

Articoli/Articles

ANTYLLUS ON THE BLADDER STONE IN AL-RĀZĪ'S  
KITĀB AL-ĤĀWĪ  
(RHazes' *LIBER CONTINENS*) –A NEW SOURCE FOR  
UROLITHIASIS AND LITHOTOMY IN ANTIQUITY

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SUMMARY

*ANTYLLUS ON THE BLADDER STONE IN AL-RĀZĪ'S KITĀB AL-ĤĀWĪ*

*The late Alexandrian physician Antyllus (approx. 2<sup>nd</sup> century AD) was one of the most important surgeons of Graeco-Roman antiquity and the only ancient surgeon whose writing is quoted in the Arab world. The fragments of his handbook transmit a part of the knowledge from the Alexandrian period, in which surgery reached its climax. The original surgical treatises of this era have all been lost as has been Antyllus' handbook. However, numerous Greek and Arabic fragments of it still survive in compilations. The present paper provides a first edition of Antyllus' chapter on lithotomy, reconstructed from the Arabic. Lithotomy was one of the most serious interventions of elective surgery practised during antiquity. This topic is particularly well covered in the Arabic Antyllus fragments, so that the chapter can probably almost be entirely reconstructed. Several new insights into the diagnosis and treatment of urolithiasis in antiquity can be retrieved from this chapter, facts that were hitherto unknown from other ancient sources. A comparison of the reconstructed chapter with the same one in the Byzantine compilation by Paul of Aegina further reveals that Paul used Antyllus as his unquoted source, making some modifications and shortening the text. The Arabic fragments mentioned can be found in al-Rāzī's Kitāb al-Ĥāwī*

**Key words:** Ancient surgery – Lithotomy – Urolithiasis – Antyllus – Alexandria  
– Rāzī, Ĥāwī – Rhazes, *Liber Continens*

*(Rhazes' Liber Continens), which is currently only available through incomplete and philologically inadequate Latin and Arabic editions. Considerations for a new standard for editions from the Ḥāwī are outlined in this paper as well. For this edition, manuscripts were collated that have not been used by scholars so far.*

### *Introduction*

Among the surgical interventions of antiquity, lithotomy is probably the most well known by those familiar with ancient medicine<sup>1</sup>. This is primarily due to the fact that lithotomy is rejected in the Hippocratic Oath for a reason for which there is no generally accepted explanation among researchers<sup>2</sup>. In any case, during the 4<sup>th</sup>–5<sup>th</sup> centuries BC, cutting for the stone was the most serious elective surgical procedure that we know of. According to our sources, lithotomy was always performed by trained surgeons in Greco-Roman antiquity. There is no evidence of semi-professional stonecutters as in early modern Europe, although such practitioners are sometimes postulated anachronistically for antiquity<sup>3</sup>. While a description of the symptoms of urolithiasis can be found in the Hippocratic text *De aere, aquis et locis*, information about the surgical procedure is only available in three post-Christian sources: the descriptions of lithotomy (1) in Celsus' (1<sup>st</sup> century AD) *De medicina* 7.26, (2) Rufus of Ephesus' (around 100 AD) *De renum et vesicae morbis* 12 and (3) Paul of Aegina's (early 7<sup>th</sup> century AD) compilation 6.60<sup>4</sup>. All three authors were able to draw on an older Alexandrian tradition, sources of which we know very little today. The Alexandrian Philoxenos (late 2<sup>nd</sup> century BC) is reported to have been the first to write a comprehensive work dealing with all matters of surgery<sup>5</sup>. In subsequent times, this treatise seems to have inspired the composition of further surgical manuals. At least in Roman Imperial times these surgical compendia, which have all been lost, always bore the uniform title *Kheirourgoúmena* (Χειρουργοῦμενα, 'surgical matters')<sup>6</sup>. It is very likely that Celsus, Rufus and Paul drew on

handbooks of this kind for their chapters on lithotomy. At any rate, fragments of four surgical manuals from Imperial times survive in Byzantine pandects<sup>7</sup>: Fragments from the handbooks on surgery by Leonides (1<sup>st</sup> century AD), Archigenes (1<sup>st</sup>–2<sup>nd</sup> centuries AD), Heliodorus (1<sup>st</sup>–2<sup>nd</sup> centuries AD) and Antyllus (2<sup>nd</sup> century AD).

In addition to the three descriptions of lithotomy listed above, a fourth, hitherto unknown one will be edited here for the first time. It was part of the *Kheirourgoúmena* by Antyllus. Although the integral Greek text of his surgical manual has been lost, numerous fragments of it survive not only in the above-mentioned Byzantine pandects, but also in the Arabic Kitāb al-Ḥāwī by Rāzī (Rhazes, *Liber Continens*). We do not have evidence of an Arabic translation of Antyllus' works in Arabic sources, however the considerable number of surgical fragments preserved in the Ḥāwī suggest that there must have been a complete Arabic translation of his *Kheirourgoúmena* from which Rāzī took his excerpts<sup>8</sup>. Antyllus is the only Greek surgeon, who is known to have been received by the Arabs. His Arabic fragments have, however, not yet been collected and analysed<sup>9</sup>. In total, six fragments, four extensive and two smaller ones from Antyllus' chapter on the bladder stone survive in the Ḥāwī. Taken together, they probably cover a large part of Antyllus' original lithotomy chapter. They provide interesting insights into aspects of the symptomatology and therapeutics of urolithiasis which cannot be found in any other ancient source. Furthermore, Antyllus' reconstructed chapter on lithotomy gives insight into issues of textual transmission, such as Rāzī's technique of excerpting and compiling as well as into questions about the sources Paul of Aegina used for the section on surgery in his *Pragmateia*.

#### *Ancient Surgery – The Present State of Research*

Antyllus and the other late Alexandrian surgeons mentioned have hardly been studied to date and are not well known among medical

historians. This unsatisfactory state of research is not limited to the late Alexandrian surgeons alone, but reflects the lack of research on Hellenistic surgery in general (above all on soft tissue surgery). Studies on surgery in the Hellenistic period are especially significant in that operative (elective) surgery was fully developed during this era. The fact that the elective surgical branch only developed during Hellenistic times may be due to the scientifically fruitful climate of Hellenistic Alexandria, where systematic anatomical studies were initially performed. They laid the groundwork for rational and targeted surgical interventions. In contrast, we have very little knowledge of elective interventions from Hippocratic times, a period in which anatomy was scarcely known.

As mentioned, the original treatises of the Alexandrian period (starting from the 3<sup>rd</sup> century BC) have been lost. Yet, part of their knowledge was transmitted in the handbooks (*Kheirourgoúmena*) by the above-mentioned Leonides, Archigenes, Heliodorus and Antyllus. These surgeons are the only major physicians of antiquity whose fragments have not been comprehensively collected and philologically edited. Since the end of the 19<sup>th</sup> century, putting together a comprehensive collection of fragments by Antyllus and the other three late Alexandrian, ‘pneumatic’ surgeons (this term was coined by Wellmann)<sup>10</sup>, was tackled four times: by Max Wellmann (announced 1895), Markwart Michler (1968), Mirko Grmek (1970) and Marie-Hélène Marganne (announced in the 1990s)<sup>11</sup>. However, none of these projects went beyond the planning phase. Francis Adams’ (1834) annotated and commented translation of the surgery of Paul of Aegina<sup>12</sup> is still unsurpassed. Along with a thorough discussion of the interventions transmitted in Paul, Adams provides parallel passages and source references taken throughout the ancient European and Arabic tradition. In contrast to this work, the surgical history by Gurlt (1898) is less significant in that it primarily reproduces extracts of surgical texts without thoroughly commenting on them,

evaluating them critically or alluding to textual parallels and interdependencies among the individual authors. Michler's historical study on Alexandrian surgery (1968) focusses on the scarce fragments by earlier Alexandrian surgeons. The late Alexandrian ('pneumatic') surgeons are not included in this work. Michler was the last trained surgeon to examine the remains of ancient surgery in a philological and critical way<sup>13</sup>. In the case of Antyllus, there are not only Greek but also Arabic fragments, making a multidisciplinary approach among different philologies indispensable. The Arabic Antyllus fragments are mainly found in al-Rāzī's *Kitāb al-Ḥāwī* (Rhazes' *Liber Continens*). This work is a vast and disorganised compilation of excerpts from Greek, Arabic, Indian and other medical sources in Arabic language. It contains fragments of numerous works from the cultural backgrounds mentioned that are otherwise lost. This makes the *Ḥāwī* immensely valuable. The main problem for scholars working on the *Ḥāwī* is, however, its greatly disordered arrangement and the lack of a comprehensive index – or an index at all. In addition, this compilation has not been completely or critically edited, thus scholars do not have a philologically reliable basis for their studies. The most complete edition of the *Ḥāwī* that is available today is its Latin translation (*Liber Continens*) from 1279 by the Jewish physician Faraḡ ibn Sālim (Faragut)<sup>14</sup>. Compared to this translation, the Haiderabad edition of the Arabic text, which appeared in 1955–1971<sup>15</sup>, is corrupt and incomplete in many places. In fact, complete books and chapters of the *Ḥāwī* are missing<sup>16</sup>. In 2012, Ḥālid Ḥarbī published the Alexandrian edition of the *Ḥāwī*, which is partly based on other manuscripts than the Haiderabad edition<sup>17</sup>.

### *Fragments*

In total, six fragments from Antyllus' chapter on the bladder stone are preserved in Rāzī's *Ḥāwī*. These fragments are all introduced by Rāzī with the formula 'Antyllus says'. In one quote (Frg. F), it is

explicitly pointed out that it originates from Antyllus' 'chapter on the stone' (باب الحصاة)<sup>18</sup>. It is therefore likely that the title of the chapter in Antyllus was Περὶ λιθιάσεως, similar to the heading of chapter in Paul. Antyllus treated urogenital and proctological surgery in the second book of his *Kheirourgoúmena*, as seen in the scholia in Oribasius<sup>19</sup>. Thus, Antyllus' lithotomy chapter was certainly also part of the second book of Antyllus' manual. The following thematic areas are treated in the six fragments mentioned:

1. Aetiology and symptomatology of bladder stones
2. Exercises to facilitate patient urination
3. Operation (lithotomy)
4. Post-operative care.

These thematic areas are distributed among the single fragments as follows (for an index of abbreviations see below):

- 1) Frg. A: *X.107.13 Haid = IV.615.1 Alex = 538 M = deest Y = 731 Th = 366v Ar = II 193rb P = 434vb Vat = 214vb V (Book 10.2)*  
Aetiology, symptomatology of the bladder stone (part 1), Exercises to facilitate patient urination (part 2)
- 2) Frg. B: *X.110.4 Haid = IV.618.-6 Alex = 540 M = 264v Y = (736) Th = 372r Ar = II 193vb P = 435ra Vat = 214vb V (Book 10.2)*  
Symptomatology (soft, hard stone)
- 3) Frg. C: *X.187.18 Haid = IV.742 Alex = 526 M = 271v Y = 771 Th = 414v Ar = II 207vb P = 450va Vat = 222ra V (Book 10.2)*  
Exercises to facilitate patient urination

- 4) Frg. D: *X.143.9 Haid = IV.669.-6 Alex = 545 M = 267r Y = 749 Th = 387v Ar = II 199va P = 441va Vat = 217vb.-4 Ven. (Book 10.2)*  
Mixed fragment: symptomatology (part 1, part 2), palpation of the stone and lithotomy (part 3), postoperative care (part 4)
- 5) Frg. E: *X.114.17 = IV.625.8 Alex = 538.-5 / (#) 540.-14 M = 264.1 / / (#) 264v.-11 Y (mutilated beginning) = 733 / (#) (738).1 Th = 369r / (#) 373v.7 Ar = II 194va P = 436ra Vat = 215rb.42 Ven. (Book 10.2)*  
End of the operation (part 1), postoperative care (part 2)
- 6) Frg. F: *X.195.-4 Haid = IV.756.-6 Alex = 558.9 M = 272v.21 Y = 775 Th = deest Ar = II 209rb P, 452ra Vat = 222vb V (Book 10.3)*  
Postoperative care (extract).

In one of her studies, Ursula Weisser introduced a classification for different types of excerpts found in Rāzī<sup>20</sup>. This classification will also be used in the commentary part of this paper. However, it must be pointed out that, at times, even within one single excerpt several types of excerpts can prevail. This is the case if some sections of an excerpt are more condensed or more comprehensive than others. Weisser's classification of types of excerpts in Rāzī is as follows:

- Type 1: Quotations in a narrow sense: the quoted text is very close to the original wording, at most there are short gaps.
- Type 2: Shortened paraphrases of the original text, express the general sense, occasionally the sequence of arguments is altered.

Type 3: Rough paraphrases, extensive passages are summarised in a few sentences.

Type 4: Isolated statements, separated from the original context.

### *Textual Form*

There are several overlaps, textual parallels and duplications among the fragments. Furthermore, it was repeatedly found that a certain section in the middle of one fragment is closely related to a section in the middle of another fragment, adding further details or supplementary information to the former. These facts prevented the fragments from being edited subsequently, in their transmitted form. Such an editorial approach would have obscured the textual coherences and interdependencies. For the sake of a clear arrangement and a reconstruction as close to the original Antyllus chapter as possible, it was deemed appropriate to subdivide the transmitted fragments by topic, if necessary. All of these ‘subfragments’ were then rearranged thematically. This method seemed more justified since most transmitted fragments in Rāzī are not continuous, but rather arrangements of partial excerpts from different sections of the author’s (here: Antyllus’) original chapter. Textual and thematic jumps within excerpts in Rāzī are usually indicated by an inserted ‘he says’, which often functions like our modern apostrophes<sup>21</sup>. The following principles were adopted for the edition: if two sections of different fragments are thematically akin, so that the second subfragment adds new aspects to the first one, then the second subfragment appears after the first one. If, however, two or more subfragments proved to be nearly identical, they are edited in synoptical form, facing each other. In order to facilitate access, the Arabic text of the synopses given below is always printed along with its English translation. For comparative purposes, Faragut’s Latin translation, that is based on a better Arabic manuscript than the ones available today, is also included in all synop-

ses. The English translation given is always taken from the Arabic. The English translation is only based on the Latin version where specifically indicated (eg. in cases of a textual loss in the Arabic version). In synopses in which two Arabic texts are compared, the two Arabic versions and their Latin counterparts are printed first, synoptically; below them, the English translations of both Arabic versions are given, again synoptically.

All Antyllus fragments discussed here are from the 10<sup>th</sup> volume of the Haiderabad edition of the Ḥāwī (equivalent to book 10 of the printed Latin edition of the *Liber Continens*)<sup>22</sup>. The Haiderabad edition is known not to have praemonenda on the manuscripts used by the editors. Nor is there an explanation of the abbreviations given in the critical apparatus, so that we do not know what manuscripts they are referring to. The manuscripts used are only mentioned in passing on the cover and title pages of each volume of the Haiderabad edition. Three manuscripts are indicated for volume 10: the manuscripts (1) Escorialensis 813 (2) Aligarh, India, Lytton (now Maulana Azad) Library and (3) New Delhi, National Museum. In the critical apparatus, these three manuscripts are referred to using الأصل ('the original'), ع and ش. On the title page of volume 10 the following information is given: 'based on the unique Escorial MS. [No. 813] Madrid [sic] compared & collated with ...' [the two other manuscripts are named here]. It can therefore be assumed that the manuscript called 'the original' by the editors in the apparatus is to be identified with the Escorialensis 813. The manuscript from Aligarh might be abbreviated with ع (since 'Aligarh' begins with an ع in Arabic) and the other manuscript using ش. Yet it is uncertain whether this is the case or if it is the other way around. There are, however, no textual variants in the apparatus for the part of volume 10 from which the presently discussed Antyllus fragments originate. Therefore, it is likely that the text is uniquely based on the Escorial manuscript. Ḥālid Ḥarbī, the editor of the Alexandrian

edition, used entirely different manuscripts than the editors of the Haiderabad edition did. The ones that Ḥarbī used are: (1) Istanbul, Saray Ahmed III 2125 (abbr. 2) ,(1) Cairo, Dār al-Kutub 1718 (abbr. 3) and Istanbul, Süleymaniye 850 (abbr. 4). Concerning the passages that contain the Antyllus fragments, variants from these three manuscripts are indicated throughout the apparatus of the Alexandrian edition. These variants are, however, of little textual importance. Amazingly, despite the (allegedly) different textual basis, the text of the Alexandrian edition is almost identical with that of the Haiderabad print in the case of the Antyllus fragments. The only exception are two textual omissions of the type *saut du même au même*<sup>23</sup> which are probably due to an editorial mistake of Ḥarbī's. It is regrettable that, in the Alexandrian edition, there are no references to the Haiderabad edition with regard to textual discrepancies between the two. In the case of the present fragments, the Alexandrian edition only provides two minor textual improvements. All in all, it appears that the manuscripts used for the Alexandrian edition belong to a manuscript tradition that is very similar to the one of the manuscripts used for the Haiderabad edition. A second (more likely) explanation for the unusual similarities could be that Ḥarbī did not produce his own critical text, based on independent collating, but rather adopted the Haiderabad text, 'embellishing' it with an apparatus of new readings from his manuscripts.

Since, to this date, no veritable critical edition is available for the Ḥāwī, it was the aim of the present edition to provide an Arabic text for the edited fragments that is as accurate as possible. Therefore four manuscripts were collated that have not been used by scholars so far<sup>24</sup>:

- (1) Ar: *Arund. Or.* 14 (1313 AD / 713 AH) of the British Library (formerly British Museum),
- (2) M: Montreal, McGill University, Osler Library of the History of Medicine 449 (17th c. AD / 6<sup>th</sup> c. AH),

(3) Y: New Haven, Yale University, Harvey Cushing / John Hay Whitney Medical Library, Arabic Ms. 10 (appr. 1674 AD / 1085 AH) and

(4) Th: Teheran, Millī Malik Library, 4429 (1607 AD / 1014 AH).

These four manuscripts provided numerous textual improvements and allowed several gaps in the Arabic to be filled. While producing the critical text, it became clear that these manuscripts follow a completely different textual tradition than the one of the manuscripts used for the Haiderabad and the Alexandrian editions. They seem to be closer to the manuscript used by Faragut for his Latin translation than any other Arabic manuscripts known. This correspondence is particularly obvious in fragment E (see the corresponding critical apparatus below). Interestingly, the three 17<sup>th</sup> century manuscripts Y, M and Th turned out to be closely related sister manuscripts. They not only transmit the same portions of text (books 1-14,3 [book numbering according to the Latin edition] of the Ḥāwī, including books 13,8-14,3 which are unedited in Arabic). They also have the same main textual variants, losses and transpositions of texts (the transpositions are due to a transposition of leaves in the subarchetype)<sup>25</sup>. This also applies for Ar, a manuscript which is three centuries older and which only transmits books 7-10 of the Ḥāwī. Consequently, all four manuscripts prove to be descendants of the same subarchetype that already had these textual corruptions. Also in the Antyllus fragments edited here, they have a transposition of text (see frg. F, transposition indicted by #, see below).

All in all, regardless of the textual quality, there is no Ḥāwī or *Continens* manuscript in either the Arabic or Latin traditions that is free of textual losses. The textual nature of the Ḥāwī itself, characterised by monotonous and repetitive strings of quotations with similar syntax following one another without logical coherence, seems to have encouraged omissions among all copyists, particularly omissions of the type *saut du même au même*. Also in Faragut's

Latin translation numerous passages are missing that can be found in the Arabic print editions. Since the gaps, textual losses, corrupt words and unintelligible sections in both the Arabic and the Latin versions can only be supplemented or rendered intelligible by constantly taking both language versions into account, a consistent Arabic-Latin double edition appeared absolutely essential<sup>26</sup>. Therefore, the above-mentioned Paris manuscript (*Par. lat.* 6912) also had to be collated<sup>27</sup>, which occasionally (but not always) provides better readings than the Latin print edition<sup>28</sup>. For the sake of completeness, *Vat. lat.* 2398 was collated as well. This manuscript, however, turned out to be a *codex descriptus* from *Par. lat.* 6912<sup>29</sup>. The text of the two Arabic editions, with all their alternative readings, was included in a critical apparatus. From the apparatus it is apparent, that Ḥarbī's Alexandrian edition has hardly achieved any editorial progress, compared with the Haiderabad edition, and that Ḥarbī's endeavour is not the result of independent scholarship<sup>30</sup>. In order to provide easier access to the complex edition of fragments printed below, all quotations ('Antyllus says', 'he says') appear underlined in the text. Where passages are missing in either the Arabic or the Latin, the lacuna is indicated with the sign (...) in the other language version. The fact that such a textual gap is indicated in the critical apparatus of the *Latin* version does not mean that the indicated passage was lost in the process of textual transmission of the Latin text. This reference primarily implies that Faragut's Arabic manuscript was deficient at this point, or, that Faragut himself may have accidentally left out the respective passage during translation. For comparative purposes, parallel passages from Celsus and Paul of Aegina are included in the synopses (more details are given in the commentary section). In these *loci paralleli*, correspondences with the Antyllus fragments from the Ḥāwī were sometimes underlined for the sake of clarity. With regard to the Arabic text, the following must be kept in mind: since we are dealing with a historical stage

of Arabic, the tenses have aspect rather than tense functions, in a modern sense. This is reflected in the English translation where, for example, قال is not rendered by 'he said', but by 'he says'.

The following is a short overview of the abbreviations used in this edition:

Editions:

Alex	Alexandrian edition by Ḥarbī
Haid	Haiderabad edition
H/A	consensus of the two Arabic print editions
V	O. Scoto (publisher): Continens Rasis ..., Venice 1529

Manuscripts:

Ar	London, British Library, <i>Arund. Or.</i> 14 (1313 AD / 713 AH)
Esc	San Lorenzo de El Escorial, <i>Escorialensis</i> 813 (according to the critical apparatus of Haid)
M	Montreal, McGill University, Osler Library of the History of Medicine 449 (17 <sup>th</sup> c. AD / 6 <sup>th</sup> c. AH). To the page numbers given here, 17 has to be added in order to get the page numbers of the digitised version provided by the library (there are 17 cover and title pages before the main text starts).
P	Paris, Bibliothèque nationale, <i>Par. lat.</i> 6912 (1282 AD)
Th	Teheran, Millī Malik Library, 4429 (1607 AD / 1014 AH); this manuscript is numbered by pages, but only every second page has a page number. Pages without numbers are indicated with numbers in brackets: "(736) Th".
Vat	Rome / Vatican State, <i>Vat. lat.</i> 2398 (1282 AD)
Y	New Haven, Yale University, Harvey Cushing/John Hay Whitney Medical Library, Arabic Ms. 10 (appr. 1674 AD / 1084 AH). This manuscript has no page or folio numbers.
إ	Istanbul, Saray Ahmed III 2125 (according to the critical apparatus of Alex)
د	Cairo, Dār al-Kutub 1718 (according to the critical apparatus of Alex)
م	Istanbul, Süleymaniye 850 (according to the critical apparatus of Alex)
↓	incorrect translation from Greek into Arabic or from Arabic into Latin
540.-14	line counts with "-" indicate that counting starts from the bottom of the
e.g.	page

5. Edition of the Fragments From Antyllus' Chapter on the Bladder Stone (<Tepi ληθιόσσοσ< – لبب الحصاة –

Thematic Unit 1: Aetiology, Symptomatology

<p><i>Rāzī, Kitāb al-Hāwī, Arabic text</i></p>	<p><i>English translation of the Arabic</i></p>	<p><i>Furugut's Latin translation of the Arabic</i></p>
<p>أنطيلس قال: تعرض من شرب المياه الكثرة ومن سوء الغذاء، فإن البول يكثر، وإذا كثر البول، رسب منه في قعر المثانة شيء بعد شيء، والتجم بعضه على بعض وأنطبخ بالحرارة فتحجر. ولذلك تعرض للصبيان أكثر الكثرة بولهم لتخاطبهم وشربهم. قال: وقد ظن بعض الناس أن الحصاة تثبت لاصقة بالمثانة. وليس كذلك، لأنها ليست لاصقة بالمثانة البتة. ولذلك تقع من مكان إلى مكان، متى تجمعت وعظمت.</p> <p>Ar, M, Th, H/A; 1 Ar, M, suppl. Alex, deest Haid; 2 Ar, M, Haid; 3 Ar, M, Haid, Wajm, Alex; 4 Ar, M, Th; 5 Ar, M, Th; 6 Ar, M, Th; 7 Ar, M, Th; 8 Ar, M, Th; 9</p>	<p><b>Fig. A (part 1)</b> X.107.13 Haid = IV.61.51 Alex = 58 M = deest Y = 73 I, Th = 366 r Ar</p> <p><b>Antyllus says:</b> it [sc. the bladder stone] occurs from drinking cloudy kinds of water and from an impaired digestion. As a consequence the urine becomes cloudy. And when the urine is cloudy, gradually a part of it precipitates to the bottom of the bladder. And this sediment sticks together and is cooked by the heat and becomes a stone. And because of the following cloudiness [of urine] occurs more frequently in young people; because they eat [different foods] simultaneously and &lt;because of&gt; their gluttony [or: because of the inferiority of their diet [Lat.], or: because of their drinking habits H/A]. <b>He says:</b> And some people believe that the stone firmly adheres to the bladder. But this is not so, because it does not stick to the bladder at all. And for this reason it falls from one place to another, when it agglomerates and becomes large.</p> <p><b>Fig. D (part 1)</b> X.145.9 Haid = IV.608-4 Alex = 545 M = 267 r Y = 749 Th = 387 v Ar</p> <p><b>Antyllus says:</b> when the stone sufferer moves, [by] running and exerting himself, his pain becomes stronger. When he is [however] at rest, his pain decreases. For the stone does not firmly adhere to the bladder. <b>He says:</b> and among its signs [i.e. the signs of the bladder stone] is, if the patient always</p>	<p><b>Fig. A (part 1)</b> II.191a P = 434b Vat = 214b V (Book, 10.2)</p> <p><b>Antyllus dixit:</b> accidit de potu aquarum turbidarum et ex mala digestione, quoniam urina turbida faciet sedimen in fundo urine partem post partem. Et adheret una pars part alteri et decoquitur per caliditatem, dum petrificabitur. Ideo accidit infantibus magis: ex turbidine urine, ex mixtione, quam faci- ant, ex malitia regiminis ipsorum. <b>Dixit:</b> extimaverunt qui- dam, quod lapis generatur adherens vesice omnino. Et non sic erit, quoniam non erit adherens vesice omnino. Ideo cadit de uno loco ad alium, quoniam congregatur et magnificatur.</p> <p>3 pantam in margine Vat, 5 mixtione P Vat minutione P, 5-6 faciant V P faciant Vat, 6 ex P P et lāt, 7 vesice V lāt vesice P, omnino deest Vat, 8 vesice V lāt vesice P, 9 quoniam V quando P,</p> <p><b>Fig. D (part 1)</b> II.191a P = 441a Vat = 2170b-4 V (Book, 10.2)</p> <p><b>Antyllus:</b> quando laborans lapide movetur accedendo et labo- rando, vehementior inde fiet dolor eius, et, si requiescit, allieviabitur dolor, quoniam non adheret lapis cum vesica. <b>Dixit:</b> de signis eius est, quod appetit laborans eo mingere, postquam mingit, aut forte egredietur annus eius, si lapis fuerit</p>
<p>أنطيلس قال: إذا تحرك صاحب الحصاة وشفى وتعيب، اشتد وجعه، وإذا سكن، خف وجعه. وليست الحصاة لاصقة بالمثانة. قال: ومن علامتها أن يشتهي الإنسان البول دائما بعد بوله. وربما خرجت مفعنته، إذا كانت</p>		







<p><b>He says:</b> and those whose stones get into the neck of the bladder urinate without pain in the following positions (ὄκται – οὐρητῶν), either he [the patient] puts a foot on the ground and pushes his belly towards the spine while being in bent position or he throws himself to the ground, rests on his knees and holds his breath, as much as possible. For this [exercise] forces the neck of the bladder to expel the stone backwards. Or he puts his leg against the wall and massages the lower abdomen upwards.</p>	<p><b>Antyllus says:</b> and concerning the positions that bring the urine out from a stone sufferer: There are some of them [sc. of the stone sufferers] who go down on their knees and &lt;br&gt;bring them [sc. the knees] close to the chest [suppl. from the Latin] &gt;. This way, their [inner] organs are compressed [lit.: come closer to one another]. Others of them [sc. the patients] insert their finger into the anus and remove the stone from the neck of the bladder.</p> <p><b>He says:</b> and others put their hands under their knees and bring them [sc. the knees] close to their chest and perform other exercises. Nature imposes these [sc. exercises] on them [sc. the stone sufferers], since all these exercises remove the stone from the orifice of the bladder.</p>
<p>Or he puts his hands under his knees and [thus] approximates them [sc. the knees] to his chest. With these positions urination is facilitated for them [sc. the stone sufferers]. <b>By me [Rabres]:</b> ...</p>	<p><b>cf. Paul 6.60.2</b> σχηματισμένον αὐτόν ὄσπερ ὀρθοκαθήμενον τὸς χεῖρας ὑπὸ τοὺς ἰσθμούς ἔχοντα ἡρώδης εἰς ὄλιγον χρόνον ἢ κούρτις ὑπερβῆναι.</p> <p>... we position him [sc. the patient] like a person sitting upright, with the hands under his own thighs, so that the bladder is compressed into a small space.</p>

**Thematic Unit 3: Operation**

<p><b>Fig. D (part 2), X.143.12 Haid</b> = <b>IV.669-2 Alex</b> = <b>555 M</b> = <b>267r Y</b> = <b>749 Th</b> = <b>387v Ar</b> = <b>II 199vb P</b> = <b>44Ivb Vat</b> = <b>218rvV (Book 10.2)</b> <b>قال:</b> والصغيرة يعسر جسها بالإصبع، لأنها ربما فارقت المثانة ووقعت في عنقها إلى مجرى البول، وينبغي ألا تكون في وقت حبس الحصة المعى ممثلة، لأن ذلك مما يقصد الجس، لكن احتقنا قبل ذلك لينبرغ ما في المعى، والعظيمة جدا يعسر مجسها وجرها إلى أن يتخلص في مكان.</p>	<p><b>He says:</b> and the small stone is difficult to palpate with your finger, because it sometimes leaves the bladder and falls into its neck towards the urethra. And during the palpation of the stone the gut [= sit intestinum repletum, quoniam hoc corruptit tactum. Et clysterizandum est patiens ante hoc ad evacuandum, quod fuerit in intestinis. Etiam lapis magni tactus erit difficilis et extracto eius, dum ipsum non habebis liberum in aliquo loco.] must not be filled, since this prevents palpation. Beforehand an enema should be administered, so that the intestinal content is emptied. And with a very big stone palpation and extraction is difficult, until it [sc. the stone] is freed at one point.</p> <p><b>Dixit:</b> tactus lapidis parvi difficilis erit per digitum fieri, quoniam forte recessit de vesica cadendo in collo eius, in meatu urine. Et expedit, quod in tempore tactus lapidis non sit intestinum repletum, quoniam hoc corruptit tactum. Et clysterizandum est patiens ante hoc ad evacuandum, quod fuerit in intestinis. Etiam lapis magni tactus erit difficilis et extracto eius, dum ipsum non habebis liberum in aliquo loco.</p> <p><b>Paul of Aegina 6.60</b> (CMG IX 2, 98-100) <b>(no Greek equivalent)</b> (<b>cf. Celsus VB.26.2BC:</b> ... quo magis calculus ad vesicam cervicem descendat. Quod an incidere, dignis quoque, sicut in curatio docebo, demissis cognoscetur. Ubi eius rei fides est, pridie is puer in lectulo continentius, ...)</p> <p><i>Translation of Paul's Greek</i> <b>(no Greek equivalent)</b></p>
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*Antyllus on the Bladder Stone in al-Rāzī's Kitāb al-Ḥawī*

<p>احتاج إلى شق عظيم جداً، الحصى بالكثيرين واكسرهما خارجاً قليلاً قليلاً حتى تخرج ولا تفتت داخلًا. واجهد ألا يعظم الشق (→*/*)</p> <p>بطي، H/A; 2: 8; وجرى M; وجرى I Th; post add. إلى Ar, M, Y; Th; 2: مستطال إلى Y; مستطال M; مستطال Ar; مستطال و Ar; ما: 3; جرحها [جرمها] H/A; 4: 4; قفيا أجهه M, Y; Th; 4: 4; وجرى Ar; وجرى M, Y; Th; 5: 5; وجرى H/A; 5: 5; وجرى Ar; وجرى M, Y; Th; 6: 6; وجرى Ar; وجرى M, Y; Th; 8: 8; وجرى Ar; وجرى M, Y; Th; 9: 9; وجرى M; وجرى 10: 10; وجرى Ar; وجرى M, Y; Th; 11: 11; وجرى Y; وجرى 12: 12; وجرى Ar; وجرى M, Y; Th; 13: 13; وجرى M, Y; Th; وجرى H/A; 14: 14; وجرى M, Y; Th; وجرى H/A; 15: 15; وجرى M, Y; Th; وجرى Ar; وجرى M, Y; Th; وجرى M; وجرى Y; وجرى 16: 16; وجرى Ar; وجرى M, Y; Th;</p>	<p>when the stone is so large that the incision you have made does not suffice for it because of its size – [that means] if a very large incision would be necessary, take the stone with a pair of tongs and gradually break it down externally, until it passes through, without splintering inside. During this, take pains to prevent the incision from becoming larger. (→*/*)</p>	<p>partie intérieure eius, caute, ne magnifecur fissura. (→*/*)</p> <p>2 non supra in corpore eius P. Iza non supra eius corpore P; 15-6 tantum in tantum Iza tantum P; 18 contracto P. Iza contracto P.</p> <p>(Note: Properly <i>tenella</i> from Italian <i>tenaglia</i> (forceps), cf. L. R. Lind (ed.), <i>transl. Berengario da Carpi On Fracture of the Skull or Cranium</i> (Philadelphia 1980), 142-143; there 'forceps' is rendered with the Latin word <i>tenella</i>.)</p>	<p><b>COM.</b> [3] <math>\mu\epsilon\tau\epsilon\delta\ \delta\epsilon\ \tau\eta\eta\ \tau\omicron\upsilon\ \lambda\iota\theta\omicron\upsilon\ \kappa\omicron\mu\iota\sigma\theta\eta\iota\upsilon\ \dots\ \tau\omicron\varsigma\ \beta\omicron\mu\eta\theta\iota\sigma\mu\epsilon\tau\alpha\ \epsilon\iota\pi\epsilon\mu\epsilon\tau\iota\ \dots</math> <b>Thematic Unit 4: 'Post-Operative Care'</b>].</p>	<p><b>COM.</b> [3.] After the removal of the stone, however ... support the effect of the drugs, see <b>Thematic Unit 4: 'Post-Operative Care'</b>].</p>
<p>قال: وإذا تشمرت الحصى في التصبيب، فند خلفها بخيطه لئلا تخرج إلى المثانة. ومد الجذ الناحية الكمرية وثد الكمرية ليكون الربط ممكنًا. ثم بط عنها وأخرجها. فإن تشمرت في رأس الإحليل، فليألف ألا تصغطها إلى الخروج بالغض،</p>	<p><b>He says:</b> and when the stone passes into the penis, then tie up the part behind it [sc. the stone] with a thread, so that it [sc. the stone] does not return into the bladder. And stretch the skin in the direction of the glands. And stretch [sc. the skin], so that the incision is possible. Then cut an incision starting from it [sc. the stone] and extract it. And when it gets into the head of the</p>	<p><b>Dixit:</b> si lapis accedit ad virgam, liga post eum cum filo, ne revertatur ad vesicam extendendo pellem ad partem capitis vereti. Et liga firmiter, ut in posse habeatur. Et scinde pro eo et eum extrahe. Quod si pervenit ad caput vereti, noli eum infestare per oppressionem ad egrediendum, quoniam excoriabitur cum eo caro. Et exinde excitabatur [sc. the stone] and extract it. And when it gets into the head of the</p>	<p>(4.) εἰ δὲ μικρὸς ὑπάρχοιεν ὁ λίθος ἐπιπέσει τὸ κενὸν καὶ μὴ δύνατο ἔξωρῆσθαι, τὴν πλάτην ἐκτενῶς ἐξ ἐπιπέσειεν ἐπιτεταμένην. Ἐπιτεταμένην αὐτὴν κατὰ τὸ δόσιον τῆς ἐλάσσου διαστήσαντες. καὶ ἀπὸ τῆς ἐλάσσου τοῦ κενῶν πρὸς τὸ πρὸς τὸ κενὸν τῆν δὲ ἐπιπέσειεν ἐπιτεταμένην κέμετα δὲ ἐλάσσου κατὰ τὸ δόσιον τὸ πρὸς τὸν λίθου κατ' ἐπιπέσειεν αὐτοῦ τοῦ</p>	<p>(4.) If the stone, however, due to its small size, has slipped into the penis and if it can not be excreted by urination, we pull the foreskin firmly forward and tie it tight with a string at the tip of the glans. We also bind the penis at its base, towards the mons pubis, by tying it at its end, in the direction of the bladder. Then we cut the tissue surrounding the stone from below,</p>

<p>urethra, do not force it [sc. the stone] with pressure to come out, because [sc. otherwise] you will pierce the flesh with it. And the result will be a wound and severe pain. Instead, make an incision at the tip of the penis and take the stone out.</p> <p>فيروشك ان ينخرق معه اللحم وينتج منه قروح واوراج شديدة، لكن شق طرف الذكر وأخرجها.</p> <p>M, Y; Th; 5 H/A; 2 H/A; 3 H/A; 4 M, Y; Th; 7 H/A; 1 H/A; 2 Ar, M; 1 Ar, M; 2 Ar, M; 3 Ar, M; 4 Ar, M; 5 Ar, M; 6 Ar, M; 7 Ar, M; 8 Ar, M; 9 Ar, M; 10</p>	<p>seinde extremitatem veretri et eum emitte.</p> <p>7. caput / capud / I. ut, 12. seinde / I. unde / I. ut;</p>	<p>Αἵλου, κἀμωρτες δὲ τὸν κοιλὸν δασκοῦσθαι τὸ λιθίον καὶ λυκορτες ἐκπέλλει τὸ τινὲς λίθον. Ἐπειὶ οὖν ἀπαρτεν ἐπιπέθεται τὸν Αἵλου ἀπὸ τοῦ ἄνω πρὸς τὸν ἄνω μετὰ τὴν τὸν Αἵλου κοιλὸν λυκομένης τῆς πρὸς τὸν ἀνασπάρθων τὸ δόγμα κοιλότην τὴν δόπειν. //</p> <p>(Cf. <i>Celsus</i> <i>Y.B.26.I.C.</i>) Nonnumquam etiam prolapsus in ipsam fistulam [sc. urinae iter] calculus, quia subinde ea extenuatur, non longe ab exitu infatu- rescit. Eum, si fieri potest, oportet evellere vel orbitario specillo vel eo ferramento, quo in sectione calculus protrahitur. Si id fieri non potuit, cutis extrema quam pluri- mum adtrahenda et condita rlande lino vincienda est; deinde a latere recta plaga coles incidendus, et calculus extimendus colem integere pars cutis conestegat, et urina natu- raltiter profluit.)</p>	<p>by cutting on the stone as a cutting support. By bending the penis, we expell the tiny stone. After untying the strings we clean the wound of blood clots. The rear string is tied so that the stone can not slip back- wards, the front string so that after the extraction of the stone, when the foreskin is detached, the returning skin covers the incision. //</p> <p>(no Greek equivalent)</p>
<p>Antyllus says: if the stone comes out, check whether there might be something remaining in the bladder. If this is the case, make it come out. Because if it remains in the bladder, it causes gangrene in the bladder and leads to death.</p> <p>By me [sc. Rhazes]: pay attention to this, if God be willing.</p>	<p>Fig. E (part I)</p> <p>Fig. E (part I)</p>	<p>Fig. E (part I)</p> <p>Dixit Antyllus: egrediente lapide in- out, check whether there might be cundina. Que si fuerit, extrahenda est, quoniam, si manserit in vesica, excitabit in vesica corrossionem et ducet ad mortem.</p> <p>et inspiciendum est in hoc.</p>	<p>Fig. E (part I)</p> <p>Fig. E (part I)</p> <p>(no Greek equivalent)</p>

<p>قال: إذا كانت الحصى ملسا مدورة صغيرة وزلت عن الأضلع، رجت دفعا إلى عنق المثانة، رجت إلى أسفل المثانة أو خفت لصغرها، فينبغي أن تدخل الإصبع في المعدة ولضعها إلى فم المثانة وشقها، فإذا شقت فحينئذ فلضع الحصى إلى عنق المثانة، فإنها تشبب في الشق ولا تترك فيما تدبر به، بعد البطر.</p>	<p><b>He says:</b> when the stone is smooth, round and small and it slips from the fingers, while we are moving it out of the neck of the bladder, and if it returns to the lower part of the bladder or when it is hidden due to its small size, then it is necessary to introduce your finger into the anus, move it [sc. the stone] to the orifice of the bladder and cut it [sc. the orifice = the neck of the bladder]. And after making the incision, move the stone to the neck of the bladder. For it [sc. the stone] is fixed at the place of the incision and, after the incision, does not leave the [sc. path] which is provided for it.</p>	<p><b>(no Greek equivalent)</b></p> <p>[see above, ei δὲ μὴ ὑποτίττοι, τὸν λαχάνον τῆς ἀριστερῆς χεὶρός ... ἢ καὶ τὸν μέσον ... κοπήσῃς εἰς τὴν ἕβραν ... διεπευγόντες ὑποτίττοντες τε τὸν ἄλβον κερὰ μικρῶν μετὰδόντες εἰς τὸν τράχηλον τῆς σφύρας ... ὁδοῦντες αὐτὸν πρὸς τοῦτόν.]</p>	<p><b>(no Greek equivalent)</b></p> <p>[see above; However, if a protrusion is not palpable, we insert, lubricated with oil, the index of the left hand ... or the middle finger ... into the anus. Then we palpate ... the protruding stone and move it gradually into the neck of the bladder. And ... push it out.]</p>
<p>أخرجت [أخرجت] Ar; Th; الرطبان M; الرطبان M; Th; قال 1          لعل [لعل] M; فيروز م; فيروز م; Th; الحصى Ar; الحصى M; Th; طلعت Ar;          2; 4; 13; 14; 15; 16; 17; 18; 19; 20; 21; 22; 23; 24; 25; 26; 27; 28; 29; 30; 31; 32; 33; 34; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 46; 47; 48; 49; 50; 51; 52; 53; 54; 55; 56; 57; 58; 59; 60; 61; 62; 63; 64; 65; 66; 67; 68; 69; 70; 71; 72; 73; 74; 75; 76; 77; 78; 79; 80; 81; 82; 83; 84; 85; 86; 87; 88; 89; 90; 91; 92; 93; 94; 95; 96; 97; 98; 99; 100; 101; 102; 103; 104; 105; 106; 107; 108; 109; 110; 111; 112; 113; 114; 115; 116; 117; 118; 119; 120; 121; 122; 123; 124; 125; 126; 127; 128; 129; 130; 131; 132; 133; 134; 135; 136; 137; 138; 139; 140; 141; 142; 143; 144; 145; 146; 147; 148; 149; 150; 151; 152; 153; 154; 155; 156; 157; 158; 159; 160; 161; 162; 163; 164; 165; 166; 167; 168; 169; 170; 171; 172; 173; 174; 175; 176; 177; 178; 179; 180; 181; 182; 183; 184; 185; 186; 187; 188; 189; 190; 191; 192; 193; 194; 195; 196; 197; 198; 199; 200; 201; 202; 203; 204; 205; 206; 207; 208; 209; 210; 211; 212; 213; 214; 215; 216; 217; 218; 219; 220; 221; 222; 223; 224; 225; 226; 227; 228; 229; 230; 231; 232; 233; 234; 235; 236; 237; 238; 239; 240; 241; 242; 243; 244; 245; 246; 247; 248; 249; 250; 251; 252; 253; 254; 255; 256; 257; 258; 259; 260; 261; 262; 263; 264; 265; 266; 267; 268; 269; 270; 271; 272; 273; 274; 275; 276; 277; 278; 279; 280; 281; 282; 283; 284; 285; 286; 287; 288; 289; 290; 291; 292; 293; 294; 295; 296; 297; 298; 299; 300; 301; 302; 303; 304; 305; 306; 307; 308; 309; 310; 311; 312; 313; 314; 315; 316; 317; 318; 319; 320; 321; 322; 323; 324; 325; 326; 327; 328; 329; 330; 331; 332; 333; 334; 335; 336; 337; 338; 339; 340; 341; 342; 343; 344; 345; 346; 347; 348; 349; 350; 351; 352; 353; 354; 355; 356; 357; 358; 359; 360; 361; 362; 363; 364; 365; 366; 367; 368; 369; 370; 371; 372; 373; 374; 375; 376; 377; 378; 379; 380; 381; 382; 383; 384; 385; 386; 387; 388; 389; 390; 391; 392; 393; 394; 395; 396; 397; 398; 399; 400; 401; 402; 403; 404; 405; 406; 407; 408; 409; 410; 411; 412; 413; 414; 415; 416; 417; 418; 419; 420; 421; 422; 423; 424; 425; 426; 427; 428; 429; 430; 431; 432; 433; 434; 435; 436; 437; 438; 439; 440; 441; 442; 443; 444; 445; 446; 447; 448; 449; 450; 451; 452; 453; 454; 455; 456; 457; 458; 459; 460; 461; 462; 463; 464; 465; 466; 467; 468; 469; 470; 471; 472; 473; 474; 475; 476; 477; 478; 479; 480; 481; 482; 483; 484; 485; 486; 487; 488; 489; 490; 491; 492; 493; 494; 495; 496; 497; 498; 499; 500; 501; 502; 503; 504; 505; 506; 507; 508; 509; 510; 511; 512; 513; 514; 515; 516; 517; 518; 519; 520; 521; 522; 523; 524; 525; 526; 527; 528; 529; 530; 531; 532; 533; 534; 535; 536; 537; 538; 539; 540; 541; 542; 543; 544; 545; 546; 547; 548; 549; 550; 551; 552; 553; 554; 555; 556; 557; 558; 559; 560; 561; 562; 563; 564; 565; 566; 567; 568; 569; 570; 571; 572; 573; 574; 575; 576; 577; 578; 579; 580; 581; 582; 583; 584; 585; 586; 587; 588; 589; 590; 591; 592; 593; 594; 595; 596; 597; 598; 599; 600; 601; 602; 603; 604; 605; 606; 607; 608; 609; 610; 611; 612; 613; 614; 615; 616; 617; 618; 619; 620; 621; 622; 623; 624; 625; 626; 627; 628; 629; 630; 631; 632; 633; 634; 635; 636; 637; 638; 639; 640; 641; 642; 643; 644; 645; 646; 647; 648; 649; 650; 651; 652; 653; 654; 655; 656; 657; 658; 659; 660; 661; 662; 663; 664; 665; 666; 667; 668; 669; 670; 671; 672; 673; 674; 675; 676; 677; 678; 679; 680; 681; 682; 683; 684; 685; 686; 687; 688; 689; 690; 691; 692; 693; 694; 695; 696; 697; 698; 699; 700; 701; 702; 703; 704; 705; 706; 707; 708; 709; 710; 711; 712; 713; 714; 715; 716; 717; 718; 719; 720; 721; 722; 723; 724; 725; 726; 727; 728; 729; 730; 731; 732; 733; 734; 735; 736; 737; 738; 739; 740; 741; 742; 743; 744; 745; 746; 747; 748; 749; 750; 751; 752; 753; 754; 755; 756; 757; 758; 759; 760; 761; 762; 763; 764; 765; 766; 767; 768; 769; 770; 771; 772; 773; 774; 775; 776; 777; 778; 779; 780; 781; 782; 783; 784; 785; 786; 787; 788; 789; 790; 791; 792; 793; 794; 795; 796; 797; 798; 799; 800; 801; 802; 803; 804; 805; 806; 807; 808; 809; 810; 811; 812; 813; 814; 815; 816; 817; 818; 819; 820; 821; 822; 823; 824; 825; 826; 827; 828; 829; 830; 831; 832; 833; 834; 835; 836; 837; 838; 839; 840; 841; 842; 843; 844; 845; 846; 847; 848; 849; 850; 851; 852; 853; 854; 855; 856; 857; 858; 859; 860; 861; 862; 863; 864; 865; 866; 867; 868; 869; 870; 871; 872; 873; 874; 875; 876; 877; 878; 879; 880; 881; 882; 883; 884; 885; 886; 887; 888; 889; 890; 891; 892; 893; 894; 895; 896; 897; 898; 899; 900; 901; 902; 903; 904; 905; 906; 907; 908; 909; 910; 911; 912; 913; 914; 915; 916; 917; 918; 919; 920; 921; 922; 923; 924; 925; 926; 927; 928; 929; 930; 931; 932; 933; 934; 935; 936; 937; 938; 939; 940; 941; 942; 943; 944; 945; 946; 947; 948; 949; 950; 951; 952; 953; 954; 955; 956; 957; 958; 959; 960; 961; 962; 963; 964; 965; 966; 967; 968; 969; 970; 971; 972; 973; 974; 975; 976; 977; 978; 979; 980; 981; 982; 983; 984; 985; 986; 987; 988; 989; 990; 991; 992; 993; 994; 995; 996; 997; 998; 999; 1000.</p>	<p><b>(no Greek equivalent)</b></p> <p>[see above, ei δὲ μὴ ὑποτίττοι, τὸν λαχάνον τῆς ἀριστερῆς χεὶρός ... ἢ καὶ τὸν μέσον ... κοπήσῃς εἰς τὴν ἕβραν ... διεπευγόντες ὑποτίττοντες τε τὸν ἄλβον κερὰ μικρῶν μετὰδόντες εἰς τὸν τράχηλον τῆς σφύρας ... ὁδοῦντες αὐτὸν πρὸς τοῦτόν.]</p>	<p><b>(no Greek equivalent)</b></p> <p>[see above; However, if a protrusion is not palpable, we insert, lubricated with oil, the index of the left hand ... or the middle finger ... into the anus. Then we palpate ... the protruding stone and move it gradually into the neck of the bladder. And ... push it out.]</p>	











Antyllus on the Bladder Stone in al-Rāzī's Kitāb al-Ḥawī

<p>البول، بل يدر البول عنها ولا يجتمع إليها بكثره.</p> <p>7 muba V ruu P Vat; 8 cum P V ann Vat;</p> <p>1 post add. Alex; 2 Th; 3 corr. Witt, Th; 4 post add. Alex; 5 post add. Witt, Th; 6 Y; 7 Th; 8 cum P V ann Vat;</p> <p>1 supra lineam secunda manu add. Alex; 2 Th; 3 corr. Witt, Th; 4 post add. Alex; 5 post add. Witt, Th; 6 Y; 7 Th; 8 cum P V ann Vat;</p>	<p>et retardabitur urina de ea. Et non congregabitur in ea multitudo urine.</p> <p>7 muba V ruu P Vat; 8 cum P V ann Vat;</p> <p>1 supra lineam secunda manu add. Alex; 2 Th; 3 corr. Witt, Th; 4 post add. Alex; 5 post add. Witt, Th; 6 Y; 7 Th; 8 cum P V ann Vat;</p>	<p>التدبير يسرع البروج، إن شاء الله.</p> <p>1 nthe P F rute Vat; 9 velocior P F velociter Vat;</p> <p>1 nthe P F rute Vat; 9 velocior P F velociter Vat;</p>	<p>regimen velocior erit sanatio.</p> <p>1 nthe P F rute Vat; 9 velocior P F velociter Vat;</p>
<p>البول، وإذا أراد العليل أن يبول، فيكبس الخادم على الرقادة، لتلا تصببه البول البنية.</p> <p>(#) إذا كانت الحصاة قد صارت في مجرى البول، ونشبت، فإما ما دامته في الكلى فتكون في الظهر. ولقد العليل في أذن الذي قد طبخ فيه حلبة وخطمي وشبث وبابونج، فإنه يسكن الوجع ويسهل خروج الحصاة. وإن انقل البول وجب أن تلبنه تلبينا بئنا، لتلا يضعف الكلى الأضعاء فيشتد الوجع جدا، وأنبه بالحقن، فإن صاحب هذه العلة لا يستقر في جوفه شيء من المسهلة لكون نقه. وأقدم الأضمة بالشحوم والحلبة والخطمي ونذر كتان وبابونج وشبث ورطبة، فإن شالها تسكن</p>	<p>Dixit: quod si voluerit patiens mingere, oblineat serviens super pallotudis, i-&lt;&gt; pilas, quod non inveniat eis urina omnino. Quod si lapis fuerit, manifestabitur, si obtinetur in meatu urine. Et dum fuerit in renibus, in dorso erit. Unde sedeat patiens in pila, in cuius aqua cocta fuerint anetum, fenugrecum, malvasiscus et camomilla, quoniam mitigabit dolorem et de facili faciet egredi lapidem. Quod si constipetur venter, congruum est, quod leniatur efficitur; ne infestetur renes inestina. Et vehementior fiat dolor valde. Et lenificat cum cum clisteribus, quoniam in ventre laborantis hac passione non requiescit aliquid laxativum et mundificatur cum clisteribus et frequenter fac et emplastra cum adipibus, fenugreco et malvasisco, camomilla, anecho et ratha, i-&lt;&gt; herba muliarum, quoniam mitigat dolorem et dilatat meatus. Et quandoque accidit cum lapide apostema et</p>	<p>قال أنطليس في باب الحصاة: مرخ المثانة بدهن السداب ولحوه، فإن المثانة، متى سكنت، قل البول وقل القيام البنية؛ لهذا علاج يعرض للمشايخ. قالا: وحمله في مقعدته منه ومن سائر ما يسكن، فإن البول يقل.</p> <p>الحصاة: Haid; أنطليس: Alex; codd. (فطيرسا المسمى Haid; 2 فرج إرجع Th; 3 لاصنام statat Witt (ar. قول الله 4: bona erit in sensibus P F in sensibus bona erit Vat; 6 eo in marg. Vat; 7 Th; 8 cum P V ann Vat; 9 velocior P F velociter Vat; 10 post add. Alex; 11 post add. Witt, Th; 12 post add. Witt, Th; 13 post add. Witt, Th; 14 post add. Witt, Th; 15 post add. Witt, Th; 16 post add. Witt, Th; 17 post add. Witt, Th; 18 post add. Witt, Th; 19 post add. Witt, Th; 20 post add. Witt, Th; 21 Y = 775 Th = deest Ar.</p>	<p>Dixit Antyllus in capitulo lapidis: unge vesicam cum oleo ruthe et similibus, quoniam, quando vesica calefit, diminuetur urina. (س) Dixit, quod hec cura bona erit in sensibus. Dixit: impone ano eius de eo ac de toto eo, quod calefacit, quoniam urina diminuetur.</p> <p>2 nthe P F rute Vat; 3 calefact V onbifi P post urina lacuam statat Witt (ar. قول الله 4: bona erit in sensibus P F in sensibus bona erit Vat; 6 eo in marg. Vat; 7 Th; 8 cum P V ann Vat; 9 velocior P F velociter Vat; 10 post add. Alex; 11 post add. Witt, Th; 12 post add. Witt, Th; 13 post add. Witt, Th; 14 post add. Witt, Th; 15 post add. Witt, Th; 16 post add. Witt, Th; 17 post add. Witt, Th; 18 post add. Witt, Th; 19 post add. Witt, Th; 20 post add. Witt, Th; 21 Y = 775 Th = deest Ar.</p>





<p>And if blood clots in the bladder and causes difficulty in urinating, this is recognisable when with the urine blood gradually leaks out. And insert your finger into the incision and take the coagulated blood out. Then pour salt and vinegar in it [sc. the incision] until it is washed clean. And be careful not to leave any blood in it. Because it [sc. the blood] causes decay of the bladder and damage [sc. of the bladder]. And if you wash it with vinegar, water and salt prevent its decay. And afterwards treat it with a powder of incense and similar substances.</p> <p><b>He says:</b> if the patient complains of severe pain, treat him with water and oil in the spring and the autumn, and with wine and oil in the winter; and with rose oil and water in the summer. And have him sit in water and oil the second and third day. <b>He says:</b> and if it is necessary to add another day because of the pain, then do so. Then start with the dressing. In a patient where no pain, loss of blood or anything bad occurs, remove it [sc. the dressing] on the third day and apply to it incense and similar substances.</p> <p>And if a swelling occurs after the incision, always dress it [sc. the swelling] with bread or something else, because if [sc. the swelling] is constantly spoiled by the urine. And if the swelling is large and you realise this, because you see a swollen redness above the dressing, have him [sc. the patient], together with the dressing on him, sit in lukewarm water in which fenugreek, seeds of celery, linen and hibiscus have been decocted. And pour rose oil and clarified butter on the bladder.</p>	<p>And if after the loss of blood urination is difficult, you should realise that a blood clot has formed. Insert your hand into the incision and take it [sc. the coagulated blood] out and heat it [sc. the wound] with vinegar, water and salt until the site is clean.</p> <p>And have someone who complains of severe pain sit in lukewarm water and oil on the second and third day. And for the one who has no pain, remove [sc. his bandage] on the third day.</p> <p>And if a swelling occurs, then proceed to having him sit in a decoction of fenugreek and flax seed. And if he feels a burning sensation, pour honey water into the bladder, rinse it with it and put a bandage on it, on which there is cumin, and administer enemias of rue oil into the anus. <b>He says:</b> and in patients without much blood issuing from the incision, you must suspect decay.</p>	<p><b>pubem.</b> ... super ulcus imponendum est duplex aut triplex [lineolum aceto madens. ... multo is oleo perunguendus; inducendusque absus lanae mollis tepido oleo repletus ... Proximo die, si spiritus difficilis redditur, si urina non excedit, si locus circa pubem mature intumuit, scire licet in vesica sanguinem concretum remansisse: igitur, demissis eodem modo digitis leviter pertractanda vesica est, et discutenda, si qua coheruit; quo fit, ut per vulnus postea procedant. Non alterum est etiam orculario clystere acetum nitro mixtum per plagam in vesicam compellere: nam sic quoque discutuntur, si qua cruenta coheruit)</p> <p>(<b>Cf. Celsus VII,26,5f:</b> Quibus temporibus tamen, si felix curatio non fuit, varia pericula oriuntur. Quae praesagere protinus licet: si continua uigilia est, si spiritus difficultas; si lingua arida est, si sitis vehementis; si uenter imus tumet; si uulnus hiat, &lt;si&gt; transfluens urina id non rodit, *** similiter &lt;ante&gt; tertium diem quaedam liuida excedunt; si is aut nihil aut tarde respondet; si uementes dolores; si post diem quintum magis febres arguent et fastidium cibi permanet, &lt;si&gt; cuba-tes- in uentre uicundus est. Nihil tamen peius est distentione neruorum et ante diem nonum uomitu bilis.)</p>
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<p><b>He says:</b> and if you want to make flesh grow, tie the respective thighs and lower legs together, so that they are heated excessively and the growth of flesh is increased.</p> <p>And if gangrene occurs, or if it is in process, the symptom is an extremely red and hard swelling. And incise the swelling at the site [sc. of the wound] and in the depth of the incision let blood flow. Then put water, salt and vinegar on it. And put a linen compress moistened with water on it. <b>He says:</b> and have suspect gangrene in someone where not much blood comes out of the wound. <b>He says:</b> and there are signs of a good healing and of poor one; and its goodness and poorness is [dependent] on the stability of the mind of the patient and the goodness of his colour and the return of appetite.</p>	<p>If you see that [sc. the incision] is black and red, immediately incise it and dress it with vinegar and salt on a linen compress to prevent the decay.</p>	<p>τοῦτον δὲ τὸν πρὶς θροναίους κοίπων τοὺς ἰμφοὺς διακνήθουσι πρὸς τὸ τοῖς βορθηλασιν ἐμπιπέειν. (4) ...</p>	<p>During the entire treatment period the thighs have to be tied together in order to support the effect of the drugs. (4) ...</p>
<p>And the signs of the poor state: [they can be recognised by] a coldness of the extremities, a pain below the navel, a tremor, a very acute fever, a dryness of the tongue, its roughness, a movement of the head and a successive vomiting of bile. And when he [sc. the patient] is close to death, a hiccup occurs and an intensive pain at the site [sc. of the incision] and he twitches in the abdominal muscles on the fifth day.</p>	<p>And someone who feels pain below the navel and coldness of the extremities, a decreased appetite, chills and acute fever, is in poor condition. And when death approaches, the following [sc. symptoms] occur: a groaning and a pain in the place that was incised and a terrible movement in the abdomen. And those whose condition is good have a stable mental condition, their colour is good and they have good appetite. And take care that their food is of such a type that it does not completely bind [Lat.: consipitate] the abdomen.</p>		
<p><b>He says:</b> and it is necessary not to neglect that the belly stays soft. For when the bladder has no pressure and does not hurt, the urine decreases. He says: and avoid everything that stimulates the flow of urine; because if the urine decreases, healing is accelerated. And rub the bladder with oil, in which rue has been decocted; and heat it [sc. the bladder] with the blanket. For if the bladder is heated, it does not stimulate the flow of urine,</p>	<p>But soften and warm the bladder with the oil rue and of that kind; for if [sc. the bladder] is heated, the urine decreases. And do not attempt the [sc. remedy] that makes the urine flow [i.e. use no diuretic], but strive to use [sc. the remedy] that reduces it [sc. the urine]. And when it is time to urinate, advise the servant to apply pressure on the dressing so that the urine does not pour onto the site of the incision so that in no case does</p>		

<p>but lets the urine flow out and not much of it [sc. the urine] accumulates in it [sc. the bladder].</p> <p><b>He says:</b> and if the patient wants to urinate, the servant should apply pressure on the dressing so that the urine does not pour onto it [sc. the dressing] in any case. If the stone is present, it gets into the groove of the urine (urethra) and adheres [there] firmly. And as for the one which is constantly in the kidneys, it is in the back. And have the patient sit in a tub of metal, in which there is a decoction of fenugreek, hibiscus, dill and camomile. For it relieves the pain and facilitates the emission of the stone. And if the belly is constipated, it is necessary to soften it decidedly so that the kidneys do not compress the intestines and the pain is not increased much; and it should be softened with enemas. For in a patient suffering from this disease none of the laxative remains in his belly, but he will recover. And (apply) dressing(s) with sebum, fenugreek, hibiscus, flax seed, camomile, dill, coriander and alfalfa. For these are substances that relieve the pain and expand the channels (trópoi). And sometimes, along with the stone, a swelling occurs; and the pain is great and becomes more intense. And sometimes flatulence accompanies them. And see if what occurs is a swelling. And if it is possible, [make] a bloodletting without delay. And apply to it [sc. the swelling] warm compresses and long bandages to soften the swelling and make it decrease, unless the body is extremely full (unless there is a plethora of blood/humours?). For then you must not exaggerate. And in this case use one of the strengthening [sc. drugs].</p>	<p>anything issue from it. For by this measure recovery is accelerated, if God be willing.</p> <p><b>Fig. F</b> <b>Aetullus says</b> in the chapter on the stone: rub the bladder with the oil of rue and oils of this kind. Since when the bladder is heated, the urine decreases. And its production is completely reduced.</p> <p><b>By me [sc. Rhazes]:</b> this healing is performed in old people. <b>He says:</b> and put something of that into his anus and of everything [sc. every remedy] that is warming, because the urine decreases.</p>	
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*Commentary*

*Thematic unit 1*

The first thematic unit of the Antyllus fragments explains the causes (aetiology) and the symptomatology of urolithiasis. It is likely that this section also served as an introduction to Antyllus' original chapter on the bladder stone. This unit consists of the fragments A (part 1), D (part 1) and the short frg. B, that only focusses on a single aspect of this subject area. Although we cannot recur to the original Greek text for comparative purposes, frg. A is likely to be an excerpt of the type Weisser 1–2, i.e. a relatively literal rendition, judging by the degree of comprehensiveness. In contrast, frg. D (part 1), summarises to a higher degree (Weisser type 3), as does frg. B (type 3–4). Frg. A (part 1) is interrupted three times by the quotation formula 'he says', frg. D (part 1) once and frg. B not at all. As mentioned above, these quotation formulae usually indicate thematic jumps or textual omissions by Rhazes.

*a. Raw Material for Stone Formation*

The Arabic Antyllus fragments identify 'cloudy urine' as the cause of stone formation. Its cloudyness is said to result from drinking cloudy water and from poor digestion. A statement comparable to the first explanation can be found in the ninth chapter of the Hippocratic *De aere, aquis et locis*. Here, the drinking of water which is very rich in sediments, is a predisposing factor for stone formation<sup>31</sup>. Galen wrote a commentary on this Hippocratic treatise, which only survives in an Arabic translation. In his commentary, Galen interprets the Hippocratic explanation, which primarily focusses on the sediment, in terms of his quality lore. He claims that the settling of sediment in water was only a consequence of the interaction of the different elementary qualities prevailing in it<sup>32</sup>. In ancient authors other than Hippocrates and Antyllus, there is no ex-

planation of lithogenesis due to cloudy water. While neither Celsus nor Rufus explain the aetiology of lithogenesis, Galen indicates that ‘undigested humours’ constitute the raw material for stone formation (see below). Similar explanations are given by Paul of Aegina (3.45) and Alexander of Tralles (6<sup>th</sup> century AD, *Ther.* 1.11). Both authors mention, sometimes in very similar wording, that a ‘thick, glutinous humour’ or ‘thickly digested material’ (Alexander) were the initial materials of stone formation:

*b. Process of Stone Formation*

In Frg. A, Antyllus describes the process of stone formation as follows: first, there is a gradual clotting of concretions from the sediment of the cloudy urine. As a second step, body heat hardens this agglomerated matter and thus generates the stone proper. Stone formation is described in an analogous way in the Hippocratic *De aere, aquis et locis*<sup>33</sup>. In contrast, none of the other authors mention a sedimentation of the urine and a formation of the stone from small concretions. They do, however, describe how the stone is generated by body heat (from the ‘glutinous humours’). Alexander relates the illustrative analogy of a potter whose burnt clay is no longer soluble in water.

*c. Higher Incidence in Children and Men*

The first mentioning of bladder stones occurring more frequently in children<sup>34</sup> appears in the Hippocratic *Epidemics*, book 6. As a cause of this higher prevalence in children, the author considers that they have greater body heat: ‘agglomeration after urination is found more frequently in small children: is this the case because they are warmer<sup>35</sup>?’ We have detailed commentary on this aphorism by Galen<sup>36</sup>. He interprets the remark ‘after urination’ in the sense that the aphorism refers to bladder stones, not kidney stones<sup>37</sup>. Galen compares the unusually cautious statement about the aetiology (‘is this the case

...?') with a passage from the Hippocratic *Aphorisms*, where the author states without a doubt that children have the most innate heat<sup>38</sup>. Having considered three variant explanations for the careful phrasing mentioned,<sup>39</sup> Galen reaches the conclusion that the author wanted to imply that bladder stones are not uniquely the result of body heat, but also of the raw material involved. For Galen, this material consists of 'raw [undigested] humours' that, according to him, result from a child's self-indulgent eating habits (ἀδηφαγία), which cause incomplete digestion. Children's tendency to continue physical activity immediately after eating is likewise responsible for incomplete digestion in Galen's opinion<sup>40</sup>. In addition to these two explanations, he gives another one: in breast-fed infants the mother's milk is thought to promote stone-formation due to its 'thickness'. This last argument is comparable to the Hippocratic *De aere*: here the formation of bladder stones in children is regarded as a special case and is attributed to the fact that the mother's milk ingested may have been too hot and bilious<sup>41</sup>, whereas generally turbid water is thought to be the prime matter of stone formation (see above). In his commentary on *De aere*, Galen explains the increased incidence in children with the fact that their bladder neck is narrower than of adults. He apparently also regards this narrowness as a cause of the alleged accumulation of heat in a child's bladder<sup>42</sup>. In contrast, in his commentary on the Hippocratic *Epidemics* 6, he does not use this argument, but claims the contrary to be true<sup>43</sup>. In addition to the increased stone formation in children that is due to excessive food ingestion, Pseudo-Alexander of Aphrodisias also notes an increased prevalence in older people. The latter is thought to result from a coolness of the body and reduced digestive activity in senility<sup>44</sup>. Paul (3.45.2) mentions (without giving a reason) that children are more likely to suffer from bladder stones than adults. Alexander of Tralles (*Ther.* 11.4) states more precisely that the greater incidence in children has to be attributed to a 'thicker substance' (ὑλὴ παχύτερα) and their greater innate

heat (ἔμφυτος θερμότης). ‘Thicker substance’ obviously refers to the ‘glutinous humours and [the] thickly digested material’ that is referred to (γλίσχρων χυμῶν καὶ παχέων ὀππωμένων), both of which had been mentioned before in Alexander’s text, in the context of nephrolithiasis. His explanation thus proves to be identical to the one given by Galen. The Hippocratic author of *De aere* explains the greater frequency of bladder stones in males (which is not mentioned in Paul and Alexander) given the fact that the male urethra is longer and more curved than the female one. Furthermore men are said to drink less than women<sup>45</sup>. In his commentary on *De aere*, Galen only mentions the length and narrowness of the male urethra, without commenting on any gender-specific drinking behaviour.

Antyllus’ remark that the mixture (κρᾶσις) is the cause for the development of bladder stones in children probably also refers to their (postulated) higher constitutional heat. The above survey of opinions of several authors seems to indicate that apparently all ancient authors adhered to this theory, at least as far as is indicated in their transmitted texts. The second reason for a higher incidence of urolithiasis in children given by Antyllus is not as clear as the first one, because there are variants in the textual transmission of the decisive noun that gives the reason for his theory. In one textual tradition (H/A) the noun reads ‘[because of] their drinking’ (شربهم). This could – as in *De aere* – refer to drinking habits, perhaps in the sense that children generally were thought to drink too little. Such a statement is, however, not transmitted elsewhere. As noted above, the drinking habits mentioned in *De aere* is gender specific, not age specific. Therefore, the ‘drinking’ reading (شربهم) should be excluded. In the manuscript Ar the reading transmitted in the main text is شرنهم, which does not make sense in this context; neither does شربهم, transmitted in M. However, in Ar, below the line, a second hand added شرههم (‘[because of] their gluttony’). This reading is also transmitted in Th. It is perfectly consistent with the reason given twice by

Galen, the childrens' ἀδηφαγία ('gluttony'). Therefore this reading, the only one that makes sense and harmonises with the Greek tradition, is the preferred one. In Faragut's Latin translation, the passage reads *ex malitia regiminis ipsorum*. This could either be an interpretative translation of 'gluttony', or this translation goes back to an Arabic reading شر تدبيرهم ('[because] of the inferiority of their diet / lifestyle') that is not attested in Arabic sources available to date. In Greek sources, at least in Aëtius 9.9, the ingestion of bad foodstuff is also mentioned as a factor of stone formation (τροφαίς ταίς τυχούσαις καὶ βλαβεραίς κεχρημένα).

In the following, Antyllus relates a theory unknown to us from other sources. Some medical authors, Antyllus states, held the belief that the stone was firmly attached to the bladder wall, a theory he rejects. The first subsection of frg. D (part 1) clearly belongs within the same context. In this fragment, symptomatical considerations are deduced from the fact that the stone does not adhere to the bladder: when the patient moves the pain is said to increase, whereas at rest it decreases. There are again no other sources known which mention this symptomatology. The following section of frg. D (part 1) provides a very condensed summary of what is described in frg. A (part 1 cont.). In this sequel of frg. A the symptoms of the bladder stone are described in more detail than by any other ancient author. As the main symptoms, Antyllus mentions a persistent urge to urinate after urination as well as the fact that stone sufferers scratch their penis<sup>46</sup>. These two symptoms are also referred to by Paul (3.45 and 6.60) and Alexander in less detail, using similar wording and vocabulary. However, the Hippocratic *De aere* already pointed out that children with urolithiasis would rub and pull their penis. The reason given by the Hippocratic author for this behaviour is as follows: he postulates that children held the naïve assumption that the cause of urination was situated in the penis itself. Thus they thought that by manipulating the penis urination can be normalised<sup>47</sup>.

In the context of his commentary on *De aere*, Galen does not refer to these symptoms. However, he describes them in *De locis affectis* using vocabulary very similar to the one used by Paul and Alexander. Therefore both authors are very likely to have drawn on Galen.

In contrast to the Hippocratic author of *De aere*, Antyllus explains the scratching as being a ‘sensual participation’ that the penis is thought to have with the bladder. Apparently what is being referred to here is the so-called ‘sympathy’ (συμπάθεια), which was often used in ancient medicine to explain influences, symptoms or pain in parts of the body that are not primarily affected by a disease. The concept of ‘sympathy’ is particularly linked with Stoic philosophy. It was not limited to medicine in antiquity, but was generally used to explain long-distance effects (eg. magnetism, electric phenomena or the connection between the lunar cycle and the tides) that could not be made clear in a simple mechanical way<sup>48</sup>. In order to illustrate the sympathy between bladder and penis one further example of body sympathy is given in the subsequent Antyllus text. This example is, however, almost incomprehensible at first sight, due to textual corruption. Literally, in Arabic the passage reads: ‘similarly the groin is [sympathetically] affected when injured by the finger’ (كما تجمع الأربية إذا نكيت بالإصبع); in Latin: ‘similarly the groin hurts when the finger is affected’ (*sicut dolebit inguis, si affligitur digitus*; for this translation the Arabic version must have been إذا نكى الإصبع). In terms of the context and in the sense of a remote sympathetic influence, the Latin text seems more plausible than the Arabic, as the latter describes a direct causal relationship, in which the relationship between groin and finger seems rather odd. The Venetian print edition of the Latin text has *unguis* (‘finger nail’) instead of *inguis* (‘groin’): ‘As the finger nail hurts when the finger is affected’. Compared with the previously described short-distance sympathy (bladder-penis) this meaning would appear more plausible. However, in the Paris manuscript that often contains better

readings, *inguis* is mentioned, as in the Arabic text (الأربية). Therefore it is unlikely to assume that there was an Arabic manuscript tradition containing the variant reading 'finger nail'. Instead, the change to *unguis*, an easy and obvious emendation in the Latin text, must have been made by a copyist of the Latin text or the publisher of the Latin print edition. Thus, an emendation of the Arabic text following the Latin version (الظفر الأربية) into (الظفر), in order to amend the textual corruption, does not appear sufficiently justified. However, there is a possible explanation for this textual corruption from the Greek. In Antyllus' text there might not have been the reading δάκτυλος (finger), but the very similar δακτύλιον (anus), which is likely to have been wrongly translated into Arabic<sup>49</sup>. 'As the groin hurts when the anus is affected' is indeed the most plausible version of the content. In the following section of the Antyllus fragment, the symptoms of various kinds of stones (in terms of size and surface characteristics) are described. Furthermore, the possibility of anal prolapse or a feeling of heaviness in the urethra and bladder in some stone sufferers is addressed. In preserved ancient texts on urolithiasis, there is no mention of these symptoms. The same applies to the contents of frg. B, where considerations are made as to what signs and symptoms indicate that a stone can be resolved using drugs.

### *Thematic unit 2*

The second thematic unit deals with certain conservative exercises, manoeuvres and positions recommended for stone sufferers to facilitate their urination and make it painless. With these exercises the stone is said to be removed from the neck of the bladder. Again, there is no parallel to this section in the transmitted medical literature of antiquity. Both the third section of frg. A and the whole frg. C are dedicated to this subject area. There is a partial overlap between both fragments; furthermore, a missing part of frg. C can be textually supplemented by frg. A (part 3). Therefore, both fragments were

printed in synoptical form. Contrary to frg. A (part 3), frg. C is interrupted once by the insertion 'he says'. Both fragments can probably be classified as excerpts of the type Weisser 1–2.

Overall, the following exercises to facilitate urination are mentioned in the fragments:

1. Putting a foot on the floor and pushing one's belly towards the spine
2. Putting one leg against the wall and massaging the lower abdomen in upward direction
3. Kneeling and holding one's breath
4. Kneeling and bringing one's chest close to the knees
5. Pushing the thighs to the thorax with one's hands under the thighs
6. Self performed digito-anal removal of the stone from the bladder neck

Method no. 5 is later mentioned once more by Antyllus and also by Paul (therefore, the relevant passage by Paul is printed in the synopsis for comparison purposes). However, this method is not referred to as a facilitating exercise, but as the positioning necessary for lithotomy (a variant of this position is still known as the 'lithotomy position' in modern surgery).

### *Thematic unit 3*

In the third thematic unit the actual lithotomy is described. Remarkably, in this section, there are clear parallels between the text of the Arabic Antyllus fragments and Paul's lithotomy chapter (6.60, sections 2–3). These parallels are significant enough to suggest that Paul's text is an excerpt from Antyllus', or at least based on Antyllus to a high degree. In the present edition, Paul's text is therefore included in the synopses along with an English translation, in

that it is likely closer to Antyllus' Greek urtext than the Arabic fragments. The parallels to the Arabic Antyllus fragments are underlined in the Greek text and its translation. It is commonly known that Paul drew on Antyllus in the surgical section (book 6) of his *Pragmateia*, since there are chapters with the indication 'from Antyllus' in the Greek text. In addition, there was a high probability that, in other sections as well, he excerpted from Antyllus without explicitly referencing his source. These 'hidden' excerpts have not been identifiable to date. However, since a greater number of Antyllus fragments from Rāzī's Ḥāwī exhibit parallels and sometimes even literal correspondences to the respective chapters of the surgery of Paul, the Arabic fragments ultimately reveal the source Paul used<sup>50</sup>. In the present case, the same thing happens in the lithotomy chapter, i.e. that Paul draws on Antyllus without naming the author. Based on the assumption that Paul's text is closer to the excerpted source, a comparison of the transmitted Greek text with the Arabic fragments indicates, however, that the excerpts of frg. D (part 3) and E are, for the most part, not literal, but rather summarised (Weisser type 2). However, in Paul's Greek text there are passages that do not have a counterpart in the Arabic fragments. Likewise, in the Arabic fragments numerous passages can be found that either do not correspond to the transmitted Greek or that are much more comprehensive than the Greek. These findings suggest that Paul did not excerpt continuously from Antyllus, but that he chose select passages, partly condensing or summarising them. Regarding the passages for which we lack an Arabic correspondence, it cannot be ruled out that Paul drew some of them from authors other than Antyllus. He may also have made editorial changes to some extent. At the beginning of the surgical section of Antyllus' lithotomy chapter, there is a passage, not transmitted in Greek, that deals with the preparation prior to surgery. This passage recommends purging the patient before surgery, so that the surgeon can palpate the stone as accurately as possible. A similar

passage is only transmitted in Celsus, where it is stated that the day before surgery the patient must fast in order to facilitate stone palpation. For comparative purposes, this Celsus passage is included in the synopsis, although purging is not explicitly mentioned here. While there is no textual parallel with the first section of Paul's lithotomy chapter the Arabic fragments, the remaining sections 2–4 are rendered in a more or less detailed way. In section two, however, a textual transposition has occurred in frg. D, so that, in its transmitted form, the Arabic text does not describe the operation in chronological order. Therefore, for the present edition, the Arabic text has been rearranged according to the corresponding Greek in Paul. The transposed section in the Arabic (and its Latin translation) is marked with asterisks (\*), while the original position that this section has in Rāzī's Ḥāwī is marked with (→ \* / \*). Additionally, frg. E (part 1, sect. 2) is a shortened or rather variant version of the transposed section of frg. D. In the second thematic subsection of Antyllus' lithotomy description, the Arabic also transmits a longer passage that lacks a Greek counterpart in Paul. This passage includes considerations about where the incision has to be made and in what size. Notably, an ancient medical dogma that has been known since Hippocratic times is repeated here: the opinion only the neck of the bladder heals, but not the bladder proper.<sup>51</sup> Therefore, according to Antyllus, the incision has to be made in the neck of the bladder, not in its corpus. In Paul's Greek chapter, the description of lithotomy is directly followed by section 3 (section numbering according to Heiberg's edition in the *Corpus Medicorum Graecorum* series) on post-operative care. After section 3 a further supplementary surgical section added (section 4) describing the operation of a small stone that has slipped into the penis. It advises extracting such a stone through an incision made in the urethra. Since the instructions on post-operative care are much more comprehensive in the Arabic Antyllus fragments than in Paul's Greek text, it hardly seems plausible that the surgical instruc-

tions from Paul's section 4 should come after this section. It is therefore suggested that Paul is responsible for the unusual textual order, i.e. that the surgery of a stone in the urethra is supplemented after the instructions on post-operative care. Furthermore, it is remarkable that the surgical procedure in Paul's section 4 is also part of Celsus' lithotomy chapter, and uses quite similar wording. This fact suggests that both Antyllus and Celsus drew on the same source tradition in this case.<sup>52</sup> Again, for comparative purposes, the relevant Celsus passage is included in the synopsis. The first part of frg. E should probably be placed at the end of Antyllus' surgical section, in that frg. E (part 1) explains that after extraction the physician must check whether the stone has been completely removed. In Paul's Greek text this section is missing. With the formula 'he says' a new section of frg. E is introduced, which, however refers to an earlier part of the surgical procedure. This section is a variant of frg. D, using different wording (see above) and with less details.

#### *Thematic unit 4*

Extensive instructions on post-operative care are preserved in Antyllus fragments E (part 2) and D (part 3). Essentially, both fragments transmit the same text, yet, frg. D (part 3) (probably type 2 Weisser) is clearly more condensed than frg. E (part 2) (appr. type 1–2 Weisser). Unlike all the other parts of frg. E (part 2), its final section lacks an equivalent passage in frg. D (part 3). Frg. E (part 2) is interrupted six times by the formula 'he says', whereas frg. D (part 3) is only interrupted once. Both fragments are mainly pharmaceutical in content, giving extensive advice on care after lithotomy in both simple and complicated cases. Thus, for example, special sitting bathes are recommended for patients with post-operative bleeding, wound healing disorders, etc. Due to the pharmaceutical character of this thematic unit it might seem doubtful that these passages are still excerpts from Antyllus. It can be observed in the

Hāwī that quotation formulae got lost in the process of textual transmission. This type of textual omission consequently leads to the merger of two excerpts by different authors. Thus, the first excerpt is given an ‘appendix’ which is in fact a mutilated excerpt from another source, but which appears to be part of the former one due to its lost quotation formula. This could also be the case for the two Antyllus fragments that have been discussed here. Yet, there is a further fragment (F), clearly introduced by ‘Antyllus says’, which duplicates parts of the last section of frg. D (part 3) (and the last section of frg. E [part 2], except for one; in the synopsis the coherence between frg. F and the other two fragments is marked with a double arrow). Thus, frg. F confirms Antyllus’ authorship of this and the preceding ones.

Comparably, the last section of Celsus’ lithotomy chapter also consists of detailed advice on pharmaceutical aftercare. And, indeed, Antyllus’ advice on aftercare in the Arabic fragments is more closely related to Celsus than to Paul, considering the level of detail and content: unlike Paul, both authors mention sitting bathes for post-operative care, eg. a sitting bath in vinegar for haemostatical purposes and then, as a further step of ‘haemostasis’, the application of cupping. Furthermore, both authors describe how blood clots are to be removed from the bladder after surgery in a similar way. Moreover, there is a similar section on prognosis in Celsus and Antyllus (starting with the symptoms of good and bad healing and closing with the symptoms of a fatal outcome). Because of these significant parallels, the relevant Celsus passages are once again included in the synopses given above, in order to facilitate comparison; parallel passages appear underlined both in Antyllus and Celsus. A comparison with Paul shows that, contrary to Celsus and Antyllus, he describes aftercare very briefly. Again, correspondences between Paul and Antyllus are shown in the synopsis by underlining them in Paul’s text.

In general, it can be observed that in contrast to the parallels between Celsus and the Arabic Antyllus fragments, the similarities between Celsus and Paul are rather scattered and discontinuous. Also, the similarities between Celsus and the Antyllus fragments are more significant and characteristic than those between Celsus and Paul. This fact seems to indicate a common source tradition for Celsus and Antyllus, and less so for Celsus and Paul.

### *Summary*

It can be concluded that the Arabic tradition preserves a large part of Antyllus' lithotomy chapter originating from his lost surgical manual (*Kheirourgoúmena*). The reconstructed chapter gives us new insights into the diagnosis and treatment of urolithiasis in antiquity, aspects that were hitherto unknown from the direct ancient tradition. This new information can mainly be found in the sections on aetiology, symptomatology and aftercare, whereas the description of the operation itself is fairly close to the one given by Paul of Aegina. It can therefore be assumed that, in this section Paul (or his intermediary source) excerpted from Antyllus more or less literally (without mentioning him as his source), whereas in the other parts of the chapter Paul (or his intermediary source) cut and a large part of the information found in Antyllus. While in some of his surgical chapters Paul clearly quotes Antyllus as his source, most chapters lack author identification. In the anonymous chapters, such as the lithotomy chapter, the identification of Paul's source is only possible by textual comparison to the Arabic Antyllus fragments. Compared to Paul's Greek text, the Arabic Antyllus fragments have a textual surplus especially in the aforementioned sections on aetiology, symptomatology and aftercare, but also in certain parts of the description of the operation. This makes it clear that Rhazes did not excerpt from an Arabic Paul translation, which preserved the lemma indication of the author

that Paul excerpted from (Antyllus). Rhazes must have instead had access to an Arabic translation of Antyllus' *Kheirourgoúmena*, of which we have otherwise no knowledge.

With regard to the philological aspects, the problems of an edition of fragments from Rhazes' Ḥāwī have been pointed out. It was explained that for fragments from the Ḥāwī a consistent double edition of the Arabic and Latin texts is essential and should be established as a new standard for editions of fragments from this work. Furthermore, for such editions, it is essential to collate all Arabic manuscripts available, since the Arabic text in the Haiderabad edition is generally not a trustworthy one.

#### BIBLIOGRAPHY AND NOTES

1. A fairly recent monograph provides a comprehensive survey of the history of urolithiasis from prehistoric times to the present (Moran ME, Urolithiasis. New York / Heidelberg: 2014. For urolithiasis in antiquity cf. pp. 27–29, 18–185 and 41–414). However, this monograph consists mostly of an uncritical overview of the secondary literature and contains numerous errors. For the history of lithotomy, cf. also Sprengel K, Geschichte der wichtigsten chirurgischen Operationen. Halle; 1805. pp. 269–338 (on 277 he even refers to Antyllus' lithotomy chapter transmitted in Rhazes. This is remarkable since Antyllus' chapter is otherwise unknown to medical historians apart from Adams op. cit. note 4, vol. 2, 361–362] who gives a brief account of it). For the surgical instruments used cf. Künzl E, 'Eine Spezialität Römischer Chirurgen: Die Lithotomie'. Archäologisches Korrespondenzblatt 1983; 13: 487–493.
2. In two other publications, I attempt to demonstrate, in the context of the surgical interventions attested in the Hippocratic texts, that the ban of lithotomy is probably due to the (aristocratic) ethos of the Coan medical school. Social status, aristocratic dignity and striving for glory (δόξα) obviously forbade the Hippocratics from performing risky elective operations. Cf. Witt M, 'The "Egoistic" Physician – Considerations about the 'Dark' Sides of Hippocratic Ethics and Their Possible Aristocratic Background'. In: Jouanna J (ed.), Actes du colloque 'Hippocrate et les hippocratismes: médecine, religion, société'.

- XIVe Colloque International Hippocratique. Paris: 2015. pp. 103–124 and *idem*, Pormann P (ed.), ‘Surgery’. In: The Cambridge Companion to Hippocrates. Cambridge / New York: 2018. pp. 217–245.
3. Cf. Lichtenthaeler Ch, Der Eid des Hippokrates. Ursprung und Bedeutung. Köln: 1984. p. 171. Celsus (VII.26. 3C) explains some aspects of how the surgeon Megees (probably early 1st century AD) performed lithotomy. The surgeon Ammonius (similar period) was given, according to Celsus (loc. cit.), the honorific name λιθοτόμος (‘stone-splitter’), because he invented a method of intraoperative stone-splitting using a kind of chisel (Cf. also Michler M, Die Alexandrinischen Chirurgen. Wiesbaden: 1968. pp. 72, 115–116 and 117–118). Galen (*Thras.* 24) teaches us that, in Imperial times, surgeons who specialised in lithotomy called themselves λιθοτόμοι. This is, however, not to be taken as an indication that there were such surgical specialists in pre-Christian centuries or even that there were non-physicians performing lithotomy as a craft, as was the case in early modern times! A passage in Livy (*epit.* 55) also provides evidence against this theory in that, in the context of lithotomy, physicians (*medici*) are mentioned.
  4. Paul does not describe the symptomatology of various kinds of bladder stones in this chapter, but in ch. 3.45. There is another comprehensive outline of this topic in the *Therapeutics* 11.1 by Alexander of Tralles (6th century AD). Alexander is not, however, concerned with surgical therapy, but with symptomatology and the pharmaceutical dissolution of bladder stones. Lithotomy in animals is outlined by Vegetius (*mulomed.* 1.46.1–2). There are hardly any parallels between Vegetius and Celsus or Paul. In the Indian book Sushruta (4th century BC) there is also a description of lithotomy, which has some parallels with the descriptions by Celsus and Paul. Whether these parallels are due to the same matter described, or whether there is a real textual dependency is hard to say with regard to the very succinct chapter in the Sushruta. Such an examination is, moreover, beyond the scope of this paper.
  5. Cf. Wellmann M, Die pneumatische Schule bis auf Archigenes. Berlin: 1895. pp. 123–124.
  6. Cf. Wellmann M, op. cit. note 5, p. 17. It is known that Thessalus of Tralles and Soran of Ephesus wrote such *Kheirourgoúmena*, works that have been lost. Also Galen planned to write *Kheirourgoúmena*, but apparently later abandoned this project.
  7. The ones by Aëtius, Oribasius and Paul of Aegina.
  8. In cases, when Rāzī opens a quotation with the formula ‘Antyllus says’ he seems to have excerpted directly from an Arabic Antyllus translation. This

applies to all Antyllus fragments presented in this paper. In the few (12) cases, however, where the double quotation formula ‘Paul and Antyllus say’ or ‘Antyllus and Paul say’ occurs in the Hāwī (this is the case for some fragments on other topics), the excerpt was obviously taken from an Arabic translation of Paul. See Witt M, “Aus Antyllos und Heliodoros” – zum Problem der doppelten Autorenlemma-Angaben in den byzantinischen Medizinpandekten, in Rāzīs Hāwī sowie den syrisch-arabischen Übersetzungen der Hunain-Schule’, Sudhoffs Archiv, Zeitschrift für Wissenschaftsgeschichte 103, 2019/2, pp. 141-174. Apparently, in this textual version, more indications of the authors excerpted by Paul were preserved than in the Greek text that is available to us. Also ‘Alī ibn ‘Īsā and Ṣalāḥ ad-Dīn seem to have drawn directly on an Arabic Antyllus translation. A further discussion of this issue can be found in my forthcoming edition of the fragments of Antyllus’ *Kheirourgoúmena*.

9. Only a few Antyllus fragments from the Hāwī dealing with couching of the cataract, have received attention so far. Cf. Hirschberg J, ‘Die Staroperation nach Antyllos’. *Centrablatt für praktische Augenheilkunde* 1904;28: 97–100 and Meyerhof M, ‘L’opération de la cataracte du chirurgien Antylle d’Alexandrie (III<sup>ème</sup> siècle après J.-C.)’. In: Koumaris J, Rosenauer F, Sackarndt B (eds.), *Livre d’or à l’occasion du jubilé de vingt-cinq ans d’activité chirurgicale du docteur Théodore L. Papayoannou*. Kairo/Naumburg: 1932. pp. 115–119.
10. Cf. Wellmann M, op. cit. note 5, p. 115.
11. Cf. Wellmann M, op. cit. note 5, p. 238, Michler M, op. cit. note 3, p. 172, and Marganne M-H, ‘A la recherche de l’œuvre perdue d’Héliodore’. In: Boudon-Millot V, Garzya A, Jouanna J, Roselli A (eds.), *Ecdotica e ricezione dei testi medici greci. Atti del V Convegno internazionale*, Napoli, 1–2 ottobre 2004. (Naples: 2006. pp. 67–82, p. 67. The following publications on Antyllus are not very useful and philologically insufficient: Sachs M, Varelis G, “‘Antyllou cheirourgoumena”. *Die chirurgischen Schriften des Antyllos* (2. Jh. n. Chr.)’. *Würzburger medizinhistorische Mitteilungen* 2001;20:61–86 and Varelis G, *Der griechische Arzt und Chirurg Antyllos* (2. Jhd. n. Chr.) und seine Bedeutung für die Entwicklung der operativen Chirurgie. Frankfurt am Main: 2001. [med. thes.].
12. Adams F (ed., transl.), *The Seven Books of Paulus Aegineta, Translated from the Greek, with a Commentary Embracing a Complete View of the Knowledge Possessed by the Greeks, Romans and Arabians on all Subjects Connected with Medicine and Surgery*. 3 vols. London: pp. 1844–1847.

13. As for Sachs M, and Varelis G, cf. note 11.
14. Faragut (transl.) / O. Scoto (publisher): *Continens Rasis ... liber quem in medicina edidit Abuchare filius Zacharie Rasis ... Hunc Helchaury, hoc est Continentem appellavit ...* Venice: 1529. Digitised available online at the Bibliothèque numérique Medic@ (<http://www.biusante.parisdescartes.fr/histoire/medica/>).
15. Osmania University (ed.), *Abū Bakr Muḥammad ibn Zakarīyā' ar-Rāzī, Kitāb al-Ḥāwī fī al-ṭibb*. 25 vol. Haiderabad / Deccan: 1955. p.71.
16. In the Arabic editions, the books and chapters 6.3, 13.8–10, 14.1–3, 15.3–6 and 16.1–2 (beginning) are missing (book and chapter numbering according to the Latin *Continens*). Furthermore, there are several gaps in books 9–10 as well as minor textual losses, gaps and corrupt readings that can be found throughout all books. Already in 1975 Albert Iskandar pointed out that the first 60 folia of the Oxford manuscript *Marsh* 156 contain the parts from the beginning of the book 14 that are missing in the Haiderabad print. (Iskandar AZ, 'The Medical Bibliography of al-Rāzī'. In: Hourani G F (ed.) *Essays on Islamic Philosophy and Science*. Albany / NY: 1975. pp. 41–46, p. 42). The manuscripts M, Y and Th used in this edition contain books 13.8–10 (beginning) that are unpublished in Arabic.
17. Ḥālid Ḥarbī (ed.), *Abū Bakr Muḥammad ibn Zakarīyā' ar-Rāzī, Kitāb al-Ḥāwī fī al-ṭibb*. 10 vols. Alexandria: 2012.
18. This is remarkable, because this is the only chapter heading from Antyllus transmitted in Rāzī's Ḥāwī. In all other excerpts, the headings have to be reconstructed using the content.
19. A further analysis of these scholia is given cf. Witt M, as note 8.
20. Cf. Weisser U, 'Zur Rezeption der "Methodus medendi" im "Continens" des Rhazes. In: Kudlien F, Durling RJ (eds.), *Galen's Method of Healing. Proceedings of the 2nd International Galen Symposium 1982*. Leiden: 1991. pp. 123–146, pp. 134–135 and eadem, 'Die Zitate aus Galens *De methodo medendi* im Ḥāwī des Rāzī'. In: Endress G, Kruk R (eds.), *The Ancient Tradition in Christian and Islamic Hellenism. Studies on the Transmission of Greek Philosophy and Science. Proceedings of the Third Symposium Graeco-Arabicum, Leiden 1991*. Leiden: 1997. pp. 279–318, p. 282.
21. Pormann PE, *The Oriental Tradition of Paul of Aegina's Pragmateia*. Leiden: 2004. p. 101 with note 158.
22. There are many discrepancies in book and chapter numbering between the Arabic Haiderabad edition and the Latin *Continens*. The latter is more complete since the Haiderabad editors primarily based their edition on a series of

Escorial manuscripts. These manuscripts transmit most of the Ḥāwī, but not the complete one – a fact that was then unknown to the Haiderabad editors and that is still unknown to Arabists today. Consequently, a number of books has unconsciously been omitted (cf. note 16). For a comprehensive synopsis of the Latin and Arabic print edition in which it is indicated which chapter of one edition corresponds to which in the other one see Witt M, *Die handschriftliche Überlieferung von ar-Rāzī's Kitāb al-Ḥāwī und seine Nutzung als Fragmentquelle: Forschungsstand und Perspektiven*. In: *Proceedings of the conference "Sammlung und Fragmentierung – medizinische Kompilationen des Morgen- und Abendlands und ihre Quellen"* (forthcoming).

23. See below in the critical apparatus of the present edition of fragments.
24. For a comprehensive description and analysis of these manuscripts cf. Witt M, as note 22.
25. For a synopsis of these transpositions in all four manuscripts cf. Witt M, as note 22.
26. All the editions of fragments and studies on Rāzī's Ḥāwī that have appeared so far are based on just one language version. Thus, they provide a rather incomplete and inaccurate text compared to what could have been produced by using both versions. Solely on the Latin version the following studies are based: Daremberg C, Ruelle EC (eds.), *Œuvres de Rufus d'Ephèse*. Paris: 1879; Masullo R, Filagrìo. *Frammenti*. Naples 1999) [few Arabic fragments included]; Anastassiou A, Irmer D: *Testimonien zum Corpus Hippocraticum*. part III: *Nachleben der hippokratischen Schriften in der Zeit vom 4. bis zum 10. Jahrhundert n. Chr.* Göttingen. 2012). In contrast, Pormann's study (note 24) is based on the Arabic version only as is the one by Kahl (Kahl O, *The Sanskrit, Persian and Syriac sources in the Comprehensive Book of Rhazes*. Leiden: 2015.).
27. A digitised online version is available at the Bibliothèque numérique Medic@ (<http://www.biusante.parisdescartes.fr/histoire/medica/>)
28. Flashar H, *Melancholie und Melancholiker in den Medizinischen Theorien der Antike*. Berlin: 1966, 88. Ullmann M, *Die Medizin im Islam*. Leiden / Köln: 1970. p. 130, note 7; Garofalo I, 'Alcune questioni sulle fonti greche nel Continens di Razes'. *Medicina nei secoli* 2002;14/2;383–406 (398); Bryson JS, 'The Kitāb al-Ḥāwī of Rāzī'. Yale: Unpublished PhD thesis; 2000. p.103.
29. Therefore, this manuscript was not used in my forthcoming collection of fragments of Antyllus' *Kheirourgoúmena*.
30. Therefore, Ḥarbī's edition was not used in my forthcoming collection of fragments of Antyllus' *Kheirourgoúmena*.

31. II.36.20-38.8 L. For resemblances of this passage to the theory of rain formation by Diogenes of Apollonia, as well as for a discussion of other statements contained in this Hippocratic lithiasis chapter, see Lesky E, 'Zur Lithiasis-Beschreibung in Περί ἀέρων ὑδάτων τόπων'. Wiener Studien 1948:63:69–83 and *eadem* 'Die Lithiasis, im Altertum eine ausgesprochene Kinderkrankheit'. Österreichische Zeitschrift für Kinderheilkunde und Kinderfürsorge 1948:1,3:249–259.
32. 'Hippocrates has taught us the reason, this water produces the stone ... and that this is due to its harmful properties and that the substances with different qualities interact. In consequence of their interaction a movement then occurs due to which a sediment is formed. For in everything that moves, a separation takes place when it comes to rest. The light and thin parts of it rise, whereas the thick and heavy parts sink to the bottom. ... This flowing water approaches from a remote location; the reason is that it assumes the qualities of the places that it passes through and crosses over, and that it has sometimes mixed with other water.' (Translation from the Arabic here and below, Strohmeier G, whom I thank for kindly providing me with a preliminary version of his translation of the Arabic text of Galen's commentary.)
33. II.38.10–21 L.
34. Today it is known that bladder stones in children occur primarily due to malnutrition (low protein diet, which is still a problem in developing countries; so-called 'endemic bladder stone disease'; Cf. Moran ME, note 1, p. 9). Interestingly, also Vegetius (*mulomed.* 1.46.1) remarks that there is an increased incidence of bladder stones in younger animals (*plerumque in pusillas etates*).
35. *Epid.* 6.3.7; V.296.3–4 L.
36. *In Hipp. Epid.* 6.3, XVBb.41.9–47.8 K.;
37. XVBb.44.8–11 K.;
38. *Aphor.* 1.14; IV.466.8f. L.
39. Galen suggests the following explanation variants: (1) Hippocrates may have gained certain knowledge in this matter at a later point, he could (2) not have meant heat in general, but rather innate heat or (3) he may have regarded heat as one factor in the proces of stone formation.
40. Cf. *In Hipp. Aph.*; XVBb.634.12–17 K., *In Hipp. de aer.*; XVBb.47.2–6 K., *In Hippocratis de nat. hom.* XV.156.7ff. K.). Cf. as well Aët. 9.9 and Theophilus Protospatharius, *In Hipp. Aph.*, vol. 2, 377, ln. 1ff. Dietz.
41. *Hipp. Aer.* 9, II.40.2–5 L.
42. 'Let us examine, why the mentioned diseases do not afflict anybody drinking from this water. We affirm that Hippocrates taught us this when he talks about

the stone that develops in the bladder. For this symptom only occurs among young people, since the necks of their bladders are narrow and the thick and turbid fluid cannot pass through. In [adult] men, however, the liquid is not retained in the bladder because of their wider bladder neck. Therefore they neither get this symptom nor any pain because of it. The stone is formed in the bladder not only because of the narrowness of its neck, but also because of the excessive and burning heat in it.' Cf. also Lesky E, note 31, p. 250.

43. *In Hipp. Epid.* 6.3, XVIIb.45.6ff. K.
44. Ps.-Alexander of Aphrodisias, *Problemata* 2.44.
45. II.40.7–42.5 L.
46. Cf. an identical symptom description from Dalmatia in 1925 that is rendered by Lesky E, note 31, p. 252.
47. Cf. also Lesky E, note 31, pp. 70 and 72.
48. Cf. Höpfner Th, 'Mageia (Sympathie)'. In Pauly / Wissowa, RE, 14.1 (1928), col. 301–337. In modern medicine there is still a terminological remnant of this concept in the so-called 'sympathetic endophthalmitis'.
49. Thanks for this hint are due to Prof. K.-D. Fischer, Mainz.
50. For a detailed discussion of this topic, see my forthcoming edition of fragments from Antyllus: *Kheirourgouména*.
51. This was explained by the observation that the bladder neck was 'fleshy', but the bladder itself 'sinewy'. Cf. my remarks in Witt M., Weichteil- und Viszeralchirurgie bei Hippokrates. Ein Rekonstruktionsversuch der verlorenen Schrift Περὶ τραυμάτων καὶ βελῶν (*De vulneribus et telis*). Berlin/New York: 2009. pp. 182–183 with note 109. Here I attempt to give an explanation for this difference in the context of ancient sources on this subject. I also add some anatomical and terminological remarks on the term 'bladder neck'.
52. A summary of this operation is also given by Philagrius (in Aëtios 11.5). There are, however, no textual dependencies to the descriptions by Celsus and Antyllus.

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