THE ILLUSTRATIONS
FROM THE WORKS OF ANDREAS VESALIUS
OF BRUSSELS

A discussion of the plates,
and a biographical sketch of Vesalius
With annotations and translations
By J.B. de C.M. Saunders and
Charles D. O’Malley
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Andreas Vesalius

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WITH ANNOTATIONS AND TRANSLATIONS,
A DISCUSSION OF THE PLATES AND THEIR
BACKGROUND, AUTHORSHIP AND INFLUENCE,
AND A BIOGRAPHICAL SKETCH OF VESALIUS

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Introduction

The work of Andreas Vesalius of Brussels constitutes one of the greatest treasures of Western civilization and culture. His masterpiece, the De Humani Corporis Fabrica and its companion volume the Epitome, issued at Basel in 1543, established with startling suddenness the beginning of modern observational science and research. Their author has come to be ranked with Hippocrates, Galen, Harvey and Lister among the great physicians and discoverers in the history of medicine. However, his book is not only one of the most remarkable known to science, it is one of the most noble and magnificent volumes in the history of printing. In it, illustration, text and typography blend to achieve an unsurpassed work of creative art, the embodiment of the spirit of the Renaissance directed toward the future with new meaning.

The purpose of the present work is to make available to the general reader, the student of art, of science and of medicine, the illustrations from the works of Andreas Vesalius through the medium of which they may gain some insight into this achievement of science and art. In the dynamic and dramatic postures of the figures which emanated from the workshop of the master painter Titian, one may trace with something of the original freshness and enthusiasm man’s discovery of his own bodily structure. In them, the student of the graphic arts will perceive the movement which freed art from conventional forms to re-approach nature, whence it could once more depart to explore other fields. Here, too, he will find the sixteenth-century woodcut at its finest, and here he will feel the power of the illustration employed for the advancement of knowledge.

To facilitate this purpose each of the illustrations has been briefly annotated. First, there appears in italics Vesalius’ own legend to the drawing followed by an explanatory note which in many instances, owing to the nature of the material, is perforce somewhat technical and therefore will be of greater interest to the physician or biologist than to the general reader or to the artist. However, it is hoped that despite the necessity of such information, the general reader will find enough in these notes to give him some understanding of the meaning of the drawing. Vesalius provided each of the illustrations with an elaborate index to the letters denoting the various structures exposed. Since the terminology employed is so archaic as to require, except for the expert in sixteenth-century medicine, interpretation of almost every term, which would greatly increase the bulk of this volume, it was thought wiser to omit the translation of the indices. However, this should present no difficulty to anyone with a knowledge of human anatomy since he will be able to identify easily the many structures, and attention has been drawn to those which might prove confusing. At this juncture the reader should perhaps be warned of the danger of judging Vesalius’ knowledge or lack of knowledge by the illustrations alone. This has been
responsible for innumerable erroneous conclusions in the Vesalian literature. While the drawings were being prepared, Vesalius himself was undergoing a rapid evolution and making new discoveries from day to day which required him to correct in the text earlier but erroneous opinions portrayed in the illustrations.

The illustrations reproduced in this volume are derived from the magnificent edition of the plates entitled the Icones Anatomicae of Andreas Vesalius and, for the most part, struck directly from the original wood blocks and published jointly by the New York Academy of Medicine and the Library of the University of Munich in 1934 under the editorship of Doctors Wiegand, Lampert and Archibald Malloch. The story of the re-discovery of the wood blocks of the Fabrica and Epitome is as extraordinary as any in the long history of bookmaking. Engraved in Venice, their peregrinations began with the long journey across the Alps to Basel, as recounted in Vesalius' letter to the printer Oporinus. Thereafter, they were used once again in the preparation of the second edition of 1555, slightly modified by cutting away the wood around some of the guide letters where they tended to be obscured by the shadows. It would seem that after Oporinus' death they passed into the hands of Jerome Froben's son and remained with this family until the third generation went out of the printing business in 1603. It is presumed that the blocks passed to Ludwig König, successor to the Frobens, and eventually they were purchased by Andreas Maschenbauer, a printer of Augsburg, who published, as the work of Titian, a selection of the plates for the use of artists and sculptors in 1706 and again in 1723. Once more they disappeared to be re-discovered, this time by the physician von Woltter. He, after having sent them in 1777 to the publisher Crusius of Leipzig, who decided that the expense of a new edition would be too great for him to undertake, entrusted them to the Bavarian anatomist and surgeon H. P. Leveling of Ingolstadt, who printed editions of the plates, financed by subscription, at Ingolstadt in 1781 and again in 1783. The blocks, now two hundred and fifty years old, were stored in Ingolstadt until that city was captured by the French in 1800 when they were evacuated to Landshut in Bavaria, to rest there for twenty-six years before continuing their journeyings. From Landshut they passed to the Library of the University of Munich where they gathered dust in a disused cupboard until they were recognized in the course of an inventory in 1893. In the meantime, the wood block of the re-engraved title page of the 1555 edition passed by some devious route into the hands of a collector in Antwerp and was subsequently presented to the Library of Louvain. Once more, in 1932, the wood blocks were unexpectedly found, stored in the Munich Library. Of the estimated 277 original blocks only fifty were missing, among which unfortunately was the portrait, and these, together with the plates of the Tabulae Sex and the single diagram from the Venesection Letter, were reproduced in facsimile to complete the Icones Anatomicae of the New York Academy of Medicine. But to this long odyssey a colophon must be written. The precious wood blocks were destroyed in the bombing of Munich during World War II.

The great achievement of Vesalius has led to strenuous efforts by historians to uncover and understand the forces responsible for the sudden emergence of the modern observational method of science in the midst of the renaissance cult of antiquity. For this reason every aspect of his life and personality has been examined with the utmost care. Despite all these efforts, many important questions go unanswered. Much of his life is an enigma, and the enigma extends to his works, notably to the illustrations. Around few other figures in the history of science has such an immense literature gathered. In order to orient the reader in the Vesalian problem a brief examination of his life and work must be made which has been based as far as possible on primary sources, but, since it is beyond the intention of this volume, the documentation has been omitted.

ANDREAS VESALIUS OF BRUSSELS (1514-64)
BIRTH AND FAMILY ORIGINS

Andreas Vesalius, like so many who have
achieved renown in the field of medicine, owed much to his heritage. The earliest existing records of the family show a long devotion to the cult of Aesculapius. Peter, his great-great-grandfather, was a physician of reputation who gathered a large and costly collection of medical treatises and wrote a commentary on the fourth Fen of Avicenna. Several of these valuable manuscripts descended to the young Vesalius and were the great joy of his student days. John, Peter's son, enrolled in the University of Louvain in 1420, that is, soon after the opening of that renowned institution, and eventually taught there until about the year 1446. He, too, was a physician who concentrated on "mathematics," i.e., astrology, and would seem to have been well in advance of his times since he addressed a letter to the pope, Eugenius IV (1431-1437), advocating reforms in the calendar which were not to be achieved until late in the following century. Later John was chosen physician to the city of Brussels, and evidence suggests that he was appointed adviser to the Duke of Burgundy. Everard, John's son and grandfather to our Vesalius, maintained this connection, being physician to Mary of Burgundy and, on her marriage to the Archduke and later Emperor Maximilian I, began a long tradition of Vesalian service to the Hapsburgs. Everard was the author of a commentary on the Ad Almansorem of Rhazes, which inspired young Andreas Vesalius' graduation thesis, and wrote, in addition, on the first four sections of the Aphorisms of Hippocrates. He was rewarded with the rank of chevalier but died comparatively young, around his forty-sixth year, sometime prior to 1485. Finally we come to Andreas, father of the great anatomist, who was the natural son of Everard and Marguerite Swinters. Long after his birth he received as a reward for faithful services papers of legitimacy dated October 1531. He had entered the service first of Margaret of Austria as an apothecary and then of her nephew the Emperor Charles V. It was to this Andreas Vesalius and his wife, Isabella Crabbe, that the celebrated anatomist, distinguished as Andreas Vesalius of Brussels, was born. According to a horoscope cast by Jerome Cardan, the Milanese physician, mathematician and epis-
tolary friend of Vesalius, the birth occurred at a quarter to six on the morning of 31 December 1514, reckoned according to the Julian Calendar. The place was Brussels, the chief city of Brabant, where his father owned a house on the Rue de Manège—then the Rue d'Enfer, although the family had not always lived in Brussels. The name Wesel, or variations of that form, was of pure Brabantine origin and designates several localities, notably around Campine; but early records indicate that the family had been long domiciled at Nimwegen in the Duchy of Cleves where, as the result of marriage alliance, the family was also known as Witings or Wytinex. Certainly Vesalius himself regarded Nimwegen as his ancestral home.

EARLY EDUCATION

Vesalius passed his earliest years in the city of his birth, in the home which was to be rebuilt in 1525 at the same time as that of his neighbor and relative John Martin, also an apothecary. Of this period of his life very little is known except that he was encouraged to pursue the family tradition by his mother, to whom he was devoted, and greatly stimulated by his father on those occasions of family reunion when the latter's presence was not required at court or on the ceaseless imperial journeys or campaigns. With such a heritage the family library was extensive, and Vesalius early acquired the habit of reading. Falloppius tells us that Vesalius was always to be found in the library studying the ancient authors. How powerful was this tradition is seen in the case of his younger brother Franciscus who, although destined for the study of law, turned to medicine in his pride for the achievements of his elder brother.

LOUVAIN 1528-1533

In 1528 after a preliminary education, unknown as to time or place, Andreas Vesalius entered the University of Louvain, pursuing his studies in the Pedagogium Castrae where he received a thorough grounding in Latin, with possibly a smattering of Greek, and continued his acquaintance with the medieval writers on science which he had begun at home. He had already
displayed an interest in anatomy and in later writings refers to dissections which he had performed at this time on small animals of all sorts, including "our weasels," a conceit pointing to the origin of his name and the animals adopted as the family arms in the form of three weasels courant.

Three years later in 1531, when Vesalius was about seventeen, he transferred to the more progressive Collegium Trilingue at Louvain, founded in 1517 under the influence of the new humanism by Jerome Busleiden (1470-1517). In accordance with humanistic conceptions, the purpose of this school was to ground young men in what were considered the three all-important keys to education and learning, Latin, Greek and Hebrew. With such keys the doors to universal knowledge would be opened, and learning would be reborn by the restoration of the dead past to new life. That Vesalius did not become a scholar in the sixteenth-century understanding of the term was due to his medical ambitions and a bent of mind early directed along the pathway of science. Latin he learned thoroughly in the best Ciceronian tradition, but his Greek was of a very lame variety, the result of his restlessness and desire to get on with his medical education. Of Hebrew he knew practically nothing. Yet the spirit of the school was permanently imbedded in Vesalius. All his writings indicate an intense interest in philology, Latin, Greek, Hebrew and Arabic. Some years later, apparently recognizing his linguistic deficiencies, he undertook the study of Arabic with a Jewish tutor, Lazarus of Frigae, although his accomplishment appears to have been slight. The same influence is evident in his attitude towards his own accomplishments in the field of anatomy. He looked upon himself as a restorer so that "anatomy will soon be cultivated in our Academies as it was of old in Alexandria" and so was kin to Rabelais, Michelangelo, Vives, and the host in art, literature and science to whom the Renaissance was indeed a renaissance.

Although we know so little of Vesalius' education at this period, we do know through his own words that two of his fellow students were Gisbertus Carbo and Anthony Perrenot, later Bishop Granvelle and imperial chancellor. To the former, who became a physician in Louvain, he presented the first articulated skeleton which he had obtained under great difficulties by robbing the gibbet, and to the latter he owed a certain degree of favor at the imperial court.

PARIS 1533-1536

It was probably in 1533 that Vesalius, now ready for a formal medical education, set out for Paris equipped with suggestions and possibly introductions from Nicolaus Florenas, an imperial physician and friend of his father, who had taken a great personal interest in the young man. Vesalius, in his dedication to the Venection Letter of 1539, was to describe Florenas as almost a father to him, which would seem to have been more than fulsome sixteenth-century rhetoric since his own father was frequently absent in attendance upon Charles V, and Florenas may have acted as director of his studies and spiritual mentor. It is even possible that it was on advice of Florenas that Vesalius decided to go to Paris.

Although the University of Paris possessed a great name and great influence in northern Europe, it was nevertheless an extremely conservative institution. This conservatism extended to the medical school and placed the study of medicine at a considerable disadvantage in relation to the great progress which was being made, notably in the universities of Italy. In 1477 the medical school of Paris had obtained its own building in the Rue de la Boucherie, but no provision had been made for the teaching of anatomy by means of dissection, and although from 1493 onward occasional anatomies were conducted in the basement of the hospital Hôtel Dieu, these were carried out in the medieval manner amounting to little more than ceremonies. However, in 1526 the Medical Faculty made a successful appeal to the Paris Parlement for a greater supply of dissection material which resulted in more frequent anatomical demonstrations. However, even then they were comparatively infrequent. It is to be doubted that Vesalius witnessed more than three or four during his stay in Paris.

Nevertheless, a candidate for the bachelor's degree was formally required to display a knowl-
edge of anatomy which he gained largely from textbooks and the study of disarticulated bones when he could obtain them. Prior to 1514 the texts were for the most part derived from the medieval Arabic tradition, that is, from the writings of Moslem physicians and their commentators or from translations of the works of classical authors necessarily corrupted by passage from Greek into Syriac, Syriac into Arabic and thence into obscure Latin. In that year a collection of Galen’s works, translated directly from the Greek into Latin by Nicolò Leoniceno (1428-1524), was published in Paris and seized upon with enthusiasm. The new medical humanism had arrived in Paris, and thereafter the publication of such translations occurred in rapid succession. Physicians, seeing for the first time the works of Galen and Hippocrates stripped of their dross, believed that now they had captured the essence and spirit of the great classical authors and were at last about to enter a new Golden Age. As yet medicine had not developed a philosophy of progress but tended to look upon the present as inferior in knowledge and achievement to the past with the resultant enslavement to the literal word, and in particular to that of Galen. This is especially evident in the membership of the Medical Faculty at Paris among whom was Johann Guinther of Andernach (1487-1574), one of Vesalius’ more important teachers. Guinther, who had previously taught Greek at Louvain, came to Paris in 1527 and established a considerable reputation for himself as an anatomist by translating Galen’s work on anatomical procedure entitled De Anatomicis Administrationibus which was issued in 1531. Although nominally termed a professor of anatomy, his major qualifications were linguistic, and there is no evidence that he actually dissected. Indeed, his pupil Vesalius was to write somewhat cruelly of him later: “I would not mind having as many cuts inflicted on me as I have seen him make either on man or other brute (except at the banqueting table).” While other teachers of Vesalius at Paris were the philosophic Jean Fernel (1497-1558), Jean Vasse of Meaux (1486-1550), dean of the faculty, and one Oliverius of whom nothing is known, the most important was Jacques du Bois of Amiens, Latinized as Jacobus Sylvius (1478-1555).

Like Guinther of Andernach, Jacobus Sylvius had in earlier life devoted himself to humanistic and literary studies but did not enter medicine until late, receiving the doctorate at the age of fifty-two. He owed supreme allegiance to Galen which led him on occasion to remark that any structure found in contemporary man which differed from the Galenical description could only be due to a later decadence and degeneration in mankind. Nonetheless, his contributions were of great importance and influence. He clarified and systematized existing anatomical knowledge, and to him we are largely indebted for the foundations of a rational terminology, much of which, especially in regard to the muscles, is in employment today.

Vesalius, like any other young student of the times, naturally accepted the Galenical anatomy. He could hardly do otherwise since there was no other. Although much has been made of the Vesalian anti-Galenism, this has been grossly exaggerated and is a complete misunderstanding of Vesalius and his times. “As the gods love me,” writes Vesalius, “I, who yield to none in my devotion and reverence for Galen, neither can nor should enjoy any greater pleasure than praising him.” He was never to oppose himself completely to the Galenical system but rather attempted to reconcile or correct the anatomical descriptions of Galen whenever they were found not to agree with observation. “I hear that many are hostile to me because I have held in contempt the authority of Galen, the prince of physicians and preceptor of all; because I have not indiscriminately accepted all his opinions; and, in short, because I have demonstrated that some fault is actually discernible in his books. Surely, scant justice to me and to our studies, and, indeed, to our generation!” The greatness of Vesalius lies in his refusal to accept slavishly the teachings of the Greco-Roman physician and authority but rather to seek corroboration and to note discrepancies by the observational method.

While in later years Vesalius was to write
sitionally of his schooling in Paris and the instruction he received there, and bitterness was to arise between him and his master Sylvius, there is no doubt that he profited greatly. However, what he wanted most, dissection and instruction at the dissecting table, was denied him. Nevertheless, by his own initiative he acquired a considerable knowledge of anatomy, probably by dissection of animals, so much so that at the second anatomy which he attended in 1535 he was requested by his teacher and fellow students to assist in the demonstration; and, so he writes, for he was not one to hide his light under a bushel, he displayed a skill which far surpassed that of the customary dissector. In the following year he conducted the third anatomy of his Paris period almost single-handed.

The very fact that there were no teachers of practical anatomy to satisfy the demands of the ambitious and impatient young student led him to seek out information at first hand and thus possibly to benefit more by his own initiative. In order to acquire osteological specimens he became a constant frequenter of Montfauccon and the Cemetery of the Innocents. The first was a mound not far without the northern wall of old Paris where a gibbet had been erected as early as the twelfth century. One of its earliest victims, ironically enough, had been a barber-surgeon, Pierre de Brosse, chamberlain and confidant of Louis IX. In Vesalius' day, it was occupied by the finest gallows in the kingdom. This was no ordinary affair but a huge charnel house crowned by a colonnade of sixteen stone pillars thirty feet high, connected by wooden beams. To this forbidding site were brought the bodies of all malefactors executed at the numerous centers within the city to be suspended from the beams until dissolution warranted disposal of the remains in the charnel house below. This place was haunted by crows and pariah dogs but provided exceptional riches for the avid anatomist. On his way to Montfauccon, Vesalius would pass the Cemetery of the Innocents. In this ancient cemetery were buried victims of the plague. Reconstruction of the city wall in 1186 had required disinterment of many of the cemetery's occupants, and the bones had been removed to a series of charnel houses specially constructed for the purpose. A marble figure which once decorated the wall may be seen to this day in the Louvre. Here Vesalius and his fellow students found "an abundant supply when I first studied the bones ... and having learned by long and tiring observation, we, even blindfolded, dared at times to wager with our companions, and in the space of half-an-hour no bone could be offered us ... which we could not identify by touch. This had to be done the more zealously by us who desired to learn inasmuch as there was a great lack of the assistance of teachers in this part of medicine."

LOUVAIN 1536-1537

After some three years in Paris, Vesalius left the medical school without graduating and returned to Louvain. The cause of his departure was the outbreak of war and the invasion of Provence by Charles V, and Vesalius, an imperial subject, needs must return to the Low Countries. Immediately he began once more to pursue his favorite discipline, and in the company of Regnier Gemma (1508-1555), later celebrated as a mathematician, astronomer and physician,

"While out walking, looking for bones in the place where on the country highways eventually, to the great convenience of students, all those who have been executed are customarily placed, I happened upon a dried cadaver. ... The bones were entirely bare, held together by the ligaments alone, and only the origin and insertion of the muscles were preserved. ... With the help of Gemma, I climbed the stake and pulled off the femur from the hip bone. While tugging at the specimen, the scapulae together with the arms and hands also followed, although the fingers of one hand, both patellae and one foot were missing. After I had brought the legs and arms home in secret and successive trips (leaving the head behind with the entire trunk of the body), I allowed myself to be shut out of the city in the evening in order to obtain the thorax which was firmly held by a chain. I was burning with so great a desire ... that I was not afraid to snatch in the middle of the night what I so longed for. ... The next day I transported the bones home piecemeal through another gate of the city ... and constructed that skeleton which is preserved at Louvain in the home of my very dear old friend Gisbertus Carbo."
It was under such difficulties that Vesalius obtained his first articulated skeleton. For reasons of discretion he announced that he had obtained the specimen in Paris, although, as it turned out, the local government was not particularly hostile to his anatomical pursuits since “later the Burgomaster so favored the studies of the candidates of medicine that he was pleased to grant whatever body was sought from him, and he himself . . . was in regular attendance when I was administering an anatomy there.”

THE “PARAPHRASE” 1537

Apparently some reputation had preceded Vesalius to Louvain, or he was more energetic and zealous in his approach to the magistrates, for with the opening of 1537 he was granted permission to conduct an anatomy before his eager fellow students, the first demonstration of human dissection which had been seen in that city for eighteen years. With unusual modesty he confessed that at this time he was relatively unskilled in the art of dissection since he had overlooked the true origin of the haemorrhoidal vessels. The year so spent at Louvain might be termed the continuation of his medical training which had been undertaken at Paris. In February 1537 his baccalaureate thesis, Paraphrase on the Ninth Book of Rhazes, was published at Louvain. We assume that his degree was granted by the University of Louvain, but no record of his graduation at that institution has been uncovered.

While the return of Vesalius to Louvain was generally marked by amicable relations, there was, however, one jarring note which in its results was to be of great importance to his career. As early as 1514 a dispute had arisen in Paris over the question as to what vein should be incised in bloodletting. In view of the universal employment of venesection as a therapeutic procedure the controversy became bitter and widespread. Indeed, in the whole history of medicine there is no more extensive and polemical a literature than that which revolved around this question. Stated in the simplest terms, the issue was whether one should incise a vein on the affected side of the body or on the opposite. This in turn represented respectively the Hippocratic and the Arabic views. It is not to be wondered at that Vesalius, a budding humanist, accepted the Greek view which led him into a fiery and intemperate dispute with Jeremiah Drivère. The latter, who Latinized his name as Thriverius Brachelius (1504-1554), had taken his degree in philosophy at Louvain and had then turned to medicine. He was regarded as a very capable teacher of great erudition, possessed an influential following among the physicians of Louvain and occupied a position which had been created by the amalgamation of two of the four public chairs of medicine. In 1532 and in 1535 Drivère had written two works on bloodletting in which he supported the ridiculous Arabic practice. Vesalius, in loyalty to his teachers in Paris who had been ridiculed, sharply attacked Drivère’s conclusions at a public assembly. This action, although excusable on the grounds of youth, was nonetheless exceedingly bad judgment since Drivère was himself a most intemperate man who “used to proclaim unashamedly that he had to employ words from the common dung-heap to suit such barbarians lest we, not yet Candidates, be infected by this sort of pestiferous decay.” As a result, Louvain could have held no future for the aspiring young anatomist despite his promising start there; the dispute led, furthermore, to the introduction of certain caustic remarks inserted in the first plate (plate 87) of his Tabulae Sex which were finally developed into the Venesection Letter of 1539.

PADUA 1537-1542

With his baccalaureate completed, Vesalius now appears to have traveled to Basel where he had his thesis reprinted by Robert Winter, a Basel printer who became an intimate friend of Vesalius. His stay in the Swiss city was brief, and almost immediately he set out for Italy where he rightly believed there were greater opportunities for the study of anatomy and medicine, as well as the possibility of obtaining the doctorate of medicine. The great attraction was the University of Padua which at this period reigned supreme, not only in the arts, literature and philosophy but as the center of the scientific
The university, almost from its foundation in 1222, had begun to play a role of constantly increasing importance in the intellectual life of Europe. The deep influence of Pietro d'Abano (1250-1316), which affected even Dante, was continued by Gentile da Foligno (d. 1348), Giorgio Valla (fl. 1450), Ermolao Barbaro (d. 1493) and Alessandro Benedetti (1460-1525) down to the opening of the sixteenth century to prepare the way for the rise of medical humanism, and the development of a progressive and critical spirit was to establish the medical school as the greatest glory of Padua.

Since Padua was under the rule of Venice, it was only natural that Vesalius should make frequent visits to the famous capital city which was only some twenty miles away. It was there that he first began to visit the sick under the tutelage of J. B. Montanus (della Monte, c. 1489-1551), Professor of Medicine at Padua, who re-introduced a type of clinical instruction which had been almost non-existent since the time of Hippocrates. It is not unlikely that Vesalius while on one of these visits first made the acquaintance of his fellow countryman, the artist Jan Stefan van Kalkar, who was later to be associated with some of the Vesalian publications. Kalkar was himself a new arrival in Venice where he had entered the school of Titian.

On 5 December 1537 the faculty of the University of Padua, after examining Vesalius, granted him at a solemn convocation the degree of Doctor of Medicine cum ultima diminutione, which represented “with highest distinction,” and thus Vesalius was required to pay a fee of only seventeen and a half ducats, diminished in accordance with the excellence of the examination. On the following day after performing a dissection, he was nominated by the “Illustrious Senate of Venice” as Professor of Surgery, an appointment which at that time bore the responsibility of teaching anatomy as well. To what influences he owed such early recognition we do not know. Certainly despite his youth, for he was but twenty-three years of age, he seems to have made a profound impression on the members of the Senate and his professors. The recommendation of powerful friends in the Imperial court may also have been of assistance.

The “Tabulae Sex” 1538

With characteristic energy the young and ambitious Professor of Surgery began his academic duties encouraged by his friend Marcantonio of Genoa, Professor of Philosophy, and with a success which exceeded all expectations. The sight of a professor descending from his academic chair to dissect and demonstrate personally on the cadaver was something entirely novel. Students, physicians and men of learning crowded his classes. Many came to dispute the statements of this brash young man only to be convinced by ocular demonstration. To clarify his discussions he introduced large charts. “Not long ago . . . I delineated the veins on a chart. . . . The delineation . . . pleased the professors . . . and all the students so much that they earnestly sought from me a like drawing of the arteries and also of the nerves. . . . I knew delineations of this sort would be not a little useful for those who might attend my dissections” wrote Vesalius in the introduction to his Tabulae Sex published in April 1538. It may be difficult today to understand the novelty of this venture. Few anatomical works up to this time had been illustrated, and of those that were, the illustrations were little more than symbols or decorations. Indeed, many of the leading physicians of the day were actively opposed to the illustration of the printed word on the grounds that this had not been done in classical times and would degrade scholarship. Technical incapacity and the lack of development in standards of reproduction gave support to such opposition, but it was now to become apparent that if not the professors, at least the students quickly became aware of the value and power of graphic anatomical demonstration. The printers were not behindhand and sought to copy both the procedure and the plates to supply a new and lucrative market.

To protect his interests and to prevent the students from employing inferior charts, Vesalius was led to publish his drawings. “Since many in vain have sought to copy what I have done, I have sent these drawings to the press.” To his
own three sketches of the vascular system he added “three views of my skeleton which, to the gratification of the students, I caused to be set up and drawn from the three standard aspects by a distinguished artist of our day Jan Stefan [van Kalkar].” The six plates, issued in 1538 without title but now known as the *Tabulae Anatomicae Sex*, constitute his first anatomical publication. They were an instantaneous success to judge from the immediate plagiarisms which appeared almost simultaneously from Marburg, Augsburg, Cologne, Frankfurt and Paris, and by the fact that only two complete sets of the Vesalian plates have survived, the rest having been literally thumbed out of existence. Indeed, the woodcuts set a new standard in biological illustration as well as in the graphic arts. The project, as evidenced by the two variants of the original edition, would seem to have been a joint venture in which the artist received in place of a fee the rights of general publication other than copies employed by Vesalius in his classes.

THE “INSTITUTIONES” 1538

The year 1538 saw a third publication by Vesalius and one which drew together all the threads of his student and earlier academic life. This was an edition of a compendium or synopsis of the anatomico-physiological views of Galen, originally composed by Vesalius’ Paris teacher, Johann Guinther of Andernach, and first published at Basel in 1536 under the title *Institutionum Anatomarum secundum Galeni Sententiam ad Candidatos Medicinae Libri Quatuor*. Vesalius was still studying under Guinther when the first edition of the *Institutiones* was published, and in it the pupil is cited as “Andreas Vesalius . . . a young man of great promise who possesses an extraordinary knowledge of medicine, learned in both [classical] tongues and skilled in dissection.” Justification for a new edition of the work is hard to find except that we regard this small manual, highly popular with students, as a makeshift companion to the recently published *Tabulae Sex*. Vesalius himself explained somewhat lamely in the preface that the new edition was necessitated by the numerous typographical errors which had rendered the work not entirely satisfactory for students. There would seem to have been other reasons. It is possible that in the manner of young academicians he was desirous of publication for its own sake and anxious to impart to his former teachers his present activity and generally to inform his friends in Louvain of his success abroad. Finally, Vesalius in thoroughly realistic fashion was always careful to dedicate his works to persons who might be of importance to him in his career. He seems never to have thought of immediate material rewards but rather of the influence which the person might exert on his behalf in the future. Thus in the preface to his edition of the *Institutiones* the dedication is to Joannes Armentianus who was not only Professor of Medicine but also Rector of the University of Louvain. The preface is of the type usual in the sixteenth century, offering the recipient nauseatingly fulsome flattery, but it then goes on to recount Vesalius’ academic achievements almost in the manner of an application for a position. Perhaps the young anatomist was momentarily unsure of his tenure in Padua, or possibly homesick, and preparing the ground for a return to Louvain. If so, he seems to have recovered his spirits or to have been given assurances of the esteem in which the Paduan authorities held him, since the possibility of his returning to his alma mater is never again apparent.

THE “VENESECTION LETTER” 1539

Unlike the *Institutiones* there was ample justification for the publication in the following year, 1539, of Vesalius’ next work, the *Venesection Letter*. From remote antiquity venesection had been established as a standard therapeutic procedure and acquired in classical times, at the hands of Hippocrates and his interpreter Galen, new and more precise indications for its performance in conformity with humoral doctrines of disease. Thereafter, in medieval times and under the influence of Arabic medicine the Hippocratic practice had become corrupted, but with the recovery of classical learning at the beginning of the sixteenth century it was becoming apparent how far traditional methods had deviated from
the precepts of the Father of medicine. The first to enunciate and support what was termed the true Hippocratic and Galenical technique of bloodletting was Pierre Brissot, a Paris physician, who based the correctness of his view upon the successful treatment of patients during an epidemic of "pleurisy" in 1514. He condemned the Arabic procedure of bleeding a patient from a point on the body as far away from the region of the ailment as possible and removing no more than a mere token of a few drops of blood. He contended that the true classical method required the removal of a sensible quantity of blood, and since "pleurisy" existed in a region drained by the vena cava, it did not matter whether the blood was evacuated from the right or the left side. Moreover, said Brissot, one might open a vein of the arm on the affected side and still preserve sufficient remoteness in the Hippocratic sense.

Brisso was bitterly attacked by the conservative element, and eventually two camps were formed and engaged in a violent polemic over the question which reached such proportions that in 1537-1538 the government of Spain was dragged into the controversy. The appearance of the Venesection Letter finds Vesalius foursquare with the champions of the purified classics, an adherent of the Hippocratic-Brisso school. Superficially the work might be judged as being no more than one more polemic on the subject to announce his stand and at the same time to attack the Arabist Jeremiah Drivère, his teacher at Louvain for whom he had acquired an intense dislike. But the Vesalian contribution was far more than this. Up to 1539 every participant in the dispute had based his arguments on either the pronouncements of ancient authorities or on empirical observations upon the outcome of illness in relationship to the procedure employed. Vesalius, on the contrary, introduced into the hitherto barren controversy an entirely new element, the findings of direct observation. Accepting the basic theory, and he could hardly do otherwise without knowledge of the circulation, he drew his conclusions from the results of his dissections and observations on the venous system, and since the disease in question affected the pleural cavity, he took pains to describe the arrangement of the azygos system of veins (plate 86). The effect was startling. Thereafter every future participant in the controversy was compelled to appeal to the body which, in turn, led to the discovery of the venous valves and thereupon provided William Harvey with the key to unlock the secret of the circulation. Furthermore, Vesalius in devoting so much attention to the venous system was unwittingly exposing one of the weakest aspects of the Galenical anatomy. Thus, it is in this small work that we first perceive the slow and gradual loosening of traditional and authoritative bonds whence eventually emerged the principle that the validity of a hypothesis rests solely upon the facts established by observation. Here Vesalius asks a first tentative question "whether the method of an anatomy could corroborate speculation." The Venesection Letter of 1539 is therefore a very important document which enables us to trace the transition to the observational method which made his great masterpiece, the Fabrica, the first positive achievement of modern science.

THE "OPERA GALENI" 1541

Sometime in 1539 the famous Venetian publishing firm of Giunta conceived the plan of a complete edition of the works of Galen. For such an edition translations hitherto made would need revision in the light of new discoveries, both philosophical and medical, and a few recently discovered manuscripts would require incorporation. The general editor chosen for this stupendous undertaking was the celebrated Joannes Baptista Montanus who was to be assisted by Augustinus Cadaldinus, a first-class classicist as well as a physician. The edition would entail the collaboration of many scholar-physicians, and among those invited to participate was Vesalius who was asked to contribute three revised texts, the Dissection of the Nerves, the Dissection of the Veins and Arteries and the very important Anatomical Administrations. In the case of the last mentioned work he would be required to revise the translation of Guinther of Andernach and thus for a second time to pass judgment on the work of his
former Paris teacher. It was naturally a great honor for the young anatomist to be asked to participate in the undertaking along with men who had already achieved fame, but there were a number of good reasons for his inclusion. Montanus, the editor, was his teacher, colleague and friend, and fully appreciated the abilities of the young man. Vesalius himself was an indefatigable student of the works of Galen. He had already been responsible for the revision of Guinther’s commentary and, as we shall see, had compiled a large book of annotations on the writings of the Greco-Roman physician. Moreover, Padua was Venetian territory, close to Venice and the Giunta press, and so Vesalius was conveniently situated for the forwarding of copy and any consultations which might be required. Moreover, it should not be overlooked that Vesalius in his own right was on the threshold of a great reputation. His name had become widely known through the popularity of the Tabulae Sex, and even his plagiarists had mentioned him with the highest commendation.

Many have been amazed that Vesalius should have accepted the invitation to participate in the Giunta edition of Galen since he was already engaged at this time in writing the Fabrica, which in sheer bulk would require all his powers. Furthermore, there has been incredulity at the seeming paradox of an avowed anti-Galenist undertaking the task. In the first case, it should be recognized that his editorial duties were to be of the lightest, merely revision of existing translations. Two of the books are brief tracts occupying scarcely a half dozen folio-sized leaves, and his emendations are very superficial. We doubt that the task occupied more than a few days. In the second case, the paradox is more apparent than real and arises from the gross exaggeration of his anti-Galenism through failure to understand the curious conflict between progressiveness and the cult of antiquity which existed during the Renaissance.

The great task of editing and printing the Opera Galeni was eventually completed, and the work was issued from Venice in seven massive folio volumes during the years 1541-1542, but only after the working editor, Augustinus Gadaldinus, had been brought to the verge of mental collapse by the pressure and magnitude of the undertaking. Almost simultaneously the great printing house of Froben in Basel began to reprint the Giuntine edition. It would appear that some sort of agreement must have existed between the two publishing houses, for the Froben edition was ready in 1542. The fact that both these famous publishers were fully occupied may have had considerable bearing on Vesalius’ choice of a printer for his masterpiece.

THE “FABRICA” AND “EPITOME” 1543

The publication of the De Humani Corporis Fabrica of Andreas Vesalius in 1543 marks the beginning of modern science. It is without doubt the greatest single contribution to the medical sciences, but it is a great deal more, an exquisite piece of creative art with its perfect blend of format, typography and illustration. The first hint that Vesalius had in mind a major work is possibly the statement appearing at the end of his introduction to the Tabulae Sex of 1538. “If I shall find this work acceptable to you and to students, some day I hope to add something greater.” This statement becomes more than suggestive when in the Venessection Letter of the following year he tells us of his activities. “We have now also finished the two plates on the nerves; in the first, the seven pairs of cranial nerves have been drawn, and in the other, all the small branches of the dorsal medulla expressed. I consider that these must be kept until we undertake the plates on the muscles and all the internal parts.” Thereafter, writing of the difficulty of obtaining bodies for dissection and remarking on the encouragement which he had received from his colleague, the Paduan philosopher Marcantonio of Genoa, presumably to continue with his plan for the large anatomical work, Vesalius adds, “wherefore, if the opportunity of bodies offers, and Jan Stefan [van Kalkar], outstanding artist of our age, does not refuse his services, I shall by no means evade that labor.”

These remarks are interpreted as indicating Vesalius’ initial efforts on the Fabrica, and, since
the Venescation Letter is dated by its author 1 January 1539, we may justly assume that its composition was under way sometime in 1538. We may be certain that the Fabrica and its companion volume, the Epitome, were the accomplishment of at least four years. The remarks on the drawing of two illustrations for the plates on the nerves leave us in doubt as to their authorship. They are in type very similar to Vesalius’ own sketches of the vascular tree found in the Tabulae Sex, but they may have been the work of Kalkar. For the moment the ambiguous statement concerning the artist must be left for later consideration. We pause but to point out that this is the only other occasion on which the name of the artist is mentioned, the first being in the introduction to the Tabulae Sex.

We do not know how long Vesalius had in mind the composition of a major textbook of anatomy. The idea may have existed from the beginning of his career; the ambition of every scholar to produce a great work in his field of study. On the other hand, if the decision was the result of liberation from Galenic authority, then there are some who believe that it could have been no earlier than his last work markedly Galenical in character, the 1538 revision of Guinther’s Institutiones. However, even at this time he was deeply disturbed by discrepancies in traditional teaching, and he remarked as early as 1539, in discussing these errors of observation, “I have noted them as fearfully as I could both in the plates [Tabulae Sex] and in the four books of the Institutiones Anatomicae of Johann Guinther which we re-issued with many emendations.” Regardless of time and reason, by the end of 1538 Vesalius already had accumulated a vast store of information from which to draw. During his student days in Paris he had assiduously studied osteology, participated in several dissections and no doubt examined the structure of animals on many occasions. Thereafter, he had again dissected the human form at Louvain, articulated at least two skeletons and performed numerous anatoniies in the course of his teaching duties at Padua. We have good reason to believe that Vesalius, who was himself a reasonably competent draughtsman, made sketches from the beginning of his studies to which he added from time to time.

The method of composing the Fabrica appears to have been to complete the books in the order in which they are found in the finished work. The majority of the illustrations for a particular book seem to have been drawn during the time that the text was being written. Evidence exists that many of the illustrations, especially those of the entire vascular tree and the distribution of the nervous system, were developed from preliminary sketches made by Vesalius himself which were modified and added to as details were uncovered by dissection on different occasions. In other words, illustrations of this type are composite pictures. In many instances the basic arrangement would seem to have been established by the dissection of forms other than man, which accounts for the intrusion of animal anatomy into figures otherwise representing the human form. After completion of a book it was sent on to the printer for composition in type. We know that the first two books of the seven, that is, almost half the total work, were completed sometime in 1541, and the remainder passed on to the printer at intervals up to the time of writing the dedicatory preface addressed to Charles V, dated 1 August 1542.

While the composition of the text was in progress, especially of the later books, the accompanying drawings were being cut in wood. For each of the illustrations he prepared a legend, or as he called it an “Index of Characters,” working sometimes from the drawings prepared for the engraver and sometimes from the finished engravings as is evident from the fact that he often forgot that the picture would be reversed when printed. From his letter to the printer Johannes Oporinus, dated 24 August 1542, we learn that the last act was the addition to the proof of the elaborate system of cross references between the printed text and the illustrations which made the Fabrica unique in the history and development of the printed book as a medium for the communication of a descriptive science. It was by means of this system that text and picture were woven into an integrated whole. The ex-
traordinary importance of such a system, analogous to the "feedback" or "servomechanisms" of the engineer, for the communication of ideas in a descriptive science can best be appreciated when we realize the limitations and ambiguity of language in describing the intricacies of anatomical structure in the absence of the body, especially in an age when scientific nomenclature was still in a state of fluidity. Through many hundreds of cross references Vesalius employed the illustration to eliminate ambiguity and to delimit the verbal statement. This is not the same thing as saying that "a picture is worth a thousand words." In fact, the latter attitude has been responsible for the innumerable errors, misunderstandings and superficial criticisms of Vesalius' works in modern times as facility in the Latin language becomes more rare. To Vesalius picture and text were one.

JOHANNES OPORINUS, THE PRINTER

Let us for a moment consider the printer to whom Vesalius entrusted the publication of this work which had consumed so much of his time, energy and money. Johannes Oporinus (1507-1568), the Latinized form of Herbst, was the son of an impoverished and unsuccessful artist, yet one whose work was sufficiently admired by his colleagues to attract to his studio numerous young artists seeking employment in Basel. It was in this studio that the Holbeins seem to have made their start, and from it many of the illustrations, initial letters and decorative frontispieces for the famous presses of Basel emanated. Oporinus was born in Basel where he received his initial education under his father's guidance since the family was too poor to send him to school. However, the youth showed such promise that he was later admitted to a boarding school for poor scholars at Strasbourg, the city of his family origins and where his grandparents had been substantial citizens but had disowned his father. Here he spent four years in the study of the classical tongues under Hieronymus Gebwiler. Upon his return to Basel, owing to the associations of his father, he received his first initiation into printing while copying manuscripts and acting as a corrector for the great printer Johann Froben. Aside from an unhappy marriage, the next important event in the life of Oporinus was a hectic period of medical study in the household of the eccentric genius Theophrastus Bombastus von Hohenheim, otherwise known as Paracelsus. Unable to endure the erratic conduct of his mentor, whom he regarded as an impious sot, Oporinus left Paracelsus, convinced that his career was not to be in medicine. Thereafter he entered upon a more serene academic life, first as Professor of Latin in the university and later of Greek. Changes in the university regulations with regard to qualifications which he was unwilling to meet compelled him to seek other occupation. As early as 1536 he was devoting a portion of his time to the printing business, having entered into partnership with Thomas Platter, a compositor named Lasius (Balthasar Ruch), and his brother-in-law Robert Winter under whose imprint Vesalius' thesis of 1537 had been re-issued. The firm acquired their equipment by buying out Andreas Cratander for 800 gulden, to be paid within a certain time. The partnership was an unfortunate one which was soon dissolved, as was a later venture of Oporinus and Winter, and in 1539 Oporinus established himself independently as a Basel printer, a position he was able to maintain despite constant financial difficulties into which he was led by his generous nature, until 1566 when he retired to enjoy a life of leisure. He died on 6 July 1568 and was buried in the cathedral of Basel.

There were many good and sufficient reasons why Vesalius should have selected Oporinus of Basel as the printer of his immortal work. Basel had now supplanted Venice as the chief publishing center of Europe. The development of intimate relations between such distinguished printers as Froben, Petri, Episcopius, Cratander, Curio and Bebel with the Holbeins, Urs Graf and other designers had revolutionized the illustrated book. Their editions, embellished by brilliant decorations and initials, had no equal. It was no accident that two of the most beautiful illustrated books in the history of science, the magnificent herbal, De Historia Stirpium of Leonhardt Fuchs
and the unrivaled Fabrica of Vesalius, should have emanated from this city. Furthermore, the Giunta press of Venice, as well as Froben of Basel, was fully engaged in the publication of the Opera of Galen, an immense undertaking. But as a printer Oporinus had special appeal for Vesalius. He had some, although slight, acquaintance with medicine. He was a trained classicist, not only in Greek and Latin, but also in Hebrew, and all three tongues are employed in the Fabrica. He was a meticulous printer, as one may judge today from the beauty of the printed page of the Fabrica and from the almost complete absence of typographical errors, apart from pagination. He was not only an artist but an innovator. He avoided the heavy roman type usual among the Basel printers and adopted a more delicate font, reminiscent of Plantin or rather of the great French school. It was Oporinus who had the temerity to print the first Latin edition of the Koran, a venture which landed him in jail, and no less than the efforts of Martin Luther were required to gain his release. Finally, Vesalius was beholden to the Basel printers, for Oporinus’ former partner, Robert Winter, had published the second edition of his Paraphrase on Rhazes and the Venessection Letter of 1539, and they grew to be intimate friends. No doubt there was a certain spiritual kinship between Vesalius and Oporinus. The former knew that Oporinus would spare no pains on the production of his masterpiece even though it might lead to serious financial loss, and in view of the epochal text, the significance of which he may have understood slightly, and the illustrations which he fully appreciated, the artist in Oporinus could not refuse. And so the composition of the printed text began, presumably in 1540 or 1541, and the book was completed according to the colophon in June of 1543.

At the same time Oporinus undertook the printing of the Epitome of the larger work which was dedicated to Philip, son of Charles V and later king of Spain, on 13 August 1542. Like the Fabrica, it carries the publication date June 1543, for, in the words of the author, it was conceived of as a companion piece to be used as a pathway beside the highway of the major work. The title is somewhat misleading, for in reality the Epitome is the descendant on a more magnificent scale of the earlier Tabulæ Sex. It was composed as a ready guide for students, largely pictorial with the bare minimum of textual description and direction, and is in no sense an epitome. Vesalius believed that the two books would complement one another and serve as a complete course in anatomy from the elementary to the advanced stage. He was to be deeply disappointed when the public seized upon the Epitome to the neglect of his Fabrica. This was undoubtedly due to the greater cost of the larger work and its unsuitability for the general student since it was an exhaustive text calling for a considerable knowledge of anatomy on the part of the reader.

ANATOMICAL ILLUSTRATION

The Renaissance saw the emergence in the realm of art of a new dogma of aesthetic theory which stated that a work of art is a direct and faithful representation of natural phenomena. The assumption required that the artist acquaint himself with the structure and physical properties of natural phenomena in order to insure objectivity and with the rules of perspective and mathematics in order to obtain representational correctness. Art had gone scientific. By the fifteenth and sixteenth centuries the new theory was firmly established and universally accepted, and it was therefore entirely logical that in their study of nature artists such as Andrea Verrocchio, Andrea Mantegna, Luca Signorelli, Antonio Pollaiuolo, Leonardo da Vinci, Albrecht Dürer, Michelangelo and Raphael, to mention but a few, should turn with enthusiasm to the detailed study of the human body. Modern natural science owes more to the efforts of these theorizing artists than to all the learned commentaries of the physicians on the Greeks and their Arabic interpreters. Nonetheless it should not be forgotten that in the midst of this progressiveness, the artist like the physician was reactionary in his pursuit of the cult of antiquity. Artist and physician were not far apart but undergoing parallel development.

Although the publication of the Fabrica of
Vesalius in 1543 marked a new era in anatomical illustration, numerous instances of collaboration between physician and artist in a field of mutual interest had occurred. Leonardo da Vinci (1452-1519) doubtless began his anatomical investigations in pursuit of better pictorial representation, but his insatiable curiosity soon overcame his artistic instincts and led him into scientific investigation. The textbook which he had planned in collaboration with the anatomist Marcantonio della Torre (1481-1512) was never completed, but had it been published it would have revolutionized the sciences of anatomy and physiology. However, the sketches lay hidden, first in the Ambrosian Library in Milan and later in the Royal Library at Windsor, for centuries, finally to be uncovered as a monument to the greatest mind of the Renaissance. But the influence of Leonardo was not entirely lost. His was the intellectual climate which made the work of Vesalius possible, and from him indirectly stems the notable line of anatomists of Ferrara who were to continue the tradition of Vesalius.

To consider the true history of anatomical illustration in its continuity from medieval to modern expression, we must leave Leonardo in his relative isolation and go back some fifty years prior to the publication of the *Fabrica*. The earliest printed medical work which indicates the influence of the new art of the Renaissance is the *Fasciculus Medicinalis*, Venice, 1491. This collection of medical tracts contains several figures skilfully drawn but hardly anatomical. However, the edition of 1493 contains a fine representation of an academic anatomy such as Vesalius was subjected to at Paris and, in addition, an illustration of the female organs of generation which though erroneously depicted at least indicates that the draughtsman had seen the structures and was reconstructing them from memory. The latter is the first instance in a printed book of a naturalistic representation of an internal organ of the body.

The next noteworthy source of illustration is the *Spiegel der Arzney*, 1518, of the Dutch physician and geographer, Laurentius Frisius (Phrysen), teacher of Mercator, which contains two anatomical plates bearing the date 1517. The first of these is a crude and fanciful diagram of the skeleton, typically medieval. The second presents the body down to the knees with the thoracic and abdominal cavities laid open to expose the contained viscera. Surrounding the main figure are six smaller views depicting the anatomy of the brain and one of the tongue. These smaller views despite their crudity are remarkable and without doubt were drawn from the actual dissection. Nothing like them had appeared previously, and the treatment was wholly new and exceptional. Their influence—indeed, the very illustrations—can be traced in the work of Johann Dryander, and they are even suggestive of several of the Vesalian plates. The artist was possibly Hans Baldung Grün, but others attribute the woodcuts to Johann Waechtelin, a pupil of the elder Holbein. The illustrations bear little or no relationship to the text of the work and are classed as so-called “fugitive sheets” such as the *Tabulae Sex* of Vesalius.

The first illustrated anatomical text in the modern sense is the *Commentary, 1521*, on the work of the medieval anatomist Mundinus by Jacopo Berengario da Carpi. Berengario, says Benvenuto Cellini, who was treated for his syphilis by this famous physician and surgeon, “was a great connoisseur in the arts of design”; indeed, Berengario was once the possessor of Raphael’s painting of John the Baptist. His work is of first importance and clearly shows the advent of the critical spirit, but despite his hyperbolic claims to have dissected several hundred bodies and obviously greater knowledge of the body, the illustrations are transitional. While traditional, schematic representations are not lacking throughout the work, many of the illustrations show artistic ability and possess a certain naturalistic quality, although at times the woodcuts are crude and unskilled. His interest in art is shown by the inclusion of drawings of the superficial muscles of the body which appear to have been included specifically for the instruction of artists. It is therefore surprising that he did not obtain more skilled representations. Some of the plates, it is true, do show a more finished workmanship, thus
suggesting possible dissatisfaction and a plurality of illustrators.

It should be noted that Berengario was among the first to employ dramatic postures in the representation of the anatomized human body. These muscle figures are based on free and artistic drawing and possess a certain dynamic quality, and although the execution of the woodcuts is somewhat crude, they should be recognized as a pioneering step leading to the magnificent "muscelmen" of Vesalius' Fabrica. These illustrations were perhaps the exemplar for the corresponding Vesalian plates which were likewise intended for the student of life drawing.

A surprising feature of Berengario da Carpi's Commentary is the omission, save one, of illustrations of the internal organs. This omission was remedied in the following year by a second publication entitled the Isagogae Breves, 1522. The Isagogae is a short anatomical compendium which was intended to replace the medieval anatomy of Mundinus. Many of the illustrations from the earlier work were retained and some improved, but the new figures still display the same diagrammatic crudities.

Johann Dryander (Eichmann) (d.1560), professor of anatomy at Marburg, was one of the first anatomists after Berengario da Carpi to have illustrations made from his own dissections. In 1536 he published at the request of the rector of the university his Anatomia Capitis Humani containing eleven woodcuts based upon anatomies held in that and the previous year. A second illustrated anatomy was published in the following year and another in 1541, to which were added further original figures and many more stolen from Berengario, Frisius and Vesalius. All the plates are crude, yet they do not lack a certain fidelity to nature.

The most notable contribution of the Parisian school was the work of Charles Estienne (Stephanus) (1504-1564), who came of the famous family of printers of that name. Somewhere in the neighborhood of 1530, in collaboration with the surgeon Estienne de la Rivière, he began the composition of an illustrated anatomy which was ultimately published in 1545 under the title De Dissectione Partium Corporis Humani. The delay in publication was due to a legal controversy arising in 1539 at which time the book had been almost completely set up in type. Of the more than fifty plates, the earliest bear dates from 1530, and some are identified by the initials S[tephanus] R[ivière]. Others carry the mark of François Jollat, the Parisian engraver, and still others have been suggested as the work of that singular genius Geoffrey Tory. Thus, while it is true that the publication of the book is post-Vesalian, the majority of the plates antedate the Fabrica, and some even the Tabulae Sex. Proofs of several of the illustrations may have been in circulation at an early date. The plates of Estienne have the distinction of being without doubt the most hideous ever published, yet possess great merit from the standpoint of the anatomist. The majority of the plates consist of large nude figures seated, reclining or standing in all sorts of surroundings, from interiors to ruined walls. From these figures small sections of the body have been removed and clumsily replaced by insets showing the anatomy of the corresponding part. The vast amount of non-essential delineation serves no purpose but confusion. It has from time to time been suggested that some of the Vesalian illustrations, especially Kalkar's plates of the skeleton in the Tabulae Sex, were inspired by those of Estienne and conversely that the later illustrations of Estienne were influenced by those of the Fabrica. There is little to support either of these views.

A very considerable advance in anatomical illustration is to be found in the work of Giovanni Battista Canano (1515-1578), a physician and anatomist of Ferrara. This work, one of the rarest of books, is entitled Musculorum Humani Corporis Picturata Dissectio and was published around the year 1541. It consists of some twenty leaves only and appears from the preface to have been intended as the first fasciculus of a larger and more extensive work. The drawings, twenty-seven in number, representing in a very exact manner the muscles and bones of the upper arm, forearm and hand, were prepared by Girolamo da Carpi (c.1501-1556), a pupil of Carofalo, and engraved on copper. The work of engraving has
been attributed, it would seem erroneously, to the famous Venetian craftsman Agostino de Musi. Although printed on thin almost transparent paper, ill-adapted to receiving impressions from the plates, these illustrations are among the most skillful and artistic anatomical representations of the first half of the sixteenth century. The greater flexibility of copper-engraving no doubt contributes to their excellence. In spirit they belong to the Vesalian school, and despite a few erroneous details, they are completely naturalistic. There is no borrowing and no holdover from earlier works, yet they are inferior to the woodcuts of the *Fabrica*. It has been suggested that Vesalius, while on his way to Basel to supervise the publication of the *Fabrica*, had stopped over in Ferrara to visit his brother Franciscus who was assisting Canano. There he spread before the latter proofs of the illustrations for the *Fabrica* with the result that Canano, recognizing their superiority, decided to withdraw his own publication despite the fact that it had already gone to press. At least, no other parts of his anatomy after the first ever appeared.

Finally, something must be said concerning the forerunners of the type of illustration comprising the Vesalian *Tabulae Sex* of 1538, the so-called “fugitive sheets.” These were as a rule single broadsides, sometimes two, usually printed on only one side of the sheet. They preceded the Vesalian plates by a few years, but continued to appear up to the final quarter of the century. Their purpose was to present popular information or to provide a ready reference for the student or relatively unlettered barber-surgeon. This naturally required a large illustration; indeed, those of Vesalius are among the largest woodcuts ever printed in Venice, the opening being no less than nineteen by thirteen and a half inches. Views of the skeleton, the internal organs and the female organs of generation were commonly represented, but perhaps the most popular, in view of the importance of bloodletting in that age, were representations of the venous system. The original market for such sheets was among bath attendants, barbers and surgeons, not a discriminating group; hence the illustrations were frequently crude and anatomically inexact. Locations on the body were marked in various ways, by the name printed on the part or by letter with the corresponding name inserted in the margin; and because of the unlearned audience to whom they were addressed, the language employed was often the vernacular. Of course there were exceptional cases, such as the two sheets published by Chrestien Wechel in Paris, 1536, representing a front and rear view of the skeleton which are superior to those of Berengario da Carpi or of Dryander although considerably inferior to the Vesalian plates.

Vesalius sought by his *Tabulae Sex* to serve much the same purpose as the “fugitive sheets” but on a different plane, since they were directed to the relatively well-educated student and physician and were expressing not an obsolete but his current anatomical teaching. They were, furthermore, exceptional in that the first three were not so much representational as expressive of the fundamental abstract physiology of the times. That they surpassed any previous sheets artistically was the result of his demand for accuracy which required the employment of a skilled artist and wood engraver.

A second feature adopted by Vesalius from the “fugitive sheet” was the “cut-out,” a device at all times popular with our children. The arrangement was such that the pictures of the internal organs could be cut out and mounted on a larger figure in such manner that when lifted or moved aside the organs could be observed in sequence from the surface to the innermost parts. This plan was utilized by Vesalius in his *Epitome*, copies of which could be purchased with the figures already made up and colored by hand.

THE ARTISTS: TITIAN, KALKAR, CAMPAGNOLA, VESALIUS

There is no more contentious and difficult subject respecting the Vesalian problem than the question of the identity of the artist or artists responsible for the Vesalian illustrations. The puzzle has led to numerous conjectures, ingenious, improbable and absurd. Opinions have ranged all the way from the view put forth at the begin-
ning of the present century that the Fabrica is a
flagrant and gigantic plagiarism from the draw-
ings prepared by Leonardo da Vinci in collabora-
tion with Marcantonio della Torre for their con-
templated volume on anatomy, to a theory
recently promulgated that the real instigator of
the Fabrica was the Flemish artist Jan van Kalkar,
who employed Vesalius as a literary hack to pro-
vide the text. Such extreme views arise in the
 incredulous minds of their authors when faced with
the extraordinary achievement of this young man
of twenty-eight which seems to them miraculous
rather than the product of genius. Furthermore,
such opinions are characteristically uninformed,
and the student of Vesalius can only admire the
rude facility with which the factual evidence is
brushed away in favor of superficial judgments.
On this whole question there is much which must
go unanswered until patient research has un-
covered further information.

No doubt exists as to the identity of the artists
of the Tabulae Sex. Vesalius definitely informs us
that the first three plates are his own work, drawn
originally as separate charts or illustrations to be
employed by him as pedagogical aids to his lec-
tures on anatomy. They were so well received by
his colleagues and students, who, however, found
difficulty in copying them, that he promptly de-
cided on publication. It was then that Jan van
Kalkar drew the three views of the skeleton which
were included in the printed edition. The colo-
phon notes that the plates were published at the
expense of Kalkar, a statement which has given
rise to a great deal of speculation. The suggested
explanation, entirely logical, is that Vesalius
turned over the rights of publication to Kalkar in
payment for his services. This is perhaps borne
out by the existence of a variant edition in which
the Kalkar statement is absent and which, if not
a proof, may represent copies distributed by
Vesalius to the members of his classes. Thus both
parties to the agreement would be satisfied, Kalk-
ar by the profits from the publication and Vesal-
ius by identification with the plates which would
now be accessible to his students.

But who was Jan Stefan van Kalkar? Search as
one may, Kalkar proves to be a very shadowy fig-
ure of whom we know a great deal less than we do
of Vesalius. He was born at Kalkar, a small town
of the Rhine province, midway between Wesel
and Cleves, around the year 1499. He studied
art in the school of Jean de Bruges, following
which he proceeded in 1536 or 1537 to Venice
where he placed himself under the tutelage of Titian. After living for a few years in Venice dur-
ing which time he is supposed to have acquired
successfully the Italian manner, "that his works
were not always perceived to be those of a Flem-
ing," as the unsupported statement of his friend
Vasari runs, he removed to Naples where he died
in 1546 or, according to some authorities be-
tween 1546 and 1550. Of his paintings we know
nothing. Several portraits have been attributed
to him but on very unsubstantial grounds; a portrait
of Cardinal Colonna, formerly thought to be by
Holbein, Rome; supposed portraits of Vesalius at
Amsterdam, London, Glasgow, Paris, Boston,
one of which is a genuine portrait of Vesalius, all
of which are attributions, and many of which are
obviously copies. Apart from these, there is a
series of sketches in the Hunterian Museum in
Glasgow evidently made for the Fabrica, attrib-
uted in the eighteenth century to Kalkar, and a
pen and ink sketch of the title page reproduced in
the present volume (plate 95). This does not
leave much to go on. The only unquestioned
work of Kalkar are the figures of the skeleton in
the Tabulae Sex, and these performe must be the
standard against which his artistic abilities are
measured. We confess that by this criterion they
do not place him in the first rank and leave him
wanting when we come to examine the Fabrica
itself.

The illustrations of the Fabrica have been at-
tributed at different times to a number of differ-
ent artists. For a long period the woodcuts were
accepted as the work of Titian on the basis of
their excellence. This attribution was re-enforced
by the proximity of Padua to Venice and the
knowledge that although the work was published
in Basel, the wood blocks, as stated in the preface,
were cut in Venice. Further strength was given to
this view by the fact that around the year 1670
Dominicus Bonavera published his Notomie di
Titian which included the three figures of the skeleton and the fourteen muscle plates from the Fabrica upon which were engraved the initials T.I.D., i.e., "Design and drawing by Titian." The tradition was continued by Giuseppe Montani in his book of anatomical illustrations (1679) in which he spoke of the "very famous plates of Vesalius" designed by Titian. Thereafter, in 1706, the original wood blocks came into the possession of Maschenbauer who published some of them and on the title page of the work noted that "The figures were designed by Titian," which statement he emphasized in the preface. No one at this time seems to have heard the questioning voice of Albrecht von Haller, the eminent eighteenth-century medical historian, who remarked that if Titian were truly the artist, and in view of his great reputation, why was he not mentioned in the Fabrica.

It was not until the nineteenth century that attention was called to certain passages in the Lives of the Painters by Vasari which seemed to indicate a different artist, namely Jan van Kalkar. Vasari remarked on "the eleven large plates of anatomical studies which Andreas Vesalius engraved after the designs of Jan van Kalkar"; elsewhere, "Jan van Kalkar ... by his hand ... were the designs for anatomical studies which the most admirable Andreas Vesalius caused to be engraved on copper and published with his works"; and finally, "the anatomical drawings for the works of Vesalius were made by Kalkar." This would seem to clear up the question of the artist's identity were it not for the fact that strangely enough these statements are not to be found in the original edition of 1550, in which no mention is made of Kalkar, but in the 1568 edition, some twenty years after Kalkar's death. In addition, it is surprising that Vasari, a connoisseur of the fine arts and an intimate of his "very dear friend van Kalkar," should have been unable to distinguish between woodcuts and copper engravings. But this and other contradictory statements have been ascribed to Vasari's defects as a writer. Further, the absence of any mention of Kalkar's name in the earlier edition of Vasari is ascribed to the fact that it was his intention to discuss only those artists not living at that time.

Nonetheless, the theory on the origin of the plates now swung from one extreme to the other. Titian was deposed, and Kalkar received the entire credit of being the author, not merely of some, but of all the illustrations of the Vesalius works. Additional support was forthcoming on the recognition that the three skeletal figures of the Tabulae Sex were certainly his work and discovery of Vesalius' mention of the artist in his Venesection Letter of 1539.

More recently opinion has begun to veer away from Kalkar and to deny him any, or but slight, credit for the illustrations of the Fabrica and the Epitome. Recognizing Kalkar to be the artist of the skeletons of the Tabulae Sex, at which time he was thirty-nine—an age scarcely formative for a draughtsman—it has seemed inconceivable that he could have developed a year or two later into the great creative artist of the Fabrica. Furthermore, careful examination of the plates of the Fabrica reveals stylistic differences suggestive of the participation of several artists, which is borne out by Vesalius' own statements that he had employed a number of draughtsmen and that some of the illustrations were by his own hand. Still more recent research has supported these conclusions, and we return once more through a full circle to the name of Titian.

Attention has of late been called to a work by Annibale Caro entitled the Dicerie, of which one portion, ascribed to a period no earlier than 1540 and written possibly in 1543, mentions "the anatomy of Vecellii [i.e., Titian]." There is no doubt that the reference concerns the drawings of the Fabrica, which would be correct as to the time of composition. Caro was in personal touch with Titian and stayed with him during the year 1540 at which time work on the Fabrica was in progress, thus giving his statements considerable authority. It has been pointed out that the present attribution to Titian does not represent a later tradition based on quality and the substitution of a greater name for a lesser, since thus far Kalkar's name had not been mentioned, but a piece of contemporary information derived from personal association with the great artist and his
friends. As for the later and contradictory account of Vasari, it is suggested that he wanted to call attention to the share played in the illustrations by Kalkar with whom, incidentally, Vasari was on terms of close friendship. Indeed, were it not for the testimony of Vasari, there would have been no reason to question the authorship of Titian in view of the excellence of the drawings, especially since "the postures and the proportions of the figures, and the landscapes in which the figures are placed, are entirely in his style."

With the exception of the three skeleton plates of the Tabulae Sex which can definitely be assigned to Kalkar, none of his works has been preserved or can be identified with certainty. Assuming that Kalkar had artistic ability commensurate with the quality of the illustrations of the Fabricta, one might assume that efforts would have been made to preserve his other artistic works. Absence of them leads to the conclusion that he was not possessed of great ability. This is to some degree apparent by comparison of the three skeletons of the Tabulae with the far more skillfully drawn skeletons of the Fabricta—assuming that the latter were the work of someone else.

However, if Kalkar was not the artist, who was? It should be noted that Vesalius spared no effort to produce the Fabricta in a sumptuous edition. The choice of printer, the care with which he wrote directions for the printing of the wood blocks suggest not only the maximum of personal care, effort and energy on the part of the author, but a willingness as well to spend whatever money was necessary to obtain the finest results. In view of this, it seems logical that Vesalius, living at Padua, would seek out the finest artist available. Who then better than the great Venetian artist Titian? Moreover, Kalkar, a pupil of Titian, may already have given Vesalius an entrée into the great painter's studio. It is unlikely that Titian himself would undertake the commission, but more likely would turn it over to one or more of his assistants, possibly including Kalkar. It has been suggested that in this manner these assistants would probably employ studies made by Titian which they would copy in clearer outline and under Vesalius' instruction fill with anatomical detail: "the aesthetic invention of the figures, the idea, in the terminology of the period, and the mise en scène would be Titian's while Kalkar's would be that of the 'medical designer.'" Such a hypothesis has certain merits. It explains the characteristics of Titian observable in the figures, the question of how Kalkar, seemingly a second-rate artist, could produce work of the quality to be found in the Fabricta, and, finally, the fact that Vesalius definitely speaks in the China Root Letter of a plurality of artists.

Any attempt to distinguish between the work of the various artists employed on the Fabricta would be based largely upon subjective criticism and certainly subject to much doubt. Yet there are indications of the work of more than one artist. Most obvious, perhaps, is the comparison of the skeleton figures of the Fabricta with the far less artistic ones of the Tabulae Sex. Since we know the latter to be the work of Kalkar, it is difficult to conceive of him as the draughtsman of the former. On this basis it is perhaps possible to distinguish between Kalkarian and non-Kalkarian illustration, that is, upon the basis of definite and objective lesser and greater skill in draughtsmanship.

In this regard another point must be considered. In some of the illustrations Vesalius wrote his text from drawings already made from previous dissection material, forgetful that when printed from the blocks, presumably yet to be made, these illustrations (9:1-2, 12:13) would be reversed. In 15:1-6 Vesalius admitted this confusion. This illustrates several things. Most obvious is the fact that the drawings in some instances had been made prior to the writing of the text, probably in accordance with the ready availability of osteological material. This is also supported by the fact that on occasion (13:4-5) the illustration indicates earlier erroneous beliefs which Vesalius, on the basis of later research, corrects in the text. Moreover, some of these earlier illustrations (9:1-2, 13:4-5, 18:11) are somewhat out of drawing, and because of lesser skill suggest the work of Kalkar.

Nevertheless this is not the complete answer. Certainly some of the drawings were the work of
Vesalius himself. John Caius who lived with Vesalius in Padua, and Fallopii, a later successor to the chair of surgery at Padua, speak quite clearly of his “writing and illustrating” the *Fabrica*. There is other support for this view. It can be established definitely that Vesalius drew not only the first three plates of the *Tabulae Sex* which demonstrate no slight artistic ability and the single diagram in the *Venesction Letter*, but also all the illustrations of the vessels in the *Fabrica*, “for without mentioning anything else, the course of the vessels which, as my friends know well, are delineated in my books solely through my own efforts.” This is borne out in the captions to the illustrations of the *Fabrica* where frequently a distinction between the singular and plural verb is made which suggests the occasions upon which the illustrations were drawn by Vesalius himself. Thus in 46:4 he writes “I have sketched the arrangement of the cava,” and in 46:5-7 “I have now represented ... by separate diagrams.”

The portrayal of the female genitalia in 60:4 is certainly not an artistic one. Furthermore, Vesalius tells how he had obtained the body of which the organs of generation are here portrayed. It was a case of body snatching which required rapid dissection and thereafter quick disposal. Thus there is the likelihood that no artist may have been immediately available and that Vesalius was required to make his own sketch. It is true that the caption to the figure uses the plural “we,” but in this instance Vesalius in recounting the incident refers to his students’ help which may account for the pronoun used. To be sure, the lack of artistry suggests amateur draughtsmanship. Similarly it is possible to conjecture from their amateurish quality that he was responsible for 65:6 and 65:7.

Furthermore, Vesalius informs us of the manner in which some of the illustrations of the muscle men were made, it should be said not by Vesalius, but also not in Titian’s studio. Presumably he refers in the following statement to some locality in Padua, either the dissection theater or possibly his own living quarters.

“Usually when administering the dissection of a man, I draw a strong chord under the lower jaw and through each jugal bone to the vertex of the head, confined as by a noose, and either more toward the forehead or the occiput according as I had it in mind to suspend the cadaver either with the head erect or depressed. I placed the longer end of the noose across a pulley fixed to a beam of the room, and by that I drew the suspended corpse now higher now lower, taking care that it might be turned in every direction according to the requirement of the task; and again when desired, I was able to rest it on a table, for the table was easily able to be accommodated to the region of the pulley. And the cadaver was suspended in this way during the delineation of all the plates of muscles, just as it is displayed in the Seventh plate [plate 39], although when that was delineated, the rope was twisted back to the occiput because of the muscles which are conspicuous in the neck.”

Almost half a century ago it was pointed out that the background to the series of muscle men, if placed in contiguous sequence, formed a continuous landscape. The region has been identified and the late Dr. Harvey Cushing visited the site and left us the following description: "the region around Abano Terme, now a fashionable watering place in the Euganean hills a short distance south by west of Padua—the countryside of Petrarch, as a matter of fact. There the site of the old Roman Thermæ shown in ruins ... the Bacchiglione river with the bridge over it, and the rugged trachytic rocks can all be easily identified." Certain peculiar mannerisms in the drawing of the landscapes suggest that they were the work of Domenico Campagnola, who worked for Titian as a landscape draughtsman at this time. His mannerisms are sufficiently distinctive to differentiate his work from that of his master.

In conclusion, the cumulative evidence points with near certainty to the fact that the illustrations of the *Fabrica* and *Epitome* emanated from the atelier of Titian. Jan van Kalkar, Domenico Campagnola and doubtless other artists participated in the work under the supervision of the master, but some of the plates are certainly the work of Vesalius himself.

**IMPERIAL PHYSICIAN 1543**

The publication of the *Fabrica* and its so-called
Epitome was the culmination as well as the turning point in Vesalius' career. The wood blocks and final instructions to the printer were ready for dispatch by 24 August 1542, and the strange caravan was on its way across the Alps under the care of the Milanese merchants, the Danoni. Nothing now remained but the completion of the typography, the printing and the work of the binder. Sometime early in 1543 Vesalius journeyed to Basel to be on hand for the arduous and tiresome task of proofreading until finally, according to the colophon, the task was completed in June 1543.

Vesalius remained in the city enjoying a well-earned rest and, incidentally, on August 3 acted as godfather to a son of his old friend and former publisher, Robert Winter. But it was not social obligation which kept Vesalius in Basel since it would seem that despite the date of the colophon, his great work was not ready for distribution until August, apparently due to binding difficulties. The anatomist needs must wait for final publication and the special copies to be presented to his patron, the emperor.

On or about August 4 Vesalius set out for Speyer where at that time the Emperor Charles V was staying, and it was presumably there that the presentation was made. A magnificently bound copy of the Epitome printed on vellum was long one of the chief treasures of the great library of Louvain until its destruction during the invasion of Belgium in 1914. This volume was believed to have been part of the gift which undoubtedly included the greater Fabraca. Although the dedication and presentation of the Fabraca to the emperor would be natural on the general grounds of desirable patronage, it seems that in reality it was connected with the decision of Vesalius to seek a court appointment as imperial physician. The ground had long been prepared for such a move. His father, an imperial apothecary, was in a position to smooth the way for him, and favor had already been sought by the presentation of a copy of his son's Tabulae Sex in 1538. Moreover, it is evident from the later China Root Letter that a general impression existed at Padua that he would not return to his academic duties after the publication of his book.

It can be said that with the publication of the Fabraca and his determination to enter the imperial service, Vesalius' period of achievement was at an end. As Charles Singer, the eminent historian of science, has remarked, after the publication of this epochal work, anatomy thenceforth becomes Vesalian, while Vesalius himself passes into the background. Various suggestions have been made as to the reason for this withdrawal of Vesalius while at the height of his academic career and with every prospect of a still more brilliant future. It is possible that he needed the imperial protection as a safeguard against wrath aroused by his too thorough exploration and use of anatomical material, as suggested by some, or that the expenses of preparing the Fabraca required him to recoup his fortune, as put forward by others, but it is most probable that the answer is to be found in the introduction to the Fabraca.

In the preface to that work Vesalius shows himself in complete accord with the philosophical and aesthetic views of his time which led him to demand recognition of the essential unity of the art of medicine, of which anatomy was but the foundation stone. The Vesalian ideal was the complete physician. Only in the practice of the art could he achieve that completeness. It is true that he might have sought this practice at Padua or Pisa, but there were strong traditional ties of family with the Hapsburg court. War, so he states, offers the highest opportunities for service to the physician and a chance to perfect surgical skill. In the imperial retinue he would see much of that, and so it was, for he performed his first service for the emperor in the short campaign against the Duke of Cleves, a rebel vassal of Charles V and an ally of Francis I.

PADUA, BOLOGNA, PISA 1543-1544.
RECEPTION OF THE "FABRACA"

The latter part of the year 1543 and the first half of 1544 were relatively peaceful since it was not until the summer that the fourth Franco-Imperial war was to break out. Since his services were apparently not needed immediately, at least
in a military capacity, Vesalius was free to return to Italy to wind up his affairs at Padua. Meanwhile, his former assistant Realdu Columbus, the same Colombus who later was to dissect with Michelangelo in Rome, assuming that his master's absence was permanent and using the opportunity to advance his reputation by liberal criticisms of Vesalius, was somewhat embarrassed by the return of the latter. Vesalius held a farewell anatomy at which, needless to say, Colombus was not present.

New truths rend the old with violence. Sufficient time had now elapsed since the publication of the Fabrica for Vesalius to learn of the reception of his book, which seems at first to have been so unfavorable that in a rage of disappointment he burned the manuscripts of his notes and works under preparation, including, so he writes, his annotations on Galen which he had planned to publish at some future time. Much speculation has centered around this incident, and Vesalius is often pictured as a kind of embattled martyr consumed in the fire of his scientific heresies. Old men with a reputation to maintain are not tolerant of dictation from their erstwhile pupils. Jacobus Sylvius of Paris, Vesalius' former teacher and recognized as the foremost anatomist in Europe, was especially indignant and attempted to undermine his position at Court. He demanded that his pupil recant or forfeit his friendship.

Despite such attacks Vesalius was not without friends. In fact, as we have it on the authority of Fallopius, the great majority of the physicians in Italy supported Vesalius in his new teachings. On leaving Padua he proceeded on what almost amounted to a royal progress. Traveling in company with Petrus Tronus, professor of surgery at Pavia, to Bologna, he stayed there with Professor Andreas Albus, who escorted him to the medical school in which a dissection was then being performed. In the name of the large gathering of spectators, one Buccafurres requested Vesalius to oblige the students by dissecting and lecturing on some topic. Vesalius acceding, chose to discuss the venous system, a fitting subject in view of his contributions to the theory of bloodletting. Two bodies were available on which he exposed the vena cava and its tributaries before the large group of spectators attracted by the fame of the anatomist. However, the discussion turned into a wordy and acrimonious debate between the philosophers and the physicians on the origin of the blood, and the meeting extended far into the night and was only ended by the intense cold. These fruitless discussions frequently lasted for days, and Vesalius, so Jerome Cardan, the mathematician, tells us, had no time for argumentative disputes. Furthermore, he had an appointment at Pisa for which he set out at dawn. As the dissection was to have continued the next day, and many had come from neighboring towns to hear the distinguished speaker, his precipitate departure was received with great disappointment and no little criticism.

The purpose of the journey was to conduct a course on anatomy at the newly established University of Pisa on the invitation of Cosimo de' Medici, Duke of Tuscany. Vesalius arrived 22 January 1544. Dissection material was floated down the Arno to Pisa, and a temporary theater was erected for the occasion. The proceedings were enlivened by the collapse of the scaffolding, so great was the press to view the demonstrations. The course continued until brought to a close by the onset of the Lenten season. Vesalius long treasured the unusual recognition of having been invited to lecture at no less than three academies, Padua, Bologna and Pisa, within the space of scarcely a single year, and he regarded the acclaim of the Italians, always very sympathetic towards him, as some compensation for the reception which his work had received at Paris and Louvain.

Duke Cosimo fully appreciated Vesalius' abilities and attempted to gain his services on a permanent basis despite imperial competition, but Vesalius, committed to the emperor, had to depart for Florence and thence northwards to join the imperial military forces.

**MILITARY SURGEON**

War with the French once more broke out in the summer of 1544, and it is during this campaign that we obtain the first clear picture of Vesalius as the imperial physician. Before the
walls of Saint-Dizier he was called upon to attend René of Nassau, Prince of Orange-Châlon, the Lord of Halvin and many others who were mortally wounded by the "fiery bombs." On them he carried out autopsy examinations to determine the cause of death which at this time was universally believed to be due to the poisonous effects of gunpowder. In addition, the duty of embalming the dead devolved upon him, for the bodies of the nobility must be transported home for sepulcher. Curiously enough, within the walls of Saint-Dizier, attached to the opposing forces of France, was Ambroise Paré (1510-1590), the most famous surgeon of the Renaissance. It was Paré who popularized the Fabrica and the Vesalian teachings among surgeons by writing an epitome of it in the vernacular which he attached to his works. In the following year Paré was to publish, out of his experience in warfare, his greatest contribution to surgery by disproving that gunshot wounds were poisonous and therewith discarding the barbaric dressing of boiling oil which Vesalius, still a tyro in the surgical art, employed at this time. Likewise, it was Paré who had first introduced (1536) disarticulation at the elbow, an operation which Vesalius attempted with a prentice hand on a Captain Solis not far from Saint-Dizier.

The campaign came to an end with the Peace of Crespy in September of 1544. In the meantime, during the winter of 1543-44, Vesalius' father, the imperial apothecary, had died leaving his son a considerable inheritance which included the family residence in Brussels. On his return, no doubt relying upon his new status as head of the family and an assured position at court, Vesalius entered into marriage with Anne, daughter of Jerome van Hamme, a counselor and master of accounts. A year or so later Vesalius' only child was born, a daughter Anne.

"CHINA ROOT LETTER" 1546

Vesalius was growing in professional stature. The emperor had arrived in Brussels in January 1545 disabled from his eleventh attack of so-called "gout," and Vesalius was employed for the first time in the treatment of his imperial master. Charles V was a difficult patient. He seldom followed the advice of his regular physicians but was always ready to lend a willing ear to any quack who had some nostrum to sell or who promised him relief from his chronic ailment. He refused to restrict his exotic and bizarre appetite which demanded a capon and cold beer at three or four in the morning. Impressed by the high praises in irregular circles for a remedy called the China root, a variety of sarsaparilla which had been introduced to Europe some ten years previously and had already fallen into disrepute, he demanded its administration. Not only had he high expectations of its efficacy, but, although he would not admit it, the approved method of administration did not require such strict control of his dietary regimen. His first physician, Cornelius van Baersdorp, and Vesalius, despite their doubts of its value, duly carried out their orders and, according to court fashion, were promptly called upon to administer the decoction to all and sundry with ample opportunity to confirm its uselessness.

Nevertheless, the China root had now received the stamp of imperial approval, and promptly the royal physicians were importuned on all sides by the medical advisers to the petty princes and nobility for the method of administration of this new remedy since their charges, like the emperor, were anxious to undergo treatment for their syphilis, or the French disease as they called it, by a regimen which was less rigorous than the standard cure by guaiac. Among those who had written Vesalius to ask his opinion of the remedy was his friend Joachim Roelants (1496-1555), city physician of Mechlin. Vesalius' reply constitutes the curiously entitled China Root Letter which was published at the instance of his brother Franciscus, by Oporinus of Basel in 1546.

The China Root Letter is in fact not one but two letters. The first portion, making up a very small part of the volume, is his reply to Roelants, and its contents is of little significance except insofar as it shows Vesalius to belong with the more progressive members of his profession in matters of materia medica. The second and larger section is the substance of his reply to a letter which he
had received from his old teacher at Paris, Jacobus Sylvius, discussing certain offensive passages in the Fabrica and informing Vesalius that these must be withdrawn if he were to retain Sylvius' friendship. The reply is a brilliant and systematic defense of the Vesalian criticism of the anatomy of Calen and reveals his extraordinary knowledge of both human and comparative anatomy. He takes the opportunity to emend certain of his statements in the Fabrica and gives an account of his new discoveries which were eventually incorporated in the second edition of his masterpiece. Here, too, he demonstrates his intense interest in pathology, and in this regard his observations and descriptions of post mortem findings are the first of any importance after the work of the pioneer Antonio Benivieni (d. 1502) of Florence. Furthermore, the China Root Letter is our most important source for details of Vesalius' personal life. Written with the warmth of personal friendship, it offers us a glimpse, slight and shadowy though it may be, of his personality.

PERSONALITY

Many attempts have been made to reconstruct the character and personality of Vesalius. He is often portrayed as a fiery, hot-tempered, disputatious extrovert of tremendous energy and ambition, "the man of wrath." On the other hand, a recent writer would see in him a shut-in, schizoid, melancholic individual who rapidly passed into depression upon achieving the pinnacle of his success and accomplishment. Such diversity of opinion is no more than a measure of our ignorance of the man and his character, and the extraordinary facility with which writers will lose all sense of objectivity to spin elaborate webs of romantic fantasy from the thinnest of factual threads. Rather, let us confess that the materials with which to reconstruct his personality are of the scantiest and that we are not in a position to view the man except dimly.

Vesalius was essentially the student possessed of an intense enthusiasm for his profession. No one, say his contemporaries, spent more time in the library reading, exploring and digesting the technical literature. Truly a child of the Renais-

sance and deeply influenced by humanistic teachings, he sought not refuge in his books but the restoration of the golden age which had been destroyed. This was the same impulse which motivated the artists of the period in their pursuit of nature. Impetuous he most certainly was, but seldom did he allow his ardor to outrun his sense of decency. In fact, unlike his contemporaries, he seldom descended to personalities in his criticisms, which are usually overt without mention of names. He was not quarrelsome nor did he like argument for argument's sake, says his friend Jerome Cardan, who holds up Vesalius as an example to a disputatious age which had bred such vicious battles as those between Fuchs and Cornelius, Fuchs and Ryff, Argentarius and Fernel, Matthiolus and Amatus Lusitanus, to mention but a few. Like every ambitious and successful man Vesalius made enemies, but he had many friends to whom he appears to have been deeply attached. He was fully aware of the significance of his work and jealously defended it. Possessed of an artistic temperament, he was perhaps unduly sensitive and deeply resentful and hurt by the attitude of his former teachers at Paris to whom he had given his affection. He has been accused of being avaricious, but we suspect that the charge was the outcome of envious regard for the considerable fortune which he acquired in practice. We doubt that he, fully conscious of his intellectual superiority, was able to tolerate his less progressive colleagues who, in their pursuit of imperial favor, sought every opportunity to undermine his authority. His mind was intensely visual, and he retained his great powers of observation to the end of his days as may be gathered from the last pathological report which he wrote. His approach to problems was exceedingly direct, and he was not much concerned with philosophical speculations. He was strangely the epitome of a modern scientist in outlook but with this difference that specialization was entirely foreign to his conception of the province of a physician. He saw medicine as a whole, and as he had done for anatomy so it was his ambition to restore the art of surgery which through ecclesiastical prohibition and other influences had been relegated to
menials. In this laudable endeavor he was almost completely frustrated and unable to overcome tradition. Indeed, had he received his doctorate from the University of Paris he would have been required to take an oath not to demean himself with the work of barbers. His attitude was misunderstood by his fellow physicians and threatened the vested interests of the surgeons' guild. This frustration would seem to have robbed him of much of the satisfaction to be derived from practice and appears to have been one of the factors which eventually made his life as court physician intolerable to him. He was not one who found it easy to conceal his feelings, which only served to increase his difficulties among jealous and servile men overly anxious for court favor and ever ready to seek personal advantage through criticism. That he should have reacted by remaining aloof and responding with cynicism is not surprising, but his friends recognized in his behavior only the earnestness and desire for the advancement of his profession.

COURT SERVICE

The opportunity for writing the *China Root Letter* occurred at Nimwegen, the city of his ancestral origins. The emperor on his return from a meeting of the Order of the Golden Fleece at Utrecht had passed through Nimwegen on his way to Guelders and arrived at Maestricht in February 1546. Here he received information that the conference being held at Ratisbon (Regensburg) as the outcome of the Diet of Worms of the previous year, was in danger of breaking up. He immediately dispatched a message to the commissioners to prolong the meeting until he might arrive and hurriedly pushed on towards Speyer on the Rhine. Meantime, it was reported that the Venetian ambassador, Bernardino Navigero, had fallen seriously ill and had remained at Nimwegen, and Vesalius was promptly ordered to attend the distinguished patient. The ambassador's illness proved stubborn and his recovery slow, which made it necessary for Vesalius to remain with his charge for nearly a month, during which time he occupied the period of enforced leisure by visiting the tombs of his ancestors and composing his long letter to Joachim Roelants.

This year of 1546 in which the *China Root Letter* was written is doubly interesting. Andrea Navigero, brother of Vesalius' patient, had been the intimate friend of Hieronymus Fracastorius (1478-1553), who in 1530 had published his poem *Syphilis*, a great literary success of the age, and who was now about to issue his famous treatise *De Contagione*, the first scientific statement on the true nature of contagion and the modes of transmission of diseases. It is possible that Vesalius met the great epidemiologist in this or the following year. Furthermore, soon after Bernardino was well enough to travel and patient and physician had completed their journey to Ratisbon, Vesalius was called into consultation with the famous anatomist of Ferrara, Giovanni Battista Canano, over the illness of Francesco d'Este, scion of that famous and noble house. At the bedside while discussing the problems of venesection, the question of the existence of venous valves was brought up by Canano, and it was at this time that the mystery of the valves originated, to be solved later by William Harvey with the discovery and demonstration of the circulation of the blood.

The position of Vesalius at court continued to improve. The emperor had complete confidence in his protomedicus, Cornelius van Baersdorp, but was desirous of having the young physician in constant attendance for a secondary opinion. The position of chief physician to the King of Denmark had, meanwhile, been offered to him but refused. In March 1547 Vesalius took a brief trip to Basel the purpose of which journey is uncertain, although it may have been in connection with a projected second edition and revision of the text of the *Fabrica*. However, he had no sooner set out on his return than he was overtaken by an imperial courier who urged him to hasten to the side of the emperor now lying at Nuremberg. In Charles' mind Vesalius was now essential to his health.

Despite the criticism and censure of his colleagues, Vesalius seized whatever opportunities offered to improve his surgical skill. Already in 1545 he had operated upon a Flemish knight
named Busquet for an osteomyelitis of the lower end of the femur, the first deliberate operation for this condition of which we know. Two years later he made what was his greatest contribution to the surgical art by the re-introduction of the classical, Hippocratic operation for drainage of the chest in empyema. With the passage of the years he obtained an extensive experience with the procedure, and his contribution was widely proclaimed by his contemporaries though few dared to follow his example. A brilliant description of the operation and his clinical success was written in 1562 and has survived in a publication of Gian Filippo Ingrassia (1510-1580), distinguished physician of Naples and later of Palermo.

While in attendance on the emperor at Brussels during the winter of 1548, Vesalius made a dramatic prophecy of the imminent death of Maximilian of Egmont, Count of Buren, which was fulfilled with startling precision almost to the very hour on December 23. The count had just returned from a mission to England, suffering from a severe quinsy of the throat. After his examination, Vesalius advised him to put his affairs in order since he had but a few hours to live. Brantome tells us that the nobleman ordered a splendid banquet graced with his finest plate to which he invited all his friends and, sitting at table, he distributed handsome presents among them and then took his leave with the utmost calmness. Thence he was carried to his bed and expired at the very hour foretold by his physician. The event caused a tremendous sensation throughout Europe and inspired writers and poets for over a generation. But Vesalius daily reported, following autopsy, that death was due to an extensive abscess involving the mediastinum of the chest. However, there were those who later became skeptical of Vesalius’ powers and motives in such predictions. The Chancellor Granvelle wrote to the president of the privy council in 1558, saying, “M. de Lalaing is well and does not much fear the opinion of Vesalius on his patients, because he always declares them mortally ill so that if they die, he is excused, and if they live, he has performed a miracle.”

Vesalius’ abilities now were receiving more than the approval of the emperor and popular acclaim. He was honored at Basel in August 1549 by members of his profession through the dedication to him of a new edition of the works of Alexander Benedito (1460-1525), a predecessor in the chair at Padua and the first since medieval times to write a comprehensive text entirely devoted to anatomy. Further recognition in a material sense was afforded him by an increase in salary and the opportunity of looking after the Cardinal Granvelle, the most powerful figure at the court. The cardinal died in 1559 only to be succeeded by his son, Antony Perrenot, Bishop of Arras and later, like his father, Cardinal Granvelle. Perrenot had been an old classmate of Vesalius at Louvain and was responsible for his receiving the increase in salary.

THE ABJURATION OF CHARLES V

In February 1552 the emperor was severely ill and prepared himself for possible death. Despite the efforts of Vesalius and the favorite physician Baersdorf, his attacks of so-called “gout” had become more frequent and more severe. Burdened by his illness and affairs of state, the emperor decided to abdicate, but it was not until 1555 that he was able to take the first step in the fulfillment of his intentions. In the afternoon of October 25, supported by the Prince of Orange, he entered the great hall of Brussels where at the same hour, on the eve of the Epiphany forty years previously, his grandfather, the Emperor Maximilian, had released him from his minority at the age of fifteen. Surrounded by the members of the Golden Fleece, the nobles, the deputies of all the provinces and his personal attendants, Charles V presented his famous speech amidst the open and unashed sobbing of the assembly. Vesalius had lost a courteous and warm-hearted master and acquired a new one, the cold and stiff-necked Philip II of Spain. However, it was not until 16 January 1556 that Charles resigned his Spanish kingdoms and that of Sicily to free himself of all responsibility and retire to the Jeremite convent of Yuste high in the Estremadura. In parting he gave Vesalius a life pension and permission to enter the service of the new ruler.
THE SECOND EDITION OF THE "FABRICA"

1555

Almost, as it were, a colophon to the emperor's reign, the second folio edition of the Fabrica, carrying the same dedication to Charles V, was issued in August 1555. The volume was far more sumptuous than that published in 1543. The paper was heavier and the type larger. The initial letters had to be re-cut and a new block prepared for the title-page in which, however, much of the beauty of the original was lost. Vesalius made many definite improvements in the text, which was shortened by getting rid of the many redundancies and the omission of comments on his personal life and that of his friends. He added further observations and corrected others, but perhaps the most valuable addition was the extension of the chapter on his physiological experiments which now included his report on the effects of nerve section, on laryngeal paralysis following section of the recurrent nerve, on collapse of the lung after opening the pleural cavity, on artificial respiration by intratracheal intubation and the continuance of life after removal of the spleen. Indeed, the second edition of his work is often praised more highly than the first on the grounds of its augmented and corrected text, but it is as a supreme example of the typographer's art of the sixteenth century that this edition deserves first consideration. The illustrations are superbly reproduced and show to better advantage on the heavier paper. Nowhere, and this includes the modern Icones of 1534, are the illustrations better seen. It is difficult to understand how the printer Opornus could have hoped to receive any return on such a costly venture. The plates had by this time been plagiarized all over Europe, and in consequence the opportunities for sale of the books must have been greatly reduced. Even though we recognize that Opornus was an exceedingly poor businessman, we doubt he could have found much to encourage him in the undertaking. Opornus' catalogue indicates that the edition had been in preparation since May 1552 when five of the seven books were offered for sale, and a letter from the printer to Conrad Hubert of Strasburg reveals that part of the delay was due to difficulties in obtaining the molds for the larger type. We suspect that another reason was lack of funds. However, Vesalius was now a wealthy man. He had recently completed the building of a palatial residence in Brussels not far from the home of his father, and with this expense over he may have now been in a position to offer a subsidy for the completion of the work.

DEATH OF HENRY II OF FRANCE 1559

Not long after assuming his responsibilities under the new monarch, Philip II, Vesalius was called upon in the tragic case of Henry II of France. Under the terms of the treaty of Cateau-Cambrésis which terminated Franco-Spanish hostilities, the double marriage of Henry's daughter to Philip II and the French king's sister to the Duke of Savoy had been arranged to take place in June and July of 1559. To celebrate the affair a brilliant series of entertainments had been provided which in a curious resurgence of medieval chivalry included tournaments and jousts. Philip remained in Brussels and on June 22 was duly married by proxy, being represented by the Duke of Alva. The betrothal ceremonies of the second marriage were no sooner over than the passage of arms commenced. On Friday, June 30, the French king participated in the jousts, and in running a second course against the Comte de Mongonnery, contrary to the rules of the tourney, he was wounded above the right eye by the broken lance of his opponent. The wound proved fatal, and the king died ten days later from an associated injury to the brain.

Immediately after the accident the most celebrated physicians of the realm were sent for. The protomedicus, Jean Chapelain, and the famous surgeon Ambroise Paré were early at his bedside. Since the king's condition showed no improvement, experiments were conducted with the stump of Mongonnery's lance on the heads of four executed criminals in an attempt to discover the secret of the wound, but the grisly procedure revealed little. In the meantime a messenger had been dispatched to Philip at Brussels.
to inform him of the accident and request the services of Vesalius.

Vesalius arrived in Paris on July 5 and as soon as he entered the king’s chamber dramatically applied a clinical test from the result of which he declared a fatal outcome. His position in Europe was now supreme, for upon his arrival he was put in charge of the case. In view of the momentous issues at stake, the responsibilities no doubt carried with them considerable nervous strain, and he was doubly burdened by the requests of importunate courtiers, especially of the house of Montmorency since the death of Henry might well result in their ruin. There was little that Vesalius could do, for the French king was beyond aid as the post mortem findings later indicated. Death was due to cerebral compression from a _contre-coup_ injury of the brain and subdural haemorrhage. From both Ambroise Paré and Vesalius, we have reports on the findings which established once again the truth of ancient Hippocratic observation that the brain could be injured without frank fracture of the skull, a matter of considerable dispute during the sixteenth century.

**THE ILLNESS OF THE INFANTE DON CARLOS**

In the autumn of 1559 Philip II transferred his court from Brussels to Madrid and thereafter spent the rest of his life away from the Netherlands. Vesalius and his wife, breaking family ties with their native land, traveled in the king’s retinue. However, in Madrid Vesalius continued to serve representatives from Flanders at the court and, on occasion, members of the English diplomatic staff. Despite his seniority in the imperial service and the confidence with which he had been regarded by Charles V, Vesalius does not appear to have received the position of chief physician to the new monarch but to have remained as physician in ordinary. Unlike his father, Philip was more Spaniard than Netherlander and was more kindly disposed towards the Iberians when granting favors.

In 1562 Vesalius participated in his last important case, the illness of the Infante Don Carlos, whose tragic and pitiful life forms the subject of romances by Schiller, Otway and many another. Philip had sent his son, recently recovered from a quartan fever, to Alcalá where, in the company of Don John of Austria and the Prince Alexander Farnese, he was to complete his education under the tutelage of the archbishop. This ancient town, the birthplace of Catherine of Aragon and the home of Cervantes, was then a flourishing university center which rivaled the better known Salamanca. The wayward and unbalanced youth of seventeen had scarcely been in residence two months when, so it is reputed, pursuing a serving maid to whom he had made amorous advances, he fell down a flight of stairs and was thrown against a door at its foot.

The Infante was rendered unconscious by the fall, and his personal physicians, Doctors Olivares, Vega and Daza Chacon, who gave him immediate attention, found a small contused wound on the back of his head which apparently penetrated to the bone. Upon notification of the accident, Philip promptly dispatched his protomédecin, Juan Gutierrez, the royal surgeon, Pedro de Torres, and a certain Portuguese physician. The accident had occurred on Sunday, April 19, but despite the multitude of physicians, who were undecided as to the nature of the wound, the prince got progressively worse, and, upon fears of erysipelas, a messenger was dispatched on Wednesday, April 29, to inform the king that his son was in a perilous condition. Philip, accompanied by Vesalius, rode through the night from Madrid and arrived on the morning of May 1. The wound was explored and dressed in the presence of the new arrivals.

It was obvious from the start that the native physicians regarded Vesalius as an alien interloper, and they paid little attention to his advice until more desperate remedies were required. Vesalius contended that the lesion extended more deeply and that it was necessary to examine the bone and even to trephine, but he received no support. The unhappy prince made no progress, and three days later a fatal issue was expected. The king rode away to the monastery of St. Jeronimo to seek solace in prayer.

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acteristic of the superstitions of the times. Relics and charms were applied to the wound, and a procession of flagellants filed past the quarters of the ailing prince. Meanwhile, the populace began to assume a threatening attitude towards the assembled physicians, and public opinion forced the attendants to apply the nostrum of a Moorish quack named Pintorecile from the kingdom of Valencia, whose ointments burned the wound and rendered the patient worse. Finally, a procession of townsmen came to the palace bearing the corpse of a friar, who had died a century before, celebrated during life for his miracles and later canonized as St. Diego of Alcalá. The corpse was placed in bed all of one night with the dolorous prince. The Duke of Alva acted as a sick-nurse and sat fully clothed throughout the nights beside the boy while the regular physicians engaged in ceremonious consultations some of which lasted for hours.

All hope had long since departed, but the physicians remained steadfast to their duty. On May 16, at the insistence of Vesalius, the left orbit was incised and a considerable collection of pus evacuated. In the evening the same procedure was carried out on the right. Promptly the prince began to improve and the fever dropped, disappearing by May 22. It was now apparent that the patient was out of danger, and on Trinity Sunday, the 24th, the king attended a solemn procession of thanksgiving. In June the prince shed a sequestrum from the diseased bone, and by July was well enough to attend a bull fight held in his honor.

The case had been a tedious one. The rank of the patient, the responsibilities, and the threatening attitude of the populace had made it a nerve-racking experience for the physicians. For Vesalius the charge was rendered doubly unpleasant by the jealousy and provincialism of the Spanish physicians, and no doubt this was but one of several such instances of professional discord which had made his position at the Spanish court almost unendurable. He had now a considerable fortune, and a return to the calm of his earlier academic life must have seemed most desirable provided he could find some way of obtaining a release from court service.

THE “EXAMEN” OF FALLOPIUS’ “OBSERVATIONES ANATOMICAEE” 1564

The desire to retire and to return to Padua seems to have been awakened in Vesalius by the receipt, a few months previous to the Don Carlos case, of the gentle criticisms of the Fabrica contained in a book by Gabriel Fallopius. In 1561 Gilles Hertog, a physician of Vesalius’ native Brabant and a former pupil of Fallopius, had arrived in Madrid carrying a presentation copy to Vesalius of his master’s work, the Observationes Anatomicaee, which had just been published in Venice. Here was an unusual contribution of original and distinguished investigation. The author wished to be regarded as a spiritual pupil of "the divine Vesalius" whom he had never met, and Vesalius immediately recognized a kindred spirit, a seeker after truth not controversy, and was quick to reply. By the end of the year 1561 he had completed a lengthy letter analyzing the Fallopioan criticisms, although he confessed that there was much which he was unable to confirm owing to the impossibility of obtaining anatomical specimens in Spain; however, there were many observations with which he was able to agree from experiences gained since the last edition of his book. Furthermore, he expressed amazement and chagrin at the high praise given by Fallopius to the Spanish anatomist, Juan Valverde di Hamusco, whose book had been published five years previously, and there was much justification for Vesalius’ irritation since Valverde’s illustrations were for the most part deliberately plagiarized from the Fabrica.

The letter was consigned for delivery to Paolo Tiepolo, the Venetian ambassador to the court of Philip II. Unfortunately the ambassador was delayed in Spain for many months and when he finally arrived in Venice, sometime after October 1562, Fallopius was dead, and the letter remained undelivered. It was not until some two years later that Vesalius learned of the death of the anatomist, while passing through Venice on his way to the Holy Land. It is evident that he had no intention of publishing the reply as he
considered it a purely personal communication. However, it chanced that on entering a bookshop in Venice he encountered Augustinus Gadalinius, the managing editor of the Opera of Galen to which Vesalius had contributed, and several other prominent physicians who inquired of the work and expressed a desire to see it in print. Paolo Tiepolo, the ambassador, was sought out, since Vesalius had not kept a copy of the letter, and the original was handed over to the publisher. This, the last work of Vesalius, appeared 24 May 1564, under the title Andreae Vesali Anatomicae libri Carum Gabrielis Fallopian Observationum Examen, but its author was never to see the work in print.

PILGRIMAGE AND DEATH 1564

In the spring of 1564 Vesalius departed from Venice on the pilgrimage from which he was never to return. What had caused him to give up court service still remains one of the unsolved mysteries of his life. Ambroise Paré, the great French surgeon, relates the story of an anatomist performing in Spain a dissection upon a noblewoman suffering from “strangulation of the uterus” and presumed dead. On the second incision of the knife she suddenly came to life “which thing struck such an admiration and horror into the hearts of all her friends that were present, that they accounted the Physician, being before of good fame and report, as infamous, odious and detestable . . . wherefore he thought there was no better way for him, if he would live safe, than to forsake the country.” Edward Jordan, an English physician, repeats the same story but mentions the name of Vesalius and suggests that he undertook a pilgrimage as an excuse for leaving Spain. In a third account by Hubert Langue, the victim of the dissection is transformed into a man, and Langue states that Vesalius became liable to the Inquisition which he escaped only through the protection of Philip II to whom Vesalius made promise of a pilgrimage.

However, other contemporary opinion entirely ignores any such dramatic reason for Vesalius’ departure to the Holy Land. Several accounts suggest that he was weary of court service and the hostility of the Spanish physicians and sought only an excuse for withdrawal. There are many factors which support this view.

Vesalius was an alien in Spain and, as is evident from the Don Carlos case, was regarded with envy and jealousy by his colleagues who attempted to obstruct his every move. Gachard, the Belgian historian, informs us that they even attempted to prevent his coming to Alcalá and that his efforts were later belittled and all credit for the prince’s recovery was ascribed to them to the miraculous intervention of the body of the exhumed Fra Diego. Political reasons, for the Netherlands were by now seething with disaffection, had made it impossible for him to assume the position of protomedicus despite the fact that Philip, like his father, had come to rely on Vesalius in all dire emergencies. Clusius, the botanist, who reached Madrid the same day that Vesalius departed, states that the physician had not been well and was granted permission to withdraw and undertake a pilgrimage for the sake of his health. Be this as it may, conditions of service had become extremely unpleasant and irksome which may have led to illness, or perhaps a feigned illness, providing a convenient excuse to retire from an intolerable position.

Finally, a desire to return to scientific research seems to have been awakened in Vesalius by the receipt of Fallopis’ Observationes. It was quite impossible for him to carry out such pursuits in bigoted and heresy-hunting Spain, and in his letter to Fallopis he makes it apparent to us how deep was his longing for academic life. “I sincerely hope that you may long maintain this purpose in that sweet leisure of letters which is yours, and in that throng of learned men whose studies are dear to their hearts and with whom you can daily compare the concepts of your mind. For I feel that the ornaments of our art originate in that arena from which as a young man I was diverted to the mechanical practice of medicine, to numerous wars, and to continuous travels . . . therefore continue to embellish with the fruits of your talents and industry our common school, whose memory is most dear to me.”

The death of Fallopis had left the famous
chair of anatomy at Padua once more vacant. We do not know whether Vesalius openly sought his old position from the Venetian government or whether it was offered to him, but it was understood that he would once more resume his professorship on his return from Palestine. And so, with an assured position upon his return, Vesalius set sail from Venice in April of 1564. The first leg of his journey took him to Cyprus, during which time he had the company of Giacomo Malatesta di Rimini, general of the Venetian army.

At one time the following inscription was to be read on a lonely grave on the small island of Zante, not far from the western seaboard of Peloponnesus. “The tomb of Andreas Vesalius of Brussels, who died October 15 of the year 1564 at the age of 50 years, on his return from Jerusalem.” The details of the circumstances surrounding his death are very contradictory and confusing. The most authentic account suggests that he was shipwrecked on his return and that his body was washed ashore where it was recognized by a goldsmith who had known Vesalius during his life and who arranged for burial. Others contend that he took ill on shipboard, and that the sailors, fearing the plague, were about to throw him into the sea but were prevailed upon to land him on the island where he later died. A certain Johann Metel in a letter to George Cassander states that he had undertaken the voyage upon promise of a large sum of money. On his return in the company of one George Boucher of Nuremberg, the ship was driven for forty days before a storm and such was the parsimonious nature of Vesalius that he had provided inadequate provisions, from which cause he became ill. Many were dying and were thrown into the sea, but Vesalius begged the sailors not to dispose of his body in this way if he should die. Eventually the island of Zante was reached and, after disembarking, Vesalius made his way to the city only to die at its very gates. As has been mentioned, the majority of these accounts are highly suspect, written long after the event and derived from secondary sources.

To many it has seemed strange that Vesalius should have abdicated his pre-eminent position as a scientist to bury himself in the relative obscurity of the Spanish court. But this is to think of Vesalius as a specialist in the modern sense; whereas the conception of specialization was entirely foreign to the sixteenth century. Medical men dabbled in theology, philosophy, mathematics, astrology, geography or any other intellectual pursuit, science or pseudo-science, for which they had the inclination. On the other hand, the laity just as frequently attempted to practice medicine. Although Vesalius defends this attitude, nonetheless he himself followed his profession with unusual singleness of purpose. He was fully conditioned by his age, and, therefore, to him the ultimate aim of the physician was the perfection of the medical art as a whole, and its practice as a natural corollary. Tradition and his aims dictated service at the imperial court. Likewise tradition restrained his development as a surgeon, and he recognized his disappointment after scarcely three years of service. By that time he was dependent upon royal permission to retire to more fruitful fields, but when the opportunity came, fate decreed otherwise.

Had Vesalius been allowed to resume his researches at Padua, it is quite possible that the whole field of medicine would in his remaining years have been advanced by a half century. His past researches had led him to the very threshold of the secret of the circulation of the blood, and the possibility is considerable that he would have taken the final step which fate was to reserve for Harvey. While such a discovery would have been the most fitting climax to the Vesalian anatomy, yet so vast were his contributions that this single factor can in no way decrease his greatness. To Andreas Vesalius of Brussels, the first man of modern science, no more fitting words could be dedicated than the epitaph engraved on the tomb of the mourning skeletal figure of the Fabrica, “Genius lives on, all else is mortal.”

J. B. deC. M. SAUNDERS
CHARLES D. O’MALLEY
Plate I  FRONTISPICE

THE WOODCUT PORTRAIT OF ANDREAS VESALIUS OF BRUSSELS FROM THE FIRST EDITION OF THE "DE HUMANI CORPORIS FABRICA," 1543

The only authentic portrait of Andreas Vesalius of Brussels is this famous woodcut from his great treatise De Humani Corporis Fabrica, first issued at Basel in 1543. Its authority is unquestioned. The same wood block was used in both Latin and German editions of his Epitome, also published in 1543, in the China Root Letter of 1546 and in the second editions of the Fabrica and Epitome of 1555, as well as in several posthumous publications of his works. It has been re-engraved on numerous occasions and is the prototype of innumerable portraits in oils painted in later times as honest memorial pieces or to entrap the unwary. On the front edge of the table we find the inscription, AN. AET. XXVIII. M.D.XLII, which provides us with the date of the portrait as well as the age of Vesalius at the time the portrait was drawn. Beneath the first inscription may be read indistinctly OCYS, IUNCUNDE ET TUTO—swiftly, pleasantly and safely—a motto apparently derived from an aphorism of the ancient physician Aesclepiades and quoted from a medieval version of the works of Aulus Cornelius Celsus (C. 25 B.C.-50 A.D.) which reads: "Aesclepiades says that it is the duty of the physician to cure his patient safely, swiftly and pleasantly."

The portrait of Vesalius has been universally admired and has attracted a great deal of attention. It is obviously successful in its expression of a vital, dynamic and vigorous young man, full of energy, radiating self-confidence and self-assurance. In atmosphere, "coloring" and illumination it is brilliant due to the admirable skill of the woodcutter, so much so as to rank as one of the finest book illustrations of the period. Despite this high praise, the woodcut presents many puzzling features. The head of Vesalius is disproportionately large and dwarfs the rest of the body. Hand, wrist, forearm and arm are badly out of drawing. Still more obvious and flagrant is the lack of proportion between the dimensions of Vesalius and those of the dissected specimen. The errors of perspective are numerous. Some would excuse such gross disproportions as being due to the aesthetic conscience of the artist seeking to avoid the commonplace, others find in the faulty draftsmanship evidence that this is no work of a competent artist and certainly no pupil of Titian. This naturally raises the question of the author of the portrait.

Many competent experts and critics assert that the portrait is the work of Jan Stefan van Kalkar (1499-1546/50), the Flemish artist trained in the school of Jean de Bruges and later a pupil of Titian. This view has come to be accepted almost universally. However, it should not be forgotten that the attribution depends solely upon the very general statements of Vasari which have been discussed in the introduction and is no more than an attribution. Charles Singer has recently re-examined the question and argues with much cogency that no pupil of Titian could have so botched his anatomy and therefore concludes that it is obviously not the work of a trained artist. He believes that Kalkar, or another, drew or painted a head of Vesalius to which a craftsman added a composition of his own, Vesalius supplying the anatomical details. But even Singer's view is not entirely satisfactory for reasons too lengthy to enumerate here. If we may be excused for complicating the problem, the suggestion that this is a self-portrait might be entertained. Vesalius was by no means unskilled as a draughtsman. The pose is characteristic of a drawing made from a mirror image, and the treatment of the specimen recalls plate 61:1 which is possibly the work of Vesalius himself. However, it is safer to say artist unknown.

Another peculiar feature is the legend engraved on the scroll resting against the inkpot. It purports to be the opening lines of Chapter 30 on the muscles moving the fingers, presumably from the Fabrica. On consulting the Fabrica it will be found that chapter 30, not 30 of Book II, deals with these muscles. The opening words are almost identical with those inscribed on the scroll but differ somewhat in arrangement. If the inscription refers to the Fabrica, then doubt is cast upon the accuracy of the dating of the portrait since by this time the early chapters would long since have been in the hands of the printer and already set up in type. The difficulty stems from the assumption that the legend relates to the Fabrica. On the other hand, we know that Vesalius was already engaged on another work to be entitled Annotations on the works of Galen. This work he later destroyed in anger over the onslaughts of his enemies. The legend may perhaps refer to chapter 30 of the Annotations, especially since in one of the very first dissections he had ever undertaken on man he discovered discrepancies in the account of Galen on the musculature of the forearm, discrepancies which he now symbolically displays on the specimen shown in the illustration. A further note of perhaps minor nature is the fact that the chapters of the Fabrica are numbered in Roman numerals while the legend of the portrait carries Arabic.

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PLATE 1. WOODCUT PORTRAIT OF ANDREAS VESALIUS
The striking and turbulent scene represented in the title page of the Fabrica, and also of the Epitome, has been the subject of endless comment regarding its significance, its artistic merits and its author. There can be no question that the woodcut ranks among the finest achievements of the art of the engraver in the sixteenth century. The line is clear and precise, the depth and perspective remarkable, the difficult cross-hatching in the shadows accomplished almost without blemish, and the whole executed with a skill and craftsmanship of the highest order. Many competent critics have expressed their admiration of the conception and arrangement of the composition, although a few find the scene too blatant a piece of self-advertising to be wholly satisfying, but it must be remembered that this was a brassily strident age.

The scene represents a public anatomy conducted by the young Vesalius and is as crowded with symbols reflecting his ideas as there are figures in the surrounding throng. The demonstration is in the open air before some ornate building in the Palladian renaissance style, possibly imaginary, and not, as often erroneously believed, within a theatre. The out-of-doors is emphasized by the plant life seen clinging to the masonry of the arch on the left. In this scene, as was the custom in public anatomies, a temporary wooden structure has been erected to accommodate the spectators. Wooden theaters of this kind, to be dismantled at the end of the course, were introduced at Padua by the anatomist Alessandro Benedetti and continued to be used until the academic year 1583-1584 when the theater was moved indoors to one of the classrooms. A permanent anatomical theater, which still stands, was constructed in 1594.

In the center of the scene stands Vesalius surrounded not only by his students and fellow physicians but also by the Rectors of the city and university, councillors and representatives of the nobility and the church. The professor discourses and demonstrates from the body itself. He signals the break with authority by descending from the chair, dispensing with the ostensors or demonstrators, andIGO the menial who formerly did the dissection to a position beneath the table where they are seen quarrelling amongst themselves. In the foreground stand three figures robed in the vestments of classical antiquity representing the golden age. They now occupy a position on a level with the new age, for, as Vesalius said, "There is ground for hope that anatomy will ere long be cultivated in all of our academies as it was of old in Alexandria." Galen’s dependence upon animal anatomy is indicated by the dog and the chained monkey, the latter being in itself an age-old symbol of medicine.

The very center of the middle distance is dominated by a skeleton articulated in the manner fully described by Vesalius, who was convinced that the study of anatomy begins with the bones, to which constant reference must be made during the process of dissection, and, in addition, the bones of animals must always be present for purposes of comparison. The nude figure clinging to the column on the left indicates the importance of surface anatomy as shown in the Epitome (plates 80, 81) and draws attention to the functional aspects which Vesalius is to teach. In the decoration of the entablature above the Corinthian columns appear the lion of the Venetian state and the ox of the Paduan school. Two putti support an armorial shield carrying three weasels coursant on a sable field, the crest of Vesalius and a play on the vernacular version of his name, Wessels. On the left, beside the doorway or window leading to the balcony, are the initials I and O, interlaced like the Greek letter phi, constituting the monogram of Johannes Opominus, professor of Greek and the publisher and printer of both the Fabrica and the Epitome.

Many have sought the portraits of Vesalius’ contemporaries in the surrounding figures. Vesalius is recognizable mainly by his occupation and his costume which is similar to that of the portrait, but the likeness is not particularly good. There is good reason to suppose that the figure clothed in classical garments, standing in the right foreground and admonishing the custodian of the dog, is Realdo Colombus (1516-1559), assistant to Vesalius and one of the first to describe the pulmonary circulation. Likewise, the elderly bearded man seen looking over the balcony on the right is reputed to be the publisher, Johannes Opominus. These attributions possess some force since the resemblances to existing portraits are close.

It would be of the greatest importance were it possible to identify the artist’s self-portrait among the crowd. The late Harvey Cushing, distinguished student of Vesalius, presumed that the young man in the second row to the left of the center and holding an open book is the artist Jan Stefan van Kalker. Cushing would read the initials S.C. on the cover of the volume, which he holds to be a sketchbook since he believed that he could discern in the right hand of the figure a pencil, the upper end of which projects beyond the upper edge of the book. It would, however, require a considerable stretch of the imagination to accept such an identification. At this time Kalker was no youth. Closer inspection of the woodcut reveals the supposed initials (which have also been read C.G., i.e., Claudius Galen) to be no more than oval, decorative medallions which is also borne out by the recut made (continued on page 44)
For reasons quite unknown the title page of the second edition of the Fabrica is a re-engraved copy of the original in which numerous minor modifications were made. The craftsmanship is totally different, and although perhaps more advanced in technique, it has given to the whole a sense of stiffness with considerable loss in fluidity, especially in the rendering of the draperies.

The alterations have in many instances destroyed the symbolic significance of the figures. Of the many changes, the most important is the representation of Vesalius. The head has been greatly enlarged and is obviously derived from the portrait. As H. M. Spielmann, the eminent iconographer, points out, this is the only portrait to reproduce the birthmark or wart above Vesalius' right eyebrow. The skeleton has been provided with a scythe—a decorative motif which Vesalius himself recommends while describing the method of articulating the specimen. The cartouche carrying the title of the work has been altered and enlarged and now indicates that Vesalius has assumed the position of physician to the Emperor Charles V. The animals in Vesalius' coat-of-arms more closely resemble weasels rather than coursing greyhounds. The monogram of Opusin is been removed and his name introduced at the foot. A goat has been introduced in the foreground, and the lower cartouche, carrying the privilege, now rephrases the animal board described by Vesalius in his vivisection experiments and as illustrated on plate 42:6. Unaccountable are such changes as the clothing of the nude on the left and the alterations in the footgear of the figures in classical garments. These modifications and many others detract from the character and significance of the illustration. Furthermore, losses in the general illumination, atmosphere and perspective of the drawing have destroyed much of the quality which has caused the original version to be so greatly admired as a work of art.

for the second edition. Furthermore, the right hand of the figure may be observed fully engaged in grasping the volume, and the pencil is surely but a fold in the garment. Although the title page is generally attributed to the Flemish artist Jan Stefan van Kalkar, pupil of Titian, there still remains much uncertainty. For the extraordinary story of the development of the title page and a more detailed analysis of the question of the artist, the reader should consult the introduction and plates 93-96.
ANDREAE VESALII
BRUXELLENSIS, INVICTISSIMI CAROLI V. IMPERATORIS
MEDICI, DE HUMANI CORPOSIS
FABRICA LIBRI SEPTEM.

BASILEAE, PER IOANNEM OPORINUM