

# THE LIFE AND WORKS OF GUILHELMUS FABRICIUS HILDANUS

(1560–1634)

*by*

ELLIS JONES

## PART I

THE subject of this essay was born at Hilden on 25 June 1560 as Wilhelm Fabry, the son of Peter Andreas Fabry, Clerk of the Court. The name Fabry (Latin: *faber*, *fabri*—a smith) was probably adopted by his forebears in place of the ubiquitous German surnames of Schmidt or Schmitz, a fashionable procedure for scholars at a time when Latin was the medium of learning. In later life he became known as Wilhelm Fabry von Hilden or Guilhelmus Fabricius Hildanus. His birthplace was a house in Schwanenstrasse, known as ‘in der Schmitten’ (The Smithy), which is no longer standing. His mother was the sister of Theodor Dirich auf der Kullen, a landlord. Wilhelm’s sister Gertrude was always called ‘Gertrude in der Schmitten’; a younger brother died in 1581 at the age of sixteen. As a boy Fabricius was fond of exercise and was particularly keen on swimming. Ahrens (1865) stated that he contracted a paralysis of the tongue as a result of swimming for too long in cold water, and that he had to combat this disability for years. I cannot substantiate this statement, but I feel sure that even if there were any residual paresis, it did not affect his career to any extent.

At the High School in Cologne he proved himself to be a talented scholar and acquired an extensive knowledge of Latin, German and French, languages which he subsequently used a great deal for the writing of his works. He was also familiar with Greek and Hebrew. When only ten years old, Fabricius had the misfortune to lose his father. Three years later his mother married one Peter Kranz but became widowed for the second time. It was only through financial assistance from Carl Uttenhoven, a Dutch poet who was a friend of the family, that Fabricius was able to remain at school in Cologne. It was Uttenhoven who urged Fabricius to take up Medicine. In spite of Uttenhoven’s patronage, Fabricius’ schooling came to a sudden premature ending when he was only thirteen. This was a result of the upheaval caused by the war in the Low Countries, the effect of which was felt along the whole lower Rhine (Schaefer, 1904). Had circumstances been more favourable, Fabricius might have proceeded to a University, but in fact he had no higher education.

For the next two years he suffered from various illnesses, including an attack of plague during which he was very ill for six months (Reber, 1909). He had barely recovered when in 1576, at the age of fifteen, he embarked upon a career

in Surgery by becoming apprenticed to Johann Dümgen, a surgeon at Neuss on the west bank of the Rhine opposite Düsseldorf. Here he remained for four years before moving to Düsseldorf in 1580 to serve under Cosmas Slotanus, surgeon-in-ordinary to William, Duke of Cleve, Jülich and Berg. Slotanus had been a pupil of the great Father of Anatomy, Vesalius, and through him Fabricius was introduced to the new Vesalian Anatomy at an early stage in his career. His interest in the subject progressively grew with time, and he eventually acquired an extensive knowledge of Anatomy such as was possessed by few surgeons at that time. The importance that Fabricius attached to Anatomy will be discussed later. Suffice it to say at present that the seeds of his knowledge were sown by Slotanus. By accompanying his master to the various court residences of the Duke, Fabricius got to know the country and the people. He learnt a fair amount of Medicine from the Duke's Physicians-in-ordinary, Reinerus Soleander (Sondermann), Galen Wierus (Wier or Weyer) and the latter's son Johann. Soleander and Johann Wier had been educated in Italy and they both left their mark on Fabricius. It was probably Soleander who taught him the importance of collecting careful records of case-histories and his *Consilia Medica* (1558) may well have served as a suggestion for Fabricius' collections of 'Centuriae' of observations (Sudhoff, 1910). Wier was an ardent antagonist of witchcraft and his fervour was certainly transmitted to Fabricius. Even in these early years Fabricius had achieved a considerable reputation as a surgeon. While on leave from the Court he was called into consultation in Hilden and its environs. At Düsseldorf in 1581 he successfully exarticulated a wrist-joint for gangrene of a whole finger, and the following year at Hilden he successfully treated a neglected punctured wound of the forehead associated with swelling of the eye and laceration of the cornea.

Life at Court may not have been entirely to Fabricius' liking, for when Slotanus died in 1585, he set out on what was to be a life of wandering. He travelled great distances by horse and never settled anywhere for long. The first move was to Metz in France in 1585, where he was apprenticed to the wound-surgeon Johann Bartisch. Later that year he was in Geneva, working under Johann Griffon, a dexterous surgeon who operated on difficult and unusual cases. Although not an author he was well versed in theory, and taught Fabricius to prepare himself for major operations by dissecting the region concerned on the cadaver beforehand. The Geneva Authorities helped him to attain this ideal by ensuring him an adequate supply of cadavers. Griffon and Fabricius together performed many dissections which were attended by distinguished doctors in Geneva, including, in 1586, Joseph Quercutanus, Physician to King Henry III of France. Griffon operated on hernia without the customary practice of castration and in 1585, Fabricius successfully operated on a case of strangulated hernia. An example of Griffon's enterprise is afforded by his successful performance of a rhinoplasty at Lausanne in 1592, five years before the first description of the operation was published by Casparus Tagliacozzi at Bologna. Griffon had learnt about the operation from accounts given him by patients who had travelled from Italy. His patient was a girl who had

had her nose cut off by soldiers when the Duke of Savoy waged war on Geneva in 1590. Two years later Griffon fashioned her a new nose and nineteen years later (1611), Fabricius, who saw her frequently in Lausanne, reported that the nose 'has undergone no change and the marks of the operation are scarcely visible; but in winter the tip of the nose turns a little blue' (Withington, 1894). Fabricius was fortunate in having such excellent masters as Slotanus and Griffon. From Griffon he received an excellent surgical grounding and the two kept up a friendly correspondence in later years.

It was in Geneva in 1587 that Fabricius married Marie Colinet, the daughter of a printer and herself a skilful surgeon and obstetrician. She was well educated and congenial and proved to be a constant source of help and happiness to her husband all his life. There cannot be many surgeons' wives in the history of Surgery who took such an active part in their husbands' professional work. Besides assisting Fabricius with his operations and managing a large part of the Obstetrics, she had to cope with all types of cases during her husband's frequent absence from home. She successfully treated a woman at Lausanne who had a compound fracture of the tibia which had penetrated through skin and stockings. Only nine weeks later the patient was walking at home without a stick. Had it not been for the skill of Fabricius' wife, the patient would have been left to an ignorant and clumsy barber. She treated fractured ribs and other fractures, but is best remembered for her discovery of the use of the magnet for extracting metal particles from the eye (see later). Fabricius always described his wife as a colleague but stressed that she did not neglect her house and the upbringing of her eight children.

In 1588 Fabricius left Geneva with his wife and travelled through France and Germany to Hilden, where he stayed for three years, living in the 'Haus auf der Bech' (the house on the stream). There was a house in Schwanenstrasse, called Fabriciushaus, still standing when I was in Hilden in 1951. It bore a plaque proclaiming that 'Hier wohnte und wirkte der Weltberühmte Arzt und bahnbrechende Förderer der wissenschaftlichen Chirurgie'. It seems highly probable that this was originally the 'Haus auf der Bech'. It was not long before Fabricius found that Hilden had its deficiencies. He was unable to pursue his study of Anatomy which so interested him, and he particularly missed the company of learned medical men. So, in 1591 he moved to Cologne, where, in addition to building up a surgical practice, he attended lectures on Anatomy and heard Professor Manlius discoursing on the Aphorisms of Hippocrates. Fabricius' first book, a treatise on gangrene entitled *de Gangraena et Sphacelo*, was published there in 1593. It was a great success and ran to a large number of editions. It was in Cologne also that Fabricius' first son died in 1595 at the age of seven.

In 1595 Fabricius was back in Geneva and busy dissecting. He gave a public demonstration of the valve of Bauhinus (in the rectum) which had been discovered in 1579 but was still almost unheard of. The Swiss climate seemed to suit Fabricius and in 1596 he moved to Lausanne. Here he continued his study of Anatomy, performing dissections and giving demonstrations. He was able to associate and discourse with the leading doctors in Lausanne and Geneva and

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his practice grew. His reputation was increasing and he was offered the position of surgeon-in-ordinary to a Polish court. This he declined. In November 1598 he was back in Cologne where his old benefactor Uttenhoven was blind and very ill. He died in 1600 but Fabricius continued a friendly relationship with his family. In 1598 Fabricius published his first twenty-five carefully documented case-histories. Thereafter these collections of 'Observationum et curationum chirurgicarum' appeared in volumes of 100, and a total of six such 'Centuriae' were published. They will be discussed later.

I came across copies of two old documents in the Heimat-Museum, Hilden, which contain references to Fabricius during his stay in Cologne. The first is a copy of an entry in the account-book of the Barbers' Company (Barbiere, Rechnungsbuch des Amtes, 1442 bis 1628, z. 355. fol. 165a) from the town archives of Cologne and records Fabricius' purchase of the right to practise Surgery in the town. It reads:

On the 25th June 1599, Mr. Wilhelmus of Hilden met the master of the Company and the master of the chamber for discussion and purchase of the licence or right valued at 12 golden guilders, 12 white raders, a quarter of wine, 2 white raders for the cellar, paid off a half—Item the highly esteemed Mr. Wilhelmus truthfully promises to pay the rest on the last day of October 1599.

The system of 'easy payments' is not so modern after all. The regulation of the practice of Medicine and Surgery was somewhat better in Cologne than in most other towns, and lay as a jealously guarded privilege in the hands of the Barbers' Company. Membership of the Company was essential for a surgeon to practise in Cologne and, as was customary for one who had not learnt his craft in that town, Fabricius had to buy the right to practise. The Company had disciplinary powers by which they could exercise control over the performance of certain surgical procedures. Such control was known as 'Beleid' (an old German word) and was invested in a commission of four masters elected by the members. They could suspend a surgeon if proceedings were instituted against him and they disapproved of his particular treatment. That this actually happened to Fabricius is evidenced by another document (Zunftakten der Barbiere aus den Jahren 1580–1638, z. 377. fol. 116a) which reads:

Item: on the 11th Sept. (1599) Mr. Jorgen (Schodt) and Mr. Wilhelm (Fabry) of Hilden received a "Beleid" concerning a boy of two whose left middle finger-tip was dead and black, and the finger as well as the hand was inflamed. It was a standing order, because of the honour of the profession, that they should conserve the finger, and as a first measure provide good cooling so that the inflammation should be driven from the finger and the hand with the result that the finger-tip would fall off spontaneously.

Item: on the 13th of the month — the finger was now black as far as the proximal phalanx, the reason being that the inflammation had not been arrested (by Schodt and Fabry). They wanted to amputate the finger proximally by the hand but the Beleidmasters would not allow this because the hand was swollen and inflamed. The relatives earnestly demanded that we should settle the matter between ourselves and express an opinion as to whether we could help the child or not. The two surgeons, however, remained absolutely silent. The Beleidmasters therefore discussed the matter between themselves and declared that there was the greatest need to help the child speedily. The relatives and the Beleidmasters demanded that I and my assistant

undertake the care of the case as it was quite obvious that Mr. Jorgen Schodt and Mr. Wilhelm of Fabry were of no help. We undertook this and, with the help of God, arrested the inflammation, witnessed Mr. Herman Jeger, Herman Mitler, Augstein Metmann, I and my assistant.

From this account it is obvious that Fabricius was denied further treatment of his case, in spite of his great experience and reputation and the fact that he was author of a famous treatise on gangrene. He knew that he could not treat the case in accordance with the Company's directives and withdrew without saying a word.

Switzerland had an irresistible attraction for Fabricius and he remained very attached to his second home-land. He was friendly with a great number of Swiss doctors and often cited them in his works. In 1600 we find him once more in Lausanne, extending his practice and performing dissections and public demonstrations. He also took a course in Pharmaceutics from the apothecary Claudius Marion. Conditions in Pharmacy at that time were poor. The apothecaries were nearly always sitting at play and left the work to apprentices, sometimes with fatal consequences. Many doctors, therefore, took to preparing their own drugs.

For the nine years, 1602–11, Fabricius was official town-practitioner to the small town of Payerne (Peterlingen) in the Vaud Canton between Fribourg in Uchtland and the Lake of Neuchatel. Here he made a home for his family and took in students as boarders. In spite of his official position he continued his life of travelling. His ever-increasing reputation brought in requests for consultations from far and wide, some of which entailed an absence from home of several weeks. On occasions he was accompanied by students. Olivier (1954) describes the case of a printer who was wounded in the shoulder by a ball during the defence of Geneva on the night of 11–12 December 1602. The whole region eventually suppurated, discharging foetid pus and sequestra. In desperation the patient came to Fabricius at Payerne. In due course he was cured and Fabricius was thanked by the patient, and presented with an official letter of thanks accompanied by a present from the Geneva authorities. Fabricius treated Princes and Royal Councillors, and the Margrave George Frederick of Baden and Hochberg appointed him surgeon-in-ordinary, an honour of which he was particularly proud. He used this designation at the head of the title-pages of many of his books and also in his letters. His publications were appearing continuously. A treatise on Dysentery was published in 1602; the first complete hundred of his 'Observations and Surgical cures' in 1606; a book on Burns in 1607 and the second hundred observations in 1611.

Leaving Payerne in 1611 he visited Lausanne and Hilden. His mother was seriously ill with dropsy and while looking after her, he undertook consultations in the hilly country around Hilden and also visited Peter Paaw, the Professor of Anatomy at Leyden in Holland. After the death of his mother on 26 April 1612, at the age of 79, Fabricius returned to Lausanne. The following year he went to Worms and spent three months with Herr v. Dalberg. It was a tragic year. On his way there he fell off his horse, and on returning to Lausanne in the August he found to his horror that an epidemic of plague had struck the town



and taken a terrible toll in his own home. His wife, children and maids were ill and two of his daughters, aged five and twelve died. To conform with custom he had to live outside his house for four months. When at last he thought he was rid of the disease it reappeared in his house after an interval of months. Fabricius made some observations on the epidemic and described giddiness and convulsions as the present symptoms. Death might ensue in a matter of hours but some patients lived for two or three days to die in delirium. Almost all of those who had a vein opened died, and none with diarrhoea and vomiting recovered. On the other hand he noticed that none, except cachectics, who had a fontanelle in the arm or leg died. Only two doctors in Lausanne treated the disease 'rationally'. Contacts of cases were forbidden to associate with other people. Fabricius noticed a large number of insects around at the time of the plague, and wondered whether they were a potential cause.

After a stay of several months in Breisgau in 1614 he was appointed by the Elders of Berne to be official surgeon to the town and Canton of Berne. He took up the appointment in the summer of 1615 and settled there for the remainder of his life. Berne now had a resident surgeon as well as a resident physician, Dr. Lentulus. In spite of this appointment Fabricius kept up his travels quite without regard to his own health. At this point it might be as well to consider the details of Fabricius' own medical history as given by Ahrens (1865). For many years he had suffered from severe attacks of neuralgia in the sole of the right foot. The pain occurred at 4 a.m. and was piercing in character. It started originally after an attack of plague in his youth when he developed a right inguinal bubo. Since then he suffered from inguinal pain whenever plague was rife. The inguinal pain was relieved by pressure on the foot. A curious feature of this neuralgia was that it was relieved by micturition, not recurring till the following morning at 4 a.m. In 1616 it remitted completely after he stopped drinking pure Lavaux wine. Fabricius also suffered from bronchial catarrh and asthma and was a martyr to gout. The gout first appeared after a journey on foot from Leuk in Valais to Berne over the Gemmi on 9 August 1617. It was very heavy going in the snow and, on reaching Berne he was attacked by 'incredibly severe pain in the feet and knees and by cramps so severe that the toes were drawn up to such an extent that an assistant had to press them down with all his might'. He was in bed a month. The gout appeared subsequently when he drank Waadtland wine, but we are assured that his way of life was not excessive.

Several honours were conferred on Fabricius in Berne. On 26 February 1616 he was granted citizenship of the town and exempted the expense. A copy of the document recording this is kept in the Heimat-Museum, Hilden. Written in old German, it is an extract from the Teusch Spruch-Buch der Statt Bern 12 Nov. 1614–9 Nov. 1618 f. 157, in the town archives of Berne. I have translated it as follows:

We, the Mayor, Council and citizens of the town of Berne proclaim with this letter that the very learned and greatly experienced Mr. Wilhelm Fabricius born at Hilden, who came approximately 26 years ago to the principality of Bergen in our country, and our towns Lausanne and Paetterlingen (who elected him to installation) and who has administered to and

served our subjects to good purpose with his skill and experience in medicine and surgery, the same expresses a desire to settle down in our capital, where he would like to obtain grace and favour and citizenship, wherefore he appears today before us in assembled congregation and humbly petitions us to receive and accept him as a citizen of this our town. . . . In accordance with this good and commendable testimonial given to him not only for his skill and great experience but also for his honourable behaviour and past during the time of his stay in our country, and in the hope that he will continue in the same honourably, eminently and laudably to serve his revered town with his skill and use those high gifts, with which God invested him, for the general well-being, we are humbly inclined to accept him, Fabricius, and his children not only into our care, protection and citizenship, but also as a physician and surgeon of this town—in return for the obligation that it will be his duty (which others are also obliged to carry out) to provide himself according to his position in life with weapons for the service of his beloved Fatherland and also to provide a fire-bucket, and in addition to this, to perform and render all that is incumbent on a faithful, obedient citizen. . . .

The following year he was elected Master of the Smiths' Company of Berne; the Company is not without significance as Fabricius' forebears were Smiths. Another honour was his appointment by Louis XIII, King of France, as Surgeon to the French Embassy in Switzerland (Reber, 1909). During his travels through France Fabricius had established friendly relations with many distinguished French doctors. At the end of 1617 he was in Hesse and the following year visited Schloss Friedberg, Frankfurt a.M., Württemberg, Strasbourg and Basle before returning to Berne. In November 1618 he arrived at Durlach (Karlsruhe) to spend a couple of months at the court of the Margrave of Baden. His master shared Fabricius' desire to raise the standard of German Surgery. According to Ahrens (1865), Billroth stated that Fabricius accompanied the Margrave into action, but that is not so.

In 1619 Fabricius was called to Metz and in 1623 he was at Solothurn attending a girl with empyema. New publications continued to appear. The fourth hundred of surgical observations were published in 1619 as were the contents of 100 letters to his friends. His book on the *Excellence and Use of Anatomy* appeared in 1624. In 1625 Fabricius' son Peter was at Padua studying Anatomy. His death two years later on a journey in Holland was yet another family tragedy which Fabricius had to bear. 1628 was a landmark in the history of Medicine, being the year of publication of Harvey's 'de Motu Cordis' at Frankfurt. Fabricius, however, never knew of Harvey's discovery. As Guthrie (1957) wrote recently, the real significance of Harvey's work was not apparent for at least two centuries, and it took about fifty years before those best qualified to judge, the anatomists and the scientists, appreciated its significance. 1628 saw Fabricius very ill with gout, and finally compelled at the age of sixty-eight to abandon his travels. During that summer there was a severe epidemic of plague in Berne and 4,000 people died. Fabricius, as usual, was a keen observer and recorded that only three out of thirty-two with fontanelles and setons died. His gout was again troublesome in 1630, and the following year he suffered badly with his chest, having many nights disturbed by asthma. On 28 November 1631 he made his will. There is a copy in the Testament Buch in the town archives of Berne (Schaefer, 1904). The officials of the Smiths' Company of

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Berne were appointed executors. The principal beneficiaries were his wife, his son John, his sister Gertrude in der Schmitten and his step-brother Gerhardt Kranz. He left a skeleton and an illustration of the internal organs and vessels of Man to John, to go to the Lausanne library later.

During a period of convalescence at Bad Pfäfers in 1632 Fabricius made a model of the Taminaschlucht where the bath buildings then lay. The model was sketched by the artist Plep and copper-plates were prepared for inclusion in Fabricius' collected edition of all his works and letters which was to contain much unpublished work. The artist Plep was commissioned to execute the 200 illustrations of instruments, and apparatus as Fabricius regarded his own efforts in the first three 'Centuriae' as being too crude. Eventually the manuscript written in German and with copper-plate illustrations was sent to the printers at Frankfurt a.M. in October 1633. Unfortunately the Thirty Years War delayed publication until after Fabricius' death, and when the book appeared at Frankfurt in 1646 it was in Latin and not German. It was entitled *Opera observationum et curationum medico-chirurgicarum quae extant omnia*, and several items including 'Von der Fürtrefflichkeit und Nutz der Anatomy' were missing. The copper-cut illustrations were by Math. Merian.

On 15 February 1634 Fabricius died at Berne at the age of seventy-four from bronchial asthma. According to Ahrens he had been free from gout for the last six months of his life. He left a widow and a son, John, the only one of eight children to survive him. John, a surgeon too, hurried from afar to be at his father's side, but was attacked by robbers three times on the way and arrived too late. Fabricius was buried at Berne in the cemetery of the Franciscan monastery which was abolished during the Reformation. This burial-place was reserved for the Elders and distinguished citizens of Berne. Dr. H. Haerberli, Conservator of the Burgerbibliothek, Berne, informs me that the monastery building adjacent to the cemetery housed the new Academy. A new building for the Academy was erected at the end of the seventeenth century and the Academy became a University in 1834. It remained in this building until it was demolished in 1905. The cemetery became a Botanical Garden for a time. Fabricius' grave-stone is now in the Historical Museum at Berne. It was originally erected by his widow and son and measures 184 cm. by 95 cm. It is made of sand-stone and inscribed in Latin. A replica is kept in the Heimat-Museum, Hilden and a translation of the Latin reads:

TRANSLATION OF THE INSCRIPTION ON THE GRAVE-STONE OF FABRICIUS

Stop, traveller!  
Sacred to all the shades  
To a distinguished and learned man,  
Remarkable for his experience of many affairs, second to none  
In his beneficence to the poor and exiled, patron of men of letters,  
GUILHELMUS FABRICIUS HILDANUS  
Surgeon-in-ordinary to the illustrious Margrave of Baden and Hochberg, etc.,  
Also of the famous republic of Berne in Switzerland;



*Ellis Jones*

While with tireless zeal for knowledge  
And satiated with this evanescent life  
And freed from human miseries,  
He piously makes his way to the heavenly academy

And so has left behind the proof of his last piety  
His spirit is with Christ,  
His name lives on earth by reason of his immortal writings;

He passed away in Berne  
On the 15th February 1634 at 11 a.m.  
To the great sorrow of the whole citizen body and  
Of many princes throughout Europe and other famous men  
(With whom he was united in great friendship  
And was always most affable):  
After living for 74 years, 5 months and 8 days.

His dearest and most sorrowful wife, true example  
of virtue and piety together with  
Her only and most dear son  
Johannes Fabricius  
In the hope of a happy resurrection  
And paying her last debt  
With sorrow and tears  
At her own expense erected this monument.

A collection of epithets, sonnets and elegies commemorating Fabricius was published by his son John in 1637 under the title *Lacrumae Aeternae*. Two mementoes of Fabricius are to be found in the University of Berne. There is a small oil painting by Stettler which was in the Dean's room in the Faculty of Medicine. It was presented to the University by Frau Professor Demme in 1902, and is a half-length portrait of Fabricius in his later years with deeply furrowed forehead and long rugged beard. He holds a human skull in his right hand. The portrait appears to have been made from a sketch on the frontispiece of Fabricius' book *Spiegel des menschlichen Lebens*. The other memento is a medallion effigy of Fabricius in the Congregation room. In 1910, on the 350th anniversary of his birth, an iron bust of Fabricius on a granite base was unveiled in the station approaches in Hilden. The 300th anniversary of his death was commemorated both at Hilden and Berne.

WORKS

Fabricius was a prolific author, and for one who spent so much of his life travelling, it is remarkable that he found time to write as much as he did. Most of his works were written in old German or Latin, a few in French. The spelling of the old German is very variable, and at times quite different from that of modern German. Only three of his works have been translated into English; they are his books on *Burns*, *Lithotomy* and the *Medical Field-chest*. As stated above, a collected edition of his works was published in Frankfurt a.M. in 1646 under the title *Opera observationum et curationum medico-chirurgicarum, quae extant omnia*.



Fig. 1.  
FABRICIUS HILDANUS (1560–1634)  
*From the portrait in the Medical  
Faculty of the University of Berne*



**Fig. 2.**  
The house at Hilden, Rhineland, in  
which Fabricius lived and worked



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A German translation by Friedrich Greiffen entitled *Wundartzney* was published in Frankfurt in 1652. It was illustrated with wood-cut illustrations and included a treatise on Hydrarthrosis (Glidwassersucht Celsi), hitherto unpublished. Ahrens (1865) stated that Greiffen's edition was 'incorrect and without taste' and recommended reference to the 1646 Latin edition. A further Latin edition appeared at Frankfurt in 1682. This great collection of Fabricius' works remained the Bible of German Surgery up to the time of Lorenz Heister. For convenience, Fabricius' works will be considered under the following headings:

The six 'Centuriae' of observations and cures.

His letters.

Monographs or treatises on various subjects.

*"Centuriae"*

Fabricius possessed a great genius for observation and his collection of six hundred surgical observations and cures (*Observationum et curationum chirurgicarum centuriae I–VI*) was the best work of its kind in the seventeenth century (Leonardo, 1943). Each 'observation' is complete in itself, and includes a succinct account of a particular condition illustrated by case-histories collected from Fabricius' wide and varied practice. The natural history of the disease and treatment are discussed and, in operation cases, a detailed account of the surgical procedure is included together with descriptions and illustrations of the instruments used. Fabricius' case-histories are remarkable for their completeness and wealth of detail. Many end with a 'follow-up' note of the case when seen years later. The value of the 'observations' is enhanced by the inclusion of summaries of similar cases seen by his acquaintances together with their views on treatment. In fact 348 scholars with whom he communicated either in person or by letter are mentioned by name in the *Centuriae*. The first twenty-five observations were published at Oppenheim in 1598 and were later translated into Latin by a friend, Johannus Rheticus (Jean Rhetier), Professor of Hebrew at Lausanne. The first complete volume of 100 which included the original twenty-five appeared at Basle in 1606, the second *Centuria* at Basle and Geneva in 1611, the third at Oppenheim and Basle in 1614. The fourth, which was published at Basle in 1619, contained many mistakes (Ahrens, 1865). The fifth appeared at Frankfurt in 1627; the sixth and last was ready in 1620 but made its first appearance in print in a collected edition of the *Centuriae* published at Lyons in 1641. A Dutch edition was published at Rotterdam in 1656, and a French translation by Théoph. Bonet, a Doctor of Medicine, appeared at Geneva in 1669. A German edition followed at Flensburg in 1780.

*Letters*

Fabricius' correspondence was very extensive. 100 letters to his friends and their replies to him were published in *Epistolarum ad amicos* at Oppenheim in 1619. In the manuscript collections in the Burgerbibliothek Berne (formerly kept by the Stadt- and Universitätsbibliothek, Berne) there are at present 443

letters written by Fabricius or addressed to him in three volumes (Cod. 495–7) (personal communication from the Conservator). According to Ahrens (1865) the third volume includes such varied subjects as the miscarriage of a calf, a shipwreck at Brugg, earthquakes at Corbery and Yverdon, and a description of the comet of 1618. His correspondents included a large number of scholars and distinguished doctors, including the physicians- and surgeons-in-ordinary of most of the Courts of Europe. His letters contained one or more observations on cases of interest and advice on treatment. They were often interspersed with news of his travels or items of household interest. To ensure delivery of his letters, Fabricius made use of young doctors travelling to foreign countries and travellers visiting the fairs at such towns as Frankfurt a.M. and Strasbourg.

#### *Monographs or Treatises*

Fabricius' publications on the following subjects will be considered: Gangrene; Lithotomy; Gun-shot wounds; Field-chest; Dysentery; Anatomy; Burns; Baths.

#### *Gangrene*

Fabricius' classic book on gangrene is one of his best known works. It was originally published at Cologne in 1593 under the title *De Gangraena et Sphacelo, d.i. vom heissen und kalten Brande oder wie es etliche nennen, S. Antoni und Martialis Feuer, desselben Unterscheid, Ursache und Heilung*. (Concerning gangrene and sphacelus, i.e. hot and cold gangrene, sometimes known as St. Anthony's and Martial Fire; their characteristics, causes and treatment.) The book contained twenty-seven chapters and ran to a large number of editions. It was translated into French and Latin.

'Hot' gangrene was defined as a process of mortification followed by severe inflammation and corruption of the soft parts; 'sphacelus' or 'cold' gangrene was a full, perfect and absolute mortification, not only of the soft parts, but of bone also. Today we would apply the terms infected and dry gangrene to these conditions.

The aetiology of gangrene lay in the following causes:

1. A violent change in the external environment such as excessive cold, heat, humidity or dryness. Fabricius dealt with many cases of frost-bite.
2. A hidden quality which was a malignant and virulent matter, either generated in the body or contracted from without. Examples were plague and poisonous bites.
3. The suffocation and interruption of vital spirits, e.g. gangrene in a hernia or following the application of excessively tight splints.

The general treatment included purging and blood-letting. Gangrenous crusts were to be removed with a knife or hook. The treatment of 'sphacelus' consisted in the application of corrosives to neighbouring healthy parts and the use of the cautery either before or after cutting away dead tissue. Amputation was a final measure.



### *Amputation*

Fabricius made great contributions to the operation of amputation. It must be remembered that he had no knowledge of the circulation of the blood. Most surgeons at the time amputated through the demarcation line between gangrenous and healthy tissue. Fabricius strongly disapproved of this and laid great emphasis on amputating through healthy tissue proximal to the line of demarcation, his reason being that the deeper tissues were involved to a higher level than the external appearance suggested. He was not the first to do this and Leonardo (1943) is incorrect on this point. This procedure was originally introduced by Celsus and was practised by Ambroise Paré, Pierre Franco and others. Fabricius laid down sites of election for the operation, depending upon the position and extent of the gangrene. Thus, for gangrene of the foot or leg, amputation was to be performed 4-5 fingers breadth below the knee. If it extended above the calf, the knee-joint was to be exarticulated; if it went up higher than the knee, amputation was to be performed as low in the thigh as possible (but through healthy tissue). The operation became more dangerous as the trunk was approached. For gangrene of the fingers the site depended upon the extent of the disease, but if a whole finger was involved, the wrist-joint should be exarticulated. Fabricius has been acclaimed as the first surgeon to amputate the thigh (Schaefer, 1904; Robinson, 1944). von Brunn (1928), however, stated that the first amputation of thigh was performed by von Wurtz (Wurtz) or Clowes (1588). I have been into this question and I am unable to confirm Wurtz's performance of the operation. Indeed he wrote (1656): 'I entreat you not to cut off members though they be crushed and shattered; for I have seen things grow on again beyond man's expectation. Therefore, be careful and not too rash in cutting off members.' But William Clowes (1544-1604) surgeon to Queen Elizabeth I, James I and St. Bartholomew's Hospital did amputate the thigh. In Poynter's *Selected Writings of William Clowes* (1948), it is written: 'The said leg was so grievously corrupted that we . . . cut it off above the knee . . . and lost not more than 4 ounces of blood.' Thus both Clowes and Fabricius were performing above-knee amputations at about the same time.

Fabricius amputated fingers and toes with a knife and saw. He disliked the use of a hammer and chisel or a bone-forceps for this purpose. For exarticulation of the ring and middle fingers, however, he did use a gouge as all the soft parts could not be cut simultaneously with the knife. In 1600 he amputated all the fingers of a Frenchman who, returning home from Rome over the St. Bernard Pass lost his way and developed frost-bite. Before amputating a hand, Fabricius marked out the proposed incision in ink first.

The *pre-operative preparation* of the patient is considered in great detail. Depending on his strength and age, he endured dieting, purgation and even blood-letting. A few days before the operation the cardiac region was fomented three to four times daily and a restorative was administered twice or thrice daily. One to two hours pre-operatively, he was given some broth, egg-white and wine but the stomach should be empty for the operation. All the instruments,

haemostatic powder and dressings were to be laid out neatly. A second saw equal in size to the first was included in case of breakage during the operation. The surgeon should remind the patient's relatives of the dangers of the operation and ask for their consent. All present were to kneel and pray God for a successful outcome to the operation. A poultice was then applied to the heart and the patient placed in position.

The actual *operation* is described in Cent. VI, Obs. 19 (Fabricius, 1652). The patient was placed on a special amputation bench and a tight band applied proximal to the proposed site of incision. By compressing the blood vessels and nerves, the animal spirits were obstructed and sensation reduced, giving rise to an artificial bloodless field and local anaesthesia (Schaefer, 1899, 1904). A second band could be applied distal to the first. The surgeon pulled the thigh to the end of the bench, the corners of which should preferably be hollowed out for ease of working. The knee was immobilized by securing it to the bench with a strap and the foot was made fast in a device that could be screwed to the bench. Fabricius devised a special tourniquet which was applied to the limb distal to the first occluding band and in place of the second band. It was a stocking or sleeve made of fine sheep-leather and was about one span long. Its width should correspond with the size of the limb, and be sufficient to surround it at the site of amputation. It was open at either end, but the lower end was encircled by a double cord by means of which the stocking could be closed like a money-bag. The anterior aspect of the stocking was split longitudinally but held tight by pieces of cord. Three assistants were employed to hold the patient. A stout-hearted man took up his position behind the patient and astride the bench. He grasped the patient from behind, taking care to avoid excessive pressure on the chest and abdomen. The second held the foot and footstool (or the thigh and the bench) and the third held the knee and thigh and kept his fingers on the cord at the lower end of the tourniquet, awaiting the order to pull it taut. If the stocking was not in use, slings were fixed to the distal of the two bands and traction exerted on these at the appropriate moment.

The incision was made with a sharp scalpel or a curved knife which cut with both edges. The soft tissues were incised down to the bone and as much periosteum as possible detached. The third assistant was given the order to pull hard on the cord at the lower end of the stocking, thus closing it around the bone. He continued to pull in a cranial direction, thereby retracting skin and muscles and enabling the surgeon to saw through the bone as high up as possible. Haemorrhage from the soft tissues was minimized and there was less risk of damage to them from the saw. Another advantage was that they later covered the stump better. After the bone had been sawn through, the stocking was discarded by cutting the cords on the anterior surface with scissors. Blood was then allowed to flow to an extent which depended on the strength of the patient and his superfluity of blood. Haemostasis was then secured by cauterizing the cut vessels and bone with the actual cautery; ball-ended cauteries were applied to the former and a flat cautery to the latter. Fabricius recommended that they be held in wet cloths as wooden handles were made loose by the heat. For

greater speed the surgeon should hold a cautery in each hand and be capable of working with either. Ambroise Paré and Fabricius had diametrically opposite views on the subject of haemostasis. Paré recommended the ligature and opposed the use of the cautery, partly on the grounds of cruelty; Fabricius was against the use of ligatures and preferred the actual cautery because it was quicker and the bleeding was less. However, he did use the ligature in certain circumstances:

1. in strong, full-blooded patients when time and blood loss were not important;
2. in weak or faint-hearted patients who dread the cautery;
3. in young subjects.

Fabricius designed his own sprung ligature-forceps which had notched beaks of various widths. They were undertied with double threads of hemp. When haemostasis was complete, the band at the proximal end of the limb was loosened and the stump dressed. Fabricius was not in favour of sutures as the stump invariably swelled and the sutures became painful and cut out. Two compresses steeped in oxycrat and albumen were applied and strewn with haemostatic powder. A defensive plaster of bole, mastic, rose oil, myrtle oil, albumen, vinegar and dragon's blood followed. The stump was then enclosed in an ox-bladder moistened on the inside so that it might slip on easily. Dressings were changed on the second day in summer and the third in winter. Daily dressings then followed. The operation concluded with a prayer.

Fabricius favoured the use of a red-hot knife or cautery-knife for amputation. According to Withington (1894) this instrument was used, or at least recommended by the Arab surgeons. Fabricius improved the design of the knife. His instrument was curved with a convex cutting edge and the end was pointed for cutting through ligaments. The back of the knife must be as thick as a thumb in order to retain sufficient heat. There was no wooden handle. Its advantages were:

1. speed of operating;
  2. the operation was less painful;
  3. the blood loss was less than when the actual cautery or ligature were used.
- A certain amount of haemorrhage did occur from the soft tissues;
4. there was less post-operative swelling of the stump.

Using this method, Fabricius performed an above-knee amputation on a boy of twelve in 1614 with the loss of only 3–4 ounces of blood (Schaefer, 1904).

### *Lithotomy*

Fabricius' classic book on Stone, entitled *Lithotomia Vesicae* first appeared in German at Basle in 1626; it was translated into Latin by his 'pupil and communer' Henry Schobingerus of St. Gallen and published at Basle in 1628. The book is described as 'an accurate account of the stone in the bladder, its causes, diagnostic signs and in particular the method of extraction both in men and women'. The Latin edition was read by one John Norton in London, who was so impressed by it that he had it translated into English and published in

London in 1640. He dedicated it to 'The Worshipfull Companie of the Barber-Chirurgians'. The preface contains a very favourable review of the book by Alexander Reid, Doctor of Physick, and of the Societie of the Colledge of Physicians at London. He exhorts all 'that have a desire to exercise themselves in this part of Surgerie', that they get the book. The book contained twenty-seven chapters and deals with all aspects of the subject of urinary calculi.

In the first chapter, Fabricius advises the surgeon to obtain an accurate knowledge of the disease before undertaking treatment. He should consult the best authors; among the ancients Hippocrates, Galen, Avicenna, Celsus and Albucasis; after them Lanfranco, Guy de Chauliac, Vigo, Vesalius, Fallopius, Fabricius ab Aquapendente and Ambroise Paré. He defines a stone as 'a preternatural, gross, slimy, coagulated humour, brought into a stone of thick matter by a preternatural heat and hidden quality in the bladder'.

Concerning the cause of stones he discusses the views of Hippocrates and Galen, namely that a thick, earthy phlegm collected in the bladder, and if for various reasons retained there, it became converted into a stone. The chemists attributed the formation of stones to the salt and tartar contained in the humours of the body. Fabricius had noticed that the nature of drinking water might predispose to stone formation, and cited the case of John Woolfe a citizen of Berne who within a few days voided nearly three hundred stones without any sensible inconvenience to the body. Certain kinds of meat and other foods might give rise to stone. He observed that sufferers from gout are often troubled with the stone, and he also recognized the risks incurred by prolonged recumbency.

He gives an accurate description of the signs and symptoms, elaborating on the five signs of Hippocrates. Sometimes the surgeon can feel a stone in the bladder by rectal examination, but the mass must be distinguished from a hard scirrhus tumour of the bladder. Final confirmation of the diagnosis was by passing a lubricated instrument into the bladder, when the stone would be felt. Before considering operation, the patient should be warned of the difficulties and complications of the operation; the size of the stone should be determined by bi-manual examination and the patient's constitution assessed. There was less danger in the female because of the shortness of the neck of the bladder. In old people healing took longer; old men and children were poor risks.

A brief anatomical description of the bladder is included and the importance of descent of the diaphragm for micturition stressed. Before subjecting himself to operation, the patient should set his house in order and make peace with God. He should select a lithotomist who was godly, faithful, honest, blameless and not given to blasphemy, drunkenness, lust and gaming; he should also be a good anatomist. The pre-operative preparation of the patient by diet, purging, bleeding and bathing is considered in detail. Unruly passions of the mind, especially anger and sadness were to be eschewed. Spring, according to Hippocrates, was the best time of year for operation; autumn was more suitable than summer and winter. If, however, operation was essential, any contrary qualities of the air should be corrected. Plenty of instruments made from the best iron should be available as instruments had been known to break in the bladder. The patient

should make a jump or, if he were an infant, held under the arms and shaken, so that the stone fell down to the bladder neck. Instructions are given for the laying and binding of the patient.

The incision should be made, not in the mid-line of the perineum, because of the risk of subsequent fistula formation but two fingers' breadth to the left of the median raphe. The size of the incision was not dependent on the size of the stone; for large stones, the incision could be dilated with a speculum. Instruments and the surgeon's fingers were anointed with oil of sweet almonds; instruments must be warm and if possible the stone drawn out intact. Fabricius describes five sorts of operation which were practised in his day. The most usual method was for the surgeon to thrust the stone down to the bladder neck by pressure on the lower abdomen with one hand and manipulation by a finger of the other hand in the rectum. An incision, as described, was made down to the bladder neck and the stone expelled through it by the finger in the rectum; little hooks might be required to extract a large stone.

The second method involved the use of instruments called *itinerarium*, *conductor* and *hamulus*. The first instrument, so named because it showed the way, was passed per urethram into the bladder. A lateral perineal incision was made and the conductor introduced through it down to the stone. The latter instrument opened up the wound and bladder neck and was concave on one side. The *itinerarium* was then removed, a *hamulus* passed along the concave side of the conductor and the latter then removed. The stone was caught in the *hamulus* and extracted. The third method, used when the stone was too big for the *hamulus*, entailed the use of pincers for grasping and extracting the stone.

The fourth method, that of Pierre Franco, was the one most highly recommended by Fabricius. An incision was made down to the *itinerarium* and a tent inserted into the wound. The wound suppurated some days later, and if the stone did not fall out spontaneously it was either forced out by pressure or removed with forceps. The fifth method, also Franco's, consisted of dissection of 'the inguen above the upper part of the os pubis' and Fabricius agreed with Franco that every surgeon should be dissuaded from attempting it.

Post-operatively, Fabricius believed in the use of tents to keep the wound open until the bladder had drained well. A silver cannula was then passed to allow the wound to heal. In the final chapters of the book Fabricius deals with retention of urine caused by stone and the management of the inoperable case. He remarks that patients with stone may live to a ripe old age.

#### *Gun-shot Wounds*

Like Ambroise Paré Fabricius wrote on gun-shot wounds, but unlike him, Fabricius had no personal experience of campaigning. In *Von geschossenen Wunden* published at Basle in 1615, he discussed the cause of the severe inflammation and gangrene so often associated with these wounds. He rejected the theory of heating of the ball in the firearm or during its passage through the air, remarking that there was no heat in the ball. He also discounted poisoning



of the wound by gunpowder. It was his opinion that the cause lay in the severe crushing of tissues, laceration of vessels and extravasation of blood.

Fabricius' treatment of these wounds was rational and consisted of the reduction of fractured bones, removal of foreign bodies—the ball and splinters of bone—and the prevention of pain. Severe haemorrhage was treated by the application of a haemostatic powder; suppuration was to be promoted by keeping the wound open with pledgets. Any remaining foreign bodies would thereby be expelled and it behoved the surgeon not to irritate the wound by persistent attempts to remove them. For through-and-through wounds of a limb, a long thick silk cord attached to a probe-needle should be drawn through the wound once daily until it was clean. Pledgets should then be placed at either end so that healing occurred from the centre. General measures included regulation of diet and room temperature and adequate sleep.

Fabricius invented an instrument for extracting musket-balls from wounds. It consisted of a tube or cannula one foot long which was introduced down the track of the ball until its end surrounded the ball. A second and longer tube was then introduced inside the first. Its lower end was toothed in a clockwise direction so that it could grip the ball. Finally, a borer was passed down the second tube and rotated in an anti-clockwise direction until it entered the ball which was then drawn out. If extraction by this method failed, one had to trust in the ball eventually being expelled by suppuration.

Wounds caused by poisoned balls came into a different category. Their recognition depended on the development of dangerous symptoms, such as fainting, vomiting, fever, delirium and retention of urine, which were out of proportion to the size of the wound. The treatment of wounds of the face caused by gunpowder depended upon whether the face was burnt or whether the powder was merely ingrained in the skin. In the latter instance as many grains as possible were to be removed with a needle and an application used to draw out the remainder. Powder in the eyes should be removed with a small sponge steeped in warm milk. Failing that, the surgeon should desist from digging out the powder.

#### *Field-chest*

Fabricius published the first description of a medical field-chest for Army use (Garrison, 1926). It was based on that of Maurice, Prince of Orange, which was shown to Fabricius by Alexander de Schweichel, Governor of the city of Mörs in the Low Countries (now in Germany) during his visit to the city in 1612. In this

not only medicines and instruments but also linnen, rowlers and other necessaries were prepared and disposed all in order in a room, but not as then put into the chests which were fitly contrived for that purpose because that the Garrison-soldiers might be supplied with what they needed for their health; and also for the renewal of medicines.

*Cista Militaris*, Fabricius' description of his field-chest was published in Latin at Geneva in 1633, and at Basle in 1634. A Dutch translation appeared at

*The Life and Works of Guilhelmus Fabricius Hildanus (1560–1634)*

Amsterdam in 1644 and an English translation in London in 1674. It was printed by W. Godbid 'to be sold by Moses Pit at the Angel in St. Paul's Church Yard'. The work is described as an inventory of the principal medicaments both internal and external and also the most important instruments with which a sensible field-surgeon should be provided. Fabricius recommended the division of the chest into partitions and classes so as to avoid all confusion and inter-mixing of medicines, the virtue and propriety of each being preserved. Twenty classes of medicines were listed with instructions on labelling, the correct type of container and recommendations for storage. A catalogue so classified should be prepared and a mark made on the margin should the supply be deficient—a practice familiar to the present-day Regimental Medical Officer when checking the contents of his pannier.

The instruments were classified into two varieties (*a*) these to be fitted into a box which the surgeon carried in his pocket and (*b*) those to be kept in the field-chest. Category (*a*) included scissors, knives, forceps, needles and probes; category (*b*) amputation saws, splints, Paré's pulley for fractures and dislocations, cauteries and instruments for elevating depressed fractures of the skull. The chest also contained rowlers, linen-cloths, tents of lint, sponge or gentian root, and ox-bladders. There was a salvatory with six divisions for different ointments.

In the preface to this work we can see the marked influence which religion had on Fabricius. Before proceeding to the actual description of his chest, he considers the wider, more philosophical aspects of the subject and holds forth on what we today would call the spiritual and economic welfare of the troops. He starts by citing the story of the Centurion and his servant who was sick of the palsy, and gives the correct New Testament references. The action of the Centurion is upheld as an example of the consideration and thoughtfulness which Christian princes and rulers should show towards their sick and wounded soldiers. Fabricius recommends that a General or Commander take pains to see that his troops have a clergyman or preacher to instruct them in the awe of God, 'for as piety is needful in all things, so is it required in war'. Secondly, he should ensure that his men have the wherewithal to live. Soldiers must receive their pay otherwise it is small wonder that the innocent poor are robbed. Thirdly, he must have a faithful, devout and experienced wound-surgeon so that his troops do not perish as a result of the negligence and drunkenness of the surgeon, a common enough occurrence. A Commander who has an inexperienced surgeon endangers his own life as well as the lives of his men. Fabricius concludes by admonishing the candid reader

for what thou art employed about here is neither beast nor pretious stone, but Man, for whom the Son of God shed his pretious Blood upon the Cross: therefore if any thing be neglected it must be answered before the Almighty to whom an account of all our actions must be rendered.

*Dysentery*

Fabricius was a keen epidemiologist. His observations on the epidemics of plague at Lausanne and Berne in 1613 and 1628 respectively have already been

mentioned. His book on dysentery *Traité de la Dysenterie* was first published in French at Payerne in 1602. German editions followed at Basle and Oppenheim in 1616 and a Latin edition at Oppenheim in 1616 (Gurlt, 1898). A 'Buch von der Rothen Ruhr' appeared in the 1652 collected edition of Fabricius' works. In it the causes, signs, prognosis and prevention of dysentery are discussed. The first chapter, 'What Dysentery is', stresses the fact that there are several varieties of diarrhoea. Fabricius followed the classification of Fernelius and described four varieties:

1. Coeliaca or white diarrhoea.
2. Lienteria or griping of the guts.
3. Common diarrhoea.
4. Dysenteria.

The differentiation of these conditions is considered. Concerning the aetiology of dysentery, Fabricius thought that there were many possible factors and mentioned sharp metallic drugs, the teeth, the state of the weather and alimentary influences (epidemic dysentery). Propagation of the disease occurred either by direct contact, e.g. the communal use of lavatories, or indirectly through keeping bad company or discoursing with actual cases (Ahrens, 1865).

For the treatment of dysentery Fabricius designed a bed-pan and two enema-syringes, one for self-administration by the patient, and the other for the physician to take with him on long journeys. The bulb of the syringe consisted of a pig's bladder. During an epidemic in Payerne in 1607 Fabricius found a brew of agrimony and veronica herbs to be very efficacious.

### *Anatomy*

'Anatomy is the key and rudder to the whole of Medicine'; these few words epitomize Fabricius' views of the importance of this subject. He considered that there was already available a sufficiency of books on Anatomy by such excellent authors as Vesalius, Dr. Peter Uffenbach of Frankfurt and Ambroise Paré, and rather than add to the list he confined himself to writing on 'The Excellence and Use of Anatomy'.

*Anatomia Praestantia et Utilitatis* was published at Berne in 1624. It was written in German. During the final years of his life a second, enlarged edition of this work, entitled *Von der Fürtrefflichkeit und Nutz der Anatomy* was prepared for publication by Fabricius. Unfortunately he died before the book could be published and the manuscript passed into the care of the Stadtbibliothek (now the Burgerbibliothek) at Berne where it is still kept. In 1936 Professor F. de Quervain, Director of the Surgical Clinic of the University of Berne and Dr. Hans Bloesch, Senior Librarian of the Stadtbibliothek published the second enlarged edition of the book 312 years after its first appearance.

The book was dedicated to the Elders of Berne and Fabricius took advantage of its publication to present to the Berne Library a skeleton which he had articulated as a token of his gratitude to the town and Republic of Berne. After

publicly dissecting the body of a criminal at Lausanne in 1601, he preserved the bones and subsequently articulated them with brass-wire, a novel method which had the advantage that the wire was hardly visible and the joints were well demonstrated. The skeleton was complete, even the ear ossicles being suspended from the skull in a small glass-covered case. At the time there was no skeleton at all in the Berne Library, the one erected by Pierre Franco about sixty years previously having disintegrated; his was articulated with catgut. Fabricius laid great stress on the availability of skeletons for the education and enlightenment of the young surgeon. His skeleton has now disappeared but the cupboard which held it is still in the possession of the Historical Museum at Berne (Schaefer, 1910; and personal communication from the Conservator of the Museum, Dr. H. Haeberli). From the fact that both scapulae had been broken to pieces, Fabricius surmised that his subject had suffered torture and martyrdom prior to his execution. He had seen similar injuries in several other skeletons. He sternly admonished those entrusted by the Authorities with the the examination of prisoners not to torture poor people to the extent of fracturing scapulae; they might well confess to crimes which they had not committed so as to be spared torture.

Besides commending the study of Anatomy to all concerned with the practice of Medicine in its widest sense, physicians, surgeons, oculists, stone- and rupture-cutters, midwives and apothecaries, he wished that politicians and theologians should have some knowledge of it; the former that they should realize the extent of the injuries inflicted by torture and the latter that they should appreciate the tangible example of the invisible and incomprehensible wonders of the Creation. There are frequent references in the book to points of similarity between the Universe and anatomical structures; the two eyes are compared with the sun and moon, the two lights which lighten the whole earth. Parts of the brain are likened to stellar bodies.

He classified apothecaries into three sorts. The rational apothecaries had learnt the fundamentals of their art from the authors of old, e.g. Hippocrates, Galen and Avicenna. The irrational had no such fundamental knowledge, but had some experience of the preparation of chemicals for medicinal use and had seen such medicaments used by doctors. The fuci-chemical (Fuci=drones) had no theoretical or practical knowledge of the preparation of medicines, deceived unsuspecting people with their 'gold-waters' and ruined the reputation of the honourable apothecaries.

### *Burns*

In this book, *De Combustionibus*, Fabricius made great contributions to the subject of burns. The book first appeared in Latin at Basle in 1607; an English translation by John Steer, a surgeon, was published in London in 1643. There is a copy in the British Museum and the full title reads:

Guilhelmus Fabricius Hildanus his experiments in Chirurgie: concerning combustions or burnings made with gunpowder, ironshot, hot water, lighting or any other fiery matter whatsoever. In which is excellently described the differences, signs, prognostication and cures of all

accidents and burnings themselves. Very necessary and useful for all Gentlemen, and soldiers as well as of the Trayned Bands as others.

Burns are defined as a 'solution of continuity of Epidermis, sometimes of the Cutis, or true skin, and oftentimes of the Musculi, Flesh, Veynes, Arteries, Nerves, etc. marked with the strength of the fire'. Fabricius was the first to classify burns into three degrees based upon the cause of the burn and distinguishing signs. *First degree burns* are caused by a burning object which does not stick to the body for long, e.g. burning straw and hot water or alternatively by the body only touching the object momentarily. The signs and symptoms are redness of the skin and pain followed later by inflammation and the formation of 'Pustels' containing clear white water. *Second degree burns* are caused by the fiery substance touching the body for a longer period of time, or by its retaining more heat, e.g. hot iron, liquid metal, oil or wax. The place

doth presently inflame, waxeth red, painfull and burneth. And in the very same moment pustels are elevated, in which are contained thin water, and waxeth yellow and is sore by reason of the stretching of the skin. The dermis is made destitute of radical moisture from the part and it is something dryed and drawn together but not as yet any eschar made.

*Third degree burns* are caused by the fiery matter sticking for a long time or by its containing a most violent heat. 'Pustels' (or more correctly vesicles) are raised instantaneously. Not only the true skin or dermis but also the flesh, veins, arteries and nerves are burned, drawn together and dried into an eschar. When this falls off a deep ulcer remains.

The prognosis depends on several factors. Light burns heal quickly and barely leave a scar, whereas severe burns heal with difficulty and leave a 'filthy and withered scar' or a 'rotten ulcer'. Wholesome and well-tempered bodies heal well, foul and plethoric bodies easily form a putrid ulcer. The part of the body is also of importance; burns of the head and face leave smooth scars, those of the groins and abdomen are very dangerous and hard to cure. Intestinal burns and burns caused by lightning are invariably fatal. Burns of the great vessels are dangerous because of subsequent occlusion of the vessels leading to gangrene.

Fabricius was the first to introduce rational treatment for burns. The large number of medicaments available were considered to act in one of two ways. Either the heat left in the burnt part was choked, resolved or dissipated by cold and moist medicines (e.g. juices, waters of houseleek, lettuce) or alternatively external heat was applied in the form of hot medicines which acted by scattering the sharp humours 'in the manner that coals are quenched when scattered'. The relative merits of the two methods are discussed and Hippocrates' and Galen's views are mentioned. In practice Fabricius treated each case on its merits. Each of the three degrees had its own type of treatment, which was varied according to the sex and age of the patient and the part of the body involved. In *First degree burns* the aim was to prevent vesicle formation. If the burn was light, the part was moistened with water or saliva and held to the fire for as long as could be endured, or else dipped in hot water, 'so that the outward



heat doth draw unto it Empyruma', that is heat left by the fire in the burned part. Onion-salve mixed with a little salt was efficacious. Generalized burns of the type sustained by a dyer's servant who fell into a cauldron of hot dye in 1605 were treated by anointing the whole body except the eyes with the following ointment:

R Saponis liquida iiβ  
Caepae cruda ℥ii  
Oleumde et tellisonorum ℥i  
Amigdalar. dulc. ana ℥iii  
Musilag. Sem. Cydon ℥iiii

Onion-salve was not to be used on the face because of possible danger to the eyes. An anodyne collyrium prepared with mother's milk was used on the eyes. General measures includes a good diet, purging and blood-letting. The fact that the patient mentioned above was cured completely in fourteen days is evidence of the efficacy of the treatment. Burns of the face caused by gun-powder were treated by removing any grains sticking to the skin with a needle. Powder in the eyes was washed out with mother's milk or warm rose water. The skin was anointed with oil of sweet almonds.

The medicaments just described were not to be used for *second degree burns*. In these the first measure was to open all vesicles with scissors and remove the epidermis where this had separated. A defensive plaster with a complicated formula was applied, and the part then wrapped in rowlers moistened in water and vinegar. General measures were as for first degree burns.

The treatment of *third degree burns* consisted in opening the vesicles and drying them with a sponge or linen. The eschar was loosened gently each day. Doubled cloths soaked in the following emulsion were applied hot:

R Medullae sem. cucurb ℥ii  
Sem. cidon. Foemogr. ana ℥i

As soon as the eschar had separated the ulcer was mundified with Egyptialum. The prevention of contractures following burns of the eyebrows, lips and fingers was enhanced by rolling the part back over a soft sponge. Linen cloths, lint or thin plates of lead were to be placed between those parts where conglutination might occur, e.g., lips and fingers.

The treatment of burns of the eyes, groins and joints is considered separately. Burns of the joints were treated by anointing the members twice daily with oil of worms, human grease or hen-fat. Human grease was regarded as a 'singular anodyne'. The surgeon is urged to 'bend his whole study to supple and soften the skin with hot and moist medicines'. Discussing the deformities caused by scars following burns, Fabricius stresses the importance of prevention by the use of emollients. The hard skin was first softened with animal fat, oil of lilies or egg-yolk. A thin plate of lead smeared with mercury was then applied to the scar. The surgeon should try to stretch the contracted skin as the Glovers do their skins. Contractures after burns were particularly liable to occur if the

surgeon had not been very diligent at the beginning. Treatment of the established condition was by making the part supple with plasters of mucilage, hysope or melilot and by the use of extension apparatus, several forms of which Fabricius designed himself.

Lightning was endowed with a certain supernatural faculty and burns so caused were very dangerous. Surgeons should always take a physician with them to such cases. Fabricius remarked upon the horrible stink of men and animals killed by lightning and noticed that dogs would not eat the flesh of these animals.

### *Baths*

Fabricius thought highly of mineral waters as healing agents and he himself convalesced at Bad Pfäfers in 1628. *De Conservanda Valetudine* was published in Latin in 1629 and a German translation appeared as 'von Erhaltung der Gesundheit' in the 1652 composite edition of Fabricius' works entitled 'Wundartzney'. In it

the baths at Loèche (Leuk) in Vallais and the mineral waters at Griesbach are briefly discussed at the request of the Right Honourable and very learned Antonius of Graffenreid, Burgomaster of the honourable town of Berne in Switzerland. Also appended is a letter to the noble, learned and very respectable Paulus Croquerus, Physician-in-ordinary to the illustrious and noble Prince Christopher, Duke of Zbaras, in which the baths at Bad Pfäfers and other important matters are discussed. Two plans are attached, the first showing the lie of the country and neighbouring places and the second the gruesome entrance, the source of the warm baths, the bath rooms and the underground cave.

The work also deals with the conduct of a rational way of living and Fabricius quotes from his vast experience of dietetics. He disapproved of artificial mineral baths prepared by alchemists and attributed the death of a woman at Berne to the poisonous nature of such a bath. He also rejected the use of vapour baths. A midday sleep was permissible if the night's sleep was disturbed but it must not be too long. He recommended that blood should be let from the right hand or arm in spring and the left in autumn, and censured the current method of simultaneous bleeding from both sides.

The letter to Paulus Croquerus mentioned above included a discussion on important medicines and their preparation, the extraction of the dead foetus and the baths at Bad Pfäfers, their situation, origin, discovery, powers and use.

(To be continued)