History of Medicine
Lawrence Herbert Wells and the history of anatomical illustration

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Summary
The pre-Vesalian history of anatomical illustration, including its ancient Greek and Roman periods, is surveyed. While dissection was abandoned in Alexandria under the Romans, it was revived in Italy during the Renaissance, and the invention of printing prompted the avalanche of documents which has cascaded ever since.

The considerable contribution of the late Professor Lawrence H. Wells to the history of anatomical illustration is emphasized and his interest in ‘fugitive sheets’, popular in the 15th and 16th centuries, is indicated.

The study of anatomy has always been closely connected with the illustration of dissected material. No modern student would dream of attempting to dissect without a textual guide in one hand and an anatomical atlas near the other. Because of this, medical illustrations tend to concentrate on detail and the artists employed to create these pictorial guides pride themselves on producing perceptually beautiful illustrations in spite of having to be accurate in proportions and details. This pride in beauty and accuracy was not always evident in the past, as will be illustrated later!

The late Professor L. H. Wells was among those students of medical history who delved into the study of the origins and development of anatomical illustration. During his tenure as Head of the Department of Anatomy at the University of Cape Town, Wells not only collected a large series of reproductions of early printed anatomical drawings but also added much to the body of literature dealing with these relics from the past. The purpose of this paper is to outline the development of anatomical illustration and to describe the contributions of Professor Wells to its history.

Anatomical illustration before the advent of printing
The ancient Greeks were the first to examine the human body in more than a purely artistic sense. Although they may have begun the practice of dissection during the classical period in Athens, by the time the centre of medical teaching had been transferred to Alexandria dissection was common. The philosophy of the time taught that the body lost all significance after death and the dissector was safe from the wrath of the gods. By 30 BC and the incorporation of the Ptolemaic provinces into the Roman Empire, respect for the bodies of the dead, enforced by statute and the general religious sentiment of Rome, made human dissection impossible. The medical students of Roman Alexandria had to content themselves with past descriptions of human anatomy and their own non-human dissections.

The loss of regular dissection must have made the learning of anatomy very difficult for the classical Greek anatomists, who had been very dogmatic. In later years western European anatomists were to consider the content of his texts to be so complete and correct as to make further research futile. Galen's influence, not only on medical knowledge, but also in terms of the lack of illustration, was to last far beyond his own age. The study of anatomy as a discipline was passed from the Greeks of Alexandria to the Islamic teachers, but the illustration of anatomy was not. The religiously strict Sunnite Arabic authors were not allowed to display the human body on parchment or by means of sculpture, and although they edited and perpetuated the works of Galen and others, their voluminous writings were artistically barren. The role of the illustrator had to be maintained by the infidels of the West.

In Europe there was no active promotion of the study of anatomy from the death of Galen (AD 199) until the beginning of the 11th century. Singer has suggested two reasons for this collapse of research: the Christian concept of the contemptibility of the body in relation to the soul, and therefore its unworthiness for study, and the dogmatic and unfailing belief in astrology for the diagnosis and treatment of disease. This did not mean that anatomical texts were not available. Arabic translations of Greek writings were re-translated into clerical Latin and medical personnel throughout western Europe were therefore familiar with the works of Galen and fellow authors such as Herophilus and Erasistratus.

At about the time of the Crusades a number of manuscripts were produced which depicted the major systems of the body on full-face figures in a straddled or semi-squatting posture. The drawings were mainly in sets of five (giving rise to the title 'five figure series') and represented, very crudely, the osseous,

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nervous, muscular, venous and arterial systems. Sometimes a sixth figure, that of a pregnant female, was added. The oldest known example of a 'five figure series' is that drawn by a monk of the abbey of Prüllingen in AD 1158. The drawings were copied by someone with no anatomical knowledge and there are a number of gross inaccuracies. Re-copies of these same drawings appeared at the Scheuren monastery at about AD 1250, in England in AD 1292 and in Bohemia in AD 1309.4

Surviving European manuscripts from earlier than this time are so rare that it is not possible to identify where the pictorial model for the diagram originated. Choulant and Frank, in their book on anatomical illustration, discuss these figures in great depth and note, among other things, that there are at least 9 extant sets from all over Europe, and where an accompanying Latin or Provençal text survives there are no signs of Arabic influence. They suggest that this last fact must mean that the style was copied directly from Alexandrian figures. A new pictorial concept based on a Latin translation of an Arabic text would have contained Arabic terminology. Whether or not this assumption is justified, the 'five figure series' appear to have been a strong tradition in Europe from the 12th to the 15th centuries. Their crude form and inaccuracies illustrate a servile adherence to tradition rather than a display of first-hand observation. Toward the end of this period highly stylized drawings also occur in the less dogmatic Shiite Persian manuscripts.

Resumption of human dissection

The development of universities during the 13th and 14th centuries led to the reawakening of the study of anatomy in Europe. The practice of human dissection, in the form of postmortem examinations, had been introduced at Bologna by 1300, and this rapidly led to a re-editing of Galen's works and new developments in anatomical illustration. Mondino di Luzzi, a professor from Bologna writing in 1316, produced a volume which incorporated the Arabic translations of Galen but, in line with the introduction of dissection, his work was more like a practical manual of anatomy. Two years earlier than this, another re-translation from the Arabic had been completed at Montpellier. Its author, Henri de Mondeville, had been a student with Mondino at Bologna, but unlike Mondino he had attempted to illustrate his text.

As early as 1304 de Mondeville had apparently taught with the aid of large paintings of partly dissected cadavers. Although these first diagrams have not survived, the 1314 manuscript contains miniature copies of most of them. The figure of death is the only drawing in the highly stylized 'five figure' posture and all of the rest are of standing individuals in naturalistic poses. The specimen illustrating superficial musculature carries his own flayed skin on a stick over his shoulder in a manner that may have influenced similar pictures in later years. The skeletal figure also contains a new concept. The 'five figure' ossous illustrations were usually grossly inaccurate and contained highly imaginary elements, but de Mondeville's drawing is more accurate, though lacking detail. This loss of detail is apparently the only drawing in the highly stylized 'five figure series' appear to have been a strong tradition in Europe from the 12th to the 15th centuries. Their crude form and inaccuracies illustrate a servile adherence to tradition rather than a display of first-hand observation. Toward the end of this period highly stylized drawings also occur in the less dogmatic Shiite Persian manuscripts.

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Printing and the Renaissance

The invention of movable type for printing did not, at first, promote the development or use of illustrations in anatomy texts. The first medical treatise to be printed was the Purgation Calendar at Gutenberg in 1457, followed closely by the Bloodletting Calendar at Mayence 5 years later.4 Both of these publications had loose-leaf woodcut illustrations indicating anatomical parts and included prominent signs of the zodiac. The illustrations were intended to be a guide to bloodletting and later diagrams became so popular that the zodiac figure in the 1491 Fasciculus edition was reprinted 15 times.5 It was not until 1478 that the first exclusively anatomical text was printed, a copy of Mondino's Anathomia.

The Latin edition of Fasciculus Medicinae, printed at Venice in 1491 and attributed to Johannes von Kirchheim (Ketham), was in fact not by a single author and was a collection of medical texts. A second edition which appeared 2 years later was in Italian (Fascicolo di Medicina) and contained a number of new illustrations. Among these woodcuts was a coloured scene depicting the progress of a medieval dissection and a full-face 'five figure' individual displaying female anatomy. This conventionalized female was intended as a pathology diagram to show the location of disorders, but the anatomy of the uterus and vagina was surprisingly accurate.

Over the next 30 years a large number of anatomical publications were turned out by the presses of Europe. Books such as Peyligk's Philosophae Naturalis Compendium (1499) and Reisch's Margarita Philosophae (1504) contained chapters on anatomy, while Hundt's Anatomopologia (1501) and Phrysenes' Spiegel der Arztnys (1518) were entirely devoted to the subject. All of the publications contained illustrations either pirated from the earlier printed books or copied and modernized from medieval manuscripts. Hints of naturalism occurred, but in general the pictures were diagrammatic and contained a large number of anatomical errors. By 1520 a combination of two circumstances had created a volatile situation which resulted in such an improvement in style that illustrations from that time on would be acceptable on a 20th century standard. These two circumstances were an improved access to Galenic texts and the rise of artistic naturalism during the Renaissance.

Throughout the middle ages Galen's words had come to Europe through the filter of the Arabic writings and it was not until 1525 that the original Greek texts were directly translated into Latin and the European secular languages. At first the new generation of students, the 'neo-Galenists', began to edit and industriously study the old texts, but it soon became apparent that the older illustrations had become far removed from Galen's original description. Many of the diagrams were so crude that it was difficult to appreciate their usefulness as teaching aids. An additional problem was the increased practical knowledge of
anatomy that the students possessed. Dissection was common and far too frequently the Galenic descriptions did not tally with what was in front of the scholar. Galen's non-human analogies were correct in general terms but the details were often wrong. Berengario da Carpi published 2 books, Commentarii (1521) and Isagogae (1522), which were intended as student aids but questioned Galen's observations. The onset of the 16th decade brought further questioners and it was only a 16th matter of time before original observation would replace blind belief in Galen. The revival of naturalism in art was substantially ahead of the return of observation to anatomy. Dissection of the body had become a commonplace occurrence among Florentine painters and artists. Da Vinci, Michelangelo and Raphael had begun to sketch the anatomical detail even before there were texts to explain it. In fact, if da Vinci could have published his drawings as he had planned, the first modern atlas would have been in existence during his lifetime. Unfortunately, da Vinci's works were never published and because they did not become available to the public until 200 years after his death, he could only have influenced a few close friends. Artists and anatomists had joined forces by 1530. Charles Estienne, directing his artists Etienne Rivere and Mercure Jollat, produced illustrations throughout the decade but only published his opus De Dissectione Partium Corporis Humani in 1545. These drawings were the first to show different systems in the same figure. A colleague, Gianbattista Canano, drew immaculate figures of separate muscles and their relation to the bones, but he became discouraged and only published a preliminary account, Musculorum Humani Corporis Picturata Dissecio, in 1541. These illustrated texts were not well received by all. Many of their contemporaries felt that since Galen had not used diagrams, any attempt to use diagrams and figures was a break with classical tradition, and therefore wrong. It was at about this time that the young anatomist Vesalius decided to produce a set of tables, literally wall charts, to illustrate Galenic physiology. He completed an initial 3 figures of organ systems on the Galenic plan and then requested an artist, van Calcar, to draw a skeleton in 3 views. These were published together as the Tabulæ Anatomicae in 1538. Vesalius had copied many of the traditional non-human features because he had only intended the Tabulæ to be a teaching guide for Galen's work. But like others before him, Vesalius questioned some of the obvious errors. The result was his publication of a new anatomical textbook based directly on observation of the human body and clearly illustrated with cross-references in the text. This book, De Humani Corporis Fabrica, was published in 1543 and was followed the same year by a supplement for non-medical students, the Epitome. This work by Vesalius was the first truly modern anatomical atlas.

'Fugitive sheets'

An interesting illustrative offshoot of the textbook figures were the 'fugitive sheets' or medical broadsides. These were essentially the same as posters and were intended to disseminate popular information. The first of the broadsides appeared soon after the invention of printing but they did not become common until after 1480. They were reasonably common between 1538 and 1580 but reached their height (anatomically, artistically and commercially) by 1613 and were still printed late into the 17th century. The printing of fugitive sheets was undoubtedly profitable since their production was not limited to a small number of locations. As a sheet was released, it was immediately pirated and re-published in another centre. Vesalius himself complained bitterly of these plagiarisms in a letter to Oporinus and mentions six towns where the imitations were printed. Some of the broadsides, with a detailed Latin text, were produced specifically for medical students, while others printed in the vernacular were designed for the use of art students and others. Often the sheet was very large and must have been created to give instruction to barbers and surgeons and to be displayed in their anterooms. Few of these figures were scientifically exact and much of the anatomy was obsolete at the time of their printing.

The first fugitive sheets to appear were technical illustrations of skeletons. Examples like Richard Helain's sheet of 1493 and the later edition by Wechtlin in 1517 were technically poor and contained many medieval errors. As previously mentioned, reprints of figures from the 1493 edition of Fascicolo were extremely popular. An innovation introduced c. 1538 used superimposed flaps to produce a multilayered effect. They were usually issued in pairs, one male and one female. The earlier specimens used 2 or 3 layers of body systems, but the later ones contained as many as 7 systemic layers. This same technique was used in anatomical texts such as the Epitome. The device may still be seen in modern publications.

The publications of Vesalius and the attendant plagiarism in the form of pirate texts and fugitive sheets signalled the end of the deep-seated dependence on authority in intellectual life and the onset of the era of independent observation.

The writings of L. H. Wells

Lawrence Wells was particularly interested in the classification of and relationships between different fugitive sheets, but to limit the discussion to this topic would be an injustice. Wells published 8 scholarly articles on the history of medicine between 1959 and 1968 and only the last 3 dealt exclusively with fugitive sheets. Among his earlier works were 2 papers dealing with the curious frog-like posture of the 'five figure series'. In his 'Great Mother' paper Wells accepted the Alexandrian source for the figures and found supportive evidence in the similar posture of terracotta figurines from Ptolemaic and Roman Egypt. The figurines were invariably found in the graves of women or in the inner 'women's apartments' of the houses. These fertility figures had even earlier antecedents in the form of squatting figures on Mesopotamian cylinder seals and an alabaster vessel from the Egyptian XVIIIth dynasty (c. 1570 - 1350 BC). Wells also noted that the distinctive posture may have been used in the Vogtherr of Strassburg fugitive sheet as late as AD 1539. In a later paper Wells expanded his thesis to include the masculine sex. He suggested that the male posture had a precedent in the Egyptian god Bes. Bes is often associated with aphrodisiacs or fertility magic, and his image in the drawings and reliefs is an extremely unusual departure from normal Egyptian representations of figures and it is very clear that the artist has been influenced by the Egyptian god Bes. Bes is often associated with aphrodisiacs or fertility magic, and his image in the drawings and reliefs is an extremely unusual departure from normal Egyptian representations of figures because he is presented full-face and with a 'five figure' posture. Wells was also fascinated by the historical individuals he researched. He carefully considered Vesalius and in 1960 he published a brief discussion of the relationship between Galen and Vesalius. Although Wells recognized that Vesalius was a grand innovator he stressed the fact that Vesalius believed himself to be a Galenist. In a note to Medical History, Wells examined the detail in the historiated initial letters of the Fabrica text. Under his scrutiny it was noted that Vesalius had left a record of some legitimate and illegitimate methods of obtaining material for dissection. The small letters 'O' and 'D' show the hanging down of a severed head from the execution scaffold and its subsequent dissection. The letter 'L' depicts a body being taken down from the gallows and the 'N' shows its transportation to the place of dissection. Wells subscribed to the view that the armed escort was part of the ceremonial nature of the proceedings. The letter 'O' of the larger series depicts the preparation of a skull by boiling, a procedure which was still under ecclesiastical ban at the time of Vesalius. The larger letter 'I' illustrates an undoubted body-snatching expedition, and Wells expressed wonder that Vesalius was willing to advertise such an act openly. He suggests that the famous removal of the
body of the Venetian patron saint, St Mark, from Alexandria to Venice may have been the inspiration for the sketch. The woodcuts and printing were probably the work of Venetians.

The drawing of the muscle-man from Valverde’s Historia de la Composicion del Cuerpo Humano (1556) was one of the few plates in this edition that was not lifted directly from Vesalius. Wells was very interested in its origin and although his 1959 paper did not solve the matter he did bring to our attention the fact that the knife in the mannikin’s hand was not a flaying instrument but was a fighting dagger. Could the intent have been to use the ‘cloak and dagger’ analogy of the duellist, with the flayed skin as the cloak?

The last three of Wells’ articles try to clarify the dates and origins of a number of unidentified fugitive sheets. This is a difficult area since the marked plagiarism of the day could produce sheets with two illustrations of different origin and an accompanying text from a third. Lindberg notes that piracy was so common that the Vesalian drawings by Calcar may have been stolen even before the final published version appeared in 1538.

In a partially successful attempt in 1964, Wells catalogued two unknown sheets housed at the University of Michigan as being a copy of a male and female set printed by Sylvestre de Paris (undated). The text on the sheets was in Latin with technical terms in Greek, Arabic and Hebrew on one side, and entirely in German on the other. Another unidentified set was classified by Wells as being related to the ‘Sabio’ family of fugitive sheets. He felt that the prints produced by Giovanni Antonio de Sabio of Venice in 1539 may have been one of the earliest anatomical sheets with flaps and could have been the inspirational model for many others. It was no surprise that Wells noted the close similarity between the text of the Sabio sheets and that of the earlier Vesalian Tabulae.

The final paper was an attempt to classify all of the fugitive sheets with superimposed flaps printed between 1538 and 1540. Wells decided that on the grounds of date of printing and origin of style, he could place them into two groups: the ‘Vogtherr’ group — consisting only of female sheets, and the ‘Guldenmundt’ group — which included all of the paired sets. The ‘Vogtherr’ specimens began to appear in 1538 and are probably purely original in their design. The ‘Guldenmundt’ group included those by Sabio and Sylvestre and were aimed at a more scholarly audience. There was often a biblical overtone of ‘Adam and Eve’ in this second series.

**Conclusion**

The development of anatomical illustration cannot be studied independently of the development of modern medicine. Singer and Rabin went so far as to entitle their work on Vesalius A Prelude to Modern Science. The rise of all science from the conjunction of anatomical artistry and observation is a proud thought, and the role played by Vesalius was pivotal.

Wells was drawn to this history and his enquiring mind sought to understand the driving forces of that bygone age. He did not consider the Renaissance to be an isolated developmental period, and he was prepared to show its connections to the preceding times in a number of papers. Wells was not afraid to attempt a sorting of the confused mass of plagiarized fugitive sheets, and his articles have helped a great deal in our understanding of their temporal and stylistic relationships.

Wells was a teacher of anatomy but throughout his career he remained a student. His legacy to the Department of Anatomy at the University of Cape Town, in the form of our gallery of anatomical illustration, is an inspiration to his fellow students of both history and medicine.

**REFERENCES**