Eakins' *The Gross Clinic*. But while Dr. Velpeau is shown teaching from a cadaver, Dr. Gross in a similar pose points out important medical procedures to his students during the course of an operation on a live patient.

The crucial difference, then, is the patient. Dr. Velpeau's cadaver might be a criminal or even the body of a suicide, which in 19th century France was given up for dissection as quasi-punishment. Dr. Gross's subject was a clinic patient whose female relative writhes in the background. Furthermore, instead of appearing stretched out in dignity, this patient's head was covered by cloths dipped in ether and his leg was raised so that his left buttock is presented to the viewer in what was considered a shockingly indecorous manner. Critics thought that blood dripping from the surgeon's hand added a note of cruelty to the scene. Though derived from earlier art, Eakins' personal observation heightened the realistic detail to a degree for which the public was not prepared and the painting was rejected for the 1876 Centennial Exhibition and relegated to the United States Hospital. Shown in the French section of the Centennial Art Gallery was Ferrin-Peyen's *The Anatomy Lesson of Doctor Velpeau* which had traveled from Paris for the event.

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Fig. 5. Jan Stephan van Kalker, *Andreas Vesalius*. Woodcut portrait photographed from a facsimile of the frontispiece from the first edition of Vesalius's *De Humani Corporis Fabrica*, 1543. Courtesy of The Historical Division of the Cleveland Health Sciences Library.





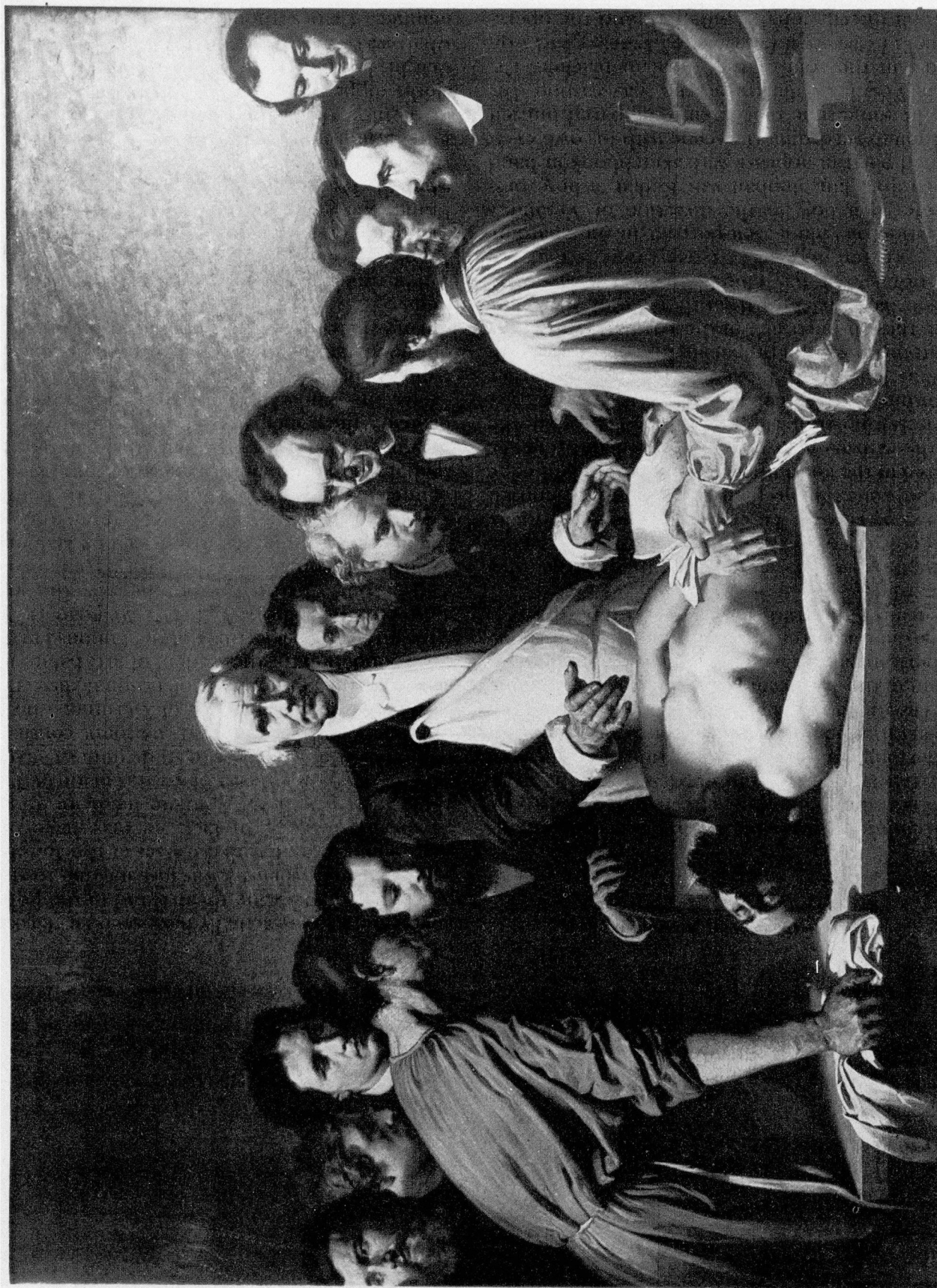
**Fig. 6.** Thomas Eakins, *Portrait of Professor Gross (The Gross Clinic)*, 1875. Oil on canvas. Philadelphia, Jefferson Medical College of Thomas Jefferson University.





**Fig. 7.** Thomas Eakins, *Wash Drawing for Autotype of Portrait of Professor Gross* (detail), c. 1875. Ink wash on paper. New York, Metropolitan Museum of Art, Rogers Fund, 1923.





**Fig. 8.** François Nicolas Augustin Feytaud, *The Anatomy Lesson of Doctor Velpeau*, 1864. Oil on canvas. Tours, Musée des Beaux-Arts.



The rejection of Eakins' *The Gross Clinic* and the negative response it drew from the critics may have resulted in part from its appearance at a time when antivivisection was a compelling issue in Philadelphia. Pending in the Pennsylvania legislature in 1876 was an antivivisection bill, and although Dr. Gross's patient was a man and not an animal, the blood-covered hands of the surgeon could be used by its advocates to arouse public feelings of squeamishness.<sup>18</sup> Ironically, the punishment theme of earlier anatomy lessons seemed to linger, and *The Gross Clinic* was interpreted by some critics as showing the detachment and cruelty of the medical profession. Just as it found its exhibition place in a hospital rather than an art gallery during the Centennial, so it found a permanent home at the Jefferson Medical College which as a result to this day owns one of the masterpieces of American painting.

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