

LEONARDO DA VINCI AND VESALIUS: A REVIEW.*

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IT has long been accepted that the founder of modern anatomy was Andreas Vesalius, and that, in anatomy, the awakening of the necessity for exact personal observation dates from the publication of his great work, *De fabrica corporis humani*, in 1543. Within the last four years, however, attempts have been made to disenthroned Vesalius from his proud position, to expose him as a gigantic plagiarist, and to establish in his place the great Florentine artist, Leonardo da Vinci.

Such attempts have naturally been provocative of further inquiry into the grounds upon which they were based, with the result that we now possess a much more accurate appreciation of the position to be assigned to both Vesalius and Leonardo in the history of anatomy.

The indictments against Vesalius are two in number, the most sweeping being that of Jackschath (1), who maintains that Leonardo wrote a work on human anatomy with abundant illus-

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trations, a work, however, which is "not to be found complete in the manuscripts of the painter preserved in Milan, London, Paris, but * * * has been fortunately preserved for us in the *Fabrica* of Vesalius," meaning thereby that Vesalius' *Fabrica* is a wholesale plagiarism of Leonardo's work. The second indictment, also of plagiarism, is by von Töply (2), who claims that Vesalius borrowed without acknowledgment certain figures published by Estienne (Stephanus, 1539).

We may consider briefly, first of all, the second, lesser charge which has been discussed by Roth (3), who finds that instead of Vesalius plagiarizing Estienne, the matter is really the reverse. Von Töply's case is based principally upon the occurrence in the work of Estienne of a series of four figures representing the skeleton from: first, the anterior surface; second, the left side; third, the dorsal surface; and fourth, the right side; upon the facts that a hyoid, malleus and incus are placed at the feet of figure 1, and that that same figure stands beside a tree-trunk to which is attached a plate bearing the name of the engraver, Jollat, and the date 1532. Vesalius has, in his *Tabulae Anatomicae*, published in 1538, a series of three skeletons, representing an anterior, a posterior, and a lateral view (the right side); in the lateral view given in the *Fabrica* (but not in that of the *Tabulae*) are represented, in addition to the main figure, a hyoid, malleus and incus; and in the dorsal view of the *Tabulae* the figure stands beside a tree-trunk, against which leans a shield. The series of Vesalius, therefore, shows many similarities to that of Estienne, and the date of Estienne's fourth figure (1532) proves that his series was developed long before that of Vesalius.

The similarities certainly give ground for suspecting plagiarism on the part of one author or another, and if the date of the Jollat figure be accepted as good evidence, the burden of exoneration lies with Vesalius. Roth assumes this burden and completely turns the tables. In the first place, it must be noted that the first portion of Estienne's work was printed in 1539, but the entire work did not appear until 1545, emendations of the part printed earlier seeming to have been made in the interval; and, further, that a second edition appeared in French in 1546. The 1545 edition does not contain the Estienne skeleton series, but only an anterior and posterior view; the lateral views appear first in the 1546 edition. Estienne's series, then, was not developed until three years after the publication of the *Fabrica* and until eight years after the publication of the *Tabulae*, and, further-

more, it may be noted that one of the missing figures is that which bears Jollat's signature and the date 1532. But this is not all. Between Estienne's anterior and posterior views on the one hand (one of which is by de la Rivière), and the lateral views on the other (one of which is by Jollat) there are marked differences in the drawing. The former, for instance, show oblique shading of the long bones, the latter transverse; and the illumination of the latter is sometimes from the right and sometimes from the left. Estienne's series, then, is evidently a composite, while Vesalius' is uniform throughout, the shading being more perfect and the illumination in all the figures being from the right.

Here, then, are two important points both of which tell strongly in favor of Vesalius, and indicate that the skeleton series of Vesalius was quite independent of that of Estienne. And there is still more. The small bones added to the lateral view of the *Fabrica* are a hyoid, a malleus and an incus, but those at the feet of Estienne's anterior view are not the same, as von Töply states, but instead of a malleus and incus there are two laryngeal cartilages, some tracheal cartilages and the semi-lunar cartilages of the knee-joint, these last structures having been discovered by Vesalius, although Sylvius later claimed priority. Roth maintains that Vesalius' artery and vein figures of the *Tabulae* appear in Estienne's 1545 edition poorly reproduced, and that the Jollat figure of the skeleton, though earlier than the corresponding figure by Vesalius, was quite distinct from it and was introduced by Estienne into his 1546 edition, just as other figures with the same signature were introduced, two of which were also used by Berengario da Carpi (1470-1530).

The date of the Jollat figure does not, then, indicate the date of Estienne's skeleton series, and there seems little reason for believing that Vesalius was indebted to this figure for his lateral view, the two figures differing so markedly, both artistically and anatomically. It being out of court, there remains only the question whether Estienne's artist, de la Rivière, borrowed from Vesalius the anterior and posterior views of the skeleton or *vice versa*. The fact that Vesalius' figures were published in 1538 in the *Tabulae Anatomicae*, while Estienne's were not printed until 1539, directs suspicion to Estienne, and the suspicion increases when the heterogeneity of Estienne's series is compared with the homogeneity of that of Vesalius, and when the matter of the knee-joint menisci is taken into consideration. De la Rivière's

tree-trunk, with the attached initialed plate, may well be, as Roth supposes, an imitation of the tree-trunk of Vesalius with the shield leaning against it, and from all the evidence adduced, only a part of which is presented here, one must be strongly inclined towards Roth's conclusion that "Estienne's engraver and artist, de la Rivière, in the preparation of the anterior and posterior views of the skeleton, had before his eyes Vesalius' *Tabulae Anatomicae* of 1538."

Turning now to the more important charge of Jackschath, that the *Fabrica* of Vesalius is a wholesale plagiarism of a lost treatise on anatomy by Leonardo da Vinci, it may be stated at once, that while the accusation must be regarded as unsupported by sufficient evidence, to say the least, yet its author has performed a good service in awakening the attention of anatomists to the remarkable and precocious investigations carried on by Leonardo in anatomy, and for this we may be grateful even while deploring the extreme position to which his enthusiasm for Leonardo has carried him.

To most of us Leonardo is familiar as a painter, the creator of "The Last Supper" in the refectory of the Convent of Santa Maria delle Grazie, in Milan, and of the "Mona Lisa" in the Louvre. His activities extended far beyond this, however, for as the editors of an English edition of Vasari's "Lives" say of him: "He was painter, sculptor, architect, engineer, musician, philosopher, chemist, botanist and geologist" (and, they ought to have added, anatomist). It would be interesting to detail some of his achievements in the fields of activity mentioned, for in many of them he surpassed all his predecessors and added to the knowledge of his time many valuable discoveries and suggestions. But it is to his anatomical investigations that our attention must be confined.

Born in 1452 at the Castle Vinci, in the valley of the Arno, about midway between Pisa and Florence, Leonardo showed in his boyhood considerable talent in drawing and modeling in clay, and about 1470 he was placed with his father's friend, Andrea Verrocchio, that he might receive instruction in these arts. Verrocchio owes his reputation rather to his work in bronze than to his painting, his equestrian statue of the Condottiere Bartolomeo Colleoni in Venice being one of the most splendid examples of that form of art which we possess. He is said to have made casts of limbs for the purpose of study, and it may be presumed that from him Leonardo received a stimulus toward a more

thorough knowledge of the structure of the human body. The native force, however, which compelled Leonardo to anatomical studies was inherent in the man; it was his unquenchable desire to prove all things. "Experience," he says, "is the interpreter between artistic nature and man," and long before Bacon, as Raab (4) points out, he made use of the inductive method. At what time and under what circumstances Leonardo began his anatomical studies is unknown.

About 1482, according to Richter (5), he left Florence for Milan, to take service under Ludovico Sforza, and it seems to be unquestionable that while there he carried on anatomical studies, for in one of his manuscripts is the memorandum: "On April 2, 1489, the book entitled 'On the Human Body,'" a statement usually interpreted as meaning that he began a book with that title on that day. Whether he began his anatomical studies while still in Florence is unknown, but it seems certain that they were principally carried on in Milan. Though conducted on a somewhat extensive scale they were planned on an even more extensive one, for from one of his manuscripts we learn that he investigated every part twice in order to learn their difference and regarded repeated dissections as absolutely necessary. Three are necessary, he says, to obtain a knowledge of the arteries and veins, three for the anatomy of the integuments, three for the nerves, muscles and ligaments, three for the bones and cartilages, three for the bones, which must be sawed in pieces to determine which are hollow, which spongy, and which contain marrow, etc. Then dissections of three female bodies are necessary. He told Cardinal Louis of Aragon, in 1516, that he had dissected more than thirty bodies, male and female, of various ages. Speaking of his projected book he says: "This work must begin with conception "in the body of the mother. The nature of the uterus is to be "described, how the foetus exists therein, in what degree of "development it leaves it, and how it lives and is nourished. Its "growth in different intervals is to be investigated, the causes "which determine its birth and the causes why it is frequently "born too soon. Then describe what parts, after the child is born, "grow more than others, and give the proportion of a one year "old child. Then describe the adult male and the adult female "and give their proportions, further the nature of their internal "constitution, their colors and their physiognomies. Then "describe how the body is composed, of veins, nerves, muscles, "bones. This thou wilt do in the last book. Then represent in

"four views four universal emotions of man, that is to say, joy,
 "with the different kinds of laughter, weeping in various manners,
 "quarreling, with different movements of the death stroke, fright,
 "fear, fierceness, cruelty, murder and the like. Then draw a
 "figure at work pulling, pushing, carrying, standing and the like.
 "Then describe the attitudes and the movements. Then perspec-
 "tive, the functions of the eye and ear and brain (I will also speak
 "of music) and describe all other senses. Then describe the
 "nature of the senses. We shall represent the actual figure of
 "man in—figures, that is to say from the front, showing the
 "height and the form of the bones, the second figure seen in
 "profile will show the depth of all parts. The third will represent
 "the bones from behind. Then we shall make three other figures
 "in similar views, with the bones sawed in parts so that their
 "thickness and cavities may be seen. Three other figures of the
 "complete bones and the nerves which come from the spinal
 "thickness and cavities may be seen. Three other figures of the
 "the bones and veins and where they are distributed, then three
 "with muscles and three with skin and showing proportions, and
 "three of the female to show the uterus and the venæ menstruales
 "which pass to the breast." In another place he says: "Thou hast
 "also to figure in thine anatomy the development of parts from
 "the creation of the man to his death, and after his death, what
 "bones are first destroyed and what persist longer; also the condi-
 "tion of extreme thinness and extreme stoutness are to be
 "represented" (6).

Whether the book thus comprehensively projected was ever
 completed is more than doubtful. Vasari (7) says that he "filled
 a book with drawings in red crayon outlined with a pen, all the
 copies made with the utmost care (from bodies) dissected by his
 own hand. In this book he set forth the entire structure, arrange-
 ment and disposition of the bones, to which he afterward added
 all the nerves, in their due order, and next supplied the muscles.
 Of each separate part he wrote an explanation in rude characters
 written backwards and with the left hand, so that whoever is not
 practised in writing, cannot understand them, since they are only
 to be read with a mirror. Of these anatomical drawings of the
 human form a great part is now in possession of Francesco da
 Melzo, a Milanese gentleman * * * who sets great store by
 these drawings and treasures them as relics."

This description tallies admirably with the manuscripts of
 Leonardo now in the Royal Library at Windsor, but these cannot

be regarded as forming a complete treatise on anatomy. Leonardo says himself that he hoped to complete his anatomy in the spring of 1510, but it appears that he was still pursuing his anatomical studies in 1514 in Rome, when, on account of his having practiced dissection, he was denied admission to the hospital by Pope Leo X. It seems from this that his expectations were not fulfilled, and in the succeeding years he was with Francis I of France in the north of Italy and later in 1516 accompanied him to France, and took up his residence at the Château Cloux, near Amboise, where he died in 1519. Richter believes that his residence in France must have been more or less that of an exile, France being at that time far behind Italy in culture, and it seems improbable that he would have, in a French provincial town, the opportunities necessary for the completion of his anatomical studies.

But the manuscripts which are still extant, even if Leonardo had made no later additions to these, are sufficient to stamp him as an anatomist far in advance of his time, as one who, for himself, cast aside the traditional anatomy of the day and pursued the methods of modern anatomy; and this, fifty or sixty years before the final establishment of anatomy upon the basis of actual observation, which resulted from the publication of Vesalius' *Fabrica* in 1543. In the fifteenth century, anatomy was bound fast by Galenic tradition; indeed, it was worse than this, for the accepted authorities were Latin translations of the Arabian commentaries of Galen. For so low had the study of the classics fallen that there were few who could read the original text of Galen. Mondino, it is true, had written a small work of forty-four pages as early as 1315 and had made actual dissections, being the first since the Ptolemaic anatomists to dissect a human body. For the most part, however, his work was based upon the statements of the Arabists, Hyrtl stating that much of it was copied verbally from the Latin translation of the Canon of Avicenna. The book was nevertheless for two hundred years the standard in the medical schools; it was first printed in 1498, and successive editions appeared until 1550, in which year a commentary upon it was published in Pavia by Matteo Corti. Indeed, it was even prescribed by law as well as by custom as *the* text-book of anatomy. Thus, in Leonardo's time, the books on anatomy were translations of translations of Galen, and so corrupt had the text become that Marc Antonio della Torre, professor of anatomy at Pavia in the early part of the sixteenth century, felt obliged to

petition for and obtained permission to substitute Galen in the original for Mondino in his teaching.

Leonardo certainly studied the works on anatomy in favor in his day, references to Mondino and Avicenna occurring in his manuscripts, and a reference to Galen has also been noted. But he refused to be bound by mediæval traditions, as were his contemporaries, but worked out his own anatomy by personal observation. Compared with the anatomy of his contemporaries it was as light to darkness. The man who at the beginning of the sixteenth century could draw up such a plan for anatomical investigation as that which has been quoted, could not fail to stand pre-eminent in the history of anatomy, even although his plan was only partially carried out.

Not only in his method of acquiring knowledge was Leonardo far in advance of his times; he also far excelled his contemporaries in the art of presenting his knowledge. For he was the first to recognize the value of systematic illustrations in anatomical description. Not that manuscript anatomical illustrations were unknown, for in Leonardo's time illustrations were used (8) in the works of de Ketham (*Fasciculus medicinae*, 1491), Pegligk (*Philosophiæ naturalis compendium*, 1499), Hundt (*Antropologium*, 1501), and Frisius (*Spiegel der Artzney*, 1515). But these figures were few in number; they were rather for illustration than for instruction, and were far from true to nature. It was not until after Leonardo's death that Berengario da Carpi (1521) systematically employed anatomical illustrations, but these were largely diagrammatic and rough in execution, far different from the artistic drawings of Leonardo, and frequently incorrect. Leonardo, as has been seen, planned to represent every part of the body; he fully appreciated the advantage possessed by good drawings over verbal descriptions, and no such combination of artistic ability and zeal in observation has ever been devoted to the service of anatomy.

Many of his figures are preserved in the Royal Library at Windsor, having in some way, probably through the Earl Arundel, Ambassador to the Court of Ferdinand II, Emperor of the Holy Roman Empire, came into the possession of Charles II. They were forgotten after his death, until discovered by Dalton, who served as Librarian to George III. He called the attention of William Hunter to their existence and Hunter wrote concerning them: "I saw, indeed, with astonishment that Leonardo had been a general and a deep student. * * * I believe Leonardo was

by far the very best anatomist and physiologist of his time." A better knowledge of Leonardo's achievement only confirms these words of Hunter; indeed, it was not until the middle of the sixteenth century that any anatomical work was produced that could stand comparison with that of Leonardo.

Before passing on to a consideration of Jackschath's charge, a few words may be said concerning the relations between Leonardo da Vinci and Marc Antonio della Torre. It is generally accepted, mainly on the authority of Vasari, that della Torre and Leonardo were collaborators in anatomy and that a joint work was in preparation, for which della Torre was to prepare the text while Leonardo was to supply the illustrations. Della Torre was born, probably in 1482, in Verona, and belonged to a family already eminent in medicine and law. At the age of eighteen he was called by the Grand Council of Venice to Padua, then under the control of Venice, as public instructor in medicine, and later became Professor of Theoretical Medicine. After a few years in Padua he was called to Pavia, then under the domination of Milan, as Professor of Anatomy. His transference to Pavia cannot have taken place earlier than 1506, for in that year he is recorded as having been still at Padua and six years later he died, before he had reached the age of thirty years (9).

Della Torre apparently wrote upon anatomy, but all traces of his work have vanished. He is supposed by some to have been the teacher of Leonardo and to have secured his services as illustrator for his "anatomy." But there appear to be difficulties in the way of such a belief. From Leonardo's own statement he was already interested in anatomical studies in 1489, while della Torre was a child of seven years of age, and it seems equally clear that Leonardo proposed to write as well as illustrate a treatise on anatomy. That the two were associated in anatomical studies during della Torre's residence at Pavia seems certain; probably they were attracted by a common interest, and the proposal for collaboration may have been made. But that it was seriously entertained by Leonardo seems doubtful in view of his definite statement about his own book and in view of the fact that throughout his manuscripts he never refers to della Torre (5).

To come now to Jackschath's indictment of Vesalius; we have Leonardo's statement that he proposed to write a book on anatomy, that book is apparently lost, in reality it is the *Fabrica* of Vesalius.

Jackschath's contention rests mainly upon the following con-

siderations. *First*, Vesalius was too young a man (twenty-eight years old) in 1543 to have written such a work as the *Fabrica*; *second*, in Leonardo's drawings peculiar symbols are employed for designating the various parts and these symbols are also found in the *Fabrica*; *third*, the *Fabrica* shows evidence of having been written at least as early as 1500, since the anatomists of the 16th century do not seem to have been known to the author; *fourth*, the *Fabrica* presents occasional erroneous treatment of the muscles in close agreement with Galen, and in one place a muscle found only in the dog occurs in a plate although the description is correct in the text. Let us consider these various points briefly:

1. As to the argument regarding Vesalius' youth at the time of publication of the *Fabrica*, it must be remembered that Vesalius began his anatomical studies in Paris probably as early as 1533, that he became Professor of Surgery at Padua in 1537, when only twenty-two years of age, and that in 1540, he had already, as the result of his own observations, become convinced of the inadequacy of the teachings of Galen. Furthermore, let it be remembered that the Renaissance was the period of the awakening of individuality and the casting off of the trammels of mediæval authority, and that the tree of knowledge was laden with ripe fruit ready to the hand of him who had sufficient independence to reach for it. It was, therefore, a period characterized by many examples of brilliant learning. Leonardo himself, and Pico della Mirandola (*monstrum sine vitio*, Scaliger) in Italy, Melancthon, a professor of Greek at Wittenberg at the age of twenty-one, in Germany, and Erasmus, More and Bacon in England, all men of extensive learning, were all products of the time. Vesalius was not an exception; he was possessed of abundant individuality, and that and the age in which he lived made the great work possible. And, after all, is it probable that an artist, such as Leonardo was *par excellence*, could have written the *Fabrica*, which throughout is a medical work (3)?

2. As to the symbols, Forster (10) has subjected them to a careful examination and finds the argument is without foundation. Leonardo's symbols were simply roman letters written backward with the left hand, as all his notes were written. The strange symbols used by Vesalius are, as he tells us himself, characters in common use in printing offices which he had to use after exhausting the Latin and Greek alphabets and numerals. Thus he uses an asterisk, the contraction symbol for *et*, the contraction symbols for *et*, *ro*, etc., symbols not uncommon in the

texts of the day and unemployed by Leonardo. And if Vesalius really stole the figures, why should he retain some of Leonardo's symbols in making the woodcuts? Why are not all the symbols like Leonardo's (3)?

3. Vesalius does refer to the anatomists of the sixteenth century and in no eulogistic terms. He does not, it is true, mention them by name, but several are sufficiently characterized by allusions to be recognizable.

4. It is true that in one of his human figures Vesalius inserts the scalene muscle of a dog, but he states concisely in the text that it is so and that it was done to save repetition of figures.

Jackschath's contention accordingly seems to fail under closer scrutiny, but in another article (11) he brings forward a new example of Vesalius' supposed plagiarism. He finds that if the backgrounds of a number of Vesalius' figures be cut out they can be exactly pieced together to form a single landscape which Jackschath recognizes as a Titian. The implication is that not only did Vesalius appropriate the figures of Leonardo, but he likewise made use of a landscape by Titian to form a background for them. Roth has repeated Jackschath's experiment and practically confirms it, but is the resulting landscape a Titian? Jackschath has offered no evidence that such is the case and the similarity of Vesalius backgrounds to the work of Titian had long before given rise to a belief that the illustrations of the *Fabrica* were from the hand of that artist. Thus in a folio edition of certain of Vesalius' plates published in 1706 the title reads: "Andreæ Vesalii Bruxellensis—Zergliederung des Menschlichen Cörper. Auf Mahlerey und Bildhauerkunst gericht. Die Figuren von Titian gezeichnet. Augsburg, gedruckt und verlegt durch Andreas Maschenbaur, 1706" (8).

Who the artist really was, who is responsible for the plates of the *Fabrica*, is uncertain. They have been ascribed both to Titian and to Christoforo Coroliano. The former, however, at the time of the publication of Vesalius' first figures in the *Tabula* (1538) was sixty-one years of age and had achieved his reputation as a master; and no work by Coriolano is known earlier than 1568, and he was still alive in 1600, so that it seems improbable that he should have coöperated even in the *Fabrica* (1543). There seems to be little question, however, that the *Tabulae* were drawn by John Stephan von Calcar, whose name appears on the title page and whose assistance is acknowledged by Vesalius in the preface. That he also assisted in the preparation of the plates

for the *Fabrica* is probable, since Vesalius, 1539, in speaking of his future works expressed the hope that he might be able to avail himself of Stephan's services. This artist was a pupil of Titian, a fact which would plausibly explain the similarity of the backgrounds to the work of that great artist.

It would seem then, that a case has hardly been made out against Vesalius either by von Töply or by Jackschath. Nor, on the face of it, does it seem likely that he could have stolen so extensively from Leonardo without discovery. Vasari, who was familiar with Leonardo's drawings, makes no mention of Vesalius in his life of Leonardo, published in 1550, seven years after the *Fabrica*, nor does Lomazzo, who boasts himself to be a follower of Leonardo and who states that he saw "at Francesco Melzi's the drawings done by Leonardo's own hand in which he explains the anatomy of the human figure," make any reference to a plagiarism in 1584.

Furthermore, we have the evidence of an eye-witness that Vesalius both wrote and made drawings for the *Fabrica*, in the words of Joh. Caius, an Englishman, who tells us that he lived in the same house with Vesalius in Padua "for eight months, during which time he wrote and drew his books *de fabrica humani corporis*" (3). And it does not seem likely that an unbiased critic could find either in the style or execution of Vesalius' figures or in the treatment of his subject, evidence which would awaken a suspicion of a theft. If he was a plagiarist, how can the virility and learning of his later works be explained? And the reputation, which he achieved as a diagnostician at the Court of Charles V., when he was body physician to the Emperor, surely indicates that he was a man of parts. That he was a diligent and thorough anatomist there can be no question; the evidences of both his skill and zeal are abundant, and if responsibility for the *Tabulae* be admitted, there seems to be no great demand on one's credulity in believing in his responsibility for the *Fabrica*.

We must, then, I believe, continue to regard the *Fabrica* as the product of Vesalius' genius. It is possible that he may have heard of Leonardo's drawings after his arrival in Italy; indeed, he may even have seen them. But this is mere conjecture, and it must be admitted that he was already a diligent and successful investigator of anatomy, and of some renown as such, before he came to Padua in 1537. He was a product of the time just as Leonardo was; it was the Renaissance, the time when men began to observe and think for themselves, to look to original sources

for information and give free play to their individualities. The spirit which moved both Leonardo and Vesalius guided also the less responsive minds of Berengario, and della Torre and later of Fallopius, and Colombo. It was the "Zeitgeist" that produced Leonardo and again Vesalius.

Must we then deprive Vesalius of the crown he has worn so long? Leonardo was the first to create a new anatomy, but he created it for himself alone; Vesalius demonstrated a new anatomy to the world. It was the publication of Vesalius' *Fabrica* that revolutionized anatomy, while Leonardo's drawings were lying unpublished, at first the cherished possessions of his favorite pupil Melzi, later in the Ambrosian Library in Milan, and still later forgotten in the Royal Library at Windsor. We must credit Leonardo as being the forerunner of the new anatomy, but Vesalius must be recognized as its founder.

REFERENCES.

1. JACKSCHATH (E.) Die Begründung der modernen Anatomie durch Leonardo da Vinci und die Wiederauffindung zweier Schriften derselben. *Med. Blätter*, 1902, xxv, pp. 770-772.
2. VON TÖPLY (R.) Aus der Renaissancezeit. (Neue Streiflichter über die Florentiner Akademie und die anatomischen Zeichnungen des Vesal.) *Janus*, 1903, viii, pp. 130-140.
3. ROTH (M.) Vesal, Estienne, Tizian, Leonardo da Vinci. *Arch. f. Anat. u. Physiol.*, Anat. Abth., 1905, pp. 79-95.
4. RAAB (F.) Leonardo da Vinci als Naturforscher. *Berlin*, 1880.
5. RICHTER (J. P.) Leonardo da Vinci. 1880.
6. HOLL (M.) Die Anatomie des Leonardo da Vinci. *Arch. f. Anat. u. Physiol.*, Anat. Abth., 1905, pp. 177-262. Also his: Leonardo da Vinci und Vesal, *Ibidem*, pp. 111-140.
7. VASARI. Lives of the Painters. Ed. by E. H. & E. W. Blashfield & A. A. Hopkins. *New York*, 1905. Vol. 2, p. 367.
8. CHOULANT (J. L.) Geschichte und Bibliographie der anatomischen Abbildung. *Leipzig*, 1852.
9. VON MARX (K.) Ueber Marc Antonio della Torre und Leonardo da Vinci, die Begründer der bildlichen Anatomie. *Abhandl. d. k. Gesellsch. d. Wissensch. Göttingen*. iv, 1848-1850.
10. FORSTER (A.) Einiges über die Beziehungen Vesal's zu Leonardo da Vinci und zu Marco Antonio della Torre. *Arch. f. Anat. u. Physiol.*, Anat. Abth., 1904, pp. 372-384.
11. JACKSCHATH (E.) Zu den anatomischen Abbildungen des Vesal. *Janus*, 1904, ix, p. 238.