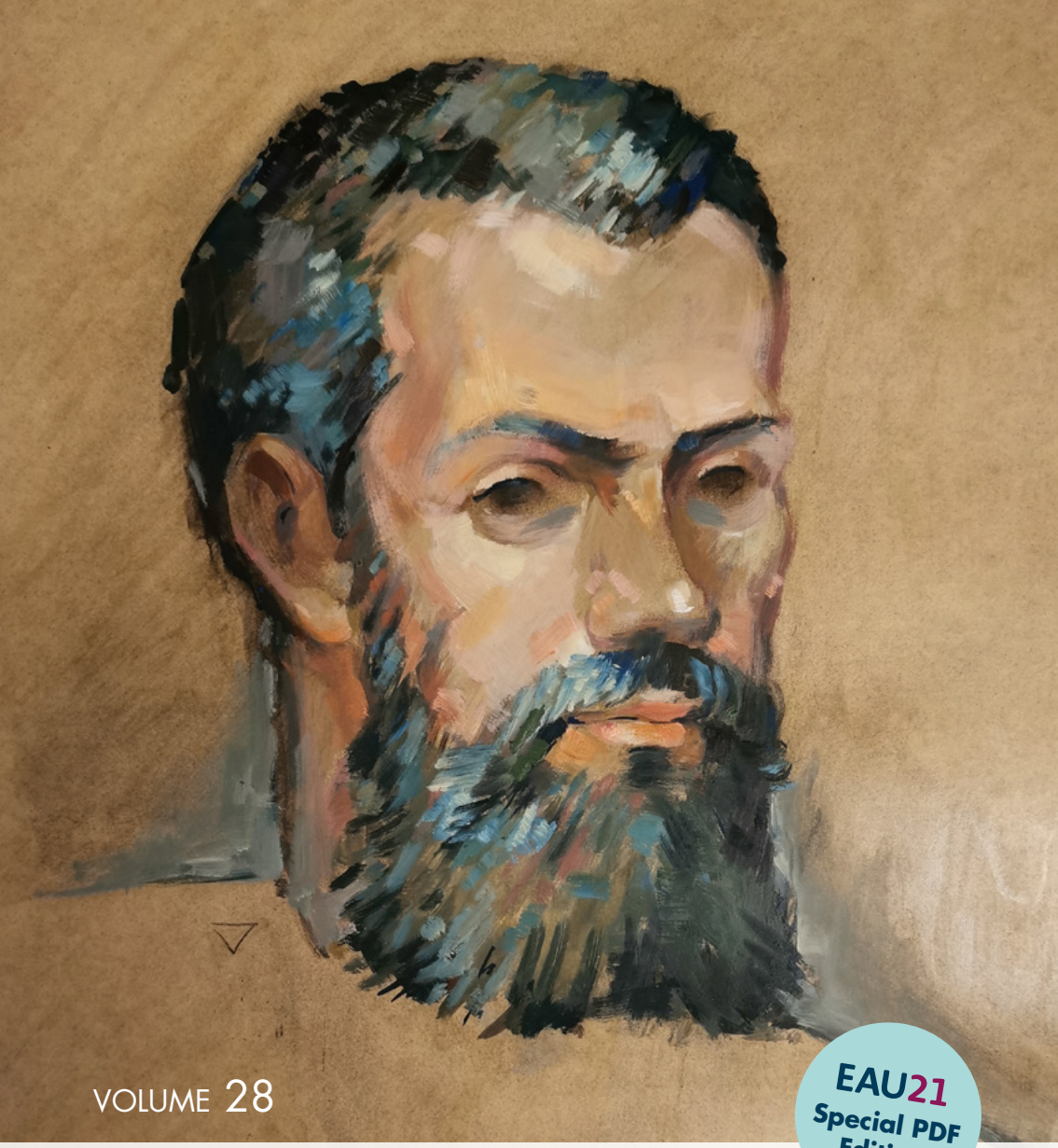

VOLUME 28

EAU21
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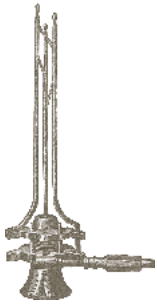
Edition

DE HISTORIA UROLOGIAE EUROPAEAE

EDITED BY PHILIP VAN KERREBROECK,
JONATHAN GODDARD AND DIRK SCHULTHEISS

De Historia Urologiae Europaeae

Volume 28



Edited by:
Philip Van Kerrebroeck

Co-editors:
Jonathan Goddard
Dirk Schultheiss

History Office

European Association of Urology
2021

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Contents of Volume 28
de Historia Urologiae Europaeae
(2021)

The History of Urology

Special Extended Chapters

Urological Pioneers

Foreword

If you are reading this volume of *De Historia Urologiae Europaeae* in 2021, you are reading a digital copy that was made available to EAU members and delegates of our virtual 36th Annual EAU Congress, EAU21. I am pleased to announce that we will, however, be printing Vol. 28 so that it can be distributed with future copies of the series when we have our next regular Annual Congress.

This volume features contributions from all around the world, with centre stage being given to two special extended chapters with new research and insights. Prof. Van Kerrebroeck explains the decision by the editorial team and the significance of these chapters in his introduction on page 7.

We start this volume with an interesting article by Jonathan Goddard and his co-author Jasmine Winyard, in which they present Geoffrey Parker, a courageous British urologist and surgeon to the French Resistance. Marcos Cherem-Kibrit and Jorge Moreno-Palacios tell the story of Saints Damian and Cosmas, whose miracles and martyrdom made them early urological patron saints.

De Historia always highlights pioneers in our field. In this edition we are introduced to Michele Troja. Co-authors Renato Jungano and Gloria Castagnolo make the case that he could be considered the first chairman of a urological department. This is part of a discussion that is being held in the EAU's History Office, and largely depends on definitions of "urology" and "department".

Finally, Thaddaeus Zajaczkowski brings to our attention Friedrich August von Haken and his significant contributions to the development of endoscopy. This is yet another example on how important developments get lost in the folds of history, but nevertheless merit our renewed attention.

Chris Chapple
EAU Secretary General

Introduction

As editor of the *De Historia Urologiae Europaeae* series, it is a great pleasure, also on behalf of the co-editors Jonathan Goddard and Dirk Schultheiss, to introduce this 28th volume.

As the Covid-19 pandemic forced us to switch from live events to digital forms of communication, we also had to question the necessity of a printed version of this volume. Nowadays printed books may seem like fixed mirrors of an elusive virtual world, but a paper version of a book remains a carefully composed object, that offers documentation or archival work that can be inspiring, and that supports our memory. The obvious presence and intrinsic beauty of a printed version of a book resists the tsunami of information, and allows the reader to spend some moments in an oasis which facilitates reflection on our work, and in fact our life. Like listening to poetry, to read a printed book requests some effort and attention, but also endures time and silence. Moreover, a printed book is here to stay as a good friend that never let us down.

Therefore we are happy and grateful that the Executive and the Board of the EAU continue to support a printed version of the *De Historia*, and make it possible to offer it to the EAU membership. However, in light of the pandemic, as this would already be the second volume that will not reach the EAU members as planned, it was agreed to already offer you a digital version of this 28th volume to coincide with the EAU21 Virtual Congress. Printed copies of Volume 28 will be available at the next regular congress.

The decision to distribute this volume digitally in 2021 was also largely influenced by the fact that this volume contains two major and indeed unique publications. We felt we could not deny you the possibility to read these, even for the time being in a digital format!

The first of these extra long chapters is "A History of the Treatment of Urethral Stricture Disease", written by Prof. Tony Mundy from London. We feel very honoured that this world expert

in urethral surgery accepted our invitation to write on the historic aspects of the challenging problem that represents urethral stricture disease, even today.

The author presents us with a brilliant overview of the many diagnostic and therapeutic developments of the past, but also proves that actual individual clinical expertise is built on so many achievements by our predecessors. With ups and also many downs, they developed the subtle art of urethral surgery. The lessons based on historic experience, as presented in this easy-to-read article, should not only prevent the repeating of earlier mistakes, but will also allow us the development of skills unseen before.

The second highlight is yet another major and indeed significant contribution to the history of Urology in Europe. "The 'Consilium' by Andreas Vesalius for Bernhardus of Augsburg" will definitely promote this volume of the 'de Historia' series as an international reference. Three non-urological colleagues, well-respected scholars on the life and works of the famous Flemish anatomist Andreas Vesalius, present us with a unique document by this giant of medicine.

The authors discuss a recently discovered and hitherto unknown medical letter (consilium) by Vesalius, dealing with a patient that presented with a chronic urological problem. Many of us know Vesalius (the Flemish doctor Andries Van Wesel) because of his pioneering work in anatomy, fewer probably know that he was also a well respected clinician in his time, and consulted all over Europe. For the first time, the recently rediscovered original Latin text has been translated into English, and presents us an intriguing glimpse into 16th century medicine. It is an amazing experience to come so close to the specific aspects of renaissance medicine! We very much enjoyed reading this article and helping with its translation. We hope that you share with us the admiration and respect for Vesalius and his clinical observations, but also for the patient that was 'submitted' for his urological problem to the diagnostic and therapeutic approach of that time!

Aside from these two milestone articles, we feature several other articles from regular contributors and from presenters at previous EAU congresses. These deal with equally intriguing topics in an elegant fashion. I very much enjoyed reading them!

We hope that this introduction has motivated you not only to scroll through this digital copy of the 28th volume of the *De Historia*, but to read the articles and enjoy the excellent illustrations. We hope to present you with a printed version as soon as possible!

On behalf of the board of the EAU History Office we would like to thank the Executive Board of the EAU for the continuing support to our activities and more especially the continuing publication of the *De Historia Urologiae Europaeae* series, even under challenging conditions.

Philip Van Kerrebroeck
EAU History Office Chairman
Editor

Peter Paul Figdor (1926-2020)

"Whenever an old man dies, it is as though a library were burning down"

This quote by Malian writer, historian and ethnologist Amadou Hampâté (1900-1991) was the deepest of our feelings when Univ. Doz. Dr. Peter Paul Figdor passed away in August 2020. He was a real library and an encyclopaedia on the History of Urology. Peter Paul Figdor was a very humble and kind man.

After completing his medical studies at the University of Vienna he started his training in urology in 1950 under the famous Prof. Dr. Richard Übelhör at the Hospital in Lainz. At that time his main interest was in nephrology, especially the use of artificial kidney and peritoneal dialysis and later also in kidney transplantation. Figdor was involved in the establishment of the first unit for haemodialysis at the Lainz Hospital in 1953, at that time one of the first in Central Europe. For further training in this field he was a long term guest resident with Prof. Alwall in Lund, Sweden, and Prof. Borst in Amsterdam, The Netherlands.

During his further urological training he focused on oncological surgery, reconstructive surgery, paediatric urology and hospital

hygiene. In 1962 he followed his teacher and chief Prof. Übelhör to his new position as University Chair at the Allgemeine Krankenhaus (AKH) in Vienna and finished his PhD degree in 1969. In 1974 he became head of the urological department at the Kaiser-Franz-Joseph-Hospital in Vienna. His long term interest in functional kidney problems resulted in the book publication *Urologische Nephrologie* ('Urological nephrology', Urban & Schwarzenberg, 1976). In 1986 and 1987 he was President of the Austrian Society of Urology (ÖGU). Among many positions he was a member of the Gesellschaft der Ärzte in Vienna and of the Royal Society of Medicine in London.

Archivist

When he retired from active urology in 1992 he was appointed archivist of the Austrian Society of Urology (GU) and dedicated all his enthusiasm to the research of the history of urology. This resulted in a variety of publications and three reference works: *Philipp Bozzini - The Beginning of Modern Endoscopy* (Endopress, 2002); *The Development of Endoscopy* (Endopress, 2004); and *Biographien Österreichischer Urologen* ('Biographies of Austrian Urologists', Universimed, 2007).

His work as an archivist was huge, but unfortunately most of his work was in a pre-digital age and the archive mainly consists of thousands of photocopies from the original books and archives he found in the libraries in Paris, London, Madrid, etc.

His knowledge on the history of urology was enormous. His chapter "Transurethral access to the bladder – endoscopy and lithotripsy" that he published in the EAU's *Europe, The Cradle of Urology* is a superb example of his knowledge.

In 1998 he joined the EAU History Office (at that time Historical Committee of the EAU) and became one of our most knowledgeable, active and scientific members. His profound expertise in all facets in the history of European urology was overwhelming and he contributed to our activities for almost two decades. After the earlier death of his beloved wife he became more secluded from our activities but we will always remember him as a good friend and an outstanding historian.

Hilary Mantel wrote: *"The writer of history is a walking anachronism, a displaced person, using today's techniques to try to know things about yesterday that yesterday didn't know itself. He must try to work authentically, hearing the words of the past, but communicating in a language the present understands."*

Such a writer of history was Peter Paul Figdor.

Prof. Dirk Schultheiss and Dr. Johan Mattelaer
Former Chairmen of the EAU History Office

Second addendum to *De Historia Urologiae Europaeae Vol.26*

Johan J. Mattelaer

In Volume 26 of *De Historia Urologiae Europaeae*, we published on page 171 the chapter 'Saint Liborius: Healer of Urinary Stones'. In Volume 27, we added a short text concerning the fate of the remains of Liborius during the French Revolution.

We finished the chapter in Vol. 26 with the following passage: "For the 100th anniversary of the department of Urology at Semmelweiss University in Budapest, Dr. Peter Nyiradi is renovating the small, but interesting museum of Urology. In the main hall will be a statue of Saint Liborius!"

Recently Prof. Imre Romics has sent a picture of this modern Liborius Statue in Budapest, and so the illustrations of the Saint Liborius iconography is now complete.

The modern statue of St. Liborius in the hall of the Urology Museum at Semmelweiss University in Budapest.

Parsifal: the story of Geoffrey Parker, British Urologist and surgeon to the French Resistance

Jasmine Winyard[1] **and Jonathan Charles Goddard**[2]

[1]Urology Registrar, Department of Urology, Leicester General Hospital

[2]Consultant Urological Surgeon

Geoffrey Parker (1902 – 1973) was a British surgeon of the mid twentieth century. He had an interest in urology and was one of the founding members of the British Association of Urological Surgeons (BAUS). Like most doctors of that era, he served in the armed forces during the Second World War. Parker's war however, turned out to be really quite extraordinary.

An eventful education

Geoffrey Edward Parker was born on 24 June 1902, the son of Mr. G. L. Parker of Brighton.[1, 2] Geoffrey and his brother were nurtured by their mother, who had been widowed when Parker was aged two. He went to Windlesham House Preparatory School and then Marlborough College. From there, he went up to Trinity Hall, Cambridge, where he was awarded a Blue* in boxing.[3]

In 1925, he moved to London to study clinical medicine at St Thomas' Hospital. It is quite clear that the social side of college life took precedence over Parker's academic studies. As a London Medical Student, as he put it, the Grammar School students (those of a lower social class who had gained scholarships from state schools) won all the prizes, whilst he and his more privileged Public School friends enjoyed the high life; although, Parker was by no means rich.[4] In order to afford London accommodation, he

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1. Anon. G.E. Parker - Obituary. British Medical Journal 1974;1(5897):80.
2. Anon. Obituary. Mr G.E. Parker. The Times 1973 06/12/1973.
3. Anon. Parker, Geoffrey Edward (1902 - 1973). Plarr's Lives of the Fellows Online 2014 24/09/2014. (accessed 20/11/20).
4. Parker G. Surgical Cosmopolis. London: William Kimber & Co. Ltd., 1970.

* A Cambridge Blue is a prestigious prize, awarded for excellence in sport at the university.

moved in with an old acquaintance, an actress called Nancy, who had a flat in Westminster. Partly to support himself financially and, I feel sure, partly for fun, he played the Hawaiian guitar in Maxim's, a Chinese restaurant in Soho. He danced as a professional at the Empress Rooms in the Royal Palace Hotel in Kensington; on Saturdays, for 10 shillings he would partner any un-accompanied lady for the evening. He also continued with his amateur boxing and won the middleweight championships of the London Hospitals. Although when Parker tried to earn a little extra money boxing, he soon realised, his amateur university-level skills did not match those of the professionals.[4]

Throughout his life, Parker, by accident or intent, appears to have commonly fallen into little adventures and led brief forays into other careers and walks of life. Parker described himself as being 'event prone'; his student days were no exception. During

Figure 1: The French Hospital in Shaftesbury Avenue, London. Photograph by Estefania Etcheves Miciolino for *Himetop - The History of Medicine Topographical Database* (himetop.net). Reproduced by kind permission.

the General Strike of 1926, he, along with many other students, volunteered for the Auxiliary Police Force. Parker gained the rank of Sergeant and was attached to Scotland Yard. At one point, he found himself commanding a section of 15 volunteer policemen and almost sparked a riot by punching a protester, the situation thankfully being calmly defused by a professional London 'Bobbie'. On another occasion he found himself in the violent streets of Dublin during the 1920's troubles when Nancy, in Dublin with her travelling theatre troupe, fell ill with mumps. Called on to rescue her and bring her home, Parker found himself dodging machine-gun fire between the republicans and the loyalists.[4] As we will see however, these experiences did not put him off getting near the sharp-end of things later in life.

In 1926, Parker successfully graduated MB BCh from Cambridge and gained his LRCP and MRSC (professional qualifications from the Royal Colleges of Physicians and Surgeons). However, distracted by his extracurricular activities, he had not done particularly well in lining himself up for one of the elite London junior doctor posts. The Dean of the Medical School, Professor Leonard Dudgeon (1876-1938), sent for Parker and made it very clear that attempts at professional boxing, playing guitar in Soho and selling himself as a dancing partner were not the activities of a London medical gentleman. Parker, with some reluctance, dropped his nightclub lifestyle releasing his boundless energy on the squash court instead (a more acceptable pursuit for a gentleman) and was rewarded with a Resident Casualty Office job at St Thomas'.[4] A Surgical House job followed and then several Resident Surgical Officer posts. Overall, these afforded him an excellent practical training. In 1928, he passed his FRCS, a year of relief and celebration for his mother as his brother also graduated in History and Law from Oxford and was made a Don at Worcester College.

A little bit of France

In 1932, Parker successfully applied for the position of Assistant Surgeon at the French Hospital in Shaftesbury Avenue, London.[5] (Fig. 1) This hospital, with 70 beds and an operat-

5. Parker G. The Black Scalpel, a surgeon with S.O.E. London: William Kimber & Co. Ltd, 1968.

Figure 2: Geoffrey Parker in WWII Battle Dress. From Parker's book, *Black Scalpel*. William Kimber, 1968.

ing theatre, had been founded in 1866 for the care of the French-speaking population of London; these included Swiss, Belgians and North Africans as well as native French.[4] A review of the hospital in 1916, in the British Journal of Nursing, complimented the cheerful and hygienic wards and, with some excitement, noted that even the English patients were given coffee for breakfast and not tea![6] The high-quality nursing and housekeeping was provided by nuns, Sisters of the Order of *Les Servantes du Sacre-Coeur*, who were trained in Versailles.[6] By coincidence, the French Hospital, re-named the Shaftesbury Hospital in 1967, later became part of the famous "3 P's" Group (the London urology hospitals of St Peter's, St Paul's and St Philip's).[7]

Not long into his first clinic, it soon became very apparent that Parker spoke no useful French! Making matters worse, he realised that all the nurses, as well as the patients, spoke only French. With the help of his wife and a French language teacher, within six months, he could converse reasonably well, if not grammatically perfectly, with both patients and nuns.[4]

War

With the outbreak of the Second World War in 1939, Geoffrey Parker, like many London doctors, joined the Emergency

6. MB. The French Hospital, Shaftesbury Avenue, WC. The British Journal of Nursing 1916;57(1481):158.
7. West E. A History of the St Peter's Group. A celebration of the St Peter's group of hospitals from 1860. London: St Peter's Trust, 1998.

Medical Service (EMS). This was a centralised, state-run system designed to cope with the predicted mass casualties from the expected air raids. The French Hospital looked after many wounded, some from the Blitz but also many of the injured French soldiers who were rescued from the beaches of Dunkirk. Once the London bombings stopped, and the war work dried up, Parker soon became restless and in the summer of 1942 he enlisted into the Royal Army Medical Corps (RAMC) where he served with the 100th Field Hospital. (Fig. 2) The British military is famous for its "hurry up and wait" approach to life and after going through basic training, Parker found himself once again very bored waiting for the unit to be deployed. He persuaded an army captain, who he met in a bar, to allow him (unofficially) onto his small arms course and became proficient in pistol, rifle and light machine gun use. He also found a tough P.T. sergeant to teach him unarmed combat in the evenings. After looking after a pilot who had broken his ankle on a parachute drop, Parker somehow managed to join his ex-patient on a parachuting rehabilitation course, where he learned to jump.[5] None of these activities were essential for his role as army surgeon; he clearly just could not sit still.

Eventually, on 29th December 1942, his unit deployed to Algiers, North Africa. Once again, bored whilst waiting for the field hospital to be constructed, Parker volunteered for a post commanding a surgical field ambulance at the front. Parker had a knack for getting chatting to people and he struck up a friendship with the train driver and fireman, Frenchmen who were delighted to find out that Parker spoke their language. A bottle of Pernod appeared and before he knew it, he had agreed to travel with his new friends on the footplate shovelling coal into the engine rather than travelling in a comfortable carriage. He ended the journey so dishevelled from his work as "assistant fireman" that he had difficulty convincing his new unit that he was indeed a British Officer and surgeon and not a vagabond. He needed a whole new uniform (not least as he had accidentally shovelled his tunic into the fire box). Bizarrely, he repeated this work-experience some years later when a train driver patient invited him along for a ride on the footplate of the famous Golden Arrow from London to Dover; a dream come true for many an English schoolboy, Parker subsequently admitted that he didn't really like trains.[4]

Major Parker took to his new role commanding the busy forward surgical unit. Unfortunately, he did not get on with his anaesthetist, so he had him transferred, which was his privilege as Commanding Officer. When the new anaesthetist, Captain Wyman joined the team; they hit it off immediately and remained friends for life. Parker operated on about 2000 casualties of war between March 1943 and February 1944 as his small unit made its way through North Africa, Sicily and into Italy as far as Sipicciano, just a few miles south of Monte Casino. Parker consolidated some of this experience into a book, *The Surgery of Abdominal Trauma*.[8] He thought it important to pass on his experience to new surgeons entering the war. Although his survival rate of 66% was commended, the book was not well reviewed in the medical press.[9] This may have been in part as he wrote it a little hurriedly and when he was ill. Unfortunately, and much to his annoyance, Parker had developed endemic jaundice. Very weakened, he was forced to return to London. It was here however, that his career took an unforeseen turn.

A sinister game of boy scouts

During the Second World War, the Ministry of Economic Warfare formed a secret society called the Special Operations Executive (SOE); they sent spies into occupied Europe. In 1944, SOE needed a surgeon, "who was capable of fighting if required", to help organise the surgical care of some French Resistance wounded in a part of France no longer occupied by the German army. They became aware of Parker, with his 'hobbies' of boxing, hand to hand combat, small arms handling and parachuting and his now excellent French; he seemed the ideal candidate. A secret meeting was arranged in a seemingly innocent house in Welbeck Street (but actually an SOE office) and Parker was offered work by one Colonel Maurice Buckmaster (1902 – 1992), a shady spymaster. The work, he was told, was "intensely interesting, but not without danger" and was accompanied by an extra 10 shillings a day "danger money"; he was told very little else.[5]

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8. Parker GE. The Surgery of Abdominal Trauma. London: J. & A. Churchill, 1944.
9. Anon. Notes on Books. British Medical Journal 1944;2(4373):565.

Now, thoroughly bored with London, Parker agreed to help. There then followed a series of events, which would not appear out of place in a James Bond film. Parker was taken to a secret room, hidden under the Science Museum in South Kensington, which was a cross between a gentleman's outfitters and an armoury. He was given French clothes and papers; even his dental fillings were changed to French ones (the Gestapo, apparently were not above checking this whilst pulling out teeth during torture). A few days later, he was instructed to go to a house on Wimpole Street, there he changed into his French clothes and was driven to a secret airfield. He was given a canvas belt containing a quarter of a million Francs and twenty-five golden sovereigns, but also a Colt 45 automatic pistol and two cyanide capsules. Finally, he was presented with a Fairbairn–Sykes fighting knife, the iconic British Commando dagger, before boarding a Dakota; a moment of cold realisation of what he had signed up for.[5]

Geoffrey Parker, with a handful of other SOE agents, was then parachuted into the French Jura mountains, an area that had just been cleared of German troops by the French Marquis. The Marquis were a super-elite and secret band of French men and women, who ran a resistance force. Parker was immediately renamed *Parsifal* by the Marquis leader, Commandant Romans. This name change was important. It was not wise for the men to know each other's real names in case they were captured. Even Parsifal's fake papers, showing him as a French pharmaceutical salesman given to him by the SOE, were not used when he was with the Marquis. Parsifal was perhaps an appropriate code name for Parker, being the name of one of King Arthur's Knights of the Round Table in medieval legend.

Within hours, he was set to work to find a location for a hospital. The Marquis were scattered across the mountain range and numbered over 2000 men and women. They had many injured comrades hidden in the woods and in Resistance safe houses. With the help of a local driver, Parker found a deserted school, rounded up the injured and took them to his new 'hospital'. However, just as they were settling in for that first night, things became interesting. It became quickly apparent, the area was not as clear of Germans

Figure 3: A memorial stone in honour of Geoffrey Parker, the English surgeon to the French Marquis. It lies at La Borne au Lion in the Jura Mountains, on the way to the summit of the Crêt de Châlam, near the site of Parker's field hospital. Photograph kindly provided by Mr George Bartram RM(Ret).

as the intelligence had suggested and suddenly, he ended up in the midst of a war of escape and evasion; as he put it, "a sinister game of boy-scouts in the woods".[5] The wounded, however injured, were quickly mobilised up into the Jura Mountains where they all lived on very little for several weeks. Parker's main role here was tending to minor injuries and finding water for the men to drink. Parker accompanied the Marquis on forays down the mountain to buy cheese and bread on the black market and to pick up supplies from RAF airdrops. The fighters carried their weapons constantly, moved by night and slept by day.

After six weeks, a mountaintop farm was found which was safe enough for a field hospital and base for the local Marquis. Now turning public health advisor, Parker's initial task was to organise the men and arrangements, which were rudimentary, with a river for bathing, and get latrines dug. Thankfully, Parker found a fellow doctor who took over the day to day running of the hospital allowing Parker to deal with the injuries of the men. His surgical role was very limited, mainly washing out wounds and giving injections of morphine to those who needed it. Interestingly, along the way, amongst this eclectic crowd of resistance fighters in the mountains, Parker acquired a medical student or two to help.

One young patient, Georges, desperately required a formal emergency laparotomy following a gunshot wound. Parker mobilised a band of Marquis, and they crept down the mountain into the town between the two-hourly patrols of the German soldiers and SS. They took over the hospital for the night, in constant fear of being discovered, which would have meant immediate and public execution. The Sister Superior readily agreed to help the Resistance; the hospital night superintendent was not keen, but that did not stop the Marquis.

After the liberation, Parker safely arranged transfer for the seriously injured men to be treated by the Red Cross in Switzerland. Eventually these men were repatriated to Lyon, along with the injured, but noncritical, wounded Marquis. They were given special care in a wing of the major hospital in Lyon. He returned to England where his cloak and dagger life was immediately erased and he gradually reacclimatised to normal existence, although not before a spell in liberated Belgium working in a 1000-bed Military Hospital set up in a convent. More European lifelong friends were made and more wine was drunk.[4] In April 1946, Parker was fully demobilised from the Army Medical Corps and he went back to his role at Woolwich Hospital and the French Hospital. His work with the SOE earned him a Distinguished Service Order and from France, the Croix de Guerre with Palm and Gold Star and he was made a Commandeur de la Légion d'Honneur. (Fig. 3)

Urology

Parker had developed an interest in urology throughout his early career. He had trained under Sidney MacDonald (1879 – 1946) and Cyril Nitch (1876 – 1969), general surgeons with an interest in urology and both onetime presidents of the Urology Section of the Royal Society of Medicine (RSM), at that time, the only British Urological Society. Before the war, he had published on early urethrography and was performing prostatectomies. In 1936, he successfully removed the prostate of an eminent retired French GP; the 94-year-old Dr Auguste Malraux who had been taught antisepsis by Lister![4]

Geoffrey Parker was a founding member of BAUS when it was established in 1945. He was also a council member of the

Urology Section of the RSM. Of note, in the minute book of the Section, at the council meeting on 26th November 1942, it was recorded that "Major Parker was likely to quit London soon on active service and a replacement would be required."[10] He was of course about to be sent to North Africa but it was only after the war that his fellow council members would have found out that Parker was to be later parachuted into France as surgeon to the French Resistance.

After the war, Parker was one of the first to try the Millin's prostatectomy, after Terence Millin (1903 – 1980) described the procedure at an RSM Urology Section meeting in November 1945.[11, 12] Within three weeks, Parker had done several of these new procedures and was very quickly asked to go to Belgium to teach the technique to a fellow surgeon there.[4] He presented his wartime experiences of abdominal surgery particularly relating to injuries of the genitourinary tract, at an RSM meeting on 27th March 1947.[13] For a time he worked with R.H.O.B. (Joey) Robinson, a urologist who was president of BAUS and the RSM Urology Section, at St Thomas'. However, he failed to get a permanent position on the staff so just continued his work at the Woolwich and French Hospitals.[4]

In 1950, Parker was also appointed as surgeon to the Italian Hospital in London, working there with his old anaesthetist friend John Wyman. Here he unexpectedly delved into the world of andrology. He recounted that there seemed to be a high incidence of male infertility in the Italian population and that he spent a lot of time persuading the newly arrived Italian immigrants, who found the weather too cold, to change from woollen to nylon underwear to cool the testes down to improve the sperm counts; he claimed some success with this sartorial approach.[4]

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10. Anon. Minutes of the Council Meeting of the Urology Section of the Royal Society of Medicine. London: The Royal Society of Medicine, 1942.
11. Millin T. Retropubic Prostatectomy; a new extravesical technique. A report of 20 cases. The Lancet 1945;2(6380):693 - 96.
12. Millin T. Retropubic Prostatectomy. Proceedings of the Royal Society of Medicine 1946;39(6):327 - 38.
13. Parker GE. Some observations on a personal series of battle casualties involving the genito-urinary system. Proceedings of the Royal Society of Medicine 1947;40(13):804 - 07.

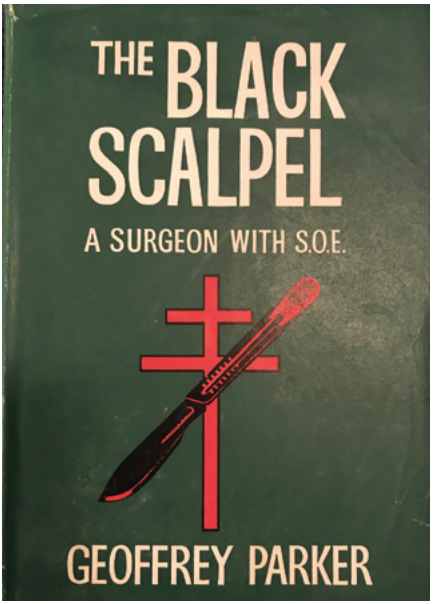

Figure 4: *Black Scalpel*, 1968. By Geoffrey Parker.

After the war Parker and his colleagues went on many trips, mainly to continental Europe, including the Soviet Union, to see other surgeons operate. Parker describes visiting Krakow to see a urologist, as urology was of "particular interest" to him. Unfortunately, he was unable to spend time with the urologist as the visitors "had" to observe another surgeon who happened to be a senior member of "the {Communist} Party" unlike the urologist. Of course, he made frequent trips back to his beloved France. We know he attended at least one BAUS meeting as he presented a paper on the surgical approach to the horseshoe kidney in June 1956, when the meeting was held in Liverpool.[14]

Geoffrey Parker certainly had a varied career. His passion for surgery, but more for the people he met through his work, is clear. In his two books much time is spent writing about the personalities of his comrades and the fellow surgeons he had met from many countries. His book, *The Black Scalpel* (1968) recounts his time with the SOE in France and makes for a thrilling read although, despite the name, there is little description of surgery. (Fig. 4) Parker kept in contact for years with some of the medical staff to whom he had handed over the care of his wartime patients. He formed deep friendships in this time and recounts a trip back to France, which was highly steeped with emotion, as well as wine.

14. Parker GE. The Surgical approach to the Horseshoe Kidney. British journal of urology 1956;28(4):447 - 48.

Parker's second book, *Surgical Cosmopolis* (1970) reports on his unintentional but thoroughly enjoyed interaction with his European patients and colleagues. Parker went to great lengths to continue his professional development as a surgeon by traveling the world to observe experts in their field. His accounts tell the stories of a huge cross-section of society amongst his patients and you can get a sense of the dark sense of humour, which many surgeons have.

Parker wrote little of his family in his books. He married Kathleen Hewlett Johnson in 1930. During the war years, she and their two sons and daughter were evacuated to Canada. With their London home shut up and mothballed, Parker stayed at his club. Indeed this enforced separation from hearth and home and lonely club lifestyle could have been one reason he was spotted by the SOE. This marriage ended in 1967 and he married again, to Margaret Lois Wilsdon who survived him when he passed away on 5th December 1973. There is little known about Geoffrey Parker's operative numbers, techniques, or prowess, but his personality made him a formidable and no doubt a driving force in the RSM and British Urology. It was an interesting life.

Correspondence to:
Mr. Jonathan Goddard
Department of Urology
Leicester General Hospital
University Hospitals of Leicester NHS Trust
Gwendolen Road
Leicester LE5 4PW
United Kingdom
jonathan.goddard@uhl-tr.nhs.uk

St. Cosmas and St. Damian's Role in Urology

Marcos Cherem-Kibrit[1] **and Jorge Moreno-Palacios**[2]

[1]Anahuac University, Huixquilucan, Mexico City, Mexico.

[2]Urology Department, Hospital de Especialidades del Centro Médico Nacional Siglo XXI, Mexico City, Mexico

Medicine and religion have been related since the beginning of the ancient cultures where different deities were attributed healing powers for different diseases. This tradition started with the Mesopotamian and Egyptian cultures, later inherited to posterior cultures such as Greeks and Romans. In these cultures, religion was an extremely important part in the life of the citizens.

In early Christianity, the first holy "martyrs" arose, who were attributed with powers considered supernatural for the cure of diseases. Based on these beliefs, the popularity of invoking different saints has grown exponentially. Depending on the disease someone is fighting against, a certain saint is handpicked and is prayed to, supplicating fast healing of the ill. For example, if a person suffers cancer he shall direct his prayers to Saint Peregrine Laziosi, whilst another person who suffers from headaches should go to Saint Denis of Paris to ask for their own improvement and eventually for their cure from the disease.[1]

This chapter will explore the history of Saint Cosmas and Saint Damian and their relationship with urology and urological disorders.

Religious Tradition

The expansion of Christianity was made after the Edict of Milan (313 AD) by Constantine the Great. Distinct strategies were employed for the conversion of Greek-Roman culture into Christian

1. María Nieto Ibáñez J. (2014). *San Cosme y San Damián, vida y milagros*. Madrid: Biblioteca de Autores Cristianos.

Figure 1: Beheading of St. Cosmas and St. Damian (1438-1440) by Fra Angelico (c1395-1455). Currently in the Louvre, Paris.

culture. One of these strategies was the Christianisation of pagan symbols and rites.[2] As examples we have: the papal mitre, which came from Greek culture; the cross, which came from the Egyptian cultures long before Jesus Christ's crucifixion and certain Christian rituals. For example, Christmas on December 25th, actually is the date of the invasion of the Roman empire, the Holy Week was originally an important worship to the Greek god Adonis, and Easter finds its origins in Egyptian beliefs, which is why it does not have a fixed date, occurring on the first Sunday following the first full moon of spring.[3] These examples were part of a simple strategy of the Christians to obtain a great quantity of followers and consolidate themselves as a powerful and dominant religion in the world.

As Christianity emerged, the two principal and most powerful cultures in Europe were the Greek and the Roman culture. Both cultures were highly religious, and they used to pray and ask different gods to regain health in case of disease. The god to whom they prayed depended on the illness they presented. An example is Asclepius, Greek god son of Apollo; as god of Medicine people visited Asclepius temples (Asclepeia), regarding health problems, or

2. Santos Cosme y Damián. Mónica Ann WALKER VADILLO. 51-60 de Iconografía Medieval, vol. III, nº 5, 2011, pp. 1-9. e-ISSN: 2254-853X. 5.
3. Dölger Franz Joseph. (2013). *Paganos y cristianos: el debate de la Antigüedad sobre el significado de los símbolos.* Ediciones Encuentro, S.A.

the case of Candelifera, Roman goddess of birth and childbirth, to whom pregnant women went and prayed before childbirth labour in order to expect a better outcome.[4] This tradition continued despite the development of Hippocratic medicine. This practice and tradition has its own history, since then faith and praying are an essential part of different cultures and religions to cure their diseases.

Cosmas and Damian in the Golden Legend

The *Golden Legend*, compiled in the 13th century by the Dominican Jacobus de Varagine are a compilation of the histories and miracles of the first Christian saints. In them we can find the story of Cosmas and Damian's life. Twin brothers born in 3rd century Arabia, they studied and distinguished themselves as physicians, they never accepted any type of payment for exercising their profession and for healing the village with their medical knowledge, all of this for their authentic Christian values and religious way of thinking.[5] They were known in the Orient as the "non-collectors" since the only thing they asked in exchange of healing people was to talk a few minutes to their patients about Jesus Christ and his gospel.[6]

Lysias, governor of Cilicia ordered that these brothers stop preaching. After this was in vain, Lysias decided to kill them. This was tried on several occasions but Lysias was not successful until he ordered their decapitation. This was a result of their constant faith, and the moment which painter Fra Angelico represented on his painting "Beheading of Saint Cosmas and Saint Damian". (Fig. 1)

The day of Cosmas and Damian was established on the 27th of September, every year (according to the Roman Calendar).[7] The Greek Orthodox Church honours the brothers on St. Anargyroi feast day on July 1st and November 1st each year. They were named Anargyroi ("the silverless") because they did not accept any

4. R., H. J. (1926). The Healing Gods of Ancient Civilizations. By Walter Addison Jayne, M.D. Pp. 569. Oxford: University Press, and New Haven: Yale University Press, 1925. £1 3s. *The Journal of Hellenic Studies*, 46(2), 263–264. doi: 10.2307/625319
5. JACOBO DE LA VORÁGINE (s. XIII) (ed. 2004): pp. 615-618.
6. ALARCÓN LÓPEZ, Miguel A. (1912): Vida de los santos mártires S. Cosme y S. Damián patronos de cortes de Baza. Imp. Editorial Barcelonesa, Barcelona.
7. Danilevicius, Z. (1967). SS. Cosmas and Damian. *Jama, 201*(13), 1021. doi: 10.1001/jama.1967.03130130047012

payment for their services while also attracting a lot of people to the Christian faith.

Miracle of Cosmas and Damian

According to the *Golden Legend*,[5] over 48 miracles were credited to the twins, including amongst others, the development of remedies against plague, scabs, scurvy, kidney stones and bed-wetting.[8]

The cult of the two martyrs, grew rapidly: it began as early as the fourth century when churches were dedicated to them in Jerusalem, in Egypt and in Mesopotamia. The trivial remains of "the brothers" were dispersed and divided in the fourth century. The relics were first brought to the Byzantium, then they were in Rome, in the tenth century carried to Bremen and since 1581 the skulls have been in the Convent of the St. Claire Nuns of Madrid, where they have been objects of veneration.

Miracle cures have happened to people who pray at the relics, that is why it quickly became the custom for perfume and ointments to be poured on the tombs of the twins on their saint day (27 September). Holes were made in the cover stones for this purpose and part of the perfume or ointment was carried away as a relic.[9]

The miracle for which Cosmas and Damian are best known could be considered the first human transplant ever done. "The Miracle of the Moor's Leg" is described as follows: a Deacon, who worked in the Basilica of Cosmas and Damian in Rome, was seriously ill because of a serious ischemia in his leg probably caused by an ergotism. He was near death and addressed a fervid prayer to his patrons (Cosmas and Damian) and fell asleep in the church.[10]

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8. MATTHEWS, Leslie G. (1968): "SS. Cosmas and Damian – Patron Saints of Medicine and Pharmacy: Their Cult in England", Medical History, vol. 12, nº 3, pp. 281-288. Disponible en línea: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1033831/
9. Csepregi, Ildikó; «The Miracles of Saints Cosmas and Damian: Characteristics of Dream Healing» I: Annual of Medieval Studies at CEU, Vol. 8 (2002)
10. Lippi D. The Transplant of the White Man's Leg: A Novel Representation of Cosma and Damian's Miracle. International Journal of Immunopathology and Pharmacology. 2009;22(2):517-520.

Figure 2: *St. Cosmas and St. Damian miracle* (c1547) by Isidro de Villoldo (?-1560). National Museum of Sculpture in Valladolid, Spain.

The twin brothers appeared to him in a dream, carrying their instruments next to the Deacon's bed and amputated his ischemic leg. Cosmas asked his brother *"What do we do now?"* Damian responded: *"today a Moorish man has died, we can use one of his legs because he no longer needs it"*. They did so, the brothers cut the leg of the deceased Moorish and attached it to the deacon, as seen in the sculpture "Miracle of Saint Cosmas and Saint Damian". (Fig. 2)

Upon awakening, the Deacon felt that he had regained strength and health. He looked at his leg and noticed that it wasn't his own, but distinctly dark. Once awake he started remembering his dream and everything made sense to him.[11] Then he came to his senses and told everyone about what he had seen in his dreams and how he had been healed. They sent at once people to the Moor's tomb and found that his leg has indeed been cut off and the Deacon's diseased limb was put its place in the tomb, witnessing the great miracle of Cosmas and Damian.[12]

The same miracle that we nowadays call transplantation of composite tissues, is still experimental and includes hand, arm, penile and leg transplants, among others. Although success stories exist, these transplants are not practiced regularly. Facial transplants are still rare, despite the first one done in 2005. This miracle is the reason for which St. Cosmas and St. Damian were associated with medicine and whereby millions of people go to them when they pray for healings.

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11. Jović N, Theologou M. THE MIRACLE OF THE BLACK LEG: EASTERN NEGLECT OF WESTERN ADDITION TO THE HAGIOGRAPHY OF SAINTS COSMAS AND DAMIAN. Acta Med Hist Adriat. 2015;13(2):329-344.
12. Ellis FS. The Golden Legend or Lives of the Saints. Compiled by Jacobus de Voragine, Archbishop of Genoa, 1275. Philadelphia: Temple Classics; 1900. pp. 543.

Figure 3: Ink Drawing of the Saints Cosmas and Damian. Hans Weiditz (c1495-1536). Both saints dressed as physicians, one performing the uroscopy (representing urology) and the other with ointments (pharmacology). Wellcome Collection, Library no. 11049i.

The advocacy of saints in the Renaissance

During the Middle Ages, Hippocratic medicine was sheltered in Western Europe in the monasteries, leaving healthcare for the general population to barber surgeons. During this time praying and invoking various saints to regain health became a regular practice in the population. Among the saints who stood out at this time are: St. Anthony the Abbot, St. Agatha and St. Catherine of Alexandria, among others.

Cosmas and Damian, having performed various miracles related to the recovery of health, were invoked for different diseases. For example: they were prayed on when someone wanted to be cured and recover from the plague, but above all they were advocated when someone presented equine glanders, inflammation of the glands, ringworm, kidney diseases, stones, swollen belly and childhood urinary incontinence. Most of them, disorders related to urology.[13]

During the Renaissance many thoughts, ideologies and techniques of everything changed, lifestyles changed and the course of history changed forever. Included in all these changes, we can

13. Duffin, J. (2013). *Medical saints: Cosmas and Damian in a postmodern world.* Oxford: Oxford University Press.

Figure 4: *Saint Cosmas and Saint Damian Condamned (*1438) by Fra Angelico. Predella of San Marco Altarpiece, National Gallery of Ireland, Dublin. Part of the larger Predella of San Marco Altarpiece, which includes Fig. 1.

Figure 5: *A verger's dream: Saints Cosmas and Damian performing a miraculous cure by transplantation of a leg.* (c1495) Oil painting attributed to the Master of Los Balbases. Wellcome Collection, Library no. 46009i.

Figure 6a and b: *The Holy Cosmas (Or Damianus)* and *The Holy Damianus (or Cosmas)* (c1465-1480). Attributed to Bartolomeo Vivarini. St. Damian and Cosmas in a medical costume with ointment pommel and spatula. Rijksmuseum, Amsterdam SK-A-4235 and SK-A-4012.

find a great artistic movement, very noticeable in all the works of the moment, a style with unique characteristics, later named "Renaissance style". In this great artistic movement, artists and painters started considering painting on canvas the life and the work of different saints. In these paintings Cosmas was directly related to uroscopy. As seen in this Hans Weiditz ink drawing (Fig. 3), this urological technique consists of observing urine. The relationship between symbols and saints was extremely common in Europe during the Renaissance, with that been said each time we can observe such procedure (uroscopy) in an artwork, it is relatable to Cosmas and Damian, the uroscopy was the symbol for the brothers.

Different artists have tried to depict on canvas the distinct stages of the life and miracles of the twin brothers, as well as the execution attempts they suffered from Lysias (governor of Cilicia) and his supporters. They were beheaded such as the painter Fra Angelico represented it in his painting "Saint Cosmas and Saint Damian Condemned". (Fig. 4) The brothers were represented carrying a staff, but also in some images the clothing of the first brother was blue and that of the second, red. (Fig. 5) Some research affirms that the blue color was designated to physicians and red color designated to surgeons.

As physicians, apart from uroscopy, they were also depicted in artworks with a medical cabinet or cases to store medicines, a

spatula which is used to mix and apply medicines, or using a mortar as a pharmaceutical instrument. They could also be carrying other medical and pharmaceutical instruments such as lancets, as we can see in Bartolomeo Vivarini's painting (Fig. 6). They were also recognized and treated as barbers, that's why they could also be represented frequently using a razor or scissors.[14]

The siblings were entrusted with the urinary tract patients and mainly those with a lithiasic disease;[15] their figure became so important and representative in the Christian Middle Ages that they replaced the figure of Asclepius (Greek god of medicine and healing) established many centuries earlier.[16]

Conclusions

Praying to different saints for the recovery of health in many countries remains as a very common practice and will continue to be so. The Christian faith has been an active and crucial part in the development of the world history, and will continue to take an important role in the world, the belief of the saints for the different needs of the followers has provided and facilitated the faith that heavenly miracles do exist if you ask for them, the belief in "medical saints" was and is a very important part of the history of medicine, since these beliefs have prevailed for much longer than current medicine. Cosmas and Damian were one of the first saints to whom the followers would go to for medical supplications with healing intentions, nowadays the twin brothers represent this example for diseases related to the urinary tract, mainly for lithiasis.

Correspondence to:
Dr. Jorge Moreno
Urology Department
UMAE Hospital de Especialidades CMN S XXI, IMSS
Cuauhtémoc 330. Col Doctores CP 06725
jorgemorenomd@gmail.com

14. López Campuzano, J. (1996). «Iconografía de los santos sanadores (II): San Cosme y San Damián». *Anales De Historia Del Arte*, 6, 255 - 266. Recuperado a partir de https://revistas.ucm.es/index.php/ANHA/article/view/ANHA9696110255A
15. RÉAU, Louis (1997): p. 342.
16. Hart GD. Asclepius the God of Medicine. London: The Royal Society of Medicine Press; 2000.

A History of the Treatment of Urethral Stricture Disease

Anthony R. Mundy
Institute of Urology and UCL Hospitals NHS Foundation Trust, London

The early history of the treatment of urethral strictures is somewhat vague if only because the term "stricture" is relatively new. Until fairly recently, towards the end of the 18th century to be more exact, patients' clinical problems were usually identified by their medical attendants by the symptom(s) from which they suffered rather than by the nature of the underlying pathology, mainly because the pathology was unknown. So, men with voiding difficulty would be described as having ischuria, strangury or dysuria, depending on the severity of their symptoms.

Even when a pathological process was ascribed to a clinical problem it was commonly based on supposition rather than evidence. If a patient with voiding difficulty was found to have a physical block to the passage of a catheter when an attempt was made to relieve his voiding difficulty, the supposition, at least from the first century AD until the 18th, was that there was some sort of *'fleshy excrescence'* that had grown into the lumen of the urethra which became known during the Roman Empire as a *'carnosity'* or *'caruncle'*. It was only when surgeons started to take an interest in morbid anatomy in the 17th and 18th centuries and started to dissect the urethra of patients who had died, who had had voiding difficulty before death, that they found a fibrotic narrowing of the lumen –which came to be known as a stricture- rather than something growing into the lumen.

Another problem in writing about the early history of urethral stricture surgery is that it is difficult to consider the subject in isolation. Almost all practitioners who dealt with strictures dealt with all aspects of surgery until comparatively very recently. Indeed, almost all of those who wrote on the subject until the sixteenth century wrote about both medicine and surgery and most if not

all their writings tended to be encyclopaedic summaries of received knowledge to date rather than their own new ideas, so it is difficult to be sure at which time in history something new developed.

From the Ancients to the Middle Ages

It seems to be an instinctive human reaction to try and push something, sharp or blunt, through an obstruction to improve flow through a blocked channel. Catheters and dilators have been found buried with the Pharaohs of ancient Egypt in their tombs so that they could relieve their urethral obstruction in the after-life, should the need arise. In ancient Greece, Plato, Aristotle and Hippocrates all had something to say about what we now call gonorrhoea – always recognised as the principal cause of strictures until recently. Socrates, it is said, joked about 'the gleet' (the urethral discharge associated with urethral strictures due to sexually transmitted disease). Epicurus committed suicide when his stricture became too difficult to dilate and after he had suffered 14 days of attempts to relieve his retention. More recently Boswell joked about his own problem and Napoleon suffered from it, as had Henry IV of France before him.[1] No doubt there are many other famous figures in history whose urethral status was equally compromised.

Historically, the earliest written references come from India. There is otherwise nothing else to be found from amongst the ancients of Europe or indeed the rest of the world – ancient China and Japan had an abhorrence of surgery - until the time of the Greeks from whom we have catheters as artefacts. In the Hellenistic period of Greek history, the first references to strictures and their treatment came from the Greeks of Alexandria. By this time, Rome was beginning to supplant Greece in the Mediterranean world, and Rome stayed pre-eminent until the Byzantine period. Intellectual activity then returned to Alexandria until the spread of Islam when the Arabs inherited the mantle of the Greeks and Romans. And so it was until the Middle Ages.

The earliest recorded references to urethral stricture disease are in the Hindu writings of Susruta in the period around 600 BC.

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1. Blandy J P. Urethral stricture. Postgraduate Medical Journal 1980; 56: 383-418..

He was clearly an outstanding surgeon by the standards of any age and wrote a monumental treatise on surgery called the *Susruta Samhita* in which he described the management of urethral obstruction with graduated dilators and the means of using them, lubricated with ghee.[2] He also described catheters made of iron, wood and shellac.

All we have of ancient Greece are some metal dilators, found in the ruins of ancient Corinth, which was a major centre of medicine in the classical Greek world. Hippocrates, who gave us the oath we all (theoretically) swear when we become doctors and is the so called 'father of medicine', had nothing to say about urethral obstruction in his writings, although he does describe urethral abscess.

It is from the city of Alexandria that we have our first written references from the Greeks to urethral obstruction and its treatment.[3,4,5,6] Alexandria became a centre of culture and science in the Hellenistic period with an influence that was to last for many centuries. Medicine, and particularly anatomy and surgery, flourished and foremost among the practitioners were Herophilos (335-280 BC) and Erasistratos (330-250 BC). They were the very first that we know of to dissect humans (both dead and, in the case of convicted criminals, alive) to study anatomy, albeit on a limited scale, and they were also the first to develop the study of experimental physiology. Both were celebrated for their surgical skills and Erasistratos described a metal catheter with the shape of an elongated-S for the treatment of urethral obstruction,[3] very much like the one found in Pompeii from the first century AD. (Fig. 1)

Catheters and dilators from this era were usually one and the same and remained so until very recently. They were usually made of metal or, to be more accurate, those that have survived

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2. Das S. Shusruta of India, the pioneer in the treatment of urethral stricture. Surgery, Gynecology & Obstetrics. 1983; 157: 581-582
3. Rutkow I M. Surgery: An Illustrated History 1993 Mosby-Year Book. St Louis, Illinois.
4. Murphy, LJT. The History of Urology 1972. Charles C Thomas. Springfield, Illinois.
5. Kuss R, Gregoir W. Les stenoses de l'urethre. Chapter in Histoire Illustré de l'Urologie. 1988 Les Editions Roger Dacosta, Paris
6. Attwatter H L. The history of urethral stricture. Brit J Urol 1943; 15: 39-51.

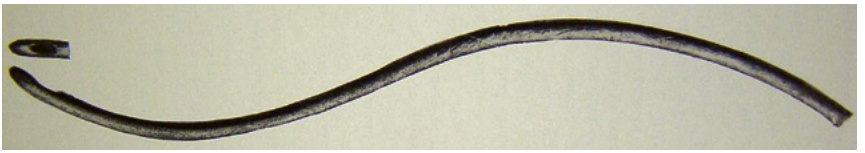

Figure 1: Illustration of an Ancient Roman metal catheter.

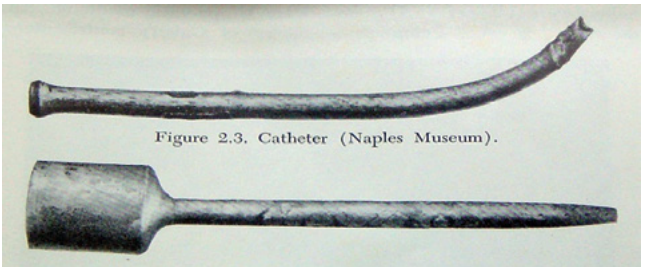

Figure 2:
A selection of instruments as found in Pompeii.

were made of metal, and they were generally curved, at least at one end. In the oldest surviving instruments bronze was the preferred material, but catheter-dilators made of ivory, paper, wood and even of animal and fish skins, coated to make them sufficiently rigid for passage, have been described.

With the Roman conquest of Greece and the spread of the Roman Empire, the intellectual focus of Europe moved to Rome. The Romans however had a contempt for medicine, and particularly for surgery, deeming it manual work. They therefore employed Greek physicians and surgeons to look after their health, the more eminent of whom subsequently integrated into Roman society.

The first and most erudite Roman writings are those of Aulus Cornelius Celsus (25 BC – 50 AD) who was not a medical practitioner at all but an aristocratic encyclopaedist who wrote eight books on medicine and surgery during the reign of the emperor Tiberius (42BC-37AD). These represented the cumulative knowledge of the subject from ancient times to the dawn of the Christian era. In these volumes, collectively known as *De Medicina*, he too described S-shaped catheter-dilators.[3,7] These were generally made

7. Celsus: De medicina. Trans. James Greive, D Wison & T. Durham, London 1756

of iron, lead or bronze and required a great deal of technical skill to manufacture. Such an instrument (Fig. 1) and others (Fig. 2) were found in the ruins of Pompeii and can be seen in the museum in Naples.[4]

A century or so after Celsus was Claudius Galenus (c.130-c.210), known as Galen. He was born and brought up in Pergamon, which was Greek then although geographically located on the coast of Asia Minor in what is now Turkey, where it is now called Bergama. He moved to Rome to work for the Emperor Marcus Aurelius (121-180).

Galen discussed the causes of lower urinary tract obstruction and it was he who distinguished between varying degrees of voiding difficulty from ischuria at one extreme, which we would understand to mean retention; then strangury, which was voiding with great difficulty, drop by drop; to the relatively milder dysuria, which was difficulty and a poor stream, usually associated with urinary frequency. It was also he who introduced the concept that was to last for centuries that urethral obstruction was due to "*carnosities*" or "*caruncles*". He described them as *"a kind of excrescence; a fleshy mass"* which were the consequence of urethral ulceration and which grew into the lumen of the urethra to obstruct it.[4,8]

The idea of a fibrotic narrowing of the urethra did not develop until more or less 1,500 years later. Gonorrhoea was recognised to be the principal cause of urethral obstruction and was known and described by the ancients. Indeed, it can be traced back to the days of Abraham as in Leviticus, XV: *"1: And the Lord spake unto Moses and to Aaron, saying, 2: Speak unto the children of Israel, and say unto them, When any man hath a running issue out of his flesh, because of his issue he is unclean"* - and so on for the rest of the Chapter (King James Bible).

It was Galen who first gave it the name "gonorrhoea" believing it was a disturbance of the seminal vesicles and that the urethral discharge was semen (*gonos* is the ancient Greek word for semen and

8. Galen: De locis affectibus. Venetiis, 1608. Trans. Daremberg. Paris 1854.

rhoia for flux.) The link to urethral discharge, (which was commonly called the *'gleet'* from the Old French word *glette*, meaning slime) and to the development of carnosities may have been made but we know of no documentation to that effect. He and his predecessors did, however, understand the link between urinary obstruction and infection and, as a consequence of infection, of chronic recurrent epididymo-orchitis and of peri-urethral abscess formation and subsequent fistulation through the skin of the genitalia and perineum. Both Galen and Celsus described dilatation as the main form of treatment for obstruction but also referred to urethrotomy when it was no longer possible to pass a catheter, although details of the technique are lacking.

It is difficult to overestimate Galen's influence on medicine and surgery and this influence was to last for 15 centuries or more. He was undoubtedly the most famous doctor of his era. He was apparently a somewhat difficult character, but he had enormous energy and the scope and scale of his work and his writings were staggering. He wrote extensively on anatomy and surgery as well as recapitulating the work of the Alexandrians before him and expostulating on a wide range of non-medical subjects as well. So extensive was his output that of all of the ancient Greek literature that survives to this day, an estimated 50% of it was written by Galen. Many of his ideas were flawed and his knowledge of anatomy was largely based on animal dissection but he had a wealth of practical surgical experience, largely based on his experience of looking after gladiators and their injuries. He was revered after his death and his work was adopted and promulgated by the Christian church and thus became dogma, literally, for well over a millennium.

Oribasius (325-403), two centuries after Galen and also from Pergamon, was the next of the ancients that we know of to record his observations on the nature and treatment of urethral obstruction. He compiled a *"Synopsis"* under the orders of the Emperor Julian the Apostate (330-363) for whom he worked and who befriended him.[4,9] This was a compendium of the writings of all those who had gone before him, including Galen, totalling 70 books (of which only

9. Oribasius: Synopsis: Trans. A. Molinier, J B Bailliere et Fils, Paris, 1876.

25 have survived), called the *"Collectiones Medicae"*. In it he described urethral obstruction, its symptoms and its treatment.

Like Galen he was a practicing physician and like Galen he wrote that the obstruction was due to a fleshy outgrowth – *a carnosity*– rather than a fibrotic narrowing and that the carnosity was the consequence of ulceration. He advocated 'cutting away these fleshy carnosities' with a sharp pointed instrument, passed through a catheter-dilator. The description sounds more like stabbing a way through the stricture and (hopefully) into the proximal urethra beyond, and then dilating the urethra and leaving an indwelling catheter made of dried paper for three days. This was followed by intermittent dilatation thereafter.

This was effectively the first description of internal urethrotomy although it may actually have described what Galen had referred to in his writings, bearing in mind - as mentioned above - that throughout early history it was usual for the leading practitioners and authorities of their time to summarise in their writings all the accumulated knowledge of their predecessors. Indeed it is likely that hardly any procedure described before the era of printing and publication, and probably down to the 17th century if not later, was truly original, and that any impression of originality in someone's work simply represents what parts of the written output of their own and of their predecessors had survived until then.

Points of technique in passing a catheter-dilator were described in the ancient and medieval literature. So we know, for example, that at least in some eras, practitioners were advised to catheterise or dilate their patient with him standing or, less commonly, kneeling or sitting rather than lying down; and with the practitioner on the right-hand side of the patient holding the instrument in his right hand and the penis in the left. Negotiating the curve of the bulbar urethra in passing the catheter-dilator was always particularly described, recognising that this was often the key to a satisfactory outcome with a rigid instrument.[4,5]

Of success rates and complications we know almost nothing. It was recognised that if somebody had unrelieved retention

they would die in approximately 7-10 days unless the retention was relieved or, alternatively, the patient developed overwhelming fever to hasten the process. How frequently this happened we do not know and otherwise there is little or no information. How much this lack of information about outcomes reflects a true lack of consideration of these matters, or a different way of thinking about them, or simply reflects the small amount of written material still available to us after all this time is a matter of debate. What we can be sure about, from the information available, is that there appears to have been little consideration of the pathology until post-mortem dissection became common in around the 17th century and of outcomes until sometime later.

Suffice it to say that the aetiology of voiding difficulty was generally considered to be due to either divine retribution for sexual excess – real or imagined – or due to physical obstruction of the bladder neck with a stone or a blood clot or occasionally from an undefined mass lesion. An atonic bladder was another recognised cause. Given that stone disease was so common in those days, indeed almost the only condition that was treated surgically for a medical condition beneath skin level; and given that most men didn't survive to an age to develop prostatic disease, this is not an altogether surprising view of aetiology. To later generations in the Middle Ages the predominant symptom of sexually transmitted disease – scalding on voiding - caused it to be described as *"chaude pisse"* leaving the gleet and voiding difficulty as its legacy. Treatment for the gleet or for obstruction from whatever cause or for atonic bladder was all the same – catheterisation-dilatation.

With the fall of the Western Roman Empire in 476 AD, the centre of medical learning moved to the Arab world which, following the conquests of Abu Bakr (573-634) and his successors of the Rashidun, Umayyad and Abbasid caliphates, extended in a broad band from Spain across the southern Mediterranean and North Africa, through the Middle East and almost to India. In the eastern caliphate Baghdad was the centre of Islamic culture until it was captured by the Mongols in 1258; and in the west the centre was Cordoba in Spain until it too was repatriated by Castille in the 14th and 15th centuries.

The medical and surgical centre of this era, at least until its conquest by the Arabs in 641, was still Alexandria and the key individual was Paul of Aegina (625-690) who was born on the Greek island of Aegina. He translated the works of his illustrious predecessors from Latin and Greek into Arabic, as Arabic became the supranational language of the region, indeed many if not most of his translations are the only surviving versions of the original texts of the ancients. That aside, he was an outstanding surgeon and author in his own right. He wrote the *Epitome of Medicine* in seven volumes of which volume six was given over to surgery with a number of detailed descriptions of surgical procedures including urethral catheterisation.

A century or two later in this era the leading light was Abu Al Quasim Al-Zaharawi (936-1013) (known as Albucasis in Europe) He lived and worked in Cordoba at the turn of the 10th/11th century and he too wrote extensively. Although a polymath he was a practicing doctor who actually did what he described. His major work, the *Al Tasrif*, became a reference work for surgery because of its well-illustrated and detailed descriptions of technique. He described the use of flexible bougies and of metal dilators made of silver for dilatation and of urethrotomy when this was not possible.[3,4,10]

The term bougie, of course, was unknown at that time. This word comes from the Mediterranean port in Algeria – Bujiyah or Bejjiyah – where the best wax for candles was made. Wax was the favoured material for non-metallic bougies until the development of gum elastic at the end of the 18th century and more modern materials thereafter. Nowadays the words sound, bougie and dilator have become almost synonymous although until recently each had a quite distinct purpose: a sound being a metal instrument to detect the presence of a stone in the bladder; a bougie a flexible instrument primarily used to detect the presence of urethral obstruction; and a dilator a metal instrument to relieve urethral obstruction.

In this Golden Age of Islam the erstwhile Persian Empire was converted to Islam. But although the Persians were 'Islamised',

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10. Spink MS, Lewis G L. Albucasis on surgery and instruments. London: Wellcome Institute, 1973; 403-4.

they were not 'Arabised', they remained Persians and made their own very significant contribution to that Golden Age. Two of the greatest Persian philosophers, encyclopaedists and writers on medical matters were Abu Bakr Muhammed ibn Zakariya al Razi (known as Rhazes in Europe) in the 9th Century (854-925) and Ibn Sina (known as Avicenna) (980-1037) in the 10th. Rhazes was a practicing physician. He wrote the *Al Hawi* in which he advised the use of lead for making catheter-dilators and the use of intraurethral instillations for gonorrhoea. He was also the first to recommend the use of a stylet for passing catheter-dilators.

Avicenna was probably the greatest of them, certainly as a philosopher, but he was not a practicing physician. He wrote Al *Qanun fi al Tibb* (The Canon of Medicine). In the second chapter of the 19th part of the third book, he discussed and described the ideal catheter, the general principles of which could pass down to our own era.[11] Indeed The Canon, written in 1025 was translated into Latin and was the standard textbook of medicine in Europe down into the 14th century.

All these works were part of major philosophical treatises which were encyclopaedias that included the work of the Greeks and Romans of that earlier period and, when they were later translated back into Latin, that acted as a repository for returning the work of the ancients of the Roman Empire back to the Europeans of the Middle Ages, as well as adding their own significant contributions.

A new beginning – the Middle Ages

The practice of the ancients – firstly the Egyptians and Hindus, then the Greeks, then the Romans and finally the Arabs, and particularly of Galen - came through history with really very little change until quite recently. This was because, from the fall of the Roman Empire until the 16th century, the Christian church assumed the role of providing medical and surgical care in Europe and the Islamic mosque did the same in the Muslim world. Indeed,

11. Kardeh, S, Choopani, R, Nezhad, GSM and Zargaran, a. The urinary catheter and its significant applications described by Avicenna (980-1037 AD) in the Canon of Medicine. Urology 2014; 84: 993-996.

in the Muslim world the population overall had much better care than in Christian Europe. In Islam, there was a moral imperative to treat the ill regardless of social status or religious belief. Compared to many contemporaneous monasteries, which were often secluded, poor and provided limited care, even by the standards of the day, Islamic hospitals tended to be large, urban structures, and were largely secular institutions open to all.

Nonetheless the monasteries did the best they could under the circumstances. The monks and the nuns were the practitioners and trained doctors were few. Many of the earliest hospitals began in monasteries and there were a lot of them. In England alone over 700 hospitals were built between 1000-1500 albeit that many of them were small. The church as a whole was the repository of medical and surgical writings, largely derived from Galen. It was the church who turned Galen's work into dogma and no-one (that we know of) ever challenged it. Nonetheless, the primary function of a monastery and of the church in general, was to worship God. Caring for the sick and needy was a secondary consideration. Learning of all types was important in the Christian church and so the writings of the ancients were preserved and copied but there was no intellectual curiosity to drive innovation except in religious philosophy. As a result academic interest in surgery steadily declined in Europe in the 1,000 years or so after Galen's death in 210AD until the beginnings of the intellectual revival, initially in Italy in the 12th and 13th centuries, that eventually led to the Renaissance.

The first sign of this revival of intellectual interest in surgery after the stagnation of the Dark Ages and early Middle Ages was in Salerno near Naples. Salerno was an important southern Mediterranean port and a centre of Lombard power with a monastery in which, it is said, a medical school was founded in its dispensary. This school developed during the 9th and 10th centuries to become a major academic institution in its own right over the next century. It was here, during the 11th and 12th centuries that the wisdom of the ancient world, preserved and enhanced by their Muslim successors, was returned to Southern Europe and slowly northwards by migrating scholars. They followed the soldiers and specifically the armies of Normans from Northern Europe who

invaded Sicily and Southern Italy during this period led by Roger, a close relation of William, Duke of Normandy who became William the Conqueror, King of England from 1066-1087. By the mid-13th century the centre of influence had moved from Salerno to Bologna in Northern Italy, and then further north into France, first to Montpelier in Southern France and then to Paris.

By this time there were problems between the five different groups of people who had come to care for the sick over the previous 200 years or so – the monks, the physicians, the surgeons, the barbers and the executioners. As a general rule, the purpose of studying medicine at that time was not so that the student could learn how to treat patients as a physician in due course (although some did): it was as part of the study of the sciences in the broadest philosophical sense and for many, if not most, for the study of everything there was to be learned. Celsus and Avicenna weren't practicing physicians, let alone surgeons, they were thinkers and wrote down what they knew.

Surgeons, on the other hand were almost entirely practical people – Galen, Oribasius and Rhazes were practicing physicians and surgeons who coincidentally wrote to record their experience. But surgeons were only really needed on the battlefield to care for the wounded because in civilian life there was not enough surgery to be done, outside of the cities, to earn a living except as itinerant surgeons, of whom the best known were the lithotomists. On the other hand there was always hair to cut and men to shave and, in monasteries, there were the scalps of the monks to be shaved as well, to give them their tonsures – their sign of Christian humility. As barbers had the necessary hardware, there were always barbers in the monasteries and they ended up doing most of the routine surgery such as for wounds, abscesses and fractures as well as doing the tooth-pulling and blood-letting as well. Like the barbers, executioners also had a day job and they were generally kept busy enough elsewhere!

Finally there were the monks for whom caring for the physical ailments of the sick was important but not as important as taking care of their spiritual needs. As a result, the barbers slowly took

over from the monks as the practitioners of surgery and then took it over entirely when the monks were discouraged by their church to continue with it because it interfered with their spiritual work. Although it was discussed several times during this era, and particularly at the 4th Lateran council in 1215,[12] the Catholic Church never actually prohibited care of the sick with medicine and surgery (it only actually prohibited the shedding of blood), but it was certainly strongly discouraged and effectively ended in the 16th century. In Catholic lands such as France, rich families continued to fund convents and monasteries that provided free health services to the poor because they considered care of the poor and the sick to be a necessary part of Catholic practice. Nonetheless the emphasis was on the worship of God and spiritual healing. In Protestant countries the emphasis came to be concerned more with the scientific rather than religious aspects of patient care, and this helped develop a view of physicians and surgeons as practitioners and, incidentally, of nursing as a profession rather than a vocation.

After the dissolution of the monasteries in England by King Henry VIII in 1540 the church abruptly ceased to be the supporter of hospitals. Only by direct petition from the citizens of London, were the hospitals St Bartholomew's, St Thomas's and St Mary of Bethlehem's (Bedlam) endowed directly by the crown.[4,6] In mainland Europe many monasteries in the protestant-leaning areas were raided and closed during the Thirty Years War (1618–48), which ravaged the towns and villages of Germany and neighbouring areas for three decades. This ended up with the same effect – the barbers took over when the war ended.

Whilst all this was evolving, other developments were taking place. The University of Paris was opened in the 12th century with four faculties including a faculty of medicine. Like most early universities it was ecclesiastical and under the ultimate control of the Pope although it wasn't necessary to be a churchman to enter as a student. Nonetheless the teaching was entirely theoretical and, in any case, those graduates that were churchmen were limited in

12. Amundsen, D W. Medical canon law on medical and surgical practice by the clergy. Bull Hist Med 1978; 52: 22- 44.

what they could do in practice without prejudice to their spiritual responsibilities. As a result the only ones who became surgeons were those lay students who had studied medicine but who had not taken the vow of celibacy.[4,5] The practicing surgeons joined together to form the Community of St Come and the barber-surgeons had their own guild.

These were very decisive events which changed the entire way medical and surgical treatment was delivered in Paris and later throughout France and ultimately throughout Europe. Surgeons wanted to be different from but otherwise to be seen as the equals of the university-educated physicians and, at the same time, to be better than and separate from the more proletarian barbers; and after a long period of 'debate' they were officially recognised as a distinct group by an edict of the French king Philip IV (1268-1314) in 1311 that all practitioners had to pass an examination to become Masters of Surgery. In the years that followed Paris produced some of the great men of surgical history including Lanfranc of Milan (1250-1306), Henri de Mondeville (1260-1320) and Guy de Chauliac (1300-1367), probably the greatest of all.

Two hundred years later, in 1544, the surgeons of Paris were granted university status.[3,5] By this time the surgeons of England had caught up with their French counterparts. Hitherto there had been a small Fellowship of Surgeons, founded in 1435, and a much larger Guild of Barbers, founded in 1388, but eventually they came together as a consolidated Company of Barber-Surgeons by royal charter in 1540 with Thomas Vicary (1495-1561) as the first president. This company eventually became the Royal College of Surgeons of England.[3]

The Renaissance

The Renaissance brought paper (as distinct from parchment) and the printing press and so the written word could be more widely and rapidly disseminated. This was the time of Leonardo da Vinci's (1452-1519) wonderful anatomical artistry but more importantly for surgeons it was the time of Andreas Vesalius (1514-1564) and his magnificent *De Humani Corporis Fabrica* (1543). For the next 200 years or so this was the basis for anatomical teaching in surgery.

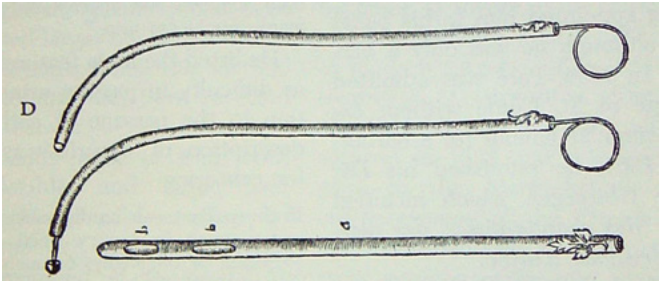

Figure 3: Leaden catheter as used by Paré.

As a result of printing, we have some good descriptions of urological disease and its treatment in the 16th century. The only two conditions that were regularly described and amenable to surgical treatment were bladder stone and urethral obstruction. The first recorded serious 'epidemic' of gonorrhoea in 1520 (largely it seems by being carried by sailors from seaport to seaport as a consequence of the explosion in the volume of maritime transport during that period) brought the problems of carnosities back to the attention of medical writers.

First and foremost among the writers and practitioners of the time was Ambroise Paré (1510-1590). He was primarily a military surgeon in the French army but he reinvigorated and modernised renaissance surgery throughout Europe by his writings.[13] He noted that carnosities were the result of "chaude-pisse", otherwise known as "virulent strangury", and probably the same thing as gonorrhoea, although Paré himself distinguished between them. He reaffirmed Galen's and Oribasius' view that the carnosities after gonorrhoea were the result of urethral ulceration. These carnosities he treated by "tearing them out by their roots" using a "leaden catheter having a rough button at the end like a round file" then following this up with urethral dilatation.[4] (Fig. 3)

Other continental European surgeons such as Thierry de Héry (1515-1570) who worked at the Hotel Dieu in Paris, where he specialized in the treatment of sexually transmitted diseases and Alfonse Ferri of Naples, his contemporary, also used a rather

13. Paré A. The workes of that famous Chirurgion, Ambrose Parey. Th. Cotes and R. Young, London 1634.

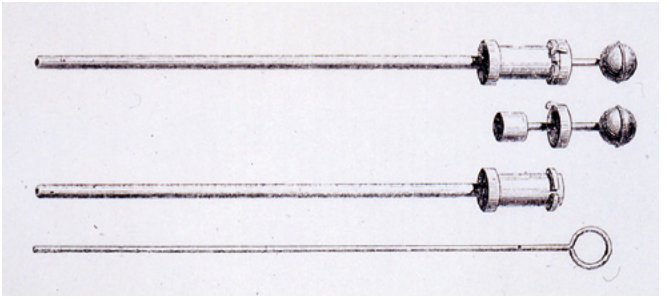

Figure 4: Sixteenth century "porte caustique".

aggressive approach to treatment.[14,15] They however preferred caustics rather than avulsion of the carnosities. Caustics included turpentine, quicksilver, quick lime, sabin (or savin), verdigris, alum, vitriol, antimony and even human and dog excrement, applied as an ointment on the tip of a metal sound or impregnated on the tip of a wax bougie or pushed down the channel of a catheter-dilator in the form of a pellet or carried in a special channel on the end of a sound – the "porte caustique". (Fig. 4) The expectation was that the caustic, whatever it was, would cause the carnosity to shrivel up. In all instances, however, dilatation followed.

In England, John Reade noted in his treatise dated 1588 *"A Treatise of Caruncle or Carnositites Growing in the Yarde or Necke of the Bladder"*, that stricture occurred as a result of gonorrhoea and described both the voiding and sexual difficulties and the development of fistulae as a consequence.[6] He suggested that instead of the use of a caustic, a small sharp point or blade could be passed through to the tip of a catheter-dilator to whittle away at the obstruction before then dilating it. This was as an appendix to a translation he had made of a volume of surgery by Franciscus Arceus– *"A silver weir (sic), sharp at the upper end, is to be passed in as far as the obstruction, then by oft thrusting it in and out, it may wear and make plain the resisting caruncles"*.

Paré had described something very similar as had Alfonso Ferri (1515-1595) of Italy and Francisco Díaz of Spain (1527-1590)

14. de Héry T. La méthode curatoire de la maladie vénérienne. L'Angelier, Abel & David, Matthieu, Paris. 1552.
15. Ferri A. De caruncula sive callo quae cervici vesicae innascitur. Lugd. Bat. 1553.

(who wrote the first treatises on diseases of the bladder, kidneys and urethra and is regarded by some as the founder of modern urology[16]) and these instruments and procedures were probably all much the same. Indeed it also seems likely that most, if not all, of the so-called internal urethrotomies before the 19th century involved passing a stylet with a sharp point or a blade on the tip, through a catheter-dilator to stab a way through the carnosity into the normal urethra more proximally – in much the same way as Oribasius had described 1,200 years earlier.

The Seventeenth and Eighteenth Centuries

In the 17th century, medicated bougies, generally using caustics, came more and more into vogue because of the successful treatment of King Henry IV of France by Jean Baptiste Loyseau of Bordeaux in 1603[4,5,6] after a failed attempt at "routine" dilatation by the King's personal physician Theodore Turquet de Mayerne (1573-1655). The latter promptly left France and moved to England where he became the English king's personal physician instead.

As the 17th turned into the 18th century so things began to change. Probably the single greatest reason for this was the increasing interest in anatomical studies of the dead, both for its own intrinsic value – thanks to Vesalius - but also to learn about the cause of death. In the early 1700's a number of French surgeons, most notably Francois Colot (1636-1706), described scarring causing narrowing of the urethra in patients who had had gonococcal urethritis rather than fleshy excrescences[5] and the theory of caruncles or carnosities was finally disproved by Giovanni Morgagni (1682-1771) in 1761.[17] Before Morgagni, diseases were generally thought to be due to an imbalance of the humours of the body and specific to the individual.[3,4] Morgagni's meticulous post-mortem dissections showed for the first time that symptoms were due to specific definable pathological processes that could affect anyone.

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16. Diaz F R. Enfermedades de los rinones, vexiga y carnosidades de la verga. Fr Sanchez edit. Madrid 1588.
17. Morgagni G. De sedibus et causis morborum. Venetiis 1761.

As ideas about aetiology and pathology developed so did some of the ideas about treatment. Whilst urethral dilatation remained the basis of all treatment of stricture disease, so "end-stage" strictures usually ended in an uncatheterisable patient who could only be left to die from retention unless he was "lucky enough" to develop significant urethro-cutaneous fistulation, sufficient to be able to void through. This point cannot be overstated. Although a few sufferers might have been able to find an itinerant surgeon or barber who could dilate their strictures they were so few in number that most sufferers of severe stricture disease would either die from acute retention or survive because of periurethral abscess formation which led, in turn, to fistulation through to the skin.

In England, in 1652, Richard Wiseman (1622-1676) helped his friend Edward Molins (c.1610-1663) perform what was called a '*perineal section*' on *"an old fornicator having been long diseased with the carnosity"*.[18,19,20,21] Both were eminent surgeons in their own right. Wiseman was a staunch royalist during the English Civil War and played a pivotal role in the struggle of English surgeons for equality with the physicians. He is widely regarded as the founder of English surgery.

Molins's procedure involved making a deep incision down into the posterior perineum through the gristle of the peri-urethral fibrosis and of the stricture itself until the knife entered the urethra and urine gushed out, such that a catheter could be passed into it, if this was possible, or the wound simply left open for the patient to void through the perineum as a fistula thereafter. This was almost certainly not the first time this procedure had been done but it is the oldest written description we have. Previous attempts to relieve intractable retention by transperineal puncture of the bladder when the urethra was impassable with a catheter had been referred to by Celsus and Galen in Rome and by Rhazes and Albucasis in Baghdad and by others in the Arab world and in Europe,[6] but never fully

18. Hunter J. A treatise on the veneral disease. London 1788.
19. Wiseman, R. Eight Chirurgical Treatises 4th Ed. London, 1665.
20. Smith H. Stricture of the urethra. John Churchill, London 1857.
21. Thompson, H.: The Pathology and Treatment of Stricture of the Urethra, both in the Male and Female. London, John Churchill 1854.

described. These were probably the first instances of what came to be known as *la boutonnière*. This came to be described as a "button-hole" puncture of the dilated urethra proximal to a stricture or to an obstructing urethral calculus but may have started (and continued) as a blind stab alongside the prostate and rectum and directly into the bladder.

It should be emphasised that Molins's perineal section procedure only opened up the proximal urethra and was therefore, more or less, a form of perineal urethrostomy rather than a true external urethrotomy as we would understand it – opening up the stricture and the adjacent distal urethra as well. The trick of course, was to find the urethra and open into it and this sometimes took several attempts over several days. Henri le Dran (1685-1773), another great French surgeon, described in 1730 a patient treated in just the same way as had Molins eighty years earlier but it took six attempts on successive days to locate the normal urethra proximal to the stricture and lay it open. Having done that he was then able to pass a bougie through the stricture and, through the urethotomy, into the bladder.[4,5,22] Eventually the wounds healed and the stricture was dilated, thereby establishing the principle of urinary diversion to rest an inflamed stenosis so that it could subsequently be dilated.[21]

It should be re-emphasised that recurrent peri-urethral abscess formation with subsequent fistulation through to the skin kept a number of patients alive who would otherwise have died of urinary retention. Also that after a successful perineal section a patient, such as Molins's patient, may well be left with a perineal fistula for the rest of his life if the patency of urethra through the stricture could not be re-established by dilatation. Indeed, simply opening up a periurethral abscess without necessarily opening into the urethra might have the same effect and might actually have been what was more usually achieved.

Such was the skill of most practitioners with the use of a catheter-dilator at this time that neither perineal section or la boutonniere were commonly performed for centuries to come except

22. Le Dran H F. Parallèle des différentes manières de tirer la Pierre hors la vessie. Ch Osmont édit. Paris 1730.

in extremis. Nonetheless it became established treatment when nothing else could be done.[4,5,6] There was still interest in the use of caustics and in urethrotomy as second-line treatment for recurrent strictures but these were generally associated with more frequent, albeit often unspecified, complications - usually bleeding in the case of urethrotomy and the chemical burning of healthy urethral epithelium around the stricture in the case of caustics when complications were specified. It is striking in fact that there is very little description of complications in this period or before the late 19th century with any surgical intervention. The treatment itself is described, often in great detail, but how often it had to be repeated, under what circumstances and with what results are curiously elusive – perhaps because nature was simply left to take its course.

This was the era of the surgeon-anatomist, foremost of whom was Pierre Joseph Desault (1744-1795) at the time of the French revolution. Desault was one of the main drivers of the 18th century French surgery. He was regarded as a poor writer[23] but a brilliant and inspiring speaker. This was also the period in which the first large hospitals were built in Europe and when surgery became a hospital-based clinical activity. From this time on most of the great surgeons were the heads of departments of the great European hospitals. From around the time of the French revolution, however, the principal European centre of surgery was London and the principal practitioner was John Hunter (1728-1793), widely regarded as the greatest surgeon-scientist of all.

Hunter's capacity for work and his output were phenomenal. There was hardly any area of surgery that has not subsequently felt his influence. It was Hunter who showed that strictures were not due to ulcers indeed that strictures in all tubular anatomical structures were due to epithelial and sub-epithelial inflammation. In the urethra they were usually the result of gonorrhoea, and continued infection led to peri-urethral infection and fibrosis.[18] He was also the first to study the sites of urethral strictures and to report that they occur most commonly in the bulbar part of the urethra. He thought

23. Desault J P. Traité des maladies des voies urinaires. Veuve Desault edit, Meguignon. Paris an VII Meguignon 1803.

gonorrhoea was the commonest cause of what he called 'organic' or 'permanent' strictures and reported other causes such as masturbation, trauma and instrumentation.[24,25] He also described "spasmodic strictures", as had Marianus Sanctus before him (Mariano Santo de Barletta, 1490-1550) and better known as a pioneer lithotomist,[26] distinguishing them from organic strictures or mixed strictures. Astley Cooper (1768-1841) accepted Hunter's classification (more or less) but thought that 99% of strictures were due to gonorrhoea.[27] Hunter and Everard Home (1756-1832)[24] (who inherited Hunter's notes and manuscripts) still relied mainly on the application of caustics followed by dilatation to treat strictures, like most surgeons of this period. Their favoured caustic was silver nitrate.

Towards the end of the 18th century Pierre Joseph Desault, one of the main drivers of the 18th century French surgery, introduced a new variant of dilatation whereby a fine catheter could be passed with a more typical dilator screwed onto the end of it to facilitate dilatation – the forerunner of the filiform and follower.[23] At around the same time, Guillaume Dupuytren (1777-1835) reintroduced the idea of using indwelling catheters for the treatment of strictures relying on a mechanism which he called "vital dilatation".[28] He argued that dilatation had two actions – the obvious mechanical (direct stretching or other disruptive) action and what was called the "vital" action in which the sheer presence of a dilator or catheter would cause "absorption" of the fibrous tissue and other inflammatory components of the stricture process explaining why, if a catheter was left apparently gripped tightly in the urethra at the end of a dilatation or catheterisation procedure, then within a relatively short period of time it would become rather loose or mobile within the urethra – an effect frequently observed but never adequately explained. Dupuytren, better known for Dupuytren's contracture, was regarded at the time a difficult and cantankerous man: obsessive-compulsive but very wealthy. Vital dilatation, later to be known as continuous dilatation, involved introducing progres-

24. Home E. Practical observations on the treatment of the stricture. London 1795.
25. Hunter J. The Works of John Hunter. Ed. James Palmer, London, 1837.
26. Mariani Sancti Barolitani. De ardore urinae et difficultate urinandi. Venetiis 1558.
27. Cooper, A. Lectures on the Principles and Practice of Surgery. London, 1837.
28. Dupuytren B. L'opérations de la Pierre. Sanson et Begin. Baillière édit. Paris 1836.

Figure 5: Civiale's urethrotome.

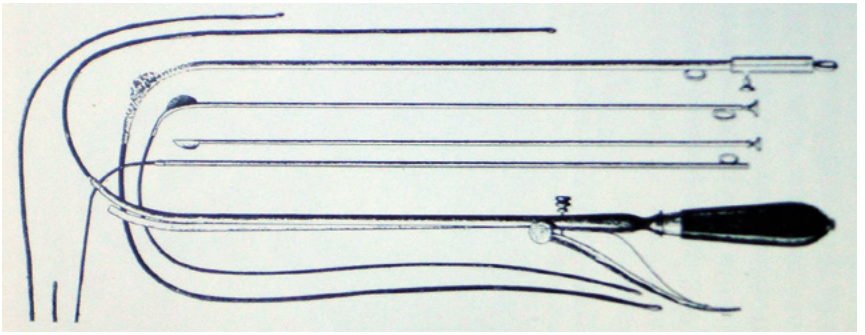

Figure 6: Maisonneuve device.

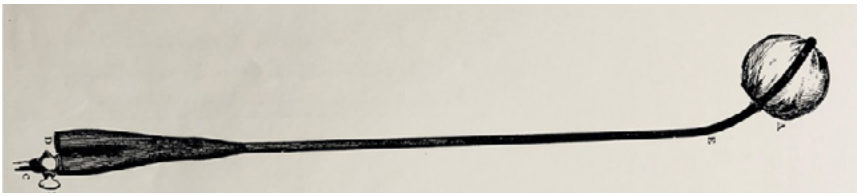

Figure 7: Reybard's design for a balloon self-retaining catheter.

sively larger catheters into the urethra and leaving them for days at a time – the idea being that this would lead to absorption of the stricture by the pressure produced by the catheter. This had been used previously but not for several centuries.

The main development in the treatment of strictures in the 18th Century was in the manufacture of catheters.[29] In ancient times naturally occurring hollow tubes were used. Tubular items

29. Kirkup J. The history and evolution of surgical instruments. VII Caheters, hollow needles and other tubular instrument. Ann R Coll Surg 1998; 80: 81-90.

were subsequently made of wood, bone or ivory, which were relatively easily carved and bored. Metal tubes were first made of lead or copper as they are more easily worked; silver is much more difficult to work with. A long strip of copper alloy could be wrapped around a thin rod and soldered along the seam then, having extracted the rod, bent to produce a curve at one or both ends – the skill being to do this without buckling.

A number of different ways of producing softer catheters had been tried as an alternative to wax but none of these really worked until gum elastic was invented in 1782 by mixing linseed oil, amber, turpentine and white lead and applying layers of this gum to a long, thin, knitted silk (or linen or cotton) cylinder.[4]

Major developments in the Nineteenth Century

The two most important developments of the 19th century were anaesthesia and antisepsis. This was also the century in which nursing developed as a profession and which saw the beginnings of pathology and bacteriology. By this time the term "stricture" had become established as a diagnosis as the idea of ulcers and carnosities of the urethra were disproved and had been discarded. In stricture treatment the 19th century saw the further development of urethrotomy and the beginnings of urethroplasty.

Urethrotomy was largely developed by a group of French surgeons and particularly Jean Civiale (1792-1867), Jean-François Reybard (1795-1863) and Jacques-Gilles Maisonneuve (1809-1894). Civiale's was the first recognisably "modern" urethrotome but the stricture had to be of a reasonable calibre for the instrument to pass through it. (Fig. 5)[30] The Maisonneuve device (Fig. 6) worked on the principle of a filiform and follower with a urethrotomy blade incorporated into it which could deal with much tighter strictures than could Civiale's urethrotome and under better control.[31]

Reybard's more notable contribution was the development of the first balloon self-retaining catheter – the forerunner of the

30. Civiale J. Traité pratique sure les maladies des organs génito-urinaires 3e édition, Baillière edit. Paris 1858
31. Maisonneuve J. Cathétérisme à la suite. Bull. Acad. Méd. 1845

modern Foley catheter. (Fig. 7)[32] Until then if a catheter was left indwelling in the urethra it had to be tied in – for example with string to tie the catheter to the pubic hair.

By this stage, Auguste Nelaton (1807-1873), who was principally a plastic surgeon, had produced the first latex rubber catheter making it easier to pass and more durable[33] and this was improved further when Charles Goodyear (1800-1860) introduced vulcanisation of rubber in 1844 – in which rubber is heated with sulphur to make it more rigid and more durable.[6]

Perineal section was still reserved for impassable strictures or otherwise for acute retention, although various surgeons such as James Syme (1799-1870) in Edinburgh in 1855[34] and Claudius Wheelhouse (1826 – 1900) in Leeds in 1876[35] were popularising external urethrotomy – as it was now coming to be called - for less severe cases of stricture but which were nonetheless recalcitrant. By this time surgery was getting into the anaesthetic era following its use in 1853 when John Snow (1813-1858) gave chloroform to Queen Victoria during the births of her last two children, Prince Leopold in 1853 and Princess Beatrice in 1857. This made external urethrotomy a very much more acceptable procedure to both the patients and their surgeons. Syme's procedure depended on the passage of a purpose-designed urethral dilator with a grooved curved probe at its distal end that could be passed into the lumen of the stricture to allow a definitive open stricturotomy, if the stricture wasn't too tight for it to pass through. (Fig. 8)

The Wheelhouse procedure involved simply opening into normal calibre urethra on either side of the stricture and passing a catheter through and into the bladder, effectively bypassing the stricture itself. (Fig. 9) Neither of these procedures was intended to be curative. They were simply intended to facilitate regular routine dilatation thereafter.

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32. Reybard J F. Traité pratique sur les rétrécissements de l'urètre. Paris 1853.
33. Mattelaer J.J., Billiet L. Catheters and sounds: The history of bladder catheterisation. Paraplegia. 1995;33:429–433.
34. Syme J. Stricture of the urethra. Edinburgh. 1849.
35. Wheelhouse CG. Perineal section, as performed at Leeds. BMJ 1876; i. 779-780.

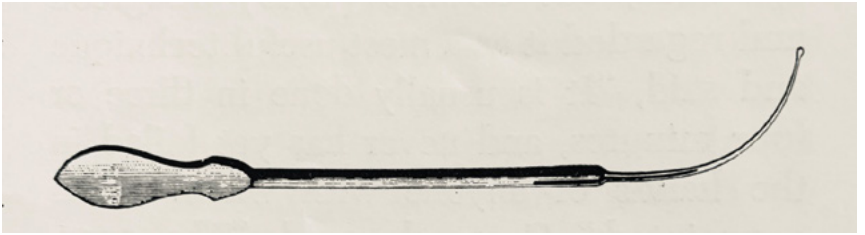

Figure 8: Specially-designed urethral dilator for Syme's external urethrotomy.

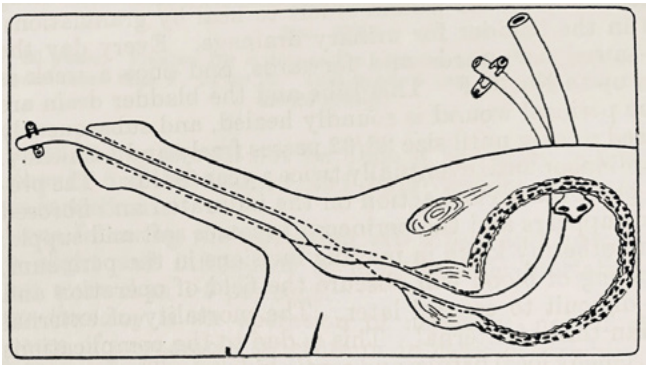

Figure 9:
The Wheelhouse procedure.

Nonetheless they differed from the traditional perineal section or boutonniere procedure which only opened up the proximal urethra and were therefore, more or less, a form of perineal urethrostomy.

Although accepted by most, in desperate cases, external urethrotomy had been condemned at the end of the previous century by Desault and Chopart (see below) and such was their continuing influence that the procedure might have been abandoned altogether during the 19th Century but for the popularising work of James Arnott (1819),[36] Astley Cooper[27] and George Guthrie (1785-1856) in London,[37] John Gouley (1832-1920) in New York[38] and, of course, Syme himself.[34,39]

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36. Arnott, J.M. A Treatise on Stricture of the Urethra. Burgess and Hill, London 1819.
37. Guthrie G J. Anatomy and diseases of the urinary and sexual organs. London 1836.
38. Gouley, J.W.S.: Diseases of the Urinary Organs including Stricture of the Urethra, Affections of the Prostate and Stone in the Bladder. William Wood, New York. 1873.
39. Ballenger E G, Frontz W A, Hamer H G, Lewis B. (Ed) History of Urology Volume II. ; Williams & Wilkins, Baltimore 1933.

When the distended urethra couldn't be entered, transrectal puncture of the bladder with a trocar and cannula was the favoured management. Suprapubic or transpubic puncture were considered too dangerous by most surgeons. Indeed we should remember that surgeons of these and earlier times were only really concerned with treating patients with severe obstruction or retention,[40] what would have been called ischuria or strangury. Lesser degrees of obstruction, in other words, dysuria, were palliated. It should be recalled that retention was synonymous with death in those days if it went unrelieved. At least those who developed urethro-cutaneous fistulation were permitted some escape of their urine and survived, albeit in precarious health.

Despite the interest in internal urethrotomy and the continuing use of caustics[41,42] with their potential adverse consequences, most surgeons still favoured dilatation for treating strictures unless the situation was serious enough to warrant external urethrotomy. Solid dilators might be made of metal, wood, ivory or whalebone and flexible dilators of leather, wax, catgut or gum elastic, although most were either metallic or gum elastic respectively.

The main debate of the 19th century was whether dilatation should be gentle and gradual or forcible. Pierre Jules Bénique in Paris, who had modified the Charrière (Joseph Fréderic Charriere, 1803-1876) gauge of calibrating bougies favoured gradual dilatation.[43,44] Jean Jacques Joseph Leroy d'Etoilles (1789-1860) – the man who first coined the term "urology"[5] - had developed the ideas of Desault and Benjamin Bell[45] and produced filiforms and followers with a variety of different tips to negotiate the most difficult of strictures and he too favoured gradual dilatation.[46] Unfortunately it was a slow process of repeated instrumentation that might take

40. O'Connell, P.A.: On the treatment of retention of urine in impermeable strictures of the urethra. Lancet, 1872; 99:286.
41. Castle, T. A Manual of Surgery. 3rd Edn. Cox, London, 1831, p274.
42. Andrews, MW. Practical Observations on the Application of Lunar Caustic to Strictures in the Urethra. 2nd Edn. Medico-Chirurgical Review, Callow and Wilson, London, 1827.
43. Béniqué J. De la retention d'urine et d'une méthode nouvelle pore introduire les bougies. Paris 1838.
44. Béniqué J. Réflexions et observations sur le traitement des rétrécissements de l'urétre. Bourgogne et Murdnev edit. Paris 1844.
45. Bell, B. Treatise on Gonorrhoea Virulente and Lues Venerea. Edinburgh 1793.
46. Leroy d'Etoilles J J J. Traitement des stenoses. Paris. 1854.

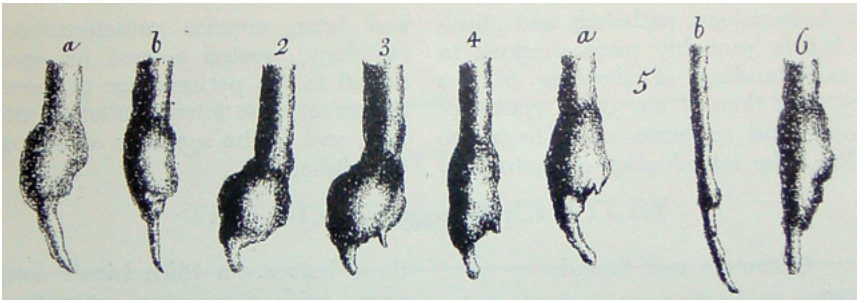

Figure 10: Wax casts of strictures.

months to achieve and many patients could not afford either the time or the expense. Forcible dilatation was not only advocated as a cure but had the advantage of being quick.[21,47] The debate raged for most of the 19th century. In the end it became clear that forcible dilatation probably did more harm than good.

Part of the problem, of course, was that there was no way of demonstrating the site and extent of a stricture as we can nowadays with urethrography and endoscopy, except by instrumentation and particularly by the use of bougies-à-boule which were designed for this purpose but could only be used with relatively mild strictures. Sir Charles Bell had described a "ball-probe" in 1807;[48] the more exotic name bougie-à-boule came from Leroy d'Etoilles. Theodore Ducamp (1793-1823) and Claude Lallemand (1790-1853) had both tried making wax casts of a stricture as an aid to diagnosis (both published in 1825)[49,50] (Fig. 10) but the method proved unreliable and even dangerous if wax became impacted within a stricture. Urologists had to wait another 100 years until 1932[51] for urethrography to became available and reliable.

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47. Thompson, H.: Diseases of the Urinary Organs, 8th ed. J. & A. Churchill, London 1888.
48. Bell, Charles: Treatise on the Diseases of the Urethra, Vesica Urinaria, Prostate and Rectum. Longmans, London, 1820.
49. Ducamp T. Traité des retentions d'urine. Baillière et Delaunay edit.Paris 1825. A treatise on retention of urine caused by strictures in the urethra and of the means by which obstruction of this canal may be effectually removed. New York 1827.
50. Lallemand C F. Maladies des organs génito-urinaires. Paris 1825.
51. Parker G. The uses and interpretation of the urethrogram. Brit J Urol, 1932; 4: 1-10.

The work of 19th century surgeons is much more available to us than from earlier periods in history because of the development of the first medical journals[52] although for most of the rest of the century most publications in journals were 'print outs' of lectures given by eminent clinicians rather than new work. (Indeed, peer review was relatively uncommon in medical and surgical journals until the 1960s.) These early journals were accompanied by an overall increase in the scope and scale of publishing in general and of medical books in particular.

Good examples in urology are the two books written by Sir Henry Thompson (1820-1904), who could reasonably be called the first "English urologist" - one on 'Diseases of the Urinary Organs'[47] in general, which ran to eight editions, and the other on urethral strictures in particular.[21] He not only summarised the understanding of aetiology and pathology – basically of gonorrhoea leading to stricture disease – as described by Hunter and his successors, but also described the details of the treatment of a patient with a stricture. The procedure for urethral dilatation would be to pass a bougie of small calibre, say of 6, 8 or 10F (although the English gauge was still widely used that time, in the UK at least) and then a week or so later the patient would return and if he had had a 6, 8 and 10 bougie passed on a previous occasion he would then have an 8, 10 and 12 passed and the following week a 10, 12 and 14 passed and so-on weekly until a normal calibre was restored. Commonly, flexible bougies would be used up to about 14F calibre and for 16F and above the surgeon would use metal dilators. By this stage the frequency of dilatation would have been reduced to fortnightly and then monthly and then three-monthly probably culminating, if all went well, with a six-monthly dilatation to maintain the urethral calibre.

A urethral fever, or urinary fever, or catheterisation fever, as it was variously known, was usual if not actually expected a day or so after instrumentation. It was defined as such by Sir Andrew Clark (1826-1893) in London in 1883,[53] specifically referring to the asso-

52. Booth, C.C. Medical Communication: the old and the new. Brit Med J 1982; 285:105-108.
53. Clark, A. Remarks on catheter fever. Lancet, 1883; 122:1075-1077.

ciation of the phenomenon with catheterisation for elderly men with prostatic disease, although that was by no means the first reference to the phenomenon.[54] Should that fever develop between dilatations and last more than a day or so during the early phase of treatment then the subsequent dilatation would be deferred. Occasionally the "fever" was severe enough to cause death for reasons unclear to the surgeons working before the time of Louis Pasteur (1822-1895) and the development of microbiology in the second half of the 19th century.

These days the fever would be ascribed to bacteraemia or septicaemia due to instrumentation in the presence of infection. In those days a diagnosis of infection required the presence of visible pus and in the absence of visible pus the fever was generally ascribed to irritation of the sympathetic nervous system by the instrumentation of the urethra.[55]

The human cost of stricture treatment

It was during this period that the first "case series" were published and the first time therefore that it was possible to evaluate the spectrum of stricture disease and its treatment. In 1862 Thomas Bryant reviewed 603 cases treated at Guy's Hospital in London, where he worked, between 1853 and 1861.[56] They were almost invariably bulbar or bulbo-membranous strictures and of these, gonorrhoea accounted for 273 (45%) and trauma for 43 (0.7%). The remaining patients had no known cause listed.

27% presented in retention and 10% presented with extravasation. The mortality in the patients with extravasation was 28%. Of the 603 patients, 565 (94%) were treated by dilatation and 38 (0.6%) by perineal surgery – 31 by the Syme technique of external urethrotomy for the seriously recurrent but not irretrievable strictures, and 7 patients by perineal section when they were otherwise irretrievable. A fistula was present in 65 patients (11%) and 47 (72%) of these were "cured" by dilatation with a 5% mortality and 18 had perineal section of whom 7 died (39%).

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54. Swinford Edwards F. Urethral fever, with records of three fatal cases. Ann Surg1886; 4: 20-29.
55. Harrison, R. Clinical Lecture on a Case of Urethral Fever. Lancet, 1878: 375-376.
56. Bryant, T. On Stricture, Retention of Urine, Stone in the Bladder, and other Diseases of the Urinary Organs. John Churchill, London (1862).

In other words, extravasation and perineal surgery were the most notable causes of death and indeed these two causes accounted for 50% of the 36 deaths in the series, giving an overall mortality in those days of 6%. Patients who were in acute retention who were not manageable by perineal section had transrectal puncture of the retented bladder and left, thereafterwards, with a vesico-rectal fistula.

Interestingly there was no discussion of "recurrence" at this time as if each obstructive episode was an event in its own right and simply dis-obstructing the patient, albeit temporarily, was a "cure" for that event. One of the first surgeons to comment specifically on this point was Sir James Paget (1814-1899) who noted in 1879 that if often took a year before a patient could go for two weeks without a dilatation and that dilatation was *"tedious, liable to risk, and finally not curative."*[57]

Although there are numerous other reports from other centres around the world, we can skip usefully to 1970 and a paper by Devereux and Burfield[58] from London who reviewed the long-term follow-up of patients with urethral strictures treated by dilatation. They described 32 patients aged 48-84 (mean 65 years) who had been followed up for 25-51 (average 34) years, largely in the pre-antibiotic era, although their current practice was to give antibiotics –such as existed at that time– for 5-7 days after dilatation. Previously, in the era before antibiotics patients had received an intra-urethral instillation of 1:1,000 acriflavine in glycerine or paraffin after dilatation. All patients received topical anaesthesia with 0.5% cocaine before instrumentation. The average patient had had 220 dilatations and on average the dilatations were performed every 3 months although this varied from every 3 weeks to once a year.

Rigors – which would previously have been described as "urethral fever" - developed in 56% of patients at the time or immediately after dilatation and 16% developed septicaemia. Significant bleeding after dilatation occurred in 59% and 47% developed reten-

57. Paget J. Clinical Lectures and Essays. Longmans Green (1879), London.
58. Devereux MH. Prolonged follow-up of urethral strictures treated by intermittent dilatation. Brit J Urol (1970); 42: 321-329.

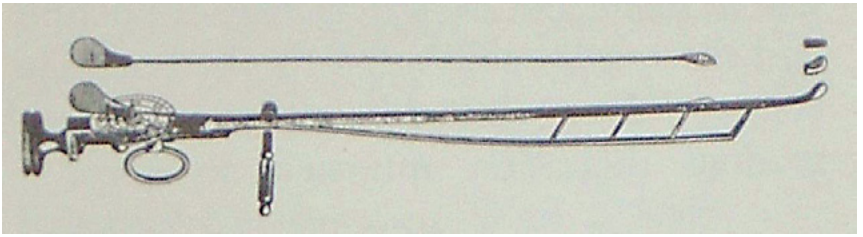

Figure 11: Otis urethrotome.

tion. Recurrent epididymitis developed in 31% and 16% developed a peri-urethral abscess. Twenty percent had a urethro-cutaneous fistula. Fifty percent of those with infected urine, on a more than occasional basis, had upper tract problems.

In short, if that was the fate of patients treated at a specialist urology hospital in the first half and middle of the 20th century, one can only guess what it was like for patients treated in earlier centuries. Even these days these figures give pause for thought given that urethral dilatation is still by far the most widely practised procedure for urethral strictures in the world today. We have no data on the number or percentage of patients who die each year as a result of urethral dilatation but there are data for deaths due to urethral catheter-related infection suggesting that 2,100 patients probably die each year from that cause in the UK alone.[59]

The second half of the 19th century saw a number of contributions from the United States. It is Fessenden Nott Otis (1825-1900) who we know best because of his urethrotome (Fig. 11) (although the one in more common use today is actually the modification from Mauermeyer[60]).

At the time Otis was mainly known for his research into urethral calibre.[61,62] This work was detailed, bordering on obses-

59. Feneley RCL, Hopley IB and Wells PNT. Urinary catheters: history, current status, adverse events and research agenda. J Med Eng and Technol , 2015; 8: 459-470.
60. Mauermayer W and Hertel E. On a modification of the Otis urethrotome. Urologe A 1977; 1: 18-20.
61. Otis, F.N.: The calibration of the normal urethra and its influence on the treatment of stricture. N.Y. Med. J., 1872; 15:152.
62. Otis, F.N.: The treatment of the stricture of the urethra. Brit Med J, 1876.1: 251-254.

Figure 12: Workings of the Desormeaux endoscope.

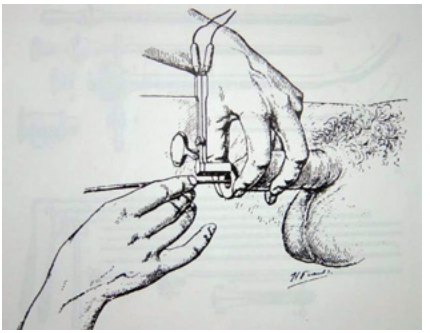

Figure 13: Incising strictures using the endoscope

sional, and brought him into conflict with many of his colleagues, notably Edward Keyes (1843-1924). Both were from New York. Keyes was one of the pioneers of American Urology: professor of genito-urinary surgery at Bellevue and founder and first president of the American Association of Genito-Urinary Surgeons. He was also a student and subsequently successor of William Van Buren (1819-1883) who was the first professor in the newly created department of urology at Bellvue Hospital Medical College and another pioneer of both urology in general and urethral stricture treatment in particular. The most widely used sounds in America are named after Van Buren. They are very similar to Clutton's sounds in the UK, which were named after Henry Clutton (1850-1909).

The second half of the 19th century also saw the beginnings of direct vision internal urethrotomy (DVIU).[63] Antonin Desormeaux (1815-1882) in Paris described his endoscope in 1853 and in 1865 reported incising urethral strictures using a long thin knife passed down his instrument.[64] (Figs. 12 & 13) Francis Cruise in Dublin (1865)[65] and Josef Grünfeld in Vienna (1881)[66] reported

63. Schultheiss D, Truss M C and Jonas U. History of direct vision internal urethrotomy. Urology, 1998; 52: 729-734.
64. Desormeaux A J. De l'endoscope et de ses Applications. Baillière et Fils. Paris. 1865.
65. Cruise F R. The utility of the endoscope as an aid in the diagnosis and treatment of disease. Dublin Q J Med Sci, 1865; 39: 329-363.
66. Grünfeld J. Die Endoskopie der Harnröhre und Blase. Ferdinand Enke, Stuttgart 1881.

cases of DVIU using instruments of their own design and in 1892 Felix Oberlander[67] described and produced the first purpose built direct vision urethrotome with an intra-corporeal light source.

So it was that when Sir Henry Thompson wrote in his monograph in 1854[21] and again in 1888, and when Sir Peter Freyer (1908)[68] and Meredith Campbell (1929)[69] (of Campbell's Urology) subsequently described urethral stricture disease and its treatment in their various writings they described the symptoms, the diagnosis and the treatment exactly has had been the case for centuries before. Indeed, their text could have stood until as recently as 35 years ago: advocating gentle dilatation for bulbar strictures, which constituted the majority of strictures, with urethrotomy reserved for strictures of the fossa navicularis and the penile urethra and for traumatic strictures of the membranous urethra or when dilatation proved ineffectual; and reserving external urethrotomy (or perineal section, as it was still called)[70] for extreme cases.

The Twentieth Century

With the passage of time the cystoscope was further developed by improving technology, culminating in the production of the pan-endoscope designed by Joseph McCarthy (1874-1965) in New York in the period 1930-1960.[71] The ultimate development was the purpose-built visual urethrotome developed by Hans Sachse (1926-2018) in Nuremberg, Germany in 1971.[72] His operating system, coupled with modern cold light illumination made visual internal urethrotomy a routine procedure. The other major development in the twentieth century was in urethroplasty.

As described above, the written history of open urethral surgery for stricture disease goes back to the perineal section performed

67. Oberländer, F.M. Die Verbesserungen des elekto-urethroskopischen Instrumentariums und dessen Anwendung. Arch Derm Syph, 1892; 24: 355-379.
68. Freyer PJ. Clinical lectures on strictures of the urethra and enlargement of the prostate. Bailliere, Tindall & Cox, London. 1902.
69. Campbell M F. Stricture of male urethra. Ann Surg, 1929; 89: 379-399.
70. White, J W Notes on six cases of perineal section; with some observations on the technique of the operation. American Journal of the Medical Sciences. 1891; 101: 28-35.
71. McCarthy, JF. A new type observation and operating cysto-urethroscope. J Urol, 1923; 10: 519-523.
72. Sachse H. Die interne Urethrotomie. Z Urol Nephrol, 1980; 73: 327-329.

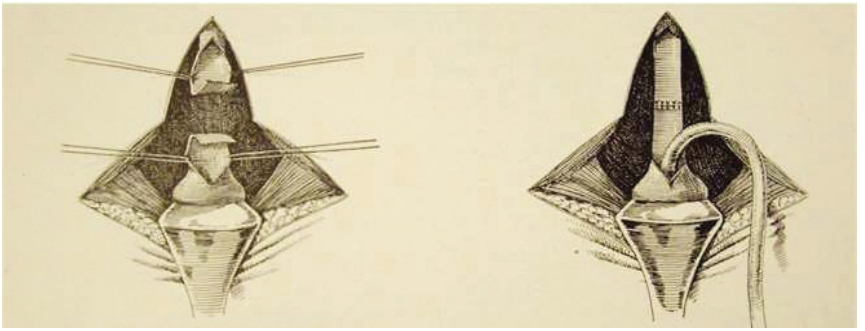

Figure 14: Russell's anastomosis technique.

by Edward Molins and described by Richard Wiseman in 1652.[19] It is, of course, impossible to know when the first open surgical procedure took place that was actually intended to cure a urethral stricture permanently but then, of course, the intention to achieve a permanent cure for any condition –rather than just alleviate the symptoms, as with urethral dilatation- depends on an understanding of the pathology of that condition and such an understanding did not start to develop until the second half of the 18th century.

Ludwig Heusner (1843-1916) in 1883 in Germany[73] and Arthur Mayo-Robson (1853-1933) in 1885 in England[74] were the first to report such 'curative' procedures, as individual case reports. Subsequently Robert Hamilton Russell (1860–1933) from Melbourne Australia, formerly a student of Joseph Lister (1827-1912), reported the first series of excision and end-to-end anastomosis in 1915.[75] However, none of these procedures were performed with mobilisation of the corpus spongiosum proximal and distal to the stricture and then circumferential repair and closure. Heusner and Mayo-Robson simply excised the stricture and sutured the two ends together.

Russell made a point of mobilising the two ends, but he only undermined the epithelium, not the underlying corpus spongio-

73. Heusner, L: Uber Resection der Urethra bei Stricturen. Deutch. Med. Wschr 1883; 9: 415-416.
74. Mayo Robson, AW. Traumatic urethral stricture caused by excision. Brit Med J 1885; 1: 481.
75. Russell RH. The treatment of urethral stricture by excision. Brit J Surg, 1914-1915; 2: 375-383.

sum. He then performed a dorsal hemi-circumferential anastomosis leaving the ventral aspect of the urethra open. A catheter was then passed into the bladder through the proximal end of the hemi-circumferential anastomosis and left coming out through the wound to the outside. (Fig. 14) This was removed after a few days and the patient followed up thereafter by passage of a urethral dilator once the skin wound had healed. However primitive by contemporary standards, these surgeons had nonetheless actually excised the stricture in their patients and sutured the two ends together, albeit only partially in some cases.

A number of earlier surgeons, notably Louis Alexander Dugas de Vallon (1806-1884) in the USA in 1835[76] and Charles-Emmanuel Sédillot (1804-1883) in Paris in 1854,[77] had simply excised the strictured segment of the urethra, having failed to find the lumen when trying to perform an external urethrotomy, and left a catheter across the gap without attempting to close the gap between the two ends. This is much the same as the procedure referred to above, that Wheelhouse described 20-40 years later in 1876 except that Wheelhouse didn't excise the strictured segment, he simply by-passed it.

In 1926 Hugh Hampton Young (1870-1945) (the founder of the *Journal of Urology*) excised the scarred spongiosus of a stricture leaving a strip of epithelium between the two healthy ends of the urethra to regenerate the remainder of the urethra.[78] Lexer (1931) tried bridging the gap between the two ends of the urethra after excision of a stricture with a vein graft but his patient died five months later and at autopsy no sign of the graft material was to be seen.[79] Mhra had tried split skin grafting the urethral defect as early as 1898[80] but it wasn't until MacLean and Gerrie in

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67. Oberländer, F.M. Die Verbesserungen des elekto-urethroskopischen Instrumentariums und dessen Anwendung. Arch Derm Syph, 1892; 24: 355-379.
76. Dugas LA. On the treatment of stricture of the urethra. South Med. Chir. J (1855); 11: 645.
77. Sédillot, C.: De l'urétrotomie externe ou périnéale (operation de la boutonniérre), Comme Méthode de traintenment des rétrécis-sements organiques de l'urétre. Gaz. Med. Paris 1854; 10:20.
78. Young H H and Davis D M. Young's Practice of Urology. Vol 2: 565-596 W B Saunders Co, Philadelphia and London. 1926.
79. Lexer E. Die gesamte Wiederherstellungs-Chirurgie. Vol 1: 243-245. Johann Ambrosius Barth, Leipzig 1931.
80. Mhra H. Plastischer Ersatz der Harnröhre im perinealen Abschnitte. Wien Med Wchnschr 1898; 48: 778-786.

1945[81] and Rank in 1950[82] that this idea picked up again. As late as 1948 Attwater was still excising the stricture and leaving a gap of 2cm hoping that it would heal across.[83]

A different, two-stage, approach, anticipating future developments, came from Pasteau and Iselin (1906)[84] who exteriorized the two ends of a ruptured bulbar urethra and sewed the two ends of the urethra to the skin at the time of the injury and then incorporated the adjacent skin into the subsequent closure to achieve a complete circumferential reconstruction at the second stage.

An alternative technique of circumferential replacement of the urethra by a xenograft had been described by Clennell Fenwick (1896)[85] who used a segment of sheep's urethra and Pringle (1904)[86] who substituted the strictured area with a segment of urethra from a bullock. Both claimed success but nobody seems to have picked up on either of these ideas!

If it were just for these and similar isolated reports, nothing else would have happened in the history of urethroplasty until the 1950's. But for patients with hypospadias and epispadias and those with urethral trauma there had been a number of developments.

In 1869 Karl Thiersch (1822-1895) described a repair which was applicable to both hypospadias and epispadias[87] and a few years later, in 1874, Simon-Emmanuel Duplay (1836-1924) described his procedure[88] which was further modified in 1880.[89] The princi-

81. MacLean J T and Gerrie J W. Repair of war wounds of the bulbous and membranous urethra using split thickness skin grafts and penicillin. J Urol 1945; 53: 419-421.
82. Rank B K. Correction of posterior urethral occlusion by epithelial inlay graft; case reports. Brit J Plast Surg. 1950; 3: 108-114.
83. Attwater H L. Discussion on the surgery of urethral stricture. Section of Urology. Proc.Soc.Med. 1948; 41: 837-842.
84. Pasteau, O. and Iselin: La resection de l'urétre périnéal. Ann. Mal. Org. Gen. Urin.1906; 24:1601.
85. Clennell Fenwick R. Repair of a defect in a strictured urethra by the transplantation of a portion of a sheeps urethra. Lancet, 1896; 1: 353.
86. Pringle JH. Repair of the urethra by transplantation of the urethra of animals. Ann Surg 1904; 40: 387-397.
87. Thiersch K. Uber die Enstehungsweise und operative Behandlung der Epispadie. Archiv der Helkunde 1869; 10: 20.
88. Duplay S. De l'hypospadias périnéo-scrotal et de son traitment chirurgical. Arch Gén de Méd 1874; 133: 657-682.
89. Duplay S. Sur le traitement chirugical de l'hypospadias et de l'epispadias. Arch Gén de Méd 1880; 145: 257-274.

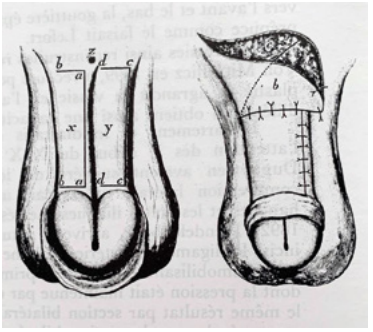

Figure 15: Thiersch's repair technique.

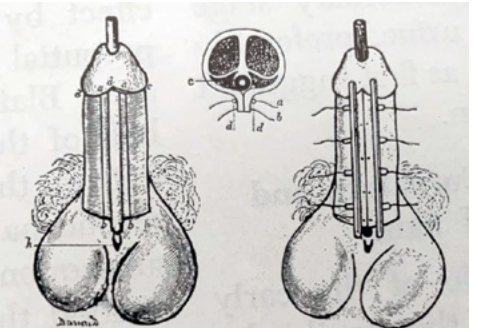

Figure 16: Duplay's method.

ples they espoused are still used today. Thiersch first constructed a urethral tube out of penile shaft skin, in both epispadias and hypospadias, and then covered it by wide mobilisation of the penile shaft skin on either side sufficient to allow closure of the skin over it. (Fig. 15) The second principle was staggering of the suture lines so that there was no direct overlap thereby reducing the risk of fistulation.

Duplay also developed two principles. The first was to "grossly" evert the skin suture line over a urethral reconstruction to reduce the risk of fistulation. (Fig. 16) His second principle was that it wasn't necessary to close a neo-urethral skin tube completely. This was the first step towards the so-called "buried strip" principle in surgical practice as described below.

Although the principles developed by Thiersch and Duplay subsequently became incorporated into surgery for urethral stricture disease, nonetheless they weren't applied as such until decades later (see below).

Urethral trauma has never been very common but 'fall-astride' or 'straddle' injuries used to be significantly more common than they are nowadays. On the other hand pelvic fracture-related urethral injury is much more common now than it used to be, mainly because its incidence is more or less closely related to industrialisation, and to the increasing use of motor vehicles in particular; but also because -in the past- patients were likely to die of the associated

injuries. Nowadays, with the development of ambulance services, prompt resuscitation and critical care in particular, the majority of patients survive their injury except at the most extreme end of the spectrum of trauma.

The guiding principle of the management of urethral trauma was developed by Jean Francois Verguin (1717-1790), a French naval surgeon working in Toulon, in 1759.[90] Before then a full thickness urethral injury would lead –after a period of retention- to urinary extravasation and death from sepsis in about 10 days. This outcome had been recognised as long ago as 1087, if not before, by the monks looking after King William the First of England ("The Conqueror") after he sustained a ruptured bulbar urethra during the siege of Mantes.[91]

The guiding principle in treatment that Verguin worked out was therefore to drain the bladder and prevent or deal with urinary extravasation. Having failed to catheterise a sailor in the French Navy with a straddle injury after a fall, he experimented in a cadaver, with a technique by which he could open the bladder through a suprapubic incision and pass a catheter-dilator through the suprapubic track thereby created and then antegradely through the bladder neck and prostatic urethra and into the perineum. There it could be identified by perineal section so that another catheter could be passed through the urethral meatus into the same perineal wound and then from there up into the bladder. Then, in due course, the catheter could be removed and the patient started on dilatation. It is important to appreciate that this was never intended to be a curative procedure in its own right. It was only to allow the subsequent passage of urethral catheter-dilators or otherwise leaving the patient with a permanent perineal fistula to void through.

With straddle trauma this procedure was somewhat easier if only because at perineal exploration the proximal end of the ruptured bulbar urethra, being more distal, was easier to find than with the posterior urethra after a pelvic fracture-related injury. It was

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90. Chopart M. Traité des maladies des voies urinaires. Remont et Fils, Paris 1792: pp 239-240.
91. Brewer, C. The Death of Kings. William the Conqueror. Abson, London, 2000, pp 21-27.

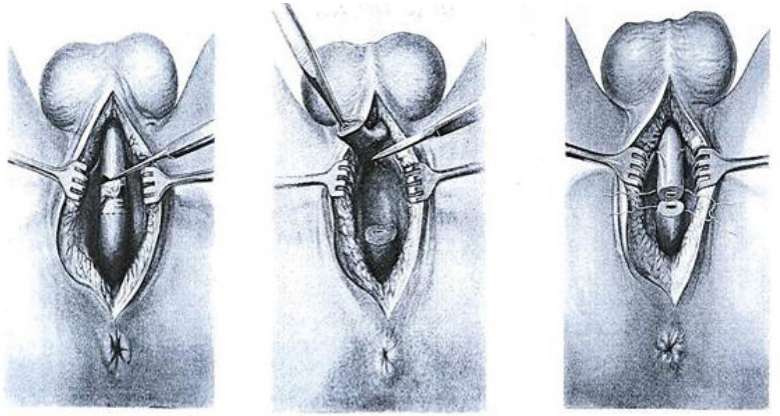

Figure 17: Marion's technique for mobilising the whole urethra

the relatively common incidence of straddle injury, coupled with the fact that it was not usually associated with such severe trauma elsewhere, that led surgeons to attempt the procedure and then follow it up with dilatation thereafter or otherwise leave them voiding through the perineal fistula.[23,90] It was Birkett, of Guys Hospital in London who wrote the first report of a definitive primary repair of a ruptured urethra following a perineal injury due to a kick from a horse in 1866[92] and other reports followed[6] – all for perineal trauma, not for more proximal injuries for years to come. In due course and with increasing experience, the same approach would be applied to a recalcitrant established stricture, as long as it wasn't too long, as described by Heusner, Mayo-Robson and Russell (above).

The next step in the further development of trans-perineal bulbar urethroplasty came from Georges Marion (1869-1960) in Paris, in the early part of the 20th century. He recognised that the only way of getting a durable repair was to mobilise the urethra – the whole urethra including the corpus spongiosum[93-96] (Fig. 17)

92. Birkett, E.L.: Complete transverse division of the urethra by a kick of a horse in the perineum: perineal section: recovery. Lancet 1866; ii: 693.
93. Marion, G. and Heitz-Boyer, M.: Réparation de l'urétre par suture bout à bout avec derivation immediate et temporaire des urines par urétrostomie. Assoc. Franc. Urol., 1911; 14:310-314.
94. Marion, G.: De la reconstitution de l'urétre par urétrorrhaphie circulaire avec derivation de l'urine. J. Urol. Med. Chir. 1912; 1: 523.
95. Marion G. Traité d'urologie. Two volumes. Masson édit. Paris 1928.
96. Marion G and Pérard J. Technique des operations plastiques sur la vessie et sur l'urètre. Masson et Cie, Paris 1942; pages 113-122 & 158-183.

and not just the epithelium as Russell had described – and to avoid an indwelling urethral catheter postoperatively as far as possible or otherwise to keep a urethral catheter in for the shortest possible time, relying on suprapubic catheterisation for bladder drainage instead.

Marion's ideas were promulgated in France in the early decades of the 20th century and in the UK by Henry Hamilton Bailey (1894-1961)[97] who, like many surgeons at that period, and since,[59, 98-100] was anxious about the use of catheters in the management of patients with urethral trauma or with strictures, and particularly those having surgery. This was because it was evident then that the nature of the material used for making catheters at that time was just as likely to cause a stricture as to help relieve it. This was less of a problem with the use of rubber catheters than with the gum elastic catheters that preceded them but it was nonetheless a problem until silicone became available in 1968.[101]

It was in the surgery of hypospadias that the next developments in urethroplasty occurred, with the publication in 1949 of a paper on surgery for hypospadias by Denis Browne[102,103] in London. The procedure he described was, in fact, more or less the same as the Duplay procedure of 1880 – although Browne himself strongly disagreed![104] A strip of skin on the ventral aspect of the shaft of the penis was left to develop into a neo-urethra from the opening of the urethra, wherever that might be, up to the glans and was then covered by the widely-mobilised skin on either side of the neo-urethral strip and what might be called 'exaggerated eversion' of the suture line. (Fig. 18) In fact the buried strip principle had been developed

97. Bailey H. Reconstruction of deep urethra. Brit J Urol 1939; 11: 111-116.
98. Buxton Browne. Catheter stricture. Lancet 1890; 2:977.
99. Middleton, RP. A plea for the abolition of the retention catheter in the preparation of patients for prostatic surgery. J A M A, 1940; 114:2368-2369.
100. Painter, M.R., Borski, A.A., Trevino, G.S., Clark, W.E. Urethral reaction to foreign objects. J Urol, 1971; 106: 227-230.
101. Nacey JN. Urinary catheter toxicity. NZ Med J, 1991; 355-356.
102. Browne D. An operation for hypospadias. Proc Roy Soc Med, 1949; 42: 466-468.
103. Browne, D. Hypospadias. Postgrad Med J, 1949; 25: 367-372.
104. Browne, D.A comparison of the Duplay and the Denis Browne techniques for hypospadias operations. Surgery, 1953; 34:787-798.

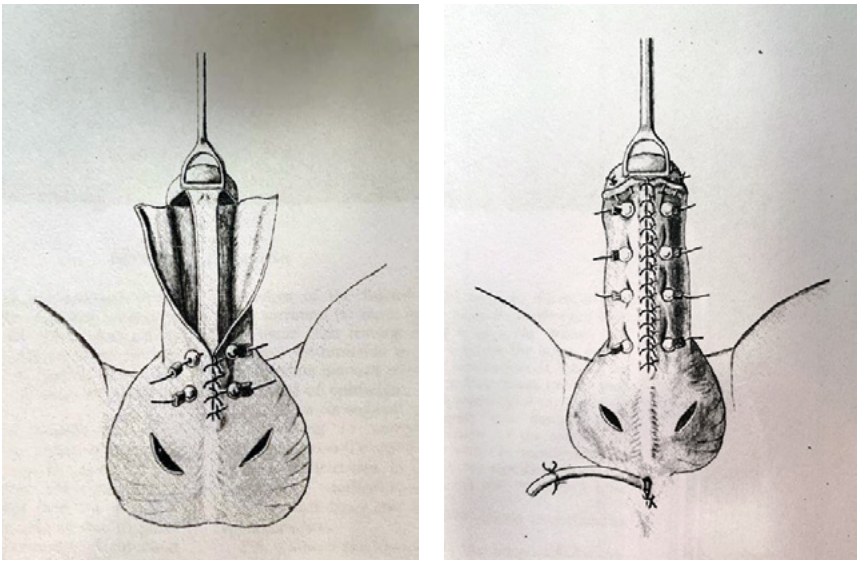

Figure 18: Browne's "exaggerated eversion".

as such by Davis and Traut in 1926[105] who developed the proof of principle that a tube could be created out of a strip. In their case the procedure was further developed clinically as the Davis intubated ureterostomy. A similar approach had been described many years earlier by Russell;[106,107] nonetheless it was Browne who popularized it.

Further developments in the surgery for hypospadias in the 1940's, 50's and 60's were based on the principles of the Thiersch and Duplay techniques and the so-called Denis Browne principle and on developments in the field of plastic surgery, and of skin grafting in particular, following on from the work of surgeons like Harold Gillies (1882-1960) and Archibald McIndoe (1900-1960). Both were New Zealanders who ended up working in England during the two World Wars. Thereafter the subject of hypospadias has its own history and we will not consider it further here.

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105. Davis J S and Traut H F. The production of epithelial lined tubes and sacs; an experimental study. J A M A, 1926; 86: 339-341.
106. Russell, R.H. Operation for severe hypospadias. Brit Med J. 1900; 2: 1432-1435.
107. Russell, R.H. Operation for hypospadias. Ann Surg, 1907; 46: 244-258.

It was in the 1950's that things changed – firstly with the development of antibiotics; secondly with the development of better latex and subsequently silicone catheters; thirdly with better diagnosis of stricture disease through the development of urethrography; and fourthly with better critical care, better instruments, better sutures and better surgery in general. The man most responsible for the change in surgery for urethral strictures was Bengt Johanson (1919-2007) who wrote a (long) paper in 1953 entitled "Reconstruction of the Male Urethra in Strictures"[108], stimulated by Browne's work. It was Johanson's work – and he was a plastic surgeon by training and practice – which generated worldwide interest in urethroplasty.

Johanson developed a staged approach to repairing a urethral stricture based on two principles. The first was to open up the urethra from normal calibre healthy-looking urethra at one end, through the stricture and into normal calibre healthy-looking urethra at the other and marsupialise the urethra to normal healthy skin. The second was to mobilise and drop in a funnel of scrotal skin to allow that marsupialisation, wherever it was. That was the first stage.

Then, at a second stage, the marsupialised urethra would be circumcised and closed with sufficient adjacent scrotal skin to give the required calibre (Fig. 19), much as Pasteau and Iselin had described 50 years earlier in a patient with urethral rupture, and referred to above[81] and which Cecil had subsequently used for intractable urethral strictures.[109]

Johanson influenced Swinney (1952, 1957)[110,111], Bonnin (1954)[112] and Turner Warwick (1968)[113] who further developed the procedure of scrotal skin inlay urethroplasty. (Fig. 20) This

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108. Johanson B. Reconstruction of the urethra in strictures. 1953; Acta Chirurgica Scandanavica. Supplement 176.
109. Cecil, A.B. A radical operation for the cure of intractable stricture of the male urethra. J Urol, 1956; 75: 501-504.
110. Swinney J. Reconstruction of urethra in the male. Brit J Urol 1952; 24: 229-235.
111. Swinney J. Urethroplasty: An assessment after seven years' experience. Brit J Urol 1957; 29: 293-297.
112. Bonnin NJ. Replacement of urethra. Brit J Urol 1954; 26: 174-182.
113. Turner-Warwick RT. Urethral strictures in relation to the sphincters. Brit J Urol 1968; 40: 677-681.

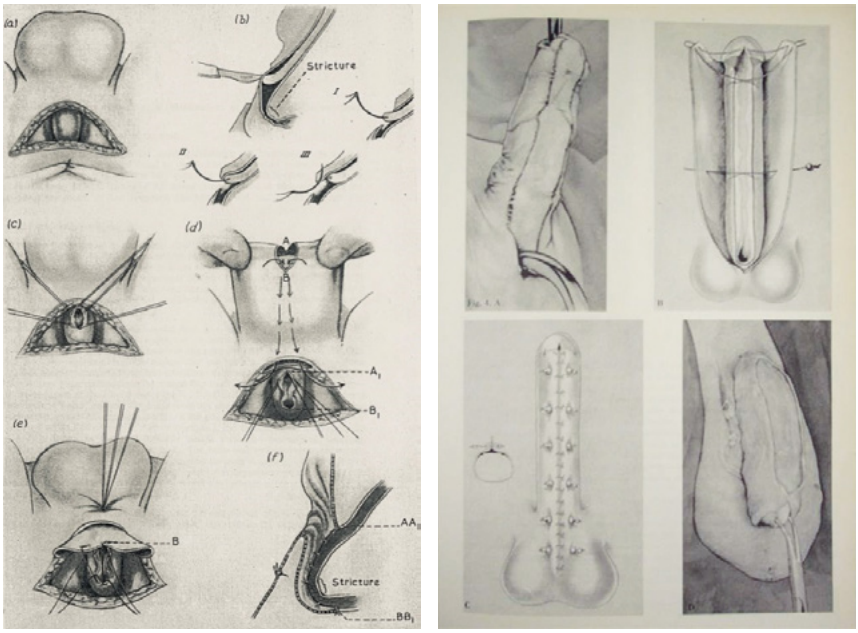

Figure 19: The second stage of Johanson's urethral stricture repair.

was modified by Turner Warwick himself (1988)[114] and by Blandy (1975)[115] to be a one-stage island patch urethroplasty (Fig. 21), stimulated by the Leadbetters' modification of the Johanson procedure which described the mobilization of a defined scrotal skin patch on a dartos pedicle (Leadbetter & Leadbetter, 1962).[116,117] (Fig. 22)

Ahmed Orandi (born 1931) in the USA developed this principle further showing that any and all of the genital skin could be used as a patch based on a dartos pedicle (Orandi, 1968).[118] (Fig. 23)

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114. Turner-Warwick R. Urethral stricture surgery, in Current Operative Surgery – Urology. A Mundy Editor. Bailliere Tindall: London. 1988 p160-218
115. Blandy J P and Singh M. The technique and results of one-stage island patch urethroplasty. Brit J Urol 1975 47: 83-87
116. Leadbetter, GW Jr. A simplified urethroplasty for strictures of the bulbous urethra. J Urol 1960; 83: 54-59
117. Leadbetter , GW Jr, Leadbetter WF. Urethral strictures in male children. J Urol 1962; 3: 409-415.
118. Orandi, A. One-stage urethroplasty. Brit J Urol 1968; 40: 717-719.

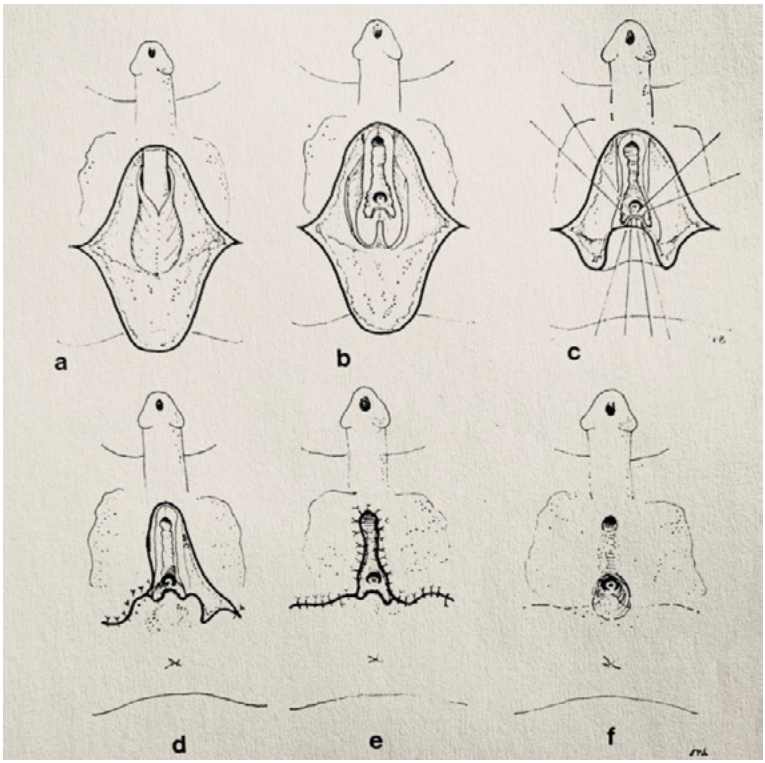

Figure 20: Scrotal skin inlay urethroplasty.

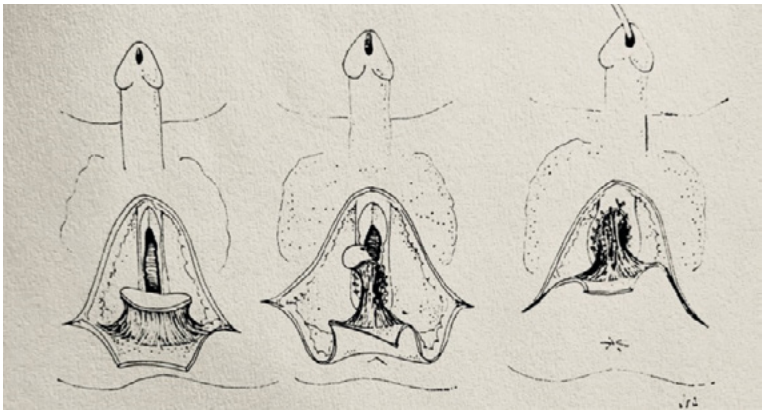

Figure 21: One-stage island patch urethroplasty.

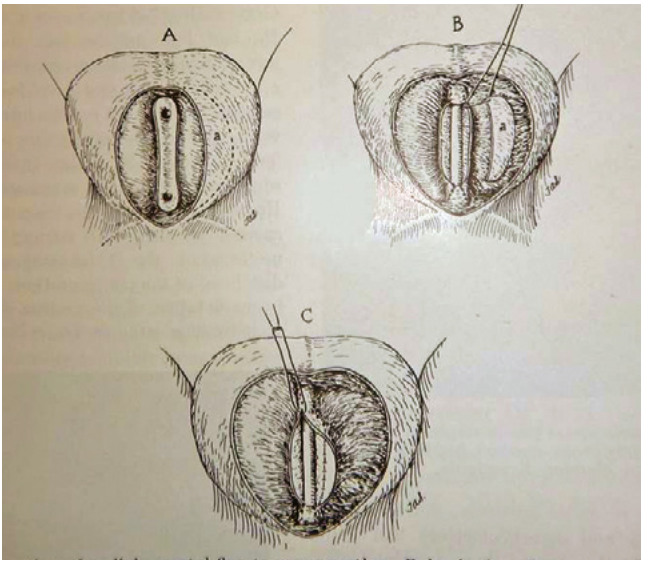

Figure 22:
Mobilization of a defined scrotal skin patch on a dartos pedicle.

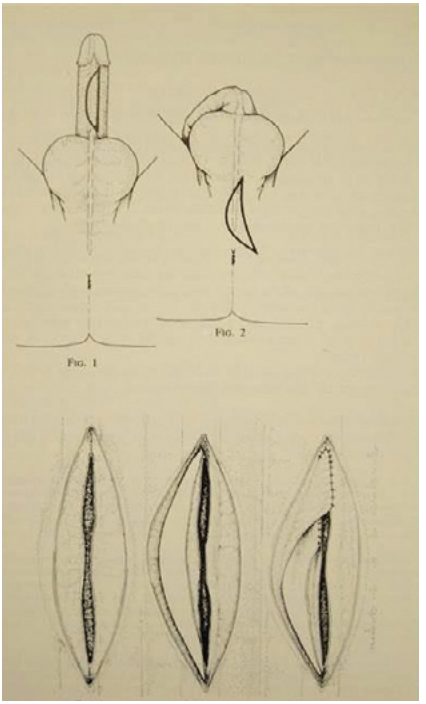

Figure 23:
Further development of patch approach.

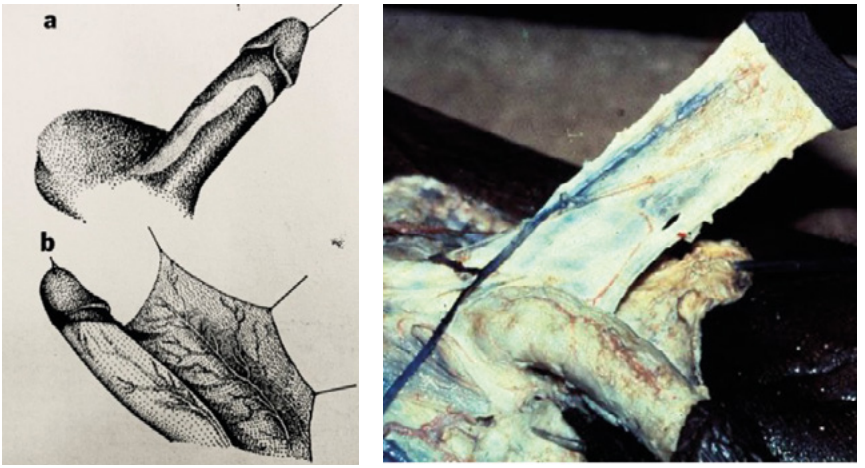

Figure 24: Quartley's flap repair.

John Quartey (1922-2005) in Ghana[119] (Fig. 24) developed this further still such that this type of 'flap repair' was standard treatment for longer strictures, not amenable to anastomotic urethroplasty, until the resurgence of 'free graft repair', with the development of buccal mucosal graft urethroplasty in the 1990s. Indeed, flap urethroplasty remains a very valuable technique to this day, in particularly difficult cases, excepting only that penile skin is generally preferred as the patch nowadays.

When flaps were introduced, most surgeons went over to that technique, but Devine and Horton (1961) continued to use free skin graft urethroplasties[120] and grafts have subsequently made a comeback, although skin has been overshadowed since 1992 by the use of buccal mucosal grafts as popularised by Burger and his colleagues from Mainz (1992).[121] Needless to say this had actually been reported before and Humby had referred to its use in hypospadias repair in 1941[122] but it had actually first been described by Kirill

119. Quartey J K M. One-stage penile/preputial cutaneous island flap urethroplasty for urethral stricture: A preliminary report. J Urol 1983; 129: 284 - 287.
120. Devine C J and Horton C E. A one stage hypospadias repair. J Urol 1961; 85, 166-172.
121. Burger R A, Muller S C, El-Damanhoury H et al. The buccal mucosal graft for urethral reconstruction: A preliminary report. J Urol 1992; 147: 662.
122. Humby GA. A one-stage operation for hypospadias. Brit J Surg 1941; 29: 84.

Sepezhko (1857-1928) in 1894 but had largely been forgotten until the beginning of the 21st century, perhaps because his report was published in Russian.[123]

Bladder mucosa had a period of popularity after it was introduced by Memmelaar in 1947[124], and subsequently, for patients with severe hypospadias and lichen sclerosus about 50 years later[125] but buccal mucosa is so much easier to harvest and to handle and, at the time of writing, is probably the most commonly used type of augmentation or substitution urethroplasty all around the world.

Further developments in the surgery for urethral trauma

The other major game-changer in the twenty years that followed Johanson's 1950s work was the development of urethroplasty for trauma, following on from Marion's ideas and particularly his most recent publication in 1942.[96] During the first half of the 20th century pelvic fracture injuries were rare and often fatal because of the severity of the associated injuries. In survivors, pelvic fracture-related urethral injury was itself rare and so primary anastomosis of a ruptured posterior urethra was rarely attempted and even more rarely, if ever, successful.

Even after a recovery from the injury very few surgeons attempted repair of a subsequent stricture, although there were some reported attempts,[126-130] because it was technically too difficult to get the two ends of the urethra together, and the usual approach was either to perform a uretero-sigmoidostomy or to leave the patient with a permanent suprapubic fistula.

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123. Korneyev I, Ilyin D, Schultheiss D, Chapple CR. The first oral mucosal graft urethroplasty was carried out in the 19th century: the pioneering experience of Kirill Sapezhko (1857-1928). Eur Urol (2012); 62: 624-627.
124. Memmelaar, J.: Use of bladder mucosa in a one-stage repair of hypospadias. J. Urol. 1947, 58: 68-73.
125. Kinkead TM, Borzi PA, Duffy PG, Ransley PG. Long-term followup of bladder mucosa graft for male urethral reconstruction. J Urol. 1994; 151:1056-1058.
126. Young H H. Treatment of complete rupture of the posterior urethra, recent or ancient, by anastomosis. J Urol 1929; 21: 417-449.
127. Watson E M . Complete rupture of urethra; method of repair in delayed cases. J Urol, 1935; 33: 64-73
128. Young, H.H. Stricture of the prostatico-membranous urethra; newer methods in the management of difficult lesions. Ann. Surg., 104:267, 1936.
129. Bailey, H. Reconstruction of the deep urethra. Brit J Urol 1939; 11:112-116.
130. Wells C A. Ruptured urethra: technique for secondary repair. Brit J Urol, 1941; 13: 8-10.

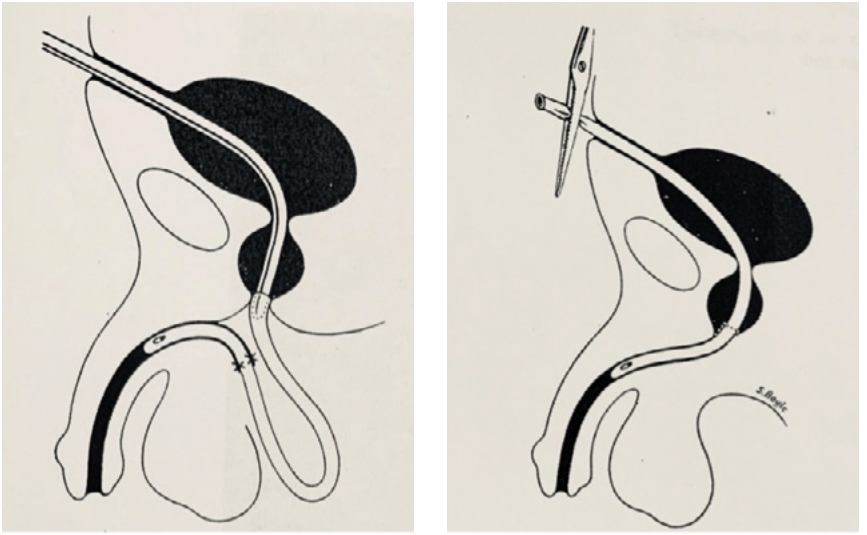

Figure 25: Badenoch's technique.

In 1936, in an excellent review, Simpson-Smith summarized the published experience to date[131] – and it was a sorry tale! Then, in 1950,[132] Badenoch described mobilisation of the bulbar urethra and coring out a path up to the apex of the prostate then pulling the urethra, stitched to a catheter, up into the prostatic urethra so that the raw surfaces on either side could heal together. (Fig. 25)

Thereafter, other surgeons turned their interest to delayed repair of these strictures, after a period of suprapubic catheterisation, as an alternative to either primary repair at the time of injury or delayed repair without direct suture as described by Badenoch.

Specifically, a group of urologists, including Keith Waterhouse (1929-2009) in New York[133] and Richard Turner-Warwick (1925

131. Simpson-Smith, A. Traumatic rupture of the urethra. Eight personal cases and a reviewnof381 recorded ruptures. Brit J Surg, 1936; 24:309-332.
132. Badenoch AW. A pull-through operation from impassable traumatic stricture of the urethra. Brit J Urol 1950; 22: 404-409.
133. Waterhouse K, Abrahams J I, Gruber H, Hackett R, Patil U B and Peng B K. The transpubic approach to the lower urinary tract. J Urol 1973; 109: 486 – 490.

- 2020) in London,[134] led the development of urethroplasty for pelvic fracture-related urethral trauma under the stimuli of a huge increase in road transportation coupled with ambulance and emergency services to get the patient to hospital for resuscitation and prompt treatment after their injury. Previously such services did not exist and it sometimes took days for patients to get to hospital to be treated. The transpubic repair of a posterior urethral "stricture" – more accurately the repair of pelvic fracture-related urethral injury – was initially developed by James Pierce from the USA[135,136] and by Donald Paine and Wilfred Coombes from Canada[137] but steadily the scale of the approach was reduced until ultimately it was shown by George Webster that most of these repairs could be done transperineally.[138] Probably the most important of the papers at this time was that of Waterhouse and colleagues who showed how, with adequate if not full mobilisation of the corpus spongiosum, long urethral defects could be bridged, although Young had described splitting the corpora to relieve tension at the anastomosis with longer defects after urethral excision in 1929[126] and in 1942[139] and so these were probably the first descriptions of the technique.

Thus, in the 1960's, 70's and 80's, with increasing experience of end-to-end anastomosis for trauma, there was increasing use of these manoeuvres for recalcitrant bulbar strictures. Parallel developments in the surgery of hypospadias and the increasing use of scrotal skin flaps for salvage surgery otherwise, following on from the work of Johanson, led to a marked increase in the use of urethroplasty for all types of urethral pathology.

In short, until very recently, the history of urethroplasty in the last 100-150 years was really the history of the surgical management of urethral trauma and of the development of surgery for

134. Turner-Warwick, R. Complex traumatic posterior urethral strictures. J Urol 1977; 118: 564-574.
135. Pierce J M. Exposure of the membranous and posterior urethra by total pubectomy. J Urol 1962; Vol 88: 256-258.
136. Pierce JM Jr. Mangement of dismemberment of the prostatic-membranous urethra and ensuing stricture disease. J Urol 1972; 107: 259-264.
137. Paine D., Coombes, W. Transpubic reconstruction of the urethra. Brit J Urol 1968; 40: 78-84.
138. Webster G D and Ramon J. Repair of pelvic fracture posterior urethral defects using an elaborated perineal approach: Experience with 74 cases. J Urol 1991; 145: 744-748.
139. Young H H Wounds of urogenital tract in modern warfare; collective statistics and case reports from A E F and our allies; discussion of urogenital wounds in modern warfare. J Urol 1942; 47: 59-108.

hypospadias. The main force for the subsequent development of urethroplasty for stricture surgery was the work of Bengt Johanson who first showed the way of pulling all of these various developments together.

As alluded to above, the 1990's saw a shift away from the use of flaps for urethroplasty to the use of grafts and particularly of buccal mucosal grafts. This began in Mainz in Germany with the publication by Burger et al, referred to above. But the most influential urologist in this area has probably been Barbagli from Arrezo in Italy.[140] He adopted the dorsal approach to bulbar stricturotomy originally described by Monseur[141] and promulgated the 'dorsal stricturotomy and buccal mucosal augmentation urethroplasty', widely known around the world as the Barbagli procedure.[142] Over the last 20-30 years the graft has been placed variously in almost every conceivable orientation[143] but some form of buccal mucosal graft bulbar urethroplasty is probably the most widely performed type of urethroplasty in the world today.

Into the 21st century

In a sense, the rest is detail and before going on to consider some of this detail it is important to point out that, not only has surgical technique changed, but so have the patients.

It has already been pointed out that the surgery of urethral trauma has largely been related to the development of industrialisation and particularly in the use of motor vehicles for transport. However, there are other equally important, if not more important changes because they have a greater impact on clinical practice. Thus gonococcal strictures are far less common than they used to be, indeed most bulbar urethral strictures these days are 'idiopathic', at least in the so-called 'developed' world.

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140. Barbagli, G, Palminteri, E, Rizzo, M. Dorsal onlay graft urethroplasty using penile skin or buccal mucosa in adult bulbourethral strictures. J Urol, 1998, 160:1307-1309.
141. Monseur J. A new procedure for urethroplasty for urethral stricture: reconstruction of the urethral canal by means of suburethral strips and the subcavernous groove. J Urol Nephrol (Paris) 1969; 75: 201-209.
142. Andrich DE, Leach CJ, Mundy AR. The Barbagli procedure gives the best results for patch urethroplasty of the bulbar urethra. BJU Int. 200; 88: 385-389.
143. Barbagli G, Balo S, Montorsi F, Sansalone S and Lazzeri M. History and evolution of the use of oral mucosa for urethral reconstruction. Asian J Urol, 2017; 4: 96 – 101.

Surgery for hypospadias has escalated out of all proportion in the last 50 years and so has its failures. And catheter-related strictures, although less common per 1,000 catheterisations since the introduction of Hydrogel and silicone, are nonetheless probably the commonest type of long(ish) strictures these days because catheters are used so much more frequently now than they ever used to be.

The average patient has changed as well. He is younger, fitter, healthier and less likely to be a smoker and is therefore a better candidate for surgery. Also it was common, if not usual, to be presented with patients for urethroplasty with indwelling catheters after previously lifelong treatment by dilatation or urethrotomy had failed. Now, they present for urethroplasty much earlier and usually before they have developed retention. Indeed, as much as anything, it is the change in the patient population (at least in the so-called 'developed' world) presenting with strictures that has led to the development of newer techniques – newer, less invasive techniques for less severe strictures in younger, fitter patients.

The other change of note, while urethroplasty was developing, was the synchronous development of urological endoscopy and subsequently of direct vision internal urethrotomy (DVIU) as described above. This was initially greeted with great enthusiasm because, with its arrival, a stricture could be treated under "direct vision" - except, of course, that the only part of the stricture of which there was direct vision with many strictures was the distal end.

Nonetheless, with the use of a guidewire to define the urethral lumen, internal urethrotomy is now relatively atraumatic – unlike blind internal urethrotomy in which profuse bleeding was a common accompaniment. However, DVIU requires a hospital setting and an operating theatre and so urethral dilatation – in an outpatient setting - remains much more common and this is the way most patients around the world are treated these days, particularly for continuing treatment. Whether or not there is any material advantage of either technique over the other has yet to be shown but there would appear to be no striking difference between the two[144,145,146] except that the need for a hospital environment for direct vision internal urethrotomy and the instrumentation required makes it a substantially more

expensive procedure. And so, in a sense, nothing has changed in the treatment of urethral strictures in the last 3,000 years except that the morbidity has –hopefully– been reduced!

As to the further development of urethroplasty – in summary there are continuing debates about whether, when there is a choice, to excise a bulbar urethral stricture and do a primary anastomotic repair or, alternatively, to open the stricture by stricturotomy and augment it with a graft, particularly a graft of oral mucosa as above.[147,148,149] Secondly, in short strictures of the bulbar urethra that are not due to straddle injury, whether it is necessary to excise the whole of the urethra and its surrounding corpus spongiosum (a transecting repair) or whether excision of the fibrotic tissue alone from within the urethral lumen and urethral mucosal anastomosis with preservation of the surrounding normal corpus spongiosum (a non-transecting repair), is sufficient.[150,151,152] Thirdly, whether or not, in lichen sclerosis-related strictures in particular, the urethra should be excised to eradicate all of the disease and substituted,[125] or alternatively, be treated by stricturotomy and augmentation as above, albeit on a more substantial scale.[153] A fourth debate is on whether surgery for complex penile strictures should be staged or be done in one stage.[154] Mostly these are questions about 'the art of the possible' rather than about hard and fast rules.

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144. Pansodoro V, Emilozzi P. Internal urethrotomy in the management of anterior urethral strictures: long term follow-up. J Urol 1996; 156: 73-5.
145. Steenkamp JW, Hayns CF, De Kock ML. Internal urethrotomy versus dilatation as treatment for male urethral strictures: a prospective, randomised comparison. J Urol 1997; 157: 98-101.
146. Hayns CF, Steenkamp JW, De Kock ML. Treatment of male urethral strictures: is repeated dilatation or internal urethrotomy useful? J Urol 1998; 160: 356-8.
147. Eltahawy EA, Virasoro R, Schlossberg SM, McCammon KA, Jordan GH. Long-term follow-up for excision and primary anastomosis for anterior urethral strictures. J Urol 2007; 177: 1803-6.
148. Terlecki, RP, Steele, MC, Valadez, C, Morey, A. Grafts are unnecessary for proximal bulbar reconstruction. J Urol, 2010;184:2395-2399.
149. Dogra PN, Singh P, Nayyar R, Yadav S. Sexual Dysfunction After Urethroplasty. Urol Clin North Am, 2017;44:49-56.
150. Jordan, GH, Eltahawy, EA, Virasoro, R. The technique of vessel-sparing excision and primary anastomosisfor proximal bulbous urethral reconstruction. J Urol 2007; 177:1799-1802.
151. Andrich DE, Mundy AR. Non-transecting anastomostic bulbar urethroplasty: a preliminary report. BJU Intl, 2011; 10: 1-5.
152. Bugeja S, Andrich DE, Mundy AR. Non-transecting urethroplasty. Transl Androl Urol, 2018; 4: 41-50.
153. Kulkarni S, Kulkarni J, Surana S, Joshi PM. Management of Panurethral Stricture. , 2017; 44:67-75.
154. Campos-Juanatey F, Bugeja S, Dragova M, Frost AV, Ivaz SL, Andrich DE, Mundy AR. Single-stage tubular urethral reconstruction using oral grafts is an alternative to classical staged approach for selected penile urethral strictures. Asian J Androl. 2019.

The role of oral mucosa seems well established particularly now that it is recognised that oral mucosa can be taken from the under surface of the tongue[155] as well as from the inside of the cheek and, when all else fails (very carefully) from the inside of the lip. Flaps have largely given way to grafts in recent years but they still have their role as increasingly complex problems in increasingly complex patients challenge those few surgeons who deal with the extreme types of strictures.

Finally – at the risk of undue repetition - it should be remembered that however effective urethroplasty might be in the cure of a urethral stricture, urethral dilatation is still vastly more common for the management of urethral strictures across the world. In the UK alone, on average, upwards of 6,000 patients (92%) undergo urethral dilatation or urethrotomy each year as distinct from 550 patients or so (8%) who have urethroplasty. The reasons are purely and simply: firstly the surgical skills necessary for urethroplasty as distinct from dilatation; and secondly, in the first instance at least, dilatation is much more cost effective than urethroplasty. This is because it can be done outside of a hospital setting with minimal equipment and at minimal expense to either the individual or the health service within which the individual lives. It isn't for some years, at least two or three, that urethroplasty, by being curative in the long run shows its value. The overall cost of urethroplasty will need to be substantially reduced to make it a competitor for the first line treatment of strictures in most parts of the world. Nonetheless it remains the best chance of a cure at present.

Having said that, it should be emphasised that urethroplasty remains the best chance of cure for a urethral stricture AT PRESENT. For the future it seems likely that regenerative medicine will offer the best chance of a long-term cure, if only because, once the development and production costs have been recovered, it will probably be delivered either endoscopically or in the radiology department under imaging control, again avoiding the hospital

155. Song LJ, Xu YM, Lazzeri M, Barbagli G. Lingual mucosal grafts for anterior urethroplasty: a review. BJU Int 2009; 104: 1052-6.

in-patient cost of open urethroplasty and the skills necessary to perform it.

References

References to the earliest writings quoted here and almost all earlier than 1900 are mainly derived from six sources Attwater, Blandy, Johanson, Kuss and Gregoir, Murphy and Rutkow; and mainly from Murphy. Unfortunately he and the other authors are contradictory on several points although this does little to affect the general theme of this review. For the primary sources, interested readers are referred to Murphy although the author's experience is that his reference list is not always reliable, even when the references are available.

Correspondence to:
Prof. Tony Mundy
tony.mundy1@nhs.net

The 'Consilium' by Andreas Vesalius for Bernhardus of Augsburg, a Nobleman with Recurrent Urinary Problems

(Padua, October 12, 1538)

Omer Steeno[1], Maurits Biesbrouck[2] and Theodoor Goddeeris[3]

[1]Endocrinologist-andrologist, Prof. em. Catholic University Leuven, Louvain, Belgium,

[2]Clinical pathologist, Roeselare, Belgium, [3]Internist-geriatrician, Kortrijk, Belgium

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It was generally accepted that the oldest consilium written by Vesalius goes back to 1542. However a consilium by Vesalius is presented here, written in 1538 for Bernhardus of Augsburg, who probably was affected by gonococcal urethritis. The detailed description of the symptoms of the patient and the proposed treatments, present a unique view on the thoughts and actions of the younger Vesalius and the diagnostic and therapeutic possibilities of his time. In this consilium we get to know Vesalius, not as an anatomist but as clinician.

On June 17, 2019, one of the authors (OS), came across a short article published in 1998 by Hans Hahn. In this article the existence of a 'new' consilium by the famous 16th century anatomist and medical doctor Vesalius is mentioned.[1,2,3] (Fig. 1) The original name of Vesalius was Andries Van Wesel, and he was born in Brussels on December 31, 1514 and died on Zakynthos (Greece) on October 15, 1564. (Figs. 2a and b)

A consilium was a written consultation, including a description of the diagnosis and the necessary treatments, for a patient

BEFINDET SICH IN EINEM SAMMELBAND DER BAUSCHBIBLIOTHEK DIE ABSCHRIFT EINES BISHER NICHT BEKANNTEN CONSILIUM VON ANDREAS VESALIUS AUS DEM JAHRE 1538?

Von
Hans Hahn

Die ehemalige Reichsstadt Schweinfurt erhielt 1813 von Sophia Carolina Dorothea Kühner eine etwa 2100 Bände umfaßende Bibliothek geschenkt, die von den Familien Bausch und Schmidt gesammelt worden war. Frau Kühner war die letzte Erbin. Sie machte mit dieser sehr großzügigen Gabe Schweinfurt zur Besitzerin einer Büchersammlung von hohem Rang. Die Bücher wurden zunächst gegliedert, waren dann aber als »Bausch-Bibliothek« eine im 17. Jahrhundert entstandene sehr bedeutende Gelehrtenbibliothek[1]. In den letzten Jahren zerlegte man sie dann aber in ihre ursprünglichen Teile, wir haben nun eine Bausch- und eine Schmidt-Bibliothek.

In letzterer Bibliothek befindet sich nun ein Sammelband (im Folioformat) von Consilien und Badeordnungen, alle handgeschrieben. Consilien sind nach unserem heutigen Sprachgebrauch Besprechungen, damals waren sie die Beschreibung eines Falles bzw. einer Krankheit in schriftlicher Form. Sie sind gewissermaßen handgeschriebene Vorfahren unserer heutigen medizinischen Zeitschriften. Dabei sollte man wissen, daß es – modern gesagt – natürlich noch keinerlei Datenschutz gab, man konnte seine Fälle ohne Einschränkungen veröffentlichen.

Der 1732 gestorbene Elias Heinrich Schmidt signierte das Buch 1730, was aber nur besagt, daß er das Buch in diesem Jahr erworben, die in ihm enthaltenen Consilien und Badeordnungen aber nicht um 1730 geschrieben worden sind. Es spricht einmal dagegen, daß alle die wenigen darin genannten Personen im 16. Jahrhundert gelebt haben (Vesal, Herzog von Wirttenberg, Churfürst von Brandenburg, der Augsburger Bischof August Egenolf von Knöringen, der Speyrer Bischof Marquart von Hattstein) und daß zwei Consilien von 1611 bzw. von 1612 stammen.

Mindestens ein Consil ist auf eine Papiersorte geschrieben, die nach ihren Wasserzeichen 1605 bis 1616 in der Kanzlei der Reichsstadt Schweinfurt verwendet worden ist[2]. Man geht also nicht fehl in der Annahme, daß die anscheinend von einem einzigen Schreiber angefertigten Abschriften dieses Sammelbandes von Anfang des 17. Jahrhunderts stammen. Wenn auch Leonhard Bausch 1602 seine Stelle als Schweinfurter Stadtphysikus angetreten hat, gelangte dieses aus der Zeit von wahrscheinlich vor 1616 stammende Buch nach dem Besitzvermerk erst 1730 in den Besitz der Familie Schmidt. Müller hält ja die Existenz einer Physikatsbibliothek für möglich und sagt, daß der Bausch-Bibliothek geradezu der Rang einer Physikats-Bibliothek zugesprochen werden kann[3]. Haben wir mit diesem Buch einen Band einer solchen Bibliothek und damit zugleich den Hinweis auf die Existenz einer solchen?

Figure 1: First page of the article by Hans Hahn (1998) in which he mentions for the first time the copy of the 1538 Vesalius consilium.

that, for whatever reason, could not be seen in person by the doctor. Although this would be the first consilium ever written by Vesalius, no further research on it was performed in the 21 years that followed Hahn's publication which mentions this hitherto unknown consilium.

The newly discovered consilium, dated October 12, 1538, was intended for Bernardus of Augsburg, and is probably not only the first one ever by Vesalius, but also the longest of his known consilia. The original text was written after the publication of his *Tabulae anatomicae sex* (Venice, April 1, 1538) and his adaptation of Winter's *Institutiones anatomicae* (Venice, May 5, 1538), but before his *Bloodletting letter*, published in Venice in April 1539. However, the latter publication was probably already finished earlier, as stated in the foreword to Count Gabriel of Ortemburg, signed in Padua on January 1, 1539.

At the time of writing the consilium for Bernardus of Augsburg, Vesalius, although only 24, was already appointed as professor, but later he mainly published on anatomy. Even his *Bloodletting letter* can be considered an anatomy-based study on the physiology of 'movements of the blood', intended to present the therapeutic application of bloodletting in case of pleurisy.[4] Already shortly after December 6, 1537 Vesalius' student and friend Vitus Tritonius documented a clinical lesson (*Cura phlegmonis*) by Vesalius on the same problem.[5]

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1. The discovery happened after a trip to Nuremberg, including a visit to the *Skt. Rochusfriedhof*, that took place in the framework of the preparation for our publication on Georg Buchner. Ref.: Steeno O, Goddeeris T, Biesbrouck M, "Georg Buchner (1536-1598), Andreas Vesalius' last companion", in *Vesalius – Journal of the International Society for the History of Medicine*, 25 (no 2), 18-44, 2019.
2. Hahn H, 'Befindet sich in einem Sammelband der Bauschbibliothek die Abschrift eines bisher nicht bekannten Consilium von Andreas Vesalius aus dem Jahre 1538?' in *Mainfränkisches Jahrbuch für Geschichte und Kunst, 50*, "Archiv des historischen Vereins für Unterfranken und Aschaffenburg", Band 121, 218-222, 1998.
3. Hans Hahn (1921-2001) was a medical doctor and had more than 50 years a practice as family doctor in Geldersheim (close to the West of Schweinfurt). In his free time he collected archaeological objects he found in the region and he informed the *Landesamt für Denkmalpflege* in Würzburg every time excavation work took place in order to recover any discoveries. He did research and published on the prehistory and early history of Frankenland. On April 6, 2001 he donated his extensive collection to the Archaeological Museum of Geldersheim.
4. Biesbrouck M, Steeno O, Goddeeris T, 'De aderlating in de *Paraphrasis in nonum librum Rhazae* Vesalius' eerste werk' [Venesection in the *Paraphrasis in nonum librum Rhazae*, Vesalius's first work] in Bob Van Hee & Maurits Biesbrouck (eds.), *Cahiers Geschiedenis van de Geneeskunde en Gezondheidszorg*. Nr. 11. *Tijdgenoten uit de leefwereld van Andreas Vesalius*, Antwerpen – Apeldoorn, Garant, 23-38, 2018.
5. Biesbrouck M, Goddeeris T, Steeno O, *Vitus Tritonius Athesinus, studiegenoot van Andreas Vesalius*, in preparation.

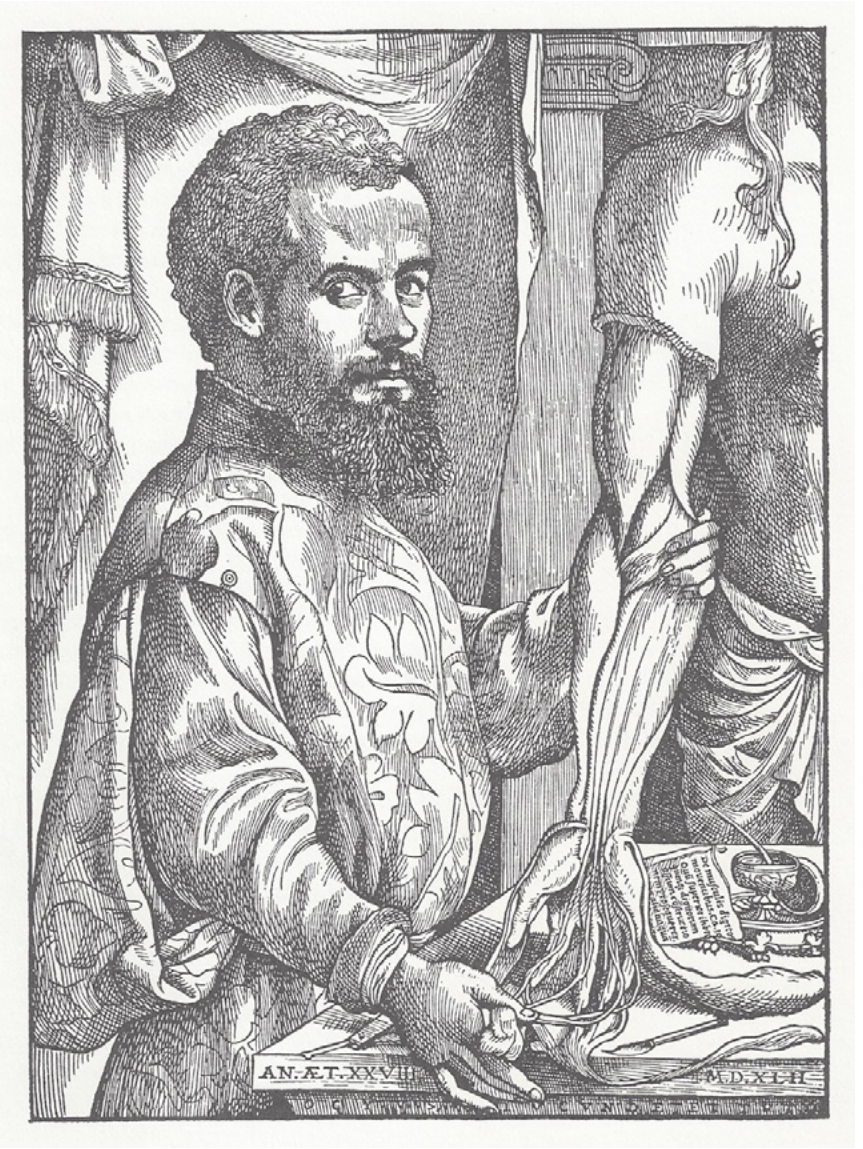


Figure 2a: Andreas Vesalius (1514–1564) at age 28. Woodcut presumably by Johan Stefan van Calcar, from the 1543 edition of Vesalius's *Fabrica*.

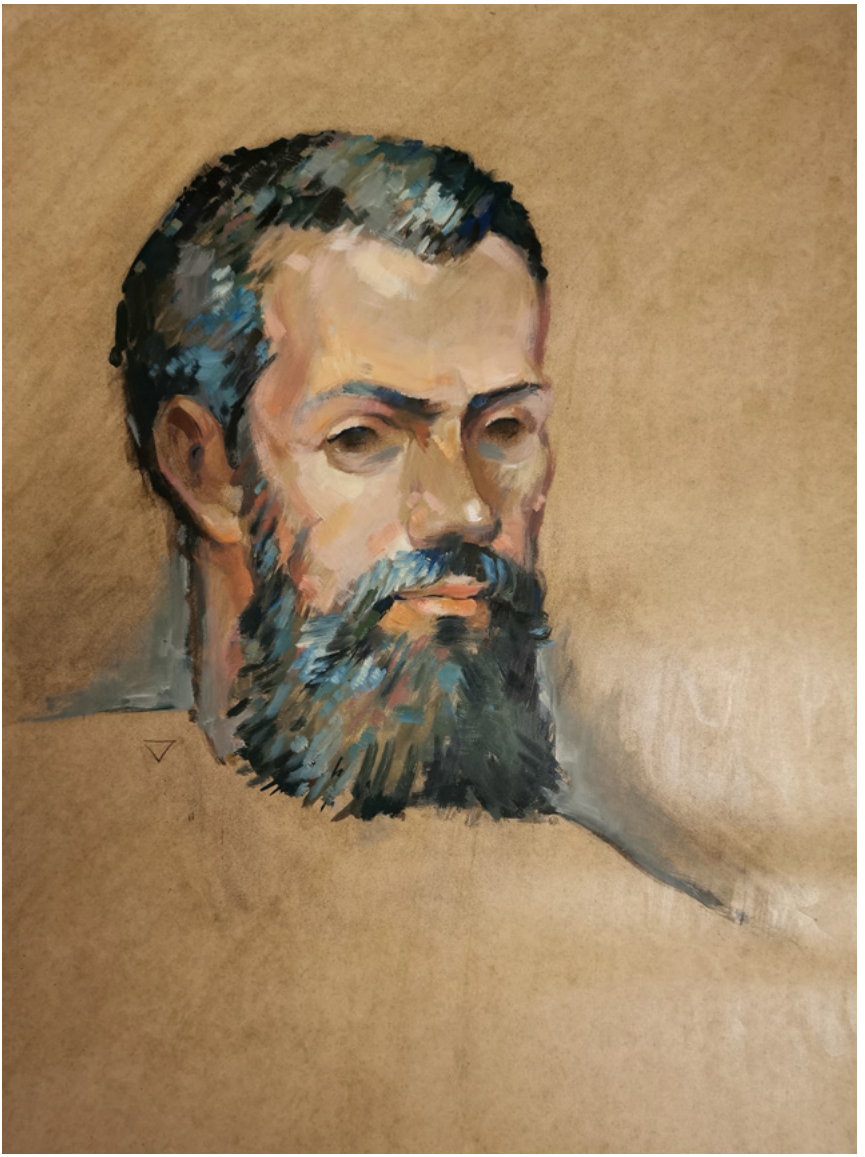


Figure 2b: Portrait of Vesalius (oil on cardboard, 56 x 71 cm. with frame), possibly unfinished, by an unknown artist (only signed with a small triangle on the left) from a legacy in the region of Würzburg (44 km from Schweinfurt). 20th Century. (Collection Omer Steeno)

The newly discovered consilium presents the young Vesalius as a clinical doctor, as this document deals mainly with clinical problems and contains hardly any anatomical elements, similar to his earlier work *Paraphrasis in nonum librum Rhazae* (Leuven, February 1537). The only anatomical element can be found on page 252 of the new consilium, discussing the 'origin' of the *vena seminalis*.

The Consilia by Vesalius

Although the inventory of the consilia by Vesalius, as compiled by Harvey Cushing (Fig. 3), has been completed over the years with additional finds, it is obvious that the consilium for Bernhardus of Augsburg is a new discovery.[6] In vol. 25 of the Bibliotheca Belgica, Ferdinand van der Haeghen cites four consilia (VIII.A, VIII.C, VIII. E and VIII.F, see tables 1 and 2).[7] Moritz Roth mentions the consilia twice in his biography of Vesalius from 1892.[8] The first mention appears in a separate section dealing with the end of Vesalius' life (*Hofdienst 1562-1564. Konsilien. Ende*). An appendix of the same work (*II. Vesals Konsilien, Fastendispens, Briefe*) includes a transcription of the consilia VIII.A, VIII.B, VIII.C, VIII.D, VIII.E, VIII.F, VIII.M and VIII.J.[8]

In 1914, de Feyfer[9] was the first to catalogue the works of Vesalius in a structured way. He compiled the consilia and some of Vesalius' letters in a separate chapter (IX. Konsilien und Briefe). He referred to a total of ten documents of which six are classified as consilia, and as a rule gives them a name based on the author that first mentioned a specific consilium. One however, the Pfister consilium, is named after the patient for whom the consilium was intended. Hence, the six consilia are indicated as: Montanus, Pfister, Ingrassia, Forestus, Garetius and Scholtz. Further to these, de Feyfer mentions the Dispensation letter for Sebastien de l'Aubespine,

6. Cushing H, *A bio bibliography of Andreas Vesalius*, Chapter VIII The 'Consilia', 171-181 and 236-238, New York, Schuman's, New York, 1943; reissued by Hamden, Archon books, London, 1962.
7. van der Haeghen F, *Bibliotheca Belgica*, Bruxelles : Culture et Civilisation, 1964, Tome V, 721; re issue of Première série, Tome XXV (UND-VIV), Gand, Camille Vyt, La Haye, Mart. Nijhoff, 1880-1890.
8. Roth M, Andreas Vesalius Bruxellensis, Georg Reimer, Berlin, 1892.
9. de Feyfer, FMG, 'Die Schriften des Andreas Vesalius' in Janus, 1914, 19: 435-507; the only cataloguing bibliography of Vesalius before Cushing and the basis for the numbers in his Vesalius-bio-bibliography (1943/1962). New edition as "Extrait du Janus", Leyden, E.J. Brill, 1914, 73 pp., ill. with corrections: Idem, 'Lijst der geschriften van Andreas Vesalius met aanteekeningen voorzien' [Annotated List of the Works of Andreas Vesalius] in Nederlandsch *Tijdschrift voor Geneeskunde*, 1915, 59: 86-113.

Bishop of Limoges and the letters to A.P. Gasser, Johan Sturm and Heinrich Petri.

However, it is not always easy to classify these documents as a regular letter (related to a non-medical contact), or as a consilium (a specific written medical consultation). Harvey Cushing used similar codes of numbers and letters as de Feyfer and classified the consilia in a separate chapter (Chapter VIII) in the Vesalius biobibliographies of 1943 and 1962.[9]

Table 1 documents all 15 known consilia by Vesalius with the publisher and the year of the first publication, as well as, if known, the name of the patient, the medical problem concerned and the year in which the consilium was written. Table 2 reviews the timing of the publications that mention newly discovered consilia.

Table 1: Overview of Vesalius's consilia.

Cushing-code	Reference	Recipient/patient medical problem	Date production
VIII.A	Montanus (1572)	?, problems of vision	1542
VIII.B	Roth (1892)	Pfister, skin disease	1553
VIII.C	Ingrassia (1568)	Duke of Terranova, purulent axillary fistula	1562
VIII.D	Forestus (1590)	young man with nasal bleeding	c. 1556
VIII.E	Garetius (1592)	Louis of Flanders, arthritis	1550?
VIII.F	Scholtz (1598)	?, epilepsy and tinnitus	before 1546
VIII.G	Dodoens (1580)	?, urinary/gallbladder stones	1559 or earlier
VIII.H	König (1954)	Lienhartus Haug, kidney stone	1542
VIII.I	Schwarz (1909-10)	v. Stubenberg, a boy, nerve problem foot	1547/48
VIII.J	Velschius (1667)	Gasser, autopsy aorta-aneurysm	1557
VIII.K	Hunt (1930)	wife of Prince of Orange, melancholy	1558
VIII.L	A. de Ruble (1881)	king Henri II of France, autopsy	1559
VIII.M	A. Burggraeve (1841)	S. de l'Aubespine, fasting dispensation	1561
VIII.N	Waltz (1878)	Naves, tibia – nerve – anal tumour	1546
VIII.O	Hahn (1998)	Bernhardus of Augsburg, gonorrhoea	1538

Table 2. Newly referenced Vesalius consilia in the literature (Codes following Cushing: VIII. …)

Reference	**Newly referenced consilia**	**Total number**
van der Haeghen 1880-1890	VIII.A, C, E, F	4
Roth 1892	VIII.B, D, J, M	4
de Feyfer 1914	no additions	0
Cushing 1943	no additions	0
Cushing 1962	VIII.G, H, I, K, L	5
Opera Vesalii 2019 [10]	VIII.N, O	2
Total number		**15**

10. See chapter VIII 'Consilia' in *Opera Litteraeque Andreae Vesalii* at <www.andreasvesalius.be>, updated annually.
11. The Bausch and Schmidt families were related to each other by marriage (vide infra) and within five generations a total of six medical doctors were active. Over the years they collected 1829 volumes with around 5200 scientific documents. This collection is currently preserved in the city library of Schweinfurt. Two thirds came originally from father and son Bausch, the remaining from members of the Schmidt family. Between 1603 and 1723, a member of the Bausch/Schmidt family was consecutively city physician in Schweinfurt. In 1652 Johann Laurentius Bausch founded in Schweinfurt the *Academia Naturae Curiosorum*, hence his Matrikel (registration) number 1 on the list of members. This academia was the first scientific and medical society in Europe and hold the motto *Nunquam otiosus* (Never idle). The organisation still exists as *Deutsche Akademie der Naturforscher Leopoldina*. Several doctors of the Bausch/Schmidt family were members of the Leopoldina and as all official members received a surname:
1652: Johann Lorenz Bausch, Matrikel-Nr. 1, surname Jason I
1661: Elias Schmidt, Matrikel-Nr. 20, surname Phaeton I
1686: Johann Heinrich Schmidt, Matrikel-Nr. 153, surname Phaeton II
1722: Johann Christoph Schmidt, Matrikel-Nr. 361, surname Phaeton IV

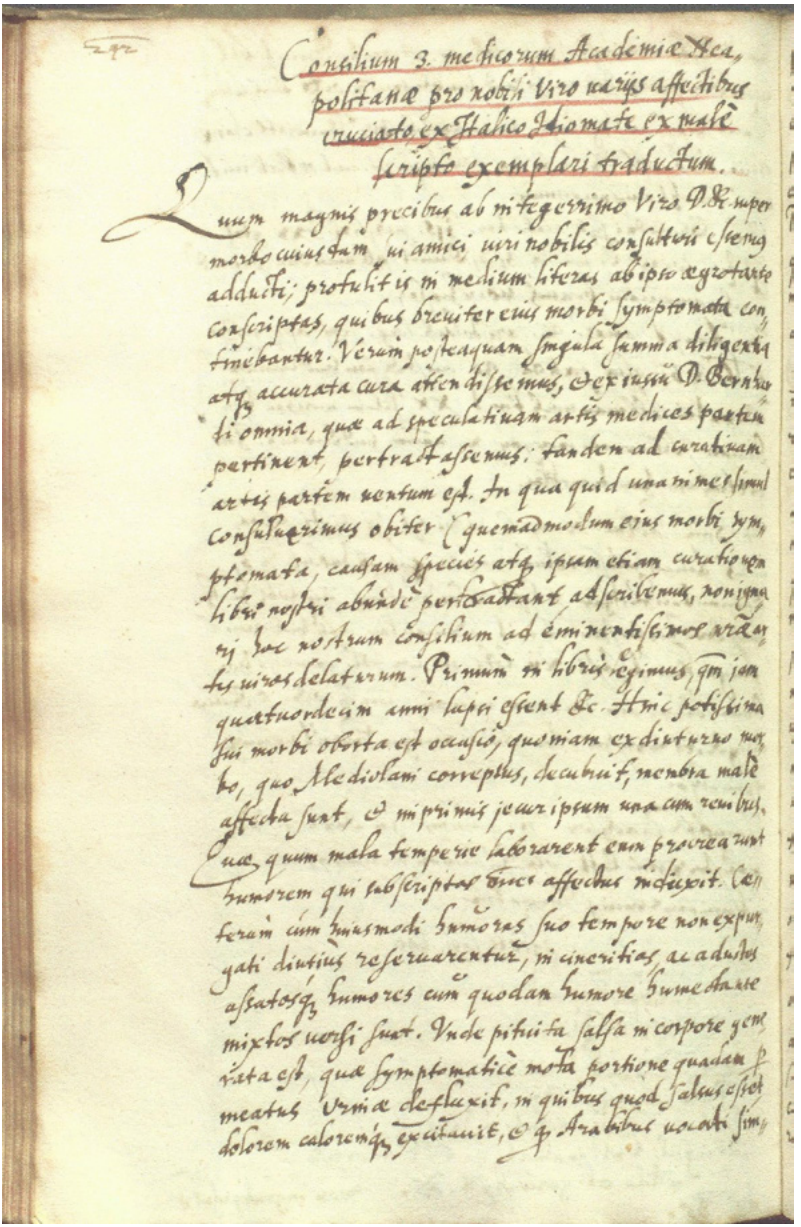
Origin of the consilium for Bernardus of Augsburg

The 1538 consilium is part of a collection (in folio) of handwritten consilia and prescriptions for bathing, mostly from the 16th century. The compilation was marked '1730' by Elias Heinrich Schmidt (died 1732) and was part of his personal library, later called the Schmidt library. The date 1730 probably indicates that Schmidt acquired his collection in that year, although the content obviously is much older, as most of the authors mentioned by name (Vesalius and others) lived in the 16th century. However, two consilia were written in 1611 and 1612. All transcripts are from the same hand and written on paper with watermarks in use in Schweinfurt between 1605 and 1616. Hence the copies must have been made at the beginning of the 17th century.

Furthermore, Leonhard Bausch (1574-1636), a city physician in Schweinfurt from 1603 on and a relative of Schmidt, had an impressive medical book collection (Physikatsbibliothek).[11] This collection was given to the city of Schweinfurt in 1813, together with the Schmidt collection by Sophia Carolina Dorothea Kühner, the last heiress of both collections. In total they contained 2100 volumes.

Initially the whole collection of books was catalogued as belonging to the Bausch library but was separated again and classified as the Schmidt and Bausch book collections at the end of the 20th century. This explains why Hans Hahn in his publication of 1998 still cites the 1538 consilium as belonging to the Bausch collection, although originally it was part of the Schmidt collection. However, several elements connect the collection of consilia to Bausch. His name is mentioned on page 31, and the possible dating corresponds with his biographical information. Furthermore, Bausch studied in Jena together with David Verbeezius (1577-1644), a medical doctor mentioned in the folio. Verbeezius practiced in Ulm, Stuttgart, Augsburg, Strasbourg, and Speyer. However, although the cover relates the book to Johann Heinrich Schmidt (1660-1723), the volume is also mentioned in the oldest catalogue of the Bausch library. Nevertheless the only documented ownership is by Elias Heinrich Schmidt (1707-1732), the son of Johann Heinrich.

Figure 3: Harvey Cushing (1869-1939), famous neurosurgeon, and author of a Vesalius bio-bibliography.



Consilium 3. medicorum Academiæ Ticinensis pro nobili viro variis affectibus cruciato ex Italico Idiomate ex male scripto exemplari traductum.

Cum magnis precibus ab integerrimo viro D. Be. super morbo cuiusdam sui amici viri nobilis consulteri essemus adducti; protulit is in medium literas ab ipso egroturo conscriptas, quibus breviter eius morbi symptomata continebantur. Verum postquam singula summa diligentia atq; accurata cura attentissemus, deprimis D. Bernardi omnia, quæ ad speculativam artis medicæ partem pertinent, pertractasse mus; tandem ad curativam artis partem ventum est. In qua quid una mecum simul consulturi essemus obiter (quemadmodum eius morbi symptomata, causam speciem atq; ipsam etiam curationem libri nostri abunde perscrutantur adscribemus, non ignari) hoc nostrum consilium ad eminentissimos viros tuos viros delaturum. Primum in libris legimus, qui iam quatuordecim annis lapsi essent &c. Huic potissimum sui morbi obortæ est occasio, quoniam ex diuturno morbo, quo Mediolani correptus, decubuit, membra male affecta sunt, & in primis ipsum os una cum genibus, quæ quum mala temperie laborarent eum procreant humorem qui subscriptos huius affectus inducit. Certe cum huiusmodi humores suo tempore non expurgati diutius reservarentur, in cacochymias, ac adustos asatosq; humores cum quodam humore humectante mixtos versi sunt. Unde pituita salsa in corpore generata est, quæ symptomatice mota portione quadam per meatus urinæ defluxit, in quibus quod salsus esset dolorem calorem q; excitavit, & p. Arabibus vocati sim,

Figure 4: Title page of the copy of the 1538 Vesalius consilium (source: Stadtarchiv und Stadtbibliothek, Stadt Schweinfurt, *Bausch-Bibliothek*, B 319).

The Schmidt (-Bausch) folio
Title: *CONSILIA GERMANICA ET LATINA auch badordnungen;*
Content: 2 folios and in total 366 unnumbered pages.
Format: 2°.
Index: f. [1v]: *Index consiliorum* (incomplete).
Description: *Katalog der Bausch-Bibliothek* (AHL 32), Nr. 650 (p. 114).
Indication: *Bausch-Bibliothek, B 319*.

The preliminary *Index consiliorum* presents an incomplete overview of 39 consilia and eight bathing prescriptions. The 1538 consilium of Vesalius is not specifically mentioned, but the next one for the same patient, but without mentioning the name, is recorded. The bathing prescriptions can also be considered as consilia, because one of them is addressed to a specific patient (*pro D. Mumprechto*).

The only other consilium for a specific patient is the one for the Duke of Württemberg. Overall, the 79 consilia and bathing prescriptions are intended to treat various ailments. Sometimes specific places, known for their healing waters are mentioned (Boll, Welzheim, Wildbad and Zell). Furthermore, several places in the South-East of Germany, especially around Swabia, are cited (Augsburg, Adelmannsfelden, Lauingen, Nördlingen, Tübingen and Ulm). This could indicate that the origin of the documents is situated in that part of Germany.

Only a few of the texts are dated, but the most recent one added dates from 1612 on, and hence we suspect that they were written somewhere between the second half of the 16th century and the beginning of the 17th century. That time frame corresponds with the period the watermark was in use, as confirmed already in Hans Hahn's publication. Supplementary to the consilium that is attributed to Vesalius, several other doctors are mentioned including Johann Winter von Andernach (1487-1574), one of Vesalius's professors in Paris, and David Verbeezius.[12,13]

12. Müller U, 'Die naturwissenschaftlichen, mathematischen, technischen und medizinischen Handschriften in der Bausch-Bibliothek' in Susan Splinter e.a., *Physica et Historia, Festschrift für Andreas Kleinert zum 65. Geburtstag, Stuttgart: Deutsche Akademie der Naturforscher Leopoldina*, Acta Historica Leopoldina, 2005, 45: 131-145, Halle (Saale), 2005.
13. Müller U. e.a., 'Die Bausch-Bibliothek in Schweinfurt. Katalog' in *Acta Historica Leopoldina*, 32: 114, 2004.

The 1538 consilium by Vesalius

The principal reason for the 1538 consilium by Vesalius is clearly presented in the introductory sentence. The consilium starts with the following statement: "A consilium by three doctors of the University of Naples, for a nobleman suffering from several ailments, translated from the original Italian (to Latin), and based on a badly-written manuscript."[14] (Fig. 4)

Clearly, Vesalius's consilium is a reaction, based on a Latin translation of a letter in Italian, apparently written by a single colleague, although he was aware that in total three doctors had been consulted by the patient. It is rather unlikely that Vesalius would sufficiently master the Italian language after only one year in the country. However in a letter dated 1544 he asks Benedetto Varchi to write to him in the future in Italian as he wants to maintain his skills.[15, 16] This is an indication that he could understand Italian, but was not very fluent in it. The transcript of the consilium however, indicates that Vesalius answered his colleague in Latin.

The complete consilium consists of 22 pages (section 242 to 263 in the folio) in easy-to-read calligraphic handwriting, with a limited number of abbreviations. The style of the letters indicates that this copy of Vesalius's consilium must be dated much later than the original, but in a time when Latin was still the common language amongst scientists and doctors. However, the Latin language used here differs from the Latin that Vesalius used in other publications. The structure of the sentences is rather simple and is in no way comparable to the Ciceronian complexity of the language used in the *Fabrica*. (Fig. 5) The fact that the consilium is a purely clinical document may explain this difference, as indeed the diagnostics are not based on physiological nor pathophysiologic information.

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14. *Consilium 3 medicorum Academiae Neapolitanae pro nobili viro variis affectibus cruciato, ex Italico Idiomate ex male scripto exemplari traductum.*
15. Letter by Andreas Vesalius to Benedetto Varchi, written in Brussels, from his parents' home, on November 26 [1544]. See Ongaro G, 'Due lettere inedite di Andrea Vesalio a Benedetto Varchi' in *Scritti in onore del prof. Pazzini*, Roma, 1968, p. 559-574.
16. For Vesalius's language skills in general and more especially in Italian see Biesbrouck M, Goddeeris T, Steeno O, 'Andreas Vesalius' opvoeding en zijn talenkennis' [Andreas Vesalius' Education and his Linguistic Knowledge] in Bob Van Hee & Maurits Biesbrouck (eds.), *Cahiers Geschiedenis van de Geneeskunde en Gezondheidszorg. Nr. 11. Tijdgenoten uit de leefwereld van Andreas Vesalius*, 9-21, Garant, Antwerpen – Apeldoorn, 2018.

Figure 5: Title page of Vesalius's *De Humani Corporis Fabrica* (Basel, Oporinus, 1543).

Furthermore, much of the therapeutic advice is based on naturally occurring products and polypragmasy, and thus may explain the rather 'regular' language.

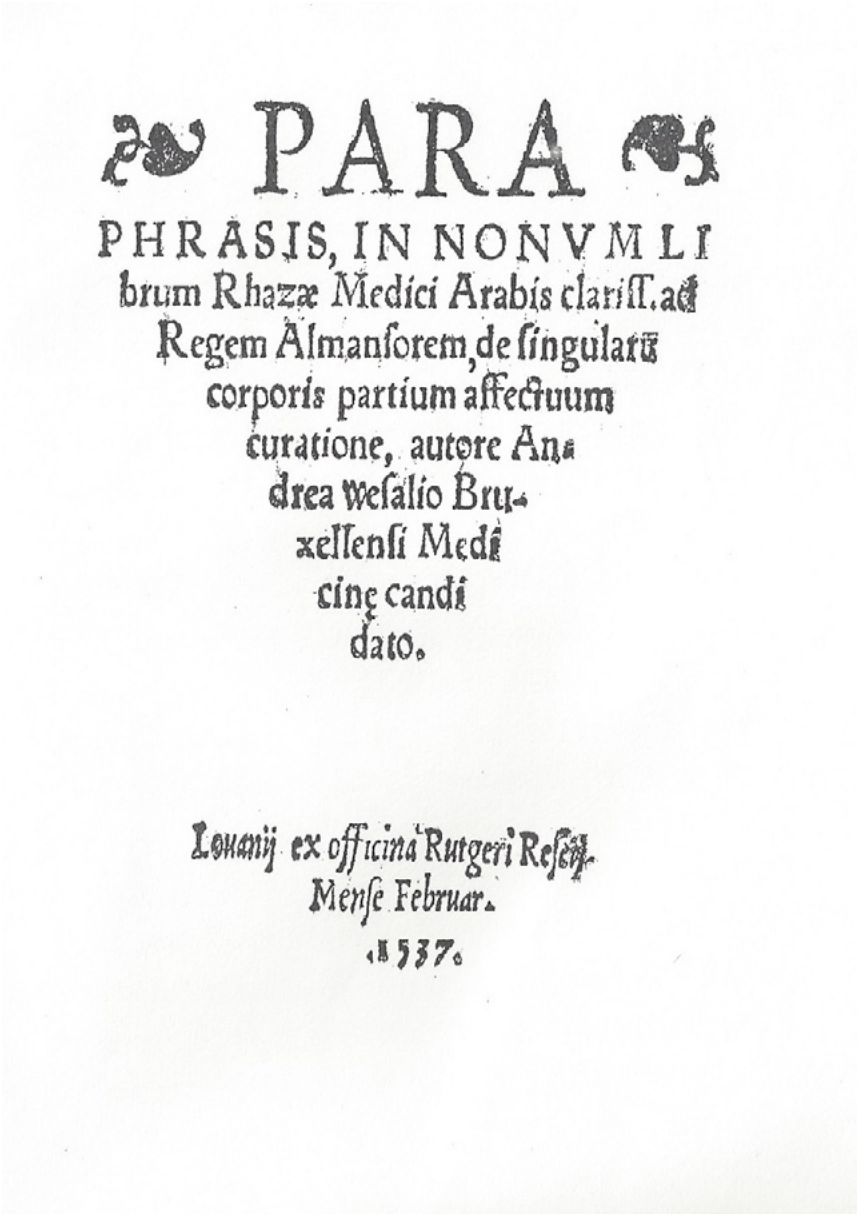
Hence, this consilium differs from Vesalius's main opus the *Fabrica* in terms of language used and is closer to the language as used in his *Paraphrasis*. (Fig. 6) Although the document preserved in Schweinfurt clearly is a transcription, there is no doubt that Vesalius is the author of the text. At this moment, we have no idea if the original Italian request, which was the reason for Vesalius to write this consilium, still exists, nor who translated the 'badly written' original Italian text by the three Neapolitan doctors. We can question even if it was possible to translate the original request in a reliable fashion, in view of the poor quality of the original.

The original manuscript of the 1538 consilium as written by Vesalius himself is still missing, and we do not know if it still exists. However, the timeline can be reconstructed as follows:

1. Three doctors from Naples write an Italian letter of poor quality (as stated in the Schweinfurt document).
2. The Neapolitan doctors send their letter to Vesalius (probably to other doctors too) and add a letter from Bernhardus himself.
3. The letter of the Neapolitan doctors is translated into Latin (also based on the Schweinfurt document).
4. Vesalius writes his reaction in Latin.
5. Vesalius's consilium is copied many years later and is incorporated in the Schweinfurter folio.
6. The Schweinfurter document is translated for the first time into English in this article.

The discovery of the Vesalius consilium by Hans Hahn

Hans Hahn strangely enough puts a question mark at the end of the title of his article in which he announces the discovery of a manuscript of the 1538 consilium by Vesalius. As the consilium ends with an indication of a specific place (Padua), date (October 12, 1538) and even the name of Vesalius, it seems very reasonable to believe that the content of this consilium is indeed by Vesalius himself. Although Vesalius was already a recognised medical doctor



PARA

PHRASIS, IN NONVM LI
brum Rhazæ Medici Arabis clariſſ. ad
Regem Almanſorem, de ſingulari
corporis partium affectuum
curatione, autore An-
drea Veſalio Bru-
xellenſi Medi
cinę candi
dato.

Louanij ex officina Rutgeri Reſcij.
Menſe Februar.
1537.

Figure 6: Title page of the first edition of Vesalius's *Paraphrasis in nonum librum Rhazae* (Leuven, R. Rescius, February 1537).

in 1538 and was active in that role in Padua, we can question why three Neapolitan colleagues would request a medical advice for a nobleman from a junior doctor (and most probably junior to themselves), that had only about one year of experience.

A possible explanation could be the fact that, after fourteen years of medical trial and error, they wanted to consult, not only with a young doctor who had recently graduated, but one who was already professor at one of Europe's most respected universities. At the time of writing his consilium, Vesalius had been professor of Surgery (*explicator chirurgiae*) for eleven months at the famous university of Padua and was responsible for teaching anatomy.[17,18] However, the same Neapolitan doctors also consulted Benedictus Victorius Faventinus, professor of Theoretical Medicine, also at the University of Padua.[19] Indeed, it was not uncommon to ask, a consilium for an important patient from several respected colleagues. Bruhesius, for example, asked several colleagues, among them Vesalius (see consilium Cushing VIII.E) for a consilium concerning Louis of Flanders.[20]

The title of the transcript should rather be seen as a description by the copyist and not as the formal title of the original consilium. Several other details indicate the hand of the copyist: the name Vesalius is written with a single 'V' although Vesalius himself still used at that time a double 'VV', and the consilium is signed as 'Andreas Vesalius Bruxellensis' although Vesalius himself, definitely later in his life, signed as 'Andreas Vesalius'. (Fig. 7)

Hans Hahn published his article before the consilium was completely translated by Studiendirektor Güssregen, because as he states, 'the translation was difficult and time consuming'. This

17. O'Malley CD, *Andreas Vesalius of Brussels 1514 1564*, University of California Press, Berkeley and Los Angeles, 75-79, 1964.
18. Biesbrouck M, Steeno O, Goddeeris T, 'Andreas Vesalius: de periode maart tot december 1537. Zijn academische graden. Een werkhypothese' [A Working Hypothesis on Andreas Vesalius and his academic degrees between March and December 1537], in "Vesalius in 1535", see <www.andreasvesalius.be>.
19. Biesbrouck M, Goddeeris T, Steeno O, Op. cit. sub 5.
20. Biesbrouck M, Steeno O, Goddeeris T, 'De briefwisseling van de Brugse arts Petrus Bruhesius en Andreas Vesalius' *consilium* voor Lodewijk van Vlaanderen' [The Correspondence of Petrus Bruhesius, Physician in Brugge, and Andreas Vesalius's *consilium* for Lodewijk van Praat] in *In Monte Artium. Journal of the Royal Library of Belgium*, 2015, 8: 7-48, 2015.

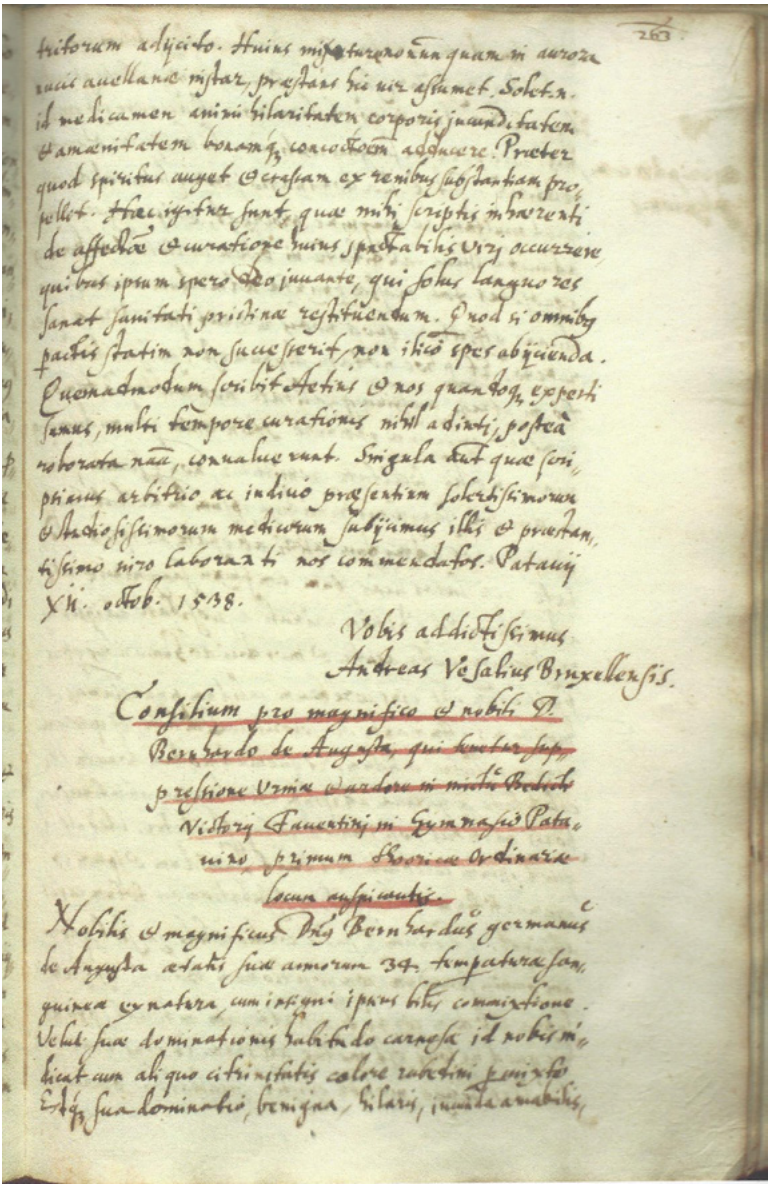


Figure 7: Last page of the copy of the 1538 Vesalius consilium with his name and the date, followed by the beginning of the consilium of Benedictus Victorius Faventinus for the same patient.

is remarkable as the transcript can be read quite easily and even a summary would have allowed a short discussion of this newly discovered consilium.

The consilium can be divided in two parts. The first part is rather short (pp 242-247) and discusses the content of the original request, as it was addressed to Vesalius, and the medical history of the patient. This first part ends with the word 'Finis'. The second part is double the length (pp 247-263) of the first part and contains the personal advice of Vesalius (*solertium nos subijcimus*). Additional remarks to the text have been added by another (later?) hand, but the original copyist also wrote some personal notes in the margin. Furthermore, in the margin of page 254 and in the text of page 255, a couple of small drawings have been added that illustrate some sounding instruments, as they were constructed and used by Vesalius himself and to which he refers in this consilium. (Fig. 8a and 8b)

All these aspects of the transcript of the 1538 consilium refer to Vesalius, and hence it is very reasonable to consider Vesalius as the author. We can only guess why Hans Hahn did not promote his important find more actively, but it could be that he was not so familiar with the figure of Vesalius. Nevertheless he felt that the find of this hitherto unknown consilium by Vesalius was a remarkable discovery.

The diagnosis in the 1538 consilium

The primary complaints of the patient, as described in the consilium, are related to the urinary system. The symptoms started a long time ago, while the patient was in Milan and are described as recurrent difficulty in voiding, painful micturition and even haematuria. This description could fit with the clinical picture of recurrent haemorrhagic cystitis.

However, it is claimed that the patient also suffers, in combination with the previous symptoms, from a continuous involuntary flow of semen, indicated by Vesalius as *fluxus seminis*. The semen does not have the usual colour nor smell, and it is obvious that the patient complains of a purulent urethral discharge! Obviously,

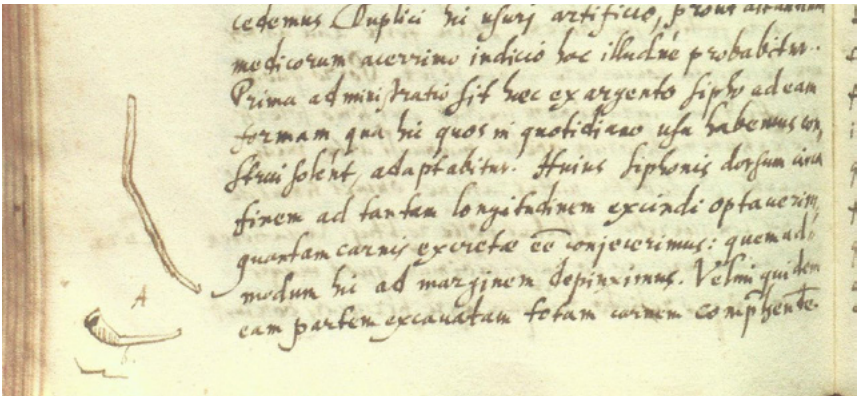


Figure 8a: The sketches of the urinary sound in the margin of the copy of the 1538 consilium (page 254, source idem sub Fig. 4).

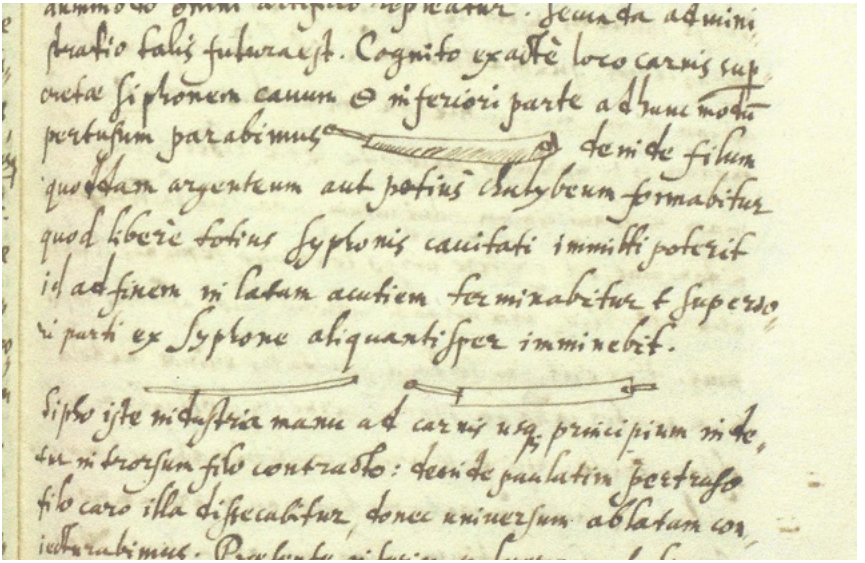


Figure. 8b: The sketches of the redesigned sound within the text of the copy of the 1538 consilium (page 255, source idem sub Fig. 4).

Vesalius was not able to make a distinction between a flow of semen or a purulent discharge, as microbes and infectious diseases were unknown in his time. However the urinary symptoms in combination with the urethral discharge that existed for 14 years, indicate most probably that he suffered from gonorrhoea (literally 'flow of semen').

The patient's medical condition was further complicated by an ulcer (erosion) in the urethra and a wart-like growth at the level of the bladder neck. The patient had been sounded multiple times, but this did not ameliorate his situation and had even caused bleeding. As the symptoms started 14 years before the consilium was requested (p 242, medio), and as the patient was 32 years old at the time of the request (p. 247, end), he must have been infected at age 18.

The term gonorrhoea is mentioned for the first time by Joannes Fernelius (Jean François Fernel 1497- April 1558) (Fig. 9), who is also known to have introduced the term 'physiology'.[21] Fernelius was a professor of Medicine at the University of Paris and was a teacher of Vesalius. He mentions gonorrhoea in 1548 in his book *De abditis rerum causis*, but did not distinguish between gonorrhoea and syphilis.[22,23]

Already on the first page of this consilium, Vesalius mentions the concomitant liver problems of the patient, and repeats this halfway his consilium, although the patient apparently did not present any specific symptom related to liver pathology (no icterus), Vesalius however insists on the importance of the liver for the course of the medical situation of this specific patient.

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21. Joannes Fernelius introduced the term gonorrhoea in his book *De abditis rerum causis*, Parisiis, apud Christianum Wechelum, 208, 1548: … *vasis spermaticis renibusque affectis, gonorrhaea se promit, qua virus turpissime velut eructando eijcitur*. He also discusses gonorrhoea in another publication *De luis venereae*. However, Fernelius did not know the difference between gonorrhoea and syphilis. He considered gonorrhoea a symptom of syphilis and divided the disease in four degrees (stadia).
22. Kiple KF, *The Cambridge Worlds History of Human Disease*, 759-760, Cambridge University Press, Cambridge, 1993.
23. W.F. Bynum WF, Porter R, 'The specificity of gonorrhoea and syphilis' in Idem, *Companion Encyclopedia of the History of Medicine*, vol. I, 567-568, Routledge, London, and New York, 1993.

Figure 9: Jean Fernel or Ioannes Fernelius (Montdidier, near Amiens 1497 – Fontainebleau 1558), line engraving by N. de Larmessin, 1682.

The consilium by Benedictus Victorius Faventinus

In the bundle, the consilium by Vesalius is followed by another consilium, written by the same hand and apparently for the same patient. This consilium starts with the following inscription, underlined in red:

> *Consilium pro magnifico et nobili D.*
> *Bernhardo de Augusta, qui tenetur sup-*
> *pressione urinae et ardore in mictu Bedicti*
> *Victorii Faventini in Gymnasio Pata-*
> *vino, primum theoricae ordinariae*
> *locum auspicantis.* (see Fig. 7)

The first sentence of this consilium presents a bit more details on the patient than in the consilium by Vesalius:

> *Nobilis et magnificus Dnus Bernhardus germanus*
> *de Augusta aetatis suae annorum 34 temperatura san-*
> *guinea ex natura, cum insigni ipsius bilis commixtione…*

Obviously this consilium was written by Benedictus Victorius Faventinus (Benedetto Vittorio from Faenza, 1481-1561) in Padua where he was professor of Theoretical Medicine.[24] The consilium is dated 1539 and hence is written a bit later than the one by Vesalius. Victorius allows us to get more information about the patient: Bernardus, a German noble man, 34 years of age (in 1539), originally from Augsburg and married (p. 271).[25] He also mentions that the patient was a patrician and got angry easily! Victorius describes elaborately the physical condition (*complexio*) and the general health of the patient. Vesalius mentions that Bernardus was a trader (p. 247, last sentence).

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24. Benedictus Victorius Faventinus (Faenza, 1481 – Bologna, 1561) became professor in Padua in 1532 (Antonio Riccoboni, *De Gymnasio Patavino*, Padova, apud Franciscum Bolzetam, 1598), five years before the arrival of Vesalius. He later went to Bologna (1540) and was the most important teacher of Pieter Van Foreest.

25. Benedictus Victorius Faventinus, 'In suppressione, et ardore urinae inter mingendum pro Nobili Domino Bernardo Augustano' in *Medicinalia consilia ad varia morborum genera*, Venetiis, in officina Erasmiana, apud Vincentium Valgrisium, 1551, ff. 244 r – 251 v; see Consilium XXX. This sentence is absent in the Schweinfurt manuscript.

propter ipſos inferius retractos eſſe. Et ex his ſalutaribus remediis, certè nedum ſuccurremus ſuppreſsioni menſtruorum, uerum & omnia corrigentur ſymptomata, quibus Magnifica & Generoſa Domina male tractatur. Ad Dei Gloriam. Amen.

Benedictus Victorius Fauentinus dum in Academia Patauina Medicinæ Theoricam profitebatur hæc dixit.

FINIS.

IN SVPPRESSIONE, ET ARDORE urinæ inter mingendum

Pro Nobili Domino Bernardo Auguſtano

Conſilium XXX.

NObilis, Et Magnificus Dominus Bernardus Germanus, de Auguſta ætatis ſuæ annorũ. XXXIIII. temperaturæ ſanguineæ ex natura, cum inſigni ipſius bilis commixtione, ueluti ſuæ Dominationis habitudo carnoſa id nobis indicat: cum aliquo citrinitatis colore rubedini permixto. Eſtque ſua D. benigna, hilaris, iucunda, amabilis, & admodum grata. Quòd ſi aliquando propter bilem cito, & uelociter iraſcatur, ſanguinis tamen benignitate repente placatur, & quoniam in eo cholera non ab acumine eſt immunis, ideo per eam ſanguis continue

Figure 10: First page of consilium XXX by Benedictus Victorius Faventinus for Benardus Augustanus, from his *Medicinalia Consilia*, Venetiis, apud Vincentium Valgrisium, 1551.

This consilium by Victorius had been published previously (1551) in Venice, simultaneously with another consilium also by him. (Fig. 10) From the beginning Victorius indicates that he deals with the same patient for whom Vesalius was asked to consult: *Nobilis et Magnificus Dominus Germanus, de Augusta aetatis suae annorum xxxiiii* ("the noble and glorious German gentleman from Augsburg, 34 years old"). However, on the last page of his consilium, Victorius indicates that this consilium was written in 1539 (*praesenti anno M.D.XXXIX*), which would mean that the patient would have been 32 years old as Vesalius indicated on October 12, 1538.[26]

The symptoms as described in both consilia are quite similar: a sharp and corrosive pain during urination, the inability to pass urine notwithstanding extreme urgency, blood at sounding to remedy the swelling at the level of the bladder neck, finally blocking of the bladder neck and an extreme burning sensation in the urethra. As a theoretical cause for the blockage he considers 'verrucous flesh' that finally results in an ulcer, and because of the blood he also suspects a little stone. However, a bit later in the consilium he rejects these causes (p. 266), contrary to Vesalius. The patient had also a lot of discomfort during coitus.

After the first part with the description of the symptoms, Victorius continues, similar to Vesalius, in a second part with some general precepts and recommendations. These include several prescriptions with various medicaments that often are the same as in the consilium by Vesalius, for example cassia, manna and turpentine.

Contrary to Vesalius in his consilium, Victorius refers often to Galenus and Avicenna. At the end Victorius also mentions that the patient visited the baths in the area of Padua in 1539. This probably were the *Termae Abano*, situated South-West of Padua in

26. Between the 12th of October 1538 and the end of 1539, 12 months could have elapsed. As he could have turned 33 at the earliest the day after the 12th of October 1538, this consilium must theoretically have been written by Victorius between the 13th of October 1539 and the 31st of December 1539. This can explain the variation in age (between 32 and 34).

the middle of the Euganean hills (also depicted in the background of the 'muscle men' of Vesalius' *Fabrica*).[27]

The text from Schweinfurt manuscript (ca. 1612) differs from the printed version (1551). The copyist chose alternatives for some specific words and thus changed the content significantly. He writes for example "shells" instead of "snails", "pigeon chicks" for "chicken chicks", "water" for "turnip", "disease" for "immobility", "double" for "quadruple", and "purification" for "medication". Furthermore in the Schweinfurt manuscript, several less important words have been skipped. This gives the impression that the copyist wrote down what he thought was important, without taking too much care to precisely copy the original text. Also the interpunction in the Schweinfurt manuscript is more logical and modern than in the Venice version.

The published version of the Victorius consilium misses the last six pages, following the word 'Finis' in the original manuscript. In these extra pages Victorius criticises the local physicians who had initially treated the patient, after reading the accompanying letter describing the original medical history of the patient.

He indicates that they committed, from the beginning, an error against the rules of theoretical medicine.[28] His critical comments are followed by a series of his own new prescriptions. He indicates to start with a cleaning of the body by vomiting, followed by laxation, and afterwards bathing in Carpi and Padua. He further advises an electuary based on sweetened water lily,[29] and indicates that he contacted, in this respect, Ludovicus Contius, also named Tosettus, who was a professor *primum locum*.[30] He warns

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27. Cavanagh G.S.T., 'A new view of the Vesalian landscape' in *Medical History*, 1983, 27: 77-79, ill. Also: Idem, *The panorama of Vesalius: A 'lost' design from Titian's studio*, Athens (GA), Sacrum Press, distributed by Emeritus books, 1996, 20 pp.
28. Victorius was professor of theoretical medicine at the University of Padua. Hence he could allow himself to be very critical for the doctors that had consulted previously with the obvious statement: *Vidi magnum errorem medicorum in principio commissum et hoc ex defectu partis theorica medicinalis.*
29. An electuary (in Latin 'electuarium') is a paste-like formulation of medicine mixed with honey or other sweetener to ease oral consumption by licking.
30. Ludovicus Carentius is meant, also named Tosettus. He was from Padua and exerted the function of regular professor *primum locum* in practical medicine for 15 years. See Jacobus Facciolatus, *Fasti Gymanasii Patavini*, Patavii, Joannes Manfré, 330, 1757.

against the use of sounds and rather advises on bathing the patient. Additionally, he recommends to the patient, who he identifies several times as a 'patrician', to take different recipes with the same ingredients as those advised by Vesalius.

As the last six pages of the Victorius consilium are missing in the printed 1551 version, we can suspect that the Schweinfurt manuscript has not been copied from the Venetian text. The Schweinfurt manuscript also misses many words compared to the printed version. This could be due to negligence of the copyist, although he carefully comments on the content of the consilium at several places in the margin of the text, similarly as he did in the Vesalius' consilium. Curiously enough, as in the Vesalius consilium, at two places in the margin of the Victorius consilium, the letters XB are written (pp. 264 and 278), although, contrary to the Vesalius consilium, not underlined. Their significance remains unclear.

Original Latin text of the 1538 consilium by Vesalius

[242] Consilium 3 medicorum Academiae Neapolitanae pro nobili viro variis affectibus cruciato, ex Italico Idiomate ex male scripto exemplari traductum

Quum magnis precibus ab integerrimo Viro D. etc. super morbo cuiusdam sui amici viri nobilis consulturi essemque adducti; protulit is in medium literas ab ipso aegrotante conscriptas, quibus breviter eius morbi symptomata continebantur. Verum posteaquam singula summa diligentia atque accurata cura attendissemus, et ex iussu D. Bernhardi omnia, quae ad speculativam artis medices partem pertinent, pertractassemus: tandem ad curativam artis partem ventum est. In qua quid unanimes simul consuluerimus obiter, quemadmodum eius morbi symptomata, causam species atque ipsam etiam curationem libri nostri abunde pertractant adscribemus, non ignari hoc nostrum consilium ad eminentissimos nostre artis viros delaturum. Primum in libris legimus, quam jam quatuordecim anni lapsi essent etc. Hinc potissima sui morbi oborta est occasio, quoniam ex diuturno morbo, quo Mediolani correptus, decubuit, membra male affecta sunt, et imprimis jecur ipsum una cum renibus. Quae, quum mala temperie laborarent eum procrearunt humorem qui subscriptae hinc affectus

induxit. Caeterum cum huiusmodi humores suo tempore non expurgati diutius reseruarentur, in cineritias, ac adustus assatosque humores cum quodam humore humectante mixtos versi sunt. Unde pituita salsa in corpore generata est, quae symptomatice mota portione quadam per meatus urinae defluxit, in quibus quod salsus esset, dolorem caloremque excitavit, et quod Arabibus vocati sim

[243] plicis medicamenti bauras naturam naturam [sic] ac qualitates referret, continuum dissolvit, atque hinc ingentem dolorem cum excoriatione, ex qua praeterea ulcus productum fuit is humor procreavit; sicque cum ardore sanguis nunc paucus non multus effluxit, nimirum pro humoris ad partem decumbentis copia. Primi medici in vera horum affectuum curatione aberrarunt, quod causae antecedenti quae erat membrum humorem mittens, ipsum vique iecur animum non attenderint; sed ad solam coniunctam vulgo vocatam causam errutione dissexerunt ad eius ablationem, lactis, per syphonem iniectione usi sunt, atque ita nonnihil dolorem et aestum mitigarunt. Caeterum quum vera causa morbi, quae antecedens erat, non aufferretur, post menses novem nunc dictorum symptomatum recidivam aeger passus est. Deinde et Venetiis solius coniunctae causae curatio facta est nec quaquam autem antecedentis; quum a. balneo in oleo infusum fuit, et olei potu uteretur, majori impetu symptomata cruciarunt, et cum ingenti dolore urinae motus adeo suppressus fuit, ut necessitas syphonis usum praescripserit; cuique ope urina effluxit, sed sanguinis et urinae stillicidio cum comitante ardore et dolore suo sequente, quem affectum vulgo stranguriam dicimus. His affectibus sex mensium spacio aeger excruciatus fuit, nec quicquam myrobalani promoverunt, quod si magis obstruerent quam conferrent, nam et has pro sanguinis fluxu, medici aegrotanti obtulerunt. Atque eam ob causam omnino earum usum prohibemus; siquidem ad praesentem effectum remedia, quae subtexemus, longe praestantiora sunt, deinceps balnea, quae Augustae vulgo sorbron vocantur minus proposito serviverunt. Nam haec cum praedictis remediis causae duntaxat coniunctae, sunt auxilia.

[244] Unde postnam [sic] majori in dolores subsequebantur. Et quod haec medicamina nihil conferrent ex indies increscentibus affectibus facile animadvertere licuisset. Qui adeo increscebant, ut syphonis immissione nihil promoveretur ac proinde chirurgi syphonibus magnum impetum facientes, nec quicquam ob carnem verrucam referentem quae in vesicae collo erat, promoventes majori vi syphonem ad vesicam usque

immiserunt, et magnum sanguinis fluxum concitarunt, tantum sane ut miremur, aegrum in vi sanabile animi deliquium (mortem dicimus) non nicidisse [sic].Verum cum iam aeger sanguine propemodum destitutus esset, urinaeque meatus dilatati, urinae copiam ad duas amphoras usque excrevit. Verum quatuor in sequentibus annis bene convaluit ablata nim. cana principe, non dicimus sanguinis, sed fortassis per aliam corporis regionem cana derivante. Sed quod adeo insigni intemperie jecur et renes laborarent, et si quatuor annis convaluisse visus est, morbus difficilis cum magno impetu facile repetiit, et syphonis usus parum promovit. Verum frequenti syphonis frictione ulceris caro verrucosa disrupta fuit, sanguisque ex pene clarus et pulcher effluxit, qui tantus excernebatur, ut aegrum moriturum adstantes arbitrarentur. Nec haec vera fuit morbi curo. Cerebrum imbecille redditum, atque ob partium inferiorum cum superioribus consensum ipsius facultates quoque imbecilliores factae sunt. Sic quoque ob semen propter crassitudinem ex calore aut spirituum resolutione aut dolore aut alia quapiam causa simile de defluxu aspectus et causae.

[245] Porro quemadmodum non mediocriter ad artis curativae partem prosit huique aegritudinis radicem locumque affectum cognoscere. Simul omnes tres conclusimus renes vesicam et vesicae collum principes esse affectas partes, addidimusque omnes has partes majoris minorisque ratione affectas esse. Caeterum quod sensum maxime affectum vesicae collum cognoscitur, nunc causarum sanguinis fluxus enumerationes postponimus. Sed id tantum adiungemus, huique sanguinis fluxus authorem fuisse solutionem continui quae in ulcere colli vesicae ex salsa pituita producto, facta creditur. Quod ulcus temporis successu carnem hanc verrucam referentem induxit, quae liberum urinae per vesicae collum transitum prohibet atque ex illo dolor et calor conciliatur, et cum urina sanguis et virulentia quaedam cum filis quibus dum ex salsa pituita promanavit. Renum affectus, iecur occasio est, ex eo enim affectum deducens causa demittitur. Sic quoque vitiorum vesicae, renes authores sunt. Princeps itaque affecta particular iecur ipsum mala temperie ut nos monuimus, laborantem. Quod ad salubres causas curativae artis partis spectat, quam plurimae sese offerunt intentiones. Prima in opportuna sex rerum non naturalium administratione consistit, atque imprimis cibi et potus. Verum quum opinemur, hoc negotium a medicis suis diligenter perpensum non prolixius eam partem prosequemur. Tamen regulam subiungemus utilissimam. Quod sc. nos affirmamus aductionem iecoris

praeter temperantem jam pridem precedentis morbi fuisse generantem causam et causae: quare credimus nunc ipsum quoque adustum subiacentibus membris malos humores praeparare. Quare in curatione quae a contrariis desumi debet, actu ac potentia frigida adhiberi convenit. Hoc facto principio ab universalioribus

[246] auspicabimur. Caeterum quum fere opinati fuerimus malam intemperiem radicatam ac fixam esse subinde remedia repetere convenit. Inter caetera autem utatur Cassia recenter extracta bis in mense pondere ℥j quae aut in iure dissolvet, aut cum sacharo mixta instar boli devorabit. Item convenit mucilago 4 sem. conium refrigerantium seu frigidorum, si ea ter in septimana aeger usus fuerit, cum syrupis succi epaticae aut boraginis aut lupuli aut fumiterrae suis aquis admixtis. Postea ex usu erit terebinthina debiti lota et par os assumpta, estque ea, quod praestantissimum sit remedium, sumenda saepius. Deinde conducunt ex charabe et alkakengi trachisci absque sn'opio cum portulacae aqua. In primo Vere ordinarie suo dominatio purgabit fiat infra scripta purgatio cum praesentibus syrupis. Postea assumet Cassiam, Diacathol. et Mannam. Deinceps revertetur ad praescriptos a mucilaginibus syrupos, et offeremus conditum buglossatum, violatum rosatum boraginatum, et syr. de succo fumiterrae supercaloris ratione. Jecur autem irrorabitur cum succo solani, cichoreae aceto et rosacea aq. Syrupus quoque simplex de cichorea. Mense autem aprilis convenit lactis potus, assumetur autem diebus quatuor adhuc ex uberibus calidum. Verum capram refrigerantibus herbis nutriri conducit. In curationis a progressu utetur confectionibus Midritati et theriacae hae siquidem confectiones scrupuli pondere his diebus assumptae singulares censentur. Iam facta universali purgatione, alia possemus adducere remedia, quorum praesentem affectum curativum congeriem nostri libri complectuntur. Animum tamen attendat tua dominatio, hunc affectum cum multis aliis, opportune victus ratione magis, quam pharmacis indigere. In cibo itaque et potu cibos intabit calidos et acres et vapores

[247] multos emittentes. Utantur vero cibis minime excrementisiis et bene nutrientibus, quos omnibus hominibus cognitos scimus. Absolutis intentionibus anteced. causae ad coniunctam praeparandum est; atque hic a manuali arte auxilium petendum est. Ulceris curatio multis intentionibus perficitur princeps et omni ulceri communis est exiccatio una cum mundificatione; atque sic demum carnem inducere convenit; suntque haec chirurgis notissima. Quare nobis curatio una-

nimiter celebrata uni corporis purgatione syphone haec pluribus diebus infundendum et lacti miscendum liquorem aliquem adstringentem ac exiccantem, deinde simul miscenda partim exiccantia et corroborantia, atque ita brevissime haec intentio complebitur. Verum caveant chirurgi ne corrodentium medicaminum usu et copia verrucosae carnis vulnus exasperent, ne ob exquisitissimum partis laborantis sensum ulcus augeant. At quod impossibile erit, alia ratione hanc carnem amovere et aeger si non auferatur moriturus sit, summopere huic nobili viro conduceret, si ex nostra patria quendem in hac negotio peritissimum ad se vocaret, is enim Dei auxilio certissimam huique affectus opem profiturus est. Quare ut ad illum chirurgum aeger accedat, aut ipsum ad se vocet, suademus. Quod si fieri nequit, vel saltem consilium eius expetatur. Haec ad nobis propositum casum sufficiunt, atque interim solertium medicorum, qui isthic sunt suffragiis nos subiicimus. Finis.

Aegrina

Desideratur quorundum, praestantissimi Viri, symptomatum curatio, aetatis triginta duorum annorum calidi et humidi temperamenti, absque magno tamen excessu habitus alioquin robusti, animi in negotiis perficiendis strenui vitae generis in perfectionibus et primorum mercatorum curis constitute. Hunc Mediolani aliquando

[248] febris diuturna, continuaque potius, quam intermittens invasit. A febris curatione sanguinem diebus aliquot una cum urina eiecit. Sanguinis mictum urinae difficultas (quam dysuriam graeci vocant) sub se acta est. Hanc medici immisso syphone curantes, aegrum aliquot septimanis pristinae in reddenta urina consuetudini restituerunt. Secuta est deinceps alia urinae retentio, quam ischuriam vocamus, quam rursus medici curare aggressi, balneis humectantibus, ac quantum suspicor emollientibus et laxantibus atque urinam perlicientibus pharmacis, eiusmodi fuere myrobaloni citrinae et chebalae usi fuerint, arbitrati, ex urinae constitie, et expultricis facultatis imbecillitate malum praecipue pendere. Eorum medicamentorum usu id effectum est, ut guttatim urina saltem emitteretur, cum sc. virgae meatus balneis dilatatus, urinam facilius transmitteret, ipsaque tenuior fluxibiliorque reddita commodius permanaret. Verum cum his parum compotes noti fierent ad syphonis quem catheterem alii syringam aut argaliam vocant, usum refugerunt. Hunc non ut prius in vesicam, usque dimittere potentes, variis modis immissionem tentarunt, ac in eodem loco obstaculum percipients carunculam ex priore ulcere, ut

mox dicam enatam, perfregerunt, atque disrupta venula duae propemodum sanguinis evacuatione, et continuis per syphonem inductis doloribus, aeger in animi deliquium propemodum concidit, ac sopore oppressus percommode obdormivit. Verum nulla urina penitus excernebatur. Inter dormiendum suavi somno correptus semen genitale copiosum eiecit, quod statim urina subsequntante atque commoda eius excretio longo temporis intervallo perseveravit; modo omnia rursus repetant. Urinae enim

[249] difficultas, in voluntaria ac continua fere absque tentigine seminis emissio, lumborum dolor et gravitas, dum feces excernit seminis major copia emittitur, quod interdum vas atque altero nucis in glandis prosamine contineri vix posset. Accedit his propter ulcerosam in virga intermeiendum sensum et in matulae fundo arenulas, atque in urina natalia corpuscula filorum speciem referentia, quinque sensuum et principis animae facultatis torpor, ac imbecillitas. Visus tamen imprimis ac memoria. Exigitur itaque horum affectuum, qui praesentiam implicant, curatio, quae ex causarum cognitione praecipue petenda venit.

Symptomatum ennumeratorum causae

Febris igitur causam tanquam ad rem parum pertinentem, omittemus. Excretionis vero san- guinis debilitatem renum ac vasorum veluti relaxationem causam suspicari licet. Ac retentionis urinae carunculam in vesicae collo obortam censemus. Nam cum sanguis cum plurimis aliis humoribus, qui febrem induxerant, effluerent. Verisimile est, vesicae meatum, ob illam humorum colluviem, acrimoniamque exulceratonem passum fuisse; nisi forte ex vena ex vesicae collo aperta, is sanguis profluxerit, ac illi quemadmodum de ulcere dicam, caro supercreverit. Huic exulcerationi cum in loco esset calido ac humido, multo sanguine abundante, in quo potissimum caro luxuriari consuevit, illi carni cicatrix eminentior nec vicinis partibus aequalis superinducta est. Videmus quippe indies in praeputii exulcerationibus, huiuscemodi molliusculam carnem, cauda instar supercrescere, cum tamen ea pars nervosior ipso vesicae collo existat. Caeterum carnem hanc vesicae collo vesicae obortam urinae meatum angustiorem reddidisse, quam sententiam confirmat prior syphonis immissio. Carne .n. illa syphone suppressa optime successit curatio. Verum non ea, quae perpetua

[250] foret. Nam praestantissimo illo Viro calido et humido nunc multo sanguine abundante rursus alia caro priori callo exulcerato suc-

crevit, quae prioris magnitudinem superantis maius stillicidium ac urinae difficultatem majorem, quam prior induxit, nec ut prior syphonem se praeterire sinit. Hanc urinae difficultatem medicus curare aggressus urinae suspicatum esse crassitiem urinam citantia porrexit quibus aspectum quidem non restituit; sed et urina commodius paulo efflueret, effecit ea, incidentium usu tenuiori reddita. Verum cum caruncula huiuscemodi in causa esset ad syphonem recurrit, quo carnis portionem perfregit; causa simul incisiori vena quapiam, unde sanguinem secundum effluxisse constat. Urina autem mox post administrationem non egrediebatur quod detrusa carnis portio et sanguinis grumus meatum adhuc opplerent. Verum semen quod in vasis seminariis ex titillatione, et ut sit in syphonis immissione pruritu collectum fuit, carnem illam et grumum expulit, quorum excretionem iam libero meatu, urina copiosa commode subsecuta est. Novimus enim in seminis excretione a musculis duobus longis virgae, communem seminis et virgae meatum distendi semenque veluti ejaculari universo corpore adhuc tanquam convulsione ad eam partem correpto, auxiliante. Impetus enim et illa meatus distentio, seminisque ejaculatio id effecerunt, ut ex una excreto grumo et superflua carne, urinae emissio secuta fuerit. Itaque factum est, ut aliquandiu absque molestia circa partes genitales aeger vixerit. Nunc demum involuntaria seminis eiectio plurimum molesta est, cuius praecipue causae esse consueverunt, seminalium vasorum laxatio, aut apertio a nimio et frequenti coitu, aut corruptum semen quod in coiti quidem ad vasa attractum fuit, tamen ob imperfectam et expultrius imbecillitatem excretum quem admodum.

[251] fieri videmus, quum quis mox repetit coitum, et nihil perfluit. Ita enim semen servari solet et tandem corrumpi. Deinde vasa seminalia laedere ac tandem illis laxatis promanare. Est et alia causa nim. vasorum seminalium imbecillitas aut resolutio aut et intemperies calida, cui accedit Veneris abstinentia in homine calido et humido cuius temperies praestantem hunc virum esse intelligo. Verum fluxus seminalis vi eo authorem esse colligo, aut eam quam primo loco esse diximus; vique coitu absque seminis eiectione; nihil n. arguit cur minus ipsum Veneri deditum esse censeamus nec raro id usu venit et impotentior quis ex repetito concubito reddatur. Si temperantior fuerit, dubio procul ultima causa mali occasio est, nimirum seminis abundantia qua sua temperies repleri consuevit, et earum partium imbecillitas retentricis dico facultatis primum expulsoria robusta concurrente. Huic rationi suffragatur balnei usus emolliens ac laxans; deinde calidorum medicaminum urinas moventium propinatio

largior. Nec ni eius symptomatis causis inquirendis prolixius insistendum etsi quum omnibus eadem propemodum curatio praescribatur. Quod vero inter egerendum copiosius emanat semen, mirum censeri non debet, cum rectum intestinum repletum ac tensum facile vasa seminalia ea parte, qua vesicae collo immittuntur comprimit. Nec vasa duntaxat pressa id efficiunt, cum vesicae cervicis pars inferior ad glandem quicquid continet seminis transmittit. Unde fit ut vix simul egere et meiere liceat. Semen hoc non naturale nec album et odoris propemodum expers excernitur sed ob moram et in vasis seminalibus corruptionem subflavum, purulentum ac quasi putridum apparet. Adde et puris aliquid et biliosi humoris commisceri. Caeterum quod ulcerosum sensum, dum urinam reddit, percipit; et praeterea dum penis erigitur. Hinc fit quod semen acrimoniae particeps earum esse voluit. Discimus.

[252] enim ex anatomica administratione sinistram venam seminalem, ab ea vena quae serosum humorem ad renem sinistrum diffundit enatam, ut inde serosi humoris aliquid semen sortiatur, quo pruritum ac voluptatem in coitu efficeret. Mora itaque qua semen continuo in vesicae cervicis meatu reservatur, id praestat ut eius acrimonia eius loco superficiem exulieret ac meatus doleat, cum urinae acrimonia ulceris continuitatem solvit. Accedit ad hoc quod semen hoc naturali calidius ob putredinem est, atque ob id magis exulcerat, quod vero in glandem et circa perinaei finem is dolor potissimum percipitur eo, quod ibidem ob con-cavitates quasdam major seminis portio reservatur, esse suspicor. Praeterea semen id in causa est, quod fila illa, ac filosae quaedam partes in urina natare videatur. Respicimus enim mox a coitu excretam urinam ea continere. Iam id magis patescet, si semini in vas quoddam injecto aqua aut urina affundatur. Nam in filosam substantiam id resolvetur. Arenulae in urinae fundo residentes, renum calorem arguunt eorum calculum testantur cum adsit praeter rerum calorem etiam gravitates sensus, quasi ponderis alicuius ab ilique suspensi. Caloris renum occasio praeter alia multa urinam ducentium creber et frequens usus esse consuevit praeter naturalem temperiem, frequentem equitationem, et crebram lumborum exercitationem. Essent igitur haec non parva calculi indicia et eiusdem efficiens causa. Materiam facile praebuisset victus ratio, cruditas, quae qualis nihil nisi coniecturari queo. Quamobrem optarim quum ita res se haberet diligentius a praesentibus medicis perpendi. Nam a calidis renibus huiscemodi arenulas in eius aetatis hominibus subinde etiam excerni loco, indico interim praesente in renibus calculo. Affectum quem.

[253] postremo enumeravimus sensus communis imbecillitatem ac principii animae facultatis torporem, quibus se implicitum scribit aeger, pendere arbitror ex copioso illo ac frequenti seminis fluxu, huius namque eductione multa spirituum dissolvitur substantia. Cum semen aliud nihil sit, quam optimi sanguinis portio cum spiritus nostri corporis copia. Unde aiebat Polyppus Hypapo [sic!], discipulus cui de semine liber est ascriptus divinum aliquid semini ni esse, eo quod tantilla nostri corporis substantia excreta, homo tantam dissolutionem ac veluti virium omnium ablationem perciperet. Videmus praeterea hos, quos continuus seminis fluxus exercet, tabe tandem consumi, aut in malum habitum aquamve intercutem decidere, quae argumento sunt corporis vires et spiritus eo fluxu dissolvi. Praeterea licet semen ab universis corporis partibus deferri creditur, optima tamen eius pars a cerebro decidit; adeo ut universum id a cerebro polypus deferri crediderit. Quamobrem mirum haud quaquam est, si non ut antea animalis facultatis actiones liberas et inculpatas habeat, maxime cum et nimia Venere utentibus idem usu venit. Inducam igitur symptomatum circa animalem facultatem existentiam nimirum seminis fluxum authorem esse. Eam sententiam praesentium medicorum acri judicio subscribens. Nam forte alia ad nos non descripta concurrere causa posset. Porro quod ad affectuum curationem spectat existimo solerti praesentium medicorum opera, manuali arte, medicamentis et debita victus ratione omnes simul de quibus conqueritur affectus posse restitui.

Cura

Curationem itaque aggressuri, ab eo auspicabimur, quod magis urget, et quo relicto, reliqua aegre percurari poterunt.

[254] ab urinae dico retentione, quam ob carunculam in vesicae colli meatum abortam esse, firmissime credo. Vellem quidem huius curationem seminis fluxus restitutionem praeire, ne dum carunculae animum adhibemus bonam fluxionem recitemus. Proinde ante omnia ab industrio manuali artifice, syphonem membro virili ad hunc modum immitti suadeo syphone paululum immisso digito ab exterioribus penis partibus syphonis caput tangetur ut locus ad quem penetrare nequit, perfecte sentiatur quod rectissime continetur, si semper sinister pollex syphonis capitis locato carnis locus notabitur facta interim notula ex atramento, aut leni per scalpelum sectione. Nec contenti erimus semel atque iterum locum hunc aut illum carnis invenisse, quin potius ter quatuorve donec absque dubio locus constet syphonis immisionem iterabimus. Ad eam administrationem cavo

syphone omnino opus est; sed tenui quopiam, qui quam minime aegrum efficiat, fortassis eum sypho ille tenuis ac ex molli plumbo fusus carnem eam perlabetur eiusque longitudinem ac altitudinem exacti commonstrabit. Diligenti itaque facta huius callosae partis inquisitione atque ipsius regione indubie notata (quam circa perinaei finem esse suspicor) ad carnis amolitionem procedemus. Duplici hic usuri artificio, prout astantium medicorum acerrimo iudicio hoc illudve probabitur. Prima administratio sit haec ex argento sipho ad eam formam qua hic quos in quotidiano usu habemus construi solent, adaptabitur. Huius siphonis dorsum circa finem ad tantam longitudinem excindi optaverim, quantam carnis excretae esse conjecerimus; quemadmodum hic ad marginem depinximus. Velim quidem eam partem excavatam totam carnem comprehendere {*Below at the left in the margin: two little sketches indicated as A and B.}*

{255} ut scilicet media illa siphonis pars A. i. ostendens immissione carnem sua cavitate B. ipsam carnem operiat. Hoc siphone diligenter intruso ac ita dictam carnem comprehendente causticum aliquod et erodens medicamen siphoni indemus in quapiam causam tenui et longo stylo intendemus donec ad carnem eam perveniat, eamque exedat ac corrodat.

Medicamenta corrodentia

Huique generis medicaminum sunt calx, praecipitatum aerugo Vitriolum aceti fex usta aqua quam separationis auri et argenti dicimus aut aqua quam magistralem pannorum vocant, aut capitellum ut nostri chirurgi aiunt ex calcis vinae et salis ammoniaci eiusque portione alique quod frita ex lixiniorum ficus adaptatur. His tamen portionem addendam suadeo, ut quae parum medicaminis, vim remittent et dolorem leniet. Hac administratione nihil ex vicinis partibus laedetur ac ipsa caro resumetur dummodo omni artificio repleatur. Secunda admini-stratio talis futura est. Cognito exacte loco carnis supercretae siphonem cavum et inferiori parte adhuc modum pertusum parabimus {little sketch} deinde filum quoddam argenteum aut potius chalybeum formabitur quod libere totius syphonis cavitati immitti poterit id ad finem in latam acutiem terminabitur et superiori parti ex syphone aliquantisper imminebit {two little sketches}. Sipho iste industria manu ad carnis usque principium indetu introrsum filo contracto; deinde paulatim pertruso filo caro illa dissecabitur, donec universum ablatam coniecturabimus. Praesente interim pulvere aut liquore qui in virgam immissus sanguini sistendo fiat, ut si forte magna sanguinis proportio profluat eam sistere queamus. Quare

utile fuerit braebisce ex succino aut charabe trochiscos, quos ad Rhazem autorem referimus. Praeterea ob eandem rationem, ante.

[256] huiuscemodi administrationem corporis plenitudinem axillaris venae dextri cubiti sectione anteferendam putaverim. Ita enim sanguinis fluxus minor redditur nec tanta inflammationis suspicio habenda erit. Harum itaque administrationum altera caro superflua auferenda erit; mox utendum exiccantibus ac adstringentibus, quae cicatricem iam facto ulceri inducere nata sunt, ut ilico pars cicatrice obducta non amplius luxuriante carne impleatur, urinaeque eatum occupet, quae vero id praestabunt erunt aut pulveres ex cupressi nuce, pompholige cinnabari quod nostrae officinae sanguinem Draconis dicunt, aloë lota, aut quopiam eius generis medicamine. Quem pulverem siphone illo, quo priorem administrationem confici volui, rectissime immittemus. Vel si pulveris usum repuerimus, ad liqiorem aliquem confugiemus, quemadmodum erit lactis caprini serum cui iam dicta medicamenta immaduerint. Quemadmodum si pompholygis sarcocollae lotae aloës cuiusque drachmam in tenuissimum pulvisculum subactum lacti caprino inderemus, id clystere virgo continuo seminis fluxu ulcerato; sicque una curandi ratione duos affectus sopiemus. Haec erit perfecta difficultatis urinae medela. Nam praeter callosam illam et carneam substantiam nihil obstare credo; nisi forte urinae crassities aliquid malo addat, cui facile ex tanta medicaminum urinam moventium ac extenuantium sylva succurri poterit. Non n. aliquam quatuor facultatum laesarum iecoris, renum aut vesicae in causa puto, non grumum sanguinis aut lapidem, meatum opplentem non transversim vesicae musculum convulsum in tumorem aliquem praeter natu-

[257] ram qualis est inflammatio, aut erysipelas atque multo minus urinae, aut flatus copiam vesicae fibras devincentem. Quum igitur ad urinae vitiae amolienda haec sufficiunt ad seminis involuntariam fluxionem orationem divertemus. Cuius curatio potissimum perficietur ad vasa fluentis revulsionem deinde in vasorum depurgatione; ultimo in effluentis seminis constrictione, vasorumque corroboratione. Principio itaque ex Cassiae bonae recenter extracta drachmis septem et tamarindorum drachmis tribus, bolum ut vocant cum saccharo conficiemus eumque borula ante prandium aut semiborula porrigemus. Vel si bolus displicet cassiam ac tamarindos altheae aq. aut decocto diluemus potionisque instar porrigemus. Altero a sumpto medicamine die axillarem dextri cubiti dividemus novem sanguinis uncias paulo plus minusque pro aegrotantis

viribus detrahentes. Inscribo ptisanam integram probe coctam et cicerum jus et vinum album tenue ac urinas movens, porrigemus. Quarta aut quinta die in aurora 3ii selectioris terebinthinae in mae aq. exactissime lotae deglutiendas dabimus, terebinthina in hostiis madidis involuta. Haec quoque alvum aliquoties deijciet. Ista ni fallor ad materiae fluentis revulsionem evacuationem vasorumque repurgationem sufficient nisi forte hyrundinibus [sic], quoque ano appositis aliquot uncias sanguinis educere luberet. Proinde mox fluxus sistendus hac methodo erit. Primum unguentum parabitur quo ter quaterne in die frigida manu testes ac vasa seminalia, qua pubis ossi incumbent una et renum regio inungentur. Conficietur aut id in hunc modum. Accipe nucleorum malorum domorum seminis herbae pulicaris, quam psylium dicimus utriusque.

[258] unciam semissem macerentur in aq. cucurbitae calida et eliciatur sucus, quem mucilaginem dicunt, adijciaturque violati, nenupharini papaveris amygd. d. cuiusque 3ii albumina ovorum recentia duo, addat et succi menthe. Ins. flor. violarum bol. armenij cuiusque scrupulum unum camphorae optimae drachmas duas et dimidium cerae albae momentum formetur unguentum molliusculum. Huius unguenti illinitionem intermisso intervallo, fotus hic subsequetur rosar. rab. nimium, cupressi gallarum immaturarum balaustiorum, corticam malorum punicorum rad. nymhae cuiusque aut aliquorum portionem aliquam. Haec i. radiorem pulverem retusa sacculo insuemus eumque in vino nigro adstringente ac solum in succo recoctum et modice depentem testibus ac pubi aliquandiu accommodabimus. Eo amoto rursus testes et pubem inangemus; id minimum bis in die repetendum erit, interim pudendis ac renibus frigido aeri expositis renum regioni laminam plumbeam varie pertusam applicabimus eam priusquam calefiat auferente, aliamque eius loco accommodabimus. Si interim insessus ex solani gallarum corticum malorum punicorum, corticum interiorum ulnij, myrthi baccarum, hypocytidos, rhoa nymph. fol. rad. er flor. deiectione eos imprimis referre putaverim. Affusa interim aceti portione albi. Scimus praeterea non mediocriter conferre quorundam liquorum adstringentium ac corroborantium. Quemadmodum si a quam destillationis aluminis et prunellorum, quas acacias vulgo vocamus, crebro per siphonem, potius quam clysterem immittemus, et praeterea, si aliud nihil prohibuerit, ad frigidam lotionem defugere confert, quae omnem morbum ex fluxione, ut inquit Aetius obortum depellere consuevit, maxime si medicamentoris

[259] in qualitate aqua praedita sit. Proderit et intermissis viribus antidotus haec, si adsumatur. Sem. salicis 3vii calamentheu 3vi sem. viticis 3v rutae 3iiii sem. cicutae 3ii cum nympheae decocto in pastillos redigito ac ex eis ad ponticae nucis magnitudinum cum poscae cyathis tribus praebeto. Omitto aliorum medicamentorum formulas huic vitio. Idoneas ne omnia in unum egere videamur. Caeterum dum his medicamentis utimur, porco eoque refrigerante et siccante aegrum enutriemus. Proinde his quae aegre corrumpuntur et difficulter permutantur. Utemur eiusmodi lenticula recocta etc. Dandum in potu et cibis viticis et cannabis semen praesertim tostum, ratae item semen ac fol. lactucae semen et cauliculi ac nympheae radix a triplex infactum cucurbita ac cucumis. In potu vero quotidie pro communi aq. aqua qua ferrum saepe extinctum est praebeatur. Si vino uti volet propinabitur nigram et adstringens, aut lac, cui nympheae radix iniecta sit. In aurora autem et ante caenam hunc syropum porrigemus:

R/ syrup. nenuphar. ℥js. aq. nenuph. aq. papav. a ℥j. aut aquar. loco rad. nymph. alb et flor. aureum habentis et sem. agni casti decoctum, addita sachari portione. Quod vero quiete utendum sit, omnisque Venera cogitatio procul arcenda nulli dubium esse scio. Ob idque locus obscurus, et lectus cui papaveris cortices, viticis et rutae et calamenthae, cicutae et nymphae, et hyosciami folia substrata sunt, et in latus decubitus maxime probantur. Hac medicandi ratione faedam seminis excretionem, et fila illa in urina natantia supprimentur. Nec haec solum efficiet, immo simul calorem illum renum auferet,

[260] omnes circa inferioris corporis partes affectus restituet nisi forte renum calculum adesset, qui privatam omnino curam post haec omnia exigeret. Verum cum ea de re dubitem, eam nunc praeteribo alias cum majori otio illam perscripturus. Si aliquando integerrimum illum virum contineri suspicio fuerit. Caeterum seminis fluxu cessante animalis facultatis pristinae operationes subsequentur. Suppresso n. seminis fluore corporis spiritus recolligentur universumque corporis ad primum habitum proba adhibita.

Diaeta

Victus ratione, redibit. Coaliscit autem haec non solum in quantitate qualitateque potus et cibi, sed in omnibus quae velimus nolimus nobis accurrunt, ut somo et vigilia quiete et motu, excretis, detentis animique affectibus praecipue tamen in aëre, qui non solum intrinsecus

nobis adhaeret, sed intima nostri corporis penetralia per inspirationem continuo adigitur. Quae igitur ad cibos potusque attinent, seu satis per se nota non exequor.

XB. Nemo n. est qui nesciat, maligna cibaria et varia et malo ordine sumpta cruditatemque et crapulam maximam et corporibus et animis indacere noxam. Residua vero quinque genera non adeo in propatulo, posita breviter percurram.

Somnus

Somnus inter diem ac noctem septem horarum spacium non excedat; sitque potius nocturnus quam diurnus, duabus horis a cibo et supra dextrum latus, capite bene alto duriore pulvino, aestateque eorum fecto initium capiat. Primo somno finito, solvere corpus et supra sinistrum redormire, non est inutile.

Motus

Exercitium prandium praecedat, quies sequatur. Nec quilibet motus exer-

[261] citium putandus, sed ille duntaxat per quem respiration permutatur. Illud autem maxime conduceret, quo superiora corporis lumbis quiescentibus moverentur. Enitendum sum-

mopere, ut excrementa omnia, quotidie expurgentur, tamen ea, quae manifeste per certos meatus exeunt quamquae occulta. Nasus igitur mane bene emungendus, et quicquid sordium nocturno tempore adhaesit expurgandum, et si quando nares obstructae videbuntur, vel digito butyro intincto, vel betae succo seu sambsuchi furculis aperiantur. Gargari tandum et abluendum os aq. cui quandoque aceti quid commiscetur. Dentes autem sunt omnium ex altissime abluendi. Oculi quoque et aures bene a sordibus suis emundandi.

Alvum lenientia

Dando cura ut quotidie alvus bis eat. Quod si sponte non fiat, iuvanda vel prunis in aqua mulsa decoctis, vel capi iure cum sacharo. Vel iusculis ex atriplice, beta et malvis multo oleo dulcis conditis. Vel quod omnibus his efficacius est, vini fex contrita aut sene. foliis cum jure decoctis. Universa autem haec sunt ante alium cibum accipienda, longe melius esset, si qua morula inter ea et prandium intercederet.

XB. Cavendum autem ne quoties desidendi cupiditas incessit vel mejendi ob negotia differatur; summe n. id capiti nocet, adeo ut quosdam, vel ob solam hanc causam, pessimos incurrisse ac lethales morbos cognoverimus. Sunt et aliae quaedam evacuationes per certos meatus factae, quae et ipsae adiuvandae. Caput igitur secundum consuetudinem semel atque iterum in septimana, abluendum lixivio aestate, mitiori, et in quo chamomill. et rosae bullierint; hyemae fortiori ex chamomil et sambsuch.

[262] Diebus quibus lotio non fit caput linteo aspero primo perfricandum, deinde eburneo pectine bene pectendum est. Balneo dulcis aquae vacuo utendum ventriculo utendum, bis vel semel in hebdomate pro consuetudine quotidie universum corpus sub aspero linteo perfricandum a superioribus ad inferiora descendendo. Animi motus quantum fieri potest moderandi praesertim ira et tristitia, maioresque curae et cogitationes post cibum sunt abigendae. Sol ignis fumus radii lunae ventus validus praesertim austrinus a capite arcendi sunt. Itaque interdiu et noctu caput, ita tuendum ut nec algeat, nec aestuet. Et perinde in cubiculis impense more prae calefactis non est immorandum multoque minus in hypocaustis. Caeterum praeter haec ut major fiat bonorum spirituum copia, crassique succi ex renibus expurgentur, huiusmodi antidotum praeparari inbebimus. Ut aliquando eius portionem in aurora aeger assumat. Habet autem in hunc modum melissae, cortic. citri gariophyllorum macis mastich. croci cinamom. nuc. myrist. quam muscatam vocamus, Cardamom. paeoniae been alb. Et rub. Zadoar. doronici sem. ocymi minoris et majoris singulorum partes, portiones moschi momentum. Insuper sumito myrabalanos chebulas no. XX et emblic. no. XXX. has conterito et in 3. lb. aq. ad suarum evaporationem concoquito et per colum traijcito. Iam piolato iuri adijcto mellis lb. j et dein rursus recoquito quousque universa aqua evaporate absumatur. Postrema tribus huius decocti partibus partem unam praedictorum medicaminum in pulverem.

[263] tritorum adijcito. Huius mixature nonum quam in aurora nucis avellanae instar, praestans hic vir assumet. Solet n. id medicamen animi hilaritatem corporis jucunditatem. et amaenitatem bonamque concoctionem adducere. Praeter quod spiritus auget et crassam ex renibus substantiam propellit. Haec igitur sunt quae mihi scriptis inhaerenti de affectione et curatione huius spectabilis viri occurrere quibus ipsum spero Deo juvante, qui solus languores sanat sanitati pristinae restituendum.

Quod si omnibus pactis statim non successerit, non ilico spes abijcienda. Quemadmodum scribit Aetius et nos quandoque experti sumus, multi tempore curationis nihil adiuti, postea roborata namque convaluerunt. Singula autem quae scripsimus arbitrio ac iudicio praesentium solertissimorum et studiosissimorum medicorum subijcimus illis et praestantissimo viro laboranti nos commendatos. Patavii xii. octob. 1538.
Vobis addictissimus Andreas Vesalius Bruxellensis.

Translation of the 1538 consilium

[242] Consilium [at the request] of three doctors from the University of Naples, for a noble man suffering different ailments, translated from the Italian based on a badly written copy.

Together with the urgent requests by the very devout doctor etc. concerning the sufferings of one of his friends, a nobleman, my advice was asked based on a letter, written by the patient himself in which he briefly explains the symptoms of his problem. Now, after having studied very carefully, with utmost attention to all the details, the medical diagnostic aspects, and at the request of Mr Bernhard, we are able to express our opinion on the therapeutic approach. In doing so we have taken into account even the slightest detail, in order to, as our books say, consider extensively and to write about the symptoms of his ailment, the aspects of the cause as well as the treatment, realising very well that our consilium will be transferred to eminent doctors.[31] At first, we have read about what was going on already for fourteen years etc. His infirmity had basically started at the occasion of a prolonged disease, contracted in Milan, for which he was bedridden and that affected his organs, and more especially his liver together with the kidneys. As they suffered from the bad climate, they caused the excessive humor that the ill-

31. For Vesalius causes of diseases were divided in two categories: general and special causes. General causes hamper the function of the vital spirits and of the organs (instruments) that influence them. Special causes are further divided in *causae primitivae, antecedentes* en *conjunctae. Causae primitivae* have an external origin, *causae antecedentes* are inflammation and an increase of the humors (vide infra sub 32), that can affect one or more parts of the body. *Causae conjunctae* are a surplus of fluids in a specific place or in the whole body (plethora), and can be responsible for a sudden disappearance of the vital force or the movement of the affected part or of the whole body. (See Abraham Titsingh, *Rust-uuren, besteed tot opbouw der loffelyke heelkonst*, Amsterdam, by Reinier en Josua Ottens, 504, 1751.)

ness, described hereunder, is responsible for and that has persisted for a prolonged period of time as the humor was not drained in due time.[32] They were transformed into charred, burned, and incinerated humors, mixed with certain damped humor. As a consequence the body produced a salty mucus, that partially drained through the urinary orifice and caused symptoms, because it was salty and caused pain and heat, comparable in terms of aspect and properties with the herbal medicine that the Arabs call *bauras*.

[243] The humor disappeared regularly but was responsible for intense pain and caused an erosion that transformed into an ulcer. Consequently together with the burning sensation, blood was passed, sometimes a bit, sometimes a lot, dependent on the amount of humor present in the organ of the patient. The first physicians made a mistake in the proper treatment of these bodily affections as they ignored the primary causes, being an organ that produced humor, and the role of the liver, but only considered the cause connected to it, commonly called 'a rash'. They tried to eliminate this by using a sound and injecting milk and in doing so slightly attenuated the pain and the burning sensation. Obviously, as the real causes, being the primary causes, were not eliminated, the patient suffered a recurrence of the symptoms, as quoted, nine months later. Later in Venice only the secondary cause was cured but not the primary cause. Meanwhile the symptoms tortured him even more when oil was infused in a spa and also given as a drink. At that time, due to the intense pain, his urination was so much suppressed, that it was necessary for him to be sounded regularly. This treatment evacuated his urine, but also caused simultaneous bleeding, together with a burning sensation and subsequent pain, an infirmity that we usually call 'stranguria'. The patient was suffering for six months from these problems, and even a treatment with black myrobalan did not help at all but caused even more

32. Vesalius uses the Latin word 'humor' (literally 'fluid') in the framework of the "Four Humors theory'. This was an important element in medical knowledge which originated in the works of Aristotle, although Hippocrates is credited with developing the theory that became a mainstay of medical belief for two thousand years. The Greeks believed that the body was made up of four main components (four humors), that needed to remain balanced to stay healthy. The humors refer to liquids within the body: blood, phlegm, yellow bile, and black bile. Each was connected to a season: yellow bile with summer, black bile with autumn, phlegm with winter and blood with spring. Use of the four humors as a diagnostic tool would result in doctors looking for symptoms: the first-time form of clinical observation.

obstruction than relief.[33] Nevertheless they prescribed it to the patient because of the blood loss. However we prohibit the use of it completely because the remedies that we propose for these problems are more efficient. Additionally the baths in Augsburg, usually called 'sorbron', brought little relief, as they only help in combination with the previously mentioned remedies to treat the secondary cause.

[244] Consequently, the patient suffered even more pain. It was easy to ascertain that these remedies did not calm down the infirmities, as they got worse day by day. The complaints increased even further when the sound was not entering when introduced and the surgeons put force, without any concern about the flesh, that looks like a wart,[34] which is situated at the level of the bladder neck. They pushed the sound with even greater force towards the bladder and caused a severe bleeding to such an extent that we are surprised that the patient with curable strength did not faint or we can even say die. And although the patient was indeed missing so much blood, the amount of urine increased up to two amphoras.[35] However he recovered over the next four years: we do not pretend that this was due to omitting the use of a drainage tube, but probably the blood was drained rather through another area of the body than it would have been the case with a drainage tube. But as his liver and kidneys suffered so much due to his serious infirmity, and although he seemed to recover for four years, his annoying problem came back easily with a severe attack and he experienced little benefit from using the sound. The frequent friction caused by the sound tore the verrucous flesh of the ulcer and clear and fresh blood was flowing in such quantities that the observers expected him to die. This also brought no cure. His brain was weakened and because of the interplay between the lower and the upper parts, its capacities were also affected. As such his semen also presented a similar aspect

33. Black myrobalan (*Terminalia chebula*), also known as chebulic myrobalan, is a tree native to South Asia. The dried unripe fruits of the myrobalan are black and have an oval form of 8 by 13 mm. These fruits contain 30-40% of tannic acid and have strong tanning and constricting properties.

34. As specific medical words were not available, Vesalius uses several comparisons with ordinary elements to indicate medical entities f.e. coccyx (as the beak of the cuckoo) for the tailbone and vertebra (derived from verticulum, the wheel of a spinning wheel). He will use this kind of comparison extensively later in his *Fabrica* and these descriptions will generally be accepted in the medical world.

35. An amphora is an ancient Roman measure for fluids and equals two urnae or eight 8 congii. An amphora was equivalent to 26.2 litre (source: Charlton T. Lewis and Charles Short, A Latin Dictionary, Clarendon Press, Oxford, 1879.

and problem because of its viscosity due to the heat or the weakness of the spirit or the pain or any other reason.

{245} Furthermore, and this is not of little importance concerning the aspect of the treatment, we have to know as well the origin of this disease as well as the place of the illness. Therefore we concluded that all three, the kidneys, the bladder and the bladder neck are the principal affected organs and we added to this that all of these parts are more or less affected. Moreover to understand the extreme sensitivity of the bladder neck, let us present the sum of causes for this bleeding. We will only add these because we think that the bleeding is the cause of the constant weakening of the ulcer at the bladder neck, provoked by the salty mucus. This ulcer caused, after a while, this verrucous flesh that prevented the free flow of urine through the bladder neck and resulted, together with the urine, in the bleeding and a certain perniciousness due to the filaments of the salty mucus, caused the persisting pain and burning sensation. The ailment of the kidneys is caused by the liver, and because of the latter, the problem descended and carried the disease with it. Therefore the kidneys are also the cause of the ailments of the bladder. The most important harmed organ hence is the liver itself, because of the bad constitution, as we reminded the patient. Concerning the methods of healing, specifically in view of treatment in medicine, many aspects must be considered.

The first of the six non-natural aspects of an appropriate treatment are principally food and drinks. But as we think that this aspect has already carefully been considered by his doctors, we will not discuss this any further. But we will add hereunder the most useful sentence. What we confirm of course is the causal role of the liver, that, contrary to a normal functioning, is already for a long time the reason for the problems of the disease (as discussed). Therefore we think that the inflamed liver produces bad humors for the lower organs. Therefore concerning the treatment, which requires a choice of opposite elements, one must use the cooling action and power.[36] As this has been proposed from the beginning,

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36. Vesalius indicates here indirectly the difference between two basic principles in medicine, each with their adepts: a cure based on the principle *contraria contrariis curantur* (classic or allopathic medicine) or based on the adagium *similia similibus curantur* (homeopathy), as promoted by Paracelsus, who published his pivotal work a couple of years earlier.

{246} it is a good moment now to discuss more general aspects. By the way, as we are quite convinced that his bad condition is chronic and consolidated, it is recommended to repeat the medications immediately. Amongst others, one should use for this the fresh extract of Cassia, two times per month with a weight of about one ounce, and this dissolved in a juice or mixed with sugar and to be taken as a bolus.[37] It would also be beneficial if the patient would use three times per week a mucus-relieving expedient made of four seeds of hemlock, chilled or cooled with a syrup of juice from liverwort or borage or hop or common fumitory, diluted with water.[38] Thereafter turpentine, well cleaned and taken orally will be useful; this is the best remedy that often should be used.[39] Furthermore extracts of charabe and alkekengi will be useful, without blue throatwort nor opium, but with water of purslane.[40]

At the beginning of spring the gentleman should be purged with, as described below, the following syrup. Afterwards he should

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37. Cassia: in Latin also indicated as *cinamomum*, is the powder of the bark of the Cassia bark tree, a variety of cinnamon (Chinese cinnamon).
38. Seeds of hemlock: seeds of the *Conium Maculatum* or poison hemlock, a biennial flowering plant native to Europe and North Africa. The plant contains different alkaloids and is highly poisonous. It was used to poison Socrates.
    Liverwort: *Anemone hepatica* (syn. Hepatica nobilis) also called kidneywort or pennywort, is a flowering plant in the buttercup family (Ranunculaceae). The leaves resemble the liver or a kidney, hence the popular names. It contains mucous substances and has been used traditionally to treat liver and gallbladder problems.
    Borage: *Borago officinalis* or bor(r)ago (from the Arab 'abu rach' which means 'father of sweat') is also known as starflower, and is an annual herb with blue flowers, native to the Mediterranean region. It has been used in medicine for its diaphoretic and diuretic properties.
    Hop: *Humulus lupulus* is a species of flowering plant in the hemp family (Cannabaceae), native to Europe, Western Asia, and North America. It is mainly known for the use in beer production, but in medieval medicine it was used for the diuretic and bile-increasing effects.
    Common fumitory: *Fumaria officinalis* (also called drug fumitory or earth smoke), is an annual flowering plant in the poppy family (Papaveraceae). The most common use in traditional medicine were as digestive aid and a diuretic, but throughout Europe a multitude of uses were ascribed. (source: Stephanus Blancardus, *Lexicon medicum*, Lipsiae, Eng. Beni. Schwichertus, 1777).
39. Turpentine: also indicated as *terebenthine* is a fluid obtained by the distillation of resin from living trees, mainly pines. It has been used since ancient times for medicinal uses in various problems.
40. Charabe: is the Arab name for gum of the white poplar tree. The bark (and the gum) of the white poplar tree contains salicylates and had multiple medical use. The gum was coppiced and dried for later use, and was sometimes also called 'amber'.
    Alkekengi: is the Arab word for berry. Vesalius points here to the fruits of *Physalis alkekengi* (bladder cherry, Chinese lantern, winter cherry). The plant is easily identifiable by the large bright orange to red papery covering over its fruits, which resembles paper lanterns. They have been used for their diuretic, liver corrective and sedative capacities.

use Cassia, Diacatholicum and Manna.[41] Thereafter he should return to mucus dissolving syrups and we would offer him an electuary of buglossatum, well-seasoned with viola and borage, and a very hot portion of syrup from juice of common fumitory.[42] The liver must be humidified with juice of nightshade, vinegar of chicory and rosewater, and also with a simple syrup of chicory. However in the month of April it is convenient that he drinks milk, but this should be taken for four days still warm from the udder. The goat must be fed with cooling herbs. For the further treatment Mithridate and theriac should be used, but the different components must be weighted very carefully during these days.[43] Once a general purification has been realized, other remedies can be used, of which several for the treatment of similar affections are described in our books. Your lordship however also has to consider that this problem, as so many others, needs more an adapted nutrition than to take medication. Concerning food and drinks, he consumes actually warm and spicy food and drinks that produce

{247} a lot of fumes. He should however use food with minimal waste and very nutritious, which is known amongst all people. This food should be prepared considering the combination of primary causes of his problem; however for this a medical manual can be useful. The treatment of the ulcer needs different approaches and should start, as for any ulcer, with desiccation in combination with cleaning; this will allow the flesh to heal; this is well known to the surgeons. Therefore we perform in general a cleaning, at the same time as the one of the body, by applying for several days with a sound a constricting and desiccating fluid mixed with milk, in

41. Diacatholicum: was a universal purging electuary (vide sub 29) of variable composition.
Manna: a white honey-like substance, known in Arab as 'mann', that is gathered from *Tamarix mannifera*. When the bark is punctured by a species of insect *Coccus manniparus*, a sweet liquid exudes from the tree and congeals when exposed to air. Manna was used in several medical indications. (Ref.: Anderson Frank J., ed. "Herbals through 1500", The Illustrated Bartsch, Vol 90, Abaris, New York, 1984.)

42. An electuary of buglossatum: an electuary (vide sub 29) containing fermented and distilled 'wine' made from *Buglossoides arvenis* (field or corn gromwell). This plant was used for the preparation of a decoction and appreciated for its beneficial effects on liver diseases. These properties may be due to the presence of antioxidant compounds. The curative effect was enhanced by adding complementary ingredients as viola and starflower.

43. Mithridate: is a semi-mythical remedy with as many as 65 ingredients, used as an antidote for poisoning, and said to be created by Mithridates VI Eupator of Pontus in the 1st century BC. It was one of the most complex, highly sought-after drugs during the Middle Ages and Renaissance.
Theriac: is a medical concoction originally formulated by the Greeks in the 1st century AD and widely adopted in the ancient world. It was an antidote and considered a panacea.

combination with products that promote desiccation and healing, in order to complete the treatment as soon as possible. However the surgeons have to be careful not to make the growth of verrucous flesh worse by using too much of these healing promoting medicaments, and as a result enlarge the ulcer in this extremely sensitive part of the patient. As it is impossible to remove this flesh otherwise, and as the patient will die if this will not be removed, it is very important for this noble man to call for somebody from my native country that is experienced in these matters, as this one would, with Gods help, be the best guarantee for success with this treatment. Therefore we recommend that the patient would go to see this surgeon or would ask him to come to see him. If however this would not be possible, he should try to have at least his consilium. This is sufficient for the case as proposed to us, but meanwhile we have added, as help for the doctors in your place, our advice for an optimal outcome.

The end.

The complaints

A cure is expected for several symptoms in a very distinguished man, thirty-two years of age, with a warm and humid temper, but a not too excessive course of life and further a robust habitus, an active spirit to accomplish his work, the kind of life constituted for the perfection and diligence of the best tradesmen. Once when in Milan

{248} he developed a long-lasting fever, rather continuously than intermittent. While he was treated for his fever, he eliminated for several days blood with his urine. The evacuation of the bloody urine was difficult (this is what the Greeks call dysuria). As a treatment the physicians introduced a sound, after which the patient could pass urine as before for several weeks. However afterwards he developed again a urinary retention, which we call ischuria, and the physicians tried to cure it with moistening baths, and as I suspect, with soothing, laxative and urine provoking medicaments, amongst these were a balm of yellow and black myrobalan.[44] However based on the aspects of his urine and his difficulties to evacuate, they doubted on the nature of his problem. The use of these medicaments seemed to have had effect, as he discharged his urine drop by drop,

because the opening of his member was dilated with the bathing, and the urine was running easier as it became thinner and more fluid. However they had little experience in using a sound, which others call a catheter, a syringe or an argalia, and were reluctant to use it.[45] As initially they did not get it in the bladder, even with force, they tried different ways to introduce it, but experienced resistance at the place of the caruncle where originally the ulcer was, but, as I will explain later, forced it and ruptured a vein which caused blood to evacuate and by continuing with the sound they caused pain, which nearly made him faint, but due to intense fatigue he fell very suitably asleep. After this he could expel no urine anymore. While sleeping in a pleasant sleep he ejected a large amount of genital semen, followed by urine and this excretion continued for a long time and this problem repeated itself several times. Beside the problem with urination,

[249] and the involuntary and continuous emission of seed without sexual excitement, he had loin pain and a heavy feeling whenever he eliminated stool and large quantities of semen, that he could not prevent to spread around from the glans of his member. Additionally beside the ulceration in his member and the chunks at the bottom of the matula, that were like little pieces of fibres originating from the urine, there was a general anaesthesia and weakness of the five senses and of his most important spiritual faculties, especially his vision and his memory. These troubles that actually affect him, need a cure, based at first on knowledge of the causes.

The causes of the mentioned symptoms

We will not discuss the causes of the fever as they are not so relevant.[46] The weakness of the kidneys and the relaxation of the

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44. Yellow myrobalan: is a medicinal plant (Terminalia citrina) that is distributed in Northeast India and Car Nicobar Island. Its bark is diuretic, and the fruits are used in various drug preparations, which are sometimes adulterated with other plant materials.
Black myrobalan: is a medicinal plant (Terminalia chebula), native to South-East Asia. Myrobalan is the main ingredient in the Ayurvedic medicine Triphala, which is used for kidney and liver dysfunctions. The dried fruits are also used as homeostatic, diuretic and laxative.

45. Argalia: hollow tube used for injecting fluids and medication into internal parts or for dislodging a stone in the urethra. It could be fitted with a bulb containing medicinal liquid. It could also be used as a catheter and was often made of silver, gold, or copper. (source: Juhani Norri, "Dictionary of Medical Vocabulary, 1375-1550.", Roudledge, London, 2016.)

46. With our current knowledge, the causes of the fever would have been the most important to evaluate. However, Vesalius working at times without any notion of microbiology nor antibiotics, these aspects were not relevant in medical diagnostics.

vessels can be suspected as cause for the excretion of blood. And for the retention of urine we feel that the caruncle at the level of the bladder neck is responsible. After all, together with the blood, most of the other humors that caused the fever, drain away. Probably the opening of the bladder suffered from the ulceration as a result of the mixing of fluids and their acrimony; unless the blood would have flown out of an open vein at the level of the bladder neck, because that spot was overgrown with flesh, as I told you already when I discussed the ulcer. As the ulceration is situated in a warm and humid place, with abundant blood, and where there is a strong tendency for the flesh to grow, the scar became more prominent and more elevated than the surrounding parts. Indeed we see everyday ulcerations that overgrow and become large as a tail, at the level of the prepuce, which is as a kind of soft flesh, because this part is more sinewy than the bladder neck itself.[47] Moreover the flesh that had grown at the bladder neck narrowed the route for the urine, as was confirmed with the first insertion of the sound. Indeed that treatment was successful as the flesh was pushed away with that sound. But not a treatment that perforates forever.

{250} Indeed in this exquisite warm and humid man with abundant blood, other flesh was growing at the level of the previous scar and exceeding it in size. This caused even more than before, dribbling and difficulty in passing urine and hindered the passage of the sound as previously. The doctor who tried to cure this urinary problem suspected that the thickness of the urine was the cause and offered him diuretic products that did not solve the problem; however the urine was flowing incidentally a bit easier because those products diluted the urine. Once it was realized that the piece of flesh was the cause, the sound was used again, and part of the flesh was perforated; however by cutting the cause of the problem also a vein was sectioned, and as a consequence blood was running off. But the urine was not coming out after this manipulation, as the damaged part of the flesh and clotted blood obstructed the opening. However the semen that was accumulated in the seminal ducts and that was irritated because of the introduction of the sound, expelled the flesh and the clot, liberated the opening, and allowed the urine

47. As Vesalius indicates 'daily' (indies), it could indicate that he consulted with patients every day and thus had a regular clinical practice as a treating physician, next to his work as a professor of anatomy and surgery.

to follow copiously.[48] Indeed we have noted that the excretion of the semen by the two long muscles of the male member distends the common opening of the semen and the member and ejects the semen with the help of the convulsion of the whole body which is then under the influence of that part of the body. Because of this force and the distention of the opening, but also because of the ejaculation of the semen, together with the excretion of the clot and the superfluous flesh, an emission of urine followed. As a consequence the patient had for a prolonged period of time no complaints at the level of his genitals. But then he got again complaints because of an involuntary emission of semen, of which the most important cause is the weakness or the opening of the seminal ducts as a consequence of excessive or too frequent coitus.[49] Another cause could be rotten semen that was attracted into the vessels during coitus as an abnormal and incompletely evacuated excretion,

[251] as we have seen in individuals that repeat the coitus too quickly and where nothing is coming out. Therefore the semen is stored and finally gets rotten. Later the seminal ducts get affected, become weak and start to leak. There is still another possible cause, being an affection of the seminal ducts that can happen because of sexual abstention in a warm and humid man, as I understand was the temper of this man. I think that the power of the flow of semen was the primary cause in this man; but it could also have been the force of the coitus without ejection of semen; indeed nothing indicates that he would have submitted himself less frequently to sexual activity and we agree that this problem is not infrequently due to this kind of activity, moreover the problem gets even worse when sexual activity is repeated. If he would have been more tempered, the ultimate cause of his problem would have been without any doubt the abundance of semen that refilled his system and the impossibility of the parts to retain it as they normally do, due to the weakness of their primary capacity, being to expel it strongly. Therefore the use of emollient and relaxing baths is useful; thereafter I would allow

48. In this consilium as well as in his *Fabrica*, Vesalius indicates the seminal ducts also as *vasa seminalia* and the corresponding vessels in men and women as *vena* or *arteria seminalis*.
49. In his *Fabrica* Vesalius describes an autopsy in Padua in a man that suffered from an 'involuntary flow of semen'. He found the ducts that transported the genital fluid to be 'open and weak' (book V, chapter 13, p. 525).

warm medicaments that promote the evacuation of urine. Not to attack the symptoms more efficient, but only because everybody will prescribe such a treatment. But as he expels a large amount of semen when he cums, it is not surprising that the filled and tense rectum can easily compress the seminal ducts at the place where they enter the bladder neck. As the ducts are effectively compressed, the lower part of the bladder neck can only transmit to the glans the part of the semen that it contains. That is why he has difficulties both with ejaculation and urination.[50] The semen that is expelled does not look natural, is not white and does not have the normal odour, but because of the containment and putrefaction in the seminal ducts it got a light yellow colour and looks purulent and it is as if it was putrefied. Additionally it is mixed with bright moisture and bilious humor. Moreover he has the feeling of an ulceration when he urinates, and also when the penis gets erect. That is why he thought that the semen was the cause of the acidity.

{252} The anatomy teaches us that in fact the left seminal duct comes from the vein that distributes serous humor to the left kidney, where some of the semen is produced from the serous humor, and where it causes stimulation and lust during the coitus.[51] Accordingly the time the semen is preserved at the level of the lower part of the bladder neck, is responsible for the acidity that causes a superficial ulceration that causes pain at the level of the opening as long as the acidity of the urine keeps the ulcer open. Additionally I think that this semen is warmer than normal because of putrefaction and therefore easily causes an ulceration. The pain is felt more in the glans and around the perineum as a larger portion of semen is accumulated there because of the cavities. The semen is also the cause that it is possible to see some fibres and fibrous parts that are swimming around in his urine. Indeed we have seen that the urine after the coitus can contain these. This is even more obvious when water or urine is mixed in a cup with semen. Indeed this dissolves into a fibrous substance. The little grains of sand that can be found at the bottom of the urine, indicate the warmth of the kidneys and witness of their stones and cause as a consequence, besides a sense of

50. Vesalius does not mean a real 'ejaculation', but the spontaneous flow of pus from the urethra.
51. For Vesalius the testicular vein (he indicates it as *vena seminalis*) carried some of the elements of the seminal fluid. This idea was generally accepted at that time whereas the dynamics of blood circulation were only described in 1628 by William Harvey (1578-1657).

warmth, also a heavy feeling, as a weight suspended from his groin. The warmth of the kidneys is what, together with a lot of other causes, drives the urine production and this happens often as a consequence of the natural condition, frequent horse riding and lumbar exercises. Hence there is not the slightest indication for a stone nor an obvious cause for this. Eating habits are an easy explanation as is a poor digestion, but I have no idea how that is in this patient and could only guess. Therefore I would prefer that, if this is the case, the physicians that see him evaluate this carefully. Because, if such little stones caused by the warm kidneys are expelled in a man of his age, they can be an indication for a stone in the kidneys.

{253} I am convinced that the problem that I just mentioned, being a global feeling of weakness and a sluggishness of the mind, as described explicitly by the patient, depends on the copious and frequent flow of semen, that, by being spelled, dissipates the spirit to a large extent. Indeed the semen is nothing else than the best part of the blood mixed with a lot of spirit from our body. Therefore Polybus, a pupil of Hippocrates, who wrote a book about the semen, said that semen has to some degree divine power and therefore, even after the relief of a small quantity from our body, a man will sense such a huge dissolution and taking away of almost all physical power.[52] Furthermore we see that those people who are disturbed by a constant flow of semen, finally waste away or develop a bad condition with oedema under the skin. This indicates that with this flow the physical and mental power is dissolved.

Furthermore it is possible that the semen originates from several parts of the body, but that the best part comes from the brain; Polybus even believed that it came completely from the brain. As such it is not surprising at all that he did not preserve his mental faculty completely and impeccable as before, especially when he surrendered himself maximally to the game of love. Therefore I conclude that the flow of semen is the author of the existence of the symptoms related to his mental faculty. The attending physicians

52. Polybus (Kos, 5th cent. BC) was married to the daughter of Hippocrates, and at the same time was his pupil. He later took over the task of teacher from his father-in-law and produced several medical books (see Daniel Le Clerc, *Histoire de la médecine*, première partie, La Haye: Isaac van der Kloot, 1729, pp. 256-257). In the copy of the consilium is written 'Hypapo', but probably it should have been 'Hippocrates'.

confirm with their keen judgment this opinion. Eventually an additional cause, not known to us, may be present. But in respect to the further treatment of the problems, I think that the knowledgeable work of the attending physicians can restore all at once the problems about which the patient complains, with manual interventions, medicaments, and an appropriate way of life.

The treatment

The treatment should be started as soon as possible, as it is very urgent, and after this is done, the other problems of the patient can be treated.

{254} I strongly believe that the urinary retention has been caused by the flesh at the level of the bladder neck. I would in fact first give attention to the recovery of the flow of semen, with the intention not to reduce the good flow by paying attention to the piece of flesh. Before anything else I recommend that a sound is introduced in the male member with a careful manual manoeuvre as follows: after having introduced the sound a little bit, feel with one finger at the outside of the penis where the tip of the sound is, so you can perfectly sense the place into which the sound can't penetrate. And when the sound is held in the most perfect place and after positioning the tip of the sound, the left thumb shall always mark the location of the piece of flesh, while meanwhile a small mark is been made with ink or with a superficial incision with the scalpel. We would not be satisfied, till we could localize, even after several attempts, exactly the place where the piece of flesh is situated, and we would prefer to try rather three or four times and have no doubt on the place, before introducing the sound any further. For this application, a hollow sound is most appropriate; however to pass the piece of flesh, the sound must be narrow to create minimal bother and probably this sound, made of soft lead will glide in his flesh and will show the length and width of what is described. After precise localization of the scar and after having indicated the area (I suspect it will be approximately at the level of the perineum), we would proceed with the removal of the piece of flesh. For the further treatment there are two possibilities but is it up to the keen judgement of the doctors present to choose one or the other. The first method would be to have made a silver sound and adapt it to

the shape of those that we have for our daily use. I would choose to open the back of the sound at the end for a length as long as we suspect the piece of flesh is to be; we have drawn here in the margin how it should be.[53]
{Below in the margin: two little sketches indicated as A and B.}

I would certainly like to have that the open part comprises totally the piece of flesh

{255} in such a way that the middle portion of the sound, indicated with A, will enclose with its hollow part indicated with B the piece of flesh. After careful introduction of the sound and after having reached the piece of flesh we would instil with the sound a caustic but also corrosive medicament and for this purpose we would embay a thin rod that reaches the piece of flesh and would destroy and corrode it.

Corroding medicaments

This kind of medicaments are chalk, the sediment of copper in sulphuric acid of vinegar, burned tartar, nipped water used for the separation of gold and silver or water, which is called magistral pannus or capitellum as our surgeons say, made of tartar and ammonium chloride, diluted in a liquor of figs.[54]

However to soothe the pain I advise to use only a portion, as a less potent medication. In doing so no neighbouring parts will be affected and the flesh will recover as long as it is treated with all care possible. The second method of treatment would be as follows. Once the exact location of the overgrown part of flesh is known, a hollow sound should be constructed with rounded end, as shown here {small sketch}, and after that a silver or metal wire is shaped that can be passed easily through the hollow sound. This wire will end in a loop that protrudes a bit at the end of the sound {two little sketches}. After introducing the sound with a skilful hand until the beginning of the piece of flesh, the wire will be pushed through

53. The known sketches and proven to have been made by Vesalius himself (f.e. for the *Fabrica*) are very detailed. However we cannot be sure if the copyist of the consilium reproduced the sketches with as much detail as Vesalius did in the original manuscript.
54. Pannus: a rag-like substace that grows on the tree *Quercus aegilops*.

till the piece of flesh, which will be constricted in the loop and after that the piece of flesh will be cut off till we feel it is completely removed. Meanwhile a powder or a fluid should be at hand, to be inserted in the penis to stop the bleeding, in case incidentally a large quantity of blood would flow, so the bleeding can be stopped. For this purpose it would be useful to use amber or bitumen pills, but for this we refer to the author Rhazes.[55] Further to that, and for the same reason,

[256] I would consider before such treatment, because of the degree of filling of the body, to perform a bloodletting in a vein of the armpit of the right arm.[56] In doing so the flow of blood is reduced, and therefore, I suspect, the inflammation will be less. The second part of the treatment will be to remove the superfluous flesh, then dehydrating and constricting products should be applied in order to induce scarification at the level of the existing ulcer. This will immediately prevent that the organ would be charged again with rampant flesh at the place of the existing scar and would block the passage of urine. For this purpose we use powder of cypress nut, a pompholyx of cinnabar, which is called in our pharmacies Dragon's blood, and aloe lota, or a similar product.[57] We introduce this powder as directly as possible into the urethra with the sound that I wished to be used in the first part of the treatment. However if we do not use a powder, we can invoke a fluid, for example whey of goat milk to which the previously quoted medication is added. Therefore, if we introduce with a clyster a drachm powder of pompholyx of cinnabar, mixed with sarcocolla and aloe lota, dissolved in goat milk into the penis that is continuously ulcered because of

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55. Amber: Vesalius uses the Latin word *succinum* to indicate amber, considered as a bitumen like substance (a kind of *asphaltum*). By extension, the word is used for any inflammable substance.
56. Vesalius advises here explicitly to perform bloodletting at the right side of the patient. Indeed this consilium is written shortly before his *Bloodletting Letter* in which he emphatically indicates that bloodletting should always be done at the right side. He based this on anatomical information, more especially the fact that the venous blood from the thorax is drained through the *vena azygos*. At that time there was an ongoing debate on the side of the body to choose for bloodletting, but Vesalius was confident that it had to be done at the right side. He discussed this problem already in his *Paraphrasis* published in 1537 (f. 52r), but without having made a final choice.
57. Pompholyx: is an equivalent for a very fine white powder.
Aloe lota: literally 'washed aloe'. Aloe lota was the treated formulation of aloe resin, often used in pills to promote defecation and to treat gastro-intestinal complaints. (source: Joh. Pet. Von Ludewig, *Grosses vollständiges universal Lexicon aller Wissenschaften und Künste*, Verlegts Johann Heinrich Bedler, Halle und Leipzig, 1732.)

the flow of semen, we will cure two illnesses with one treatment.[58] This will be the perfect healing for the urinary difficulty, for as I belief nothing else obstructs than that scar and the fleshy substance; unless the thickness of the urine contributes to the problem, which could easily be solved with the many urine draining and diluting medicaments from the forest. Because as a cause I do not think on a damage to the four faculties of the liver, the kidneys or the bladder, nor on blood cloths or a stone that blocks the meatus, nor on a convulsion of the crosswise muscles of the bladder because of an unnatural tumour

[257] because of inflammation or erysipelas and even less on urine that is retained because of lack of supply of air to the fibres of the bladder. As this is sufficient to attenuate the urinary problems, we will discuss now the involuntary flow of semen. The treatment of this problem is above all accomplished by interruption of the flow in the vessels and the cleansing thereof and ultimately in a limitation of the flow of semen and a corroboration of the vessels. First, we will prepare a mixture of seven drachms of fresh extract of good cassia and three drachms of tamarind, a bolus as people say, with sugar and we will give this to him one hour or half an hour before his meal. However if he would not like this bolus, we will dilute the cassia and the tamarind in a decoction of tamarind in water and we will present it to him in the form of a drink.[59] The second day after the ingestion of this medicine we will cut the axillary vein at the level of the armpit of the right elbow and remove more or less than nine ounces depending on the condition of the patient.[60] I would prescribe him a pure well-cooked barley-water and juice of chick-peas and diluted white wine, to expel the urine. The fourth or fifth day we would give him in the morning two scruples of pine resin washed in water and wrapped in moist tiny slices of bread. This will

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58. Drachm: originally a drachm (in Latin *drachma*) was equivalent to 3.845g, but this could change per country and even per city.
Sarcocolla: this refers to the *Astragalus sarcocolla*, a shrub or tree from Persia, identified as a species of *Astragalus*, denoting its balsam. Galenus mentions the power of sarcocolla balsam in healing wounds.
59. Bolus: in medicine at the time of Vesalius, a bolus (from Latin *bolus*, ball) is the administration of a discrete amount of medication, drug, or other compound within a specific time, generally within 1 to 30 minutes, in order to raise its concentration in the blood to an effective level.
60. Ounces: in medicine at the time of Vesalius, weights were based on the medical pound (equivalent to 369.13g). The medical pound was equivalent to 12 ounces, one ounce to eight drachms and a drachm to 3 scruples.

also result in some evacuation of stool. This will suffice to restore the flow of material from the (seminal) vessels, if I am right, unless he would prefer to eliminate a couple of ounces of blood with leeches applied at the level of the anus. Accordingly, with this method the flow of semen finally must soon be stopped. Hence therefore after that an ointment should be prepared that has to be applied three or four times a day with cold hands on the testicles and the seminal vessels, where they exert under the pubic bones, and in the region of the kidneys. This ointment must be prepared as follows. Take kernels of ordinary apples and seed of fleabane, that we call psyllium,

{258} macerate half of an ounce of both in diluted hot pumpkin juice, that is said to have mucilaginous properties, add two scruples of violas, waterlilies, poppies, almonds, and two fresh whites of egg and add juice of mint.[61] Additionally a soft ointment should be made with a flower of viola, a scruple of apricot and two drachms of the best camphor mixed with white wax for half of the weight. This ointment should be applied with intervals and will cause heating, and should be fostered with rhubarb, unripe gallnuts of the cypress, pomegranate, pomegranate bark, the root of a waterlily, of each one portion. This should be pulverized, put together in a small pouch, tanned in red wine, boiled till it becomes sap and then hung in proper measure on his testicles and pubic area. This has to be repeated minimally twice daily and when this is removed the area between the testicles and the pubic area has to be rubbed with the ointment. Meanwhile the pubic area and the kidneys have to be exposed to cool air and a lead plate with variable perforations should be applied to the area of the kidneys. Before this has warmed, it has to be accommodated to another spot. If meanwhile he would develop diarrhoea, I think he could recover mainly with the extract of gallnuts of nightshade, pomegranate bark, the inner bark of an elm, berries of myrtle, hypocistis, and the leaves, root and flower of a waterlily.[62] Meanwhile some white vinegar can be

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61. Fleabane: was called in Latin *Pulicaris herba* but also indicated as *psyllium* (current name Pulicaria vulgaris). The plant produces small seeds that after ingestion stimulate mucus production that eventually attenuated the painful irritation of the urethra because of gonorrhoea. The plant was supposed to chase fleas out of the house and therefore got his name.
62. Hypocistis: is a parasitic plant (Cytinus hypocystis) found primarily in locations around the Mediterranean Sea.

added. We also know that some constricting and tonifying liquids can contribute a lot. We use a distillate of alum and prunes, that we indicate in general as acacia, to instil repeatedly with a sound rather than with a clyster. Besides this it can be useful, if nothing prevents this, to take a refuge to a cold bath. This has the habit to remove every disease, resulting from diarrhoea as Aetius said, definitely when water of good quality is available.[63]

[259] The following antidote could be useful and restore his force if he takes it. From the seeds of the willow 7 scruples, 6 scruples water mint, 5 scruples seeds of wine tree, 4 scruples common rue, 2 scruples seeds of water hemlock with a decoction of waterlily and processed in pills the size of a hazelnut.[64] From these he should be given three per day together with three spoons of posca.[65] I omit the formulas of other medicaments for this ailment. Let us not consider them appropriate in any way for this one ailment. Furthermore when we use the medicaments, we must feed the patient with pork meat as this will have a cooling and drying effect. Additionally the patient should avoid what can cause spoilage and digestive problems. Therefore we would propose to use boiled lentils, etc.[66] In his drinks and in his food, he should be given seed of the vine tree and hemp, especially roasted, and what is also good are seed and the leaves of lettuce and cabbage as well as the root of the water lily, reduced three times with pumpkin and cucumber. For drinking in general, water should be provided that has been used several times to extinguish heated iron.[67] Whenever he wants to consume wine it should be preferably red astringent wine or milk to which root of water lily has been added. In the morning and before the first meal we would give him this syrup: R/ syrup of waterlily one ounce, water of lily and papaver one ounce, or instead of these waters, a decoction of the root

63. Probably Vesalius refers here to Aetius from Amida, a Byzantine-Greek medical doctor and writer, following some sources active during the 4th cent. AD. Aetius was probably the first Ancient Greek writer of a medical book.
64. Size of a hazelnut: in the Latin text Vesalius uses *Nux pontica* (the nut of the common hazel or Corylus avellana) to indicate the size of the pills.
65. Posca: a cheap drink based on a whole egg diluted with water and mixed with some vinegar.
66. etc.: Vesalius trust that his colleagues have sufficient knowledge and therefore he does not elaborate all details. Hence to understand the full content of his consilium additional knowledge on medicinal practices of his time are necessary.
67. Water: Vesalius probably refers here to water that has been used by a blacksmith to cool down the heated iron. It is unclear why this advice. However, a mineral content (iron?) was seen as an extra virtue, and mineral waters were widely used in medicine (Aquae ferruginae).

of the white water lily and the golden flower and seeds of the chaste tree and added to this a portion of sugar.[68] However I am convinced without any doubt that it would be really good for his wellbeing that he should abstain from any thought about the game of Love. And therefore he should be offered a dark place and a bed covered with the peel of papaver and leaves of the wine tree and of common rue and of calamint, of water hemlock and of waterlily, and of henbane, and he should lie down as much as possible on his side.[69] This medical action will stop the excretion of rotten semen and of the fibres that swim in his urine. However this will not be the only effect, as this will also relieve the heat of the kidneys,

{260} and restore the health of all lower parts of his body, unless there would be by accident a kidney stone, which would request a completely different treatment after all.[70] But as I doubt this, I will skip this for now and write about it elsewhere and when I have more time. But only when this most respectable man would be suspected to have one. Moreover once the flow of semen will have stopped, the original functions of his mental faculty will return and the whole physical condition will be again as before without any doubt. We will come back on how this will be achieved.

Diets

All this is not possible only because of the quality and the quantity of food and drinks, but because of all what happens to us wanted or unwanted, as sleeping and waking, rest and movement, defecation, control of the state of mind and above all the air, that does not remain only internally, but with the respiration continuously penetrates in the most intimate parts of our body. But on what concerns eating and drinking I will not elaborate, as this is

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68. Chaste tree: also called chasteberry, Abraham's balm or monk's pepper (Vitex agnus-castus), is a flowering plant native of the Mediterranean region. Theophrastus mentions the shrub several times, and it has been long believed to be an anaphrodisiac, leading to its name. However its effectiveness for such effect remains unproven.
69. Calamint: refers to the plant *Clinopodium nepeta* (synonym *Calamintha nepeta*), known as lesser calamint, a perennial herb of the mint family.
Henbane: refers to *Hyoscyamus niger*, commonly known as henbane, black henbane or stinking nightshade, a poisonous plant from the Solanaceae family.
70. In Vesalius ' writings kidney stones are hardly discussed, except for a short passage in his *Paraphrasis*. It could be that he wrote more on the subject during his stay in Leuven, as he writes in his *China root epistle* that he burned some of his writings.

known sufficiently.

XB. Indeed there is nobody that does not know that poor and too varied food in the wrong order in combination with raw vegetables and too much drinking causing a hangover, are harmful for the body and the mind.[71] I will not go extensively over the remaining five but discuss them briefly.[72]

Sleep

Between the sleep during the day and at night may not be more than seven hours; it is also better to sleep at night than during the day, two hours after the meal and sleep on the right side, with the head high enough on a pretty hard pillow and in summer go to sleep early enough. It is not useless to relieve the body after the first sleep and sleep again on the left side.

Physical exercise

Physical exercise should precede the meal, and a rest should follow afterwards. Not every exercise should be considered,

{261} but only the one that has an influence on the respiration. In this case the one in which the upper body parts are moved while the loins keep at rest is the most useful. It is also of utmost importance to try to eliminate oneself daily from all bodily waste, especially the one that discharges imperceptibly from the orifices. The nose must be cleaned well every morning, and all the dirt that adheres to it during the nighttime must be cleared out, and if the nasal passages seem to be obstructed, they have to be opened with a buttered finger or with a little fork covered with beet juice or marjoram. After that, the mouth must be rinsed by gargling with water to which a bit of vinegar is added. The teeth have to be cleansed as profoundly as possible. Also the eyes and the ears must be well freed from their dirt.

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71. In the margin of some sentences is noted 'XB', underlined in red as are the sentences themselves. We suspect that a reader (XB?) wanted to stress the importance of these passages and therefore underlined them.
72. This concerns sleep, physical exercise, corporeal hygiene, defecation, and care for the head. Only three of these are mentioned in the margin.

Promoting bowel movements

Take care that he has a bowel movement two times per day. When this does not happen spontaneously, this can be remedied with prunes, softly cooked in water or in a soup of turkey with sugar. Or a soup of common madder, beet and mallow prepared in sweet oil. Or, even more effective than all this, are burnt and grinded tartar of wine or grinded senna leaves cooked with juice.[73] All this must be taken before any food, and it would be even better by far to have some time in between this and the first meal.

XB. However he has to take care that his greed to remain inactive or to urinate because of his troubles, does not get too prominent and becomes master of his mind, because this can make his situation, as we experienced, worse than deadly diseases.

Supplementary evacuations must be done from certain orifices, and these have to be facilitated. Therefore the head must be washed as usual several times a week with salted water, in summer soothed by boiling it with chamomile and roses and in winter fortified with chamomile and marjoram.[74]

[262] The days that the head is not washed it should be rubbed with a rough cloth, and afterwards well combed with an ivory comb. One or two times per week or if customary every day the whole body should be rubbed with a hard cloth going down from the upper to the lower part using a little jar with fresh water. A change in temper especially anger and sadness, and major concerns and heavy thoughts after a meal should be avoided as much as possible. Sun, fire, smoke, the rays of the moonlights and strong

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73. Grinded senna leaves: historically Egyptian senna (*Senna alexandrina*) was used as a laxative in the form of senna pods, or as herbal tea made from the leaves. Senna is considered to be a stimulant of the myenteric plexus of the colon and induces peristaltic contractions. However, the original Latin text 'vini fex contrite sene' is prone to several translations and interpretations. The Latin word 'fex' (faex or faeces) in combination with 'vini contrite' (dregs of wine), probably refers by comparison to a similar process of grinding senna leaves.

74. Chamomile: can refer to any of various daisy like plants of the Aster family (Asteraceae). Chamomile tea, used as a tonic and an antiseptic in many herbal remedies, is made from English (or Roman) chamomile (*Chamaemelum nobile*) or from German chamomile (*Matricaria chamomilla*).
Marjoram: is synonymous with a variety of oregano (*Origanum majorana*). Hippocrates advised already oregano for its heating and stimulating effect. For the Ancient Greeks and Romans marjoram was also a symbol of happiness.

winds, more specifically from the south, should be kept away from the head. Therefore the head should be protected day and night in such a way that it does not catches cold nor gets heated. And he should not linger in a bedroom that is heated as usual and definitely not in a hypocaustum. Furthermore, besides this, in order to obtain a larger quantity of good spirits, the thick humors should be cleaned from the kidneys, for which purpose we have conceived that an antidote has to be prepared as follows. From this he has to take from time to time a portion in the morning. It should be prepared with melissa, lemon zest, clove, mastic, saffron threads, cinnamon and nutmeg which we call muscat, cardamom, white and red peony, seeds of wild ginger, parts of bush basil as well as of great basil and pieces of musk.[75] I would also add XX seeds of black myrobalan and XXX of emblic that have been grounded and boiled in 3 pounds water till evaporation occurred, and then passed through a sieve.[76] To this prepared juice, one pound honey must be added and the whole should be boiled again till all water has evaporated. Afterwards to three parts of this decoction one part of the pulverized medicaments that are grinded to powder should be added.

[263] From this mixture the honourable man should take by nine o'clock in the morning a quantity comparable to a hazelnut. This medicament raises the mind, increases physical wellbeing and the concoction guarantees a good digestion. Except the fact that this treatment strengthens the mood, it also eliminates solid material out of the kidneys. These are the things that I wanted to add to my writing about the problem and the cure of this venerable man which I wish for him with the help of God, who is the only one that heals the sick and make them recover their health. However if all this would not be immediately successful, hope may not be given up. Similar to what Aetius wrote and as we also experienced, often a cure may take a long time. Afterwards tonic agents may energize him. However we submit the different things we have described

75. Melissa: also called 'common balm', 'balm mint' or 'lemon balm'(*Melissa officinalis*) is a plant from the mint family native to South-Central Europe and the Mediterranean Basin. The tea, the essential oil and the extract are used in traditional and alternative medicine.

76. The emblic (in Latin *Phyllanthus emblica*) is a tree that grows in Asia, and belongs to the family of the *Euphorbiaceae*. The tree has small leaves and produces nearly spherical yellow-green fruits, the size of a marble, that are sour and bitter. These nuts are rich in ascorbic acid (Vitamin C), although the concentration seems to be variable.

to the judgment and the decision of the very competent and very learned medical doctors that have recommended us to the outstanding and suffering gentleman.

Padua, xii. octob. 1538. Your very devoted Andreas Vesalius Bruxellensis.

Conclusion

We know Vesalius mainly from his major work *De humani corporis fabrica libri septem* (Basel: Oporinus 1543), in which we get to know him as an anatomist and scientist. In it, he drew up certain boundaries, between which anatomy should be practiced as an exact science. Just like Copernicus, with his *De revolutionibus orbius coelestium* from a little later in 1543, Vesalius broke with the medieval way of thinking that had been mainly based on faithfully reproducing and building upon infallible established knowledge. Vesalius insisted on personally establishing certain facts, describing and recording their elements and characteristics, while keeping it all verifiable for third parties.

But Vesalius was also a physician. He used the then-current medical knowledge that was still very much tied to the Middle Ages. Many others wrote consilia, but it was Vesalius's consilia that allow us to see how a scientific mind practiced medicine: how did he assess his patient? How did he look at the affliction? How did he proceed, therapeutically?

Through his consilia, we get to know Vesalius not just as a physician, but as the first "modern" scientist who practices medicine. It is a rare occurrence for a new consilium of his to be discovered. It is always a surprise and many consider such an occurrence to be the equivalent of the discovery of a new work. It marks a unique occasion to get to know Vesalius better, and to appreciate a new dimension to his medical knowledge and his approach as doctor-scientist.

Correspondence to:
Contact details
omer.steeno@skynet.be
maurits.biesbrouck@scarlet.be
tgoddeeris@hotmail.com

Michele Troja: Enlightenment Scientist, and the "Urology Chair" at the University of Naples in the18th Century

Renato Jungano[1] **and Gloria Castagnolo**[2]

[1]History Office of the Italian Society of Urology

[2]Medical Library of the University of Naples Federico II

Michele Troja was a physician and researcher in Naples and Paris, between the end of 18th and the beginning of 19th centuries. (Figs. 1 and 2) His career, marked by the Age of Enlightenment, was focused on the experimental and clinical study of biology, physiology, bones, eyes, the urinary tract, and vaccine therapy; his urological works are significant. He was assigned, by the University of Naples, to be its Chair of "Diseases of the eyes and urinary bladder", which should be considered as the first University Chair of urological discipline.

Biography[1,2]

Michele Troja was born in Andria, Puglia, a region of southern Italy, on June 22, 1747. After completing the first phase of his studies, he moved to Naples in 1765 to enrol in the Faculty of Medicine & Surgery of the Royal University. He had as Master Tutor Domenico Cotugno (1736-1822), physician, surgeon and anatomist and follower of the modern theories of GiovanBattista Morgagni (1682-1771). During his studies, Troja was appointed, in 1770, assistant surgeon of the Hospital of San Giacomo, in Naples. Troja completed his university studies in 1772 and, in September of that year, he was awarded a doctoral degree by the *Almo Collegio dei Medici napoletani.*

1. Del Gaizo M., *Della vita e delle opere di Michele Troja, Memoria prima*, Bollettino degli Atti dell'Accademia Medico-Chirurgica di Napoli, Napoli, 1898.
2. Von Schönberg A., *Biographie des Dr. und Professors Michel Troja*, Erlangen, 1828.

Figure 1: Portrait of Troja, depicted in: Angelo Bellini's *I cateteri flessibili nella storia della veneorologia e dell'urologia in Italia dall'epoca greco-romana ai giorni nostri (Flexible catheters in the history of venereology and urology in Italy from the Greco-Roman era to the present day)* (Milan, 1935)

Figure 2: The bust of Michele Troja at the Museum of Anatomy in the University of Naples.

In 1744 a fund of 10 thousand ducats was established by Luigi Tortora,[3] a Neapolitan surgeon, to periodically confer a scholarship to young surgeons for their specialization in Paris. In 1774 the scholarship was awarded to Troja, who left for Paris after four years of surgical and anatomical practice carried out at the San Giacomo Hospital. In Paris he devoted himself to the study of bone regeneration and the pathological and experimental study of cataract. He became a member of the French Royal Academy of Medicine, Academy of Sciences and Royal Society of Medicine.

Troja had the honour of being invited by Denis Diderot (1713-1784) to write five articles in the *Supplément à l'Encyclopédie* (published in 1777). In 1777 he returned to Naples where the Royal House of Bourbon offered him offices and honours. In 1779 he was awarded the "Chair for eye and urinary bladder diseases" at the Hospital of the Incurabili by the Royal University of Naples. He was later elected, in 1789, Surgeon of the King's Chamber of His Majesty Ferdinand IV and in 1801 he was appointed Director of the smallpox vaccination board.

3. Del Gaizo M. op.cit. p.58.

In 1780 He married Anna Maria Marpacher, Queen Maria Carolina's lady-in-waiting. From the marriage was born Carlo (1784-1858), so named in honour of the Queen who had given him to baptism. Carlo was raised to become a historian and politician and had an important role as Constitutional Prime Minister. Another son, Ferdinando (1786-1854) was born later. He would become magistrate and Prime Minister of the Bourbon Kingdom, with a political direction very different from that of his brother Carlo's government.

During the Neapolitan Revolution, from 1798 to 1802, Michele Troja followed the Court which had taken refuge in Palermo; it was in these years that he began the smallpox vaccination. During the French domination, from 1805 to 1815, the Court took refuge again in Palermo but, on this occasion, Troja remained there only a few years; on his return to Naples he found all his assets seized by the new regime, fortunately only temporarily.[4] Back in Naples he remained in the public offices until 1811 and, after this date, he devoted himself assiduously to his studies. He died in Naples on April 11, 1827.

Scientific activity

Troja devoted his scientific life to clinical and experimental observation of phenomena connected with bones, eyes, urogenital apparatus, and vaccine therapy; moreover, his interest was also directed toward biology and physiology. Being a son of the Age of Enlightenment, the work of Troja is proof of his outstanding strict appliance of experimental method to scientific research.[5]

About bones:
Troja was the author of two articles[6] and two plates[7] on the bones for the *Supplément à l'Encyclopédie* (published in 1777). He held two speeches in Paris:

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4. Trevisani G., *Brevi notizie della vita e delle opere di Carlo Troja*, Napoli, 1858, p.5.
5. Védrènes A., *Expériences sur la régéneration des os par M.Troja*, Paris, 1890, p.53.
6. Diderot D, d'Alembert JB., Supplément à l'Encyclopédie ou Dictionnaire raisonné des sciences, des arts et des métiers, par une société de gens de lettres ; mis en ordre et publié par M***, Tome 4, N-Z, 1776-1777. Tibia, (Anatomie, Chirurgie), pp. 941-7 and Ténacité des os (Anatomie) pp. 931-3.
7. Diderot D, d'Alembert JB., (L'Encyclopédie), Recueil de planches sur les sciences, les arts libéraux, et les art méchaniques, avec leur explication, 1751-1780, Chirurgie planches VII – VIII and p. 15.

- on bone regeneration, a memory that had been presented to the Société royale de Medecine in Paris in 1776 [8]
- on the singular structure of tibia of animals, a memory that had been presented to the Royale Académie des Sciences in 1777.[9]

De novorum ossium, in integris aut maximis, ob morbos, deperditionibus, regeneratione esperimenta: this work was conceived following the studies of Albrecht von Haller of Bern (1708-1777),[10] of Henri Louis Duhamel du Monceau of Paris (1700-1782)[11] and of Lazzaro Spallanzani of Pavia (1729-1799).[12] This is a text of great clinical and experimental value which was translated – with some adjuncts- into Italian,[13] French,[14] and German.[15] It deals with the debate between von Haller and Duhamel about ossification and includes reports on original and complex experiments, introducing the method of experimental necrosis[16] -actually an induced osteomyelitis- with biological, histological and chemical approach regarding bone regeneration as well as the detailed analytical and experimental study on osteogenesis and on the fundamental role of the periosteum. These experiments were analysed and reproduced up to two centuries later.[17-19] He continued, all lifelong, to study bone physiology, so he published, in 1814 a supplement to his own research of 1775 and 1779.[20]

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8. Diderot D, d'Alembert JB. *Supplément à l'Encyclopédie., Régéneration des os*, pp.355-365 and 3 planches..
9. Troja M., *Sur la structure singuliére du Tibia et du Cubitus des Grenouilles et des Crapauds, avec quelques expériences sur la réprodution des os dans les mêmes animaux in Mémoires de Mathématique et de Physique*. Tome IX, Paris MDCCLXXX., pp. 768-780.
10. Von Haller A., *Deux mémoires sur la formation des os, fondés sur des expériences*, Lausanne, 1758
11. Duhamel du Monceau H.L., *Mémoires de l'Académie des sciences*, 1741.
12. Spallanzani L., *Prodromo di un'opera da imprimersi sopra le riproduzioni animali*, Modena, 1768.
13. Troja M., *Esperienze intorno alla rigenerazione delle ossa, al callo della frattura ed alla forza che la natura impiega in allungare le ossa mentre crescono*, Napoli, 1779.
14. Védrènes A., op.cit.
15. Troja M., *Neue Beobachtungen und Versuche über die Knochen von Dr.J.J. Albrecht von Schönberg*, Erlangen, 1828
16. Delle Chiaje S., *Troja inventore della necrosi artificiale, in Discorso storico sul Museo di anatomia e sulle opere notomiche dei pubblici professori della R. Università di Napoli*, Filiatre Sebezio LI, p.214.
17. Randelli G., *Ripetizione degli esperimenti di Michele Troja sulla rigenerazione delle ossa*, Physis VI, 1964, I, pp.45-64.
18. Belloni L., *Dalla osteogenesi periostale alla resezione sotto-periostale: Michele Troja, 1775, e Bernardino Larghi, 1847*, in Simposi clinici, VIII, 1971, 4, pp.25-33.
19. Petronio F., *Sulla importanza dei lavori di patologia chirurgica fatti* da M Troja, Rendiconti della Reale Accademia medico-chirurgica. Napoli, 1867.
20. Troja M., *Osservazioni ed esperimenti sulle ossa*, Napoli, 1814.

About eyes:
During his stay in Paris, Troja collaborated with Felice Fontana (1730-1805), an Italian physiologist on research on the ciliary body of the eye.[21] In the same period he developed a system to produce the cataract in the eyes of human cadavers and of animals.[22]

After his appointment to the University Chair, Troja collected his lessons in *Lezioni intorno alle malattie degli occhi* (Naples, 1780).[23] This is a treatise on ophthalmology in 470 pages which focuses on history, anatomy, physiology and mainly in pathology of the eyes. It is divided into three sections:
1. The structure of the eye and vision
2. Diseases of the external parts surrounding the eyeball
3. Diseases of the eyeball
In 1781 he wrote, together with his pupil Salvadore Jacono, a dissertation about extraction as surgical therapy for cataract.[24]

About smallpox prevention:
In 1801 Joseph Marshall, an English physician, following Jenner's theories and methodology, introduced in Palermo the smallpox vaccination for the English fleet.[25] Soon after, King Ferdinando IV, on the advice of Troja, established the vaccination campaign in the Kingdoms of Naples and Sicily. Troja was appointed director of the Institute for Vaccination in Naples. He worked on the biology of the vaccine, producing it from cows, as well as on the organisation of the administration of the vaccine on the population.[26]

Gennaro Galbiati (1776–1844) and Michele Troja, in Naples, introduced the retro-vaccination and developed the c*alf lymph vaccine*.[27] In 1803 they were able to prove that cowpox could

21. Fontana F., *Déscription d'un nouveau canal de l'oeil* in Traité sur le venin de la vipère, Florence. 1781
22. Troja M., *Mémoire sur une Cataracte artificielle qu'on peut produire sur les yeux des cadavres & des animaux* vivants in Roziers, Observations sur la Physique, sur l'histoire naturelle et sur les arts. Paris, 1778.
23. Troja M., *Lezioni intorno alle malattie degli occhi,* Napoli, 1780.
24. Jacono Catalano S., *Dissertazione sulla preferenza dell'operazione della cateratta per estrazione,* Napoli, 1780
25. Borrelli A., *Dall'innesto del vaiolo alla vaccinazione jenneriana: il dibattito scientifico napoletano* in Nuncius, Annali di storia della scienza, anno XII, 1997, fasc.1, pp. 67-85.
26. Troja M., *Inoculazione del vajuolo vaccino* in Sicilia, 1801.
27. G., Galbiati *Memoria sulla inoculazione vaccina,* Napoli. 1810.

be transferred from cowpox-vaccinated people to cows (retro-vaccination) and the recovered calf lymphatic material was very effective for further vaccination of humans.

The campaign of vaccination was long lasting and complex because of many controversies that arose around different kinds of vaccination, relative biological behaviour and dangerous outcomes.[28] Moreover, at that time, there were also people who refused vaccination out of ignorance or for superstitious and divergent economic interests. For this reason Troja had to write a complete report of scientific and epidemiological method on vaccine policy in the Kingdom of Naples.[29]

About physiology and biology:
In 1770 Troja performed an autopsy on a human body and surprisingly found in it an earthworm in the sinus frontalis.[30] In Paris Troja met the French anatomist and physiologist Antoine Portal (1742-1832) and translated into Italian his work on asphyxia in 1776.[31] Portal himself entrusted Troja with a research on pathogenesis of asphyxiation produced experimentally in animals by carbonium momoxide.[32, 33] Troja's main study carried out on physio-pathology; these reports became a milestone on this subject, as remarked in the following years by French physiologist Claude Bernard (1813-1878).[34] He collaborated with Giuseppe Saverio Poli (1746-1826) on his treatise on molluscs.[35]

About genito-urinary diseases:
One of the purposes of Tortora's scholarship awarded by Troja was bettering his knowledge in performing lithotomy. When he returned

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28. Buonaguro F.M et al., *The XIX century smallpox prevention in Naples and the risk of transmission of human blood-related pathogens*, Journal of Translational Medicine, 2015, 13:33.
29. Galbiati G., *Lettera apologetica sulla vaccina*, Napoli, 1803.
30. Troja M., *Rarissima observatio de magno lumbrico in frontali sinu reperto, & totam ejus cavitatis replente*, Napoli, 1770.
31. Portal A., *Rapporto fatto per ordine dell'Accademia delle scienze sopra gli effetti dei vapori mofettici nel corpo dell'uomo*, Parigi, 1776.
32. Troja M., *Mémoire sur la mort des animaux soffoqués par la vapeur du charbon allumé & sur le moyens de les rappeler à la vie in Roziers Observations sur la Physique, sur l'histoire naturelle et sur les arts.*, pp. 173-183
33. Troja M., *Suite du mémoire de M.Troja*, Roziers, op. cit., pp. 212-308.
34. Bernard C., *Leçons sur les effects des substances toxiques et médicamenteuses*, Paris, 1837.
35 Poli I. X., *Testacea utriusque Siciliae eorumque historia et anatome tabulis aeneis illustrata*, Parma, 1791.

to Naples , at the Incurabili hospital, he studied the pathology and the clinical behaviour of diseases of uro-genital apparatus; moreover his contribution on the urolithiasis is fundamental inasmuch as he deals with physics, chemistry and structure of urinary stones and their implementation on therapy. In the foreword of his main work on this topic "*Lezioni intorno ai mali della vescica urinaria*",[36] that was translated also into German,[37] there is a grateful acknowledgement to Mariano Santo (1488-1577), one of the pioneers or fathers of lithotomy.

In this textbook are collected the lessons held at the University of Naples. It was published between 1785 and 1793; it consists in two volumes: the first volume deals, in six lessons, with:

1. The structure of kidneys and ureters
2. Wounds; inflammation and its consequences; kidney dislocation
3. About stones, general view; kidney stones
4. Stone solvents; nephrotomy; renal fistula; renal ulcers
5. Urine obstruction diseases; some ureteral diseases; diabetes
6. Different kinds of lumbar pain; lumbar abscess; lumbar aneurism

The second volume deals with:

1. Bladder stones
2. Lithotomy
3. Urethral diseases

About the construction of flexible catheters[38, 39]
Troja had written a chapter entitled "Résine elastique" in the Supplément à l'Encyclopédie of 1777.[40,41] In this chapter he analyses meticulously the physical and chemical properties of caoutchouc and describes all the phases of construction of surgical appliances made of this substance.

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36. Troja M., Lezioni intorno ai mali della vescica orinaria e delle sue appartenenze, Napoli, 1785-1793.
37. Troja M., Ueber die Krankheiten der Nieren., Der Harnblase un der ubrigen zur Ab-und Aussonderung des Harns bsetimmten Theile, N. Samml. d. auserl h. n. Abhandl. f. Wundartze, Leipzig, 1788.
38. Bellini A., I cateteri flessibili nella storia della veneorologia e dell'urologia in Italia dall'epoca greco-romana ai giorni nostri, Milano, 1935.
39. Galbiati G., Memoria sulla maniera di costruire i cateteri flessibili. Napoli, 1805.
40. Troja M., Résine èlastique in Diderot D, d'Alembert JB, Supplément à l'Encyclopédie, op.cit., pp. 610-613.
41. Troja M., in L'Encyclopédie, Recueil de planches sur les sciences, les arts libéraux, et les art méchaniques, avec leur explication, 1751-1780, Chirurgie, planche VI and p. 15.

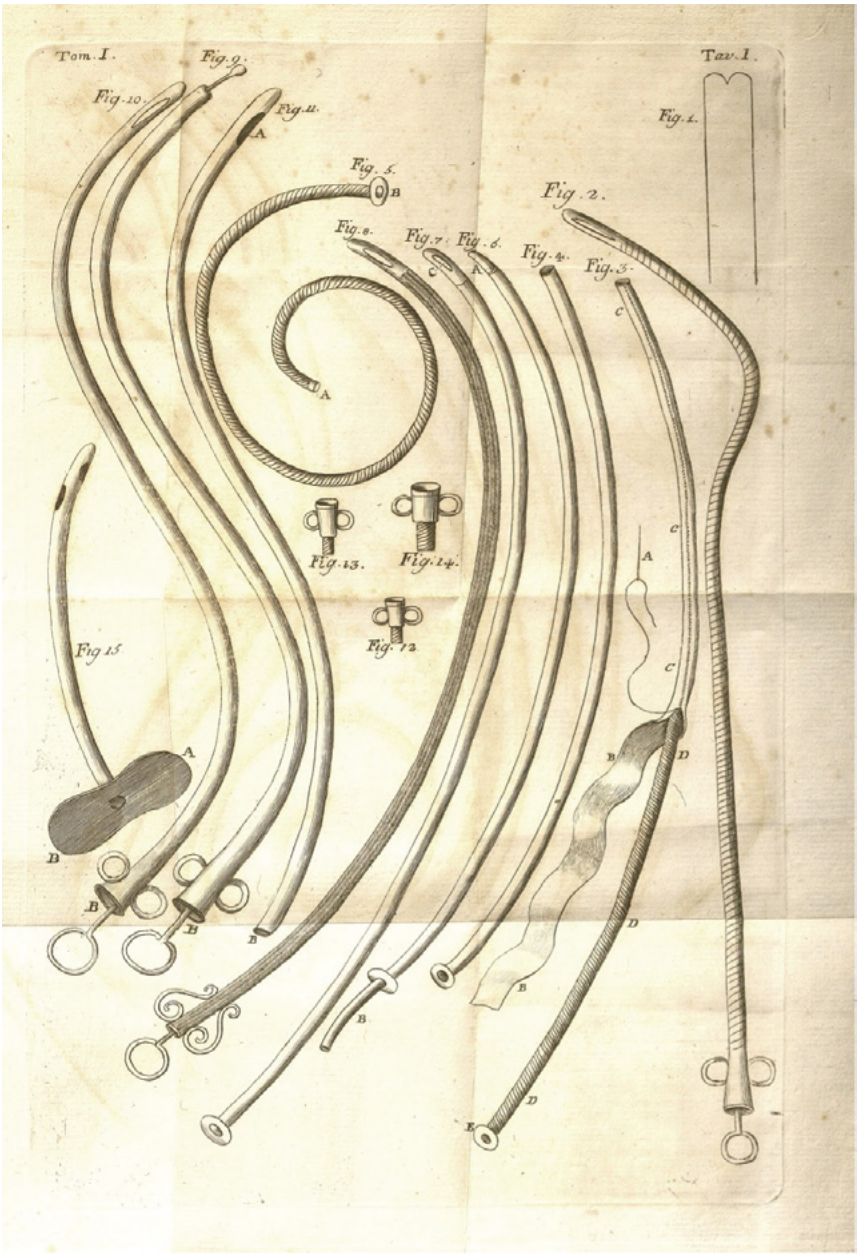


Figure 3: Drawing of different kind of catheters.

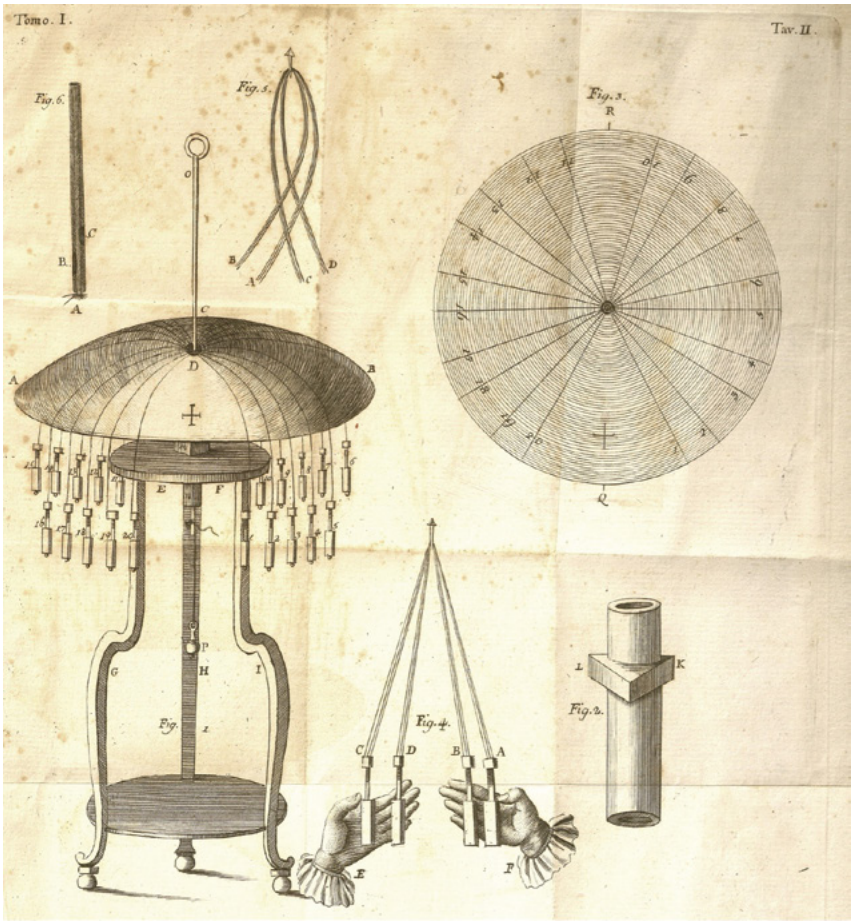


Figure 4: Apparatus for the construction of flexible catheters.

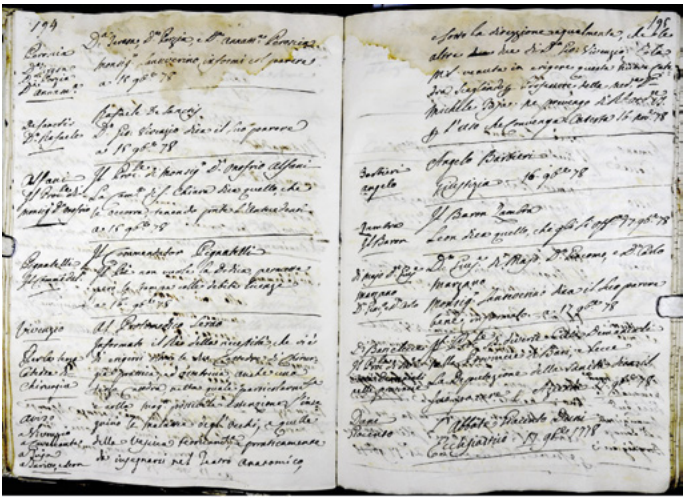
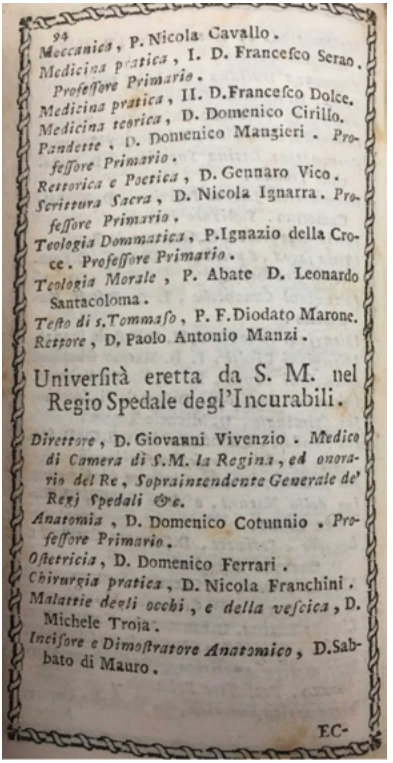


Figure 5: The "Prammatica" or edict for the establishment of Troja's university chair.



94
Meccanica, P. Nicola Cavallo.
Medicina pratica, I. D. Francesco Serao. Professore Primario.
Medicina pratica, II. D. Francesco Dolce.
Medicina teorica, D. Domenico Cirillo.
Pandette, D. Domenico Mangieri. Professore Primario.
Rettorica e Poetica, D. Gennaro Vico.
Scrittura Sacra, D. Nicola Ignarra. Professore Primario.
Teologia Dommatica, P. Ignazio della Croce. Professore Primario.
Teologia Morale, P. Abate D. Leonardo Santacoloma.
Testo di s. Tommaso, P. F. Diodato Marone.
Rettore, D. Paolo Antonio Manzi.

Università eretta da S. M. nel Regio Spedale degl'Incurabili.

Direttore, D. Giovanni Vivenzio. Medico di Camera di S.M. la Regina, ed onorario del Re, Sopraintendente Generale de' Regj Spedali &c.
Anatomia, D. Domenico Cotunnio. Professore Primario.
Ostetricia, D. Domenico Ferrari.
Chirurgia pratica, D. Nicola Franchini.
Malattie degli occhi, e della vescica, D. Michele Troja.
Incisore e Dimostratore Anatomico, D. Sabbato di Mauro.

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Figure 6: The Chairs at the Hospital of Incurables.

The last part of the first volume on urology[42] is dedicated to the construction of flexible catheters made of silk and elastic resin; here it is possible to find a description of flexible catheters available in those times but the main and smartest contribution is the instruction as to construct, step-by-step, catheters following his project. The work is accompanied by precious illustrations. (Figs. 3 & 4)

Michael Troja: Honorarius Chirurgus in Cathedra de morbis oculorum et vesicae.

In 1773 Pope Clemente XIV promulgated the suppression of the Society of Jesus (Jesuits).[43] But already in 1767 Ferdinand IV, Bourbon King of Naples, promulgated the law on the expulsion of the Jesuits and occupation of their property.[44] Therefore the University of Naples acquired what was the Jesuit College as a new seat.[45]

All the University Chairs and Teachings were established here, excluding those pertaining to surgery which were established at the "University erected by H.M. at the Hospital of the Incurables", the large and prestigious Neapolitan hospital.[46] At this University there were: the Engraver and Anatomical Demonstrator and the chairs of: Anatomy, Obstetrics, Practical Surgery. Its director was Giovanni Vivenzio (1747-1819), Protomedical General of the Kingdom and Director and Superintendent of the Royal Hospitals.

In 1779 the Chair of "Eyes and bladder diseases" was added to the existing ones. (Figs. 5 & 6). While the Ophthalmic Clinic entrusted to Professor Barth existed in Vienna since 1775,[47] there were no precedents regarding the establishment of an academic

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42. Troja M., *Memoria sulla costruzione dei cateteri flessibili, e di ogni altra sorta di tubi pieghevoli, onde la Chirurgia potesse aver bisogno Ed in particolare di quei, che si fanno di seta, e che si cuoprono di Resina Elastica di Cajenna, o di altra sostanza, in Lezioni sopra i mali…, op.cit.*, pp.261-295.
43. Dominus ac Redemptor, July 21, 1773.
44. De Sariis A., *Codice delle Leggi del Regno di Napoli*, libro primo, Napoli, 1792.
45. Pinto A., *Da Collegio massimo a Università*, in Societas Anno XLII, Gennaio Aprile 1993, pp.10-23.
46. Borrelli A., *Le origini della Scuola medica dell'Ospedale degli Incurabili di Napoli*, Estratto dall'Archivio storico per le Province napoletane, Società napoletana di Storia patria, Napoli, 2000
47. Del Gaizo M., *Della vita e delle opere di Michele* Troja: Memoria terza, Bollettino degli Atti dell'Accademia Medico-Chirurgica di Napoli, Napoli, 1905.

teaching related to the urinary system. This is the unicity of the Chair entrusted to Michele Troja. After the end of the Bourbon Reign this University lost its prerogatives; a new Chair of Urology took place in Naples two centuries later, in 1975, and was entrusted to Professor Tullio Lotti (1933-).

Correspondence to:
Dr. Renato Jungano
ufficiostorico@siu.it

Friedrich August von Haken (1833-1888) His Contribution to the Development of Endoscopy

Thaddaeus Zajaczkowski
Retired Urologist, Essen, Germany

August von Haken was one of the pioneers of endoscopy and the forerunner of Max Nitze. Friedrich August Haken was born on December 18, 1833 in Riga. Upon completing his secondary education he studied zoology and later medicine in Dorpat (Estonia). After a time spent studying in Berlin, Vienna and Prague in 1862 he returned to Riga. (Fig. 1) In the same year he published his work "Urethral Dilator for Ureteroscopy" in the Vienna Medical Weekly (*Wiener Medizinischen Wochenschrift*). For 25 years, from 1863 until his early death in 1888 he worked as a general practitioner in his hometown.

In his pioneering work, Haken reported that using a urethral dilator and a reflector the urethra can be easily examined. Furthermore, this instrument could be used to carry out a cystoscopy on female patients.

Haken's dilator consists of three arms, each of them has a diameter of 1.75 mm. The device can be inserted in the urethra when it is closed and then spread apart using its handle. The device has a funnel on the outside, though which the urethra can be illuminated using a curved mirror. For the endoscopy of women he recommends 5.5 cm long tubes with matte black inner surface which can be inserted into the bladder using an obturator.

His work provided the foundation for the development of a set of instruments by Josef Grünfeld (1840-1910) in 1874, in Vienna, who explicitly recognized the groundwork of August von Haken in his publication. It is evident that this early pioneer of endoscopy has since then not received the recognition I feel he deserves. It is

Figure 1: Dr. August Haken (1833-1888).

a concern of mine to address this matter.[1-5]

Extensive research was undertaken to collect literature, documents and other materials in the Estonian, Latvian, German and Polish libraries and archives in order to prepare this study.[4-7]

Background

In Urology, like in many other medical specialties, surgical progress goes hand-in-hand with technical advancements, and a medical pioneering spirit is combined with technical know-how and creativity to realise better solutions for physicians and patients.

Endoscopy is the examination of a bodily orifice, cavity, canal or organ using a device consisting of a rigid or flexible tube, a light source to illuminate the organ or object under inspection, and a lens system with an eye piece. Cystoscopy is an endoscopy of the urinary bladder via the urethra. The concept of examining the body's interior and its organs dates back to ancient times. In ancient times and in the Middle Ages, endoscopy had to rely on the use of

1. Goldberg V. Max Nitze's Vorgänger A. Haken // Urologe, 1978, no.318, 66-67.
2. Hatzinger M.: August von Haken (1833-1888)- Einer der Pioniere der Endoskopie und Wegbereiter von Max Nitze. Der Urologe-Suppl. 1. 2016, V20.5, 557.
3. Grünfeld J.: Zur endoskopischen Untersuchung der Harnröhre und Harnblase. Wien. med Presse. 1874, 15: 225-228 and 249-252.
4. University of Tartu. Research Library, Tartu, Estonia. 2017-2020.
5. University of Riga, Riga, Latvia. 2017-2021.
6. Zajaczkowski T, Zamann A. P.: Julius Bruck (1840-1902) and his influence on the endoscopy of today. World J. Urol. 2004 22: 293-303.
7. Reuter M.A.:Reuter H.J., Engel R. M.: History of Endoscopy. Vol. I-IV, W. Kohlhammer Compunication GmbH, Kommissionsverlag W.. Kohlhammer, Stuttgart 1999.

specula and mirrors, with the necessary illumination being provided predominantly by candlelight or sunlight.[1]

During the lengthy and time-consuming development of the endoscope (and of the cystoscope) many physicians and medical instrument makers made various attempts to combine the three essential elements of the device: the tube, the light source and the light conductor (which could consist of a reflector, mirror, glass prism, an optical lens combination, etc.) into a single closed system. Sunlight, an oil or paraffin lamp, wax candle, gas lamp, gasogene lamp (burning a mixture of turpentine and alcohol) or magnesium served as a light source for some considerable time.

For centuries, man has sought the ability to examine the cavity of the live human body. In the development of methods for visualizing the interior of hollow organs, or body cavities, the fundamental problems to be solved were adequate and satisfactory illumination and an optically adaptable and good visualization mechanism.

The most important problem was the canalisation of the access to the hollow organ, the bladder. This was made possible as early as antiquity, some 2500 years ago, with the aid of the catheter. The catheter can therefore be regarded as the 'father' of all cystoscopes because its shaft serves not only to provide access to the bladder, for its unfolding, filling and irrigation but also for its emptying. Emptying the painfully overfilled and obstructed bladder must have been one of the problems of man since the very beginning of time. Visualization of the urinary tract was a most important factor in the development of modern urology, and may well be regarded as the basis for the recognition of urology as a special field.

Highlighting the above achievements in the development of cystoscopic instruments, we recall from oblivion August Haken, who invented tools and performed urethroscopy and, in the case of women, a partial cystoscopy, albeit imperfectly, at a time before the invention of the lightbulb. Haken was therefore a pioneer, which led to Grünfeld and Nitze's cystoscope and a development of the diagnostic and operative endoscopic instruments. This is the glory of Haken.

In the 19th century, the electric endoscope was created. Advances were made techniques of illumination, and a completely new development began which was intimately coupled with the discovery of electricity. In 1828, the physicist C. H. Pfaff wrote that platinum wire could be made incandescent with electric current. In 1845, the Viennese dentist Moritz Heider (1816-1866) was the first to cauterise a dental pulp with this method.

In 1852, in Breslau (Wrocław), surgeon Albrecht Theodor Middeldorpf (1824-1868) introduced "galvanocautery" as a routine method to surgery. He published a book about electrocaterisation in medicine. The electrothermal effect was utilized for tissue destruction through heating (cutting and haemostasis). This book, published in Breslau in 1864, inspired the young dentist Julius Bruck (1840-1902) of Breslau. He was also inspired by his father's (Jonas Bruck, 1813-1883) paper "Die Galvanokaustik in der zahnärztlichen Praxis" ("The galvanocaustic in dentistry") from 1864. It is no coincidence that Julius Bruck ventured to take the first step from electrocauterisation to electroendoscopy (diaphanoscopy).[7, 8, 9, 10]

Julius Bruck was not only the most famous dentist and fighter for dentists' education in Germany in his time, but also one of the most successful inventors. In 1866, he produced light by using an exposed electrically heated platinum loop, which at that time was the most powerful light source available. He conceived of the possibility of placing the source of light in the distal end of an instrument and invented a double glass tube with a water-cooling compartment. This water-cooled apparatus (diaphanoscope) was inserted into the rectum or vagina, to transilluminate the bladder. The key to further advances was born with the introduction of an internal electric light source.

In 1877, the potential of Bruck's theoretical advance was realised in combination with other advances which virtually established

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8. Rathert P., Moll F., Schultheiss D.: Highlights in the history of urology in Germany. In: J.E. Mattelaer Kortrijk (ed). Hist. Urol. Europ. 1998; 5: 45-74.
9. Shah J.: Endoscopy through the ages. BJU Int; 2002; 6: 645-652.
10. Scott W.W. Jr.: The Development of the Cystoscope. From „Lichtleiter to Fiber Optics". Invest. Urol. 1969; 6: 657- 661.

the form of the clinically useful cystoscope as it is usedtoday. The remarkable man responsible for this synthesis was Maximilian Nitze.

Visualisation of the urinary tract was a major factor in the development of modern urology, and may well be regarded as the basis for recognising urology as a field of specialisation. This period was founded by Julius Bruck and subsequently perfected by Maximilian Nitze. Modern urethroscopes and ureteroscopes came to be regarded as essential tools in the urologist's armoury of today.[10-15]

August Haken (1833-1888)

Friedrich August Haken was born on 18 December 1833 in Riga, the capital of Latvia, then part of the Russian Empire. Haken's large family and the generations before him belonged to an educated Baltic German elite. They had been doctors, teachers, officers, engineers, lawyers and politicians. Haken completed his secondary education at the Riga Governorate high school (Gymnasium) in 1855. Initially enrolling to study zoology but then changing over to medicine. He graduated at the University of Tartu (then known as Dorpat) in Estonia in 1859.

In 1861, while working as an assistant at the University's Institute of Forensic Medicine, he was awarded the degree of Doctor of Medicine on the basis of his dissertation entitled "General remarks on hernias and laparotomies with intestinal implantation" (Allgemeine Bemerkungen zu den Hernien und Laparotomie mit Darmimplantation). (Fig. 2)

During his studies he belonged to Fraternitas Rigensis (Baltic Student Fraternity, Student Organization in Latvia), of which he was a loyal member until the end of his life. During

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11. Ringleb O.: Lehrbuch der Kystoskopie. Einschließlich der nach M. Nitzes Tod erzielten Fortschritte. J. F. Bergmann München; 1927. 8
12. Storz S.: Legends of Urology. The Canadian Journal of Urology (CJU Inernational). 2016, 23(1): 8116-8120.
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14. Zajaczkowski T., Zaman A.P.: Julius Bruck (1840-1902) - His Contribution to the Development of Endoscopy. Hist. Urol. Europ. 2003, 10: 59-71.
15. Alken P.: Meilsteine von Karl Storz. Milestones of Karl Storz. In: Zajaczkowski T.: Franzvon Paula Gruithuisen (1774-1852) Vorreiter der Lithotripsie. Pionier of Lithotripsy. Verlag Endo Press, Tuttlingen, Straub Druck Medien A G, Schramberg, Germany; 2011, 195-198.

Allgemeine Bemerkungen
zu den
Hernien
und
Laparotomie mit Darmimplantation.

INAUGURAL-DISSERTATION,
welche
mit Bewilligung der Hochverordneten
Medicinischen Facultät der Kaiserlichen Universität zu
DORPAT
zur Erlangung
des
Doctorgrades
öffentlich vertheidigen wird
C. August Haken,

DORPAT.
Buchdruckerei und Lithographische Anstalt von Carl Schulz
1861.

Figure 2: Doctoral thesis, 1861.

1862 and 1863, August von Haken completed his medical postgraduate education by going on a study trip to Berlin, Vienna and Prague. While in Vienna, in cooperation with the medical instrument maker Joseph Leiter (1830-1892), von Haken invented and developed his rigid urological instrument. In the same year he published his work "Urethral Dilator for Urethroscopy" in the international medical journal *Wiener Medizinische Wochenschrift*, accompanied by a detailed drawing and description of the newly invented instrument.

The latter explains the principle of operation of the device which, when inserted into the urethra, expands and forms a space through which the light beam reflected by the mirror's reflector can pass. The clinician is thus able to examine not only the urethral mucosa in men, but also to remove foreign bodies in female patients. August von Haken's invention was greatly valued by his successors, the Austrian uro-dermatologist Josef Grünfeld (1849-1910), and the German urologist Max Nitze (1848-1906), who in 1879 developed the electric cystoscope.

In 1863 von Haken was invited to take up the post of extraordinary professor of surgery at the University of Kharkov, in Russia (today Ukraine), which he turned down, preferring instead

to return to his birthplace, Riga, where he devoted his skills and energies to working as a doctor.

During his 25 years of professional activity, and as a man of high social standing, he served in a variety of capacities: as Director of the Municipal Poor House, Chief Physician of the Red Cross Field Hospital in Riga (1877-1878), Vice-President of the Board of Trustees of the 3 Sisters' Hospital, Vice-President of the Board of Trustees of the Hostel for Religious Sisters, and Director of the Home Care Institutions for the Disabled.

In 1881 he was ennobled and accorded the title 'von' by Tsar Alexander II of Russia, in recognition of his military service in the war against the Turks. Dr. Friedrich August von Haken (Haken) married on 14th May 1863 Anna Catharina Elisabeth Charlotte (née Hedenström). They had six children: five daughters and one son. On 21 November 1888, August von Haken died suddenly at the age of 54 and was buried in Riga's Tornakalns Cemetery beneath a massive stone cross that remains to this day. In honour of August Haken, in 1896 the Red Cross Board of Trustees established a children's dispensary named after him in Riga. (Fig. 3) [3,16-22]

His son Walter August von Haken supplemented and edited the genealogical collection of Haken's family, previously collected by his father. (Fig. 4) The most famous of the German line of Hakens was Dr. Hermann Haken (1828-1916). Born in Kosslin (today Koszalin), he was a German lawyer and politician. He achieved great fame as probably the most important lord mayor

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18. Portrait F. A. von Haken:Illustrierte Beilage der Rigaschen Rundschau.(III. Beil. d. Rig. Rdsch,), 1904, 87.
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21. Haken v. F.A.: In: Haken v. W. A.: Genealogische Stammtafel der Familie Haken in Kurland, Livland und Estland (1560-1900). Ergänzt und Herausgeber von Walter August von Haken, Druck von W. F. Däcker, Riga, 1902, 1-33.
22. Haken A.: Allgemeine Bemerkungen zu den Hernien und Laparotomie mit Darmimplantation. Inaugural Dissertation. Medizinische Fakultät der Kaiserlichen UniversitätDorpat. Buchdruckerei und lithographische Anstalt von Carl Schulz, Dorpat; 1861, pp. 1-119.

Staatsrat Dr. med. August von Haken †.

Friedrich August von Haken, geb. am 18. Dezember 1833 zu Riga als Sohn des Landkommissärs Ed. Wilh. Haken wurde im Rigaschen Gouvernements-Gymnasium erzogen und im 1. Semester 1855 an der Dorpater Universität, zuerst für das Studium der Zoologie dann für Medizin immatrikuliert. Während seiner Studienjahre gehörte er der Fraternitas Rigensis an, der er mit warmem Herzen bis an seines Lebens Ende angehangen. Nachdem er bereits 1859 als Assistent für gerichtliche Medizin am Dorpater Hospital fungiert, begab er sich, nach seiner am 10. April 1861 erfolgten Doktor-Promotion in's Ausland, um in Berlin, Wien und Prag seine Studien fortzusetzen. Einem im Jahre 1863 an ihn ergangenen Rufe zum außerordentlichen Professor der Chirurgie an der Universität Charkow leistete er nicht folge, vielmehr begann er in diesem Jahre seine ärztliche Tätigkeit in unserer Stadt. Von welch außergewöhnlich raschem und glänzendem Erfolge sie begleitet war, ist seinen Zeitgenossen lebhaft erinnerlich. In den 25 Jahren seines beruflichen Wirkens in unserer Stadt hat Haken der Kommune als Direktor der Hausarmenpflege, dem Staate als Arzt am Kameralhof und in den Kriegsjahren 1877/79 als Oberarzt des temporären Kriegshospitals des „Roten Kreuzes", sowie in der Stellung als Vizepräsident des Kuratoriums des Schwesternasyls gedient. Durch wiederholte Ordensverleihung, Beförderung zum Staatsrat und im Jahre 1881 erfolgte Erhebung in den erblichen Reichsadel sind seine hervorragenden Verdienste von der Staatsregierung anerkannt worden.

Die „Zeitung für Stadt und Land" widmete ihm nach seinem am 21. November 1888 erfolgten Tode einen Nachruf dem wir Folgendes entnehmen:

„Nicht minder, als der vor Kurzem verstorbene Dr. Brauser, hatte auch August Haken es verstanden, zwischen sich und seinen Patienten nicht nur berufliche sondern auch persönliche Beziehungen zu knüpfen, die erfolgreich in einander griffen. Ist es schon eine allgemein feststehende Tatsache, daß das bloße Erscheinen des Arztes am Lager eines Leidenden von wohltätigstem Einfluß auf dessen Gemütsstimmung ist, so wurde bei Hakens ärztlicher Tätigkeit dieser Einfluß noch wesentlich gesteigert durch den Zauber, der von seiner milden Persönlichkeit ausging, durch sein gütiges, in jedem Zuge den echten Menschenfreund zeigendes Wesens, durch die sichere, bestimmte und doch so freundliche Art, in der er am Krankenbett anordnete, oder aber, wo es galt, mit seiner oft bewährten und im Laufe der Jahre mit so außerordentlich glücklichem Erfolge geübten Operationskunst einzugreifen, dem Patienten Mut und Zuversicht einzuflößen wußte.

Wohl ist die stete, allzeitige Hilfsbereitschaft eine der vornehmsten Pflichten des ärztlichen Berufs. Mit ganz besonderer Gewissenhaftigkeit ist der Verstorbene dieser Pflicht nachzukommen bestissen gewesen. Jederzeit und sobald es, angesichts seiner ausgedehnten Praxis nur möglich war, ist er erschienen, sobald er gerufen wurde, bei Reich und Arm, bei Vornehm und Gering. Und so ist er denn von denen, die ihn näher kannten und im Banne seines vorstehend nur skizzenhaft gezeichneten Wesens standen — und das war seine ganze große Klientel — nicht nur geschätzt und geehrt, sondern auch geliebt worden als aufopfernder, uneigennütziger Helfer in der Not, als zuverlässiger, vollsten Vertrauens werter Freund und Berater.

Einen schweren Verlust erleidet durch das Hinscheiden Hakens auch ein Institut, dem er sein lebhaftestes Interesse zugewandt und dem er mit rechtem Feuereifer gedient — das Kuratorium des Asyls der Schwestern vom Roten Kreuz, dem er als Vizepräsident und fachmännischer Leiter dieses ausgezeichneten Krankenpflegerinnen-Korps angehörte. Er war es, der das letztere so vortrefflich, nach neuesten, praktisch und wissenschaftlich anerkannten Mustern organisierte, der dasselbe in den Dienst auch der privaten häuslichen Krankenpflege stellte und letztere damit zu einer hier bisher nicht einmal geahnten Höhe und Wirksamkeit erhob. Die Werke des Roten Kreuzes zu Riga werden auch in Zukunft den Namen ihres Organisators loben."

Figure 3: Obituary, 1888.


1560—1900.

Genealogische Stammtafel

der Familie

Haken

in

Kurland, Livland und Estland

zusammengestellt

von

weil. Dr. med. Friedrich August von Haken.

Ergänzt und herausgegeben

von

Walter August von Haken.

Manuskript.

Riga.

Druck von W. F. Häcker.

1902.

Figure 4: Genealogical chart of the Haken family, 1902.

of Stettin (Szczecin). During his 29 years in office, he developed the capital of Pomerania into a modern city and one of the most important industrial and port cities in the Baltic region. Most closely associated with the mayor's name, however, is the Oder riverside street Haken Terraces/Hakenterrasse), named after him.[4,5,17,19,21,23,24]

Haken's publication

In 1862, August Haken published his work "Dilatatorium urethrae zur Urethroskopie" (Urethral dilator for urethroscopy). (Figs. 5a and b) In his paper, he described how the urethra should be examined using the dilator and reflector he constructed. Until that time the major complication associated with using previous endoscopes (J. Bruck, A. J. Desormeaux and others) was burns. Haken solved this unpleasant problem with a simple way, he simply separated the light from endoscope. The light source was placed to the side of the patient and the light was directed with the help of a concave mirror commonly used in otology into the dilated urethra (dilator).

With his instrument it was possible to diagnose pathological changes of the mucousa of the urethra, dilate it if indicated, and remove foreign bodies from the urethra or bladder in women. Partial cystoscopy in women was also possible.

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Sonnabend den 22. März Nr. 12. Zwölfter Jahrgang 1862.

Bureau: Stadt, Herrengasse Nr. 252.

Man pränumerirt in Wien im Bureau der „Wiener mediz. Wochenschrift" und in Seidel's Buchhandlung, Graben 1122. Ausser Wien in den Buchhandlungen und Postämtern. — Geldsendungen müssen frankirt werden.

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Dilatatorium urethrae zur Urethroscopie.

Von ***Med.-Dr. August Haken*** *in Riga.*

Wenn nach nicht sehr vielen Versuchen ein Instrument jetzt schon der Oeffentlichkeit übergeben wird, so geschieht es nur aus dem Grunde, um auf das Factum aufmerksam zu machen, dass man mit Hilfe eines einfach construirten und leicht anwendbaren Dilatatoriums — und eines Beleuchtungs-Spiegels — im Stande ist die Urethra der Untersuchung zugänglich zu machen. Man ist mit Benutzung dieses Instrumentes im Stande — auf eine für das zu untersuchende Individuum schonende und schmerzlose Weise — die Veränderungen der Harnröhre zu erkennen und vielleicht sogar befähigt, etwaige operative Eingriffe, wie Entfernen fremder Körper etc. zu vollziehen.

Das Dilatatorium (Fig. I.) besitzt im geöffneten Zustande eine Länge von 12 Centimètre und besteht: aus einem Messingtrichter *f*, aus einer kreisförmigen Stahlplatte *a a* mit drei Vorsprüngen, aus einer halbkreisförmigen *b b* mit zwei Vorsprüngen und aus drei runden Stahlstäbchen oder Branchen *c' c'' c'''*.

Der Trichter *f*, von 4 Centimètre Länge, ist innerlich matt geschwärzt — äusserlich mit einer Schrauben-Windung versehen und bewegt sich in einer entsprechenden Schrauben-Windung der unteren Stahlplatte *a a* auf und ab.

An der unteren Platte *a a* befindet sich das mit einer Handhabe versehene Getriebe *g*, welches um seine Längsachse gedreht, auf der Kammstange *d*, die in der oberen Platte *b b* festsitzt, auf und ab geschraubt werden kann, d. h. durch eine Achsenumdrehung des Getriebes *g* wird die obere Platte *b b* der unteren Platte *a a* genähert — oder von letzterer entfernt. Ausserdem befinden sich in der unteren Platte *a a* zwei Führungsstangen *c c*, welche durch die obere Platte *b b* gehen.

Die drei Vorsprünge der unteren Platte *a a* sind verschieden von einander construirt. Der rechte Vorsprung (in der Fig. I.) zeigt allein nur ein längliches Fenster und dient zur Aufnahme des Stäbchens *c'''*, der linke dient als Stützpunkt für den entsprechenden Vorsprung der oberen Platte *b b* — im geöffneten Zustande des Instrumentes. Der in der Figur I nicht sichtbare, hintere Vorsprung nimmt das Stäbchen *c''* auf und erlaubt letzterem, unter einer angebrachten Kappe, eine gewisse Beweglichkeit nach aussen — und wieder zur Mittellinie des Instrumentes.

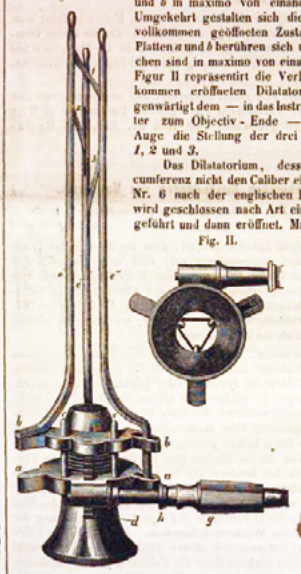
An der oberen Platte *b b* dient der rechte, gefensterte Vorsprung für das Stäbchen *c'''* nur zum Durchtritt. Der linke dagegen ist mit dem Stäbchen *c'* verschiebbar verbunden. Demnach stehen zwei Stäbchen *c''* und *c'''* mit der unteren Platte *a a* und das dritte *c'* mit der oberen Platte *b b* in Verbindung.

Die drei runden Stahlstäbchen oder Branchen *c' c'' c'''* sind ungleich lang, von 1¾ Millimètre im Durchmesser und an ihren oberen Theilen durch drei Gelenks-Spangen *1*, *2*, *3*, je über 1 Centimètre lang, mit einander verbunden.

Das Dilatatorium kann sowohl am unteren, als auch am oberen Theile, je nach den Verhältnissen der Urethra penis, verschieden erweitert werden. Unten, am Ocular-Theile werden die drei Branchen durch den keulartig sich hineindrängenden Messingtrichter *f* aus einander gedrängt, und oben — am Objectiv-Ende — werden sie vermittelst der drei Gelenks-Spangen *1*, *2*, *3* durch das Getriebe *g* von einander entfernt.

Im ganz geschlossenen Zustande des Dilatatoriums*) liegen die drei Branchen sich unmittelbar berührend an einander und imitiren eine Katheter-Form, während die beiden Platten *a* und *b* in maximo von einander entfernt sind. Umgekehrt gestalten sich die Verhältnisse im vollkommen geöffneten Zustande: die beiden Platten *a* und *b* berühren sich und die drei Branchen sind in maximo von einander entfernt. Die Figur II repräsentirt die Verhältnisse des vollkommen eröffneten Dilatatoriums und vergegenwärtigt dem — in das Instrument vom Trichter zum Objectiv-Ende — hineinblickenden Auge die Stellung der drei Gelenks-Spangen *1*, *2* und *3*.

Fig. I.



Das Dilatatorium, dessen Branchen-Circumferenz nicht den Caliber eines Katheters von Nr. 6 nach der englischen Filière übersteigt, wird geschlossen nach Art eines Katheters eingeführt und dann eröffnet. Man dilatirt zuerst und zwar nur allmählich, das Objectiv-Ende mit Hilfe des Getriebes *g* — und dann erst, um das Ocular-Ende zu erweitern, setzt man den Trichter *f* in Bewegung. Hat man die Urethra penis, die testante Hyrtl einen erheblichen Grad von Erweiterungsfähigkeit besitzt, genügend dilatirt, so bediene man sich abermals der Handhabe des Getriebes *g* und ziehe dieselbe vom Ringe *h* ab. Durch das Abziehen der Handhabe vom Ringe *h* kann sich das Getriebe *g* auf der Kammstange *d* nicht mehr fortbewegen und die drei Branchen sind durch diesen Mechanismus bleibend entfernt und unverrückbar eingestellt.

Fig. II.

Ist die Urethra penis dilatirt, so benütze man einen concaven Beleuchtungs-Spiegel von 6 Zoll Brennweite.

*) Die Figur I stellt das Dilatatorium im halbgeöffneten Zustande dar.

Figure 5a: Haken's publication in the Vienna Medical Weekly, 1862.

Will man das Dilatatorium aus der Urethra wieder entfernen, so wird folgendes Manoeuvre unternommen: man schraube zuerst den Trichter *f* zurück, nähere die Handhabe des Getriebes *g* dem Ringe *h* und entferne durch Achsenumdrehung des Getriebes *g* die obere Platte *b b* von der unteren *a a* — wodurch die Branchen wieder genähert werden.

Was die Lage des zu untersuchenden Individuums anbelangt, so setze man dasselbe auf einen Tisch, stelle die Beleuchtungslampe seitwärts von ihm auf — und suche mit Hilfe des Beleuchtungsspiegels das Licht in die dilatirte Urethra zu reflectiren. Der Untersucher sitzt oder kniet zwischen den Schenkeln des zu untersuchenden Individuums und blickt durch die Oeffnung des Spiegels in die von letzterem beleuchtete Harnröhre. Der Spiegel zeigt in Form und Construction keine besonderen Abweichungen von den bei der Laryngoscopie schon in Gebrauch stehenden Beleuchtungsspiegeln. —

Um die weibliche Harnröhre — und zugleich auch einen kleinen Theil der Harnblase — zu urethroscopiren, bediene man sich Fackfong-Röhrchen von verschiedenen Calibern (von Nr. 12 u. s. w. bis Nr. 17 nach der englischen Filière).

Jedes zu diesem Zwecke gebrauchte Röhrchen muss $5^1/_2$ Centimètre Länge messen, innerlich matt geschwärzt sein und einen 2 Centimètre langen, festsitzenden, trichterförmigen Aufsatz haben. Ausserdem gehört, zur Erleichterung beim Einführen in die Harnröhre, zu jedem urethroscopischen Röhrchen ein entsprechend geformter und langer Obturator.

Nach Entleerung der Harnblase mit einem Katheter führt man, in liegender oder sitzender Lage der Patientin, das mit einem Obturator versehene, urethroscopische Röhrchen in die Harnröhre und beleuchtet dieselbe, wie früher angegeben, mit einem concaven Beleuchtungspiegel.

Die Instrumente sind zuerst ausgeführt und angefertigt von dem Hrn. J. Leiter, Fabrikanten chirurgischer Instrumente in Wien (Alservorstadt) und gezeichnet vom Hrn. Dr. Med. Carl Heitzmann.

Die angeborenen Missbildungen des Mastdarms.

Von ***Dr. Julius Althaus*** *in London.*

(Schluss.)

Einige Chirurgen haben behauptet, dass ein After in der Lende persönlich allerdings unangenehmer sei, aber dass ein solcher in der Inguinalgegend fataler sei, wenn der betreffende Patient sich verheirathet; indessen scheint die Lage des Afters in dieser Beziehung ziemlich gleichgiltig zu sein, und zieht Hr. Curling im Allgemeinen die Operationen in der Leiste vor, weil dieselbe leichter und gefahrloser ist als die in der Lende.

Bei einer Discussion, welche unlängst über diesen Gegenstand in der Pariser Akademie stattfand, wurde die Frage aufgeworfen, ob die linke Seite oder die rechte bei der Inguinaloperation vorzuziehen sei. Hr. Huguier erklärte, es sei am besten auf der rechten Seite zu operiren; während des intra-uterinen Lebens sei nämlich die flexura sigmoidea sehr stark entwickelt, und ginge, da sie in der linken fossa iliaca keinen gehörigen Raum fände, in die fossa iliaca dextra und von da ins Becken zum Rectum über. Diese Verhältnisse finden sich bei Kindern bis zu anderthalb oder gar zwei Jahren. Wenn daher die Oeffnung an der rechten Seite angelegt würde, so befände sie sich näher am Ende des Darms, und das Kind würde dann nicht so leicht Prolapsus in Folge der Zurückziehung der flexura sigmoidea beim Wachsen bekommen. Hrn. Curlings Erfahrungen stimmen indessen mit dieser Ansicht Huguier's nicht überein. Er hat an der rechten Seite die Colotomie in fünf kindlichen Leichen vorgenommen; in drei von diesen Fällen erreichte er das Colon leicht, und in zweien von diesen dreien muss die Darmschlinge von der linken bis zur rechten Leiste 9 Zoll. In einem vierten Falle schob sich nach Eröffnung des Bruches Dünndarm vor, und das Colon war nicht zu finden; es stellte sich nämlich heraus, dass der Darm aus der linken fossa iliaca in die Höhe stieg, eine beträchtliche Windung (5 Zoll lang) in der linken Leiste machte und dann im Rectum endigte. In einem fünften Falle legte sich der Blinddarm vor, und das Colon liess sich nicht erreichen; der Dickdarm machte

nämlich aus der linken fossa iliaca heraus eine Windung nach oben, die 3 Zoll lang war, sich aber der rechten Leiste nicht näherte.

Aus diesen Untersuchungen ergibt sich, dass die Lage des Darms, wie sie von Huguier angegeben ist, nicht so beständig in Kindern vorkommt, als er behauptet. In der früheren Lebenszeit ist das Colon bedeutend entwickelt und macht grosse Windungen, nachdem es die linke fossa iliaca erreicht, welche indessen in verschiedenen Personen sehr verschieden sind; und obwohl es gewöhnlich nach der rechten Leiste zu geht, sind doch so zahlreiche Ausnahmen da, dass die Operation in der linken Leiste vorzuziehen ist. Der Umstand, dass ein künstlicher After an der rechten Seite der Endigung des Nahrungskanales etwas näher liegt, kann kaum in Betracht kommen; und wenn es auch wahrscheinlich wäre, dass nach einer Operation an dieser Seite ein Prolapsus von dem untern Theil des Darmkanals nicht so leicht einträte, so liesse sich doch auf der andern Seite erwarten, dass der obere Theil eine Neigung zur Inversion haben würde, da er frei und lose in der Bauchhöhle ist. Vorläufig hat Huguier's Angabe gar keine Erfahrung für sich, denn eine Colotomie ist bisher noch nie in der rechten Leiste vorgenommen worden.

Hr. Curling stellt die folgenden Regeln für operative Eingriffe in den verschiedenen Formen der Missbildungen des Mastdarmes auf:

1. Bei einfachem imperforirtem After der ersten Form, sollte frühzeitig ein Versuch gemacht werden, den Darm in der Regio ano-perinealis zu öffnen. Der Einschnitt muss an der Stelle des Afters, genau in der Mittellinie, nach dem Steissbein zu, gemacht werden, man muss den muskulös-aponeurotischen Boden des Beckens trennen und $1^1/_4$" tief eindringen; sollte man dann keinen Darm antreffen, so muss man die Operation verschieben oder aufgeben. Wenn noch keine lange Zeit seit der Geburt verflossen und das Kind noch nicht durch Erbrechen oder Mangel an Nahrung erschöpft ist, so kann man acht oder zwölf Stunden warten, und die Wunde dann von Neuem untersuchen; denn es kann vorkommen, dass der Mastdarm, durch das Drängen des Kindes herabgedrückt und keinen Widerstand auf dem Boden des Beckens findend, sich zwischen den Wundrändern präsentirt. Beobachtet man daher eine Protrusion, so kann man die Geschwulst mit der Spitze eines Bistouris exploriren. Hat man den Darm erreicht und eine hinreichende Oeffnung darin gemacht, so fasse man die Wände desselben mit der Zange und ziehe sie sachte nach der äusseren Wunde herab, an deren Rändern man dieselben mit zwei oder mehreren metallischen Nähten befestigt. Man muss dann Breiumschläge auf die Wunde legen und sie rein halten lassen und die Nähte können fünf oder sieben Tage darin bleiben. Nach sieben oder zehn Tagen führt man gelegentlich, einige Wochen lang, eine Bougie ein, auch in günstig verlaufenden Fällen, um der Neigung zur Contraction entgegen zu arbeiten. Wenn der Damm während des Drängens des Kindes vorgewölbt wird, so kann man ziemlich sicher darauf rechnen, dass der Erfolg ein günstiger sein wird; wenn aber dieser Theil eingedrückt erscheint und das Becken klein und eng ist, so sind die Aussichten so schlecht, dass es fraglich wird, ob man überhaupt einen Versuch machen soll, eine Passage in der Aftergegend zu erhalten. In diesem Falle, oder auch wenn man den Darm nicht erreichen kann, muss der Chirurg die Eltern mit der Lage der Dinge bekannt machen, und wenn sie einwilligen, das Colon in der linken Leiste öffnen.

2. Wenn, wie in der zweiten Form, der After sich in einen Blindsack öffnet, so muss man sofort den Versuch machen, den Endtheil des Darmkanals zu erreichen. Wenn die Symptome nicht zu dringend sind, so könnte man allenfalls den Sack erst ein paar Stunden lang durch Einlegung eines Stückes Pressschwamm erweitern. Fühlt der Operateur den oberen Theil des ausgedehnten Mastdarms gegen den untern projiciren, so kann man die Geschwulst mit einer Nadel exploriren, und wenn Gas oder Meconium herauskommt, eine gehörige Oeffnung mit einem Bistouri machen. Fühlt man aber nichts, was auf die unmittelbare Nähe des Darms deutet, so muss man den After durch eine Incision erweitern, welche gegen das Steissbein zu geht, so, dass die hintere Wand des Sackes getrennt wird; und muss dann in dieser Richtung $1^1/_2$ oder 2" von dem After weiter suchen. Erreicht man den Darm nicht, so muss man die Operation aufgeben und die Colotomie in der Leiste ausführen. Diese letztere Operation zu verschieben, damit der Darm noch mehr überladen werde und in die Darmwunde hinabsteige, scheint nicht

Figure 5b: Haken's publication in the Vienna Medical Weekly, 1862.

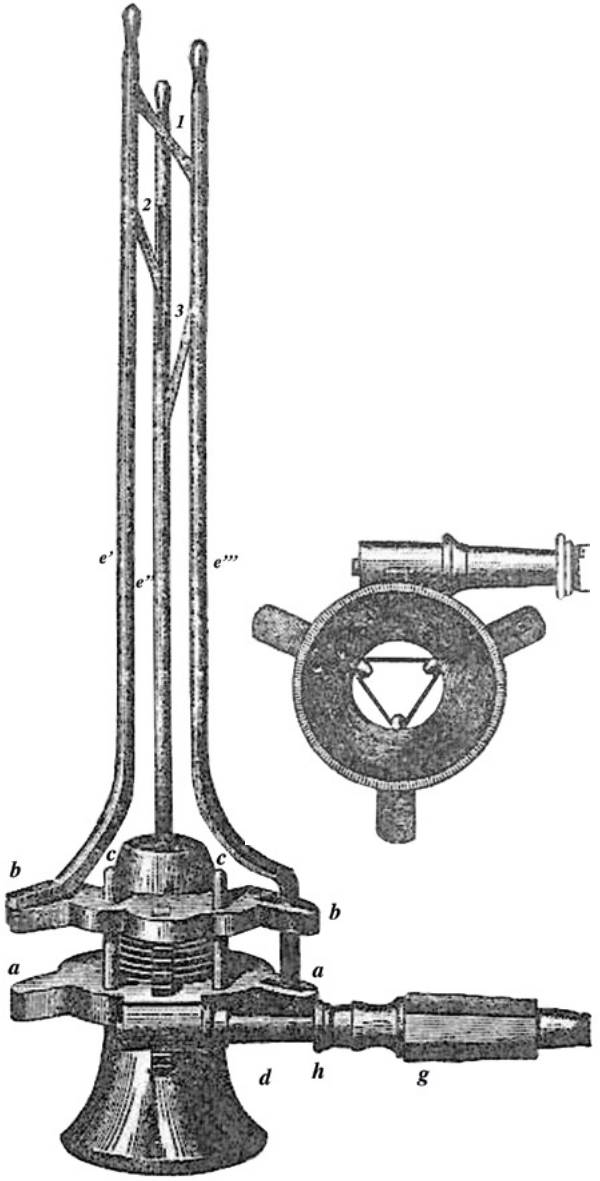


Figure 6: "Dilatatorium urethrae" for urethroscopy (half open) according to August Haken, 1862.

Here follows an English translation of the original description of August Haken's intrument:

Urethral Dilator for Urethroscopy By Med. Dr. August Haken in Riga

If an instrument after not too much testing is handed over to the general public, it happens for the reason to call attention to the fact that with the help of a simply designed and easy to use dilator (and an illuminating mirror) it is possible to make the urethra accessible for examination. Using this instrument, we are capable of identifying disorders in the urethra in agentle and painless way for the person subject to the examination, and it may even enable the performance of surgical interventions, e.g. removal of foreign bodies.

The dilator {(Fig. 6)} is 12 centimetre long when opened and it consist of a brass funnel (d), a round steel disk (aa) with three lugs, a semicircular steel disk (bb) with two lugs and three steel rods or branches (e', e'', e'''). [4]

The funnel (d) is 4 cm long, its inner surface is matte blackened. On the outside it's furnished a with a thread and it moves in the corresponding thread of the bottom steel disk (aa) back and forth.

The gear (g) has a handle and it is connected to the bottom disk. By turning it around its longitudinal axis, it can be moved up and down along the rack d, which is fixed to the upper disk bb, i. e. by turning gear g around its axis the upper disk bb and the lower disk aa can be moved towards each other, or away from each other. Additionally, there are two guiding rodscc fixed to the bottom disk aa and passing through the upper disk bb.

Each of the three lugs of the bottom disk aa are constructed differently. The lug on the right (Image I) has only one oblong hole holding the rod e'''. The left one serves as a support point for the corresponding lug of the upper disk bb when the instrument is in its "open" state. The rear lug which is not visible on Image I, holds the rod e''. It also allows the rod a certain mobility outwards and back towards the center line of the instrument under an attached cover. On the upper disk bb the lug with the opening on the right side simply provides a passage for the rod e'''.

On the other hand, the left one is connected to the rod e' adjustably. Therefore, two rods e'' and e''' are connected to the bottom disk aa, and the third one e' is connected to the upper disk bb.

The three steel rods or branches e' e'' e''' have different length. They have a diameter of 1 ¾ millimeter and their upper ends are connected by three joint strips 1, 2, 3, each one of which is over 1 cm long. The dilator can be extended at its bottom and at its top part as well depending on the conditions of the urethra. At the bottom (ocular part) the three branches are pushed apart by the club-like, interloping brass funnel d. At the top (the objective part), they can be separated by the joint strips 1, 2, 3 using the gear g.

When the dilator is completely closed, {the main image shows the dilator in a half-open position} the three rods are touching each other and imitate a catheter-shape, while the two disks a and b are separated as much as possible. The positions of the components are exactly the opposite when the instrument is completely open. The two disks a and b are touching each other and the rods are maximally separated from each other. Image II represents the configuration of the completely open dilator and shows the position of the joint strips 1, 2 and 3 as seen by the eye looking into the instrument from the funnel towards the objective end.

The circumference of rods of the dilator is smaller than of a catheter No. 6 according to the English diameter gauge. The dilator first must be closed and inserted like a catheter, then opened. First, the objective end needs to be dilated gradually using the gear g. Then, to expand the ocular end the funnel f needs to be moved. If the urethra (which according to Hyrtl considerably expandable) is sufficiently dilated, the handle of the gear g must be used again, and pulled away from the ring h. By pulling away the handle from the ring h, the gear g won't be able to move along the rack d anymore. This mechanism separates the three rods and fixes them in that position.

When the penile urethra is dilated, a curved illuminating mirror of 6 inch focal length can be used.

When the dilator needs to be removed, the following is to be done. First, the funnel d needs to be screwed back, the handle of the gear g needs to be moved towards the ring h and the upper disc bb has to be moved away

from the bottom disk aa by turning the gear around its axis. This moves the rods towards each other.

As far as the position of the examined person is concerned, the person must be seated on the examination table and the illuminating lamp must be set up on either side. Using an illuminating mirror the light can be directed into the dilated urethra. The examiner sits or kneels between the thighs of the person to be examined and looks through the hole of the mirror into the illuminated urethra. The mirror is not significantly different in form or construction from the illuminating mirrors used for laryngoscopy.

To do the ureteroscopy of the female urethra (and also a small part of the urinary bladder) one needs to employ packfong tubes of different calibers (from No. 12 to No. 17 according to the English diameter gauge).

Each of the tubes used for this purpose must be 5 ½ centimeter long, their inner surface must be matte blackened, and they must have a 2 centimeter long, firmly attached, funnel-shaped extension. To make the insertion in the urethra easier, each ureteroscopic tube needs to have an appropriately shaped and long obturator.

After emptying the urinary bladder with a catheter the ureteroscopic tube with the obturator can be inserted in the urethra of the lying or sitting female patient, and illuminated with a curved illuminating mirror, as mentioned before.

The instruments were initially implemented and made by Mr. J. Leiter, surgical instrument manufacturer in Vienna and drawn by Mr. Dr. Med. Carl Heitzmann.

Haken's scientific work in a urological context

Dr Haken is a prime example of the successful cooperation between physician and medical instrument maker, Josef Leiter. Ideas and attempts of realization of endoscopy go back to the middle of the 19th century Filipp Bozzini, (1773-1809); Jean A. Desormeaux, (1815-1882), Ernst Fürstenheim (1836-1904), Francis Cruise (1834-1912) and many others. Already in 1841, Friedrich Hofmann (1806-1886) of Burgsteinfurt described his perforated concave mirror with a central aperture in it as the ideal

instrument that allowed reflecting and focussing light into the external auditory canals and inspecting the tympanic membrane. He recommended his device also for the inspection of other concealed regions of the body. This revolutionized lighting technique above all in E.N.T. (ear, nose, and throat department), and was also used for ophthalmoscopy and urethroscopy (Haken, Grünfeld). The invention was simple: he scratched the reflective coating away from a toiletry mirror and used this hole to look through.

In the paper translated above, Haken addressed the options available at the time for urethroscopy and treating patients with urethral afflictions. He invented special instrument for this purpose and described its construction and gave the operations instruction. Haken separated the light from the shaft of the endoscope (tube, catheter) in order to avoid burns and pain for the patient. He preferred examination of a seated patient, but also conducted examination on a standing patient as did Francis Richard Cruise (1834-1912). He suggested reflecting the light of the laterally situated lamp through a funnel over the speculum made by using a freestanding concave reflector into the urethra.

The patient sat on a table and the doctor sat or kneeled between his thighs. He separated the endoscope into three parts (as in laryngoscope) and was therefore the first to depart from the Bozzini and Desormeaux principle (unified light source with the endoscope). In female patients he used 5.5 cm long, 12-17 English "Filice" nickel silver tubes with funnel-shaped attachment and a matte black interior surface as well as an obturator with which he could also observe the bladder. Other doctors like A. Couriard in St. Petersburg, R. F. Weir in New York and A. Reder in Vienna followed this path as well. (Fig. 7) [1, 3, 7, 25, 26]

For the first time ever, Dr. F.A. Haken had made endoscopy of the urethra in women practically applicable with his simplified three leaved dilatorium urethrae, thus, twelve years later, becom-

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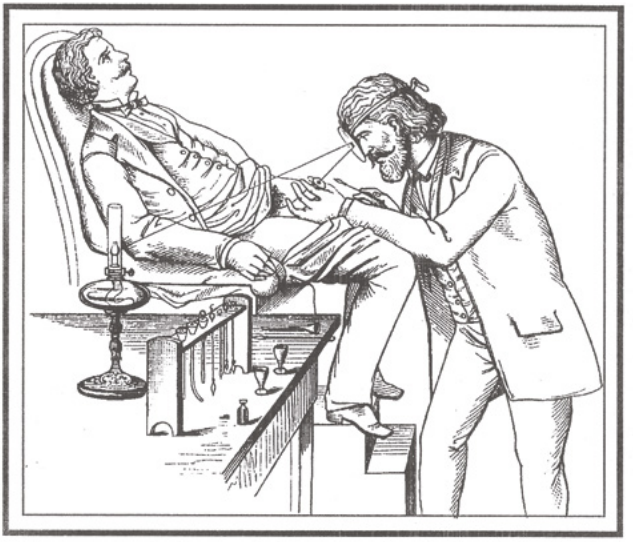

Figure 7: Endoscopic examination (urethroscopy) according to August Haken and Joseph Grünfeld, 1874.

ing Viennese urologist Josef Grünfeld's predecessor. Haken's work provided the foundation for the development of a set of groundbreaking instruments by Grünfeld, who duly acknowledged von Haken's contribution in his publication. The importance of Haken's work was clearly recognised at this time.[3]

Several developments followed in the development of modern cystoscopy. In 1873, the dermatologist Joseph Grünfeld (1840-1910) founded modern urethroscopy at the Clinic for Syphilitic Patients in Vienna, the "Allgemeine Poliklinik" (General outpatient Clinic), which was under the direction of Carl Ludwig von Sigmund (1810-1883).

In his book, which bundled his clinical lectures on diseases of the urinary tract, Professor J. C.F. Guyon mentions that "in 1874 the first publication of Grünfeld from Vienna took place, who perfected the procedure of Haken from Riga, published in 1862, and made endoscopy of the urethra applicable in practice."[1,20] August Haken and Josef Grünfeld thus achieved the most important step in endoscopy since Pilipp Bozzini (1773-1809) and in the period just before Maximilian Nitze (1848-1906).

In 1879 the first Nitze-Leiter cystoscope was constructed. In it was incorporated the incandescent lamp invented by Thomas Elva Edison (1847-1931). This instrument was the forerunner of all the modern cystoscopes. The invention of the cystoscope, which included finding solutions to the fundamental problems of adequate and satisfactory illumination and an optically adaptable and good visualisation mechanism, revolutionised endoscopy, so that Nitze can legitimately be called the father of cystoscopy. His cystoscope was further refined, but was used in largely the same form for over 80 years. The legacy of discovery of Max Nitze established the specialty of urology and a legitimate claim as the father of urology.[1,2,3,6,7,11,26-30]

In the 1950s and 1960s Harold Hopkins developed the 'Cold Light' fibre-optic light transmission and the rod lens cystoscope. German medical instrument manufacturer Karl Storz had been working on a strong extracorporal light source and a light transmission system. These combined ideas started the creation of the modern cystoscope.

Nowadays, Storz's flexible video cystoscope offers the safety and atraumatic tip, a smooth surface for gentle insertion, and a 6.5 Fr. working channel to use a variety of instruments. Distal chip technology also provides a full-screen display, giving urologists a better view of patient anatomy. [6,7,12,15,30,32-34]

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Conclusion

Modern endoscopy is based on the pioneering work of Philipp Bozzini (1806), Julius Bruck (1867) and Maximillan Nitze (1879). However, such important developments can rarely be reduced to a single person's work and ideas. There was also a host of less well-known doctors and surgeons, who have contributed to progress technique and medicine. One such innovator was Dr. August Haken from Riga, who made an important contribution to development of endoscopy in 1862.[7]

The significance of Haken's invention can be fully appreciated only in connection with the time in which he lived. The 1862 paper presented here was certainly known in urological circles of his time, and it was cited, and finally recognized in France as well. I hope that a largely forgotten scientific paper will now be made available again, and that its English translation makes it accessible to readers outside of German-speaking countries.

Later on, many other inventors contributed to the improvements which brought about the modern endoscopy. Some other authors and medical instrument makers deserve thanks for the perfection of the cystoscope at that time, for instance Deike (reversing lens), Beneche (optical lens combination: system of three lenses), Leiter (0o-optics), and v. Dittel (appreciation of the importance of mignon lamp).

The development of the cystoscope from the Lichtleiter of Bozzini over Maximilan Nitze, to the fibre optic cystoscope of today provides a striking example of the interplay between physics, instrument makers, physicists and development of sciences. This ongoing collaboration had improved further development of the diagnostic, surgical tools and considerably influenced of new dissecting techniques, leading to minimally-invasive surgery.

Any urologist writing this contribution 35 years ago could not possibly have foreseen the changes that were to take place in what was then regarded as a static field. There were even those in his country who told Hopkins that there was no need for any improvement in the cystoscope. Fortunately for mankind, Storz and

Hopkins were not only geniuses, but men of remarkable obstinacy and perseverance. They became legends of urology. Endourology in every field of medicine, not only in urology, owes its present state to these very remarkable doers. [12, 33, 34]

Correspondence to:
Dr.T. Zajaczkowski
Germania Platz 6,
D-45355 Essen, Germany
th.genowefa@gmx.de

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Text correction:
Loek Keizer

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"Remember the days of old, consider the years of many generations, ask thy father, and he will shew thee; thy elders, and they will tell thee." (Deuteronomy 32:7)

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