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LEONARDO'S MYOLOGY

This essay is a short contribution to the study of a wide-ranging topic, namely the rich variety of graphic media used by Renaissance artists to represent the body and its muscles. In our collective memory, muscular figures are often associated with Michelangelo's powerful and majestic nudes, which he rendered using different drawing techniques. For example, two spectacular preparatory studies for the bathers of the *Battle of Cascina*, today in Haarlem (fig. 1), are sketched in black chalk and lightly heightened with lead white¹. To further document Michelangelo's *bravura*

¹ C. de Tolnay, *Corpus dei disegni di Michelangelo*, Novara 1975, Vol. I, p. 60, no. 50r and no. 51r: Tolnay does not mention that these sketches are heightened with white, while on Haarlem 50r he records traces made with a stylus. For a more accurate description of these drawings, see C. van Tuyl van Serooskerken, *The Italian Drawings of the Fifteenth and Sixteenth Centuries in the Teyler Museum*, Haarlem/Ghent/Doornspijk 2000, pp. 94-100. The two drawings have been recently shown in the exhibition organized in Haarlem (from 6 October 2005 to 8 January 2006) and in London (from 23 March to 25 June 2006). The exhibition was not accompanied by the traditional catalogue but by a book: H. Chapman, *Michelangelo Drawings: Closer to the Master*, New Haven/London 2005. Following Johannes Wilde and the most recent English tradition, Chapman believes, like van Tuyl, that the sketches are original preparatory drawings by Michelangelo for the cartoon of the *Battle of Cascina*: see exh. no. 9r and 10r, pp. 84-86. Andreas Schumacher, however, has written a very critical and intelligent review of the exhibition. He follows with some interesting arguments the "German" tradition (Brinckmann, Dussler, Perrig and others) and believes that the two sheets in Haarlem are copies made by other artists after the cartoon drawn by Michelangelo: A. Schumacher, «Hugo Chapman, Michelangelo Drawings: Closer to the Master», in: *Zeitschrift für Kunstgeschichte*, LXXI, 2008, pp. 424-425. The extraordinary, indeed superior quality of these two sheets could have been reached only by a major master. If one rejects the attribution to Michelangelo, one must find a credible alternative. After having observed them again in the recent wonderful exhibition in Vienna, the present writer confirms their attribu-

in representing the human body with different graphic instruments, we can also look at two more sheets: another study for the *Battle of Cascina* (fig. 2), now in London, was executed in pen and brown ink, brown and warm-grey wash applied with a brush, and heightened with lead white over leadpoint and stylus²; while a folio with one of the *ignudi* for the Sistine Ceiling (fig. 3), now in Vienna, was instead drawn in red chalk and heightened with lead white over traces made with a stylus³. It is worth illustrating these two last splendid works again because they have been expunged by some art historians from the corpus of the Florentine artist⁴. Using similar technical tools but in another manner, Leonardo da Vinci achieved radically different effects in the representation of the human body. This essay, therefore, pursues the following goals in particular: an analysis of the graphic media and representation strategies Leonardo employed in order to depict the muscular tissues of the human figure; and secondly, an investigation of how the artist deployed graphic conventions

tion to Michelangelo: see A. Gnann, *Michelangelo. Zeichnungen eines Genies*, Wien 2010, no. 25r and 26r, pp. 101-107, as by Michelangelo.

² J. Wilde, *Michelangelo and his Studio*, London 1953, pp. 14-16 (6r); Tolnay, 1975 (as in n. 1), p. 61 (no. 52r); M. Hirst, *Michelangelo and his Drawings*, New Haven/London 1988, pp. 25-26; Chapman, 2005 (as in n. 1), pp. 79-88 for both this drawing and the two sheets in Haarlem mentioned in n. 1. Schumacher, 2008 (as in n. 1), pp. 425-426, thinks, following Perrig, that this drawing is also a copy after the cartoon. Gnann, 2010 (as in n. 1), no. 24, pp. 98-100, exhibited it again under the name of Michelangelo.

³ Hirst, 1988 (as in n. 2), pp. 61-62, 67; Tolnay, 1975 (as in n. 1), pp. 110-111 (no. 144r).

⁴ A. Perrig, *Michelangelo's Drawings: The Science of Attribution*, New Haven/London 1991, p. 120, n. 55, attributes the drawing in the British Museum to the young Benvenuto Cellini; moreover (Id., p. 50), he thinks that the sheet in Vienna is a forgery. Perrig's very important publications on this subject begin with his series of books, *Michelangelo-Studien*, printed in the 1970s: Vol. I: *Michelangelo und die Zeichnungswissenschaft – Ein methodologischer Versuch*, Frankfurt am Main/Bern 1976; Vol. II: *Die echten figürlichen Zeichnungen Michelangelos*, Frankfurt am Main/Bern 1978; Vol. III: *Das «Jüngste Gericht» und seine Vorgeschichte*, Frankfurt am Main/Bern 1976; Vol. IV: *Die «Michelangelo»-Zeichnungen Benvenuto Cellinis*, Frankfurt am Main/Bern 1977; Vol. V: *Die «Michelangelo»-Zeichnungen von Mini, Cavalieri, Clovio, Condivi, Venusti und Daniele da Volterra*, Frankfurt am Main/Bern 1978. Moreover, see Id., «Cellini als Zeichner oder: Die Wiederkehr seiner in Paris hinterlassenen Blätter», in: *Benvenuto Cellini. Kunst und Kunsttheorie im 16. Jahrhundert*, ed. by A. Nova & A. Schreurs, Köln/Weimar/Wien 2003, pp. 125-160.

to design those elements that he could not see because they do not exist or, in other words, how he, on certain occasions, resorted to a purely fictional visual representation of the body.

Myology is the aspect of human anatomy most relevant to painters and sculptors. It is, therefore, not surprising that Leonardo returned to this subject many times. Indeed, there is ample evidence that, above all towards the end of his life, he planned to write a treatise especially devoted to this theme. In one paragraph of his *Libro di pittura*, dated between 1500 and 1505 in the Pedretti and Vecce edition, Leonardo writes: «Ne l'alzare e bassare delle braccia le poppe spariscano, od elle si fanno di più rilievo; e 'l simile fanno li rilievi de' fianchi nel piegarsi in fuori o in dentro nelli loro fianchi; e le spalli fan più varietà, e li fianchi, et il collo, che nesus[n]'altra giontura, perché hanno li moti più variabili: e di questo si farà un libro particolare»⁵. This project is not only mentioned in the *Libro* compiled by his pupil Francesco Melzi but it is also documented by one of his original notes written on folio 19037r of the Royal Library in Windsor (K/P 81r) (fig. 4). Indeed, the lower darker inscription written around 1506 under the two sketches of the kneeling figure reads,

Different muscles become uncovered in the different movements of the animals, and different muscles are those which hide themselves in such diversity of movement; and concerning this it is necessary to make *a long treatise* for the purpose of recognising the places that have been injured by wounds, and also for the convenience of sculptors and painters⁶.

⁵ L. da Vinci, *Libro di Pittura, Codice Urbinate lat. 1270 nella Biblioteca Apostolica Vaticana*, ed. by C. Pedretti, critical transcription by C. Vecce, Firenze 1995, p. 275, no. 332 (italics mine). *Leonardo da Vinci. Treatise on Painting (Codex Urbinas Latinus 1270)*, trans. and annotated by A.P. McMahon: «The breasts disappear, or gain greater relief on raising or lowering the arms, and the same is done by the flesh in relief, such as the hips when bent outward or inward. The shoulders, the hips and the neck display greater variations than any other articulation, because they have the most manifold motions, and on this a special book will be written».

⁶ For the English translation, see *The Notebooks of Leonardo da Vinci* [1938], ed. by E. MacCurdy, Old Saybrook/CT n.d. [2003], p. 130. For the original text, see *Leonardo da Vinci. Corpus degli studi anatomici nella collezione di Sua Maestà la Regina Elisabetta II nel castello di Windsor*, ed. by K.D. Keele & C. Pedretti, Firenze 1980-1984, Vol. II, Testi, p. 270, fol. 81r (Windsor, RL 19037r), text no. III: «Notando. Diversi muscoli si scopre

That his anatomical research should have been useful for different professions, for physicians as well as artists, is repeated by Leonardo in several other passages of his anatomical notes, such as folio 19005v in Windsor (K/P 141v) (pl. XI), drawn around 1510-1511, where we read that the representation of the upper arm from different angles and positions will be very useful for sculptors who have to emphasize the muscles affected by the figure's movements⁷.

Leonardo's interest in this matter did not abate. The long inscription at the top of folio 19085r (K/P 176r) (fig. 5), which belongs to the so-called *Anatomical Manuscript C II* and therefore dates from around 1513-1516, is a most revealing list of muscles organized according to a morphological taxonomy. They are classified according to their form: oval, *pescina* (like the biceps), *lacertosa* (in the form of a lacert) and so on⁸. However – as confirmed by the note's caption at the bottom of the page, which reads «de moto» and deals with the movement of an arrow shot vertically into the air – Leonardo was not so much interested in constructing a classification of the muscles for its own sake, to round out his anatomical atlas, even if the idea of classifying them according to their visual shape («in the form of a fish» for example) is worth considering in greater depth; rather, thinking analogically, he was investigating the very origin and cause of the human figure's movement. He also asserted this intention in a note at the top left corner of an earlier sheet (fig. 6), which belongs to the so-called *Anatomical Manuscript A* (ca. 1509-1510)⁹. Indeed, Leonardo's myologi-

nelli diversi movimenti delli animali, e diversi muscoli son quelli che in tal diversità di moti si occultano. E di questo è *necessario a fare lungo trattato* al proposito del cognoscere li lochi lesi dalle ferite, e, ancora, al proposito delli statuari e pittori, ecc.». Italics mine. See also p. 116, fol. 47r (Windsor, RL 19044r), dated ca. 1508-1509 by Pedretti, text no. I: «Farai regola e misura di ciascun muscolo e renderai ragione di tutti li loro uffizi, e in che modo s'adoprono e chi li muove, ecc.».

⁷ *Ibid.*, Vol. III, Testi, p. 518, fol. 141v (Windsor, RL 19005v), text no. IX: «E questo fia bono per li statuari, li quali debbono pronunziare più li muscoli che son causa de' moti de' membri che quelli che in tal moto non si adoprono».

⁸ *Ibid.*, Vol. III, Testi, p. 714, fol. 176r (Windsor, RL 19085r), text no. II: «Li muscoli son di molte sorte [...]. Alcuni sono ovali, altri pescini [come il bicipite], altri lacertosi. [...] Alcuni movano li membri da omni fronte. Alcuni movan li membri da una sola fronte. [...] E così qui si darà la difinitioni di ciascuna parte di che si compone l'omo».

⁹ *Ibid.*, Vol. III, Testi, p. 556, fol. 147v (Windsor, RL 19010v), ca. 1509-1510. Inscription no. V at top left: «Dopo la dimostrazione di tutte le parte delle membra del-

cal studies had two primary goals: a “correct” representation of the movements of the human body – “correct”, of course, according to the artist’s own standards and vision – and an “accurate” depiction of the emotions, which can be reproduced, according to Leonardo, through an understanding and rendering of the facial muscles.

As Domenico Laurenza has pointed out, physiognomy was very much a part of Leonardo’s anatomical project¹⁰. Indeed, an extraordinary drawing in Windsor, belonging to the period of his intense collaboration with Marcantonio della Torre (ca. 1509-1511), shows how seriously the painter took his medical research as an instrument to achieve accuracy in the visual representation of the microcosm. The crucial passage is the short text (pl. III) added between the two heads in the centre of the folio: «*h* is the muscle of wrath; *p* is the muscle of pain; *g* is the chewing muscle; *gnm* is the same muscle; *ot* is the muscle of anger»¹¹. It seems that nobody has yet attempted to analyse any of Leonardo’s works following these clues literally. Of course, the artist’s notes can be seen as either irrelevant or superfluous because his art “speaks for itself” since it is capable of transmitting the same message in purely visual terms. Yet the perfect match between written and visual evidence is baffling. The head of *Christ carrying the cross* (fig. 7), now in Venice, is characterized by a deep sense of grief, for example, and his face expresses the intensity and entirety of his pain¹². But even more telling is a comparison with the celebrated preparatory study for the so-called Niccolò Piccinino in the central episode of the *Battle of Anghiari* (fig. 8) because the wrinkling muscle *h* and the two vertical folds *ot* of the

l’omo e delli altri animali si figurerà il modo del bene operare tali membri, cioè dello levarsi da diacere, d’andare, correre, saltare per diversi aspetti, levare e portare gran pesi, gittare cose lontane da sé e del notare. E così in ciascuno atto dimostrare quali membra e muscoli sieno causa delle predette operazioni e, massime, del giucar di braccia».

¹⁰ D. Laurenza, *De figura umana. Fisiognomica, anatomia e arte in Leonardo*, Firenze 2001.

¹¹ Translation mine. For the original text, see Keele & Pedretti, 1980-1984 (as in n. 6), Vol. III, Testi, p. 526, fol. 142v (Windsor, RL 19012v), text no. VI: «*h* è il muscolo dell’ira; *p* è il muscolo del dolore; *g* è muscol del morso; *gnm* è un medesimo muscolo; *ot* è il muscolo dell’ira».

¹² *Leonardo da Vinci: Master Draftsman*, Exhibition catalogue (New York, Metropolitan Museum of Art, 2003), ed. by C.C. Bambach, New Haven/London 2003, pp. 423-426.

figure are clearly drawn to represent the warrior's wrath and anger according to the rules of a less than clearly defined «ragione scientifica» – to use Leonardo's words¹³. In order to reach his goal with the greatest accuracy, Leonardo did not shy away from conducting a meticulous archaeological excavation of the body, as the inscription under the face on the left of the aforementioned drawing (pl. III) reveals:

The muscle *m* [that is, the masseter] is bigger than the muscle *p* [that is, the back part of the temporal muscle], because it must endure a greater effort. I remove the muscle *m* and what remains is its specific location, as one can see in the other head with the letter *n*. Then I remove the muscles *o* and *c*, so that only the bone *f* remains¹⁴.

This way of dissecting without losing sight of the physical context of the removed organs is typical of Leonardo's anatomical method, and the time has come to have a look at the artist's actual practice – his graphic media as well as his visual strategies – beginning with a series of drawings that depict the sartorius (fig. 9)¹⁵.

If we wish to understand Leonardo's anatomical project, we must always be aware of a double process that simultaneously moves in two opposite directions: from the surface to depth through dissection, and from depth to the surface through a complex procedure of the graphic recomposition of the dissected limbs, which is realized in different stages. When we look at his drawings, therefore, we are not confronted with a series of static protocols, but with visual material that documents a complex process of dismantling and reassembling and that implies a dynamic vision of the body, since Leonardo's principal goal was an adequate representation of the movement of the limbs. His first known anatomical drawings on blue prepared paper date from around 1485, but they are already so sophisticated that they presuppose a series of earlier studies,

¹³ *Ibid.*, pp. 505-508.

¹⁴ Translation mine. For the original text, see Keele & Pedretti, 1980-1984 (as in n. 6), Vol. III, Testi, p. 526, fol. 142v (Windsor, RL 19012v), text no. IX: «Il muscolo *m* è più grosso che 'l *p* perché [ha] a durare più fatica. / Io levo il muscolo *m* e resta il suo sito, come si vede nell'altra testa in *n*. E levo li due muscoli *oc*, e resta l'osso *f*».

¹⁵ *Ibid.*, Vol. II, Testi, p. 16, fol. 6r (Windsor, RL 12626r).

which are now lost. It is even possible that Leonardo might have produced these lost sketches in Florence during the early phase of his career¹⁶, and indeed the very short inscription at the top right of folio 12626r in Windsor (K/P 6r) is clear evidence of an already well-developed surgical expertise (fig. 9). Leonardo writes: «I have removed the muscle *an* [that is, the sartorius], [...] and I have revealed *rt* [that is, the femoral muscle]. Now I shall attend to *mo* which lies underneath [that is, the lateral vastus muscle]»¹⁷. Such a *modus operandi* will re-emerge twenty years later, perhaps with more precision and accuracy, although, in the later case (fig. 10), Leonardo does not observe the muscles under the sartorius – which has been cut and removed as it was in the earlier drawing – but instead wishes to reveal the femoral channel. As already mentioned, Leonardo was always interested in rendering the physical context of his observations, and the two sketches at the bottom right of this sheet in Windsor are superb evidence of his ingenious analytical method. In the critical literature, the dots enclosing the leg bones have sometimes been misunderstood and described as markings for *spolvero* holes used to transfer the visual information to another sheet, but as the artist himself makes clear in the inscription to the right, they are instead intended to preserve the integrity of the dissected body which, otherwise, would look like a monstrous thing or object¹⁸. This method of representation helped to achieve a spe-

¹⁶ In his last book on the subject, Domenico Laurenza has indeed reconstructed a group of anatomical drawings that he tentatively dates ca. 1478-1482, that is before his move to Milan. See D. Laurenza, *Leonardo: L'anatomia*, Firenze 2009, pp. 11-35.

¹⁷ Translation mine. For the original text, see Keele & Pedretti, 1980-1984 (as in n. 6), Vol. II, Testi, p. 16, fol. 6r (Windsor, RL 12626r), text no. I: «I' ho levato il muscolo *an* ch'è di lunghezza mezzo braccio, e ho scoperto *rt*. Ora attendi a quello che resta sotto *mo*».

¹⁸ *Ibid.*, Vol. II, Testi, p. 256, fol. 77r (Windsor, RL 19035r), text no. II: «Ricordati di non mutare mai li termini di nessun membro per alcuno muscolo che tu levassi per iscoprirne un altro. E se tu pure levi m[u]scoli, [...] allora tu debbi segnare con ispessi punti, il termine di quel membro che fu levato per la separazione di qualunque muscolo. E questo farai acciò la figura di quel membro che tu descrivi non resti cosa monstrosa per averle tolto le sue parti. E, oltre a di questo, ne segue maggior cognizione del tutto, perché levatoli la parte tu vedi nel tutto la vera figura della parte donde essa fu levata». For the English translation of this passage, see MacCurdy, 2003 (as in n. 6), p. 128: «Remember never to change the contour lines of any limb by any muscle that you remove in order to uncover another; and if you only remove muscles, [...] you ought then to indicate

cific goal, namely an accurate representation of the *inner* proportions of the body which, in his mind, were as important as its *outer* proportions.

Of course, this was not an end in itself, since his research in this field was dominated by the desire to explore the mechanisms of muscular movement. In the leg drawing discussed above (fig. 4), for example, Leonardo sketches the limbs of a kneeling figure on the right-hand side and tries to illustrate the rotation of the sartorius when the knee is bent; a rotating action which is suggested graphically in a very ingenious way. He achieved this by giving an elongated oval shape to the sartorius, which is emphasized by parallel pen strokes in order to separate its shape from the rest of the body. The sketch on the left, then, partly covers the study of this mechanism with other muscular tissues. Indeed, after having dissected the body, Leonardo begins to recompose it through a very methodical representation of its different layers. As he himself wrote in one of his notes (fig. 11), «you will draw these bones after having sawed them first lengthways and then across. [...] Afterwards you'll be covering them step by step, adding the nerves, the veins and the muscles»¹⁹.

For Leonardo, therefore, there is not only an inner and an outer body, but a series of strata that overlap creating a mass of tissues that must be rendered in all their complexity. Myology is a major component of this system and in comparison with Michelangelo, who used his graphic techniques in a purely pictorial manner, Leonardo seems to have reflected upon the communicative power of his media. One should be neither too rigid nor too schematic; no doubt, exceptions are a given. It seems reasonable to suggest, however, that pen and chalk were used alternatively by the artist to explore different anatomical issues (figs. 12a-b-c, figs. 13a-b-c).

with frequent dots the contour line of that limb which was removed by the separation of any muscle; and this you will do so that the shape of that limb which you describe may not remain an unnatural thing through having its parts taken away. And in addition to this there ensues a greater knowledge of the whole, for when the part has been taken away you see in the whole the true shape of the part whence it was taken».

¹⁹ Translation mine. For the original text, see Keele & Pedretti, 1980-1984 (as in n. 6), Vol. III, Testi, p. 480, fol. 135v (Windsor, RL 19000v), text no. IV: «Farai prima questi ossi segati per lo lungo e poi per il trasverso, acciò si veda, dove l'ossa son grosse o sottili. Poi le figura intere e disgiunte, com'è qui di sopra, ma per quattro aspetti, acciò si possa comprendere la lor vera figura. Poi le va' vestendo, a grado a grado, de' sua nervi, vene e muscoli».

The famous text flanking the powerful muscular figure in the middle of folio 12631r in Windsor (K/P 89r) (figs. 12b, 13b) reads: «Second demonstration interposed between the anatomy and the life»²⁰. Leonardo was aware of the difference between the muscular tissues dissected by the anatomist and their forms in the animated body. If pen and ink were deemed suitable to reproduce the structure of the bones and the shape of the inner muscles, black chalk was considered more appropriate for the «second demonstration», for that middle stage between the anatomical sketches and the study from life, which Leonardo preferred to reproduce with a soft red chalk. This most elegant red chalk interacts with the white background of the paper in such a way as to create highlights, whereas Michelangelo had resorted mostly to the use of white lead. These expressive and forceful outlines in red chalk then had to be reinforced in pen and ink when Leonardo decided to draw his figures on red prepared paper (fig. 13c). As previously mentioned, this is a rather rigid classification. As we shall see in a moment, at least one sketch of the inner anatomy is rendered in black chalk, and there are pen drawings of the second, intermediate stage as well as superficial anatomy. In other words, pen and ink are used to represent all aspects concerning myology. Generally speaking, however, the distinction proposed above remains consistent between 1506 and 1508.

It was the artist himself who consciously and frequently reflected upon his own representation techniques. In the specific case of myology, he often referred to two different strategies: reproducing muscles as threads, that is *fili*, to give a better representation of the internal strata of the body (fig. 14), and re-arranging them in such a way that those placed on the surface are pierced by a «window», giving a better perception of the inner strata of the body (fig. 15). A comparison between two folios of the *Anatomical manuscript A* (figs. 14, 15), drawn around 1509-1511, is instructive because they are accompanied by inscriptions, which are precious relics of Leonardo's working method. The one at the bottom right of the first folio (fig. 14) explains that an artist, before drawing the muscles, should first sketch an interlacement of threads (*fili*) because only in this

²⁰ For this English translation, see MacCurdy, 2003 (as in n. 6), p. 194. For the original text, see Keele & Pedretti, 1980-1984 (as in n. 6), Vol. II, Testi, fol. 89r (Windsor, RL 12631r), text no. I: «Dimostrazione seconda interposta infra l'anatomia e 'l vivo».

way is it possible to avoid confusion: «And this [method] will supply a speedier conception when you wish to represent all the muscles one above the other. And if you make it in any other way your representation will be confused»²¹. Clarity of exposition was indeed a major preoccupation in Leonardo's conceptualization of the body. Furthermore, the diagrammatic scheme of the muscles responsible for the movement of the shoulder – drawn at the top right – is derived from the rough sketch in black chalk on the other folio. The text flanking this latter study (fig. 15) is one of the most important inscriptions of the entire anatomical corpus for two reasons: firstly, because Leonardo theorizes here the convention of the transparent window, and secondly because he explicitly mentions the medium used to trace the drawing: «Make a demonstration with muscles lean and thin so that the space that is produced between the one and the other may make a window in order to show that which is found behind them. / As in this representation of a shoulder made here in charcoal»²². Of course, Leonardo simply wishes to inform his reader that he is referring to a specific sketch on the page. However, it is telling that, in doing so, he makes reference to the medium and not to its position on the folio.

That figurative conventions as well as graphic techniques play a fundamental role in our perception of the world is a major result of Leonardo's research and philosophy. The question remains, however, whether his graphic material, which had cognitive functions and implications, was also a contribution to “knowledge”. I don't mean “knowledge” as it is understood in modern philosophical terms, but how Leonardo conceptualized it in his own terms and phrasing («cognizione», «conoscere», «vera

²¹ For this English translation, see MacCurdy, 2003 (as in n. 6), p. 96. For the original text, see Keele & Pedretti, 1980-1984 (as in n. 6), Vol. III, Testi, p. 494, fol. 137v (Windsor, RL 19003v), text no. V: «[...] E questa [tecnica] darà più espedita cognizione quando tu vorrai figurare tutti li muscoli l'uno sopra dell'altro, e, se farai altrimenti, la tua figurazione sia confusa».

²² For this English translation, see MacCurdy, 2003 (as in n. 6), p. 101. For the original text, see Keele & Pedretti, 1980-1984 (as in n. 6), Vol. III, Testi, p. 560, fol. 148r (Windsor, RL 19014r), text no. I: «Fa' una dimostrazione con muscoli magri e sottili acciò che lo spazio che nasce infra l'uno e l'altro faccia finestra a dimostrare ciò che dupo loro si trova. / Come questa figurazion di spalla fatta qui di carbone».

forma» etc.). As the present writer has argued in other essays²³, the artist was of course a man of his time, and, therefore, one should not be too interested in determining what he diagnosed correctly – from a modern point of view – as a physician: this is a task for doctors who are curious about Leonardo's anatomical achievements, which were indeed considerable. Rather, the present writer is more concerned with what he would like to define as the “aporia of the detail”, an aporia inherent to the status of the graphic sign which appears precise and reliable but can, nevertheless, be deceiving. Of course, this contradiction only arises in our modern reception of Leonardo's self-referential system, a system that, within itself, remains entirely coherent. Some of Leonardo's anatomical drawings *are*, therefore, a genuine cognitive instrument both in the creation and the transmission of knowledge because only they can help to *explain* – not illustrate, but explain – *certain* phenomena which words themselves simply cannot. This is a type of knowledge that images rather than language can conceptualize and at the same time give form in a much more tangible manner. Nevertheless, Leonardo's anatomical drawings can be perceived as “deceitful” by modern viewers, because we look at the same material from a completely different cultural background. As is well known, Leonardo wrote on folio 19097v in Windsor (K/P 35r) (pl. VIII), following the claims of antique and medieval sources, that sperm is transported by the spinal column, and hence he drew a channel connecting the spinal cord to the penis – a channel which does not exist. In a much later drawing (Windsor, RL 19062r [K/P 155r]) he reproduced a similarly fictional porous septum separating the two halves of the heart (fig. 16). The two folios are exemplary because they illustrate well the aporia I have outlined above. If some details are the curious outcome of a lack of an even more precise observation, which would have been theoretically possible (a more adequate representation of the *septum*, for example), these very same folios record, for the first time in history, the correct curvature of the spinal column and the four ventricles of the heart. What is their status

²³ See, for example, A. Nova, «La dolce morte»: Die anatomischen Zeichnungen Leonardo da Vincis und der kognitive Wert der Bilder», in: *In Bildern denken? Kognitive Potentiale von Visualisierung in Kunst und Wissenschaft*, ed. by U. Nortmann & C. Wagner, München 2010, pp. 147-173.

then, since they are both “true” and “false”, although their graphic clarity gives the viewer the impression that they are transmitting «true knowledge», to use Leonardo’s vocabulary? In modern terms I would like to call them technical drawings, i.e. visual products of his *techné*, visual instruments and tools whose significance, however, was fundamentally bound to specific texts and historical contexts.

One of Leonardo’s greatest achievements was to have understood that an image alone could not have produced «true knowledge» – as he was wont to repeat. Towards the end of his life he put aside the polemics against physicians that had characterized his earlier writings and reached a compromise, best documented by the inscription at the top right of folio 19013v in Windsor (K/P 144v) (fig. 17):

E tu che vogli con parole dimostrare la figura dell’omo con tutti li aspetti della sua membrificazione, remove da te tale opinione, perché quanto più minutamente descriverai, tanto più confonderai la mente del lettore e più lo removerai dalla cognizione della cosa descritta. Adunque è necessario figurare e descrivere²⁴.

In the end, only word and image combined could transfer information to a distant reader, through both time and space.

²⁴ Keele & Pedretti, 1980-1984 (as in n. 6), Vol. III, Testi, fol. 144v (Windsor, RL 19013v), text no. I.

ALESSANDRO NOVA

1. Michelangelo,
Study for the bathers
of the «Battle of
Cascina», ca. 1504,
Haarlem, Teylers
Museum, Inv. A 19r

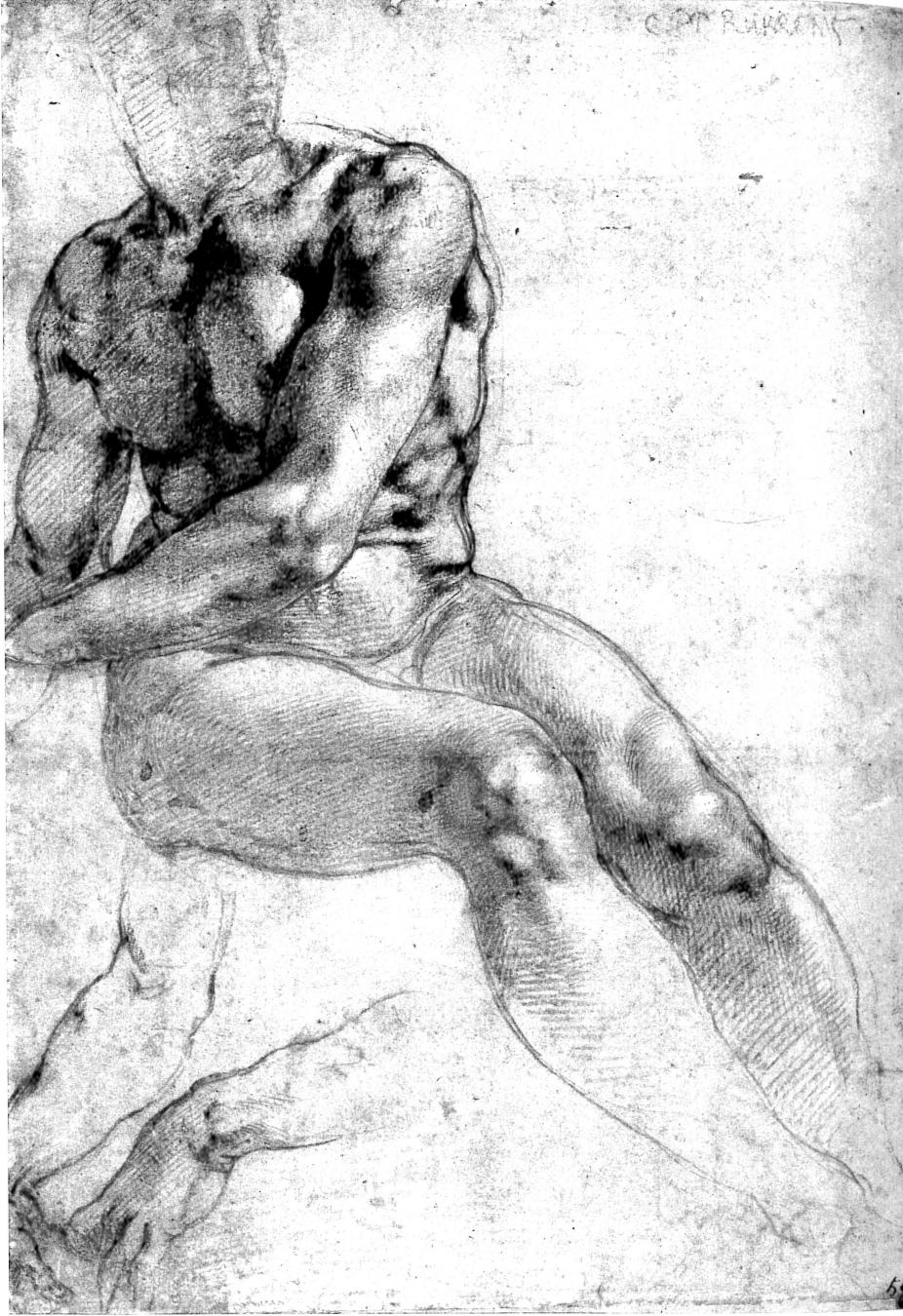




2. Michelangelo,
Study for the bathers
of the «*Battle of*
Cascina», ca. 1504,
London, British
Museum, Inv. 1887-
5-12-116r

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3. Michelangelo,
Study for an Ignudo
of the Sistine Ceiling,
ca. 1510-1511,
Vienna, Albertina,
Inv. 120

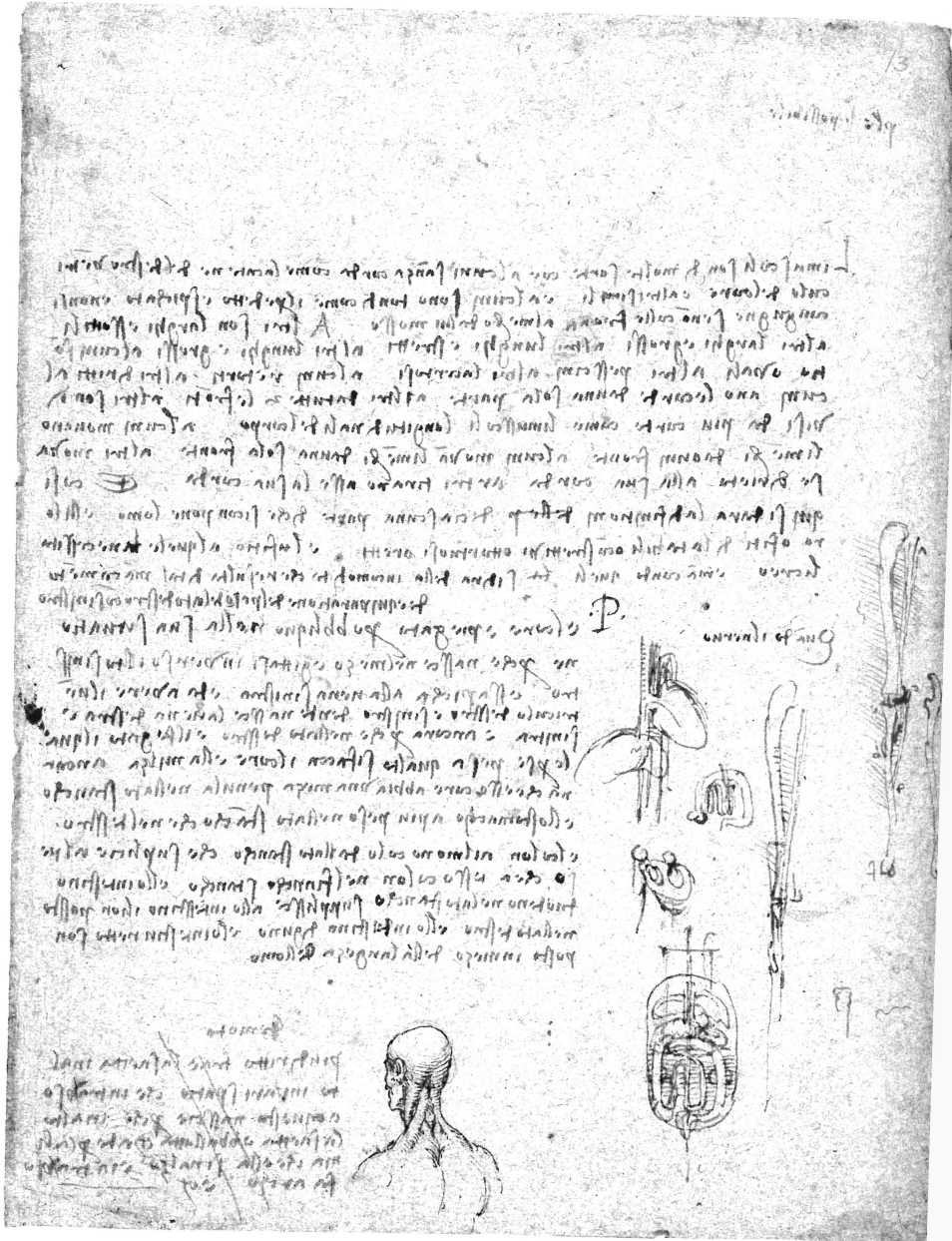


4. Leonardo da Vinci, *The muscles of the leg, with notes*, ca. 1506 (the text on the verso was begun around 1489, with additions which must be dated to 1506 or later), Windsor, RL 19037r

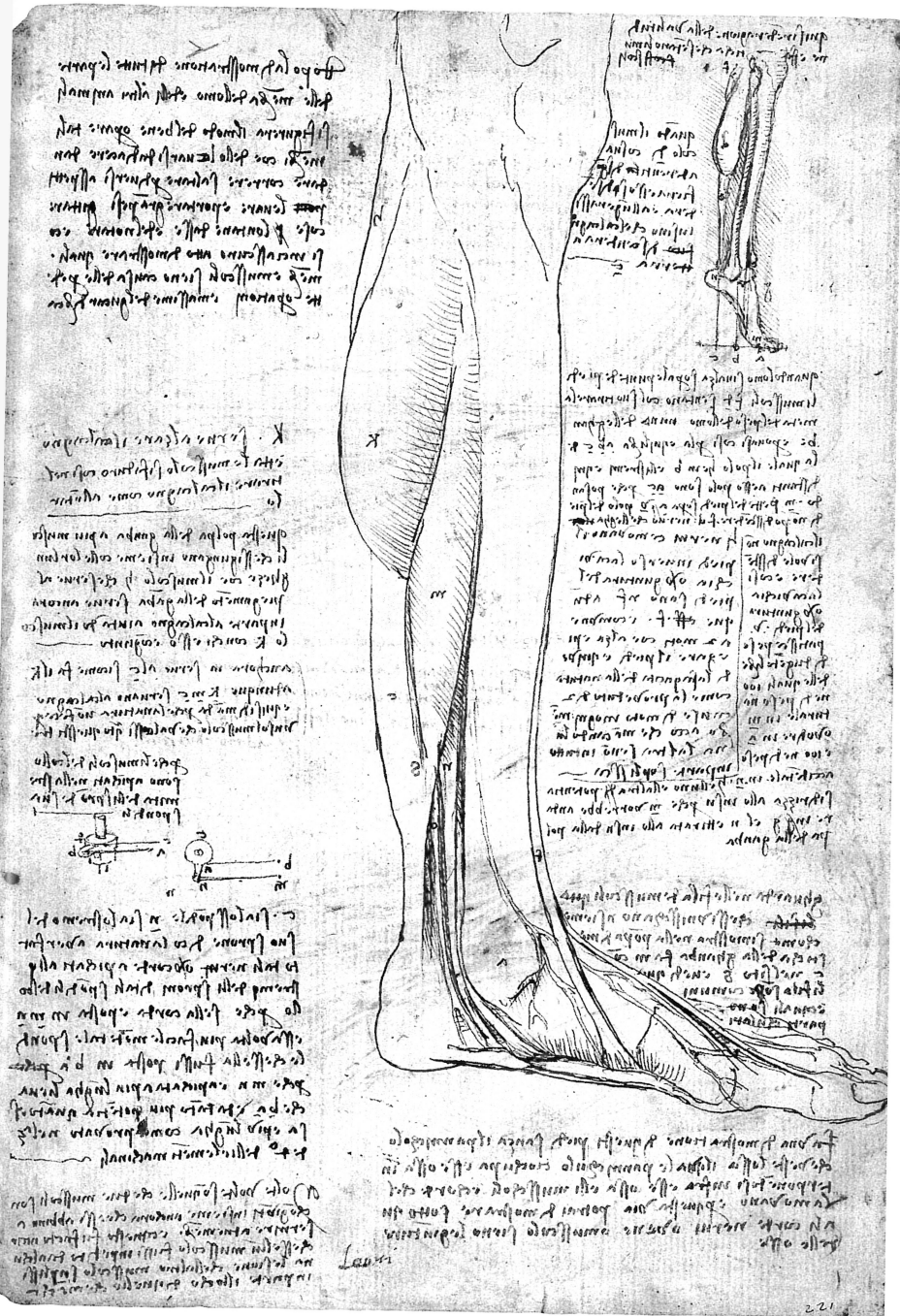
9

The drawing shows a side view of a human leg, with the femur on the left and the tibia on the right. The muscles are depicted with fine lines indicating their fibers and tendons. There are several blocks of handwritten text in Italian, written in a cursive script, surrounding the drawing. The text is oriented vertically and horizontally, following the contours of the anatomical structures. At the top, there are several horizontal lines, possibly representing a different view or a continuation of the text from the reverse side of the page.

5. Leonardo da Vinci, *Sketches and notes on the muscles*, ca. 1513-1516, Windsor, RL 19085r



6. Leonardo da Vinci, *The muscles of the lower leg*, ca. 1509-1510, Windsor, RL 19010v





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7. Leonardo da Vinci, *The head and shoulders of Christ being held by his hair by a hand* (Study for a Christ carrying the cross), ca. 1488-1490, Venice, Gallerie dell'Accademia, Inv. 231

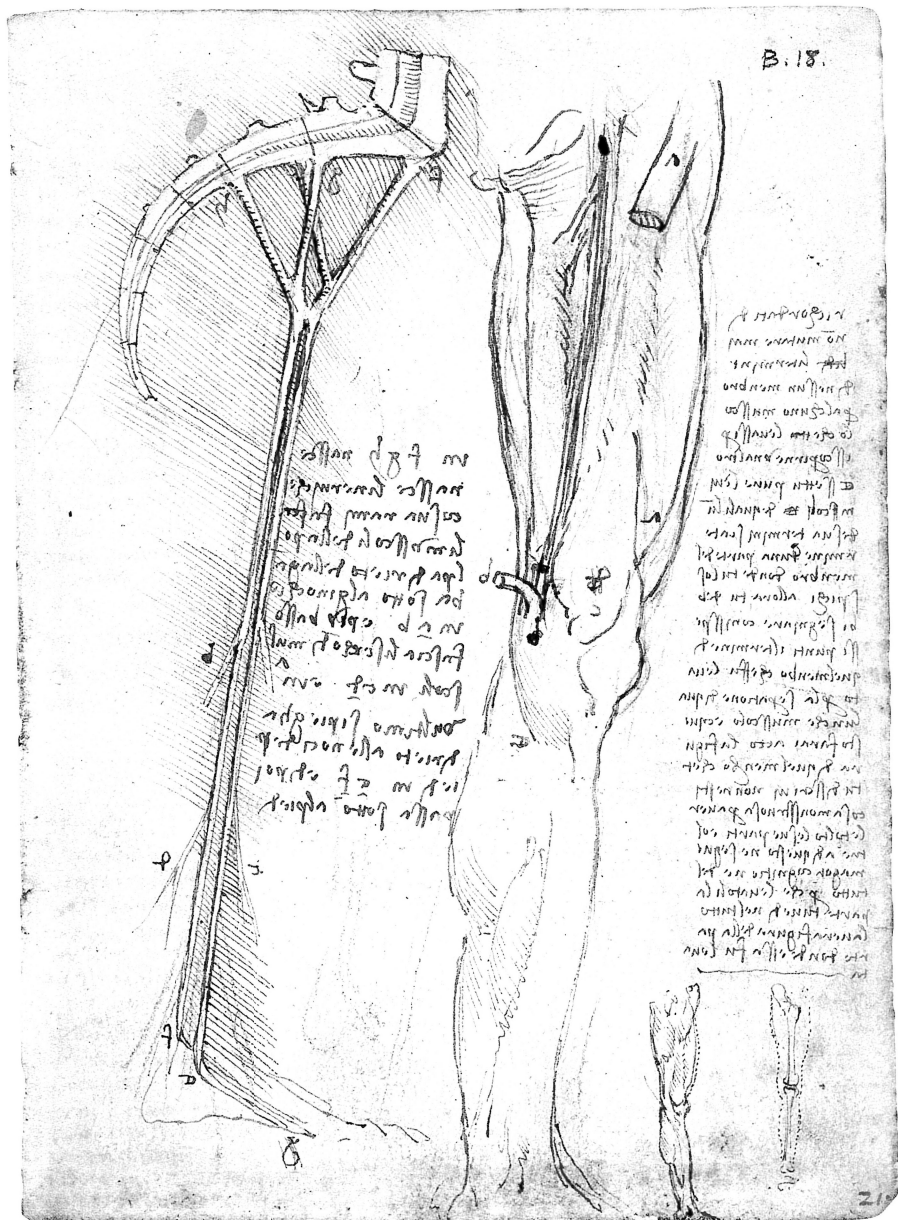


8. Leonardo da Vinci, *Studies for the heads of two soldiers in the «Battle of Anghiari»*, ca. 1503-1504, Budapest, Szépművészeti Múzeum, Inv. 1775

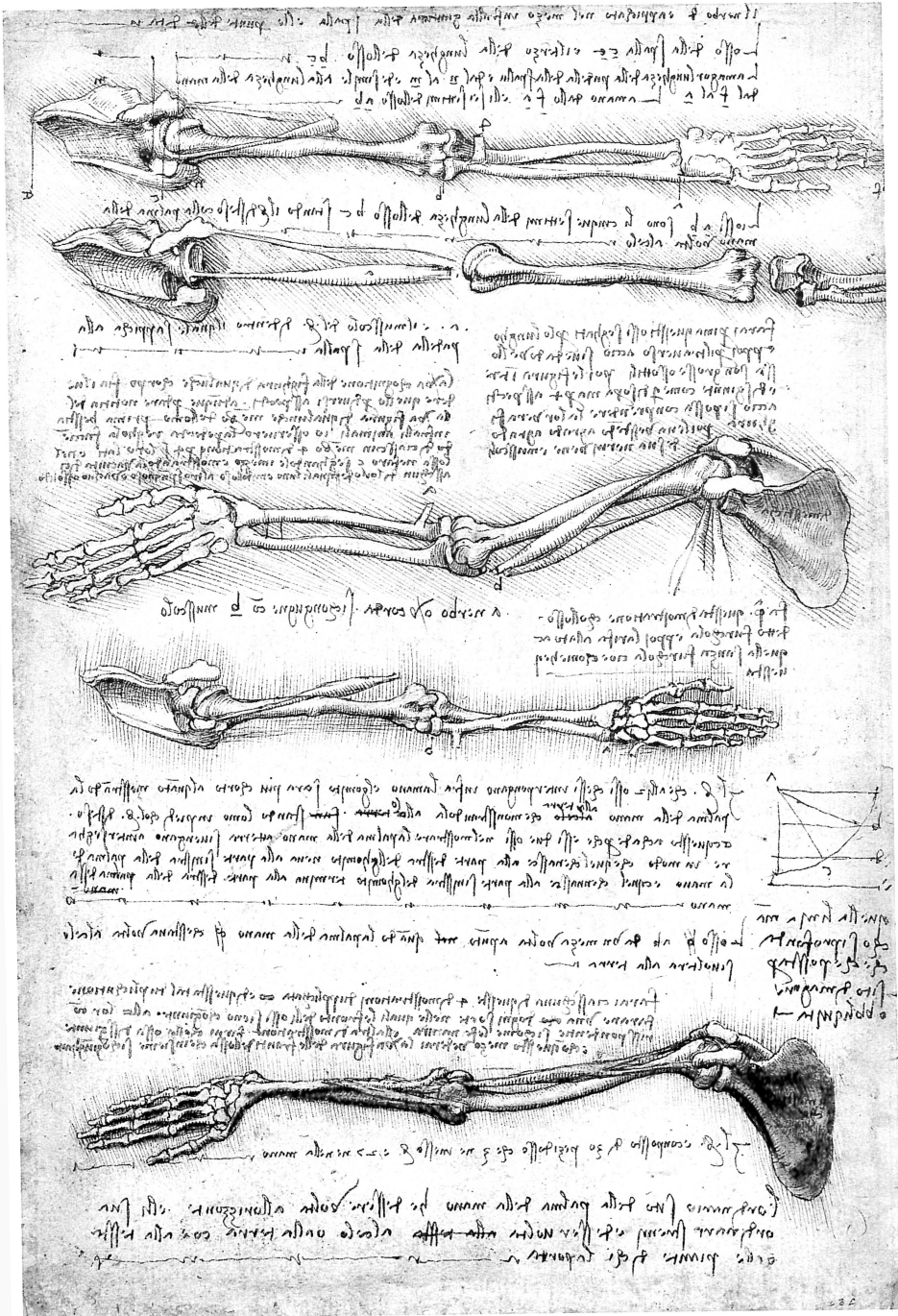


9. Leonardo da Vinci, *Various anatomical studies*, ca. 1485-1487, Windsor, RL 12626r, detail

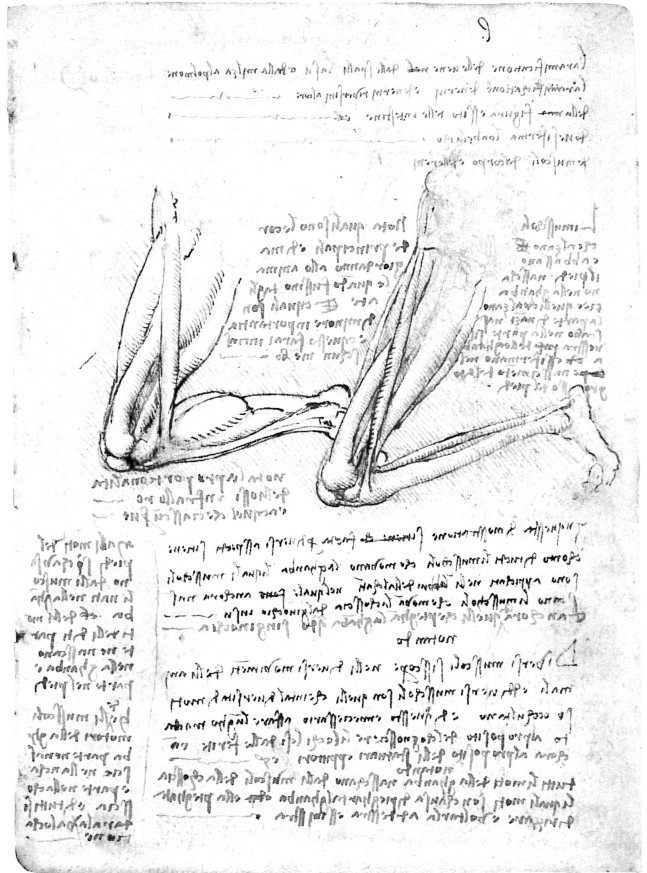
10. Leonardo da Vinci, *The anatomy of the leg*, ca. 1506, Windsor, RL 190351

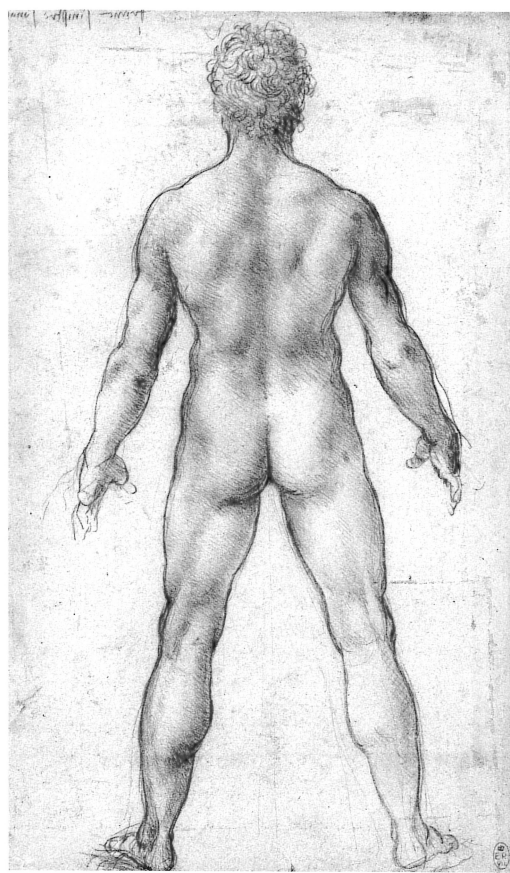
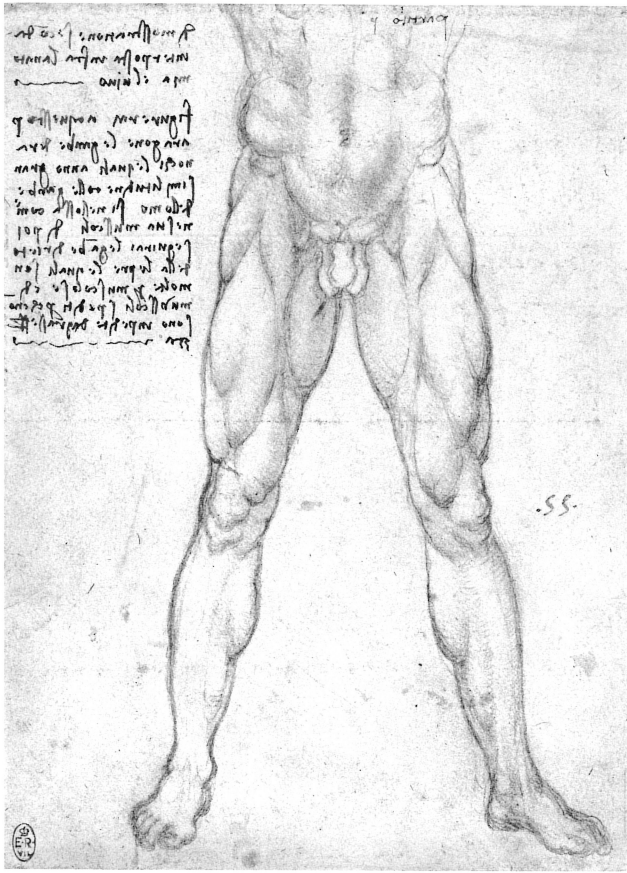


11. Leonardo da Vinci, *The bones and muscles of the arm*, ca. 1509-1511, Windsor, RL 19000v

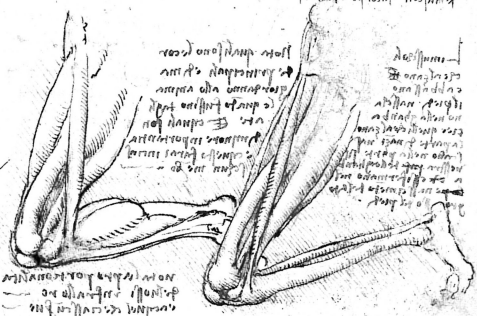


12 A-B-C. Leonardo da Vinci, *Three layers of muscles (anatomy; «second demonstration interposed between the anatomy and the life»; superficial anatomy)*, Windsor, RL 19037r, 12631r, and 12596r



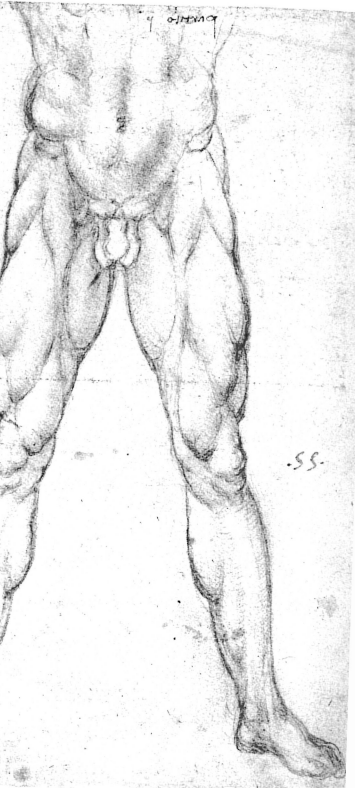


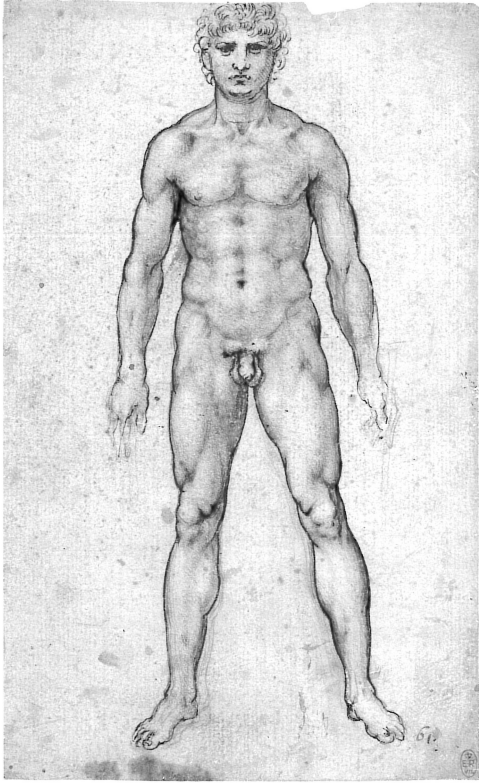
Handwritten text at the top of the page, likely a title or introductory notes.



Handwritten text below the sketches, providing detailed descriptions of the anatomical structures.

Handwritten text on the left side of the second page, possibly a title or notes.

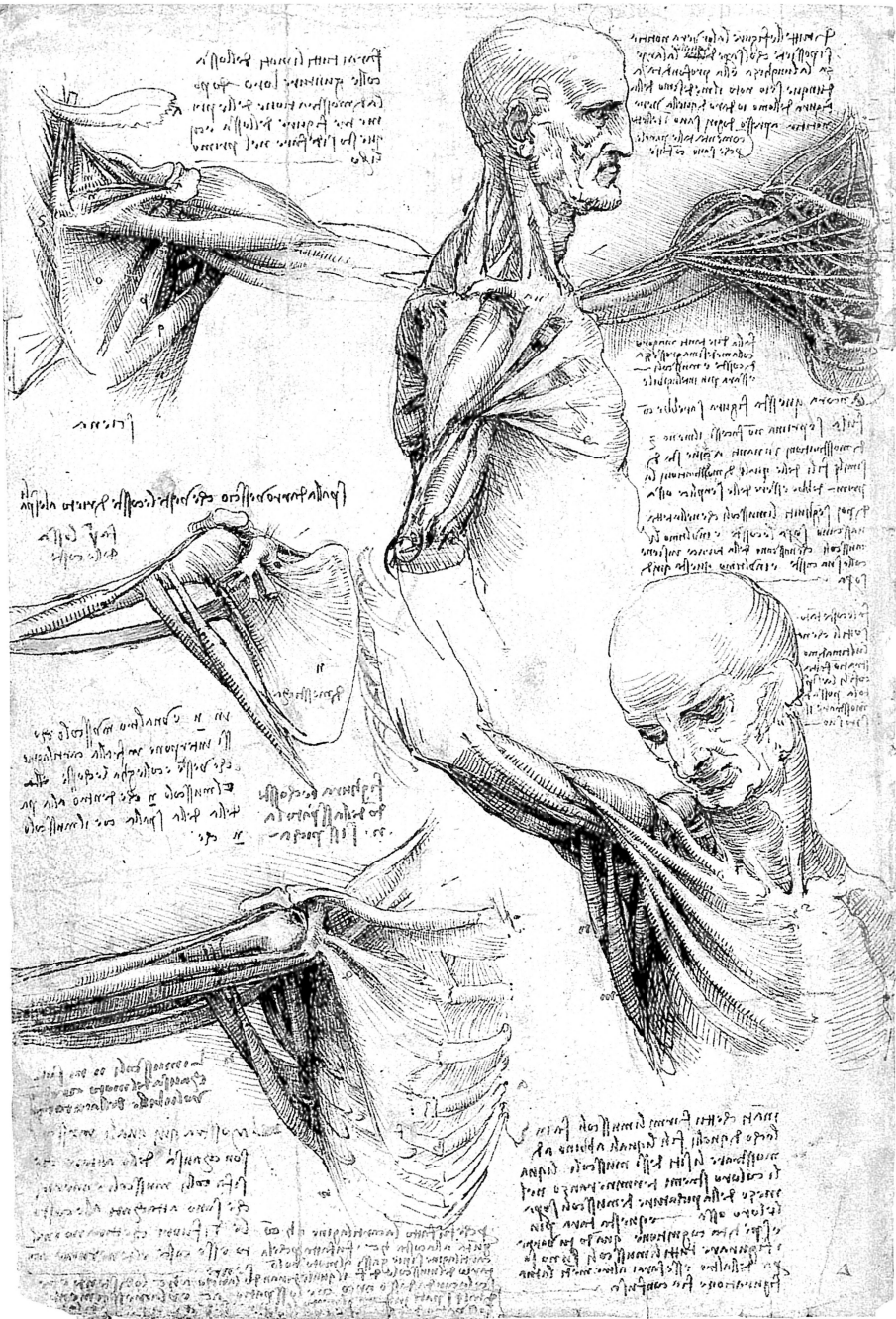


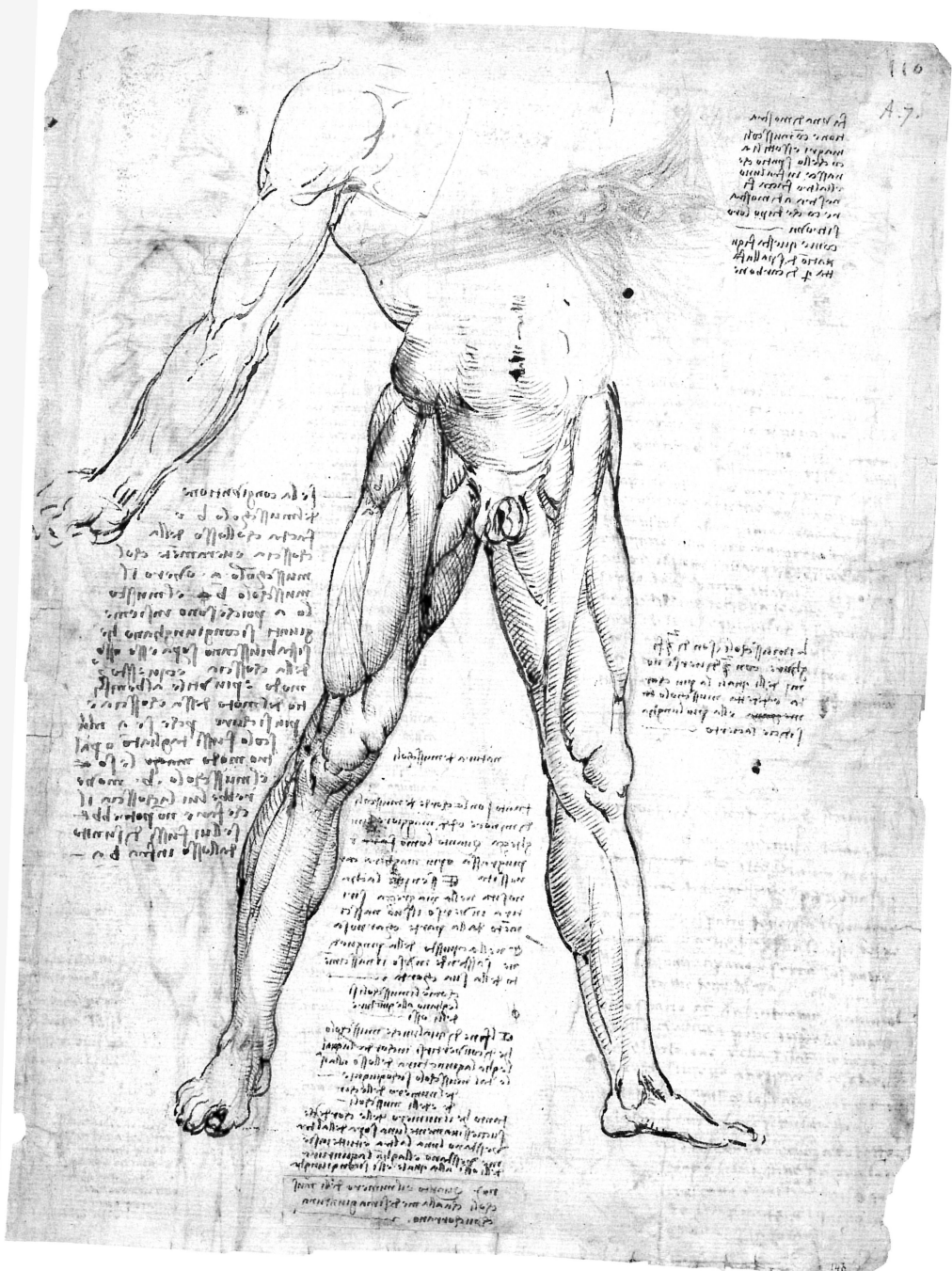


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13 A-B-C. Leonardo da Vinci, *Three layers of muscles* (anatomy; «second demonstration interposed between the anatomy and the life»; superficial anatomy), Windsor, RL 19037r, 12631r, and 12594r

14. Leonardo da Vinci, *The anatomy of the right shoulder*, ca. 1509-1511, Windsor, RL 19003v





110
A.7.

Handwritten text in a cursive script, likely describing anatomical details of the shoulder and upper arm area.

Handwritten text in a cursive script, likely describing anatomical details of the leg and foot area.

Large block of handwritten text in a cursive script, likely describing anatomical details of the lower leg and foot area.

15. Leonardo da Vinci, *The anatomy of the legs, and a sketch of the shoulder*, ca. 1509-1511, Windsor, RL 19014F

16. Leonardo da Vinci, *Diagram of the atria and ventricles of the heart, with notes on the action of the ventricles*, ca. 1513, Windsor, RL 19062r

ANATOMIA DEL CUORE

The diagram illustrates the internal structure of the heart, showing the four chambers: the right atrium (Atrio dextero), right ventricle (Ventricolo dextero), left atrium (Atrio sinistro), and left ventricle (Ventricolo sinistro). The diagram is annotated with numerous handwritten notes in Italian, providing a detailed anatomical and functional description of the heart's components. The notes describe the structure of the heart walls, the valves, and the flow of blood through the chambers. The text is written in a cursive script, characteristic of Leonardo da Vinci's handwriting.

17. Leonardo da Vinci, *The anatomy of the shoulder, arm, and foot*, ca. 1510-1511, Windsor, RL 19013v

