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Andrés Vesalio, Francisco Díaz, Miguel de Cervantes Saavedra and the birth of urology in the 16th Century

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Abstract

In the sixteenth century there were great advances in science, literature, and the arts. During this century, urology as a specialty was conceived, thanks to the contributions of Andreas Vesalius, anatomist and leading physician to the court of Charles V, and Dr. Francisco Diaz, a native of Alcala de Henares, surgeon and clinician. Dr. Diaz had a close relationship with Miguel de Cervantes, who at one point in his life suffered from renal colic. In his masterpiece "Re-Printed Treaty of all diseases of the kidneys, bladder and wattles of the Cock and Urina, divided into three books," of which the first book of urology is the History of Medicine, describes in detail the clinical and therapeutic aspects of urological diseases, known as the "bad stone" and urethral strictures known as "wattles", in addition to describing the different surgical techniques and the development of new instruments for urological procedures, which include the cisorio instrument and the Speculum pudendi. For the above, Dr. Francisco Diaz is considered the father of urology. (Gac Med Mex. 2015;151:507-16)

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To the memory of Dr. Jorge Elías Dib, outstanding man, academician, poet, teacher and humanist of Mexican medicine and urology.

The authors

History, poetry and painting symbolize between each other, and are so similar that, when you write history, you paint, and when you paint, you compose.

Miguel de Cervantes Saavedra

The Renaissance marked the beginning of a new era in human evolution. It started in Italy in the 15th century and rapidly spread to the rest of Europe during the 16th century. It was characterized by a return to humanism, science and art, breaking up with obscurantism that characterized the Middle Age. During this period, medicine, as the rest of sciences, woke up from its lethargy with physicians appearing in the scientific firmament that, by breaking paradigms, laid the foundations of modern medicine through implemetation of the scientific method, questioning of that considered to be magic, investigation, systematized and universal teaching, antithesis of medieval teaching, and better diffusion of knowledge by means of printed books, as opposed to manuscripts, which was accomplished

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Figure 1. *Michael Servetus. Please note in the upper left panel the depiction of his death by fire.*

Figure 2. *Andreas Vesalius. Prominent anatomist of the 16th century that with his investigations changed the galenic conception on the structure of the human body, which resulted in better knowledge of physiology and disease.*

thanks to the invention of the movable-type printing press by Johannes Gutenberg. Thus, books became not only reservoirs of wisdom, but also the most important weapons against ignorance and status quo of the epoch. It is important to mention that this was accomplished thanks to the decided and brave actions of great men who, even at the expense of their freedom and sometimes their life, dedicated their lives to the noble task of scientific medicine, not only attending to those who fell ill, but also writing and making books where newly acquired knowledge was described and new philosophical and political ideas were exposed. In this sense, we can mention as a living example of this spirit Michael Servetus, theologist, philosopher and physician, who described pulmonary circulation in a book entitled *The Restitution of Christianity.* Servetus, also known as Michel de Villeneuve, was ferociously persecuted by both catholic and protestant Inquisition due to the questioning of Trinity on the book entitled *Dialogues on the Trinity and on the Justice of Christ's Reign,* and for claiming that baptism should be instituted in adulthood rather than childhood. Finally, Calvin and the leaders of the Swiss protestant Cantons condemned him to death and was burned alive at the stake, with green wood, on October 27, 1553 in Geneva. Together with him, a volume of *The Restitution of Christianity* was also burned[1,2] (Fig. 1).

For the purposes of this work, it is not possible to refer the entire myriad of physicians and other characters that shined just as stars in the 16th century firmament, and hence we will focus the remainder of the manuscript on mentioning only two of them, whom we personally consider the orchestrators of the scientific foundations of urology; we refer to Andreas Vesalius, a prominent anatomist, and to Francisco Díaz, considered by many the father of urology, and who, by designs of fate, had a close relationship with the Prince of Inventiveness, an unexpected guest of this manuscript.

Andreas Vesalius

Andreas Vesalius (Andreas van Wesel) is the prototype of the 16th century renaissance physician. He was born in Brussells on December 31, 1515. Descendant of a family of physicians at the service of the German crown, Vesalius was interested since very young in learning different languages, including Latin, Greek, Arabic and Hebrew, which facilitated access to different works, which he could consult at the paternal library (Fig. 2). During his early life he was a restless investigator who liked to dissect animals and attentively observe corpses' decomposition and exposure of different anatomical structures, the latter because his home was in front of a hill where criminals were executed. Vesalius, who had an open and inquisitive mind and was eager to learn medicine, travelled to Paris at

the age of 18 years. There is where he had his first confrontations with galenic medicine, which dominated the medical universe, and with his anatomy professors Jacobus Sylvius, who used his book *De Usu partium* to teach anatomy, and Günther von Andernach, epecially with the former. In those times, medicine teaching followed the scholastic principles where the professor "taught" by reading old texts sitting in a special chair above the level of everyone, which was referred to as the Chair. Especially, and with regard to anatomy, which was Vesalius' fascination, the teacher pointed with a long stick at different parts of the human body following the galenic descriptions, and his assistants performed the corresponding dissection. Vesalius opposed to this, not only to the teaching method and how dissections were performed, but to the poorly accurate galenic anatomical descriptions that mostly were made in animals, which he made his classmates and teachers realize, creating great animadversion against him on behalf of the latter. During his days as a student in Paris, Vesalius was a classmate to Michael Servetus. Vesalius had to leave Paris in 1536 due to the outbreak of the war between Spain and France, with the former ruled by Charles V, to whom Vesalius was loyal vassal, and the latter by Francis I. Vesalius travelled to Leuven, where he continued his studies of medicine, dedicating large part of his time to dissection of corpses and anatomical description. He graduated as a Bachelor of Medicine in 1537. Since this epoch of his life, his interest on publishing books could be foreseen, which gave as a result the text entitled *Paraphrasis in nonum librum Rhazae ad Almanzorem,* where he tries to advocate for the precepts of Arabic medicine, lead by Razes, against the galenic principles. As a bachelor, Vesalius travelled to the Republic of Venezia, where he met a character who was to become his friend, as well as his future collaborator; we refer to Jan Steven van Calcar, a prominent painter, student of Titian. From Venezia he travelled to Padua, where he graduated as a Doctor of Medicine on December 5, 1537, and was appointed professor of Surgery on next day, with the duty of teaching surgery and anatomy. This appointment was fundamental, since from there, Vesalius initiated a new methodology for the teaching of medicine, moving from the aforementioned scholastic to tutorial teaching, where the professor performed anatomical practices close to the student, and where the student was an active part; in other words, he climbed down from the chair to consolidate the teacher-student dyad. The success of Vesalius as a professor in Padua was owing to his profound knowledge on human anatomy, to the fact that he personally performed the dissections with no help of prosectors and to the use of diagrams[3-6].

Figure 3. *Osteological anatomy table illustrated by Calcar and used by Vesalius to teach anatomy.*

Vesalius consolidated this new pedagogical methodology with anatomical drawings, by the way of a remarkable originality, clarity and veracity, which complemented the teaching, especially when anatomical astructures could not be clearly identified in the corpse. These initial anatomical drawings were entitled *Tabulae Anatomicae Sex,* which means "six anatomical tables", and were printed by D. Bernardi and dedicated to Narcissus Parthenopeus. These had great diffusion among students, facilitating the study of anatomy and understanding of the structure of the human body. It is important mentioning that the drawings of the three tables where the bones are described were made by Calcar and the three visceral tables by Vesalius himself. In the visceral tables, the liver, the porta, cava, heart, aorta and genitals are described with detail and mastery[6] (Fig. 3 and 4).

During his stay in Padua, Vesalius continued with an intense teaching activity and dedicated to anatomical research, preparing the material for what was going to be his *opus magnum.* When he had enough material, he started its methodic classification, creating the

Figure 4. *Anatomy table illustrated with great detail by Vesalius where the liver, spleen and portal system are observed to the left. To the right, male and female urogenital systems.*

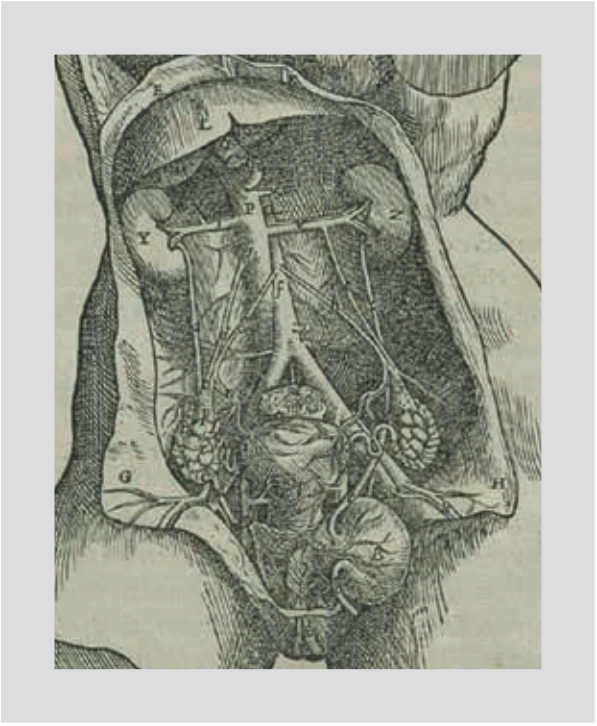

Figure 5. *Anatomical detail of the female urogenital anatomy.*

corresponding drawings aided by his friend Calcar. With the clear idea of compiling anatomical knowledge in a text, he looked for a publisher, and managed to interest Johannes Oporinus, who resided in Basel and was amazed when he looked at the anatomical drawings and decided to print them, with the small detail that such as Vesalio presented them, it was not possible to make the editorial work, and asked for them to be brought engraved in wooden plates (xylography, from *xilon:* wood and *graphe:* inscription). Consequently, Vesalius returned to Padua where, together with Calcar and by means of novel process that consisted in transferring the drawings to wooden plates (a method that was termed *calcar* in honour of the paintor), the relief drawings made in plates of pear wood, selected due to its hardness, were ready. The printing process started and thus, in 1543, when Vesalius was only 28 years old, one of the greatest and influential medicine texts of all times saw the light: *De Humani Corporis Fabrica Libri Septem, Of the Structure of the Human Body in Seven Books.* The book was dedicated to Charles V and is composed of 697 pages in 7 books, with 187 capital letters, 189 chapters and 289 engravings. The first book is dedicated to the bones, the parts that sustain and give support to the body and in which all have stability and insertion, the second book deals with the ligaments that join bones and cartilages to each other and muscles that produce voluntary movement, the third book is about veins and arteries distributed throughout the body, the fourth book shows the nerves, the fifth, nutrition and urogenital organs, the sixth deals with the heart and in the seventh, a master description is made of the brain[7-10] (Fig. 5 and 6).

It's impossible to describe in a few lines the entire anatomical sense and content of the book, but suffice it to mention that the cover, shown in figure 6, has a very special hermetical symbolic meaning, where Vesalius' victory over 14 centuries of galenic concepts is consolidated, as well as the new methodology of medicine teaching at the side of the corpse and at the same level of everyone, and that medicine, by virtue of its transcendence, must be taught in a very special venue, a temple. On the other hand, his family, his university (the University of Padua) and his patron and protector (the Republic of Venezia) are honored in the cover, as well as his friend, the printer Johannes Oporinus, who can be appreciated in the upper right corner of the cover looking downwards. With regard to the writing on the cover, its translation is: Andreas Vesalius, native to Brussels, professor at the Paduan School of Medicine. *Of the Structure of the Human Body in Seven Books* (Fig. 7).

Vesalius systematized anatomical knowledge, not only with the excellent drawings he made together with Calcar, but also with excellent descriptions, which was a breakthrough at its time and gave rise a school that spread rapidly in Europe. In the first edition of his book, Vesalius made 200 corrections to galenic descriptions,

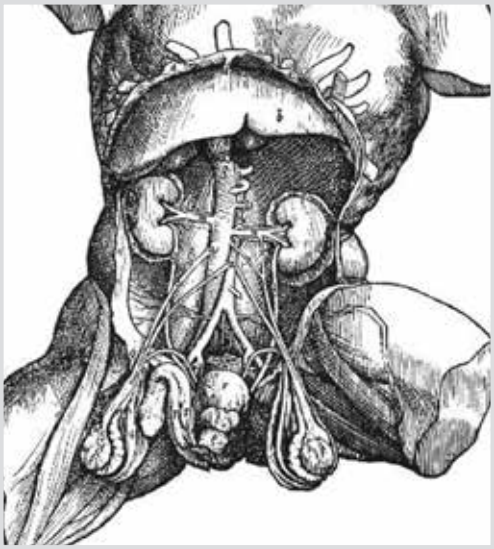

Figure 6. *Anatomical detail of the male urogental anatomy. Please note the details of the anatomical proportions of the bladder, prostate and urethra.*

Figure 7. *Cover of one of medicine's most important works, De Humani Corporis Fabrica Libri Septem. At the center, directing the dissection and staring forward appears Andreas Vesalius.*

and once published, he made notes and new marginal corrections, preparing the new edition, which appeared in 1555. With his contributions, especially on urogenital anatomy, the land was prepared for the improvement of urologic surgical techniques of his time, especially for the stone disease and other conditions. For this reason we consider Vesalius to be one of the pillars of scientific urology, since he showed in detail and with thorough description both female and male urogenital organs. Finally, it's important to mention that Vesalius spent the next 20 years of his life at the service, first, of Charles V and subsequently of Ferdinand II. During his work as a doctor he hade fierce detractors and many enemies, but he also was recognized and protected by prominent Spanish physicians such as Pedro Jimeno and Luis Collado. Vesalius died in the island of Zakynthos on the way back of a pilgrimage to Holy Land on October 15, 1564.

Francisco Díaz

Francisco Díaz was born in Alcalá de Henares in December 1527, 13 years after Vesalius (Fig. 8). He studied at the University of Alcalá and graduated as a Bachelor of Arts in 1548 and Bachelor of Medicine in 1551, and on November 30, 1555, he is granted the title of Doctor of Medicine. In addition to being a physician he was a philosopher, and was awarded the

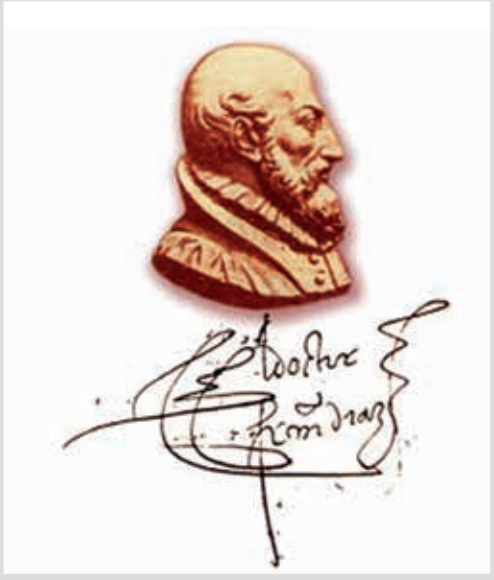

Figure 8. *Francisco Díaz de Alcalá. Author of one of the most influential books in the area of urology in the 16th century, for which he has been considered the father of urology.*

Master of Phylosophy title on July 5, 1556. Based on documents of the University of Alcalá, we know that he was a teacher at this institution from 1556 to 1558. During his studies and stay in Alcalá, he was in close contact with prominent Spanish physicians, among whom Francisco Vallés, also known as *"Divino Vallés",* and Fernando de Mena, among others, stand out. Francisco Vallés is considered the father of pathologic anatomy. During his studies through Europe he had contact with Vesalius, from whom he learned about anatomical dissection techniques and whom he later substituted as Philip II physician. In addition to his medical practice, he was a prominent apothecary, expert on medicinal plants distillation. Fernando de Mena was also in turn doctor of Philip II, and his relationship with Francisco Díaz, in addition to being his teacher, lies in the fact that he died of renal calculi complications being under the care of the latter, who wrote a detailed description of his terminal illness[11-14].

During his training he stayed in Valencia from 1549 to 1550, where he studied anatomy and dissections with Pedro Jimeno and Luis Collado, which caused a deep influence on Díaz professional performance, since during his professional practice he was emphatic on recommending that anatomical knowledge is fundamental for the practice of surgery. Let's remember that Jimeno and Collado, prominent anatomists, were students of Vesalius and his protectors in the Spanish court. Thus, Dr. Francisco Díaz had a srtong vesalian anatomy influence. In addition to being physician and philosopher, he was a lover of poetry and literature and, therefore, he had contact, by different quirks of fate, with prominent intelectuals of that epoch, especially with Miguel de Cervantes Saavedra, who mentions him in a sonet of his *Galatea* and writes another for his most important work. We have to insist on the close relationship existing between Dr. Díaz and the Prince of Inventiveness which, according to different sources was related to friendship existing between their families: Dr. Díaz met Cervantes' parents and was the godfather of his brother Rodrigo; to Dr. Díaz intervention to help freeing Cervantes from his captivity and to the fact that the latter was his patient, since according to Rubio Esteban, Miguel de Cervantes suffered from a terrible life-threatening nephritic colic, and for this reason, Dr. Díaz "made him drink a large amount of water, with which he knew how to heal the illness of such a prominent character." Cervantes' renal condition becomes evident in his *Quixote,* where different mentions appear related to the "suffering of the kidneys"[11-14] (Fig. 9).

Figure 9. *Miguel de Cervantes Saavedra, Prince of Inventiveness, dedicated several sonnets to Dr. Francisco Díaz due to their tight friendship.*

It was frequent for sonnets known as eulogistic or laudatory to be written in order to acclaim and distinguish some prominent character; in this sense, two giants of the Spanish Golden Age wrote each sonnets to Dr. Francisco Díaz: the already mentioned Miguel de Cervantes and Lope de Vega[15].

Sonnet dedicated to Dr. Díaz in the *Galatea* by Miguel de Cervantes, which says:

From you, Doctor Francisco Díaz, I can
Assure to these my shepherds
That with confident and cheerful heart
May overtake in your praises.
And if on these now I fall short,
With your inventiveness deserving more
It is because time is brief and I don't dare
Being able to pay all I owe to you.

Sonnet by Lope de Vega dedicated to Dr. Díaz and included in his *Treatise of Urology*. This is included at the beginning of the work[15].

To immortality moves and calls,
A new benefit to the world revealed,

Divine inventiveness today you opened,
The mouth of envy and of fame.
Since at the end ingratitude withers love
Your rare value, that uncertain
Treasure to the ancients concealed,
With celestial hand pours and spills.
May Italy cease, and the famous opinion.
Of Arabs, to whom heavens unravels,
The unmeasured virtue of unknown herbs.
Now Spain shows itself fortunate,
That each and everyone today heavens celebrate,
Francisco Díaz exceeds and surpasses.

Laudatory sonnet by Miguel de Cervantes to Dr. Díaz, curiously included at the end of the *Tratado de Urología*[15].

You, who with new and unique decorum
So many remedies for an ailment order
Well may expect from these sands
Of the Sacred Tajo, which are of gold
And the praise that is owed to a treasure
Finds of science with your rich veins
Of rare advent and health filled,
Joy and laughter of the sick I cry
That by your skills a shattered stone,
Thousand marbles, thousand bronzes to your fame,
Will give without envious competitions.
Heavens will give you palm, the soil, ivy,
Since one and the other already call you
Spirit of Apolo in both sciences.

He also had a close relation with the physician-poet Juan de Vergara, as he was a close relative, perhaps brother of his second wife, Mariana de Vergara. Vergara dedicates two eulogistic sonnets to Dr. Díaz, one of which is the following[15]:

Of Your well spent, rich years
In wakefullness and study eternally
With the laurel clinging to your distinguished forehead
Just prize, to so strange works
Well gives us today clear dissappointments
The ingenious work by you present
Universal Remedy from which the people
Benefit will be able to obtain for so many damages
Prosperous and favorable the high heaven
To the mortal lineage clear shows itself
With this story of ours enriched
Since to ensure health to the soil
It gave the sovereign pen of yours
That discovers the remedy and gives life

In spite of his performance as a teacher and knowledge, he didn't find accomodation and enough surgical practice and income in Alcalá, and since at that time he was already married and with six children, he decided to try his luck in other cities. After losing a public examination for a post of surgeon in Valladolid, he travelled to Burgos where he was hired as the surgeon of the place with a salary of 40,000 maravedis a year. Being in this city, in addition to his surgical work and his already intense activity in the urology practice, he played an outstanding role during the plague epidemics that occurred between 1564 and 1565 and that earned him public recognition and by the Council. During the epidemics, his wife and one of his daughterd died and he decided to leave Burgos and return to Alcalá, where he had his second marriage. Subsequently, and after many vicissitudes, he settled down in Madrid, where he was appointed chamber surgeon of the court of Philip II, with a salary of 60,000 yearly maravedis, a post that he maintained until his death. Over time, this work gave him recognition, better income and political power within the court. This way, he was able to have his sons pursue a career, of which one adopts medicine and the other becomes a trinitary monk under the name Brother Pedro Medrano[16-20].

In addition to being an excellent anatomist and surgeon, Dr. Francisco Díaz was also an acute observer of diseases and an agile clinician, who confronted his diagnostic suspicions with autopsy findings, which we can clearly observe in his description of Juan Velázquez illness: "Juan Velázquez, knight of the Santiago order and of the Council of Orders, most illustrious gentleman who having sustained an extremely serious urinary burning sensation, with suspicion of most distinguished physicians of having stone disease, though not founded in signs so they expressed their opinion, only graduate Ruy García claimed not having found stone in the kidney or bladder, which was contradicted by other most illustrious doctors, and in view of the dissention, I tried to assist in opening him and in the bladder we found a sordid and black and malicious ulcer, which Graduate Ruy García and myself had claimed to suspect, because the excrements clearly suggested it; and as we proceeded, the right kidney, very healthy, but the left one had a chancre of the size of a large egg yoke, very hard, something everyone overlooked. He had the lung damaged, almost entirely gangrened and lost, with no signs in the entire respiratory process, since it always was free and with no difficulty. As we further proceeded, we found a small stone in the liver, of the size of a broad bean, black as a fish, and in the

bile we found ten black stones, with some very small yellow seams".

In the times of Dr. Díaz, urinary calculi and urethral stenosis (then known as wattles) were the most common known urologic diseases. Next, the description of the anteropsterior urethrotomy as described by Dr. Díaz: "For that case, being confused and with much care, looking for a remedy or instrument that was sufficient for this and that could do it promptly and with the least possible danger, and looking that lead was also useless as the other mentioned resources, I came up to the idea of having a sort of catheter made, and as the cathether is open at both sides, so is this instrument at the tip, so that there was a pointed silver stick inside, and to advance by cutting the callousness little by little, for more safety. It should be used as follows. Introduce this instrument up to where the wattle or callus would be, and then put pressure as I previously said and cut with much space, with the most rhythm possible, and proceed until the callousness is completely torn appart. I am well aware that this instrument is somewhat dangerous, but more dangerous is for the hardness to remain in place, since it originates damages that many times we have substantiated and, this way, out of two dangers, we shall address the biggest".

Francisco Díaz devoted a large part of his practice to urology, in which he became an expert. As all 16th century intellectuals he was a superb writer. He published two books and announced a third one that would address anatomy, but it never saw the light. His first success was published in 1575 with the title *Compendio de Chirurgia,* written in the form of dialogues or discussions, and as Díaz commented in the prologue: "For the profit and practice of Romance-writing surgeons due to the lack of Castilian-written surgery books they had." This book is composed of four volumes and a brief treatise. The first book consists of 13 discussions and is dedicated to anatomy. The second one consists of 22 discussions and is dedicated to abscesses. The third one consists of 19 discussions and adresses the study of wounds. The fourth has 14 discussions and deals with ulcers or old sores. The fifth or brief treatise contains surgical observations and recommendations on some urologic processes, out of which "water" testicular hernia or hydrocele and *ninphea* or growth of the flesh in the female external genitals, which corresponds to condyloma.

In addition to general surgical practice, Dr. Díaz had a special interst on urology, which he cultivated with great interest for a time span of nearly 30 years. All the knowledge acquired and enriched by different experiences


TRATADO
NVEVAMENTE
IMPRESSO, DE TODAS
LAS ENFERMEDADES DELOS
Kiñones, Vexiga, y Carnosidades dela verga, y Vrina, diuidido en tres libros. Compuesto por Francisco Diaz Dotor en Medicina, y maestro en Filosofia, por la insigne vniuersidad de Alcala de Henares, y Cirujano del Rey nuestro Señor.
DIRIGIDO AL DOTOR VALLE
Protomedico del Rey nuestro Señor, y Medico de su Camara, &c.
CON PRIVILEGIO.
Impresso en Madrid por Francisco Sanchez.
Año. 1 5 8 8.

Figure 10. *Masterpiece of Dr. Francisco Díaz, first treatise of urology in the history of medicine.*

drove our distinguished urologist to write and publish the masterpiece of urology and first of its kind in the history of medicine, with the title *Tratado Nuevamente Impreso de Todas las Enfermedades de los Riñones, Vejiga y Carnosidades de la Verga y Urina, dividido en tres libros* (Newly Printed Treatise of all Diseases of the Kidneys, Bladder, and Proud Flesh of the Penis, and Urine, divided in three books). To the title of the book, the author added: "Composed by Francisco Díaz, Doctor of Medicine and Master of Philosophy, by the Famous University of Alcalá de Henares and Surgeon of the King Our Lord." The book is dedicated to: Doctor Valle, First Physician of Our Lord the King and Physician of His chamber. By this time, Dr. Díaz already had fame and influence on the court and therefore his great work was published with Privilege of the king Ferdinand II. The book had great acceptance and in the 17th century it was reprinted three times in the years 1627, 1643 and 1666[16] (Fig. 10).

In the first book, the author deeply addresses known kidney diseases, highlighting stone disease of the kidneys and establishes the differences between sands

Figure 11. *Speculum pudendi. Instrument of Dr. Díaz invention for small urethral calculi extraction.*

Figure 12. *Cisorio instrument developed by Dr. Díaz for the treatment of urethral strictures.*

and stones. He writes on therapeutics based on ointments, decoctions, mineral waters and some magic. He addresses the vomica secondary to perirenal abscess fistulized to the lung, urinary burning sensation, blood flow through the penis, *"diabética pasion",* sore or renal ulcers and their treatment with fresh milk. The second book addresses bladder diseases. It starts with a detailed anatomical description of the organ, to later broadly dedicate this chapter to stone disease of the bladder. This book describes its etiology and its treatment with hygienic and dietary measures. It establishes that prognosis of this condition is worse in male, elderly and obese subjects. It dedicates an important number of pages to surgical treatment and vesical calculi extraction, either by using the Castilian or the Italian carving. For large calculi, it recommends fragmentation initially by means of tongs to later extract them with the scoop. For a better understanding of the techniques, this book includes drawings illustrating them. For small urethral calculi extraction, the *Speculum pudendi* is developed and described in this book, which was introduced closed, and once inside it was opened by means of an ingenious device to capture the stone, and once closed back, extract it. In addition to the *Speculum pudendi,* it developes an instrument named *cisorio*, which was intended to cut urethral fleshy protruberances. The author also describes vesical ulcerations and their treatment by means of vesical lavages with collyriums of his invention, which were performed using a metallic tube as a catheter. The third book is dedicated to fleshy protruberances of the penile urethra, which are defined according to the author as "flesh excrecences in excess to what according to nature corresponds to some part." He describes different techniques and instruments for their treatment and mentions the most serious complication of this condition, urine suppression, which had to be addressed promptly with the *cisorio* instrument of his invention, otherwise the life of the patient was at risk[16] (Fig. 11 and 12).

A curios fact in Dr. Diaz life is his participation as an expert in the trial of Elena/o de Céspedes, a female transexual who posed as a man. This character practiced as surgeon, and the chronics refer that in her role as a female he had a child, but after her husband died she suffered a transformation into a man. When he wanted to marry a woman by the name of María del Caño, the local vicary issued the corresponding banns, in response to which she was denounced for being a woman. For this, consultation was asked from several physicians. At that moment, Elena/o, who thanks to her surgical knowledge had already manipulated her genital organs using different contraptions to close her vagina and modify her breasts, used an extension resembling the penis and testicles. The first experts certified that she was a male, but since doubt persisted due to different declarations, Dr. Díaz intervention was requested as physician of the court and expert on urogenital conditions. Dr. Díaz explored Elena/o in a poorly-illuminated room and after the corresponding "touching" he declared she was a male. With this certification endorsed by Dr. Mancilla, physician of the court as well, Elena/o de Céspedes was authorized, after which, she led a conjugal life and continued his work as a surgeon. But one year later, she was denounced again before the Inquisition because being a woman she was married with another woman, which in those times constituted a serious felony and the sin of sodomy. The Inquisition arrested her again and brought her to trial; expert examinations were repeated, both by physicians and midwives, with all these certifying that she was a woman and not a male or hermaphrodite (as she claimed to be). For that reason, Dr. Díaz was summoned by the Inquisition to answer for his initial sworn statements. Dr. Díaz had no option but to accept his mistake and retract his earlier statements, not without before claiming that the confusion was due to "wiles" and "delusion of the demon", i.e., witchcraft he was the subject of by the defendant. This way,

Elena/o de Céspedes, a female surgeon from an epoch characterized by obscurantism and male chauvinism, was condemned to suffer auto-da-fé, to be exhibited wearing the corresponding garments, to receive 200 lashes and to attend as a nurse secluded in an hospital and serve patients for 10 years with no payment at all. What a mess Dr. Díaz got into![21]

After a hard but productive life where vicissitudes of medical practice, the quest to survive in a competitive and courtly environment, his interest on literature, and especially poetry were combined, and consolidating urology as a special branch of the practice of medicine, Dr. Francisco Díaz passed away in Madrid on April 8, 1590.

Epilogue

The legacy to mankind and medical science of Andreas Vesalius and Francisco Díaz is invaluable. They were part of a group of brilliant men who made of the 16th century a period of great contributions in science, art, literature and in geographical discoveries, but especially because they laid the foundations for the initiation of freethinking and questioning of dogmas imposed during the Middle Age, by propelling humanism and providing a new vision of a world that was being rediscovered. Surely it was not easy for them, but thanks to their perseverance they achieved change, Vesalius, based on his anatomical studies, by reconsidering the structure of human body and Francisco Díaz, maybe unintentionally, by founding a new branch of medicine: urology.

References

1. de Michelli A. Miguel Servet and pulmonary blood circulation. Arch Cardiol Mex. 2003;73:171-4.
2. Cremades JA. Miguel Servet 450 years ago. Bull Acad Natl Med. 2003;187:1597-1606.
3. Romero HA, Ramírez BJ, Ponce LF, et al. Surgery and anatomy in the Renaissance. Cir Cir. 2005;73:151-8.
4. Romero HA, Soto MM, Moreno RJ, et al. Distinguished doctors of the University of Padua and their Works: 16th to 18th centuries. Cir Cir. 2007;75:57-61.
5. DeBroe ME, Sacré D, Snelders ED, et al. The Flemish anatomist Andreas Vesalius (1514-1564) and the kidney. Am J Nephrol. 1997;17:252-60.
6. Benini A, Bonar SK. Andreas Vesalius 1514-1564. Spine. 1996;21:1388-93.
7. Nutton V. Vesalius revised. His annotations to the 1555 Fabrica. Med Hist. 2012;56:415-43.
8. Toledo-Pereyra LH. De Humani Corporis Fabrica surgical revolution. J Invest Surg. 2008;21:232-6.
9. Touwaide A. The kidney from Galeno to Vesalius. A first approach. J Nephrol. 2006;10:4-8.
10. De Schaepdryver AF. Knowledge of the human body. At the 450th anniversary of the first edition of Andreas Vesalius' life work. De Humani Corporis Fabrica Libri Septem". Verh K Acad Geneeskd Belg. 1993;55: 485-502.
11. Escribano V. La Cirugía y los Cirujanos Españoles del Siglo XVI. El Dr. Francisco Díaz, 2o. ed. Granada, Ventura Traveset; 1938.
12. Maganto E. El Doctor Francisco Díaz y su época. Biografía conmemorativa en el cuarto centenario de su fallecimiento. Eduardo Fabregat, editor, Barcelona; 1990.
13. Maganto E. Historia de la Urología Española. Francisco Díaz. Consultado en: http://historia.aeu.es/FranciscoDiaz.htm.
14. Díaz, F. http://www.mcnbiografias.com/app-bio/do/show?key=diaz-francisco.
15. De la Relación entre Miguel de Cervantes y el Doctor Francisco Díaz. Consultado en: http://historia.aeu.es/PDF/es_porque_el_tiempo_es_breve.PDF.
16. Puigvert A. Enfermedades de los riñones, vexiga y carnosidades de la verga. By Francisco Díaz. Comments on an old book. Eur Urol. 1978; 4:231-5.
17. Molla y Rodrigo R. El Dr. Francisco Díaz y sus Obras. En: Díaz, Francisco. Tratado de todas las Enfermedades de los Riñones. Vol. I.Madrid: Biblioteca clásica de la Medicina Española.; 1922.
18. Riera J. La Obra Urológica de Francisco Díaz. Cuadernos de Historia de la Medicina Española. 1967;6:13-59.
19. Moreno TA, Pérez AM. Urological terminology in Francisco Díaz: an example in the history of the Spanish language. Arch Esp Urol. 2003; 56:739-54.
20. Maganto PE. The original of the Tratado de Urología by Francisco Díaz. Lost during the fire of the monastery of El Escorial in 1671. Actas Urol Esp. 1992; 16:91-102.
21. Maganto PE. The intervention of Dr. Francisco Díaz in the inquisitorial process against Elena/o de Cespedes, a transsexual surgeon found guilty by the Inquisition in Toledo in 1587. Arch Esp Urol. 2007;60:873-6.