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THE ANATOMICAL STUDIES OF LEONARDO DA VINCI AN ASSESSMENT

To introduce the essays collected in this volume and the conference they resulted from, perhaps it is useful to briefly summarize the history of the most recent contributions dedicated to Leonardo's anatomical work. For the sake of clarity we should identify three areas: specialist studies, more general studies of the history of science and anatomy during the early modern period, and studies of the history of the body, a theme that has been central to humanistic research over the last thirty years.

Let us start with the first area, specialist studies. With some exceptions, which we will mention later on, those that focused on Leonardo's anatomy first of all tried to understand the intrinsic content of his studies according to what is today defined as an "internal" scientific historical approach. In other words, these scholars sought to understand what Leonardo would have analysed and represented from a strictly anatomical point of view. Thus, they considered questions such as: Did Leonardo dissect humans and/or animals? What human anatomical forms did he observe and accurately represent? What physiological functions was he the first to record on paper thereby becoming, in a certain sense, their discoverer? This first branch included authors such as J. Playfair McMurrich, who published his pioneering monograph in 1930, Elmer B. Belt, Charles D. O'Malley and John B. Saunders¹ as well as a whole series of less well-

¹ Here and in the following notes we limit ourselves to mentioning the most representative works of the authors considered. J.P. McMurrich, *Leonardo da Vinci: The Anatomist (1452-1519)*, Baltimore 1930; E. Belt, *Leonardo the Anatomist*, Lawrence 1955, and Id., «Leonardo da Vinci's Studies of the Aging Process», in: *Geriatrics*, VII,

known contributions often written by doctors and published in journals of medicine or the history of medicine. The greatest representative of this “internal” branch of study is Kenneth D. Keele², although we should specify that in his more general book, *Leonardo da Vinci's Elements of the Science of Man*, the author went beyond the “internal” approach – at least regarding the history of science and some more technical aspects of the artistic works – surpassing the limits of anatomy to embrace other areas of Leonardo's activities.

This approach has produced highly important studies that only a biased historiographical vision could define as archaic. It is true that these researches, at least in some cases, lack historical sensibility because, in emphasising the theme of the comparison between Leonardo's medical knowledge and ours, they lose sight of the context in which his reflections on the body were formed. But those publications had a different purpose and value: they set out to shed light on the intrinsic anatomical content of the artist's drawings and thus represented and still represent an important starting point for each subsequent and more complex historical reconstruction of Leonardo's work in this field. We limit ourselves to a single example among many possible ones. In the successful monograph by O'Malley and Saunders³, published in 1952, the artist's anatomical studies are presented according to a classification arranged by systems: the bone system, the muscular system, the nervous system and so on, one distinct from the other, according to an analytical model that dominates in contemporary anatomy. These systems were indeed introduced in the Renaissance, but after Leonardo and mainly by Andreas Vesalius. Leonardo's approach to anatomy was obviously also aware of analytical phases of attention to the individual anatomic systems and the slightest

1952, pp. 205-210, reprinted in: *Raccolta Vinciana*, XVII, 1954, pp. 91-116; C.D. O'Malley & J.B. Saunders, *Leonardo da Vinci on the Human Body*, New York 1952.

² Among the works by K.D. Keele see: *Leonardo da Vinci on Movement of the Heart and Blood*, London/Philadelphia 1952; «Leonardo da Vinci's Influence on Renaissance Anatomy», in: *Medical History*, VIII (IV), 1964, pp. 360-370; *Leonardo da Vinci. Elements of the Science of Man*, New York/London 1983; finally, the fundamental work, in collaboration with C. Pedretti, *Leonardo da Vinci: Corpus of the Anatomical Studies in the Collection of Her Majesty the Queen at Windsor Castle*, London/New York 1979-1980, 3 Vols.

³ O'Malley & Saunders, 1952 (as in n. 1).

details highlighted during dissection, but it was guided by a general philosophical vision dominated by the relationship between the individual systems and parts of the body as a whole or, at least, more limited but organic composites like the arm, the hand, the torso and so on. Relationships that a contemporary anatomist would define as “topographic” (*topographic anatomy*), but for a Renaissance scholar they were directly connected to general and philosophical notions such as the concept of “harmony”, consisting, as stated, in the relationship between the parts of a whole. O’Malley and Saunders’ book, undervaluing these aspects, demonstrates its historical limitations by ignoring the context in which Leonardo lived and worked. On the other hand, the clarity and orderliness with which the two authors present the intrinsically anatomical content of his drawings makes their book an essential tool to this day and the same can be said of Keele’s fundamental studies.

Between the 1960s and 1980s a double revolution occurred in the field of specialist studies on Leonardo’s anatomical work. One of these two revolutions was mainly “philological” in nature, the other more “hermeneutic” or “interpretative”. The main character of the first was Carlo Pedretti, and the other Martin Kemp.

Pedretti – above all in the monumental *Corpus* of anatomical drawings at Windsor⁴, but already in numerous previous essays and starting from points of inspiration in the work of Kenneth Clark – provided a broad and detailed philological framework for Leonardo’s anatomical sheets: dates and physical relationships between the various groups of anatomical sheets; moreover, he realized that some medicine sheets belonged to pages of other manuscripts by Leonardo. The anatomical texts, drawings and sheets cease to be excerpts isolated from their context, fragments of an anthology. As far as da Vinci’s anatomical project is concerned, Pedretti added the philological approach that Gerolamo Calvi had previously used for other sheets and manuscripts by Leonardo and that Clark, as an art historian, had employed for the chiefly iconographic and graphic aspects of Leonardo drawings.

⁴ K.D. Keele & C. Pedretti, *Leonardo da Vinci: Corpus degli studi anatomici nella collezione di Sua Maestà la Regina Elisabetta II nel Castello di Windsor*, Firenze 1980-1984, 3 Vols. (Italian edition of the work mentioned in n. 2).

The other (hermeneutic) revolution is due to Kemp, in a great number of contributions, but above all in two articles, published in 1971 and 1972 in the *Journal of the Warburg and Courtauld Institutes*⁵, and the rich monograph on Leonardo dating from 1981⁶. Kemp introduced Leonardo's anatomical studies in the context of other fields of his scientific and artistic work, dedicated much attention to the epistemological implications of the anatomical drawings and finally showed that many of them only gave the illusion of being "realistic": he demonstrated that they were instead visualizations of preconceived theories, such as those concerning the soul, the spirits and the humours. Ernst H. Gombrich had already previously shown something similar in relation to the essentially artistic aspects of Leonardo's work. Kemp radicalized and developed this method in the context of the anatomical drawings, accomplishing a fundamental process of historical "disillusionment", namely taking Leonardo back to the reality of the era in which he had lived.

In the authors considered up to this point, and even in the more recent contributions by an art historian such as Martin Clayton, alert to the technical and visual elements of the anatomical drawings and assisted, for the more "internal" or anatomical part, by the doctor Ron Philo, the most theoretical elements of Leonardo's anatomical work, those concerning, for example, the body and its relationship to the soul, spirits and emotions, were essentially seen as a «collapse of empiricism»⁷ and a deplorable debt towards theories inherited from the previous tradition.

The most recent research, in particular that by Domenico Laurenza, has instead given a more positive interpretation to these theoretical elements of Leonardo's anatomy, enhancing, as much as possible for a non-systematic author like Leonardo, the philosophical aspects: from a more

⁵ M. Kemp, «Il concetto dell'anima in Leonardo's Early Skull Studies», in: *Journal of the Warburg and Courtauld Institutes*, XXXIV, 1971, pp. 115-134; Id., «Dissection and Divinity in Leonardo's Late Anatomies», in: *Journal of the Warburg and Courtauld Institutes*, XXXV, 1972, pp. 200-225.

⁶ M. Kemp, *Leonardo da Vinci: The Marvellous Works of Nature and Man*, London 1981 (2nd ed., Oxford 2006).

⁷ M. Clayton & R. Philo, *Leonardo da Vinci: The Anatomy of Man*, Houston 1992, p. 21. Other contributions by Clayton have appeared in the catalogues of general exhibitions dedicated to Leonardo's drawings at Windsor.

general point of view of the history of thought, for example in connection to the concept of “harmony”⁸; in relation to the most distinct problems, for example those concerning the relationship between the various areas of Leonardo’s research⁹; and finally in relation to the historical contexts that form the backdrop to Leonardo’s anatomical and philosophical reflections¹⁰.

Other authors¹¹ have then favoured the study of more intrinsically visual aspects of the anatomical studies in relation to perspective, with a curiosity that was not so purely “technical” as that demonstrated in previous studies¹² and therefore more open to the theoretical dimension. Some recent essays are, finally, just as alert to the cultural context of Leonardo’s anatomical research as well as the topicality of their teachings – such as the cognitive value of his studies, his relationship with death and the history of the body in the Renaissance¹³ or the surprising polysemantic values inherent in some of his more particular studies, such as those on the anatomy of the hand and its representation¹⁴.

If we leave the specialist studies on da Vinci and instead turn to examine the more general histories of science, medicine and anatomy of the

⁸ For example, in connection with the idea of “harmony”, in D. Laurenza, *La ricerca dell’armonia: Rappresentazioni anatomiche nel Rinascimento*, Firenze 2003.

⁹ Id., *De figura umana: Fisiognomica, anatomia e arte in Leonardo*, Firenze 2001.

¹⁰ Id., *Leonardo: L’anatomia*, Firenze 2009.

¹¹ R. Zwijnenberg, *The Writings and Drawings of Leonardo da Vinci: Order and Chaos in Early Modern Thought*, Cambridge 1999.

¹² K.H. Veltman, with the collaboration of K.D. Keele, *Studies on Leonardo da Vinci, I. Linear Perspective and the Visual Dimensions of Science and Art*, München 1986. See also the “technical” article by M.W. Kwakkelstein, «New Copies by Leonardo after Pollaiuolo and Verrocchio and his Use of an Écorché Model», in: *Apollo*, CLIX, 2004, pp. 21-29.

¹³ See for example A. Nova, «La dolce morte: Die anatomischen Zeichnungen Leonardo da Vincis als Erkenntnismittel und reflektierte Kunstpraxis», in: *Zeitsprünge*, IX, 2005, Heft 1-2, pp. 101-130; Id., «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. The two texts address different general problems, although at times the material overlaps. See also O. Breidbach, *Bilder des Wissens: Zur Kulturgeschichte der wissenschaftlichen Wahrnehmung*, München 2005, pp. 17-19.

¹⁴ L. Dovev, «On the Hand from Within: Palms, Selfhood and Generation in Leonardo’s Anatomical Project», in: *Leonardo*, XLIII, 2010, pp. 63-69.

early modern period, we realise that the interest in Leonardo has recently diminished – a specific problem of those disciplines, as the field of art history has always enjoyed a lively interest in the artist-anatomist¹⁵. In a widely circulated manual on the history of science Leonardo is not even mentioned and it is not difficult to understand why, as the author writes: «The fact that the new science was born and developed like a public and collective enterprise represents, in my opinion, its most characteristic aspect»¹⁶. Indeed, the scientists of what we call the Scientific Revolution understood their mission as the exchange of ideas, publication and debate. Leonardo instead was never able to publish his research: thus he remained outside of this dialogue and this history of science understood as progress through sharing and the exchange of notions. Nevertheless, there are clear signals of a reversal of trend in the most recent history of science and of greater interest in the solitary figures who worked outside the great networks of communication. The approaches proposed by recent specialist studies, briefly outlined above, have contributed to this – particularly those addressing problems of visual culture, the history of the body and thought as they are set in specific historical contexts – as well as the recent Leonardo exhibitions organized by the Istituto e Museo di Storia della Scienza in Florence (recently renamed, in June 2010, Museo Galileo)¹⁷.

The papers of this conference also move in the same direction. Organized and hosted by an art historical institute – the Kunsthistorisches Institut in Florenz – belonging to the Max-Planck-Gesellschaft, which finances not only numerous scientific research institutions but also programmes on the history of science, it attempts to give voice to the various approaches described above, from the most internal and medical (unfortunately limited to Rolando Del Maestro as the contribution by the cardiologist Francis Wells is not included) to the most philological and lin-

¹⁵ See for example A. Carlino, *La fabbrica del corpo: Libri e dissezione nel Rinascimento*, Torino 1994; J. Sawday, *The Body Emblazoned: Dissection and the Human Body in Renaissance Culture*, London/New York 1995; R. Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, London 1997.

¹⁶ M. Mamiani, *Storia della scienza moderna*, Roma/Bari 1998, p. 75.

¹⁷ *La mente di Leonardo: Nel laboratorio del Genio Universale*, ed. by P. Galluzzi, Firenze 2006; *La mente di Leonardo: Al tempo della «Battaglia di Anghiari»*, ed. by C. Pedretti, Firenze 2006, esp. pp. 124-155 (text by D. Laurenza).

guistic (Carlo Vecce and Maria Rosaria D'Anzi for the verbal language as well as Carmen Bambach for the iconographic implications), from the analyses most strictly concerned with art history and visual culture (Alessandro Nova and Hana Gründler) to issues of the history of science alert to the historical contexts and sources (Monica Azzolini and Domenico Laurenza), while the examination of the main aspects proposed by Carlo Pedretti provides an example of how the most refined specialist culture can result from wide-ranging reconstructions.