

## The *Cyrurgia* of Albucasis and other works, 1500

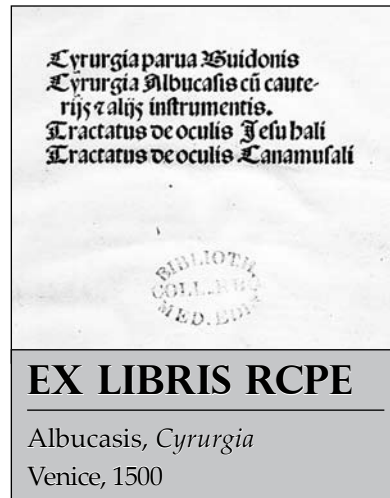
Four surgical treatises, printed in the last year of the fifteenth century, make up the oldest illustrated printed book in the Sibbald Library.<sup>1</sup> The second one, the *Cyrurgia* of Albucasis, is the most interesting and I shall deal only briefly with the others.

The first work in the book, *Cyrurgia parva Guidonis*, is the *Chirurgia parva* or short treatise on surgery of Guy de Chauliac, a fourteenth-century French surgeon whose works were still influential in the sixteenth century. His work was heavily influenced by Arab sources and became a standard surgical text which was reworked many times and appears in many forms in the sixteenth century, often with the title *Guido* or *Guidon*. Here, however, we have the first printed Latin edition of the *Chirurgia parva*, a brief compendium of the *Chirurgia magna* of (probably) 1363. It seems likely that the *Chirurgia parva* is a series of extracts made from the larger work by an unknown hand or hands.

The third and fourth treatises, *Tractatus de oculis Jesu hali* and *Tractatus de oculis Canamusali*, concern the eye and their authorship is somewhat obscure. *Jesu Hali* (*Jesu filius Hali*) was the Latinised name of Ali Ben Isa who flourished around 1050 and wrote on the eye.

Canamusali de Baldach would appear to be Ammar ibn Ali al-Mausili who probably hailed from Mosul rather than from Baghdad as his Latinised name would suggest; if so, he probably flourished in the thirteenth century. In this text, he presents himself as collator rather than author, saying clearly that he has made a compendium of material on the eye from various 'Hebrew and Chaldean sources and from India'. Hargreaves regards the attribution of the text which Canamusali presents as doubtful but suggests David the Armenian (*David Armenicus*) as the possible author.<sup>2</sup> Sack simply attributes it to David Armenicus.<sup>3</sup> Perhaps the only safe conclusion is that these two works on the eye contain a collection of material from mediæval Arabic sources.

The second treatise in the collection, *Cyrurgia Albucasis cum cauteriis et aliis instrumentis*, is of much more interest than the others for several reasons. The work on surgery of Abu 'l-Qasim Khalaf ibn 'Abbas al-Zahrawi (936–1013), Latinised as Albucasis or Abulcasis, was a standard mediæval text which has some claim to be the first complete surgical treatise. Albucasis was an Andalucian Moor who spent most of his life in Cordoba and published his treatise about the year 1000. The Arabic text was translated into Latin by Gerard of Cremona in



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Albucasis, *Cyrurgia*  
Venice, 1500

the twelfth century.\* The attribution to Gerard in this edition depends on the explicit at the end of the work (Figure 1): 'The end of the book on surgery which was translated by Master Gerard of Cremona at Toledo from Arabic into Latin; this book comes from the 30 individual books of the *acaragi* written by Albucasis.'<sup>†</sup>

The Latin translation of Albucasis's three-part surgical treatise became the most popular surgical text of the Middle Ages and, until the Renaissance, writers including Guy

de Chauliac were heavily influenced by it. The Arabic manuscripts of the treatise were illustrated with numerous diagrams of the surgical instruments which are described, sometimes in considerable detail, in the text. These illustrations were presumably copied into the Latin translation when this was made. Thus text and illustrations were transmitted together and it must be from such an illustrated Latin manuscript that the type was set and the woodblocks drawn and cut for the illustrated printed editions.

There has been confusion in the literature about the date of the first printed edition of Albucasis on surgery; in fact, there is no doubt that this printed edition of 1500/01 is the first, as an examination of the British Library Incunabula Short Title Catalogue confirms.<sup>†</sup> The publication date of 1500/01 derives from the date in the colophon: 'M.CCCCC. Sexto Kal. Februarius', which is 27 January in modern notation; however, the Venetian numbered year did not begin until 1 March at this period – hence the Venetian year is 1500, but the year would be 1501 if reckoned from 1 January.

The treatise is particularly interesting for at least two quite different reasons; firstly, for its content, including the illustrations and descriptions of the instruments. Secondly and perhaps more importantly, this book is also a very early example of the use of woodcut illustrations embedded in the text. The printing surface of a woodblock stands in relief as does that of metal type. This means that the block can be placed among the lines of metal type –

Explicit liber cyrurgie que trāstulit magr̄ Gerard⁹ cremonensis in tollo de arabico in latinū; q̄ liber ē tricesimā p̄tula libri aḡaragi: que p̄pofuit Albucasim.

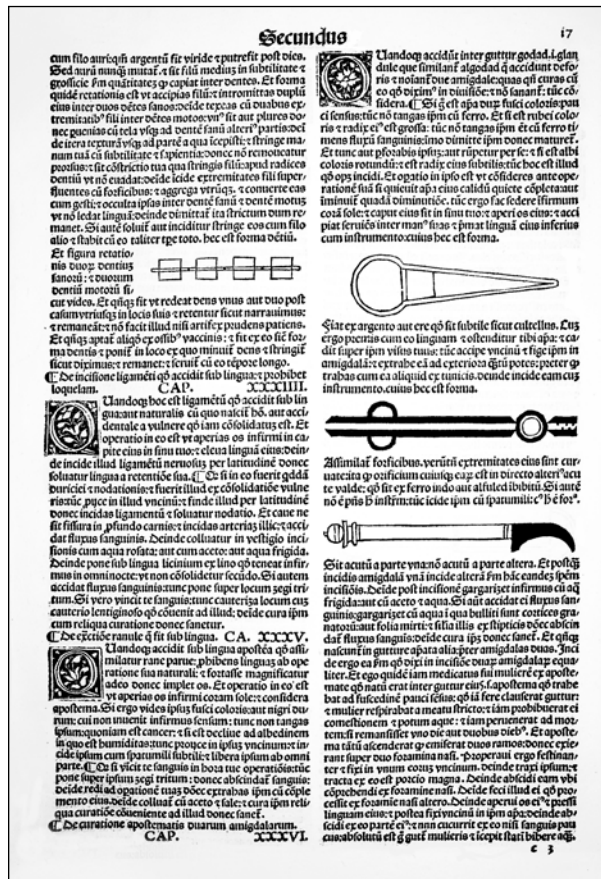
**FIGURE 1** The end of the last (third) book of Albucasis's surgical treatise with the attribution of the translation to Gerard of Cremona.

indeed, the lines of type can be made to flow around it – and, provided the height of the block is carefully adjusted, its image can be printed along with the image of the letterpress in the same pull of the hand press. This ability to print letterpress and type together gives the compositor or designer the possibility of arranging the illustrations so that each is close to the text it illustrates.

This was a new innovation in printed book illustration, although it had been common enough in some earlier manuscript practice. Probably the most accomplished use of this arrangement of woodcuts in the sixteenth century is the *Fabrica* of Vesalius. This Albucasis predates the *Fabrica* by 43 years. The bibliographer HG Aldis is disparaging of Bonetus Locatellus, the printer of the four surgical treatises, ‘whose books are more numerous than interesting’,<sup>4</sup> but if Locatellus or the publisher for whom he printed the treatises, Octavian Scot of Modena, was the first to devise this arrangement of woodcut and text, that judgement is more than unjust. In any case, whether it was his invention or not, Locatellus’s workmen made a fine job of the printing; both images and text are clear – even if sometimes the solid black regions of some images are not as uniform as they should be – which speaks of precise adjustment of the blocks and careful presswork.

Turning now to the content, the scholarly English edition of Spink & Lewis<sup>5</sup> giving the Arabic text collated from a number of illustrated manuscripts together with an English translation and commentary means that we can compare both the content of the text and the illustrations between an Arabic mediæval version and the translation of Gerard as printed here. The French translation of 1861 from the Arabic by Lucien Leclerc, an army doctor, is also very valuable for these comparisons.<sup>6</sup> The correspondence is remarkably close indicating that, in this case at least, the transmission from Arabic into Latin and over 500 years preserved both text and images. The versions of the images that were passed down still correspond very well with the descriptions both of the instruments and of their use.

The first book is concerned only with the illustration and use of cautery irons and is, for me at least, much less interesting than the second two books which deal with a wide range of surgical conditions – and conditions treated surgically (not the same thing), including abscesses, wounds, fractures, ‘dropsy’ and various gynaecological conditions and obstetric complications. Some modern commentators have claimed that Albucasis used forceps to assist delivery, pre-dating the Chamberlens by more than half a millennium, but the work contains no evidence to support this. The obstetrical instruments are all illustrated and described in a chapter on removing the dead fetus and they are clearly quite unsuitable for use on a living child (for discussion of these instruments see reference 5, p. 488–94).



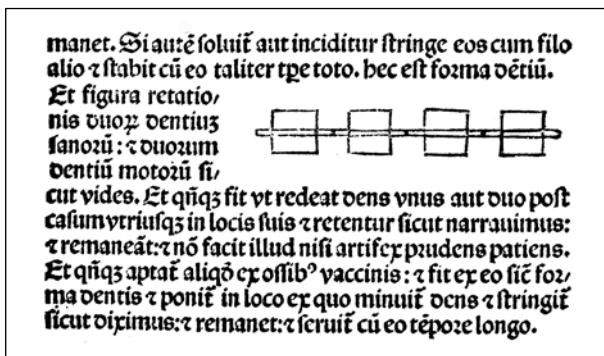
**FIGURE 2** A page from Book II of Albucasis on surgery. Note the decorated capitals and illustrations printed from woodblocks. On the left is an illustration of teeth wired together; see Figure 3. The text flows round the figure which is placed just beside the description of the procedure. On the right are three instruments for use in tonsillectomy; see Figure 4.

Space allows only brief descriptions here of two of Albucasis’s accounts of his procedures.

**REPLACING TEETH**

Albucasis describes a number of dental procedures; here is his account of the treatment of loose or missing teeth. He first describes how, if medical treatment has been unsuccessful in fixing loose teeth, they should be wired to sound teeth on either side using silver or, preferably, gold wire since the latter does not corrode. The wire is to be looped around a sound tooth, then woven in and out around the loose teeth until it is wrapped round another sound tooth. The figures in the Arabic manuscripts show this weaving more clearly than does Figure 2. Translating from *Et figura* we have:

And here is the illustration of fixing two loose teeth between two sound ones, as you can see. And if one or two of the teeth should fall out, put them back in place and fix them as we have instructed and they will stay in place; but this is not to be attempted except by a painstaking and skilled surgeon. And



**FIGURE 3** Enlarged view of image on left of Figure 2 and part of the description of wiring loose to sound teeth.

sometimes a piece of ox bone may be worked into the shape of a tooth and fitted into the place of a [missing] tooth and fixed there as we have directed; it will remain in place and [the patient] will have the use of it for a long time.

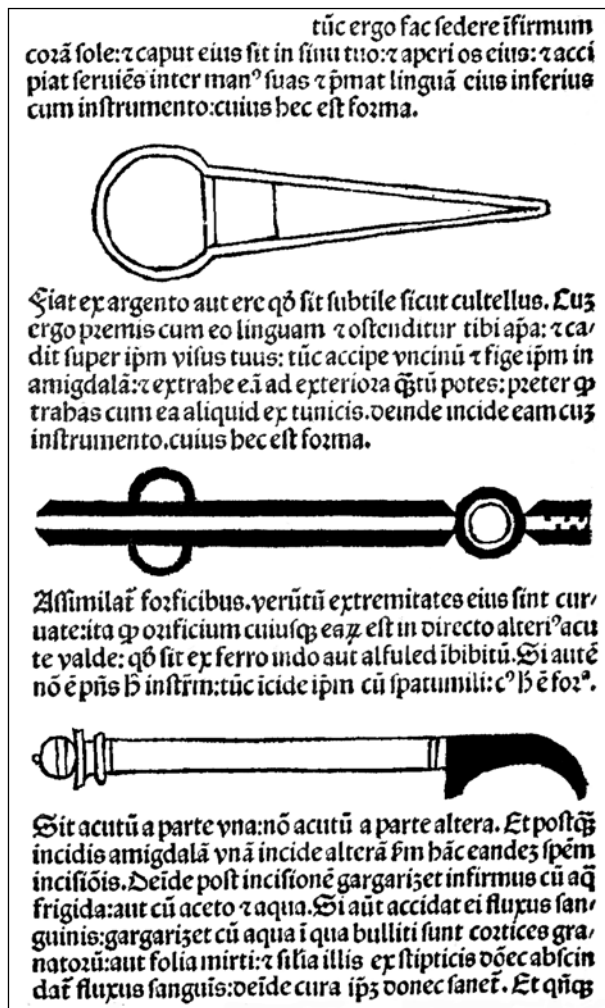
This must be judged an impressive account of dental treatment for around the year 1000; one wonders how many ‘painstaking and skilled’ surgeons were able to achieve these long-lasting results.

**TONSILLECTOMY**

Albucasis is said to have been the first to describe a special instrument for tonsillectomy, an operation he describes in some detail. It is worth considering part of his account in some detail. He begins by advising that what were probably suppurating tonsils should not be operated on and that the operation should be delayed until acute inflammation has settled; the description of the operation proper begins on the first line of the text in Figure 4. Translating the text from *tu[n]c ergo* we have:

Sit the patient facing the sun with his head in your lap; open his mouth and let an assistant hold [the patient’s head] between his hands and depress his tongue with the instrument drawn here [top drawing]. Let it be made of silver or bronze and as thin as a small knife blade. Then when you press the tongue down with it the swelling will be apparent and your gaze will fall upon it. Then take a hook and fix it in the tonsil and pull it as far forward as possible but avoid pulling any of its capsule [adjacent mucosa?] with it. Then cut it off with the instrument drawn below [middle drawing] which is similar to a forceps except that its ends are curved with each hollow exactly opposite its fellow, and extremely sharp. It is made of Indian iron or *alfulēd inbibitum*.\*\*

But if you do not have such an instrument cut the tonsil off with a knife of this kind [bottom drawing] which is sharp only on one side. When you have removed one tonsil, remove the other using the



**FIGURE 4** Instruments for and part of the description of tonsillectomy. From top down: tongue depressor, cutting forceps or guillotine (the cutting jaws are at the right) and a curved knife sharp only on its concave edge.

same type of incision then let the patient gargle with cold water or vinegar and water. If there should be haemorrhage make him gargle with water in which pomegranate rind or myrtle-berries have been boiled and continue with styptics until the bleeding ceases then treat him until it is healed.

Although the general nature of the procedure is clear enough, if we imagine trying to follow the directions in detail we soon find that we could not do as the text instructs. We are to put the patient *coram sole* – presumably so that the sun shines on his face – with his head *in sinu tuo*; just what does this mean? ‘In your lap,’ as Spink & Lewis say translating from the Arabic, or ‘on your knees’, as Leclerc has it, also from the Arabic? An assistant is then to hold the patient’s ‘head between his two hands’, but then the assistant is also to depress the tongue; how? – his hands are full. Next, we are told that we (the surgeon) are to depress the tongue, but apparently the assistant has already done that while also using both hands to hold the patient’s head. While we

depress the tongue we are to fix a hook in the tonsil, which uses our free hand. Then we are to take the 'guillotine' to cut the tonsillar pedicle, but this is not possible since both our hands are already occupied. In short, we cannot carry out the operation like this.

Assuming that it was possible to carry out tonsillectomy at the time (and Albucasis has apparently designed a special instrument for the operation), what has gone wrong with our text? Perhaps Gerard of Cremona mistranslated the Arabic? But it seems that cannot be the whole explanation since Leclerc also gives an impossible set of instructions. However, Spink & Lewis do not require the assistant to hold the head or the surgeon to depress the tongue so their instructions are practicable, suggesting that there is probably some difficulty in interpreting the Arabic text. However, there does exist a much older description of the operation whose directions it certainly would be possible to follow, that of Paul of Aegina (Paulus Aegineta), a seventh-century Byzantine Greek whose work was certainly known to Albucasis and influenced him.<sup>7,8</sup> Here, translating from Alban Thorer's Latin, is what the surgeon is to do:

We set the patient facing the light of the sun, with his mouth wide open and an assistant holding the back of his head and with a second [assistant] depressing his tongue towards the mandible with a spatula designed for this purpose; we take a hook and push it into the tonsil which we pull forwards without breaking its capsule. Then we amputate the structure through its pedicle with a scalpel with the blade curved for use by that hand – for there are two of these with their blades oppositely curved.

## REFERENCES

- 1 *Cirurgia parva Guidonis. Cirurgia Albucasis cum cauteriis & aliis instrumentis. Tractatus de oculis Jesu hali. Tractatus de oculis Canamusali.* Venice: Bonetus Locatellus; 1500.
- 2 Hargreaves GD. *A catalogue of medical incunabula in Edinburgh libraries.* Edinburgh: Royal Medical Society; 1976. p. 52.
- 3 Sack V. *Die Inkunabeln der Universitätsbibliothek und anderer öffentlicher Sammlungen in Freiburg im Breisgau und Umgebung.* Part I. Wiesbaden: Harrassowitz; 1985. p. 1,688.
- 4 Aldis HG. *The printed book.* 2nd ed. Cambridge: Cambridge University Press; 1921. p. 14.
- 5 Spink MS, Lewis GL, editors. *Albucasis on surgery and instruments.* London: Wellcome Institute of the History of Medicine; 1973.
- 6 Leclerc L. *La chirurgie d'Albucasis.* Paris: JB Baillière; 1861. p. 106.
- 7 Aegineta P. *De re medica libri septem.* Trans. A Thorer. Basel: Andreas Cratander; 1538. p. 370.
- 8 Adams F, editor. *The seven books of Paulus Aegineta.* Trans. F Adams. Vol II. London: Sydenham Society; 1846. p. 297.

## NOTES

The images illustrating this paper have been digitally enhanced and retouched to improve their contrast and legibility.

\* Confusingly, there were two Gerards of Cremona. The first (fl. twelfth century) translated works on philosophy. The second, also known as Gerard de Sabloneta (fl. thirteenth century), is credited with translating Avicenna and Rhazes and may have translated Albucasis.

† The name of the Arab work *acaragi* is unclear, but the *Kitab-al-Tasrif* apparently did have 30 volumes or parts and there is no doubt that

What could be clearer? Adams's translation from Greek confirms the account in every detail. Since Paul also gives identical advice to that of Albucasis about when not to operate and about other details, we may suspect that the rather confused instructions now credited to Albucasis are a distorted version of Paul's account or an account based on his. Albucasis may have invented a better instrument to cut the tonsillar pedicle, but that seems to be all he contributed to tonsillectomy.

If this analysis of a tiny portion of a large work teaches us only one thing it should be that, if a text demands the impossible, it is most probably corrupt. But perhaps it also makes it easier for us to understand why Renaissance scholars were so anxious to seek out 'ancient' sources – not just because of their chronological age but because they hoped they were nearer to an accurate account of the writings of their revered masters, distorted by fewer passages through endless copies of copies, each risking the introduction of new errors. And that, in turn, should remind us that printing revolutionised the transmission of texts not only by making multiple copies available relatively inexpensively, but also by making it possible for many readers to consult identical material with much greater ease and, when they became available, for the 'best' versions of ancient texts to be made (almost) universally available. With the increase over the sixteenth century in the number of texts translated into vernaculars, this became even more important.

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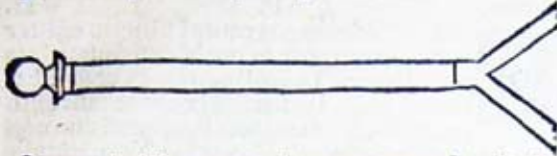
it is the work in question. It is the 30th volume or part of Albucasis's treatise, that on surgical instruments.<sup>5</sup> See also \*\* below.

† One of Albucasis's other works, the *Liber servitoris*, was printed by Jenson in Venice in 1471, which has apparently confused some authors. Surprisingly, Spink & Lewis who write, correctly, that the surgical work was first printed with Guy de Chauliac's *Cirurgia Parva*, date this to 1497,<sup>3</sup> but the Albucasis in this book is also *Liber servitoris*, and they claim further editions in 1499 and 1500. I can find no trace of 1497 or 1499 editions containing the surgical treatise and the 1500 is our edition. However, there is a 1499 edition of Guy de Chauliac's *Chirurgia (magna)* which also contains the treatises *De oculis* of Canamusali and *Jesu filius Hali*; one copy of the Bodleian Library's *Cirurgia parva* (1500), which contains the surgical treatise, is bound with this. Perhaps this was one source of confusion.

\*\* When the mediæval translators did not understand a word in the Arabic manuscript or could not find a Latin translation for it, they sometimes attempted a phonetic transliteration which is generally obscure to the non-Arabic reader; *alfuled* is an example. *Inhibitum* is genuine Latin but is meaningless without knowing the preceding word. We have a Latin translation of 1533 which replaces these two words with *aut simili cauterio* '[metal] similar to that used for a cautery', which at least makes sense. The French translation<sup>6</sup> from the Arabic gives a clue that allows us to make sense of *alfuled inhibitum*. A footnote to the phrase *fer de Damas* says that a word transcribed as *foulad* means hardened steel or iron (*acier* or *fer trempé*). One can imagine *foulad* being rendered by the translator as *alfuled* in which case *inhibitum* makes perfect sense since it can mean soaked – as does the French *trempe* – meaning here the quenching of hot steel to harden it.

# Albucasis

Forma impellentis quo impellitur fetus.



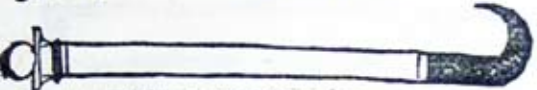
Forma almisdac qua pteritur caput magnū: et assimilatur forpici: cui sunt dentes in extremitate sicut vides. Et quāq; sit oblongum sicut forpices sibi hanc formā sicut vides cui sunt dentes sicut dentes ferre quo incidit et pterit.



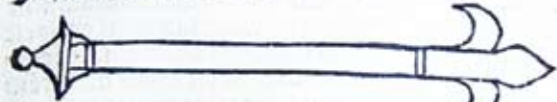
Forma almisdac quo conterit caput paruum.



Forma yncini habentis spinam ynam.



Forma yncini habentis spinas duas.



Forma forpici cui sunt dentes ferre cū q; pterit caput feti



Forma spatulilium hnt duas extremitates ad abscedēdū caput



Forma duorum spatulilium etiaz latozum.



Ista instrumēta omnia exercētur: et quāto plus multipli cantur species eorum: et preparata sunt apud artifices est velocior ad operationē suam: et altior apud homines propter quātitatem suam. Non ergo despicias ex eis instrumentum quin sint apud te preparata. Inexcusabilis est enim necessitas eorum.

De extractione secundine. CAP. LXXXVIII.

Quando retinetur secundina apud parturientem. tunc opus ut precipias infirmę ut retineat anhelitus suum. Deinde fac eam sternutare cū cōditi: et stringe manū tuā super os ei: et nares ipsius. si ergo egreditur p̄ h̄ bonū ē. Si nō. tūc accipe ollā et p̄fora in cōopertorio foramē: et pone in ea herbas aperientes os matricis: sicut calamentū rutam: et ancti: et camomillaz: et sebā: et cassiā lignēā: et centaureaz. accipe omnes istas herbas: aut quasdas earum: et submerge eas cum aqua: et pone eam super ignē: deinde pone embulā arundinis super foramen coopertorii olle: et extremitatē aliam in os matricis: et teneat eā donec perveniat vapor ad concavitatem matricis. deinde fac eam sternutare sicut diximus. secundina enī egredietur cū facilitate. Si autem remaneat post hanc curationē: et non egredietur: tunc precipe obstetrici: et submergat manū suā in oleo sisamino: aut mucillagine altee. deinde intromittat in vulvā: et querat cum ea secundinam. Cum ergo intenerit eam: tunc accipiat eā et extendat ipsam paulatim. Si autem fuerit annexa in profundo matricis: tunc intromittat manū sibi quod narrauimus. donec quando intenerit secundinam et extrahat eam paulatim sibi rectitudinē: ut non cadat matrix apud attractiones vehementes: imo oportet ut permittatur cum facilitate ad latera dextra et sinistra. deinde addatur in quātitates attractionis. Ipsa enī obedit: tunc et servatur: et euadit ab adherētia.

De si os matricis est coartatum sicut nos iam narrauimus: cura eam cum sternutatione: et ex medicatiōe oble cum herbis. Si autem non egredietur cum omnibus que narrauimus: tunc caue ne fatigeris super eam in iteratione extractionis. Verū oportet ut quod egredietur ad os matricis ex ea liges ad coxā mulieris. deinde clisuriza eam cum ynguento tertrafarmacon. Ipsius enim putrefaciet eam post dies et dissoluetur et egredietur. Verumtamen quando putrefit eleuatur ex ea odor malus ad stomachū et caput et ledit illud infirmam. Oportet ergo ut administrantur suffumigationes conuenientes ad illud. Quidā autem antiquorum iam experti sunt suffumigationes nasturcy et ficuum siccarum. Forma instrumenti quo suffumigatur mulier apud retentionē secundine et menstruum. Siat ex vitro sise alcama: aut ex zere: et ponat extremitas ampla super ignē: et suffumigatio sit posita super prunas teneat eam donec consumatur illa suffumigatio et itera aliam.

De curatiōe ani nō perforati. CAP. LXXXIX.

Alcunt multi puerorum et ani eorum sunt nō perforati: quos iaz opilonit sifac subtile. Opus ergo obstetrici ut p̄forat illud sifac digito suo: et si nō perforat ipm cū spatulili acuto et caueat lacertū ne tangat eū: deinde pone super ipm



The obstetric instruments illustrated in Albucasis's surgical treatise first printed in 1500/01, which is discussed in the article on pages 85–88. The text makes it clear that the instruments on the left are for use in extracting a dead fetus from the uterus and not to assist delivery of a live child. The illustrations are printed from wood blocks inserted in the forme of metal type and printed with the text in the same impression of the press. This book, the earliest illustrated printed book in the Sibbald Library, is a very early example of the embedding of illustrations in the text. The image above is on Lib. II Cap. LXXXVII (folium 25 verso).