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An Apothecary's Handbook

M. J. Geller

The proposition that a coherent science existed within Babylonian medicine is based on recognising a highly systematic organisation of medical data in cuneiform sources, and specifically in an Akkadian example of *Listenwissenschaften* devoted to the use of therapeutic drugs. The text, from the Vorderasiatisches Museum Berlin (VAT 8256, hereafter referred to as BAM 1), dating roughly from the 8th-7th century BCE, could be considered as an apothecary's handbook or Vademecum. Franz Köcher understood the importance of this tablet, since it was the very first tablet he copied in the BAM series.[1] Although one could view BAM 1 initially as a pharmacological compendium from Assur, it became a popular standard text within the medical curriculum, with copies of the text known from many other sites, with duplicates from Nineveh and Sultantepe, as well as in Babylonian archives.[2] The primary question which remains to be answered is: what was the overall purpose for this text, reflected in the logic behind its structure? The text is neither an inventory of drugs nor is it an explanatory pharmacological text (like Uruanna or Šammu šikinšu, comparing different drugs with each other), but it nevertheless has the general appearance of a lexical tablet. There is no obvious principle of association between entries to explain the order of drugs being listed. So far, the organisational principles behind this tablet have remained unsolved, but an attempt will be made in the present article to offer a solution to this puzzling problem.

The Vademecum (BAM 1) is a large three-column tablet, although various lines throughout overwrite the three-column arrangement. Column one consists of a list of drugs (mostly but not always plants), column two lists diseases for which these plants are to utilised, while column three provides brief instructions for how the drugs are to be handled and administered.[3] The other organisation feature of the tablet is the judicious use of rulings, to separate blocks of entries or individual entries from each other in a sequence which looks more intentional than random. Moreover, the tablet either repeats entries verbatim from a preceding line or arbitrarily uses 'ditto' (KI.MIN or ŠU.BI.AŠ.ÀM), without any obvious reason for the differences. However, one characteristic of the tablet which seems fairly secure is that it deals with *simplicia* or single drugs used against a single pathology, indicated by the fact that each drug is listed as a separate entry, even within blocks of data referring to the same disease. In effect, the main purpose of the apothecary's Vademecum was to designate the *minimal requirements* necessary to create rudimentary medical recipes, namely a drug, a disease, and instructions for use.

It is not easy to try to reconstruct how this complex array of information was assembled into a three-column dataset, considering the limitations of working on clay. Unlike a modern-day accountant who can keep a continuous journal of transactions while formulating double-entry bookkeeping, a large tablet like BAM 1 would only stay moist for a relatively short period of time, which means that the compiler of the tablet would either be working from memory or from data gathered from a large collection of medical texts from a readily available archive.

[1] BAM 1 has been edited by Annie Attia and Gilles Buisson, and they made many significant contributions to our understanding of this important text, although without offering a translation. See Attia-Buisson 2012 (JMC 19). An earlier version of this paper was given as the Hans Sloan Lecture of The Worshipful Society of Apothecaries of London (16 April, 2019).

[2] All duplicates are given by Attia-Buisson 2012 (JMC 19): 25.

[3] A concise description of BAM 1 (referred to as the *Therapeutical Vademecum*) is given in Rumor 2018: 452, pointing out structural parallels not only with the Akkadian explanatory text Šammu šikinšū (discussed below), but also with Theophrastus' *Historia plantarum*. These comparisons point to a technical literature which was not random or spontaneous but probably reflected a relatively fixed and recognisable format originating from within a school curriculum.

The puzzling feature of this tablet is how and by what rationale the various blocks of medical data were ordered, which might offer some insights into aspects of pharmacology current in Assur or inherited from earlier scholarship.

The search for clues to this tablet should begin with an overview of the columns. First, the list of drugs in column one is not entirely what we would expect. Under normal circumstances, we encounter familiar drugs used time and time again in compound recipes, derived from plants or parts of trees or readily available minerals. However, in the list of drugs in column one, many of the entries are unknown to extant medical recipes, representing either rare or highly exotic drugs.[4] Furthermore, it is remarkable that the listed drugs appear to be *simplicia*,[5] since in the first millennium BCE we see a marked tendency towards the use of compound recipes containing numerous drugs, with examples of single prescriptions listing as many as 90 drugs.[6] However, this apothecary's Vademecum might in fact be an indication of a renewed interest in simple drugs among Assur medics or scholars, as a way of isolating or identifying the active ingredient of a compound recipe.[7]

Column two is also unusual. Diseases are normally listed according to which part of the human body is affected, from head to foot, as a standard way of organising the data, but this convenient principle is not followed in BAM 1.[8] Consequently, it remains difficult to establish the order of how and why these diseases are listed, or what they have in common. The list in column two begins with tooth decay,[9] then jumps to bladder and bowel disease (with a strange intrusion for psychogenic disease or female infertility), then various types of fevers and paralysis, mixed with psychological ailments, lung disease and cough, jaundice, rectal disease, skin conditions, finally ending with impotence. It turns out, however, to be important to look at the horizontal rulings between lines, which divide the text into either individual lines or block entries, usually conforming to a specific disease listed in column two, i.e. drugs dealing with dental problems or a type of fever or rectal disease are marked off by rulings. So although the diseases are central to the architecture of this Vademecum, the order in which they are listed in BAM 1 so far offers few hints at any possible taxonomy of disease or the central purpose of this text.[10]

[4] It is noteworthy that many drugs commonly used in therapeutic recipes are absent in BAM 1, such as *ankinūte, asu*, *elkulla, irrû, suādu, šakirû, šibburatu, šurmēnu,* etc.

[5] The idea of a single drug or *simplicium* used to treat a single disease was a favourite dictum of Franz Köcher, but this rule cannot be applied generally, since the same drugs were often used against a variety of ailments, either in simple or compound forms.

[6] See BAM VII No. 9b (description p. 12). One common pattern in later periods appears to be compound recipes containing numerous drugs, followed by secondary listings of *simplicia*, without any explanation of the distinction between these types of prescriptions.

[7] One of the difficulties in assessing the use of *simplicia* is that text modern editions of medical texts do not often give special attention to the use of simple drugs. The list of *simplicia* in BAM VII pp. 5-6, indicating drugs used to treat both renal and rectal disease, offers some points of comparison with BAM 1.

[8] It is useful to be reminded that organising cuneiform data is a problem; one cannot alphabetise it because there is no alphabet.

[9] The first block of six drugs are to be applied to the surface of the tooth, presumably representing various drugs to treat toothache. This list is followed by a single-line ruling, naming thistle which has to be picked before sunrise and to be applied to the tooth, but an additional note on this entry stands out: thistle picked in this way is designated as a drug for the 'worm', referring to the so-called tooth-worm thought to have caused toothache in the first place. Under normal circumstances, the tooth-worm was addressed by a spell, since the causes of disease are often the themes of incantations rather than drug recipes.

[10] Elsewhere within medical texts, diseases were often listed in a fixed order. An excellent example of this is BAM 228-229 (edited in Bácskay 2018: 203-205), two copies of the same recipe with a list of 46 drugs used in a rinse (*marhaṣu*) for the following ailments: sun-heat (*himit ṣeti*), flatulence (*šibiṭ šāri*), *šimmatu* and *rimûtu* paralyses, *šaššaṭu*-disease, 'hand-of-the-ghost'-disease, 'hand-of-the-oath'-disease, 'hand-of-mankind'-disease, and any (other) disease (*kal murṣi*)'. The recipe adds a comment that, *asûti u mašmaššūti iltazzaz-ma la paṭir*, '(although) healing and exorcism have been available, (it) is not resolved' (ibid. 204). A list of drugs for the same ailments appears in BAM 189 (Bácskay 2018: 202) as well as in the comprehensive compound recipe BAM VII No. 34

Column three consists of concise instructions for how drugs were to be prepared and administered, sparse in comparison with normal prescriptions. In fact, apart from some exceptional remarks which occur periodically, the main instructions for preparing *materia medica* fall into three main categories: crushed and taken internally (usually in beer), rubbed on externally mixed with oil, or applied to the surface of the body, usually in a bandage. This is a gross over-simplification of what is actually found in therapeutic recipes, while omitting many different types of other preparations and applications.

Since the list of diseases and instructions do not readily relinquish their secrets, let us have another look at the list of drugs in column one, which shows some interesting detectable patterns. Sometimes drugs are separated by rulings immediately before and after the drug, which clearly indicates a *simplicium.* In other cases, the rulings divide up the drugs within the same disease section, as in ll. 20-28, in which the first lines are marked off by separate rulings but other entries occur as a group. The first two columns in these lines read as follows:

Ú ILLU NU.LUH.HA	Ú *hi-niq* BUN
Ú ^{šim}ŠEŠ	Ú *hi-niq* BUN
Ú ILLU ^{šim}BULUH	Ú *hi-niq* BUN
Ú HENBUR ^{giš}DÌH	Ú KI.MIN
Ú *imhur-lim*	Ú KI.MIN
Ú *a-zu-pi-ru* SIG_7	Ú KI.MIN
Ú *al-la-an-ka-niš*	Ú KI.MIN
Ú SUM^{sar}	Ú KI.MIN
Ú *ha-šá-a-nu*	Ú KI.MIN

drug resin of *nuhurtu*	drug for stricture of the bladder
drug bitter aromatic (^{šim}*murru*)	drug for stricture of the bladder
drug resin of *baluhhu*	drug for stricture of the bladder
drug shoot of thorn-bush (*baltu*)	drug ditto
drug *imhur-līm*	drug ditto
drug green *azupiru*	drug ditto
drug Kaniš-oak (*allankaniš*)	drug ditto
drug garlic (*šūmu*)	drug ditto
drug *hašânu*	drug ditto

It is reasonable to posit that these blocks of drugs, diseases, and instructions are modelled after prescriptions in therapeutic texts, which provide more elaborate versions of the same basic information. Often in medical texts, however, a new entry following a prescription reads DIŠ KI.MIN or 'if ditto', without repeating the symptoms, indicating that a new drug or drugs can treat the same disease as in the immediately preceding recipe. A typical example of such separate entries following a prescription, with each line separated by rulings and containing *simplicia,* is known from urinary tract disease (BAM VII 98 [No. 9]):

DIŠ KI.MIN ^{giš}GEŠTIN.KA_5.A *tur-ár* SÚD ŠÀ GÌŠ-*šú* DIRI [.....
DIŠ KI.MIN NUMUN ^{ú}*tu-lál tur-ár* SÚD ŠÀ GÌŠ-*šú* DIRI [.....
DIŠ KI.MIN ^{na4}$PEŠ_4$.ANŠE *tur-ár* SÚD ŠÀ GÌŠ -*šú* DIRI [.....
DIŠ KI.MIN ^{na4}ÁŠ.HAR *ina* Ì.NUN SÚ[D .....

(Bácskay 2018: 197-201). All of these texts refer to the same list of diseases, beginning with 'sun-fever' (*himiṭ ṣēti*), in precisely the same order. It may be that all of these conditions were indicated by fever and paralysis, but the fixed order of these lists reveal a standard pharmaceutical episteme common to medical texts, but not shared by BAM 1.

DIŠ KI.MIN ^{na4}ÁŠ.HAR ^{na4}AN.ZAH *ina* Ì.NUN SÚD [.....
DIŠ KI.MIN NUMUN ^{giš}ESI GAZ SIM *ina* A GAZI^{sar} *u* GA *tara-ba*[*k* .....

If ditto, dry out and crush fox-vine(-wood) and soften the *shaft* of his penis [.....].
If ditto, dry out and crush seed of *tullal*, soften the *shaft* of his penis [.....].
If ditto, dry out and crush 'donkey-vulva'(-shell), soften the *shaft* of his penis [.....].
If ditto, crush *ashar* in ghee [.....]
If ditto, crush *ashar* and frit in ghee [.....].
If ditto, pound and sift the seed of *ušû*(-wood), you stir it in *kasû*-juice and milk, [.....

These lines occur within a large format four-column library tablet. By way of comparison, a similar listing of simplicia occurs in a single-column tablet (an IM.GÍD.DA, BM 38583) with extracts from various recipes (*bulṭu*) enumerated with minimal wording, without elaboration.[11] One passage (ll. 3'-11') reads,

DIŠ NA *sa-ma-nam* GIG Ì ^{giš}EREN ŠÉŠ-*su* ^{ú}*r*[*u-*.....]
DIŠ-*niš* HÁD.DU ^{šim}GÚR.GÚR ^{šim}LI SÚD *ana* Š[À-*šú* ŠUB-*di*]
PA ^{gi}ZÚ.LUM.MA *ina* UGU *tu-ṭ*[*a-ap-pi* TI]
DIŠ KI.MIN SAHAR *a-sur-re-e ša* É SUMUN *ina* K[AŠ NAG]
DIŠ KI.MIN SUHUŠ ^{ú}EME.UR.GI$_7$ *ina* GÚ-*šú* GAR-[*an*]
DIŠ KI.MIN PA ^{ú}*u*$_5$-*ra-nu ina* GÚ-*š*[*ú* GAR-*an*]
DIŠ KI.MIN *a-lu-tú* HÁD.DU SÚD *ina* Ì [ŠÉS]
DIŠ KI.MIN ^{ú}AM.SI.HAR.RA.NA *ina* Ì [ŠÉŠ]

---

6 *bu-ul-ṭù ša sa-ma-nam* G[IG]

If a person suffers from *samānu*-disease, you rub him with cedar oil,
you dry ...[...] together, you pound *kukru* and juniper and [put] into it,
you apply fine leaf of 'date-reed' (*kūru*) over (it) [and he will get better].
If ditto, [you have him drink] in beer dust of the latrine of an old house.
If ditto, you put on his neck root of 'dog's-tongue'-plant.
If ditto, [you put] on his neck leaf of *urānu*-plant.
If ditto, you dry out (and) pound crab,[12] [you rub it on] in oil.
If ditto, you [rub on with] 'gecko'-plant in oil.

---

6 recipes of *samānu*-disease

Not only are parallels with BAM 1 clear from this passage, but the remainder of this relatively small tablet contains similar lists of simplicia, as aptly described by Schmidtchen in his edition of the text. Another entry provides 12 recipes for jaundice, headed by the simple phrase (l. 12'): DIŠ NA *a-mur-ri-qa-na* GIG ^{ú}NÍG.GIDRU SÚD *ina* KAŠ [NAG], 'if a man suffers from jaundice, you pound 'shepherd's-staff'-plant and [you have him drink] it in beer'. The following 11 entries each begin with KI.MIN, a simplicium, and the instruction to be drunk in beer,[13] and the section ends with a familiar rubric, '12 recipes (*bulṭū*) for jaundice-disease'. While the tablet

[11] See Schmidtchen 2018: 462-469, with an excellent hand copy of the tablet. The edition here has some minor suggestions for restorations, mostly based on the assumption that ends of the lines can be restored.
[12] This assumes that the ingredient here is *allutu* 'crab' rather than *alūtu* 'beet', since beet is unlikely to be pounded. See Schmidtchen 2018: 468 for the use of crab in medical recipes.
[13] Schmidtchen's restoration of the ends of these lines with *ina* KAŠ NAG is convincing.

does not duplicate entries in BAM 1, at least five of the drugs appear in both texts, although in a different order: juniper (*burāšu*), root of 'dog's tongue'-plant (*lišān kalbi*), licorice (*šūšu*) 'date-reed' (*kūru*), and *namruqqu*. The question raised by this Late Babylonian tablet is whether its contents were taken from another handbook similar to BAM 1, or conversely whether the contents of BAM 1 were based upon various entries from numerous separate sources which were then compiled into a large six-column compendium.

Although such chicken-or-egg questions are unlikely to be resolved, it is reasonable to assume that this relatively common type of medical idiom (i.e. a list of simplicia) was likely to have served as a model for BAM 1. Following this logic, multiple entries of drugs between rulings in BAM 1 all represent simplicia, which would otherwise appear in successive recipes in medical recipes introduced by 'ditto', as alternative treatments for a given disease or symptoms.

Some drugs stand out as unusual. It is worth noting that Dreckapotheke hardly occurs in the apothecary's Vademecum, except in two exceptional drugs referring to 'sailors' excrement' and 'sailors' dust,' both probably indicating the same drug (ll. 49, 79).[14] Apart from these exceptional cases, another feature of the list is that the same drug appears within sequential listings of diseases. For instance, the drug *baluhhu* occurs at the end of one block of drugs for teeth (l. 14) and slightly later at the end of a block for stricture of the bladder (l. 23). Another case is the use of the drug *kamantu* or seed of *kamantu*, which appears repeatedly at the head of a list of drugs for *ašû*-disease (l. 61), as well as at the top of a list of drugs for flatulence (l. 74). The same drug *kamantu* occurs in the following section among drugs for *samānu* (l. 83), and then again at the head of the list for the very next disease in sequence, lung disease (l. 86). Not to belabor the point, the seed of *atkam* appears in a single entry for lung disease (90), and shortly thereafter at the top of the list for 'cough' (93). It is possible that the repetition of the same drugs for different diseases may provide clues to the organisation of the list; similar ingredients may have been one criterion for why diseases were listed in a certain sequence, indicating some basic commonalities in treatment.

But we still have column three to consider. Under normal circumstances, one would treat the third column of instructions as the least significant aspect of this text, since these entries refer to the simple mechanics of drug preparation, having little to do with theory. But this may well be wrong. A cursory glance at the list shows how these instructions tend to occur in blocks, either associated with a single disease, or alternatively the same instructions appear with various diseases, even if separated by rulings.[15] This suggests another potential clue to BAM 1, that instructions for administering drugs could have also been a factor in how the lists were ordered.

Grist for the Mill

In the search for the external source material which may have contributed to our apothecary's Vademecum, it may be instructive to compare the gall-bladder-disease section (BAM 1 ll. 29-34) with BAM 578 i 20-26 (Suālu). The entries in this Nineveh recipe, in an atypical tabular format, all refer to *simplicia* to be drunk in beer:

[14] Both of these examples were to be applied externally to the patient, but in one case for fever and in another case for a type of skin disease.

[15] An example of this occurs in ll. 36-51, listing different ailments, each separated by ruling, and each designating a different drug in the first column; in column three for these lines, the instructions for treatment mostly recommend rubbing in oil.

Ú.DILI Ú ZÉ *ina* KAŠ NAG
Ú *me-er-gi-ra-nu* Ú ZÉ *ina* KAŠ NAG GAZI^{sar} Ú ZÉ *ina* KAŠ NAG
Ú ^{šim}LI Ú ZÉ *ina* KAŠ NAG Ú NU.LUH.HA Ú ZÉ *ina* KAŠ NAG
Ú BAR ^{giš}*šu-ši* Ú ZÉ *ina* KAŠ NAG PA ^{ú}*al-la-nu* Ú ZÉ *ina* KAŠ NAG
Ú U_5.ARGAB^{mušen} Ú ZÉ *ina* KAŠ NAG Ú LAG MUN Ú ZÉ *ina* KAŠ NAG
Ú SUM^{sar} Ú ZÉ *ina* KAŠ NAG Ú SUHUŠ ^{giš}NAM.TAR NÍTA Ú ZÉ *ina* KAŠ NAG
Ú SUHUŠ ^{giš}*šu-ši* Ú ZÉ SÚD *ina* Í *u* KAŠ NAG Ú *ṣi-ba-ru* Ú ZÉ SÚD *ina* A NAG

'Single'-plant, gall-bladder drug, to drink in beer.
Drug *mergirānu*, gall-bladder drug, to drink in beer. *Kasû*, gall-bladder drug, to drink in beer.
Drug aromatic juniper (*burāšu*), gall-bladder drug, to drink in beer. Drug: *nuhurtu,* gall-bladder drug, to drink in beer.
Drug peel of licorice (*šūšu*), gall-bladder drug, to drink in beer. Oak (*allānu*) leaf, gall-bladder drug, to drink in beer.
Drug bat guano, gall-bladder drug, to drink in beer. Drug lump of salt, gall-bladder drug, to drink in beer.
Drug garlic, gall-bladder drug, to drink in beer. Drug male mandrake (*pillû*) root, gall-bladder drug, to drink in beer.
Drug licorice root, gall-bladder drug, to pound and to drink in oil or beer. *Ṣibaru*, gall-bladder drug, to pound, to drink in water.

Despite the strong resemblances in formatting and layout and some overlap in content, these drugs against gall-bladder-disease in Suālu are not generally the same as those in BAM 1. What do we make of such seemingly contradictory evidence? The drugs in both lists share more-or-less the same instructions, to be imbibed in beer, which is a shorthand formulation for saying that the drugs are for internal consumption. Yet it is unlikely that BAM 578 could have derived from a source text for BAM 1.

One of the enduring mysteries is why Tablet 59 of the omen series Šumma ālu is attached to the reverse of BAM 1, which is a highly exceptional situation.[16] The fact that 26 out of 42 plants listed in Šumma ālu 59 are also to be found in BAM 1 might explain the connection between the genres, but many questions remain. The function of Šumma ālu Tablet 59 appears to highlight the ominous (mostly negative) consequences of plants[17] being 'disturbed' or being 'worried' (*adir*) in their natural habitat, presumably before being gathered as *materia medica.* It is noticeable, however, that many plants or trees mentioned in Šumma ālu 59, which commonly feature in medical recipes (e.g. cedar, cypress trees, *taškarinnu* trees, *šalālu*-reed, or *kanaktu*-aromatic), are absent in BAM 1. Moreover, had Tablet 59 served as a source text, it would probably have appeared at the beginning of the Vademecum rather than as an appendix at the end, and the order of entries in BAM 1 would probably have adhered more closely to Šumma ālu. A reasonable explanation may be that Šumma ālu 59 served as an appendix to BAM 1 because the omen apodoses were deemed to be relevant to the correct administration of the drugs. In any event, the omens provided a view of *materia medica* not otherwise found in medical recipes, describing possible consequences if plants were not correctly gathered or handled. This kind of meta-data in the form of omens predated astrology

[16] It is important to note the important parallel with KADP 1 (columns 5-6), which adds the Vademecum section (drug, disease, instructions) as an appendix to a list of plants. It is this appendix to KADP 1 (discussed below) which is the earliest evidence for a Vademecum format resembling BAM 1, and the fact that both of these texts include an appendix at the end which deviates from the format of previous columns may not be coincidental. The only other example known to me of an addendum of a different genre -- added to the end of a text -- occurs in an astronomical tablet with schematic drawings of constellations (MLC 1866), see Beaulieu, Frahm, Horowitz, Steele 2018: 7-8.
[17] It is relevant that no minerals are mentioned in Šumma ālu Tablet 59 among *materia medica.*

and the genres of astral magic and medicine which developed in later periods, which associated *materia medica* (plants, trees, and stones) with zodiac signs and predictions from astral influences.[18] Moreover, it seems likely that Šumma ālu 59 already existed in a standard form before BAM 1 was composed. The two texts were entirely independent, as far as their respective compositions were concerned, but both examples of *Listenwissenschaften* relied upon knowledge of medicinal drugs, some common and some rarely attested.

One general conundrum regarding lexical texts is whether they borrowed directly from literary sources, or whether *belles lettres* drew freely upon lexical sources for vocabulary, or a combination of both.[19] While it seems plausible that BAM 1 extracted data (lists of plants, lists of diseases, etc.) from various sources, no other known listings of drugs quite resembles the layout of BAM 1. The great pharmacological compendium, Uruanna, for instance, provides data on plants and occasionally diseases to be treated,[20] but no other list provides a tabulation of diseases together with treatments (corresponding to columns two and three of BAM 1). The text most comparable to BAM 1 is the botanical commentary Šammu šikinšu, which gives a brief description and name of a plant, then states what the plant is good for, and finally adds minimal instructions for treatment;[21] but the text is not in tabular form like BAM 1, nor is there much overlap in terms of contents between the two texts. None of these pharmacological works can be seen as a model for BAM 1.

As mentioned above, the problem of envisaging how a text like the Vademecum was composed is that the modern default for creating a text is a single author who can preferably be named (e.g. Esagil-kīn-apli, Aristotle, Galileo, etc.), who would gather all relevant data in his studio or workshop and compile a tabular version of his research results. This view imagines hundreds of medical tablets being assembled, with each Vademecum entry representing an excerpt of simple drugs from a large array of prescriptions or pharmaceutical lists. In this ideal scheme, rulings between entries would represent individual sources or tablets, while multiple entries between entries would reflect alternative simple drugs employed against the same disease. Alternatively, different sections of this text could possibly have been the work of different scholars in various locations and times, with a variety of aims or organisational

[18]Pioneering work on *materia medica* associated with astrology can be found in two important short articles, Heeßel 2005 and 2008.

[19] See the discussion regarding the connection between the lexical list Izi and literary texts in Crisostomo 2019: 195-197.

[20] A new edition of plant lists by J.A. Scurlock with copies of sources by J. Fincke is promised to appear shortly. A short excerpt of Uruanna can be found in Scurlock 2014: 289-291. Nineveh medical archives also preserve extensive lists of medicinal plants organised according to ailments or uses (e.g. as a salve, etc.), e.g. BAM 430 and 431; for a recent discussion of the importance of these plant lists, see Simkó 2018: 547-552.

[21] See the excellent edition in JMC 18 and 19 (Stadhouders 2011 and 2012). The term *šiknu* in this text refers to the 'nature' or properties of medicinal plants, for which a parallel to Greek *physis* 'nature' can be found in Plato's Phaedrus, citing a statement from Hippocrates out of context:

« Then see what Hippocrates and true reason say about nature (*physeōs*). In considering the nature of anything, must we not consider first, whether that in respect to which we wish to be learned ourselves and to make others learned is simple or multiform (*haploun ē polueideis*), and then, if it is simple, enquire what power of acting (*dunatoi*) it possesses, or of being acted upon, and by what, and if it has many forms, number them, and then see in the case of each form, as we did in the case of the simple nature, what its action is and how it is acted upon and by what? (Plato, *Phaedrus,* trans. H. N. Fowler, (Loeb No. 36), 548-49. »

The vague meaning of the passage within Platonic philosophy obscures the original purpose behind the Hippocratic observation, which refers to expertise required to know the 'nature' (*physis*) of 'simple' and 'multiform' (*haploun ē polueideis*) medicinal plants, and their 'powers' (*dunatoi*) or effective properties. Recognising that both terms *haploun* 'simple' and *polueideis* 'multiform' can refer specifically to plants (according to Liddell and Scott) allows for a clearer understanding of the original meaning of the Hippocratic passage, which was co-opted by Plato for different reasons entirely. This reading of the Hippocratic quotation also indicates similarity between the terms *physis* and *šiknu*, since the latter term (in the explanatory text of Šammu šikinšu) was not describing the 'appearance' of medicinal plants (which were designated as 'good' for use against various diseases) but their effective medicinal properties or 'nature'.

considerations in mind, but in the end the work of a single compiler would probably have been responsible for the final redaction.

If such were the case, however, one would expect much more consistency between the entries, since the purpose of such a list would not have been to copy verbatim from recipes but summarise the crucial information from a large number of tablets. In fact, there is considerable variation, especially in how repeated information is noted, in three very different ways. Entries either repeat the information verbatim (e.g. the name of the disease or instructions for use), or make liberal use of the notation KI.MIN for 'ditto' or another standard notation for 'ditto', ŠU.BI.AŠ.ÀM.[22] The varied style of BAM 1 entries may suggest different sources consisting of other lexical lists as well as recipes. Let us explore this option further.

The Use of Ditto

To pursue this different line of inquiry, it may be useful to examine the frequent use of the second notation ŠU.BI.AŠ.ÀM for 'ditto' in BAM 1. First, it is important to note that the expression only appears in column three of the main text and once in the apodosis of a Šumma ālu omen (l. 194). This conforms to a general pattern in omens, where ŠU.BI.AŠ.ÀM tends to occur in omen apodoses, while the similar expression KI.MIN can appear in either the protasis or apodosis. Second, ŠU.BI.AŠ.ÀM appears sporadically in Šumma ālu omens, but mainly in manuscripts from Assur.[23] Third, it is noteworthy how elusive the expression ŠU.BI.AŠ.ÀM in other genres, e.g. attested in a Nippur medical text[24] and occasionally in the anti-witchcraft corpus in tablets from Babylon and Uruk.[25] So how do we explain the many uses of this notation in BAM 1? In fact, it is difficult to discern a pattern among examples of ŠU.BI.AŠ.ÀM from the third column of BAM 1, as in ll. 61-72, treatments for *ašû*-disease:

[22] The notation ŠU.BI.AŠ.ÀM appears 30 times in BAM 1, and once in the Šumma ālu section (l. 193).

[23] I have not conducted an exhaustive survey, but so far I have not found the phrase ŠU.BI.AŠ.ÀM in any Nineveh recensions of Šumma ālu omens. Compare the Nineveh and Assur manuscripts of Šumma ālu Tablet 23 100-103 (in the edition of Freedman 2006: 46), based on K 2925: 12'-14' (P237752):

[DIŠ MUŠ *ina* É LÚ *ina h*]*a-ru-ri* NÁ-*iṣ* É.BI BIR-⌈*ah*⌉
[DIŠ MUŠ *ina*] ⌈*a*⌉-*sur-re-e* É NA *ú-lid* É.BI BIR
DIŠ MUŠ *ina a-sur-re-e* É NA NÁ-*iṣ* É.BI [BIR]
If a snake reclines on a grindstone in a man's house, that house will be dispersed.
If a snake gives birth in the latrine of a man's house, that house will be dispersed.
If a snake reclines in the latrine of a man's house, that house will be dispersed.

Compare its Assur counterpart, based on VAT A 453+ (Heeßel 2007 [KAL 1]: 46, 26-28):

[DIŠ] ⌈MUŠ⌉ *ina* [É] LÚ *ina ha-ru-ri* NÁ-*iṣ* É.BI ŠU.⌈BI⌉.AŠ.ÀM
[DIŠ M]UŠ *in*[*a a-sur-re*]-*e* É LÚ Ù.TU ⌈ŠU. BI⌉.AŠ.ÀM
[DIŠ M]UŠ *ina* ⌈*a*⌉-[*sur-re*]-*e* ⌈É⌉ LÚ NÁ-*iṣ* É.BI ⌈ŠU⌉.BI.AŠ.ÀM

An older duplicate of this same text from Assur (Heeßel 2007 [KAL 1]: 35) also includes the same ŠU.BI.AŠ.ÀM phrase.

[24] BAM 398, dupl. BAM 138 ii 1-8, see J.A. Scurlock 2014: 561-62. In each of four ruled sections, the recipe ends with a variation of the phrase, *ina* KUŠ *te-ṭer-ri ba-ah-ru-us-su* ŠU.BI.AŠ.ÀM, 'you smear (*materia medica*) on leather and while hot, ditto (= bandage him so that he recovers).' An alternative expression ŠU.BI.GIN$_7$.NAM for 'ditto' appears once in eye disease texts, but only in a rubric, see IGI 1 l. 124' (Geller and Panayotov, 2020): KA.INIM.MA IGI.GIG.GA.KAM DÙ.DÙ.BI ŠU.BI.GIN$_7$.NAM.

[25] Abusch-Schwemer 2016: 15 (= CMAwR No. 3.4: 24), editing SBTU 2, 22 + 85) gives the following incipit: DIŠ NA *gi-na-a šu-dur* ŠU.BI.AŠ.ÀM. This phrase refers back to the previous incipit (ibid. p. 13: 1), DIŠ NA *gi-na-a šu-dur ur-ra u mu-ši ina-an-ziq* ZI.GA-*su sad-rat*, 'if a man is constantly afraid and worried day and night, his losses occur regularly'. The 'ditto' phrase completes the clause. A second example can be found in the same volume (CMAwR No. A.1: 21', see p. 440), in a Late Babylonian tablet (BM 47695+) to undo witchcraft (*ana pišerti kišpī*). A third example can be found in Abusch-Schwemer 2020: 53-54 (CMAwR No. 5.2), in a text to prevent witchcraft from affecting a pregnant woman. These are all isolated occurrences of ŠU.BI.AŠ.ÀM in the extensive anti-witchcraft corpus, from Assur, Uruk, and Babylon, but there are no apparent instances of the notation from Nineveh in these sources. Interestingly, the one occurrence of ŠU.BI.AŠ.ÀM in MUL.APIN (Hunger-Steele 2109: 102) appears in three manuscripts, but none of these are from Nineveh.

col. 2	col. 3	
Ú *a-ši-i*	SÚD *ina* Ì.GIŠ ŠÉŠ	(to pound, to rub on in oil)
Ú *a-ši-i*	SÚD *ina* Ì.GIŠ ŠÉŠ	(to pound, to rub on in oil)
Ú *a-ši-i*	NA *qut-tu-ru*	(to fumigate a man)
Ú *a-ši-i*	NA *qut-tu-ru*	(to fumigate a man)
Ú *a-ši-i*	SÍG NIGIN *ina* GÚ NA GAR-*nu*	(to wrap wool to place on the man's neck)
Ú *a-ši-i*	SÚD *ina* KAŠ SAG NAG	(to pound, to drink in premium beer)
Ú *a-ši-i*	[ŠU.BI.AŠ.ÀM]	(ditto)
Ú *a-ši-i*	[ŠU.BI.AŠ.ÀM]	(ditto)
Ú *a-ši-i*	Š[U.BI.AŠ.ÀM]	(ditto)
Ú *a-ši-i*	Š[U.BI.AŠ.ÀM]	(ditto)
Ú *a-ši-i*	ŠU.B[I.AŠ.ÀM]	(ditto)
Ú *a-ši-i*	ŠU.BI.[AŠ.ÀM]	(ditto)

Compare instructions for treating cough (*suālu*), ll. 92-97:

col. 2	col. 3	
Ú *su-a-lim*	SÚD *ina* Ì.GĪŠ *u* KAŠ SAG NAG	(to pound, to drink in oil or premium beer)
Ú *su-a-lim*	ŠU.BI.AŠ.ÀM	(ditto)
Ú KI.MIN	ŠU.BI.AŠ.ÀM	(ditto)
Ú KI.MIN	ŠU.BI.AŠ.ÀM	(ditto)
Ú KI.MIN	ŠU.BI.AŠ.ÀM	(ditto)
Ú KI.MIN	ŠU.BI.AŠ.ÀM	(ditto)

The distribution of KI.MIN and ŠU.BI.AŠ.ÀM in BAM 1 may reflect some original source material from which the data was derived, but this still does not help solve the overall problem of determining how the text was constructed.

It seems likely, however, that the compiler(s) of BAM 1 had expertise in both medical and omen literature, judging by the types of notations found in the text. It would be an over-simplification to conclude that BAM 1 reflects data gathered exclusively from medical recipes. For instance, the final listing of drugs in BAM 1 (ll. 156-161, each line ruled) suddenly deviates markedly from all previous entries:

Ú SU.DAR GU_7	ŠÀ.ZI.GA	*ú-maṭ-ṭa*$^{!}$
Ú *a-zal-la-a*	KI.MIN	ZARAH NU TUK-*ši*
Ú <SAG.>DU $BURU_4^{mušen}$	$ŠEG_6$-*šal* GU_7	*né-ez-zu bu-na-nu*-⌈*šú*$^{!}$⌉
Ú <SAG.>DU $BURU_4^{mušen}$ BABBAR	$ŠEG_6$-*šal* GU_7	*ni-ṭil-šú* ZÁLAG-*ir*
Ú GA.RAŠ^{sar}	Ú ŠE.LÚ^{sar}	*šá* IGI^2-*šú* GIG NU GU_7
Ú LU.UB^{sar}	Ú <LÚ.>U_{18}.LU^{sar}	*šá* ŠÀ-*šú* GIG NU GU_7
drug (by) eating *šumuttu*	impotence	will diminish
drug *azallû*	ditto	not to have depression
drug head of a raven	you boil and give to eat	its form is to be evacuated
drug head of a white raven	you boil and give to eat	to brighten his eyesight
drug leek	coriander (*kisibirru*)	which the one whose eyes are sick is not to eat
drug turnip	*amīlānu* ('man-like'-plant)	which one whose innards are sick is not to eat

Nothing prepares us for this sudden change. In these concluding lines, column one offers some exotic as well as ordinary ingredients; column two gives both alternative plants and instructions; column three describes the effects of therapy or warnings when the drug should not be taken. A possible parallel for these lines is an unusual and unique Assur tablet (A 522 = BAM 318), now recopied and edited in Schwemer 2013. As Daniel Schwemer notes (p. 184), some sections of this text are directly drawn from Šumma ālu, which raises a red flag for us. Additionally, BAM 318 likewise contains numerous examples of simplicia, but col. iii 18-28 is a particularly relevant section of this unique tablet, marked off by rulings.

[DIŠ S]AG.DU BAL.GI^{ku6} GU$_7$-*ma* SAG.DU-*su ši-ib-tú ul* DIRI
DIŠ [SA]G.DU BURU$_4^{mušen}$ GE$_6$ GU$_7$-*ma ni-ṭil-šu*$^{!}$ *i-nam-mir*
DIŠ ⌈^{ú}⌉*šu-mut-tu* GU$_7$-*ma* ⌈*la*⌋-*sa-ma uṣ*-⌊*ṣab*⌋
DIŠ ^{ú}GA.RAŠ^{sar} GU$_7$-*ma ni-ṭil-šu* LÁ-*ṭi*
DIŠ SUM^{sar} SUM.SIKIL^{sar} GU$_7$-*ma* SAG.KI GIG
DIŠ ^{ú}*ṣa-ṣu-um-tú* GU$_7$-*ma ni-iš* ⌈*lìb-bi* TUK-*ši*⌋
DIŠ LU.ÚB^{sar} ^{ú}LÚ.ÙLU.LU GU$_7$-*ma* [Š]À [GIG][26]
DIŠ ^{ú}*ka-mu-na* ^{ú}*kam-ha-tú*[27] GU$_7$-*ma ana* x [.....]
DIŠ ^{ú}HUR.SAG ^{ú}NÍG.BAL^{sar} G[U$_7$-*ma* .....]
DIŠ ^{ú}NU.LUH.HA ⌈GU$_7$-*ma ni-iš* ŠÀ⌋ [TUK-*ši*]
DIŠ *a-zal-lá* [GU$_7$-*m*]*a ni-is-sa-tú i-m*[*a-aš-ši*]

[If] he eats [the] head of a tortoise, his head will not be filled with gray hair.
If he eats the head of a black crow, his eyesight will become bright.
If he eats *šumuttu*-plant, he will increase running.
If he eats leek, his vision will diminish.
If he eats garlic (or) onion, the temple(s) will get ill.
If he eats *ṣasṣumtu*-plant, he will have potency.
If he eats turnip (or) *amēlānu*-plant, [the stomach will get ill(?)].
If he eats *kamūnu* (or) truffle, [.....].
If he eats *azupīru* (or) NÍG.BAL-garden plant,[28] [...].
If he eats *nuhurtu*-plant, [he will have] potency.
If he eats *azallû*-plant, depression will diminish.[29]

There is a substantial amount of overlap between these lines of BAM 1 and BAM 318, along with the remark in both texts that eating the head of a crow will diminish one's eyesight. Within this short extract, many of the same plants appear as in BAM 1: *šumuttu, karašu*-leek, *laptu*-turnip and its counterpart *amēlānu*-plant (mentioned jointly in both texts), and the *azallû*-plant. Similar consequences from consuming these plants are also mentioned, such as increasing or losing sexual potency, enhanced or diminished eyesight, and relief of depression. The unique character of BAM 318, with its predominant reliance upon simple rather than compound recipes, offers another important comparison with BAM 1. Instead of the usual introductory formula in recipes, DIŠ NA (symptom) GIG, 'if a man is ill with (a symptom)', BAM 318 uses an alternative formulation, DIŠ NA (*ana amēli*) (symptom) NU TE (*la ṭehê*), ' for (a symptom) not to approach a man'.[30] What follows are rather standard and relatively simple instructions similar to what is found in col. iii of BAM 1, e. g. 'you take' (TI), 'you pound' (SÚD), 'you dry

[26] The proposed restoration is based on BAM 1: 163 col. iii.
[27] A variant of *kam'atu* 'truffle'.
[28] Alternatively, one might read this plant as Ú *šá-pal* (^{giš})KIRI$_6$, the 'foot of the garden'-plant.
[29] Schwemer restores the verb as *i-m*[*a-aš-ši*], 'he will forget' melancholy, which is certainly plausible.
[30] See Schwemer 2013: 186. A similar usage appears in BAM 209.

out' (HÁD), 'you give to drink in premium beer on an empty stomach' (*ina* KAŠ.SAG NU *pa-tan* NAG), etc.[31] All of these features of BAM 318 point to his atypical text from Assur archives as possible source material for the compiler(s) of BAM 1, in highlighting simple drugs regularly used for specific ailments, under a relatively streamlined regime of treatments, but of course, the reverse is also possible, that BAM 318 borrowed this pattern from the Vademecum.

When considering possible sources for BAM 1, one needs to take note of an early 'forefunner' or precursor to BAM 1, which is known from an addendum to KADP 1 (Köcher 1955: pl. 1-9), which is a list of medical plants / drugs.[32] The last two columns of this Middle Assyrian 6-column tablet provides evidence for an early Vademecum, in the form of listing drugs, medical conditions, and instructions for administering the drugs (how and when, etc.). Although the tablet does not duplicate BAM 1 except in isolated entries, the overall content is recognisable as the same genre of text, as the following extracts from KADP 1 column 5 will show:

First extract (KADP 1, col. 5, ll. 6-10)

[Ú] ŠAKIRA	Ú ŠU.DINGIR.RA.KE$_4$	*sà-ku ana* A.ME[Š ŠUB GU$_7$]
[Ú ŠA]KIRA	Ú ZÚ.GIG	*sà-ku ina* U[GU ZÚ-*šú* GAR][33]
[Ú ŠAKI]RA	Ú LA.RA.AH	*sà-ku ina* G[Ú GAR]
[Ú .....] x	Ú ZÚ.KUD UR.GI$_7$	*sà-ku ana* IG[I ZÚ.KUD GAR]
[Ú .....]	Ú ZÚ.KUD MUŠ	*sà-ku ina* N[A GU$_7$]

drug *šakirû*	drug against 'hand of a god'(-disease), to pound, to [put] into water, [to consume]	
drug *šakirû*	drug for toothache,	[to place] over [his tooth]
drug *šakirû*	drug for labour pains,	to pound, [to place] on the neck
drug [.....]	drug for dog-bite, to pound,	to [place] on the surface [of the bite]
drug [.....]	drug for snakebite,	to [have] a man [consume]

Second extract (KADP 1, col. 5, ll. 20-28)

Ú NUMUN IN.NU.UŠ	Ú MÚD.MEŠ *ina* KIR$_4$ TAR ^{sig}ÀKA NÍGIN *ina* MÚD ^{na4}*šá*-[*da-nu*]-DAB.BA *ta-ṣa-bu ana* KIR$_4$.BI GAR-*nu*
Ú NUMUN IN.NU.UŠ	Ú ŠÀ.ZI.GA.KE$_4$ *ina* ^{sig}HÉ.ME.D[A] *ta-ṭa-me ina šu-pal* ^{giš}NÁ-*šú* GAR-*n*[*u*]
Ú TAR.MUŠ	Ú NÍG.AK.A *ana* NA NU DIM$_4$ *ina* U$_4$.NÁ.A NA G[U$_7$]
Ú TAR.MUŠ	Ú ZÚ.KUD MUŠ *sà-ku ina* Ì.GIŠ ŠÉ[Š]
Ú HAR.HAR-*ši* (*hašû*)	Ú ZÚ.KUD MUŠ *sà-ku ina* Ì.GIŠ Š[ÉŠ]
Ú HAR.HAR-*ši*	Ú NÍG.AK.A NU DIM$_4$ *ina* U$_4$.NÁ.A NA G[U$_7$]
Ú HAR.HAR-*pa*$^{!}$-*na*	Ú [NÍG].AK.A NU DIM$_4$ *ina* U$_4$.NÁ.A NA G[U$_7$]

[31] It is of interest to contrast the presumed use of 2nd person singular forms in the therapeutic recipes with the infinitives used predominantly in the instructions (third column) of BAM 1. The use of infinitives in BAM 1 applies to verbs in common use, such as SÚD for *sâku*, 'to pound', which appears regularly in the MA parallel KADP 1 col. 5 as *sà-ku* (see below).

[32] I am indebted to Frans Wiggermann for drawing my attention to this tablet. His notes also mention BAM 423, another Middle Assyrian tablet which little actual resemblance to KADP 1, except for the fact that it includes some simple instructions with a listing of plants and diseases. For example, l. 11 reads:

Ú *ši-gu-uš-te* SIG$_7$	Ú *a-mur-ri-qa-ni*	SÚD *ina* GEŠTIN SUR NAG
drug *šiguštu*	drug for jaundice	to pound, to drink in pressed wine

Parallels with BAM 1 have been noted by Attia-Buisson 2012. One notes frequent use of the notation KI.MIN in this tablet, which is not the case with KADP 1. Although Köcher assumes this tablet to be Middle Assyrian, it may be somewhat later than KADP 1.

[33] The parallel with BAM 1: 1 is obvious, but the position within the listing is different.

drug seed of *maštakal*	drug (for) stopping nosebleed, to wrap (in) a wad, (which) you soak in the 'blood' of magnetite, to place into the nose
drug seed of *maštakal*	drug for impotence, (which) you spin in red wool, to place at the foot of his bed
drug *tarmuš*	drug for magical practice, that it not approach a man, to have a man eat at the end of the month
drug *tarmuš*	drug for snakebite, to pound, to rub on in oil
drug *hašû*	drug for snakebite, to pound, to rub on in oil
drug *hašû*	drug for magical practice, that it not approach a man, to have a man eat at the end of the month
drug *haltapānu*	drug for magical practice, that it not approach a man, to have a man eat at the end of the month

It is worth noting both similarities and differences between KADP 1 and BAM 1. The obvious parallels are thematic, listing simple drugs and illnesses and instructions, divided by horizontal rulings, with consideration repetition between entries. The same drug (e.g. *šakirû*) can be used for three different unrelated medical conditions, with some variation between instructions (to pound, to consume, or to apply externally). In some cases, variables are minor, such as the use of the same logogram HAR.HAR (confusing for us) to refer to two different drugs, *hašû* and *haltapānu*, both of which are listed against sorcery, with the same instructions. Also, a segue between sections can be determined by repetitions, such as different simplicia (*tarmuš* and *hašû*) being useful for snakebite. The differences are also significant between KADP 1 and BAM 1. First, there is no use of 'ditto' (KI.MIN or ŠU.BI.AŠ.ÀM) in KADP 1, although these feature prominently in BAM 1.[34] Second, the three-column format in BAM 1 cannot be easily detected in KADP 1, despite the fact that both have vertical as well as horizontal rulings. This is significant, since it means that the scribe of KADP 1 did not visualise three separate logical divisions of the text, but that the diseases and instructions were listed together as integral parts of column two. This difference will be significant for our final analysis of BAM 1.

Elementary, Watson

This brings us to the point of trying to decide how the text of BAM 1 was actually constructed, which also relates to the overall purpose of this text. Let us review the various possibilities individually.

First, one might think that the text revolves around the list of drugs (mostly plants) in the first column as a way of describing a large number of *materia medica*, in terms of diseases which they can treat and how they are administered. There are several obstacles to this proposal. First, the list of drugs is far from complete and many common drugs have been omitted from the list. Second, many of the drugs are duplicated throughout the text, and one would have thought that if this text was a study of drugs, all instances of the same drug would be collected under the same heading, so that one could immediately determine what diseases could treated by a specific drug.[35] In short, the order of drugs does not appear to answer a hypothetical question, 'what drugs were used against which diseases and in what manner?'[36]

[34] The notation KI.MIN appears in a sequence of lines in BAM 423, another Middle Assyrian precursor to BAM 1, but only sporadically.

[35] This is indeed a feature of KADP 1, as noted above.

[36]There is much we do not know about the drugs listed and any implicit theories involving their applications. For instance, to what extent were drugs for 'hot' conditions (e.g. fever) considered to be 'cold', or which drugs for 'moist' diseases were considered to be 'dry'? This paradigm of opposites is well known from Greek medicine and may have been employed by Babylonian medical theorists as well.

A second possibility is that the diseases / symptoms category in column two was the primary factor in assembling the tabular data, and that drugs and treatments were secondary. On the other hand, the order of diseases does not adhere to the usual head-to-foot anatomical scheme typical of medical literature, and once again the list of diseases and symptoms is selective rather than comprehensive, with many known and common diseases not mentioned. There does not appear to be any logical principle behind the order of diseases being listed, beyond being random. Furthermore, one might have supposed that, were the diseases or symptoms to be determining criteria for the overall organisation of the text, they would have been listed in the first column, followed by the associated drugs and operations in columns two and three. The order of entries in the second column does not appear to address any hypothetical question, such as, 'which ailments were treated by which drugs and under what conditions?' The answers to any such question would not have been easy to find in this tablet.

This leaves us with a third possibility -- which seems counterintuitive -- that the treatment data in column three were significant indicators of the purpose for composing BAM 1.[37] To full appreciate this, we need to start from the end of the text, from lines excerpted from Šumma ālu, which provide omen predictions associated with many of the same medical plants. In this case, new information does not come from the list of plants on the left, but on the apodoses in the right hand (or third) column. The question is whether column three of BAM 1 might address the hypothetical question, 'what are the main types of drug applications (internal or external) for particular ailments?'[38]

With this in mind, we note that the Vademecum opens with operations dealing with dentistry and ailments of the mouth, all of which involve the external application of drugs directly onto the teeth (*ana* UGU ZÚ-*šú* GAR-*nu,* ll. 1-14). It is difficult to explain the intrusion of the 'hand-of-the-oath'-ailment immediately following dentistry, but drinking on the new moon (l. 17) is likely to involve beer, since taking drugs in beer is what consistently follows. In ll.18-22 which follow, the use of beer connects various genitalia-related conditions, progressing from retaining semen (lit. 'seed') to 'stricture of the bladder' (*hi-niq* BUN , ll. 23-28) and then to the gall-bladder (or 'bile', ZÉ, ll. ll. 29-33), all related to each other by mixing drugs in beer to be inserted into the vagina, or to be blown into the urethra via a tube, or to be drunk. The most common instruction throughout these sections, however, is: *ina* KAŠ SAG NAG, 'to drink in premium beer', indicated either by repetition of the phrase or by 'ditto'.

Not all the transitions are easy to understand, but the next group of substances and symptoms marks a significant change (ll. 34-36). The instructions for 'sick intestines' (*irrū*) call for medications to be pounded and taken in beer, but the related ailment, *maškadu*, now requires substances to be taken externally by being bandaged in wool or rubbed on (usually in oil). These three lines contain the full repertoire of directives (ingesting, massaging, applying) for internal and external administration.

The pattern then changes again, and the next varied group of illnesses all share the same general instructions of external massage with oil (SÚD *ina* Ì.GIŠ ŠÉŠ, 'to pound and rub on in oil', ll. 37-51). The following section is a mixed bag (ll. 52-57), and the only common element appears to be 'heat stroke' (*himiṭ ṣēti*) in the second column, continuing on from the previous section (ll. 48-51). The next intrusion of several lines, dealing with depression or magically-induced gloom, is difficult to explain, but what follows is a lengthy section of entries concerning *ašû*-disease (ll. 61-72). Treatments include massage with oil and fumigation (an innovation at this point), as well as bandaging with wool, but beer soon takes over as the main drug medium,

[37] This may be comparable to bilingual parts of a lexical texts like Erimhuš, in which the Akkadian entries on the right are primary, with the Sumerian on the left being secondary. This is discussed in detail by Kaira Boddy, *The Composition and Tradition of Erimhuš* (Cuneiform Monographs 52, 2021).

[38] The question might also be rephrased as, 'which diseases are normally associated with external or internal drug treatments?'

usually indicated by 'ditto' (for SÚD *ina* KAŠ SAG NAG, 'to pound, to drink in premium beer'). The sequence is interrupted at this point by a notation which overrides the three-column format, advocating that various drugs be applied externally in a heated state by rubbing onto the head (l. 73), perhaps again alluding to *asû*-disease. This lengthy line, however, provides a segue to the next groups of entries for treating flatulence (*šibiṭ šāri,* lit. 'attack of wind') and *samānu*-disease, which have nothing in common except that drugs are usually to be rubbed onto the body externally, either in oil or ghee, with the exception of one drug (*hašû*) to be imbibed in beer (l. 75). Nevertheless, almost all drugs for the various ailments in these sections (ll. 61-86) are to be applied externally (SÚD *ina* Ì.GIŠ ŠÉŠ, 'to pound and rub on in oil'), regardless of ruled divisions between different diseases or symptoms.

Another transition follows, with the first line of a section dealing with sick lungs again calling for drugs to be massaged (l. 88, SÚD *ina* Ì.GIŠ ŠÉŠ), but all subsequent drugs are to be administered internally for lungs, wheezing, coughing, *šīqu*-illness, phlegm, jaundice, and even the bowels (ll. 87-117), involving drugs mixed with beer, or less commonly with oil, honey, wine, or juice. Remaining patterns are much the same, with drugs placed over the surface of a lesion, or mixed with oil or fat and inserted into the anus to treat rectal problems; once again, the drugs and diseases change, but the procedures in column three are stable, crossing over ruled sections. The repetitions of entries and frequent use of 'ditto' in the third column of BAM 1 provide the strongest clues to the loose structure of the text, namely that the sequence of diseases and their associated drugs were listed roughly according to the type of treatments employed, indicating whether drugs were to be taken internally (usually with beer) or externally (usually rubbed on with oil or bandaged).

The pattern is complicated, since the logical associations between groups of entries appear to alternate at times between the second and third columns, indicated by repeated entries bridging ruled sections. What conclusions can we draw from this patchwork evidence? Clearly there is a system at work which is never explained by ancient physicians, but which appears to be something other than arbitrary.

Schematic modelling

One novel view of BAM 1 is to treat the entire composition as a modelling exercise, similar to those employed in Babylonian astronomy and astrology. According to Francesca Rochberg, schematic models were employed in texts such as MUL.APIN and the so-called Astrolabes to chart the length of daylight hours throughout the calendar year, or the more abstract 'zigzag' schemes charted the motion of a celestial body through zones of the zodiac; modelling could also be used to track the first and last visibility of a planet or new and full moons.[39] Rochberg's crucial point, however, is that astronomical models were not intended to reflect reality or the 'accuracy of representation of the physical or natural world,' but rather used mathematical analogies to solve astronomical problems (Rochberg 2018: 144). Although such concepts are difficult for non-mathematically inclined non-astronomers to comprehend, nevertheless, the modelling concept can arguably be carried over into other Mesopotamian disciplines, and specifically medicine, despite having no actual mathematical component. To show how this works, the astronomical text MUL.APIN offers important comparisons with BAM 1 in regard to modelling. One of the classic features of MUL.APIN is the use of a 360-

[39] See Rochberg 2018: 136-137, 141. Francesca Rochberg also notes, in an article soon to be published, that Babylonian astronomical models reflect a 'world constructed of numbers, measures, and numerical relationships', as opposed to an image framed by an all enclosing celestial sphere. She points out that astronomical models of lengths of daylight hours throughout the year were already worked out in the Old Babylonian period, and that numerical values for these models were provided in the later 'astrolabes.' This information is important for showing that abstract mathematical models were already known in the second millennium BCE. Her observations will appear in F. Rochberg and J. L. Berggren, 'Describing and Understanding the World in Antiquity', in Michael Friedman ed., *A Cultural History of Mathematics in Antiquity,* Vol. 1, Chapter 5, (forthcoming).

day calendar, which arbitrarily assigned 30 days to each of 12 months in the year. As Hunger and Steele note:

> It is important to stress that the schematic 360-day year never replaced the luni-solar calendar as a true calendar used in everyday life. Instead, the schematic calendar existed purely as a simplification of the true calendar, both to make calculation easier and to provide a fixed framework to place events (in our case, astronomical phenomena) in a schematic fashion. (Hunger and Steele 2019: 8)

As this statement makes clear, an entirely theoretical calendrical scheme was employed which everyone knew to be unrealistic but convenient for calculations, while also employing a data-driven empirical calendar worked out through observation and later mathematical algorithms. Apart from its calendrical model, MUL.APIN also employed a simple if not particularly accurate numerical scheme for charting the length of day and night throughout the year (Hunger and Steele 2019: 11-12). In addition to astronomical observations, MUL.APIN incorporated predictions in the form of celestial omens (ibid. 4), which shows a similar mixing of genres, in common with BAM 1. Two other aspects of MUL.APIN are relevant to the present discussion. Although the rather crude schematics of the text were rendered virtually obsolete by later advances in mathematical astronomy and discovery of the zodiac, MUL.APIN continued to be copied and studied even into the Seleucid period (ibid. 15).[40] On the other hand, it was not meant for strictly academic enjoyment, since MUL.APIN continued to have practical applications, especially those sections dealing with intercalation and visibility of the moon (ibid. 14). All of these features measure up quite well in comparison with BAM 1, which existed side-by-side with complex therapeutic prescriptions, containing much more detailed information regarding symptoms, medical ingredients, and the administration of drugs. Nevertheless, tablets based on the format of BAM 1 continued to be composed in later periods.[41] The purpose of a Vademecum was not to reproduce in an abbreviated form the data from therapeutic recipes, but rather to create a simplified scheme for assigning the application of drugs to various diseases and symptoms, based on limitations regarding how the drugs (usually plants) were to be treated and administered.

By thinking of BAM 1 as a form of schematic modelling of Babylonian medicine, rather than as a carefully chosen selection of extracts drawn from actual recipes or prescriptions, one solves three important puzzles presented by this text.

First, the fact that BAM 1 is so eclectic in its choices of diseases and drugs cannot be explained by conventional logic. For a Vademecum or handbook to be of any practical use (like a *Physician's Desk Reference*), one would expect to find a head-to-foot systematic treatment of diseases and drugs used to treat them. Instead, BAM 1 lists some diseases in a seemingly random order with a mixture of common and rare drugs, with only the bare minimum of details regarding how drugs are administered.[42] Second, although some sections of BAM 1 have remarkably similar parallel passages in therapeutic recipes, nothing is precisely duplicated, even when the same diseases and similar drugs and instructions are listed. So far, there is no evidence that BAM 1 was actually citing or excerpting precise data from other texts.

[40] Other studies have shown that it served as a model for Aramaic astronomy, in texts such as Enoch (Drawnel, 2011: 402-405).

[41] Apart from duplicates noted in Attia-Buisson 2012 (JMC 19): 25, one Late Babylonian version of the Vademecum (BAM 380 = BE 13623+) stands out as a parallel but not duplicate pharmacological handbook, perhaps patterned after BAM 1 but with a different selection of drugs, diseases and instructions. Nevertheless, the schematic logic of the text is similar to the Assur handbook.

[42] Francesca Rochberg notes (personal communication) that the minimal details in column three of BAM 1 might reflect astronomical models that skip dates or positions which can theoretically be interpolated from the numbers in the text.

To a certain extent, one might expect medicine to be an exact science in which the same drugs would be employed against the same illnesses, but this does not yet appear to be the case. Third, appending Šumma ālu omens to the end of the text is far from orthodox, since genres are usually clearly delineated in Akkadian *Wissenschaften*. The omens, however, function well as part of an analogous modelling scheme, since they provide additional theoretical data regarding the drugs listed in the first column of BAM 1, without describing the effects or even side-effects of the drugs.

The main point about modelling (based on astronomical analogies) -- as distinguished from catalogues or lists or omens, etc. -- is that scientific models normally represent abstract data, formulated through mathematics. In the case of medicine, for which mathematics is irrelevant, there is nevertheless an abstract aspect to BAM 1 which is atypical and highly unusual, with the logic being: 'A is to B given C'.[43] A selection of simple drugs (A) is to be employed for certain diseases (B), if and only if administered under certain conditions (C). The difference between BAM 1 and numerous therapeutic recipes is that the information in column three of BAM 1 does not represent instructions but guidelines for treatment, and hence qualifies as schematic. All three columns taken together form an interdependent logical framework.

This view of BAM 1 as an example of abstract modelling can encounter objections. One possible hurdle is to explain the presence of a 'forerunner' KADP 1, column 5-6, discussed above, which does not duplicate BAM 1 but shows a somewhat rudimentary form of a Vademecum, similar enough to be comparable. The question is whether such forms of abstract thinking we are attributing to BAM 1 can be comfortably placed back into the second millennium BCE. [44] If one returns to the examples from the field of astronomy, we know that some parts of what later became Enūma Anu Enlil were known to Middle Assyrian scribe-scholars.[45] With these as examples in mind, it should not surprise us to find a precursor to BAM 1 in a Middle Assyrian composition. Nevertheless, without mounting a teleological argument for 'progress', it is fair to point out that the specific example of the earlier vademecum, KADP 1, does not demonstrate quite the same logic or level of abstraction as that of the later Neo-Assyrian text. A cursory comparison between KADP 1 and BAM 1 shows some revealing differences between the two texts. First, KADP 1 appends its vademecum to a plant list, but it is not of primary interest to the compiler(s) of the text. Second, the purpose of KADP 1 appears to be concrete rather than abstract, in listing the same drugs on the left column with their corresponding ailments and other data relevant to their uses. Several instructions in KADP 1 state that the drugs are to be administered on the last day of the month, which is not often found in therapeutic recipes, or alternatively, that drugs could be employed against conditions not always associated with medicine, such as wild beasts (*nammaššu*)[46] or against magical practices not to be employed in a man's house. On the other hand, some instructions in KADP 1 appear to be *sui generis* rather than simply copied from recipes, such as the following (col. v 42-44):

[43] An alternative formulation might be: Item A (drug) can *only* relate to Item B (disease) under condition C (instruction).

[44] Irving Finkel reminds me of the often-made observation that in the field of Mesopotamian law, the law codes (such as Codex Hammurabi) were theoretical legal models which existed alongside common law, as known from legal documents and court cases. The law codes were never cited in legal cases.

[45] See Heeßel 2018: 255-260. Although Heeßel concludes that no recension of EAE can be securely identified from second millennium sources, it is nevertheless the case that isolated second millennium BCE manuscripts resembled what later became known as EAE. In other words, one cannot prove a Middle Assyrian 'Series' of EAE, but parts of the text were known in some form, whether labelled as EAE or not.

[46] See l. 15: Ú NÍG.KI.A *ina* É NA NU.GÁL *sà-ku ana* U[GU] É NA *su-lu-hu,* 'drug for wild animals not to be found in a man's house, to pound, to sprinkle the surface of the house.'

Ú *at-kam*	Ú MURUB.MEŠ GIG *sà-ku ana* A.MEŠ PÚ ŠUB
	ina IM.ŠU.RIN *se-ke-ru* MURUB.MEŠ *muš-šu-u* GAZ MURUB.MEŠ LÁ
drug *atkam*	drug for sore hips, to pound, to put into well-water,
	to heat in an oven, to massage the hips, to crush, to bind the hips

The formulation of this entry is a combination of common instructions (to pound, to heat in an oven), combined with more atypical uses of well-water and massage-therapy. It does not have the hallmarks of the more theoretical general instructions found in BAM 1, which suggest either internal or external applications.

The comparisons between KADP 1 and BAM 1 are useful guides to determine how a text, such as the Vademecum, can percolate over a long period and develop different patterns over time. The abstract modelling of BAM 1 can be detected in earlier phases to a limited extent, but it seems clear that the specifics of the instructions in BAM 1's third column were not as important over time as the general patterns they represented, as general guidelines for the administration of drugs. They were intended as more general than specific, to provide a theoretical framework for the uses of drugs, rather than particular instances for individual cases. The contract between KADP 1 and BAM 1 does indeed show developments in thinking which indicate changes in how medicine adapted to the intellectual milieu of Assur in the Neo-Assyrian period. This was the same environment which produced the Assur Medical Catalogue and KAR 44, both major achievements.

Conclusion

It is not an easy task to analyse a cryptic text like BAM 1, which represents the bare bones of medical theory without being fleshed out by helpful explanatory guides from those who composed and used such texts. While operating in the dark, one inevitably makes incorrect assumptions, many of which are discussed in the present study. The initial question raised by BAM 1 is why it was composed in the first place and by whom, conjuring up the paradigm image of a single scribe writing down data at a single point in time. This and other texts could represent cumulative knowledge gathered over generations of experience with drugs and their applications. The second obvious question regards which column is primary and which secondary: is this a text about drugs or diseases? with the usual conjecture being that the instructions were tertiary. In fact, there is no convincing hierarchy of data. Another approach is to search for some internal logic for the sequencing of drugs and diseases, which leads to examining the internal patterns of repetitions among the drugs, to see if multiple references to the same drug might render information about how the listings were ordered. Without any external information to guide us, no real clues emerge. The internal formats, particularly in the use of 'ditto' notations, render some hints regarding the importance of the instructions in column three, since these notations reflect similar patterns in other texts, which might have contributed some data to the Vademecum. In the end, if one looks at BAM 1 as three independent columns of data, on drugs, diseases, and instructions, the overall purpose of this text remains elusive.

Once one grasps the importance of abstract modelling within the Babylonian academy, the role of BAM 1 comes much more sharply into focus. The combination of vertical and horizontal rulings indicates from the start that the text is to be read in both directions, both as lists and as individual propositions, grouped into discrete sections. The point about BAM 1 is that it is selective rather than comprehensive in its choices, hence not a catalogue or practical listing of drugs or diseases, nor or these ordered in any easily divined way. Instructions are rudimentary and general, unspecific, and largely unduplicated in therapeutic texts in the form in which they appear. All of these are indications that BAM 1 is something other than an

Uruanna type of plant list: it is likely to be a schematic model, intended to illustrate the theory of the use of medicinal drugs, not the practice.

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APPENDIX BAM 1 translation

NB. Names of drugs repeated in the text are marked in **Bold**.

	Col i	Col. ii	Col. iii
1)	[drug male mandrake (***pillû***)][1]	drug for the sick tooth	to place over his (the patient's) tooth
	[drug root of male mandrake]	drug ditto	ditto
	[drug green 'cranium-like'(-plant) (*gulgullānu*)]	drug ditto	ditto
	[drug *lulumtu*]	drug ditto	ditto
5)	[drug centipede (*hallulāya*)]	drug ditto	ditto
	[drug root of] sun(-plant)	drug ditto	ditto
	drug [root] of thistle (***ašagu***) which	the sun has not witnessed when you uproot it	drug against (tooth)worm, ditto
	drug *kudimeru*	drug for a knocked out tooth	to dry, to pound, to mix in oil, ditto
	drug *šibir ṣīri*(MAH)	drug for a knocked out tooth	to dry, to pound, to mix in oil, ditto
10)	drug root of thorn-bush (*baltu*) which the sun has not witnessed when you uproot it		drug for a knocked out tooth, ditto
	drug *mirišmara*	drug for loose (lit. weak) teeth	to place over the teeth
	drug root of ***haltappānu***, drug root	of *alluzu*[2], drug ditto	ditto
	drug resin of *šimṭatu*,	bitter-aromatic (^{šim}*murru*), drug ditto	ditto
	drug resin of ***baluhhu***	drug ditto	ditto
15)	drug *marguṣu*	drug to clean the teeth	you clean the teeth while fasting[3]
	drug alum (*gabû*), mint (***ninû***),	*tūru*-aromatic, ditto	ditto
	drug shoot of tamarisk (***bīnu***)	drug to annul the 'hand of the oath'	to drink on the new moon
	drug seed of ***kamantu***	drug for holding seed (semen)	to pound, to drink in premium beer
	drug seed of ***atkam***	drug for holding seed (semen)	to pound, to mix with roasted barley flour in beer dregs, to put into her vagina

[1] The drugs in the first ruled section of column one are restored from CT 14 23 (K 259), as noted in Attia-Buisson 2012 (JMC 19): 32.

[2] The second drug appears in column two because of insufficient space in column one. This same pattern is repeated elsewhere, in ll. 12, 16 and 136.

[3] *lā patān*, which often alternates with *balu patān*, usually translated idiomatically as 'on an empty stomach'.

20)	drug resin of ***nuhurtu***	drug for stricture of the bladder[4]	to drink in beer, to rub in oil, to blow (through) a tube into his penis
	drug bitter aromatic (^{šim}***murru***)[5]	drug for stricture of the bladder	ditto
	drug resin of ***baluhhu***	drug for stricture of the bladder	ditto
	drug shoot of thorn-bush (***baltu***)	drug ditto	to pound, to drink in premium beer
	drug *imhur-līm*	drug ditto	to pound, to drink in wine[6]
25)	drug green *azupiru*	drug ditto	to pound, to drink in premium beer
	drug Kaniš-oak (*allankaniš*)	drug ditto	to pound, to drink in premium beer
	drug garlic (*šūmu*)	drug ditto	to pound, to drink in oil or premium beer
	drug *hašânu*[7]	drug ditto	to pound, to drink in oil or premium beer
	drug *ṣiburu*	drug for the gall-bladder	to pound, to drink in premium beer[8]
30)	drug bitumen (*ittû*)	drug for the gall-bladder	to pound, to drink in either premium beer or wine
	drug *merginu*[!]	drug for the gall-bladder	ditto
	drug ***ka'u***-fungus[9]	drug for the gall-bladder	ditto
	drug *tullal*, tamarisk (***bīnu***)-leaf	iron, snake-stone, drug for the gall-bladder	ditto
	drug ***purupuhu***[10]	drug for the sick intestines (*irrū*)	to pound, to drink in premium beer
35)	drug root of ***kurkanû***	drug to remove *maškadu*-disease	to wrap (in) goat wool, to place on a man's neck
	drug shepherd's crook(-plant) (*haṭṭi re'i*)	drug ditto	to wrap wool [on a man's neck], to rub on in oil
	drug root of thistle (***ašagu***) root of	[... drug] ditto	to keep rubbing on in oil
	drug resin of tamarisk (***bīnu***)	drug for paralysis (*šimmatu*)	to wrap goat wool to place on a man's neck
	drug leaf of ***šunû***	drug for an attack of *šadânu*-disease	to pound, to rub on in oil
40)	drug handle (lit. 'ear') of *red* thorn-bush (***baltu***)	drug ditto	to pound, to rub on in oil

[4] *hiniq ellabuhhi.*
[5] See BAM VII No. 1 ii 23' (p. 36), in which this drug is a *simplicium* for urinary tract disease.
[6] Wine, which occurs relatively infrequently, was used as an alternative to beer (see l. 30). Like beer, it was used as a solvent for drugs because of its alcohol content.
[7] Literally, a 'lung-like' plant.
[8] Cf. Uruanna II 373 ZÉ *mar-tu* Ú *ṣi-bu-ru* (see also Uruanna II 54, 304).
[9] To be identified with *kammu*-fungus below (l. 131).
[10] Var. *puhpuhu*. See Uruanna II 47, *puhpuhu šá-mi* IZI *lib-bi*, drug for 'internal fever'.

	drug leaf of thistle (***ašagu***)	drug for fever (*ṣētu*)	to pound, to rub on in oil
	drug licorice (***šūšu***)[11]	drug for *li'ibu*-fever	to pound, to rub on in oil
	drug *kusipu*	drug for *hammu*-disease	to pound, to rub on in oil
	drug ***ṣadānu***	drug for an abscess (*ummedu*)	to pound, to rub on in oil
45)	drug mint (***nīnû***)	drug for *stomach*[12]-(disease)	to pound, to rub on in oil
	drug green *azupiru*	drug for the (sick) buttocks	to pound, to rub on in oil
	dru ***kamūnu***	drug ditto	to pound, to rub on in oil
	drug ***ṣaṣumtu***	drug for heat stroke (*himiṭ ṣēti*)	to drink in premium beer, to keep rubbing on in oil
	drug sailors' excrement[13]	drug for heat stroke	to pound, to rub on in oil
50)	drug *aprušu*	drug for heat stroke	to pound, to rub on in oil
	drug leaf of *amurdinnu*	drug for heat stroke	to pound, to rub on in oil
	drug *lipāru*	drug for heat stroke	to put (into) fluids, warmed up[14], to bathe a man
	drug ***hašû***,[15] garlic-plant	drug for heat stroke	to rub on in honey, oil
	drug *ararû*	drug for heat stroke	ditto
55)	drug *šuqdānu*[16]	drug for heat stroke	to pound, to rub on in oil
	drug cobweb (*pizzir*)	drug for heat stroke	to drink in premium beer, ditto
	drug *imhur-līm*[17]	drug for heat stroke	to pound, to drink in premium beer, ditto
	drug ***azallû***	drug for depression	to eat and drink on an empty stomach
	drug seed of ***azallû***	drug for the 'face-of-evil'	not to approach a man[18], to rub on *daprānu*-juniper in oil

[11] See JMC 19: 35, giving evidence for the logogram NI.NE for *šūšu* 'licorice'.
[12] Reading [*k*]*a-aš-ri* for *karši,* 'stomach'; see Attia-Buisson 2012 (JMC 19): 36. A similar error occurs below (*im-ih-ru* for *mi-ih-ru*).
[13] *zê malāhi*, one of the few examples of Dreckapotheke in this text.
[14] Restoring <*ina*> A.MEŠ, with *sekir* 'heated', both referring to the *lipāru*-ingredient being warmed-up and administered in liquid form (court. G. Buisson).
[15] Lit. 'lung'-plant, but the logogram ^{ú}HAR.HAR might also indicate the plant *haltappānu*.
[16] 'almond-like' plant.
[17] A common panacea, 'it treats a thousand' (conditions).
[18] The entry in column two extends into column three, for reasons of spacing.

60)	drug seed of ***alluzu***	drug for ditto	ditto
	drug ***kamantu***	drug for *ašû*-disease	to pound, to rub on in oil[19]
	drug seed of ebony (*ušû*)	drug for *ašû*-disease	to pound, to rub on in oil
	drug *ata'išu*	drug for *ašû*-disease	to fumigate a man
	drug weed (*išbabtu*$_4$)	drug for *ašû*-disease	to fumigate a man
65)	drug resin of ***baluhhu***	drug for *ašû*-disease	to wrap wool, to place on the man's neck
	drug ***kukru***-aromatic	drug for 'fleeting' *ašû*-disease	to pound, to drink in premium beer
col. ii			
	drug ***urānu***	drug for *ašû*-disease	[ditto]
	drug *simat erēši*-plant[20]	drug for *ašû*-disease	[ditto]
	drug ***ṣaṣumtu***	drug for *ašû*-disease	d[itto]
70)	drug *dadānu*-carob	drug for *ašû*-disease	d[itto]
	drug seed of ***kamantu***	drug for *ašû*-disease	di[tto]
	drug ***kukru***-aromatic	drug for *ašû*-disease	di[tto]
	drug ***kukru***-aromatic, juniper (*burāšu*), ***kamantu***, *nikiptu*, *hûratu*-madder, seed of *qutru*		
	put all of these drugs in oil, cook in a fire, when hot, rub repeatedly onto his head[21]		
	drug ***kamantu***	drug for an attack of flatulence[22]	to pound, to rub in oil
75)	drug ***hašû***, garlic-plant	drug for an attack of flatulence	to drink in honey, oil, or premium beer
	drug fox-vine (***karān šēlebi***)	drug for an attack of flatulence	to pound, to keep rubbing on in oil
	drug *tarpisu*[23]	drug for *samānu*-disease	to pound, to rub in oil
	drug *amhara*	drug for *samānu*-disease	to pound, to keep rubbing on in hot ghee
	drug sailors' 'dust', *not causing trembling,*	drug for *samānu*-disease	ditto, you (keep rubbing)
80)	drug of Mt. Amadanu in premium beer, (or) of Mt. Habhu not dried out[24]		to pound, ditto

[19] Parallels with BAM 494 are explained by Attia-Buisson 2012 (JMC 19): 37.
[20] See Attia-Buisson 2012 (JMC 19): 37, discussing this plant name, 'suitable for cultivating'-plant.
[21] These lines override the three-column format of the tablet.
[22] Akk. *šibit šāri*, 'stroke of wind', referring to wind within the body. This disease is often listed immediately after 'sun-fever' (*himit ṣēti*).
[23] Hapax.
[24] The entry ignores the divisions between columns one and two.

	drug ***kurkanû***	drug for *samānu*-disease	to pound, to rub on in oil
	drug *pizallūru*-gecko	drug for *samānu*-disease	ditto
	drug ***kamantu***	drug for *samānu*-disease	ditto
	drug ***ṣaṣumtu***	drug for *samānu*-disease	ditto
85)	drug ***kamūnu***	drug for *samānu*-disease	ditto
	drug seed of ***kamantu***[25]	drug for lungs	to pound, to rub on in oil
	drug ***hašânu***[26]	drug for lungs	to pound, to consume on an empty stomach
	drug *puglānu*[27]	drug for lungs	ditto
	drug *buṭnānu*[28]	drug for lungs	ditto
90)	drug seed of ***atkam*** (***aktam***)	drug for sick lungs, to pound, to drink in oil on an empty stomach, while his tongue is grasped	
	drug *šallapānu*	drug for lungs which wheeze	to pound, to drink in premium beer
	drug field clod (***kirbān eqli***)	drug for cough (*suālu*)	to pound, to drink in oil or premium beer
	drug seed of ***atkam*** (***aktam***)	drug for cough (*suālu*)	ditto
	drug ***nuhurtu***	drug ditto	ditto
95)	drug root of licorice (***šūšu***)	drug ditto	ditto
	drug root of ***šunû***	drug ditto	ditto
	drug resin of poplar (*ṣarbatu*)	drug ditto	ditto
	drug ***andahšum***	drug ditto, to drink in honey, oil, or premium beer on an empty stomach (while) his tongue is grasped	
	drug ‘milk-like’(-plant) (***šizbānu***),[29] drug for cough (*suālu*), to drink in pressed oil on an empty stomach (while) his tongue is grasped		
100)	drug ‘dog’s tongue’ (***lišān kalbi***)	drug ditto (for cough)	to drink its squeezed out juices
	drug ***nuhurtu***	drug ditto	to pound, to drink in premium beer

[25] For a comment on these simplicia against lung disease, see Stadhouders and Johnson 2018: 576 and 597, based on comparison with a LB tablet (BM 78963, probably from Borsippa) with similar data on simplicia aimed to treating *suālu* and lung disease. There is little overlap in the choices of drugs between BM 78963 and BAM 1, and the textual formats are different, but the use of simplicia is common to both texts.
[26] Lit. ‘lung(*hašū*)-like plant’ (perhaps thyme), which may be the reason why it is used for lung disease.
[27] Lit. ‘radish(*puglu*)-like plant’
[28] Lit. terebinth(*buṭnānu*)-like plant’ (perhaps pistachio).
[29] See l. 107, where instructions for the same milk-like drug also require grasping the tongue, but in that line, the spacing conforms to the three-column format.

	drug seed of field clod (***kirbān eqli***)	drug for *šiqu*-illness[30]	to pound, to drink in ass' milk
	drug *takdanānu*	drug for *šiqu*-illness	ditto
	drug 'dagger-like'(-plant) (***patrānu***)	drug for *šiqu*-illness	ditto
105)	drug ***andahšum***	drug for *šiqu*-illness	to pound, to drink in premium beer
	drug resin of ***nuhurtu***	drug for a man who suffers from scarring[31]	to drink in honey, oil, or beer
	drug 'milk-like'(-plant) (***šizbānu***)	drug for phlegm (*hahhu*),[32] on an empty stomach, to drink pressed oil while his tongue is grasped	
	drug root of ***šūšu***-licorice	drug for phlegm	to pound, to drink in premium beer
	drug root of ***šunû***	drug for phlegm	ditto
110)	drug dog's tongue (***lišān kalbi***)	drug for phlegm	to have a man drink its squeezed out juices
	drug root of date (*suluppu*)	drug for *ahhazu*-jaundice	to pound, to drink in honey or oil
	drug *šagabegalzi*	drug for sick *bowels* (*takaltu*)[33]	to pound, to drink in wine
	drug marsh-apple (*hašhūr api*)	drug for the *bowels*	to pound, to drink in either beer or in wine
	drug fox-vine (***karān šēlebi***)	drug for the *bowels*	to pound, to rub repeatedly on the man in hot ghee
115)	drug *imhur-līm*[34]	drug for the *bowels*	to pound, to drink in premium beer
	drug *imhur-ešrâ*[35]	drug for the *bowels*	ditto
	drug *taramuš*	drug for the *bowels*	ditto
	drug ***puhpuhu***[?]	drug for *hidar* ('bird-spur'-disease)	to place over the surface of the lesion
	drug *kamkadu*	ditto	ditto
120)	drug *kasû*[36]	ditto	to dry out, to [place] over the surface of the lesion
	drug 'dagger-like'(-plant) (***patrānu***)	drug for *amurriqānu*-jaundice	[to pound, to drink in beer]

[30] The illness *šīqu* may be related to the meaning of this word as a term for irrigation. For an analogous source for this entry, see Šammu šikinšu (Stadhouders 2011 [JMC 18]: 8, 28): Ú LAG GÁNA(*kirban eqli*) MU.NI(*šumšu*) *a*[*na*] *ši-qi* TAR-*si*(*parāsi*) SIG(*damiq*) HÁD.A(*tubbal*) *lu ina* [..... *l*]*u ina* KAŠ(*šikari*) SAG(*rēštî*) NAG.MEŠ(*ištanatti*)-[*ma*], 'its name is field clod, good for *šīqu*-disease, you dry it, he keeps drinking (it) either in [....] or in premium beer. It could be possible to restore 'ass's milk' in this Šammu šikinšu passage, since one of the other drugs for *šīqu*-disease in this same passage of AMT 1 107 (*andahšum*) recommends administering the drug in premium beer.

[31] Cf. BAM 578 ii 7 DIŠ NA ZÉ *sah-ha* DAB-*su,* see Scurlock 2014: 510, 521, 'if bile and scarring affect a person'.

[32] The term is likely to be onomatopoeia for expectorating.

[33] Lit. 'sack', but the exact anatomical designation of this term remains uncertain.

[34] 'It treats a thousand (ailments), a common drug.

[35] 'It treats twenty' (ailments), a common drug.

[36] Now identified as tamarind in JMC.

	drug seed of *nabrūqu*[37]	drug ditto (for *amurriqānu*-jaundice)	[ditto]
	drug seed of *kūru*[38]	drug ditto	[ditto]
	drug *šigguštu*	drug ditto	[to pound, to drink in pressed wine]
125)	drug root of 'dog's tongue' (***lišān kalbi***)	drug ditto	[before sunrise,]
	you dig (it) up,	[you mince (it),	to drink its squeezed juices]
	drug root of ***šūšu***-licorice	drug ditto	[ditto]
	drug [juniper]-aromatic (*burāšu*)	[.....]	[to pound, drink in ....]
	drug alum (*gabû*)	[.....]	[to pound, put into water, you clarify and make drink(?)]

col. iii

	drug mint (***urnû***)[39]	drug for rectal-disease[40]	[to mix with fat, to put into his anus]
130)	drug ash-tree (*e'ru*)	drug ditto	[to mix with fat, to put into his anus]
	drug fungus (***kammu***) of the leatherworker	drug ditto	[to mix with fat, to put into his anus]
	drug seed of tamarisk (***bīnu***)	drug ditto	[to stir, to drink in beer]
	drug root of male mandrake (***pillû***)	drug ditto	[to mix with fat, to put into his anus]
	drug ***girgirû***	drug ditto	to mix with fat or *diluted beer* which[41] [.....]
135)	drug *ašdānu* (var. ***ṣadānu***)	drug for rectal-disease	[mix with oil] while fresh, [put into his anus]
	drug fresh *suādu*-aromatic	drug field clod (*kirbān eqli*)[42], drug ditto	[mix] with [oil, put into his anus]
	drug ***nīnû***-mint, while fresh	drug ditto	in [strong] vinegar
	you prepare a clyster[43]	sprinkle *daprānu*-oil,	you keep putting (it) into his anus
	drug 'field-drum'-plant (*tibbutti eqli*)	drug ditto	to dry out, to pound, to mix with oil, to [put] into [his] anus

[37] See Schmidtchen 2018: 466-467, showing the majority of these drugs listed as simplicia against *amurriqānu* in a LB tablet.
[38] The logogram is usually GI.ZÚ.LUM, lit. 'date-reed', although this entry in BAM 1 reads GI_{16} (two GI signs written one over the other).
[39] The copy of BAM 1 for this line reads *ur-nu* SA_5, 'red mint', but CAD U 235 is probably correct in reading *ur-nu-ú*[!].
[40] Akk. *šuburru marṣu*, 'sick anus'.
[41] Reading *lu hi-qam šá* [.....].
[42] *kirbān eqli*. For reasons of space, this drug was entered into column two but belongs to column one. See ll. 11, 12, and 16 above, for a similar pattern.
[43] Cf. CAD A/1 354-355 (ref. court. G. Buisson).

	drug bitter aromatic (^{šim}***murru***) of mountains left kidney,	drug for the *split* anus[44]	to mix with fat of a male sheep's to put into his anus[45]
140)	drug ***girgirû***	drug ditto (for the anus)	ditto (to put into his anus)
	drug ***girgirû*** to drink in premium beer,	drug for a burning[46] anus to boil in a *tamgussu*-vessel,	to place on the surface of the lesion, ditto (to put into his anus)[47]
	drug mint (***urnû***$^{!}$) to mix	drug for an anus made burning[48] with fat,	you hold[49] a moth, to put into his anus
	drug a fresh field clod (***kirbān eqli***)	drug ditto	ditto (to put into his anus)
	drug *būšānu*, tongue$^{!}$ of the dog[50] in premium beer or	of Ningizibarra (Gula), oil	you mix bran[51], he should drink (it) regularly[52]
145)	drug 'bitter'-aromatic (^{šim}***murru***) of a perfumer[53] drug ***urānu***[54] drug for *šaššaṭu*-disease	drug for *šaššaṭu*-disease drug for *šaššaṭu*-disease	to mix in premium beer, to drink […….....….]
	drug ***ṣadānu***	drug for chronic illness[55]	to mix in beer dregs, to bandage the patient
	drug *briars*(?)[56] of ***haltappānu***	drug for a *dried up* lesion[57]	to put onto the surface of the lesion
	drug cucumber (*tigilû*)	drug for *midru*-disease	to mix in beer dregs, to bandage the patient

[44] Reading *šá-tuq* for expected *šatiq*. For other possible solutions to this puzzling notation, see Attia-Buisson 2012 44-45.
[45] The column format was clumsily adapted to accommodate this clause.
[46] *hamṭu*
[47] The clause is artificially divided over the three columns.
[48] DÚR *ha-am-ṭí* DÙ
[49] Reading DAB-*al* as *tukâl*^{al}.
[50] This is the drug *lišān kalbi*, punning on Gula's emblematic dog.
[51] Reading DUH (for *tuhhu*) *tu-sam-*<*mah*>$^{he\text{-}pí}$
[52] The clause is artificially divided over the three columns.
[53] *muraqqû*
[54] See above l. 68
[55] *murṣu lazzu* (written *là-zi*).
[56] Reading *hiš-ut,* 'thorns', which would argue against the uncertain identification of *haltappānu* as thyme. See Attia-Buisson 2012 (JMC 19): 46 for other suggestions.
[57] Reading *murṣu nahri*.

150)	drug *merrû*	drug for *midru*-disease	ditto
	drug 'milk-like'(-plant) (***šizbānu***)	drug for internal heat (fever) which throbs	to pound, to rub on in oil
	drug seed of tamarisk (***bīnu***)	drug ditto	ditto
	drug *uššultu*(-grass)	drug for protuberances (*širū*)[58]	which have dryness (*rišiktu*)
	to heat ,	in premium beer,	to rub on in oil[59]
	drug *amuzinu*	drug for flaccid flesh (*šīrū tabkūte*)	to heat in premium beer, to bathe the man
155)	drug rose (*urṭû*)	drug for lice (*kalmātu*)	not to be present on a man's body
	drug (by) eating *šumuttu*	impotence	will diminish
	drug ***azallû***	ditto (to reduce impotence and)	not to have depression
	drug head of a raven	you boil and give to eat,	its form is to be evacuated[60]
	drug head of a white raven	you boil and give to eat,	to brighten his eyesight
160)	drug leek (*karašu*)	coriander (*kisibirru*),	which the one whose eyes are sick is not to eat
	drug turnip (*laptu*)	*amīlānu* ('man-like'-plant),	which the one whose innards are sick is not to eat

(Šumma ālu Tablet 59, see Freedman 2017: 125-126. Drugs appearing in BAM 1 are marked in bold)

	(If) plants (drugs)	are distressed[61]	– disease of cattle.
	(If) the ***puhpuhu*** (-plant)	is distressed	– disease of cattle.
	(If) **dog's tongue**(-plant)	is distressed	– raging of the lion and wolf.
165)	(If) the ***qutru***-plant	is distressed	– there will be a devastating flood in the land.
	(If) **fox-vine**	is distressed	– disease of the troops, devastating flood.

[58] For this meaning, see CAD Š/3 117.
[59] The clause is artificially divided over the three columns.
[60] Reading *né-ez-zu bu-na-nu-*⌊*šú*⌋.
[61] Reading *a-dír*. The translation 'distressed' is based on Akk *adāru*, 'to fear', with a passive meaning to be the object of worry or fear.

	(If) *šarmadu*	is distressed	– Šamaš will cause illness in the land.
	(If) **leek**	is distressed	– there will be *di'u*-fever in the land.
	(If) **garlic**	is distressed	– hearts in the land will not be happy.
170)	(If) **onion**	is distressed	– losses will be caused in the land.
	(If) 'sweet' plant	is distressed	– Adad will devastate the harvest in the land.
	(If) *hiriṣu*	is distressed	– obstinacy present in the land.
	(If) a **canebrake** (*apu*)	is distressed	– cattle famine.[62]
	(If) a box-tree (*taškarinnu*)	is distressed	– the moon will be eclipsed in the land.
175)	(If) an **ebony** (*ušû*)-tree	is distressed	– Adad will devastate the harvest in the land.
	(If) connifers (*terinnu*)	are distressed	– Ea will cause an eclipse in the Apsû.
	If **licorice** (*šūšu*)	is distressed	– Ningišzida will cause *di'u*-fever in the land.
	If figs	are distressed	– there will be *di'u*-fever in the land.
	If **apples**	are distressed	– there will be *di'u*-fever in the land.
180)	If **tamarisk**	is distressed	– hearts in the land will not be happy
	If a **date-palm**	is distressed	– hearts of the people will not be happy
col. iv			
	If a *šalālu*-reed	is distressed	– there will be [..... in the land].
	If a **mandrake**	is distressed	– the viscera of people will not be in good shape.
	If a **thistle**	is distressed	– herds will die from *ziqtu*-pox.[63]
185)	If a **thornbush**	is distressed	– ditto, [the harvest(?) will] not will not prosper.
	If a cedar-tree	is distressed	– the harvest of the land will not prosper.
	If a cypress-tree (*šurmēnu*)	is distressed	– storm-clouds will be darkened in the land.
	If a ***daprānu*-tree**	is distressed	– (a god) will abide[64] in the land .....[65]
	If a *mihru*-tree[66]	is distressed	– the land: whatever of it will leave.
190)	If an **ash**-tree (*e'ru*)	is distressed	– (a god) will cause unpleasantness in the land.

[62] CAD A/2 200, citing CT 39 9:19 (Alu): *šumma* GI *a-dir* GIŠ.GI *u* ^{giš}TIR ZÁH.MEŠ, 'if reeds are distressed, the canebrake or forest is destroyed'.
[63] Reading máš.an[še *ina zi*]*q-tì* ba.ús. Attia-Buisson 2012: 30 read this line as a corrupt version of the previous line, based on duplicates.
[64] Reading DÚR.RÙ, corresonding to DUR.RU in l. iv 16 below.
[65] The logogram ŠÀxGI$_6$ is a hapax in BAM 1, here and in iv 16 below.
[66] Written *im-ih-ru*, a tree but rare as a drug (see Uruanna II 500), not attested in recipes.

	If a **poplar**	is distressed	– there will be no recession[67] in the land.
	If an aromatic ***kukru***-tree	is distressed	– there will be no wealthy ones.[68]
	If ***kamūnu***	is distressed	– there will be no ... in the land.
	If *zibû* (black cumin?)	is distressed	– ditto.
195)	If ***šunû***	is distressed	– Ištar will set the boundaries of the lands.
	If a ***dadānu*-carob**	is distressed	– disease of cats.[69]
	If *milled barley*[70]	is distressed	– the divine Seven will inhabit the .....[71]
	If a ripe stalk (*lillânu*)[72]	is distressed	– Ereškigal will be feared.[73]
	If a *musukannu*-tree	is distressed	– the land: whatever of it will leave.
200)	If a green *šakkullu*-tree	is distressed	– there will be an epidemic[74] in the land.
	If a *kiškanū*-tree	is distressed	– in the land, mankind is not *stricken.*[75]
	If a ***buṭnu***-terebinth(-tree)	is distressed	– the land: its fruit will not *grow*.[76]
	If an **oak-tree** (*allānu*)	is distressed	– the kingship is not all-powerful.
	If a ***lipāru***	is distressed	– there is an omen in the land.
205)	If a *kanaktu*-aromatic	is distressed	– there will be an epidemic[77] in the land.
	If a **canebrake** (*apu*)	is distressed	– the reeds and forests will be destroyed.[78]

[67] Reading L[ÁL-*ṭ*]*i* = diminution.
[68] Reading E[N NÍ]G.TUKU NU GÁL-*ši*.
[69] Reading ⌈ŠUB⌋-*ti* SA.A(*šurānī*), with Attia-Buisson 2012 [JMC 19]: 30; *miqtu* usually refers to cattle-disease, not to cats.
[70] Reading ŠE ÀR, a hapax for *še'u ṭēnu*.
[71] Reading ŠÀxGE$_6$ DÚR.RU.
[72] Rare.
[73] Reading ^{d}NIN.KI.<GAL> *'i-a-dar.*
[74] Reading NAM$^{!}$.ÚS.MEŠ = Akk. *mūtānu*.
[75] Reading SÌG (*mahiṣ*) rather than GIŠ.
[76] Reading ÍL(!) instead of MIR, following Attia-Buisson 2012 [JMC 19]: 30.
[77] Reading <NAM.>ÚS.MEŠ for *mūtānu*. See above, l. 201.
[78] See the note above to l. 175.

Notes on the text

1-20. Lines 1-20 of this text are cited elsewhere by the present author as examples of handbook-formulations which are comparable with Late Antique medicine in Aramaic and Syriac sources, see *The Ancient Near East and the Foundations of Europe*, ed. M. Krebernik and S. Ponchia (Münster, 2020), 95-108.

9. Lit. 'staff of the high-ranking', similar to 'shepherd's staff'-plant. This drug is not attested in Uruanna, and the Akkadian term *šibru* as a plant name (if not the same as another plant, *šimru*) is not well known. For alternative interpretations, cf. the comprehensive note on this entry in Attia-Buisson 2012 (JMC 19): 32-33. The argument for *šibru / šibirru* as 'rue' is based on the similarity of the word to Mandaic *šambra*, Talmud Aramaic *šbr'*, and Akk *šibburratu,* but this brings us back to using etymology as the sole means of identifying a drug, *à la* Campbell Thompson. The alternative solution of 'sceptre' as a colourful name describing the plant avoids the etymology trap.

24. Although this drug usually appears together with *imhur-ešrâ*, almost as a companion drug, *imhur-līm* appears as a simplicium in BAM VII No. 1 i 5' (p. 32) for urinary tract disease.

31. The plant *merzinu* (according to Köcher's copy in BAM 1 and the duplicate reading in RA 13 37: 20) is a hapax. While Köcher copied this plant as [ú *m*]*e*-[*er*]-*zi-nu*, it may be that his copy was influenced by his awareness of the duplicate, and that this name may be an error (i. e. *mergi*<*na*>*nu*) for the plant *merginānu* / *mergirānu* (see for convenience CAD M/2 106); the *-ānu* ending is quite common in drug names, indicating 'like', hence the *mergu*-like plant. The identification of the entry with this type of plant is also suggested by the reference in Suālu-disease texts (BAM 578 i 21), Ú *me-er-gi-ra-nu* Ú ZÉ *ina* KAŠ NAG, 'drug: *mergirānu*, gall-bladder drug, to drink in beer' (cited above). The other possibility is that the plant *merzinu* is indeed a hapax and has nothing to do with *merginānu,* or that both manuscripts copied this drug from a common faulty Vorlage.

29-34. An alternative possibility is that the symptom refers to 'bile' (*martu*), noting that 'bile' is a major cause of disease within Greek medicine, as one of the four humours.

33. The drug *tullal* occurs as a simplicium for a penis-related condition, see BAM VII No. 9 iii 4', and together with tamarisk in a recipe (ibid. No. 31 8'; No. 45 9') for *maškadu*-disease, which appears in l. 35.

Shavings of iron (^{na4}AN.BAR = *parzillu*) were used in recipes such as in potency massage-remedies (see Biggs 1967: 18 No. 2:9, cf. CAD P 214-215 for other examples), as was a 'snake stone' (NA_4 MUŠ = *aban ṣēri*, CAD Ṣ 150). Cf. STT 108: 32 (Abnu šikinšu, edited in Schuster-Brandis 2008), 27: NA_4(*abnu*) GAR-*šú*(*šikinšu*) GIM(*kīma*) KUŠ(*maški*) MUŠ(*ṣēri*) NA_4(*aban*) MUŠ(*ṣēri*) [MU.NI(*šumšu*)]), 'a stone, its properties like snakeskin, [its name] being "snake-stone".' Another possibility for AN.BAR MUŠ could be 'snake iron', corresponding to a plant called *kisât ṣēri,* 'snake-binding'(-plant); for convenience, see CAD K 420. See also Attia-Buisson 2012 (JMC 19): 34-35.

35. The plant *kurkanû* appears as a simplicium against *maškadu*-disease in BAM VII No. 45 rev. 10', and it appears in Šammu šikinšu (Stadhouders 2011 [JMC 18]: 22 §26 as a remedy for *maškadu*-disease: Ú *kur-ka-nu-ú* MU.NI(*šumšu*) Ú(*šammu*) *maš-ka-di* ZI(*nasāhi*), '*kurkanû* is its name, a plant to remove *maškadu*.'

44. The *ummedu*-abscess is written [*u*]*m-ma-dí*, but a duplicate (STT 92 ii 17) reads *um-me-di*, which is the more conventional orthography for this ailment. See the comment in Bácskay 2018: 41.

46. Akk. *qinnatu* is not elsewhere associated with illnesses (i.e. sick buttocks) in therapeutic recipes. The usual expression is that one has a sick anus (*šuburru marṣu*), see ll. 129-143.

48. For *himiṭ ṣēti,* see Bácskay 2018: 176-210. It is important to note that this type of fever (*himit ṣeti*) was associated in various texts edited by Bácskay with a number of other ailments, namely flatulence (lit. 'blast of wind'), *šimmatu* and *rimûtu* paralyses, *šaššaṭu*-disease, 'hand-of-the-ghost'-disease, 'hand-of-the-oath'-disease, 'hand-of-mankind'-disease, and any (other) disease', all listed in various manuscripts in a standard fixed order. None of the other conditions associated with this kind of fever are listed in BAM 1.

56. *Pizzir*: Cf. Attia-Buisson 2012 (JMC 19): 36, suggesting an alternative reading of *uzun ṣēri*, 'snake-ear'(-plant). The 'cobweb' plant is also known in Uruanna II 52, 61, and elsewhere, as *pinzir* / *pizzir,* used as a drug to combat anxiety.

58-60. The drug *azallû* and its seed appear in a compound recipe (BAM VII No. 50: 15). Note the alliteration between *azallû* and the rare drug *alluzu*, which also appears as an alternative drug in l. 12.

This section contains one of few references in this text to illness caused by magic or sorcery (IGI.HUL, literally 'evil face / eye'), sharing the same drug as used against depression.

66. The aromatic drug *kukru* also appears in l. 72 for *ašû*-disease, indicating that the same drug can be used for two similar diseases or phases of the same disease. In this case, the unidentified *ašû*-disease is qualified as being 'fleeting' (*muttaprišu*, lit. 'flying').

81. The descriptive comment on Dreckapotheke 'sailor's dust' (SAHAR *ma-la-hi*) in Col. 1 is *la* ⌜GÁL⌝-*šú rat-te,* with the signs being interpreted as derived from *ratātu,* 'to tremble' (CAD R 218). See Attia-Buisson (JMC 19 38) for a different reading of the phrase (as šika gurun-*šú* súd-*te*), with various possible interpretations. Col. 3 reads KI.MIN (= SÚD *ina* Ì.NUN) *tu-*<*paššaš*>, ' to pound, you keep rubbing on in hot ghee', giving a variant reading with the verb 'to rub' in the standard form typical of recipes. Attia and Buisson 2012 (JMC 19): 38, suggests reading *te* for this sign rather than *tu*, based on photos, but Köcher's copy shows a clear *tu*-sign, although one does not usually see a 2.p.s verbal form in this column of BAM 1.

82. The drugs against this disease come from mountains, with two mountains mentioned by name as alternatives. See Attia and Buisson 2012 (JMC 19): 39, for a detailed discussion of this line, with alternative possibilities for interpretation, all of which are rather complex, e.g. reading *ina bi-riš* 'at the side of' instead of *ina* KAŠ SAG, 'in premium beer', or reading *la ud-du-rat* 'not darkened', instead of *la* HÁD.DU SÚD, 'not dried', 'to pound'. A text like BAM 1 is unlikely to be overly esoteric and the simplest readings are likely to be the correct ones. Hence, the present interpretation opts for alternative designations of a mountain drug from two possible provenances, with slightly different applications (either given in beer or not dried), with the instruction SÚD (*sâku*) belonging to column three, following previous lines, then followed by KI.MIN, 'ditto'.

84. The logogram for the *pizallūru*-gecko is Ú ANŠE KASKAL-*na* (lit. 'crossroad-donkey'), which could refer to the use of the gecko as a medical ingredient, or to leaf upon which the gecko likes to reside, as noted in an explanatory lists of drugs (see Geller 2015: 36).

88. An entry for lungs can be found in Šammu šikinšu (Stadhouders 2011 [JMC 18]: 14, 102'), for which the common plant *kukru* is prescribed both for *agubbû*-chills and alternatively for the lungs, to be administered by drying, pounding, and given on an empty stomach.

102. The drug *lišān kalbi* appears in a simplicium for urinary-tract disease (BAM VII No. 1 ii 13' [p. 36]), but with different instructions for administering the drug, which may be the reason why it is not listed elsewhere in BAM 1.

104. The illness *šīqu* may be related to the meaning of this word as a term for irrigation. For an analogous source for this entry, see Šammu šikinšu (Stadhouders 2011 [JMC 18]: 8, 28): Ú LAG GÁNA(*kirban eqli*) MU.NI(*šumšu*) *a*[*na*] *ši-qi* TAR-*si*(*parāsi*) SIG(*damiq*) HÁD.A(*tubbal*) *lu ina* [.... *l*]*u ina* KAŠ(*šikari*) SAG(*rēštî*) NAG.MEŠ(*ištanatti*)-[*ma*], 'its name is field clod, good for *šīqu*-disease, you dry it, he keeps drinking (it) either in [....] or in premium beer.' It might be possible to restore 'ass's milk' in this Šammu šikinšu passage, based on this parallel in BAM 1.

114. Although CAD Š/1 61-62 identifies *šagabegalzi* as a Kassite plant, with no further explanation, the name of the drug could be a Sumerian loanword (šà-ga-bé gal-zu), meaning 'wise regarding its innards', a suitable name for a drug to treat bowel-disease.

118. Cf. Uruanna III 319-320, identifying one logogram for the drug *puhpuhu* as Ú MAH, although this drug is usually written out syllabically. Another lexical list gives the logogram for this drug as Ú.NUNUZ^{sar} (Practical Vocabulary Assur 84, see CAD P 485). The drug might be identifiable with *purupuhu* (l. 34 above), a drug for intestinal disease. On the other hand, the drug is to be applied here externally, as explained in the third column of this entry.

The pathology indicated by *hidar* appears to be variant of *handūru*, a 'spur' belonging to birds, written *hi-dar* MUŠEN(*iṣṣūri*), an obscure designation of a disease, so far only attested in lexical passages. Another lexical text of similar content, BAM 421: 24 (see for convenience CAD H 182), reads, Ú *šá-mi* GIG *hi-dar* MUŠEN, 'drug: a plant for the disease 'bird-spur'; the drug being identified in this way is lost, and this gets us no closer to an identification of the type of disease. One possibility is that it is a tarsal spur on the human foot, which might resemble the type of spur common to the feet of many birds.

119. Šammu šikinšu (Stadhouders 2011 [JMC 18] 17 §7) recommends the use of the drug *kamkadu* against a lesion which exudes sweat, which is to be applied to the surface of the lesion: Ú ⌜*kam*⌝-*ka-du* MU.NI(*šumšu*) *ana* GIG(*simmi*) *šá* IR(*zu'ta*) ŠUB-*ú*(*inaddû*) SIG$_5$(*damiq*) SÚD(*tasâk*) *ana* IGI(*pān*)

GIG(*simmi*) ŠUB-*di*(*tanaddi*), 'its name is *kamkadu,* good for a lesion which exudes sweat, you pound (it) and apply it to the surface of the lesion.'

121ff.. These and the following lines are restored from duplicates, RA 13 25f. and STT 92 ii (see Attia-Buisson [JMC 19]: 25 for a full list of duplicates).

124. Cf. the parallel passage in STT 92 ii 6, Ú *šim-gu-uš-ti* GIŠ.SAR $SIG_7^!$: Ú *amurriqānu* : *sâku ina* Ì.GIŠ GUD NAG, 'The fresh garden drug *šigguštu* : a jaundice-drug: to pound in ox-fat and make (one) drink'.

127. This and the following entry are restored by Attia and Buisson 2012 (JMC 19): 42 from BAM 578 iii 11-12, giving instructions for using the same drugs against the same disease, *amuriqānu*-jaundice (see Scurlock 2014: 514, 524). It will be useful to see the passage in BAM 578 iii 10-11 in full, to see the degree of correspondence with this section of BAM 1 dealing with this particular ailment:

ú*nam-ruq-qa* SÚD *ina* KAŠ NAG ú*nam-ruq-qa* SÚD *ina* A NAG IM.SAHAR.NA_4.KUR.RA(*gabû*) *ina* A.MEŠ ŠUB *tu-zak* NAG ^{šim}LI(*burāšu*) SÚD *ina* GA NAG,

'you pound *namruqqu* (*nabruqqu*), you (have one) drink in water, you put alum in fluid, you clarify, you (have one) drink, you pound juniper, you (have one) drink in milk.

129. See Šammu šikinšu (Stadhouders 2011 [JMC 18]: 8: 33 and 11: 67, in which drugs for rectal disease are also mixed with fat and put into the rectum, which helps restore column three of this section.

139. The same drug (^{šim}*murru*) is also deemed to be beneficial for the anus in Šammu šikinšu (Stadhouders 2011 [JMC 18]: 25, §4 and §5: ^{šim}ŠEŠ(*murru*) *šùm*-[*šú*] *ana* DÚR(*suburri*) SIG(*damiq*), '*murru* is its name, it is beneficial for the anus.'

144. See Attia-Buisson 2012 (JMC 19) 45-46, citing various interpretations of this phrase, but the present translation assumes simplest explanation as most likely. The healing goddess Gula is often depicted with her dog, whose saliva might have been thought to have healing properties.

151. Col. 2 reads: *ummi* (KÚM) *libbi* (ŠÀ) *šá tebû* (ZI), which is a designation of symptoms rather than a disease. See also Attia-Buisson 2012 (JMC 19): 46, citing BAM 421 i 31', in which the same drug (*šizbānu*) is employed against the same symptoms (KÚM *lìb-bi* ZI).

156. Reading ŠÀ.ZI.GA or *nīš libbi* for 'sexual potency', which actually refers to ritual recipes to treat male impotence. The term *nīš libbi* or 'sexual potency' actually refers to the lack of this condition, i.e. impotence. An entry for impotence (ŠÀ.ZI.GA) occurs in Šammu šikinšu (Stadhouder 2011 [JMC 18]: 11, 71', although the name of the drug is lost.

158. The head of a raven (*qaqqad āribi*) is fairly common in medical recipes, cf. for convenience CAD A/2 266, and it also appears in A 522 = BAM 318 ii 3, see Schwemer 2013: 186. In the Syriac Book of Medicine, the head of black raven (*rš' dᶜwrb' 'wkm'*) was also used, but only for its brains (*mwḥ* = Akk. *muhhu*).

159. This line appears to allude to an Assur text (A 522 = BAM 318 iii 19, now Schwemer 2013: 181-200), as noted by Attia-Buisson 2012 (JMC 19): 47. The Syriac Book of Medicines recommends applying the liver of a raven for the white of the eyes (*kbdh ḥšyḥ lḥwr' dᶜyn'*), which might also reflect the idea of brightening the eyes. The Syriac text also lists the egg of a white raven (*bᶜ' dᶜwrb' blq'*) as one of series of *simplicia* used to improve the condition of 'whiteness of eyes' (*lḥwr' dᶜyn'*).

Blind Mice and Despairing Rats: The Uses of *kurkanû*-Turmeric in Ancient and Modern Medicine[1]

JoAnn Scurlock

In order to assess the effectiveness of the plants used in ancient Mesopotamian medicine, it is necessary to compare, where possible, ancient and modern uses of the same plant. I see no benefit to be gained from taking the position of Niek Veldhuis, that refuses to accept as science any tradition that does not have a concept of nature defined as a "predictable universe that follows an impersonal regularity".[2]

Afterall, what is "science?" Is it carefully observing and using what works, and then trying to figure out why it works afterwards (as in ancient Mesopotamia) or is it dreaming up a perfect theory (humors "corrected" by bleeding, purging and blistering) and then applying your theory relentlessly for over three millennia even though it is demonstrably killing people because the theory says it should be working? No bad medicine just bad patients.

What is meant by "science" in the latter context is the disenchanted world of the mathematician Descartes and his mechanistic philosopher followers. In fact, every major advance in science, whether in medicine, biology or physics, has had to fight its way past this mechanistic philosophy. The rejection of occult properties including evolution and gravity were basic for Descartes' disciples. Indeed, the current intelligent design theory is a mathematically grounded resurgence of the view that God is life and all the rest dead matter. In the field of medicine, mechanists joined forces with Protestant divines to reject germ theory as a return of Babylonian demonology (Jastrow 1913) or false attribution of occult properties, depending on whom you asked. Truly modern scientists speak in animist terms, even if often disguised under made-up Greco-Latin words like macrophage, which literally means: "large eater". Dead matter does not "eat".

Ancient Greek philosopher-physicians were armed with an animistic view of nature not usually attributed to them, but unmistakable in their own writings. This orientation to life allowed them to discern a basic truth which study after study in modern plant medicine fully confirms, namely that body chemicals are in a delicate balance, whereby too much or too little of the same bio-chemicals in the mix can have equally disastrous consequences. Unfortunately, this brilliant insight was hitched to the service of a dangerously incorrect notion that what is in balance in the body are blood, bile, phlegm and an imaginarily pure substance (actually a mixture of blood and bile), namely black bile. And, apart from rebalancing humors, nothing else mattered. As a result, Hippocratic medicine, of which we shall see an example presently, had a distressing tendency to do the wrong thing, all too often with fatal results. Did they notice that patients were dying? Yes. Did this shake their faith in their method? No.

Neither did it shake the faith of early modern disciples of Hippocrates' revivifier, Galen. Fagon, court physician to Louis XIV, who essentially murdered a good part of the royal family with his Galenic medicine, excoriated a traditional healer who occasionally (and successfully) treated members of the royal family as a quack, the original usage of the word.[3] What his ilk had to say about the courageous woman who hid the future Louis XV from his

[1] Modern medical identifications are, unless otherwise noted, taken from Scurlock and Andersen, 2005. I would also like to personally thank Dr. Fauci who has been editor for the last ten editions of Harrison's Principles of Internal Medicine, the standard textbook and my modern medicine bible. In my humble opinion, he is far sexier than Brad Pitt who plays him on Saturday Night Live.

[2] Veldhuis 2014, 22-23.

[3] Saint-Simon 1967, 151.

doctors, and is the only reason that the royal family made it to the French Revolution, was doubtless unprintable.

Ancient Mesopotamian physicians were more careful observers and not at all prone to theory-first methodology. They were prepared to countenance attacks from without as well as disturbances within the body. Moreover, their fully enchanted world allowed them to discover, by trial and error, plants that worked then and, truth be told, work even today and in surprisingly sophisticated ways that we are still in the process of discovering.

I began my contributions in this field perhaps a bit too hastily by using traditional usages and modern studies to identify *kamantu* with henna.[4] The virtue of my approach I have since been able to confirm by studying a plant whose identification is really beyond doubt, namely *šūšu*-licorice.[5] In this article, we shall continue the process by studying yet another plant with a secure etymology, namely *kurkanû*-turmeric. We shall go through one by one each medical condition that ancient Assyrians and Babylonians used *kurkanû*-turmeric to treat, either singly or in combinrion with other plants, and then discuss what, if anything, modern medicinal studies have shown about such a treatment for that condition.

Hair

Probably the parts of ancient Mesopotamian medicine that draw the most derisive laughter are treatments for hair growth. So we have:

HAIR:

the inner bark (*bukānu*) of *amilānu*-mandrake, *elikulla* and *kurkanû* are (wrapped) in [wool] from a virgin she-goat and worn on the neck as an amulet for hair falling out (BAM 480 iii 55 [Worthington, JMC 5.13:188'])

Actually, there are a number of plants that are capable of bringing some cover to bald pates. Key are anti-androgenic properties, giving some credence to the popular belief that bald men are sexier than their hairy counterparts. Ancient Mesopotamian use of *kurkanû*-turmeric (in the salve form typical to accompany amulets of the same ingredients) is supported by modern pharmacology. A study using the Thai variety (Srivilai et al. 2018) built on previous research to demonstrate the effectiveness of treatment with the extract, without the often experienced side effect of, surprise, surprise, decreased sexual performance (Srivilai et al. 2018, 140-141,144,148). The absence of this particular unwanted side-effect is probably to be credited to the fact that curcumin (the extract) is known also to have androgenic effects (Mohamadpour et al. 2017). Indeed, aging roosters who got their feed curried with curcumin would be happy to learn that the significant improvement in their semen quality and fertility rates (Kazemizadeh et al. 2019) was saving them from the stew pot.

Key here is dosage; as we shall see again and again with this plant, nothing happens with a really low dose of curcumin. As the dosage is increased, the expected effect appears and rises to a maximum. After that, no further improvement is experienced until a high dose threshold is crossed, after which the plant actually reverses course and enables what it had been blocking and vice versa. This sounds like a defect but it actually makes the plant more useful, since manipulation of the dosage allows you to take whichever tack you want or, to put it in enchanted world terms, to tell the plant what you want it to do for you.

So, for example, curcumin is famous as a protector of cells from inflammatory and oxidative damage when tested *in vitro* at low doses of 1-30μM. However, other studies suggest curcumin as a weapon against Y79 retinoblastoma cells. It is an efficient killer of these cells, up-regulating 903 genes and down-regulating 1,319 others, thus doing genetic damage comparable to that of radiation (Sreenivasan et al. 2012). But that is not all that it does. It also immobilizes them in place and closes cell membranes to their knock, thus

[4] Scurlock 2007.
[5] Scurlock forthcoming.

helping to prevent metastases (Li et al. 2018, esp.3-4). And how does our plant do all this to those poor little Y79 cells? By up-regulating the very pathways (JNK and p38 MAPK) and nuclear factor NF-κB that it down-regulates when producing its anti-inflammatory effects. For this, you need a high dose of 50-80μM of curcumin. Yu et al. 2016, 861, 862 864-867)

To note is that dosages for individual patients are never actually given in Middle and Neo-Assyrian texts, apart from the odd direction to use more for a man than for a woman. Dosage information thus remained part of the oral tradition until the late Babylonian period when individual dosages begin to be recorded. This practice fully justifies the warning that the trained expert, the one who knows, was not to show his texts to a neophyte, the one who does not know. As with the diagnosis of illness, sophisticated treatments of the sort employed by ancient Mesopotamian physicians were **not** for amateurs.

For the Thai baldness experiment (Srivilai et al. 2018), thirty-seven volunteers or perhaps better, volunteered, males aged from 3-15 years came in to donate their foreskins to science. Hey, free circumcisions and under hospital conditions—what was not to like? What was discovered by *in vitro* study of the foreskins was that, although effective by itself, turmeric works even better if combined with an already existing treatment, allowing the dosage of the latter to be reduced. In the latter application, monoxidil flux was increased 20-fold by turmeric essential oil. (Srivilai et al. 2018, 140, 142-148)

What was even more interesting was a series of experiments designed to emulate actual topical application. Here it was discovered that the essential oil did not substantially evaporate over 8 hours in the open air but the water or ethanol in which it was dissolved did, and with serious effects. In the first hour (so without the evaporation), the enhancement of monoxodil flux was 100 fold (Srivilai et al. 2018, 146-147). This more than justifies the common use of oil and ghee as solvents for salves and daubs in ancient Mesopotamia.

So, this essential oil, the terpenes in turmeric, have the capacity to make whatever accompanies them pass more easily through the skin (Srivilai et al. 2018, 140, 146-147), thus bypassing the intestinal tract which does a number on curcumin (the most active part of the plant, which is what is usually used for study, a whopping 90% loss--Sun et al. 2018, 131). Although ancient Mesopotamians do take turmeric by mouth, it is striking how often recourse is had to salves and enemas where the terpenes which they have not removed may most effectively do their work. They also very rarely, if ever, used water as a solvent for *kurkanû*-turmeric, as is often the case with modern testing. (Sun et al. 2018, 130-131,137). Traditional healers in the back country of India and Thailand do, it is true, invariably use water as a solvent. However, to remember is that they are survivors of lost medical traditions. The number of these healers who have received training informed by the latest medical research may probably be counted on the fingers of one hand; indeed they are lucky to be legal. Under these circumstances, using preparations of a potentially dangerous medicinal plant that minimizes its bio-availablity is the morally correct choice. It should also be noted that using the whole plant rather than one of its fractions considerably improves absorption even when taken by mouth (Nasef et al. 2019).

Ears

Although the virtues of transdermal medication are gradually being discovered, fumigation as a delivery system, particularly the smoky variety, has had to fight an uphill battle for acceptance. What could be more magical, the modern western observer wants to know, than burning something on a brazier near the patient, the standard ancient Mesopotamian treatment for ear infections? So we have:

EARS:

bandages:

ḫarmunu, *aktam*, *imbû tâmtim*, *kukru*, *burāšu*-juniper, *erēnu*-cedar, *šurmēnu*-cypress, *atāʾišu*, *kurkanû*, *ṣaṣuntu*, *sīḫu*, *argānu*, *barīrātu* and "lone plant" are [ground], mixed with oil

and wax, massaged into leather and used in a bandage for the head roaring (BAM 3 ii 49 [Worthington, JMC 7.22])

fumigants:

kukru, *burāšu*-juniper, *suʾādu*, *kanaktu*-aromatic, *asû*-myrtle, *ballukku*-aromatic, *baluḫḫu*-aromatic, ["sweet reed"], *atāʾišu*, *maštu* (= *šammi ašî* seed), *kalgukku*-clay, [*kasû*], *kurkanû*, *šimeššalû*-boxwood, and *erēnu*-cedar are used in a [fumigant] for the ears (BM 32277+ iii 18)

kukru, *burāšu*-juniper, *ṣumlalû*, *kanaktu*-aromatic, myrrh, *asû*-myrtle, *ballukku*-aromatic, *baluḫḫu*-aromatic, "sweet reed", *atāʾišu*, *maštu* (= *šammi ašî* seed), *kasû*, *kalgukku*-clay, *kurkanû*, *suʾādu*, *šimeššalû*-boxwood and *erēnu*-cedar are used in a fumigant for "sick" ears (CTN 4.113 ii 26′//BM 76023 + 83009: 10')

ox kidney fat, gazelle dung, *kurkanû*, *imḫur-lim*, powdered *taskarinnu*-tree, *ballukku*-aromatic, "sweet reed", *kukru*, *kasû*, *suʾādu*, *šupuḫru*-cedar resin and *kalgukku*-clay are used in a fumigant for the ears (BM 32277+ iii 11)

ox kidney fat, gazelle dung, *kurkanû*, *zabi* (= *imḫur-ešra*) and powdered *taskarinnu*-tree are used in a fumigant for roaring ears (BAM 506:3′//BAM 3 iv 32 [AMD 3 no. 143])[6]

tampons:

kukru, *burāšu*-juniper, *ṣumlalû*, *nikiptu*, *asû*-myrtle, *ballukku*-aromatic, *baluḫḫu*-aromatic, "sweet reed", *atāʾišu*, *maštu* (= *šammi ašî* seed), *kalgukku*-clay, *kasû*, *kurkanû*, *šimeššalû*-boxwood, and *erēnu*-cedar are moistened with *erēnu*-cedar resin and used in a tampon for ghost-like jabbing pain in the ears (BAM 3 iv 18′//Heeßel and Al-Rawi, Iraq 65.223 i 40 [AMD 3 no.163a])

burāšu-juniper, *kukru*, *ṣumlalû*, [*nikiptu*, *asû*-myrtle], *šimeššalû*-boxwood, *ballukku*-aromatic, "sweet reed", *atāʾišu*, *maštu* (= *šammi ašî* seed), [*kalgukku*-clay], *kasû*, [*kurkanû*], *baluḫḫu*-aromatic and *erēnu*-cedar are moistened with *erēnu*-cedar resin and used in a tampon for ghost-like hurting ears (RA 53.10ff r. 23 [AMD 3 no.163b])

First, the infection itself. What we are seeing in Mesopotamian texts are largely cases of otitis media. What is interesting about this condition is that what you have is a case of the cure being potentially worse than the disease. To know is that one of the body's defenses against infection not only in the ear but also the trachea and digestive and reproductive tracts is to envelop the invading pathogens in mucus so that they can be flushed out of the system by mucociliary clearance. Unfortunately, too much mucus gums up the clearance system and winds up impairing your hearing. The normal pathogen, *Haemophilus influenzae*, is a slippery customer for direct anti-viral treatment (although turmeric can do this too, as we shall see). Nonetheless, if the mucus overproduction problem can be solved, the pathogen will in any case be cleared out in the natural course of things. (Konduru et al. 2017, 1-2)

And this is where the anti-inflammatory properties of turmeric come in. As it transpired in *in vitro* testing of human ear cells and injection of a low dose of 50mg/kg into mice, curcumin was able to down-regulate mucus production which had been put into overdrive by the invading pathogen (testing was carried out after as well as before deliberate infection). Curcumin accomplishes this by de-activating pro-inflammatory p38MAPK pathways by up-regulating protein MAP Kinase Phosphatase-1 (MKP-1) (Konduru et al. 2017, 3-8)

Next the smoke. Fumigation is an extremely efficient delivery system for medicinal drugs. In fact, delivery of curcumin via the nasal passages is more effective even than injection (Chauhan et al. 2018, 30). Fumigation does its magic, so to speak, by forming nanoparticles, the hottest newest way to deliver curcumin to the body without losing most of

[6] Worthington, 2006, 26 missed the parallel and misrestored the symptom as a result.

it in the process. For cancer cell apoptosis, you need to maintain a consistently high dose of curcumin in the system, which nanoparticles can deliver. Moreover, you also need to worry about healthy cells getting lost in the process of killing those you want dead. Nanoparticles allow (although this is by no means always observed in practice) intermediate dosages to be used against cancer, a good way to kill what you want killed without hurting too many innocent victims. (Konduru et al. 2017, 7-9).

The artificial versions of nanoparticles (made from gold, silver and polymer) produce perfect particles. They are, however, hardly biodegradable. By contrast, the comparatively eco-friendly oil-encased carbon nanoparticles (and the hot new super high-tech equivalent of just mixing ground turmeric in oil or ghee, the liposomes-- Ng et al. 2018, 51-53) are somewhat irregular spheroids and ovoids that vary in size. The carbon nano-particles work just as well as their prettier sisters, fumigation by smoke yielding almost instantaneous drainage of mucus. (Chun et al. 2016, 1-2,4-6,10-11).

We may surmise from these articles that the virtue of the delivery to the ear by fumigation is to produce drainage. Other ancient Mesopotamian treatments for the ears also involve drainage as, for example the ones that use pomegranate juice. At the end, the drainage is stopped with alum, as in the following:

EARS:

tampons:

1 shekel of *nurmû*-pomegranate juice and 1 shekel of infusion of *kanaktu*-aromatic are sprinkled onto a tuft of wool and used in a three day tampon for the ears feeling heavy; on the fourth day, the ears are wiped off and alum is blown in with a reed straw (BAM 3 iv 28‖RSO 32.109ff iii 4)

1 shekel of *nurmû*-pomegranate juice and 1 or 2 shekel(s) of infusion of *kanaktu*-aromatic are sprinkled onto a tuft of wool and used in a three day tampon for fever spreading into a person's ears so that his hearing is heavy; on the fourth day, if the pus in the ears has come out the ears are wiped off; when the pus is finished, alum is blown in with a reed straw (BAM 503 ii 54'‖RSO 32 109ff ii 15)

erēnu-cedar oil, myrrh, 1 shekel of *nurmû*-pomegranate juice and 1 shekel of infusion of *kanaktu*-aromatic are sprinkled on a tuft of wool and used in a three day tampon for the right ear feeling heavy; preceded by drops with myrrh and … oil; on the fourth day, the ears are wiped off and alum is blown in (CTN 4.113 ii 11)

With the turmeric treatments, the virtue of the plant is at this latter end of the process, namely stopping any more mucus from being formed. Interestingly, the ancient Mesopotamian physician was aware of this fact—in Uruanna, *kurkanû*-turmeric is specifically recommended as a plant for opening/closing the nose ($nR2_{2a}$ i 10) and to stop phlegm (from flowing) ($nR2_{2a}$ i 4).

Eyes

Ancient Mesopotamian treatments for the eyes using *kurkanû*-turmeric involve opaque spots and dimmed vision, a condition often associated with eyes full of blood. So, we have:

EYES:

salves/rubs/daubs:

Emesallim-salt, *kuppû*-fish gall, *kurkanû* and "white plant" are mixed with ghee and used in a daub for removing opaque spots (*ṣillu*) (BAM 382:5‖BAM 22:20')

2 carats of *daʾmātu*-clay, 2 carats of *kurukummu*,[7] a carat of "white plant" and a carat of *imbû tâmtim* are integrated(?), wetted(?) with the blood of a male and female *ḫurri*-bird and used in a daub for dimmed eyes; may also be daubed on dry; followed with hot milk drops

[7] *kurukummu* is the Aramaic/Hebrew equivalent of *kurkanû*, see AHw 510b.

four times a day and a daub with *asḫar*-kohl (SpTU 2.50:5-9//BM 132097 obv. 11'-15' [AfO 35:22-23])

These references are presumably describing cataracts and retinopathy, respectively. The development of retinopathy (and glaucoma) has been linked to over-activation of N-methyl-D-aspartate (NMDA) which results in cells swelling up (necrosis) and dying (apoptosis). (Matteucci et al. 2005, 641-642, 643). *In vitro* experiments indicated that pre-treatment of retinal cells with very small amounts of curcumin (1 and 5 μM) did essentially nothing to protect the cells from the onslaught. However at 15μM, there was significant protective activity. But doctor beware, at 50μM, the cells they were trying to protect died (Matteucci et al. 2005, 642,643-644).

To know is that NMDA is no villain; on the contrary, it is essential to cell survival. But when something goes seriously wrong, NMDA gets over-stimulated and a massive influx of calcium ions through NMDA receptors results in cells beginning to die. Curcumin seems to calm things down. (Matteucci et al. 2005, 643-645). The modern competitors to curcumin for this condition include actual blockers of NMDA. There are to this latter style of treatment a few little side effects: memory impairment, psycho-mimetic effects and ataxia. (Matteucci et al. 2005, 647). So you can't walk and people think you are crazy but your eyes are better, or at least you think so, since you can't actually remember how well you saw before. Seriously, this is not what anybody wanted to happen, although nobody wants to know how they found out about the side effects. Medicinal plants used safely for millennia are tested to death, designer drugs produced by big pharmaceutical companies — not really, no.

In addition to excitotoxicity, eyes can be done in by inflammatory processes in which curcumin is also something of an expert. Salted corneal epithelial cells were soon bursting with pro-inflammatory cytokines such as interleukins IL-1β and IL-6 and tumor necrosis factor TNF-α. A mere 5μM of curcumin solved this problem by down-regulating the p38MAPK pathway, returning IL-1β, IL-6 and TNF-α to normal levels, and suppressing nuclear factor kappa light chain enhancer of activated B cells (NF-κB) activation (Chen et al. 2010, 437, 439-442).

As if this were not enough, eyes also, over time, develop oxidative damage which appears to be the underlying cause of cataracts. Once again, curcumin to the rescue. In one study (Awasthi et al. 1996), rats were given oxidative damage to their eyes by the simple expedient of feeding them corn oil, not the most reassuring thing for an American whose food culture is awash with corn products. Careful experimentation established that 500mg/kg was the top end, and 50mg/kg the minimum necessary to produce the desired effect with 75mg/kg optimal. The rats were thus given a dose of 75mg/kg of curcumin mixed with their corn oil and were proven significantly less likely to experience opacification (Awasthi et al. 1996, 761,762).

As for how curcumin is able to prevent oxidative damage, opinions vary. Some say that curcumin actually scavenges the reactive oxygen species (ROS) that cause lipid perioxidation, others that curcumin works by up-regulating the body's own anti-oxidant defenses (Awasthi et al. 1996, 761). What the researchers who fed corn oil to the rats discovered was that, the formation of cataracts aside, what makes them turn opaque so that you cannot see through them is 4-hydroxy 2-nonenal (4-HNE). This is only mildly electrophilic and thus does not come into play right away, but kicks in as the cataract matures. 4-HNE is one of the infamous reactive oxygen species (ROS). They are called electrophilic because they do their damage by literally stealing electrons from other molecules, including those of membrane lipids and nucleic acids. ROS are not evil; in fact, one of their jobs is to protect the body from outside attackers. However, things can easily get out of hand, since if only one membrane lipid molecule gets oxidized, you get a free radical chain reaction, and

eletrophiles get mass-produced as a result. So the body also has an anti-oxidant system on hand to protect itself from its own soldiers, as necessary. One of the body's anti-oxidant enzymes that curcumin up-regulates, namely one of the glutathione S-transferases (GST), uses 4-HNE as a substrate, thus automatically reducing the amount of it available to keep you from being able to see (Awasthi et al. 1996, 761, 763-766).

A major cause of retinopathy and cataracts is diabetes mellitus. Here, the usually ignored terpenes of turmeric come into their own. Whereas curcumin is very useful in treating the cataracts, retinopathy as well as peripheral neuropathies of diabetes, it is the sesquiterpenes that deliver the bulk of the hypoglycemic punch, treating the underlying cause and not just the symptoms produced (Aldebasi et al. 2013, 196; cf. Grover et al. 2019).

This by no means affects the ability of curcumin alone to prevent the formation and delay the maturation of diabetic cataracts. A study (Suryanarayana et al. 2003) induced cataracts in rats by feeding them galactose, thus making them hyperglycemic. They then tested the effects of curcumin on the development and maturation of the resulting cataracts. Sensibly, they also tried different doses of curcumin. It should come as no surprise by now that the smaller of two doses tried (.002%) worked as expected, whereas the larger dose (.01%) delayed the onset of the cataracts, all right, but it also made them mature even faster than they would otherwise have done. To be precise, at the two-week mark, all of the rats fed galactose alone (100%) had stage II cataracts and at the four week mark, 72% had mature stage IV cataracts. At two weeks, the low dose of curcumin with galactose group had 50% with Stage II and 17% free and clear and at four weeks only 58% had Stage IV cataracts. As for the high dose of curcumin with galactose group, 92% had Stage II after two weeks and none actually clear. Shockingly, four weeks found 100% with Stage IV, a jump of 28% from the galactose only group. Meanwhile, no adverse effects were experienced by a high dose curcumin-alone group. What this means is that, as might have been guessed from the common use of turmeric as a spice, that it does not do much of anything unless it senses that there is something wrong (Suryanarayana et al. 2003, 223, 226).

What is happening here with the curcumin effect on cataract development and maturation is that, if Awashti et al. 1996 know what they are talking about, the small dose will be inhibiting 4-HNE by up-regulating its friendly glutathione S-transferase (GST). The larger dose will, true to form, be down-regulating the GST, allowing 4-HNE to proliferate unchecked. Indeed, a later study identifies the larger dose as pro-oxidative (Raju et al. 2006, 733-734, 736).

Instead, however, of simply lowering the dose, the researchers in this project decided to see what happened when curcumin was combined with vitamin E. Vitamin E is a well-known scavenger of free radicals and can cancel the pro-oxidative activities of high doses of curcumin. So, they put their galactose alone group II up against galactose plus .01% curcumin group III, galactose plus .01% curcumin plus 15mg vitamin E group IV, galactose plus .005% curcumin group V, galactose plus .005% curcumin plus 15mg Vitamin E group VI and galactose plus 15mg Vitamin E group VII. The two doses of curcumin behaved as expected, but not even the low dose could match Vitamin E alone. However, when the two were put together, not only were the results even better than with the vitamin alone but, curiously, it was the high dose of curcumin that did the best job when combined with the Vitamin E. The reason for this is quite simple, the low dose by itself works by stabilizing the system, preventing the galactose from raising malonaldehyde (MDA) levels and increasing lipid peroxidation. However, when combined with Vitamin E you get a sudden significant decrease in MDA levels which is not at all what you want. Since the high dose raises MDA levels and Vitamin E lowers them, putting them together serves to prevent the wild fluctuations that ensue whenever the system gets out of balance (Raju et al. 2006, 733-738).

It would be interesting to know which of the other plants and animal substances used with turmeric by the Mesopotamians contain significant amounts of vitamin E.

Anxiety and Depression

Ancient Mesopotamians suffered from anxiety and depression. Those with public business of any kind had, sometimes with good reason, suspicions that competitors or opponents in legal cases or even that wife who wanted a divorce were spreading rumors or even practicing some form of sorcery against them. Frequent wars for which ordinary citizens were drafted will, even then, have produced their share of post-traumatic stress disorder. For all of this, ancient Mesopotamian physicians had treatments that included ritual and prayer and plant medicines. Among these medicines was *kurkanû* as in the following passages:

SORCERY:

<u>psychological</u>:

potions/snuff:

nuḫurtu, *ḫašû*-thyme, *kasû*, *nīnû*, *urnû*, *tīyatu*, *šibburratu*, 15 grains of Amanus salt, 15 grains of *tarmuš*, 15 grains of *imḫur-lim*, 15 grains of *imḫur-ešra*, 1 shekel of *bīnu*-tamarisk seed, *maštakal*, *uriyānu* (URU.AN.NA) seed, *atāʾišu*, *kurkanû*, and *burāšu*-juniper seed are tested plants to be (mixed) with beer or wine or tavern keeper's beer or milk and used in a potion or dried and used as snuff for anxiety and depression (to avert various types of sorcery associated with legal cases); the anger is supposed to depart, the hot lungs cool and the breath of the person to be sweet to god, king, magnate, and prince and depression to be released from his body; was supposedly come up with by seven sages in their assembly (Leichty, Gs. Sachs, p. 262 [CBS 14161]:4 [AMD 8/2 10.15:4)

1 *qa* of *nuḫurtu*, 1 *qa* of *ḫašû*-thyme, ½ *qa* of *kasû*, 1 *qa* of *nīnû*, 1/3 *qa* of *šumuttu*, 1 *qa* of *tīyatu*, 1/3 *qa* of *ṣaṣumtu*, 15 grains of Amanus salt, [20] grains of *imḫur-lim*, 20 grains of *imḫur-ešra*, [20] grains of *tarmuš*, 1 shekel of *bīnu*-tamarisk seed, 1 shekel of *maštakal*, 1 shekel of *maštakal* seed, 1 shekel of [*atāʾišu*], [1] shekel of *kurkanû*, and 1 shekel of *burāšu*-juniper are tested plants to be (mixed) with beer or wine or tavern keeper's beer or milk and used in a potion or dried and used as snuff for anxiety and depression (to avert various types of sorcery associated with legal cases); the anger is supposed to depart, the hot lungs cool and the breath of the person be sweet to god, king, magnate, and prince; is also used for pleural effusion (BM 4238+lo.e. 1⁄⁄BM 42250 r. 4⁄⁄BM 43123+ [Finkel, Fs. Lambert 204-205; AMD 8/3 3.11:13]

baths:

sikillu, *mergirānu*, *maštakal*, *ašqulālu*, "sunflower", *imḫur-lim*, *sīḫu*, *argānu*, *barīrātu*, *erēnu*-cedar, *šurmēnu*-cypress, *daprānu*-juniper, *suʾādu*/"sweet reed", *ašāgu*-thorn and male and female *nikiptu*, chopped up at night in a *pursītu*-vessel, baked in the morning in a *tamgussu*-vessel and used in a bath to pacify personal god and goddess, Marduk, Ṣarpanitum, Ellil and Ea; accompanied by a salve (STT 230:27)

salves:

atāʾišu, *kurkanû*, *imḫur-ešra*, *tarmuš* and *nīnû* are used in a salve for *Egalkura* issues, continual worry and anxiety, having financial losses, getting slandered, having troubled dreams in which he sees dead persons due to "hand of mankind" seizure by Marduk; accompanied by a series of amulets with plants and stones in them, an Egalkura stone necklace to calm anger; and a recitation enlisting Marduk's help to gain favor (SpTU 2,22+3,85 ii 43⁄⁄AMT 92/1 i 4' [AMD 8/2 3.4,2: 31]

atāʾišu, *kurkanû*, *imḫur-lim*, *bīnu*-tamarisk and *surmēnu*-cypress are poured into *pūru*-oil and sweet oil are used in a salve rubbed in vigorously for *Egalkura* issues (curses, indigestion, bad reputation and slander); accompanied by an amulet with alternating stones and burls of *sikillu*, *pišru* wood, *anḫullu*, *imbû tâmtim* and *tarmuš* threaded on

red-dyed wool worn on the neck after consecration before Venus with juniper censer, libation of beer and recitation (BM 56148+ i 21(Schuster-Brandis, *Steine* pls. 9-27)//SpTU 5,244:22 [AMD 8/3 6.1.1:21])

amulets:

tarmuš and *imḫur-lim* are paired with *ḫulālu*-chalcedony; "snake plant" and *kurkanû* are paired with *šubû*-stone; *maštu* and *ašqulālu* are paired with sparkling obsidian; *imḫur-lim* and *imbû tâmtim* are paired with *baštu*-stone; *elkulla* and "white plant" are paired with *sâbu*-stone; *elikulla* and *erēnu*-cedar are paired with black obsidian; *sīḫu* and *barīrātu* are paired with *mūṣu*-stone; used in a series of amulets for *Egalkura* issues, continual worry and anxiety, having financial losses, getting slandered, having troubled dreams in which he sees dead persons due to "hand of mankind" seizure by Marduk; accompanied by an *Egalkura* stone necklace to calm anger; a salve for the anxiety and a recitation enlisting Marduk's help to gain favor (SpTU 2,22+3,85 ii 23 [AMD 8/2 3.4,2: 11])

ušû-ebony *pišru*-wood, elephant tooth, *taskarinnu*-wood, *mēsu*-wood, *musuakkannu*-wood, […], *ešmarû*, *kurkanû*, *kikkirānu* and *anḫullu* are used in a linen bag amulet for being sick all the time from illnesses that defy diagnosis; this is designed to brighten his darkness, pacify his personal god and goddess, give him a good reputation and let him win his legal cases; accompanied by a potion with [*ḫašû*-thyme(?)], *atāʾišu*, *tarmuš*, *imḫur-lim*, *imḫur-ešra,* [*kurkanû*(?)], and *elikulla* whisked into beer; both are sanctified by an anti-witchcraft ritual (Si 34//Si 745+818//Si 722+725 [AMD 8/2 8.36: 8])

I have included the amulets because they are often used together with salves, potions or fumigants containing the same or similar ingredients. Rubbing against the body, especially when the amulet is wet can also serve to transmit plant medicines through the skin. (for more see Scurlock 2006, 59f.)

Depression is a complex illness. A number of biological pathways are dysregulated in depressed patients. Discovered so far, are monoaminergic activity, immuno-inflammation, oxidative stress, hypothalamus-pituitary-adrenal (HPA) activity and neuro-progression, all of which are affected by curcumin (Lopresti et al. 2015, 38).

In some quarters, depression is seen as a neuropsychiatric disease caused by neuro-inflammation in specific regions of the brain. Curcumin has demonstrated an ability to produce an anti-depressant-like effect in animal models of depression, so the question was: Are we sure that this is due to its neuro-protective effects and if so, by what mechanism does it work its magic? Promising in this regard was the discovery that pro-inflammatory cytokines, interleukins IL-1β and IL-6 and tumor necrosis factor TNF-α seem to be involved in the neuronal damage associated with (stress-induced) major depressive disorder. Of particular interest is that IL-1β is also implicated in Alzheimers (Fan et al. 2019, 1-2).

Rats, including a group that had been injected with 40 mg/kg of curcumin got stressed by putting all of them in solitary confinement. Every day for five weeks, without warning or predictability, one of the following was going to happen: leaving the lights on all night, not feeding them for 24 hours, not giving them anything to drink for 24 hours, making them swim for 5 minutes in cold water, shaking their cages, holding them and not letting them go, making them sleep on wet bedding and pinching their tails for a minute (Fan et al. 2019, 2-3). Specific tests were devised to target IL-1β to see what was happening to it as well as to perform an analysis of the effects of all this on rat brain cells (Fan et al. 2019, 3-4, 4-5).

After 5 weeks of mild torture, the rats were ready to confess whether they still liked sucrose and whether they "despaired" of swimming their way out of danger of drowning as opposed to floating along with just enough effort to keep their heads above water (Fan et al. 2019, 4). The curcumin treated rats showed their happiness by partially regaining their taste

for sugar. Similarly, they did significantly more swimming to avoid drowning than the control rats (Fan et al. 2019, 5).

The other tests revealed that the curcumin succeeded in knocking down IL-1β, thus preventing its over-expression from causing damage to neuronal brain cells in the relevant regions (Fan et al. 2019, 5-9, 13-14). It follows that the positive effects of curcumin on rat sweet tooth and determination to live were produced by its knocking down of IL-1β (Fan et al. 2019, 9-11). And curcumin did this by reversing the effects of IL-1β on the p38MAPK pathway in the area of the brain associated with depression. Over-expression of IL-1β up-regulates the pathway; curcumin prevents this from happening, down-regulating destructive and up-regulating protective proteins (Fan et al. 2019, 11, 12-13, 15).

For whatever reason, clinical trials on 60 and 56 human volunteers, respectively have shown it to be a safe and effective treatment for major depression disorder (Sanmukhani et al. 2014; Lopresti et al. 2014). Interesting to note is that success has also been obtained using a curcumin/saffron mix (Lopresti et al. 2017), comparable to the ancient use of *kurkanû* with other plants including *azupīru* (saffron or safflower) as in the following references:

nuḫurtu, *kurkanû*, *ḫašû*-thyme, and *azupīru* (used in a potion to keep away bad) signs and omens (BAM 431 vi 35')

nuḫurtu, *kurkanû*, *ḫašû*-thyme, and *azupīru* are (mixed) with first quality beer and used in a potion drunk on an empty stomach to keep a person from continually seeing bad signs in his house (LKA 115 r. 7' [Maul, Zukunftsbewältigung 503: 7'; AMD 8/2 11.5: 25'])

Anxiety is another disorder potentially treated with curcumin. Researchers took advantage of the fact that lead poisoning can produce both depression and anxiety to devise an anxious rat experiment to explore the effects of lead on the serotonenergic system in the dorsal raphe nucleus, and the possibility that curcumin might be able to counter this (Benammi et al. 2014, 920-921). The dose of curcumin was 30 mg/kg and it was mixed with olive oil and administered by oral gavage. The lead, for those receiving it, went in by needle and both treatments lasted for three days.

Anxiety testing involved a maze made of black wood elevated 50 cm above the floor. This had two open and two closed arms and a 10cm square center. Each rat was placed in the center facing towards one of the closed arms and left there for five minutes. Anxiety was measured by the amount of time spent in the open area. Test two was a dark light box. This was, obviously, a box with two compartments connected by a door; one of these was open and light and the other closed and dark. The rat was placed in the dark compartment with its back to the door and given 10 minutes to decide how much time to spend in the dark and how much in the light (Benammi et al. 2014, 921-922).

That was it for the mice, quite literally, and their brains got sectioned with special attention paid to the dorsal raphe nucleus (Benammi et al. 2014, 922-923). Anxious, lead-injected, rats spent 40% less time in the open arms of the maze and 27.7 % less time in the dark compartment than controls. In both cases, the lead-injected rats found safety in not staying where they were. The curcumin/olive oil preparation-fed rats spent significantly more time in the open arms of the maze and in the dark compartment than similarly poisoned rats without the curcumin (Benammi et al. 2014, 923). Other studies suggest protective effects of curcumin against anxiety in sleep deprived or immobilized rats (Benammi et al. 2014, 923).

As for what is producing the anxiety, fingers have been pointed at the up-regulation of serotonin, which is very puzzling since curcumin seems also to do this (Benammi et al. 2014, 923-924). Indeed, curcumin has been shown to raise not only levels of serotonin but also dopamine and noradrenaline in the hypocampus (Xia et al. 2007). Judging from the general behavior of curcumin, the most likely scenario is that it up-regulates serotonin at high doses and down-regulates it at low ones.

Another study (Wu et al. 2015) proposes an answer for anxiety due to dietary deficiency of docosahexaenoic acid (DHA) that the body struggles to synthesize from Omega-3. Curcumin to the rescue—when curcumin is fed to rats together with a DHA precursor, it increases DHA levels in the hypocampus by a whopping 162% percent at the optimal dosage which was, unsurprisingly to me, the 250ppm rather than the 500ppm also tried. Further tests revealed that the precursor was doing the heavy lifting of DHA production in the liver but with the help of the curcumin, the amount was bumped up and actually made it across the brain-blood barrier. With bump-up, there was a 179% increase, again with the half dose (Wu et al. 2015, 951-953,955-956).

The half dose mystery was elucidated by further *in vitro* study. Liver cells treated with another precursor of DHA and curcumin showed no effect at 10µM of curcumin, you got 132% more DHA synthesized at 20µM and 85% **less** at 40µM (Wu et al. 2015, 956-957). The wisdom of taking a "more the merrier" attitude of all too many studies with inconclusive or even contradictory results could not be more ill advised. It behooves researchers to pay more attention to dosage, especially with the super-concentrated nano-versions.

The ultimate result of this particular study was that the rats become less anxious as measured by the standard elevated maze test (Wu et al. 2015, 951-953). This is serious good news to vegetarians and vegans who are particularly at risk for not getting enough DHA in their diets as well as victims of brain trauma and the modern practice of feeding maize to fish, cattle and battery chickens (Wu et al. 2015, 951,957-959).

Post-traumatic stress disorder is another phychological problem where curcumin may prove of benefit (Monsey et al. 2015, 1278-1279). A group of long suffering rats were literally shocked in a byzantine series of rooms. There was the lit chamber with the grid floor (A) and the dark room with a black floor that smelled of peppermint (B) and the brightly lit room with the grid floor and cedar chips (C) and the lit room with grid floors wrapped in blue pads that smelled of fabric softener (D). The rats were trained in one chamber to associate tones they heard with shocks to their feet, then after various intervals moved to another room where they heard tones but got no shocks. So A and C were shocking experiences and B and D were tones-only zones (Monsey et al. 2015, 1279-1280). The idea was to evoke Pavlovian memories of the fear the rats had experienced in the first and third chambers as reflected by "freezing" behavior—staying absolutely still except for respiration. On the order of 270mg/kg of curcumin mixed into the rat's feed had no effect on the post actual shock reaction but was able to significantly prevent the formation and retention of fear memories. In other words, the rats fed the curcumin recognized that they were not in the shock rooms and ignored the tones, whereas the ones not fed curcumin froze. The curcumin-fed rats also did well on the standard anxiety tests (Monsey et al. 2015, 1280-1286). This curcumin effect, it is suggested, was achieved through down-regulation of the IKK-NF-κB signaling pathway, more usually associated with inflammatory processes. This pathway, it seems, is also involved in the formation of memories and in particular the consolidation and reconsolidation of Pavlovian fear memories. Once burned, twice shy (Monsey et al. 2015, 1286-1287).

Pain

Pain treatment was another important use of *kurkanû*-turmeric in ancient Mesopotamia. There, apart from migraine headaches, reactive arthritis and sore hips/feet, the treatments clump around *sagallu* and *maškādu*, leg pain which may include sciatica, plus what is fairly clearly peripheral neuropathy.

pain:

bandages:

ḫašû, *atāʾišu*, *kurkanû*, *erēnu*-cedar, *šurmēnu*-cypress, *daprānu*-juniper, ["sweet reed", *asû*-myrtle, *ballukku*-aromatic, *kukru*], *nikiptu*, *burāšu*-juniper, *ṣumlalû*, *labanātu*-incense, *šupuḫru*-cedar oil, *sīḫu*, [*argānu*, *barīrātu*, *maštakal*, *bīnu*-tamarisk], *suḫuššu*-dwarf

palm and *qān šalāli*-reed are crushed together, sifted, decocted and used in a bandage(?) for [*maškadu*(?)] (BAM 406:4')

tarmuš, *kurkanû*, *erēnu*-cedar, […], "sweet reed", *ballukku*-aromatic, *nikiptu*, *burāšu*-juniper, *šimeššalû*-boxwood, *ṣumlalû*, […], […], *sīḫu*, *argānu*, *barīrātu*, […] and GIŠ.NÍG.TUKU are crushed, sifted, boiled over a fire and used in a hip bandage(?) for *sagallu* (BAM 130:2)

salves/rubs/daubs:

kurkanû is ground, mixed with oil and used in a salve for *maškadu* (K 2428+2548+6728 obv. 7')

kurkanû is ground, mixed with oil and used in a salve for *maškadu* (K 2428+ 2548+6728 obv. 10')

kurkanû is crushed, mixed with oil and used in a salve for *maškadu* (BAM 379 ii 10'//CTN 4 195 iii 6')

human skull, *abukatu*, and *kurkanû* are mixed with oil and used in a salve for ghost pain(?) (AMT 97/4:17'[AMD 3 no. 293)

kurkanû, *kamkadu* and *šunû*-chastetree are poured into oil and used in a massage rubbed on the feet with the hands for *maškadu*; accompanied by a recitation (BAM 182:23')

fumigants:

kurkanû and *imḫur-ešra* are crushed and used in fumigant over *eʾru*-tree coals for *sagallu*; preceded by an amulet with *tarmuš*, *imḫur-lim* and *imḫur-ešra* and a salve with *imḫur-lim*; accompanied by a recitation (CT 23 5-14 ii 43')

dried bitumen, […], *imbû tâmtim*, *kurkanû*, *tarmuš*, *imḫur-lim* and *imḫur-ešra* are used in a salve or fumigant for *sagallu*(?) (BAM 122 r. 21')

potions:

tigilû, puquttu, *kazallu* and *kurkanû* are mixed with beer and used in a potion for *sagallu* (BAM 257:11) [See BAM 81:8'-9' and BAM 122 r. 18'-19']

enemas:

šupuḫru-cedar, [*erēnu*-cedar(?)], *šurmēnu*-cypress, "sweet reed", *asû*-myrtle, *ballukku*-aromatic, *šimeššalû*-boxwood, myrrh, […], *kukru*, *ṣumlalû*, *burāšu*-juniper, *suʾādu*, *baluḫḫu*-aromatic, *kurkanû*, *nikiptu*, *sīḫu*, *argānu*, *barīrātu*, *šūšu*-licorice, […], *nīnû*, *kasû*, *ḫašû*, *nuḫurtu*, *urnû*, *tīyatu*, *azupīru*, *šumuttu*-vegetable, *samīdu*, lumps of malt, wheat groats and dates are boiled in beer and used in an enema for needling pain in the right or left side; preceded by a hot bandage with dates, crushed malt, yeast, *ballukku*-aromatic, flax seed, *aktam* and winnowed beerwort and bath with *šunû*-chastetree (BAM 3 iv 40 [Worthington, JMC 7 26])

amulets:

kurkanû root is wrapped in goat hair and used in an amulet for removing *maškadu* (BAM 1 i 36; BAM 423 i 12')

kurkanû is wound into burls with red wool for a band made from male and female spring lamb wool and gazelle tendon threaded with male and female *šû*-stone, carnelian, coral, *ianibu*-stone, *šubû*-stone, *ṣibitu*-stone, *abašmu*-stone, *zalaqqu*-stone, magnetic hematite, *kakkusakku*-stone and sea *biṣṣūru*-shell and used in an amulet bound on the hip socket for *sagallu*; accompanied by a recitation (BAM 124 iv 32//BAM 128 iv 31')

kurkanû is wound into burls on a band made from male and female spring lamb wool and everyday cloth threaded with male and female *šû*-stone, *ayyartu*-coral, carnelian, *ṣibitu*-stone, *ianibu*-stone and *šubû*-stone and used in an amulet bound on the hips for *sagallu* (BAM 354 iii 5)

kurkanû is wound into burls on a band knotted and used in an amulet tied on the thighs and ankles for *sagallu* (BAM 354 iii 6//STT 273 i 17')

[*imḫur-lim*], *imḫur-ešra*, *kurkanû*, […], [*atāʾišu*], *kibrītu*-sulphur and *ruʾītu*-sulphur are formed into burls on a band made from male and female spring lamb wool threaded with […] stones and used in an amulet(?) for *sagallu*; followed by a ritual and a rub with *šeguššu*-flour (CT 23.5-14 i 4')

procedure lost:

dālilu that lives inside a *biṣṣūru*-shell is ground in oil, (mixed with) *imbû tâmtim*, […] *kurkanû* and […] and used for *sagallu* with thigh muscles so tense he cannot stand or walk (BAM 130:26)

[…], [*imḫur-lim*], *imḫur-ešra*, *tarmuš*, *šūšu*-licorice, […]-tree, *suʾādu* seed, […]. *kurkanû*, *urnû*, *nuṣābu*, […], *ṣaṣumtu*, *kamkadu*, *kamantu*, *bīnu*-tamarisk seed, […] seed, […], *ašāgu*-thorn, *pillû*, […], *šibburratu* and […] are used for sore and swollen hips(?) (BAM 56 obv. 11')

<u>numbness</u>:

fumigants:

kibrītu-sulphur, *kurkanû*, dried bitumen and *imbû tâmtim* are used in a fumigant for numbness (AMT 91/1 r. 2)

[…], *imḫur-lim*, *imḫur-ešra*, "lone plant", *kurkanû*, […], *kibrītu*-sulphur, *imbû tâmtim,* dried bitumen, "human bone", *atāʾišu* and […] are used in a fumigant for numbness (Rm. 265:6')

kibrītu-sulphur, *kurkanû*, dried bitumen and *imbû tâmtim* are (mixed) with oil and used in a salve or fumigant for numbness (AMT 92/4+92/9 iii 2')

kurkanû is wrapped in [goat(?)] wool and worn on the neck in an amulet for removing numbness (BAM 423 i 13'; cf. 422 iii 7; 159 vi 51)

Quite apart from controlling pain by down-regulating inflammatory pathways and up-regulating anti-oxidant ones, as might have been expected (Sun et al., 2018, 131-132, 133-137), turmeric appears to have a few other tricks up its sleeve. A gruesome rat study established that β-elemene from curcuma zedoary has the potential actually to promote neurite outgrowth and axonal regeneration in spinal cord injury, thus promoting motor behavioral recovery (Wang et al. 2018). This is a pretty eloquent argument for using the whole plant, and not just what you think is its "active" ingredient. Not that the "inert" ingredients in our medicines and placebos are actually inert. The lactose "inert filler" in a prescription mefloquine pill came very close to killing me.

To know is that the dosage problem is especially significant in the area of pain treatment. Testing for safety at various dosages for the use of pain relief has revealed that at an unbelievably high dosage of 2600mg/kg of curcumin taken for two years, no rats actually died, winning curcumin a "generally safe" rating from the FDA. What went unnoticed is that the involved rats developed chronic active inflammation, ulcers, hyperplasia of the cecum and stomach, intestinal carcinoma and clitoral gland adenomas. Already at 13 weeks, these conditions were beginning to appear and the rats also had discolored faces (jaundice) (Sun et al., 2018, 130). In short, those rats were in pain and being inflicted with conditions that turmeric is famous for treating. Why? Because at this high dosage, the turmeric was pouring gasoline on the fire of auto-immune inflammatory and oxidative damage. Meanwhile, the researchers were wringing their hands over the low bio-availablity of curcumin (Sun et al., 2018, 130-131,137). Good thing, by the looks of it!

Plants like *kurkanû*-turmeric work homeopathically, with small amounts curing what large amounts actually cause (viz. inflammatory and oxidative damage). So, you do yourself no favors by giving huge doses to patients. Moreover, the amount you administer should be adjusted in accordance with the weight of individual patients, as it is invariably for the laboratory animals. The problem here is related to the fact that *kurkanû*-turmeric works by

manipulating the body's own bio-chemistry which is itself a delicate balance of too much and too little.

Taking oxidative damage as an example, the body produces oxygen free radicals, which are essential to its survival, but to make sure they don't work too well or too long, there are anti-oxidants to balance them out. Two examples of natural anti-oxidants produced by the body are bilirubin and uric acid. The right amount of these organic chemicals and all is well, but too much bilirubin and you have jaundice; too much uric acid and you have gout caused by the uric acid crystals those macrophages love to eat (en.wikipedia.org/wiki/radical_[Chemistry]).

This warning applies also to the pharmaceutical company's designer drugs. Duloxetine, used for neuropathic pain and depression, is known to drive patients to suicide. A set of cases at KU MedCenter described in Letters to the Editors of the *Journal of Clinical Psychopharmacology* 2008 Feb;28(1) reveals that trouble arises when a patient uses the product on top of another, similar, medication or rapidly increases the dosage beyond a certain threshold. It is hard not to think that here, too, we have a case of too much or too little.

Similarly, one reason for the opioid crisis is that this imitation opium, which was supposed to be oh so much better than the original, in addition to being even more addictive than opium, can actually cause hyperalgesia (increased responsiveness to noxious stimulus) (Sun et al., 2018, 133). In other words, that stubbed toe feels like it is broken when it isn't. It is thus somewhat reassuring to learn that it is possible to moderate overly powerful painkillers such as opiods and morphine by using curcumin with them. The result is to tamp down the addictive properties and reverse the hyperalgesia (Sun et al., 2018, 133). But maybe we should also be worrying more about too much of a good thing, especially for treatments on the long haul, and more inclined to tailor dosages to an actual patient's weight which is, at least in America, by no means uniform.

Now for the really good news. The usefulness of turmeric for a wide variety of types of even pathological (chronic) pain is completely confirmed by modern bio-medical research (Sun et al. 2018). In human trials involving arthritis patients, curcuma domestica managed to hold its own against ibuprofen and without the latter's side effects of abdominal pain and distension (Sun et al. 2018, 136). Ancient Mesopotamian physicians often used combinations of plants—one of these combinations for arthritic pain includes *kurkanû*-turmeric and *asnû* ("Dilmun dates" = Tamar Hindi in Arabic = *Tamarindis indica* as in the following. These two plants synergize and have been shown to alleviate pain and improve knee joint mobility (Rao et al. 2019).

anal suppositories:

rikibti arkabi, *nīnû*, *baluḫḫu*-aromatic resin, *asnû*, *kurkanû* and salt are used in a particulary potent acorn-shaped suppository for cases where the patient's hips hurt him before he reaches the age where this would be expected, his shins sting him, and his knees give him a gnawing pain due to his having had DÚR.GIG when he was a child (reactive arthritis) (AMT 43/1+ [BAM 7 pl. 15] i 6)

Another study on experimental bone loss in rat jaws tested using 75 and 150 mg/kg of curcumin (Akpinar et al. 2018) confirms that curcumin is not simply taking away the pain of rheumatoid arthritis. Indeed, it acts to prevent the associated bone loss by down-regulating IL-1β and increasing the proportion of osteoblasts to osteoclasts. A further study detected interference with the differentiation and function of the osteoclasts via manipulation of the NF-κB signal pathway at concentrations that did not harm other cells (Yang et al. 2019). And clever germacrone synthesized from turmeric rhizome could do all these things at once, simultaneously decreasing the levels of TNF-α and IFN-γ and increasing the levels of IL-4 in

the affected joints. How did it know to do this? Quite simply the CIA mice (with collagen induced arthritis) had abnormally elevated levels of TNF-α and IFN-γ and abnormally reduced levels of IL-4 in their serum and synovial tissues (Wang et al. 2019, 562). And all this at 20mg/kg delivered orally! (Wang et al. 2019, 561).

But what about *kurkanû*-turmeric for headaches and, in particular, "hand of ghost" headaches, what we call migraine, as in the following references?

fumigants:

atāʾišu, *kibrītu*-sulphur, *kurkanû* and male and female *nikiptu* are crushed finely, mixed with *erēnu*-cedar resin and used in a fumigant for the head (BAM 156:45‖BAM 480 iv 19‖BAM 9:12 [Worthington, JMC 5 14: 220'])

[…], *baluḫḫu*-aromatic and *kurkanû* are used in a fumigant for the head (BAM 480 iv 15 [Worthington, JMC 5 13: 216'])

[*kibrītu*-sulphur], *ruʾītu*-sulphur, *agargarītu*-sulphur, *kurkanû*, *ašlu*-rush, stag horn, […] *ṭūru*-aromatic, *nīnû*, *baluḫḫu*-aromatic resin, *atāʾišu*, *nikiptu*, *kukru*, […] and *šaršarru*-red clay are used in a fumigant for "hand of ghost" (BAM 472:10' [AMD 3 no. 286])

[…], a skinned wild *pizallurtu*-gecko, *ašāgu*-thorn, […], *kurkanû* and gazelle dung are used as a fumigant for "hand of ghost" directed into the nostrils (BAM 469:8' [AMD 3 no. 247])

Here, what is desired is the down–regulation of COX2 and a return to a normal balance with COX1. As we shall see later, high doses of curcumin actually up-regulate COX2. However, a recent study (Abdolahi et al. epub 2019) using actual migraine sufferers combined high dose nano-curcumin with ω-3 with happy results, for the fairly obvious reason that the last thing you want is the combined force of two down-regulators on the system creating a spike and dangerously low levels of something your body needs. If your medicines are pulling in opposite directions, you have a better chance of coming out with the happy balance you actually want and, sure enough, the patients reported fewer and less severe headaches. Interestingly, without exception, the headache treatments with *kurkanû*-turmeric of which I am aware use the ancient Mesopotamian equivalent of nano-curcumin, namely fumigation, and alongside the sulphur often used to concentrate turmeric extracts. Never fear, the late period texts that give actual dosages measure them in carats.

Ancient Mesopotamians also used *kurkanû*-turmeric in what can only be described as nervine tonics as in the following references.

enemas:

enema no. 1: *erēnu*-cedar, *šupuḫru*-cedar, *šurmēnu*-cypress, *daprānu*-juniper, […], *šimeššalû*, myrrh, *kanaktu*-aromatic, *ṭūru*-aromatic, […], *ṣumlalû*, *burāšu*-juniper, […], "sweet reed", *baluḫḫu*-aromatic, […], *abukatu* and "white plant"

enema no. 2: flax seed, *aktam*, *azallû*, *šammi buʾšāni*, *sīḫu*, *argānu*, *barīrātu*, *aprušu*, white alum, black alum, alum, *uḫḫulu qarnānu* and winnowed wheat groats

enema no. 3: malt lumps, *kasû*, *saḫlû*, *šumuttu*-vegetable or "life plant", *nīnû*, *urnû*, *azupīru* or *azupīrānu*, (*samīdu*), *zibû*, *ḫašû*, *nuḫurtu*, *sibbirru, tīyatu*, *kamkadu*, "life plant" or [*šumuttu*-vegetable], "fox grape", *ṣaṣuntu*, *šunû*-tree, "sunflower", *tarmuš*, *imḫur-lim*, *imḫur-ešra*, *atāʾišu*, *kurkanû*, *šammi ašî* seed, *kirbān eqli*, *asnû* and salt; all plants are boiled in undiluted beer, groat water and undiluted vinegar, filtered and allowed to cool; 1/2 *qa* of oil is poured onto it; used in an enema for the great lotion for [burning of *ṣētu*, *šibiṭ šāri*], *šimmatu* (numbness), *rimūtu* (paralysis), *šaššaṭu* (tetany), "hand of ghost" (pain), ["hand of curse", DÚR.GIG] or *kal* GIG (BAM 168:15‖BAM 413 r. 7'‖BAM 52:34‖UET 4.153:11‖BAM 53:3)

erēnu-cedar. *šurmēnu*-cypress, *daprānu*-juniper, *asû*-myrtle, *ballukku*-aromatic, *ṭūru*-aromatic, *šupuḫru*-cedar, "sweet reed", *ṣumlalû*, *nikiptu*, *suʾādu*, *kanaktu*, […]-aromatic,

abukatu resin, *atāʾišu*, *kurkanû*, […], sheep kidney fat, date rind, and *asû*-myrtle oil are used in a sedative; followed by another sedative (BAM 40:10‖AMT 98/2:6')

Similarly, in modern medicine, curcumin has been tested for neuroprotective properties in such diseases as Alexander disease, Alzheimer's disease, ischemia stroke, traumatic brain injury, spinal cord injury, peripheral nerve injury, diabetic peripheral neuropathy, and Parkinson's disease (Forouzanfar et al. 2019). Benefits seem to come from curcumin's ability to keep mitochondria up and running (Bagheri et al. 2020).

Lungs

Ancient Mesopotamian texts specifically mention respiratory distress as one of the conditions to be treated with *kurkanû*-turmeric, alongside thick sputum, pain in the breast and shoulders and just "sick lungs".

"hand of ghost" (respiratory distress):

fumigants:

human skull, *abukatu*-aromatic and *kurkanû* are ground like groats, mixed with ox fat and used in a fumigant for ghost shortness of breath (BAM 469 r. 22‖BAM 471 iv 6' [AMD 3 no. 280])

phlegm:

potions:

[…], first quality beer, "sweet reed", *asû*-myrtle or myrrh, *šurmēnu*-cypress, *kikkirānu*, *kurkanû* and […] are boiled together; honey and pressed-out oil are poured on; used in a potion for thick sputum in the lungs; the patient is expected to vomit (BAM 555 ii 16)

[…], "sweet reed", *ballukku*-aromatic, *šurmēnu*-cypress, *burāšu*-juniper, *kurkanû*, *baluḫḫu*-aromatic, *baluḫḫu*-aromatic resin, *nuḫurtu*, *kikkirānu*, *elikulla* seed, *šibburratu*, […], *buṭnu* and *ḫašānu* are chopped together; green malt mash is made; it and [*titapu*-preparation made with] emmer are baked in an oven, taken out and allowed to cool; the plant mixture is mixed with the green malt mash and *titapu*-preparation made with emmer, decanted into a bowl, set aside for three days; [honey] and pressed-out oil are poured on; first quality beer is poured on, decanted into an *adagurru*-vessel; used in a potion drunk on an empty stomach for thick sputum in the lungs; the illness is expected to have a remission (BAM 555 ii 18)

pain:

potions:

erēnu-cedar, *šurmēnu*-cypress, *daprānu*-juniper, *asû*-myrtle, *šimeššalû*-boxwood, […], *šupuḫru*-cedar, *suʾādu*, *baluḫḫu*-aromatic, *kukru*, *tarmuš*, […], *ḫabigalbat*, *samīdu*, *zibû*, *šunḫu*, *antaḫšum*-vegetable and *kurkanû* are ground in equal quantities; "life plant", *errû*, *uriyānu* and […] are crushed and sifted; mixed with beer or […] and used in a potion drunk on an empty stomach for hurting breast and shoulders (BAM 217:27)

miscellaneous lung problems:

bandages:

[*kukru*, *burāšu*-juniper, *ṣumlalû*], *ṭūru*-aromatic, myrrh, *baluḫḫu*-aromatic resin, [*abukatu*] resin, [*baluḫḫu*-aromatic, *atāʾišu* and *kurkanû*] are ground, mixed with bitumen and *isqūqu*-flour and used [to bandage] (chest and back) as far as the kidneys for lung problems (BAM 36:4')

potions:

buṭnu, *ḫašânu*, *kikkirānu*(?), *kurkanû*, […] and *šabḫa* are plants for the lungs for the cold season (BAM 431 v 34')

ḫaltappanu, *kurkanû*, *ḫašânu*, *kukru*, *aktam* seed, *ḫašû*, *šammi buʾšāni*, "white plant" and *buṭnānu* are used for the lungs (pharmacist's preparation(?)) (BAM 431 v 37')

[1] shekel of *erēnu*-cedar, 1 shekel of *šurmēnu*-cypress, 1 1/2 shekel of *daprānu*-juniper, [x] shekels of *asû*-myrtle, 2 shekels of *nikiptu*, [x] shekels of *šimeššalû*-boxwood, [x] shekels of *suʾādu*, 3 shekels *ballukku*-aromatic, 5 shekels of "sweet reed", [x] shekels of myrrh, 1/2 shekel of *ṭūru*-aromatic, 1/5 shekel of *baluḫḫu*-aromatic, [x] shekels of *buṭnānu*, 2 shekels of *ḫašânu*, [x] shekels of *kurkanû* and 10 shekels of *kikkirānu* with 1 *qa* of *kasû*, 1 *qa* of honey, […], x *qa* of filtered green malt-mash, 6 *qa* of *titapu*-preparation, […] and x grains of groats made from […] are left for seven days in beerwort; when it has cooked, opened and used in a *tariḫu* potion drunk on an empty stomach for "sick lungs"; secret of kingship (BAM 42:18)

potions or regimen:

5 shekels of *erēnu*-cedar, 5 shekels of *šurmēnu*-cypress, 3 shekels of *šimeššalû*, 5 shekels of "sweet reed", 3 [shekels] of *ballukku*-aromatic, 2 shekels of *suʾādu*, 3 shekels of *buṭnānu*, 5 shekels of *ḫašânu*, 3 shekels of *kurkanû* and 10 shekels of *kikkirānu* are chopped together, crushed with a pestle, sifted, reground by dragging a basalt grinding stone over it, sifted through a fine linen cloth; a *qa* of the resulting groats are washed with water, baked in an oven, cooled with cold baked *kasû* juice, rebaked in an oven and allowed to cool; the groats and the aromatic mixture are mixed with 7 *qa* of green malt-mash and beer bread while the patient waits; if it is a man with "sick" lungs, he eats it on an empty stomach; it is decanted; pressed-out oil is poured on it and it is eaten and washed down with sweet wine; this is a *saḫunu* to be used (only) for a man or for the king; secret of kingship (BAM 42:4//BAM 556 ii 62')

aspiration treatments:

1 shekel of *erēnu*-cedar, 1 shekel of *šurmēnu*-cypress, 1 1/2 shekels of *daprānu*-juniper, 1 shekel of *asû*-myrtle, ([1 shekel of *baluḫḫu*-aromatic]), 5 shekels of "sweet reed", 3 shekels of *ballukku*-aromatic, 1 shekel of *suʾādu*, 1 of *šimeššalû*-boxwood, 2 shekels of *nikiptu*, 1 1/2 shekels of myrrh, 1/2 shekel of *ṭūru*-aromatic, 1/4 shekel of *baluḫḫu*-aromatic resin, 1 shekel of *buṭnānu*, 3 shekels of *ḫašânu*, 2 shekels of *kurkanû* and 10 shekels of *qulquliānu* are chopped together, crushed and sifted; *titapu* preparation made with oil and emmer is baked in an oven, taken out and allowed to cool and crushed with a pestle; green malt mash, the *titapu* preparation and the dry ingredients are mixed together, boiled, ground and set aside for three days; when it has cooked, pressed-out oil and beer are whisked together and poured on; drunk through a straw on an empty stomach for "sick lungs", thick sputum in the lungs, *suʾālu*-cough or cold season or any problem of the lungs; *tariḫu* made with winnowed beerwort (= green malt mash mixed with *titapu* preparation); secret of kingship (Heeßel and al-Rawi, Iraq 65.229 iv 33)

1 shekel of *erēnu*-cedar, 2 shekel of *šurmēnu*-cypress, 1 1/2 shekels of *daprānu*-juniper, 2 shekels of *asû*-myrtle, 2 shekels of *ballukku*-aromatic, 2 shekels of *šimeššalû*-boxwood, 4 shekels of "sweet reed", 2 shekels of *nikiptu*, 2 shekels of *suʾādu*, 1/2 shekel of myrrh, 1/2 shekel of *ṭūru*-aromatic, 1/4 shekel of *baluḫḫu*-aromatic resin, 2 shekels of *buṭnānu*, 2 shekels of *ḫašânu*, 2 shekels of *kurkanû*, and 10 shekels of *qulquliānu* are chopped together, mixed with raisins which have been washed twice in water, collected in a *karpatu*-vessel; undiluted sweet wine is poured on top; set out for seven days or until moistened and used in a potion drunk through a sweet reed straw on an empty stomach for sick lungs or thick sputum in the lungs or *suʾālu*-cough; *tariḫu* potion; secret of kingship (BM 78963:29)

<u>pulmonary edema</u>:

aspiration treatments:

[1] 1/2 shekels of *erēnu*-cedar, 1 1/2 shekels of *šurmēnu*-cypress, 1 1/2 or 2 shekels of *daprānu*-juniper, 2 shekels of *asû*-myrtle, (3 shekels *ballukku*-aromatic), 1 1/2 shekels of *šimeššalû*-boxwood, 5 shekels of "sweet reed", (3 shekels *ballukku*-aromatic), (2

shekels of *suʾādu*), 1 1/2 or 2 shekels of *nikiptu*, (2 shekels of *suʾādu*), 1/2 shekel of myrrh, 1/2 shekel of *ṭūru*-aromatic, 1/5 shekel of *baluḫḫu*-aromatic (resin), 2 shekels of *buṭnānu*, 2 shekels of *ḫašânu*, 3 shekels of *kurkanû* and 10 shekels of *kikkirānu* or *qulquliānu* are chopped, mixed with [1 *sūtu*] of raisins which have been washed three times in drawn wine, collected in a *karpatu*-vessel; red or strong wine is poured on top; set out for five days or until decocted and used in a potion drunk through a sweet reed straw on an empty stomach in the cold season for waterlogged lungs; also good for waterlogged kidneys and for "wind"; to be used (only) for a man; *tariḫu* potion; secret of kingship (BAM 42:29‖BAM 44:37')

Included in this category will have been cases of asthma. Curcumin in small doses is anti-inflammatory, so it can serve as a bronchodilator as well as reducing inflammation and over-production of mucus. Researchers discovered that the liposomal formulation was successful in down-regulating IL-6, IL-8, IL-1β and TNF-α via NF-κB and STAT3 signaling pathways. Unsurprisingly to me, the truly tiny dose of 1μg/mL worked better than the 5μg/mL (Ng et al. 2018, 54). Another study that simply administered the curcumin in aerosol form to rats (Chauhan et al. 2018) used 5 mg/kg as their selected dosage, when 2.5 mg/kg essentially did nothing (Chauhan et al. 2018, 30,32). Once again, results were quite promising. Nitrite levels were down 21%, the elevated ROS levels responsible for airway smooth muscle contraction and excess mucus production, down 35%. COX2 levels were back to normal, the ERK, p38 and JNK signalling pathways were un-up-regulated and TNF-α was down by 46%. With one exception, namely lypooxygenase LOX5, curcumin performed as well or better than the currently used drug for asthma (Chauhan et al. 2018, 32-34).

Heart

Besides being a bronchodilator, *kurkanû*-turmeric also helps to serve as a vasodilator and preventer of fibrosis in the aorta (Li et al. 2019, 5). Heart conditions treated in ancient Mesopotamia with *kurkanû*-turmeric essentially involve a crushing sensation in the chest.

fumigants:

copulating *pizalluru*-geckos from the steppe, *burāšu*-juniper, *bīnu*-tamarisk, *kurkanû*, *atāʾišu*, *kibrītu*-sulphur, shell-duck droppings, wood shoots and *kamūn bīni* are used in a fumigant for chest pain (*ḫūṣ hepi libbi*) (TCL 6 34 iii 4)

kurkanû, *atāʾišu*, *kibrītu*-sulphur, and *uḫḫulu qarnānu* are used in a fumigant over coals for chest pain (*ḫūṣ hepi libbi*) (TCL 6 34 iii 6)

copulating *pizalluru*-geckos from the steppe are dried and used with *burāšu*-juniper and "old human bone" in a fumigant over *uḫḫulu qarnānu*; *kurkanû* and *atāʾišu* are used in a fumigant over *uḫḫulu qarnānu*; *kibrītu*-sulphur, a lizard and a male shell-duck are used in a fumigant over *uḫḫulu qarnānu*; boat (fig?!) shoots and *kamūn bīni* are used in a fumigant; *kibrītu*-sulphur and *atāʾišu* are used in a fumigant for chest pain (*ḫūṣ hepi libbi*) not to come back and bother the patient (BAM 445:28 [AMD 8/1 7.7: 65])

amulets:

wild *kurkanû*, *erēnu*-cedar and *mūṣu*-stone are used in an amulet for chest pain (*ḫūṣ hepi libbi*) (BAM 311: 17')

A common cause of chest pain in a semi-arid environment will have been heat stress. Prolonged hot weather can induce chronic stress, leading to cardiovascular failure, neurological impairment, renal failure and, ultimately, death (Chen et al. 2020, 1-2).

Researchers got some mice into serious hot water to test curcumin's ability to attenuate this form of stress, comparing the results of 50mg/kg, 100mg/kg and 200mg/kg dosages of curcumin administered orally for four weeks to the results with aspirin, heat alone and control. They had a mini-bathtub heated up to 41 degrees Centigrade and with just enough

water to immerse the adult male mice without drowning them. Measurement of blood pressure and heart pressure were taken in a minimally invasive manner using a bag and net tail cuff; temperature, by contrast, required a rectal thermometer. After 20 minutes in the bath, the mice were "sacrificed" for science and the heart tissues prepared and examined (Chen et al. 2020, 2-4). As hoped, the increase in angiotensin II (Ang II) was mitigated by the curcumin, which performed better than the aspirin (16.9% reduction) even at the lowest dose of 50mg/kg (26.9% reduction) rising up to 35.1% reduction at the highest dose tried (Chen et al. 2020, 5). This is good news indeed, since aspirin has long been known to alleviate pain and to prevent heart attacks (Chen et al. 2020, 6).

It is good to know that turmeric (in small doses) is generally protective of internal organs, so the heart as well as the lungs, liver and kidneys. Curcumin seems to be very good at counteracting poisons (Hosseini and Hosseinzadeh 2018), a suspected significant subset of ancient Mesopotamian references to *kišpu*-sorcery, for which *kurkanû*-turmeric is used as a treatment. One of our *kurkanû*-turmeric references appears to be a case of a patient fed a cardio-toxic poison

potions/snuff:

tarmuš, *imḫur-lim*, *imḫur-ešra*, *sikillu*, *elkulla*, *baluḫḫu*-aromatic, *aktam*, *atāʾišu*, "swamp apple", *lapat armanni*, alum, *imbû tâmtim*, *nuḫurtu*, *tīyatu*, *ḫašû*-thyme, *urnû*, *samīdu*, *šibburratu*, *azupīru*, *nīnû*, *šumuttu*, *baltu*-thorn sprouts, *ašāgu*-thorn sprouts, *qan šalāli* sprouts, *bīnu*-tamarisk, *bīnu*-tamarisk seed, *maštakal*, *maštakal* seed, *burāšu*-juniper, *burāšu*-juniper seed, KÙ.PAD salt, Amanus salt, dates, *ḫaluppu* seed, *suʾādu*, *kurkanû* and *kasû* are (mixed) with beer or wine or water or oil or *ḫīqu*-beer and used in a potion or used in a snuff for loss of appetite, depression, chest pain, tense limbs, cramped tongue, bitten lips, ringing ears, numb hands, gnawing pain in the knees and shins, protruding epigastrium, impotence, chills, weight changes, drooling, shortness of breath, trouble sleeping and sluggishness due to *kišpu* (BAM 59: 9⁄⁄BAM 430 iv 23'⁄⁄BAM 431 iv 18 [AMD 8/1 7.10.3.1:18; 7.10.4: 17]⁄⁄BAM 438: [25])

tarmuš, *imḫur-lim*, *imḫur-ešra*, *maštakal*(?), *sikillu*, *elkulla*, *imbû tâmtim*, *lapat armanni*, *ḫaluppu* seed, *urnû*, *ḫašû*-thyme, *šibburratu*, *nuḫurtu*, […], "swamp apple" and […] are used in potions and a bath for chest pain, tense limbs, cramped tongue, bitten tongue, ringing ears, numb hands, gnawing pain in the knees and shins, protruding epigastrium, impotence, chills, weight changes, drooling, [shortness of breath, trouble sleeping and sluggishness] due to *kišpu* in food, drink or oil (BAM 445: 10-25 [AMD 8/1 7.7: 47-69])

Studies have shown that turmeric either alone or with other drugs is a promising adjunct to cancer treatment, preventing otherwise irreversible damage to the heart produced by the drugs employed for this purpose (Li et al. 2019, § 3.4). Of little relevance to ancient Mesopotamians, but of supreme importance to moderns the world over, turmeric can help protect hearts from damage due to an estrogenic compound used to make polycarbonate plastic and epoxy resins that humans and animals pick up from the food we eat, the beverages we drink and, to a lesser extent, the air we breathe (Valokola et al. 2019).

Gastrointestinal Tract (GI)

The GI tract uses of turmeric by the ancient Mesopotamian physician for ulcers (*tugānu*) and ulcerative colitis (DÚR.GIG) have actually made it to clinical trial (Khonche et al. 2016; Singla et al. 2014). This is perhaps unsurprising for a plant famous for its anti-inflammatory properties, to test which innumerable rats have had their stomachs sacrificed (Rajagopal et al. 2018).

ulcers/obstruction:

potions:

aktam, *imḫur-lim*, *imḫur-ešra*, *tarmuš*, *atāišu*, *kalbānu*, *kurkanû*, *zibû*, "white plant", myrrh, alum, *šīpu*-orpiment, *šaršarru*-red clay, *ininnu*-barley and *abukatu* resin are ground together, (mixed) with beer and pressed-out oil and used in a potion drunk on an empty stomach for *tugānu* (STT 96:17)

procedure lost:

"sweet reed", […], *kukru*, *burāšu*-juniper, […], *atāʾišu*, *tarmuš*, [*imḫur-lim*], *imḫur-ešra*, *ṣiburu*, […], *kurkanû*, *kikkirānu*, *ḫašânu* and *ari*[…] are crushed together and used to prevent the prolongation of A.GA.ZI (BAM 74 iii 6)

DÚR.GIG (includes ulcerative colitis)

salves/rubs/daubs:

saḫlû, *nīnû*, *kurkanû*, *errû*, *abukatu* resin and *kibrītu*-sulphur are mixed with sheep fat and used to firmly rub the anus for DÚR.GIG; preceded by an acorn-shaped anal suppository with *saḫlû*, *nīnû*, *kukru*, *burāšu*-juniper, *uḫḫulu qarnānu*, one bulb *šūmu*-garlic, *upinzir*-insect and dates (BAM 96 ii 12)

fumigants:

[*burāšu*-juniper], *kukru*, *kikkirānu*, *ballukku*-aromatic, *atāʾišu*, *kurkanû*, [*asû*-myrtle], […]. *saḫlû*, *kasû*, *uḫḫulu qarnānu*, *abukatu* resin, *baluḫḫu*-aromatic resin […], salt, gazelle droppings and myrrh are used in a fumigant for DÚR.GIG (BAM 104:26)

kukru, *burāšu*-juniper, *atāʾišu*, *kibrītu*-sulphur, *nīnû*, *ṭūru*-aromatic, *baluḫḫu*-aromatic resin and *kurkanû* are ground together and placed in a *kirru*-vessel over *ašāgu*-thorn coals and used in a fumigant that the patient sits over until his abdominal wall is lubricated and the sweat rolls off for DÚR.GIG; the patient is to be kept out of the wind, rain and heat of the day (BM 103386 r. 10 [Heeßel, AMD 14: 322])

potions:

tarmuš, *imḫur-lim*, *imḫur-ešra*, *ḫaluppu*-tree seed, *allanu*-oak, *ḫašû* and *kurkanû* are mixed with wine and used in a potion for DÚR.GIG (BAM 164:24)

ḫaluppu-tree seed, *lišān kalbi*, *tarmuš*, *kamkadu*, *ḫašû* and *kurkanû* are used in a potion for DÚR.GIG (BAM 430 v 15'//BAM 431 v 9')

enemas:

erēnu-cedar, *šurmēnu*-cypress, *daprānu*-juniper, *asû*-myrtle, *ballukku*-aromatic, "sweet reed" or *šimeššalû*-boxwood, *ṣumlalû*, *tarmuš*, *imḫur-lim*, *imḫur-ešra*, *kurkanû* and *suʾādu* in equal proportions are chopped together; *burāšu*-juniper infusion is sprinkled on; left out overnight, boiled and filtered; 10 shekels of honey and 1/3 *qa* of pressed-out oil are poured on; used in an enema for wind groaning and butting into the anus, diarrhea, stinging limbs, limp arms and wasting of the flesh due to DÚR.GIG, "hand of curse"; the patient is expected to have a bowel movement; accompanied by a fumigation with *burāšu*-juniper and *atāʾišu* (BAM 168:34)

anal suppositories:

[…], *saḫlû*, *kurkanû*, *nuḫurtu*, datepalm fibre, dates, *ballukku*-aromatic, *kukru*, *burāšu*-juniper, *rikibti arkabi*, […], *abukatu* resin and *ṭūru*-aromatic are mixed with sheep fat and wax and used in an acorn-shaped anal suppository for DÚR.GIG (BAM 104:29)

One reason that ulcerative colitis is so serious is that the patient can develop colorectal cancer. The culprit here are the NF-κB and STAT3 signaling pathways (Wu et al. 2020, 228) but, never fear, curcumin's ability to decrease the expression of TNF-α, NF-κB, IL-6, COX-2, NOS, and IFN-γ can save the day (Wu et al. 2020, 230) and this despite or, dare I say it, because, of its low bioavailablity when taken by mouth. So in spite of, to them distressingly,

low blood levels of curcumin in their patients, the curcumin has been doing its anti-oxidant job in clinical trials to the shock and surprise of researchers (Wu et al. 2020, 231).

Liver

Ancient Mesopotamian treatments for the liver concentrate on jaundice as in the following references:

kurkanû is ground, (mixed) with beer and used in a potion for *amuriqānu*-jaundice (BAM 578 iii 10)

kurkanû is ground, (mixed) with beer and used in a potion for jaundice (*aḫḫazu*); preceded and followed by other potions (BAM 578 iv 36)

wild *kurkanû* is ground, (mixed) with beer and used in a potion for liver problems (BAM 92 iii 5)

On the high dosage end of the coin, its pro-oxidative properties will have made *kurkanû* a very effective treatment for jaundice (by removing excess anti-oxidant bilurubin from the bloodstream). Indeed, a clinical trial of liver cirrhosis patients revealed a significant decrease in serum levels of bilirubin after three months of treatment in the curcumin group (Nouri-Vaskeh et al. 2020, 3-4).

Pancreas

Pancreatitis[8] is another syndrome treated with *kurkanû*-turmeric in ancient texts. The symptoms are clear enough from the first reference in the sequence of treatments for the same condition in BAM 434 and parallels and from the cited BAM 238 reference. Ancient physicians classed all of these cases under the broad rubric of *kišpu* (sorcery).

potions:

tarmuš root, *imḫur-lim* root, *imḫur-ešra* root, *sikillu*, *tullal*, *ardadillu*, *ardadillu* seed, *šakirû*, *lišān kalbi*, *nuḫurtu*, *tīyatu*, *urnû* leaf, *ḫašû*-thyme, sea foam, *nīnû*, *ruʾtītu*-sulphur, *bukānu*/*pišru*-wood, "swamp apple", *urânu*, *kurkanû*, *ašqulālu*, *atāʾišu* and *azallû* are ground together, (mixed) with beer and used in a potion for pancreatitis: mucus in the epigastrium (vomiting on an empty stomach), burning sensation in the epigastrium, reduced appetite, and tense flesh (erythematous skin nodules) due to *kišpu* in his food or drink (BAM 434 iv 8′//BAM 190: 31 [AMD 8/1 7.10.1,1: 98'"])

maštakal, *tarmuš*, *imḫur-lim*, *imḫur-ešra*, *sikillu*, *pišru*-wood *urânu*, "lone plant", "swamp apple", *kurkanû*, *azallû*, *nīnû*, *šakirû*, *lišān kalbi*, *ḫašû*-thyme, *nuḫurtu*, *tīyatu*, *urnû*, *šibburratu*, sea foam, *ruʾtītu*-sulphur, *ardadillu* and *ardadillu* seed are used for *kišpu* (BAM 434 iv 13 [AMD 8/1 7.10.1,1: 103'"])

nuḫurtu, *tīyatu*, *aktam*, *kurkanû*, *šibburratu*, *urnû*, *azallû*, *šumuttu*, *maštakal*, *nikiptu*, *karān šēlibi*, Emesallim salt, *bīnu*-tamarisk and *nīnû* are (mixed) with wine or beer and used in a potion for *kišpu* (BAM 434 iv 20 [AMD 8/1 7.10.1,1: 110'"])

tarmuš, *imḫur-lim*, *imḫur-ešra*, *ḫašû*-thyme, *atāʾišu*, *kasû*, *nuḫurtu*, *tīyatu*, *aktam*, *kurkanû*, *šibburratu*, *urnû*, *azallû*, *šumuttu*, *maštakal*, *nikiptu*, *karān-šelibi*, Emesallim salt, *bīnu*-tamarisk and *nīnû* are (mixed) with beer and used in a potion for *kišpu* (BAM 434 iv 44 [AMD 8/1 7.10.1,1: 134'"])

tarmuš, *imḫur-lim*, *imḫur-ešra*, *ḫašû*-thyme, *atāʾišu*, *urnû*, *šibburratu*, *nīnû*, *kurkanû*, 4 grains of *azallû*, *kasû*, *maštakal*, *lišān kalbi* and Amanus salt are (mixed) with wine or beer and used in a potion for *kišpu* (BAM 434 iv 74 [AMD 8/1 7.10.1,1: 164'"])

1 *qa* of *nuḫurtu*, 1 *qa* of *ḫašû*-thyme, ½ *qa* of *kasû*, 1 *qa* of *nīnû*, 1/3 *qa* of *šumuttu*, 1 *qa* of *tīyatu*, 1/3 *qa* of *ṣaṣumtu*, 15 grains of Amanus salt, [20] grains of *imḫur-lim*, 20 grains of *imḫur-ešra*, [20] grains of *tarmuš*, 1 shekel of *bīnu*-tamarisk seed, 1 shekel of

[8] This corrects Scurlock and Andersen 2005, 357-358 where Andersen thought it was an allergy and Scurlock neglected to check it out herself.

maštakal, 1 shekel of *maštakal* seed, 1 shekel of [*atāʾišu*], [1] shekel of *kurkanû*, and 1 shekel of *burāšu*-juniper are tested plants to be (mixed) with beer or wine or tavern keeper's beer or milk and used in a potion or dried and used as snuff for continual phlegm, bouts of sweating, mucus (in the epigastrium) or continual production of liquid from the lungs (pleural effusion) and phlegm continually coming from mouth and tongue due to repeated acts of *kišpu*; is also used for anxiety and depression (BM 4238+lo.e. 1⁄⁄BM 42250 r. 4⁄⁄BM 43123+ [Finkel, Fs. Lambert 204-205; AMD 8/3 3.11:13]

Here, the most obvious beneficial effects will have been the result of its analgesic properties and ability to up or down regulate the production of pancreatic secretions by acting as a lipase inhibitor (Yoshioka et al. 2019) or by preventing this inhibition, depending on the dosage. The former usage is for diet pills, the latter will literally prevent the pancreas from eating itself as a result of excess production of proteolytic enzymes (Harrison 11th ed, 1372-1377).

Urinary Tract

The uses of *kurkanû*-turmeric for the urinary tract focus on partially blocked tubes, so constriction of the urethra and difficulty in passing kidney stones.

<u>constriction of the urethra</u>:

potions:

"lone plant" seed, "fox grape" seed, *dadānu*-thorn seed, […], *šammi buʾšāni*, *kurkanû*, *buṭnu*-terebinth, […], white alum, myrrh and […] resin are used in a potion(?) for constriction of the urethra (AMT 31/1+59/1 [= BAM 7 pl. 1-2] i 44)

kalû-paste, […], *kurkanû*, a fragment of ostrich egg shell, *šimru*, *lišān kalbi*, *imḫur-lim*, [*imḫur-ešra*], […], *erkulla*, *elikulla*, "lone plant", *ḫarmunu* and *šammi buʾšāni* are used in a potion drunk before he sets foot on the ground in the mornimg for continually hurting shoulders, continual tiredness, continual forgetfulness, bad dreams, hair standing on end, incessant vomiting and inability to sleep day or night due to constriction of the urethra; accompanied by a recitation (AMT 31/1+59/1 [= BAM 7 pl. 1-2] i 6)

tarmuš, *imḫur-lim*, *imḫur-ešra*, *ṣarbatu*-poplar resin, *atāʾišu*, *ḫašû*, *ṣiburu*, *kurkanû*, *šammi buʾšāni*, "canebrake plant", *šumuttu*-vegetable, š*agabigalzu*, wild *tigilû*, *nuṣābu*, *kirbān eqli*, "fox grape", *sikillu*, *ankinūtu*, wildflowers, "daughter of the field", *elkulla*, *elikulla*, *bīnu*-tamarisk, "lone plant" seed, *šunû*-tree seed, *šimru* root, *puquttu*-thorn seed, *ušû*-tree seed, *šibburratu*, myrrh, *kukru*, *arzallu*, [*ṣumlalû*(?)], *lišān kalbi* seed, *qutru* seed, *šuqdānu*, *allankaniš*-oak, *ḫazalluna*, *baluḫḫu*-aromatic resin, $BURU_5$.ENSI A.ŠAG_4.GA-insect and a fragment of ostrich egg shell are ground together, mixed with undiluted wine or […] and used in a potion(?) for constriction of the urethra (AMT 31/1+59/1 [BAM 7 pl. 1-2] i 36)

[…], [2] shekels of *tarmuš*, 2 shekels of *imḫur-lim*, 2 shekels of *imḫur-ešra*, [2] shekels of "lone plant", 1 shekel of […] seed, 2 shekels of […], 2 shekels of […], 2 shekels of […], 2 shekels of *kurkanû*, [2 shekels] of *nuṣābu*, 2 shekels of *arariânu*, 2 shekels of […], [2 shekels] of *samānu*, 2 shekels of […], 2 shekels of […], 2 shekels of *paṭrānu*(?), […], 2 shekels of *errû*, 1 shekel of "white plant", 2 shekels of […], 2 shekels of […]-stone, 1 shekel of *tigilû*, […] [2] shekels of […], 1 shekel of *šammi buʾšāni*, 2 shekels of […], […], 1 shekel of *šūšu*-licorice, 2 shekels of […], […], […], 2 shekels of […], […], 1 shekel of […], […], 2 shekels of […], 2 shekels of […], […], 2 shekels of *ṣumlalû*, 2 shekels of […], 1 shekel of […], 2 shekels of fragments of ostrich egg shell, […], [2 shekels] of *nīnû*, 2 shekels of […], […], [2 shekels] of *imbû tâmtim*, […], 2 shekels of *mūṣu*-stone, 2 shekels of [magnetic hematite, 2 shekels of white] *anzaḫḫu*-frit, 2 shekels of black *anzaḫḫu*-frit, 2 shekels of pumice, 2 shekels of stones of *ḫarūbu*-carob pods, 2

shekels of […], 2 shekels of *biṣṣūr atāne*-shell, 2 shekels of sea *biṣṣūru*-shell, 2 shekels of [*pallišu*-plant] stone, 2 shekels of *sāpinu*-plant stone, 2 shekels of *zalaqqu*-stone, 2 shekels of *ḫallūru*-chick peas, 2 shekels of [*kakku*-lentils], 2 shekels of *kiššēnu*-beans, 2 shekels of *šammi buʾšāni*, 2 shekels of *uḫḫulu qarnānu*, 2 shekels of […], 2 shekels of *kanaktu*-aromatic, 2 shekels of *abukatu* resin, 2 shekels of *zibû*, 1/2 shekel of […], 1/2 shekel of KÙ.PAD-salt, 1/2 shekel of Amanus-salt and 1/2 shekel of [*buḫru*]-salt are crushed, sifted, and used in a potion(?) for constriction of the urethra; accompanied by a ritual and recitations (K 6493+6811+Bu 91 5-9,52 [BAM 7 pl. 11-12] obv. 12')

<u>stones</u>:

potions:

kurkanû is mixed with wine and used in a potion to make concentrated stones fall out; it is expected to diminish in size (BAM 380:57÷BAM 381 iv 12)

2 shekels of [… 2 shekels of … 2 shekels of …], 2 shekels of [… 2 shekels of … 2 shekels of …], 2 shekels of [… 2 shekels of … 2 shekels of …], 2 shekels of *kurkanû*, [2 shekels of … 2 shekels of …], 2 shekels of *mergirānu*, 2 shekels of [… 2 shekels of …], 2 shekels of *samānu*, 2 shekels of [… 2 shekels of …], 2 shekels of *puquttu*-thorn, 2 shekels of *azallû*, [2 shekels of …], 2 shekels of "fox grape", 2 shekels of raisins, [2 shekels of *lišān kalbi*], 2 shekels of wild *tigilû*, 2 shekels of *errû*, [2 shekels of …], 2 shekels of *šammi buʾšāni*, 2 shekels of *aktam*, [2 shekels of *tīyatu*], 2 shekels of male *pillû* root, 2 shekels of *lipšaḫ*, [2 shekels of *kukru*], 2 shekels of *burāšu*-juniper, 2 shekels of *ṣumlalû*, [2 shekels of *šimeššalû*-boxwood], 2 shekels of *abukatu* resin, 2 shekels of *suʾādu*, [2 shekels of myrrh], 2 shekels of male *nikiptu*, 2 shekels of female *nikiptu*, [2 shekels of …], 2 shekels of *nuḫurtu*, 2 shekels of *urnû*, [2 shekels of …], 2 shekels of *azupīru*, 2 shekels of *šumuttu*, [2 shekels of …], 2 shekels of *samīdu*, 2 shekels of *zibû*, [2 shekels of …], 2 shekels of *nitku*-frit, 2 shekels of […]-stone, [2 shekels of …], 2 shekels of *ḫallūru*-chick peas, 2 shekels of *kakku*-lentils, [2 shekels of *kiššēnu*-beans], 2 shekels of *ḫurātu*-madder, 2 shekels of *nurmû*-pomegranate, 2 [shekels of …], 2 shekels of *eʾru*-tree seed, [2 shekels of …], [2 shekels of …], 2 shekels of *šunʾu*, [2 shekels of …], [2 shekels of …], 2 shekels of *imbû tâmtim*, [2 shekels] of sea [*biṣṣūru*-shell, 2 [shekels of *misis tâmti*], 2 shekels of [sea] "tablet reed", [2 shekels] of *biṣṣūr atāne*-shell, 2 shekels of [*karaš tâmtim*], 2 shekels of [*kalû*-clay], [2 shekels] of *mūṣu*-stone, 2 shekels of *kalgukku*-clay, 2 shekels of [*zalaqqu*-stone], [2 shekels] of *anzaḫḫu*-frit, 2 shekels of black *anzaḫḫu*-frit, 2 shekels of magnetic hematite, 2 shekels of *pallišu*-plant [stone], 2 shekels of *sāpinu*-plant stone, 2 shekels of *alluḫaru*-[alum], 2 shekels of qitmu-alum, 2 shekels of alum, 2 shekels of stones of *ḫarūbu*-carob pods, 2 shekels of pumice, 2 shekels of fragments of ostrich egg shell, 2 shekels of KÙ.PAD-salt, 2 [shekels] of Amanus-salt and 2 shekels of *buḫru*-salt; alternatively 1/2 shekel each <u>of the salts are plants</u> for constriction of the urethra with hurting kidney region, […] or retention of urine; the plants are crushed with a lead *esittu*-pestle and the stones mill ground with a grind stone; plants and stones are sifted and mixed together, left out overnight in a porous *pursītu*-vessel, mixed with beer or first quality *kurunnu* beer or wine and used in a potion for constriction of the urethra due to stones; accompanied by a recitation and ritual; the stone is expected to fall out (AMT 58/3+K 2960+AMT 62/1 [BAM 7 pl. 6-8] i 6)

This use, too, has been studied for the obvious reason that one of the culprits in renal obstruction (that damages the kidneys) is our old friend tumor necrosis factor TNF-α. This has a Jekyll and Hyde personality. Dr. Jekyll is represented by receptor TNFR1 whose activation leads to the recruitment of its very own death domain protein (TRADD). If this protein links up with the right other proteins, you get a TRADD-RIP-TRAF complex that gets

things moving in a cell defensive direction. Mr. Hyde is receptor TNFR2 which hijacks TRADD and pairs it up with FADD which, if unchecked, brings about tubulointerstitial fibrosis and apoptotic renal tubular cell death (Hashem et al. 2016, 478). Needless to say, what you really want in this case is make sure that you have more TNFR1 activity going on than TNFR2 activity, and curcumin can do precisely that (Hashem et al. 2016, 484).

Yet another set of rats got to suffer for science. Surgery under anesthesia produced the desired constriction (the left ureter was sutured with a tiny silk thread in two places). Thirty days later, after happily munching chow with or without turmeric powder added, the rats were "sacrificed" and their kidneys examined. High creatinine levels in the sutured rats indicated significant damage to the kidneys, an effect significantly improved by the 5% w/w dose of turmeric powder in the lucky rats who got curried chow (Hashem et al. 2016, 479, 480-484).

Gynecology

Testing for specifically women problems, particularly ones that have anything to do with sex, is and probably will always remain in its infancy. It does not follow that we have absolutely no clue why ancient Mesopotamian physicians used *kurkanû*-turmeric for infertility.

salves:

wild *kurkanû*, *nabrūqu*, *kukru* and […] are mixed with […] oil and used in a salve for infertility (BAM 244: 31)

wild [*kurkanû*] and *ḫarmunu* are ground, (mixed) with oil and used in a [salve] for infertility (BAM 244: 37)

potions:

kurkanû and *nabrūqu* are ground, (mixed) with wine and used in a potion for infertility (BAM 244: 33)

The most famous recitation for pregnant women in ancient Mesopotmia is the Cow of Sîn, in which an imaginary cow is helped to give birth quickly with a direct analogy drawn to the woman who hopes soon to deliver her baby.

Dairy cows, even in the modern world sometimes have difficulty in giving birth or, more precisely, in managing to get the placenta out with the calf. For dairy farmers this is potentially a devastating problem, since if the placenta is not out in the first 24 hours, the cow is going to have difficulty getting pregnant, and cows do not give milk unless they are pregnant. This infertility is partly, but not entirely, due to uterine infection, the bovine equivalent of human puerperal fever.

Traditional healers in China have, probably for millennia, used an herbal powder containing turmeric and licorice, a plant used by ancient Mesopotamian physicians to treat uterine atony and puerperal fever in humans, to successfully treat cows with retained placenta, and it still works today (Huang et al. 2018). It is probably not too daring to suggest that the rather odd Cow of Sin recitation is due to a spill-over into gynecology from ancient Mesopotamian veterinary practices.

Regardless of how the use will have been discovered, the effectiveness of *kurkanû* for treating female infertility may be indirectly confirmed by modern science. The most common cause, even today, of this problem is polycystic ovarian syndrome (Heshmati et al. 2020, 77). What this consists of is essentially a negative feedback loop between excess estrogen and excess androgen due to FSH deficiency and LH excess (Harrison, 11th ed. 1828). The standard treatment is with anti-androgens such as clomiphene-citrate. As an anti-androgen, when taken in the appropriate dose, *kurkanû* ought to allow affected women to ovulate and to become pregnant. There is a certain irony in this situation, since the same anti-androgenic properties that can be harnessed to further female fertility may also one day provide a safe and

reversible form of male birth control (Mishra et al. 2018, 109). What is good for the goose is not necessarily good for the gander.

Fungal Infections

In addition to everything else it does, turmeric in the alcoholic extracts commonly used in ancient Mesopotamia can handle not only common bacterial pathogens including Staphylococcus aureus and microbes such as Streptococcus pneumoniae but even fungal infections (Irshad et al. 2018, 2689, 2691-2692).

Among the diseases caused by fungi are the numerous cases of ringworm (*kurāru*) and mycetoma (*muruṣ kabbarti*) mentioned in cuneiform texts treated, in some cases, with *kurkanû*-turmeric by the ancient physician.

ringworm**:**

bandages:

šunû-tree seed, *pillû* seed, *qutru* seed, *kamantu*, *uriyānu* leaves, […], *rušruššu*, *ṣaṣumtu*, *kurkanû*, *tigilû*, *mirišmara* and *kalbānu* are dried, crushed, sifted, mixed with first quality beer and vinegar and used to bandage the head for three days for ringworm (*kurāru*), preceded by plastering the head with urine, washing it with *uḫḫulu qarnānu* infusion (liquid soap) and *kasû* juice, and shaving (BAM 156:36) [Aššur version]

šunû-tree seed, *pillû* seed, flax seed, *kamantu*, *uriyānu* leaves, […], [*rušruššu*, *ṣaṣumtu*], *kurkanû*, *saggilatu*, *mirišmara* leaves [and *kalbānu*] are dried, crushed, sifted, made into a dough with *kasû* juice, redried, crushed, sifted, mixed with first quality beer and vinegar and used to bandage the head for three days for ringworm (*kurāru*), preceded by shaving, rubbing with "stinking oil", plastering the head with […] root, *kumāḫu* root, riverbank mud, *tarmuš*, *qutrātu* seed and […] mixed with cow urine, washing with beer, and […] it with *kasû*-juice; on the fourth day, after the bandage has been taken off, the head is washed with hot urine (BAM 494 iii 33') [Nineveh version]

ballukku, seed of compacted(?) […], reed blades, *talupadi* seed, the […-]*zini* from the left thigh of a ewe that has given birth to twins, [the skull] of a suckling goat that has not bitten grass or taken barley that you have roasted in *a nemsītu*-vessel, [x]*baltu* of salt, *šarmadu*(?), *karān šēlibi* and *ḫaṭṭi rēʾî* seed that you have roasted, *lišān kalbi* seed, *kurkanû*, *egemgiru*-ginger and […] are ground together, mixed, formed into a dough with *kasû* juice that has been heated and allowed to cool and used in a fifteen day bandage for ringworm (*kurāru*) on the eyebrows; preceded by a daub with *kamkadu*; followed by a three-day daub with "white plant" (BAM 515 ii 41)

mycetoma*:*

bandages:

[…], *kukru*, *atāʾišu* and *kurkanû* are decocted in a *tamgussu*-vessel and used in a [bandage] for *muruṣ kabbarti* (AMT 100/3 + 32/2 + 15/3 i 17)

In parts of India, mycetoma and the bacteria that colonize the infected foot all too often result in amputation. Fungi do their dirty work by releasing toxins that manipulate the body's systems in ways that are highly damaging to internal organs in addition to causing neuro-inflammation. Where curcumin comes in is to reverse the effects produced by the toxin. So, for example, in rats poisoned with aflatoxin (produced by Aspergillus sp.) curcumin was able to lower serum urea, creatinine, uric acid and MDA at a low dose of 200mg/kg (in rats), thus protecting the kidneys from damage. Curcumin has also protected lucky rats from damage to the liver, heart and lungs and from neuro-inflammatory effects produced by fungi (Hosseini and Hosseinzadeh 2018, 411-413). As for the fungal cells themselves, curcumin inhibits the release of hydrogen ion and decreases the level of cellular ergosterol thus decreasing the secretion of proteinase. If it keeps this up long enough, the cell

membrane breaks, the fungi, so to speak, spill out their guts and die (Abouali et al. 2019, 3921).

Snakebite

A more familiar toxin is the venom released by snakes into their bites, yet another condition which *kurkanû*-turmeric was used to treat.

salves:

šakirû, *lišān kalbi*, *kamūnu*-cumin, *urbatu*-rush, *imḫur-lim*, *elpetu*-rush and *kurkanû* are mixed with oil and used in a salve for snakebite (Scheil, RA 15.76:13)

Cobra venom is particularly dangerous because it prevents normal muscle contraction, which can be fatal if the respiratory muscles are involved. What the venom does is to block neuro-muscular transmission by irreversibly inhibiting acetylcholine from binding to its receptor (Daduang et al. 2005, 321). Studies have mostly been conducted in Thailand, which has its own varieties of turmeric. However it is possible to suppose similar benefits from more standard varieties (Lattman et al. 2010, 261).

What we are seeing in these experiments is snake venom being used to paralyze artificially stimulated rat phrenic nerve hemi-diaphragms in vitro, an effect antagonized by the turmeric extract (Lattman et al. 2010, 257-259). The statement that the extract worked better in a dose-dependent manner up to 32µg/ml (Lattman et al. 2010, 259) allows for a guess as to what will be happening with curcumin. At this dosage, curcumin is anti-inflammatory and anti-oxidant and anti-excito-toxic.

Viruses

Viral diseases attacking the lungs and liver such as Haemophilus influenzae and Hepatitis B are included in the potential victims of curcumin (Sornpet et al. 2017). Ancient Mesopotamians also suffered from viral exanthems which they treated with *kurkanû* as in the following references:

bandages:

[…], *kurkanû*(?) (and) *saḫlû* are massaged into a cloth and used in a bandage for white *bubuʾtu*-blisters on the body due to hand of Šamaš (BAM 584 ii 31')

fumigants:

ṭūru-aromatic, *baluḫḫu*-aromatic resin and *kurkanû* are thrown onto coals and used as a fumigant directed into the mouth and nostrils for *ašu* (pox diseases); afterwards pressed out oil is blown into the nostrils via a reed pipe (BAM 3 i 37‖BAM 494 ii 29‖BAM 497 ii 14' [Worthington, JMC 7 20])

The battle with viral pathogens is won the same way you win with battle with cancer. At high doses such as those provided by nano particles, curcumin is, as we have seen, an efficient killer of cancer cells, by manipulating genetic makeup and preventing them from moving to and entering their victims. These processes are particularly devastating to viruses, since they do not reproduce by themselves. Instead, virions attach themselves to body cells, which they invade. Next, they hijack the cell's transcription and proliferation systems, in part by suppressing interferon IFN-β mRNA so that the victim reproduces the virus (vRNA) rather than itself. Once the damage is done, the virions detach themselves and move on to new victims (Saikia et al. 2019, 107). Turmeric does its helpful work as usual by manipulating the body's own defense systems; in this case by up-regulating TNF-α to be joined for the first 24 hours by interferon IFN-β mRNA which the virus has been suppressing, and down-regulating IL-6 and IL-10 which the virus has been up-regulating to its own advantage (Sornpet et al. 2017, 873-875).

Bacteria

Curcumin treatments for mouth infections have reached the clinical trial stage. (Singh et al. 2018; Pulikkotil et al. 2015).

potions:

tarmuš and *kurkanû* are ground, mixed(?) with oil and beer and used in a potion(?) for yellow spotted teeth and mouth infection (*ṣibit pî*)(?) administered after the patient has been made to vomit with a feather; preceded by a rub with […], *emesallim*-salt, *nīnû*, *saḫlû* and *burāšu*-juniper and a rinse with water, honey, oil and first quality beer; to be used when a plaster has not worked (BAM 543 i 29)

For bacteria, the targets for genetic damage to be (hopefully) caused by curcumin are somewhat different than for viruses. Bacteria normally flush out potentially damaging substances with efflux pumps. The way that they become drug-resistant is by up-regulation of this system, essentially giving themselves diarrhea, so that antibiotics get excreted before they can do any damage. High dose nano-curcumin down-regulates the system so that, as with humans who cannot excrete, they die (Takrami et al. 2019).

Here again, a word of warning is in order. In fighting pathogens, there is always a problem with damaged DNA in the cells you are supposed to be protecting (how do you think your plant took out the bacteria?). Researchers assaying a purified and concentrated form of curcumin discovered that 5 µl worked well in renaturing this damaged DNA, but higher than this, there was a decrease in effectiveness until at 15µl DNA in the cells to be protected was actually being permanently damaged (Irshad et al. 2018, 2693). Other studies confirm that, although high doses are very good at killing pathogens, they are also very good at damaging the DNA of healthy cells (Irshad et al. 2018, 2693-2695).

Depressing but true is the fact that the pharma-giants are already busy at work making patentable, genetically-modified, superpowerful versions of curcumin that promise to be the next generation of drug disasters, only these will not just kill you; they will destroy your DNA while they are at it. This is the rationalist new, new, new, the absence of which, for Eckart Frahm, denies for ancient Mesopotamia the possibility of science without the scare quotes.[9]

As exciting as making things explode might be, it would probably make more sense to take advantage, where possible, of the less dramatic tricks up turmeric's sleeve. So, for example, treatment of urethritis might shift focus from combatting the bacterial or microbial cause, although turmeric can do that also, to correcting the mess that chronic infections can make of the body's defensive systems, so downregulating the production of leukocytic discharge, as we see it doing in the following examples:

tarmuš, “white plant”, *kurkanû* and "lone plant" seed are ground, mixed with strong wine and used in a potion for discharge (*mūṣu*) (BAM 161 v 12)

[*tarmuš*, “white plant”], *kurkanû* and “lone plant” are ground together, mixed with first quality beer and used in a potion drunk on an empty stomach for discharge (*mūṣu*) (AMT 66/7 iii 8)

kurkanû (is) a plant for (stopping) flow from the penis ($nR2_{2a}$ i 6)[10]

[9] “Later, starting in the sixth century BCE, when outside kings began to rule over Mesopotamia, Babylonian scholars became more and more focused on demonstrating to the newcomers who now governed them the superiority of their ancient scribal and cultural traditions, which further disincentivized attempts to move beyond them”(Frahm, 2018: 118,125). He freely admits that Babylonian doctors did a far better job than Hippocratic ones, the latter in some cases essentially murdering their patients (p. 122) but what Greek doctors did was still science, and what ancient Mesopotamians did was not, nor was it even more advanced without the scare quotes. “It is better to die of physic than be cured by magic.” We have here the summa of Western rationalism, whose fruitless search for absolute certainty makes a religion out of science, with sometimes horrific results. (Allen 2000)

[10] Uruanna, Aššurbanipal’s *nishu* recension of Tablet 2.

kurkanû (is) a plant for (stopping) continual flow from the penis (nR2_{2a} i 7)
kurkanû root (is) a plant for purifying flow from the penis (N2_{2a} iii 9[11]; nR2_{2a} i 23)

Wounds

You would think that Ancient Greek physician would know what to do with a wound, and up to a point, they did. What to put on it had already long been discovered by the old wives who are the foundation of every culture's medicine. However, whenever theory kicked in, there was bound to be trouble. So Hippocratic physicians noticed that round sores took longer to heal than square ones. Theoretically, they believed, the problem lay in the impossibility of a circle ever completely closing. The solution? You carved round ulcers square with a knife (Majno 1975 154-156).

Ancient Mesopotamians were less knife-happy and had a secret weapon for wounds that would not heal that was unknown even to Hellenic old wives. One of the uses of *kurkanû*-turmeric that is attested from ancient Mesopotamia is for *samānu* (lit: "red-like"), a term that refers to reddening and other symptoms of soft-tissue inflammation and infection.

bandages:

[…], *ḫašû*-thyme(?), *atāʾišu*(?), *kurkanû*, *erēnu*-cedar, *šurmēnu*-cypress, *daprānu*-juniper, […], *nikiptu, burāšu*-juniper, *ṣumlalû*, aromatics, *šupuḫru*-cedar oil, *sīḫu*-wormwood, […], dwarf palm and *qān šalālu*-reed are crushed together, sifted, decocted as a decoction and used in a [bandage] for inflammation(?) (BAM 406:4')

salves:

kurkanû is ground, (mixed) with oil and used as a salve for *samānu* (NIM.NIM) (BAM 1 ii 16)

("dust from the damp course of an old house" = turmeric) is (mixed) with [oil and used as a salve] for *samānu* (BM 38583:6')

[…] and *kurkanû* is ground, (mixed) with oil and used in a [salve] for inflammation(?) (BAM 406:3')

Turmeric, as we know from modern experiments, is a potent anti-bacterial agent. But this is by no means all that it does. The healing of a wound is a multi-stage process (Majno 1975 2-6). First order of business is to fill in the hole ASAP with fibrin, a cheap (from the body's perspective) and soft but tough connective tissue that is ideal for filling in spaces—like that slash in your arm. Next step is acute inflammation, which sounds awful but is the body's way of cleaning up all that is in the wound that shouldn't be there, like spilled blood, foreign tissue and bacteria. This mess is literally eaten up by various types of white blood cells released by the body. These are visible as pus which, if white, means that the cells are sacrificing their little lives to good purpose and are winning the battle with bacteria. If the pus becomes colored or stinks this is not, as ancient Mesopotamians knew, a good sign. We know that this is because the bacteria are getting the upper hand; if the Mesopotamians had had microscopes and could see the bacteria, they would have agreed.

Even if all goes well and the defenders win the day, there are still processes at work that can go wrong. As soon as the cleanup is finished, the fibrin needs to be dissolved and fibroblasts and other cells need to migrate to the wound and stay there (Madhyastha et al. 2010, 59). Once in place, the fibroblasts kick in by multiplying and filling the gap assisted by new blood vessels which grow into the region of repair. This complex is known as granulation tissue which, if all goes as it should, contracts, pulling the margins of the wound together in a process that ultimately results in a scar.

But some wounds, particularly those of diabetics, simply refuse to heal. What has happened in this situation is that healing never got beyond the inflammation stage (Sidhu et

[11] Uruanna, fragment of one of the several copies of the Later Niniveh version of Tablet 2.

al. 1999, 363-364). The essential process of fibrinolysis (dissolution of the fibrin) is aided, and cell migration, proliferation and adhesion is promoted by urokinase plasminogen activator (uPA) which is, in turn, regulated by two of the MAPK signal pathways (JNK and p38) that are favorite targets for upregulation or inhibition by curcumin, the fraction of turmeric that makes it yellow (Madhyastha et al. 2010, 59, 65). Under normal circumstances, the fibrin is supposed to be dissolved by plasmin produced by uPA. Fibrin is connective tissue, so plasmin has the ability to loosen cells from their basement membranes and allow them to travel unimpeded to a new location (Madhyastha et al. 2010, 59-60). Not only that, but uPA can trigger intra-cellular signaling systems, as well as ensuring that the resulting crowd sticks to the wound and is fruitful and multiplies (Madhyastha et al. 2010, 65). But sometimes, all this does not happen.

Researchers devised a test using well-plates containing mini-wounds to see whether treatment with curcumin could persuade fibroblasts to migrate and pitch their tents where needed. And, indeed it did. How? By upregulating uPA, a dose of 20μM of curcumin producing a fourfold increase in uPA protein (Madhyastha et al. 2010, 61,63,65). And how did it do that? By upregulating both the JNK and p38 MAPK signal pathways that themselves regulate the relevant gene expression (Madhyastha et al. 2010, 61,65).

Here, the issue of dosage became important. Researchers have long been aware that different doses of curcumin can have quite opposite effects. High doses (50μM) and up kill cells with 60μM and up killing 50% of them, although up to 40μM is still safe (Madhyastha et al. 2010, 61). Doses of 10-30μM are not only safe but have significant anti-oxidant properties (i.e. are cell protective and anti-inflammatory) with 30 providing a whopping 70% reduction in ROS [reactive oxygen species] (Madhyastha et al. 2010, 61).

If, then, you want uPA to produce plasmin to dissolve your fibrin and give your cells their marching orders, you need to be careful with your dosage. Up to 40μM, fibrinolysis is chugging along swimmingly, at 50μM, nothing much is happening, because the cells you want to keep are getting killed off by your medicine (Madhyastha et al. 2010, 63), that is, of course, unless you want them killed off, as for example to prevent pathological scar formation in the later stages of wound healing (Madhyastha et al. 2010, 65).

The job is not, of course, done until granulation tissue has been formed and, here too, curcumin to the rescue. In vitro and in vivo experiments have confirmed its benefits for the formation of granulation tissue and the growth of blood vessels in the wound as well as the arrival of normal skin cells to help form the scar (Madhyastha et al. 2010, 65; cf. Sidhu et al. 1999, 365-367, 370-372).

Last, but by no means least, curcumin stimulates the maturation and cross-linking of collagen, thus accelerating the rate of wound contraction (Madhyastha et al. 2010, 65; cf. Sidhu et al. 1999, 367). The desired effect of curcumin has been confirmed by in vivo experiments with wounded rats' backs (Yen et al. 2018, 605-617). The wounds in question closed up in 12 days due to increased production of alpha smooth muscle actin (alpha-SMA) that gives collagen its contractility (Yen et al. 2018, 608; cf. Sidhu et al. 1999, 36, 372).

Of course, you would not wish the wound to close up over blood, disease or bacteria, so the system is designed so that closure will not begin until the pro-inflammatory cytokines released by the white blood cells have done their work. A number of these cytokines, including TNF-α (tumor necrosis factor-alpha) ensure this by suppressing α-SMA and collagen production (Yen et al. 2018, 612-613). This is fine, but only if the inflammatory genie returns to its bottle, which it sometimes fails to do. Clever curcumin upregulates TNF-α at the beginning of the healing process, when it is needed for cleanup, thus ensuring victory over bacteria, and then downregulates it when collagen and α-SMA are needed to close up the wound (Yen et al. 2018, 612-616). It manages this by manipulation of the NF-κB signal pathway (Yen et al. 2018, 608-612).

Also involved is a similar process whereby cyclooxygenase-2 (COX-2) is first enhanced and then allowed to return to its normal skin balance with COX-1. This process, obviously, happens naturally in a spontaneously healing wound. What turmeric does is to speed up the process (cf. Sidhu et al. 1999, 372-373) and ensure that the cycle goes through to completion (Meizarini et al. 2018, 25-26,28).

Researchers have, to my knowledge, not yet suggested how turmeric manages to change course in midstream in this way, but there is an obvious answer to this conundrum. As we have noticed, a high dose of curcumin is pro-inflammatory, a low dose anti-inflammatory. So, if you begin your experiment with a high dose (but not too high!), you will be upregulating TNF-α. However, as the process continues, the dose of curcumin will be gradually used up and, when you reach a low dose level of curcumin in the system, TNF-α will automatically be downregulated, more α-SMA and collagen will be produced, and the wound will begin to close. For humans, it would perhaps be wise to progressively scale down the dose, as is sometimes done in Ayurivedic medicine.

At the end of the day, then, curcumin has the potential to solve all problems associated with the healing of wounds. This healing power involves rebalancing the body's own, out of kilter, systems, the very thing ancient Greek physicians were trying, and failing, to accomplish. And this includes our wound that will not close, and without the need for the ancient Greek physician's dirty knife.

In sum, we have seen that ancient Assyrians and Babylonians used turmeric to treat a wide number of different diseases and syndromes, sometimes alone and many times in harness with other medicines. We have seen that modern lab tests and if we are lucky cinical trials have confirmed the effectiveness of turmeric for these illnesses. Due to assyriogical inability to translate many of plants used with turmeric, it is impossible at the moment to know what part the other ingredients in a treatment my have played. What is perfectly clear is that ancient Mesopotamian physicians use of turmeric was rational.

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Five glosses in six manuscripts of one therapeutic prescription. A case-study.

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Introduction

In 2018 I held a presentation about my on-going research on glosses and embedded variants attested in the therapeutic text corpus on 64th Rencontre Assyriologique Internationale.[1] That presentation aimed at introducing the corpus and I demonstrated the main formal and functional characteristics of the glosses and embedded variants attested in therapeutic prescriptions. It can be clearly observed that the majority of references can be attested on cuneiform tablets from the Neo-Assyrian period, especially on medical tablets from Assurbanipal's library. The present presentation on 65th Rencontre Assyriologique Internationale deals with a single prescription that is preserved on six manuscripts, including a therapeutic series tablet from the Assurbanipal's library. Five manuscripts are cuneiform tablets from different Assyrian and Babylonian scientific libraries, which have been kept in tablet collections of four different museums, like the British Museum, the Vorderasiatisches Museum, the Metropolitan Museum and the Royal Museums of Art and History in Brussels.[2] The sixth manuscript is preserved on the so-called Ryder amulet which is a modern forgery produced by using an ancient cuneiform tablet.

The manuscripts

The provenance and date of the five tablets and the modern forgery are heterogeneous. Only a single tablet originates from Babylonia, BAM 385, which was excavated by Robert Koldewey in the archaeological site N13 (N13:102) in Babylon, which is not an archive, but a collection of 260 tablets scattered in the Merkes area.[3] Based on its paleography, BAM 385 was identified by Köcher as Middle Babylonian.[4] The tablet includes therapeutic prescriptions and incantations against 'ghost' and 'hand of a ghost,' which have several parallels in the first millennium medical text corpus.[5]

The remaining cuneiform tablets and the modern forgery can be connected to Assyria. The single-column tablet BAM 323 originates from the Kisir-Ashur library (N4 73) and the multi-column tablet BAM 221 was also excavated in Ashur but its exact archaeological context is unknown.[6] Both tablets include incantations, rituals, and prescriptions against sufferings caused by the 'ghost' or 'hand of a ghost' and many of them are parallel to further therapeutic texts from the Kisir-Ashur library and Ashurbanipal's library.[7] The four-column tablet BAM 471 comes from Ashurbanipal's library. This tablet includes a collection of recipes against

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[1] The presentation and this paper are preliminary results of my on-going project intended to elaborate glosses and embedded variants attested in therapeutic prescriptions. This research was supported by the Deutscher Akademischer Austauschdienst (57378441) and the Central Funds Program of the Pázmány Péter Catholic University.

[2] I would like to express my sincere thanks to Sarah Graff (associate curator in the Department of Ancient Near Eastern Art of Metropolitan Museum) and Hendrik Hameeuw (researcher in the Antiquity Department of Royal Museums of Art and History) who kindly sent me photos of the relevant tablets.

[3] This collection consists of Neo-Babylonian material including some older tablets (Pedersén 2005, 218).

[4] Köcher BAM IV xxvii note to this line.

[5] For the list of parallels of BAM 385, see Scurlock 2005, 714.

[6] F. Köcher provided the field number (Ass. 9610) of BAM 221 but this number was not mentioned by Pedersén among the cuneiform tablets found in libraries in Ashur.

[7] For the parallels of BAM 221, see Scurlock 2006, 710-711. For the parallels of BAM 323, see Scurlock 2006, 712-713.

'hand of a ghost' and it might be the first or the sixth tablet of the therapeutic series Neck.[8] It is important to mention that the discussed prescription is not the single parallel on these manuscripts.

The provenance of the fragment CTMMA 2, 33 is not known, it was purchased by the Rogers Fund in 1956. It is a fragment of an originally larger Assyrian medical tablet with Neo-Assyrian script which was trimmed to assume a rectangular form in the modern period and in the present state contains three fragmentary prescriptions. Based on its similarity in form and text Lambert suggested that this fragment served as a cast for the Ryder amulet, the modern forgery kept in a private collection.[9]

The prescription

The six manuscripts of the discussed prescription are as follows:

A = K 2477+ (BAM 471) iii 17'-20'
B = MRAH O.0195 (BAM 221) iii 14'-18'
C = VAT 8242 (BAM 323) rev. 75-78
D1 = MMA 56.81.52 (CTMMA 2, 33) 5-9.
D2 = Ryder amulet (BiOr 39 598-599) 4-8
a = VAT 17580 (BAM 385) iv 4-10[10]

Transliteration

$A_{iii\ 17'}$ DIŠ NA ŠU.GEDIM.MA DAB-*su-ma* ^{lú}MU$_7$.MU$_7$ ZI-*šú la i-le-'i* ^{ú}[…]
$B_{iii\ 14'-15'}$ DIŠ NA ŠU.GEDIM.MA DAB-*su-ma* ^{lú}MAŠ.MAŠ ZI-*šú la i-le-i* / ^{ú}LAL
$C_{rev.\ 75}$ DIŠ NA ŠU.GEDIM.MA DAB-*su* ^{lú}MAŠ.MAŠ ZI-*šú la i-le-'i* ^{ú}LÁL
$D1_5$ [*... la-az-z*]*i ša* ^{lú}MAŠ.MAŠ ZI-*šú la i-le-'i* […]
$D2_4$ [*... la-az-z*]*i*[11] *ša* ^{lú}MAŠ.MAŠ ZI-*šú la i-le-*ˀ'*i*ˀ […]
$a_{iv\ 4-5}$ […….*-s*]*u-ma* ^{lú}MU$_7$.MU$_7$ ZI-*šú* / […] ^{ú}LÁL

$A_{iii\ 18'}$ ^{ú}*an-ki-nu-ti* ^{ú}DILI ^{ú}AŠ.TÁL.TÁL ^{ú}ḪUR.SAG SIG$_7$ GURUN ^{giš}MAŠ.ḪU[Š …]
$B_{iii\ 15'-16'}$ ^{ú}*an-ki-nu-te* ^{ú}DILI ^{ú}AŠ.TÁL.TÁL ^{ú}ḪUR.SAG SIG$_7$ / GURUN ^{giš}MAŠ.ḪUŠ![12] NUNUZ ^{giš}DÌḪ NUNUZ ^{giš}KIŠI$_{16}$
$C_{rev.\ 75-76}$ ^{ú}*an-ki-nu-te* / ^{ú}AŠ.TÁL.TÁL ^{ú}ḪUR.SAG SIG$_7$ GURUN ^{giš}MAŠ.ḪUŠ GURUN ^{giš}DÌḪ
$D1_{6-7}$ […] ˹ú˺AŠ.TÁL.TÁL ^{ú}ḪUR.SAG$^{sar!}$ SIG$_7$[13] […] / […ᵍᵘʳᵘⁿ?] ^{giš}*kal-ba-ni*
$D2_{5-6a}$ […] ^{ú}AŠ.TÁL.TÁL ^{ú}ḪUR.SAG^{s}[$^{ar!}$] SIG$_7$[14] […] / […ᵍᵘʳᵘⁿ?] ^{giš}*kal-ba-ni*

[8] Suggested by Panayotov 2018, 99. For the parallels of BAM 471, see Scurlock 2006, 716-718.
[9] Farber also identified the Ryder amulet as a modern forgery which was produced by using an ancient cuneiform tablet (Farber 1982, 598).
[10] On Köcher's hand-copy this prescription has different line numbers (lines 4-12) because Köcher also gave line numbers to interlinear glosses.
[11] The hypothetical reconstruction of the incipit ([*ana* KIN ŠU.GEDIM.MA *la-az-z*]*i ša* ^{lú}MAŠ.MAŠ ZI-*šú la i-le-*ˀ'*i*ˀ) has been suggested by Farber (Farber 1982, 599 note to this line) who argued that the incipit is the same as BAM 469 rev. 11 (a similar or the same incipit can be found in BAM 470 obv. 24': [x x x] ŠU GEDIM.MA *la*-[*az-zi ša* ^{lú}MAŠ.MAŠ ZI-*š*]*ú la i-le*-['*i*] edited by Scurlock 2006, 555 and BAM 9 rev. 14: [*a-n*]*a* KIN ŠU.GEDIM.MA ZAL.ZAL *ša* ^{lú}MAŠ.MAŠ ZI-*šú* NU ZU-*u* ana ZI-*šú*). Scurlock's transliteration followed Farber's reconstruction (Scurlock 2006, 605) but Lambert restored the incipit only partially in his edition of CTMMA 2, 33 (Lambert 2005, 172) suggesting maybe that he rejected this reconstruction. Cf. an alternate reading of this part of the incipit in BAM 469 rev. 11 in BabMed corpora (*ana* KIN ŠU GIDIM-*ma la uṣ$_4$-ṣi$_2$ ša* ^{lú}MAŠ.MAŠ ZI-*šú la i*-[...]) and its tentatively parallel BAM 470 obv. 24' (*[...] ŠU GIDIM-*ma la uṣ$_4$-ṣi$_2$ ša* ^{lú}MAŠ.MAŠ ZI-*šú la i*-[…]) but I do not find this transliteration convincing.
[12] (Text: BIR).
[13] (Text: ^{ú}ḪUR.SAG SIG$_7$ SAR).
[14] (Text: ^{ú}ḪUR.SAG SIG$_7$ S⌈AR]).

a$_{iv\ 5\text{-}7}$ **^{ú}*an-ki-nu-t*[*e*] / [$^{ú?}$DILI$^{?}$ ^{ú}AŠ.TÁ]L.TÁL ^{ú}ḪUR.SAG SI[G$_7$] / [… ^{giš}M]AŠ.ḪUŠ NUNUZ ^{giš}DÌḪ** : **NUNUZ ^{giš}KIŠI$_{16}$**

A$_{iii\ 19'}$ [^{ú}*a*]*r-zal-la* ^{ú}*tara-muš* ^{ú}*el-kul-la* NUMUN ^{giš}ŠINIG ^{ú}˹LÚ˺.[U$_{18}^{?}$.LU$^{?}$]

B$_{iii\ 16'\text{-}17'}$ ^{ú}*ár-zal-la* ^{ú}*tara-muš* / ^{ú}*el-kul-la* NUMUN ^{giš}*bi-ni* ^{ú}LÚ.U$_{18}$.LU

C$_{rev.\ 76\text{-}77}$ ^{ú}*ár-zal-la* / ^{ú}*tara-muš* ^{ú}*el-kul*$^{!}$*-la* NUMUN ^{giš}ŠINIG GÌR.PAD.DU LÚ.U$_{18}$.LU

D1$_{7\text{-}8}$ ^{ú}*ár-zal-la* ^{ú}*tara-mu*[*š*] […] / […… ^{giš}*b*]*i*$^{!}$*-ni* x GÌR.PAD.DU NAM.LÚ.U$_{18}$.LU

D2$_{6\text{-}7}$ ^{ú}*ár-zal-la* ^{ú}*tara-m*[*uš*] / […] […… ^{gi}]^{š}*bi-ni* x GÌR.PAD.DU NAM.LÚ.U$_{18}$.LU

a$_{iv\ 7\text{-}9}$ ^{ú}*ár-zal*-[*la*] / [^{ú}*tara*]-*muš* ^{ú}*el-kul-la* NUMUN ^{giš}*b*[*i-ni*] / ^{ú}LÚ.U$_{18}$.LU

A$_{iii\ 20'}$ [1^{niš} SÚ]D *ina* Ì [:] *ina* Ì ^{giš}EREN **ŠÉŠ *ina* KUŠ DÙ.DÙ^{pí} *ina* GÚ-*šú* GAR^{an}**

B$_{iii\ 17'\text{-}18'}$ 1^{niš} SÚD *ina* Ì : *ina* Ì ^{giš}EREN˺ **ŠÉŠ^{aš} / *ina* KUŠ DÙ.DÙ^{pí} *ina* GÚ-*šú* GAR^{an}**

C$_{rev.\ 77\text{-}78}$ 1^{niš} *ina* Ì / ŠÉŠ-*su-ma ina* KUŠ DÙ.DÙ *ina* GÚ-*šú* GAR^{an} TI^{uṭ}

D1$_{8\text{-}9}$ TÉŠ.[BI] […] / […] ŠÉŠ$^{?}$-*s*]*u ina* KUŠ DÙ.DÙ^{pí} *ina* GÚ-*šú* x GAR^{a}[^{n}]

D2$_{7\text{-}8}$ TÉŠ.[BI] […] / […] ŠÉŠ$^{?}$-*s*]*u ina* KUŠ DÙ.DÙ^{pí} *ina* GÚ-*šú* ˹x˺ GAR^{a}[^{n}]

a$_{iv\ 9\text{-}10}$ 1^{niš} SÚD *ina* Ì : **Ì ^{giš}[EREN?] Š[ÉŠ …] / *ina* KUŠ** : **KUŠ MAŠ.DÀ DÙ.DÙ *ina* GÚ-*šú* G[AR …]**

Translation

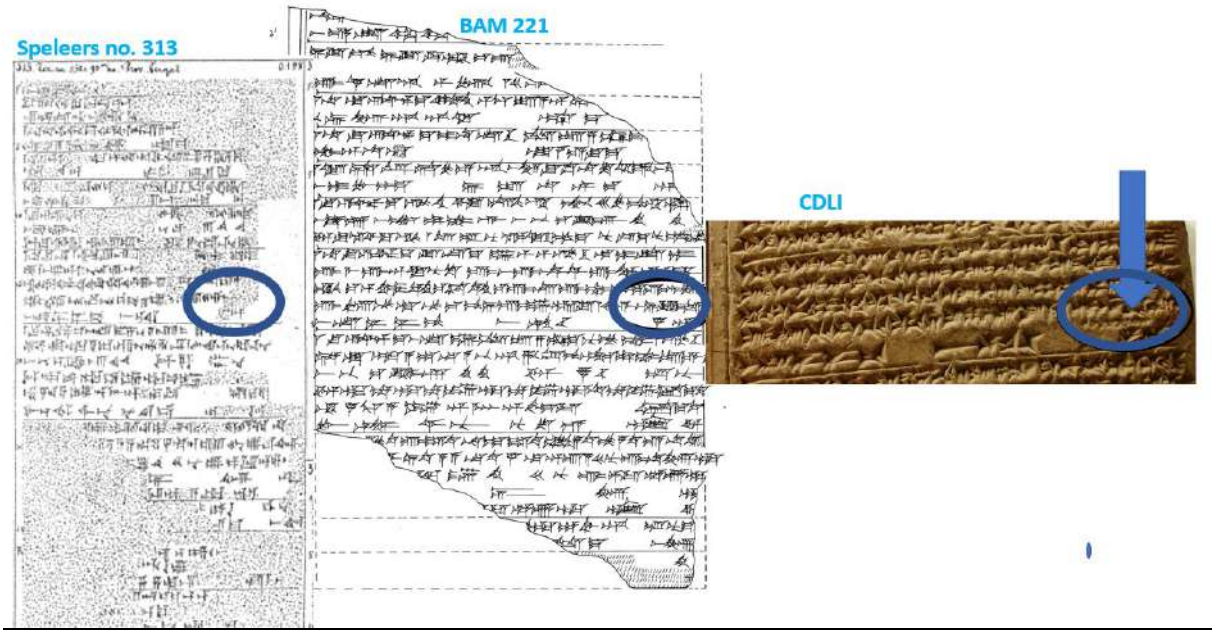
If a man has been seized by the ‘hand of the ghost’ and the incantation priest is not able to release (him) (var. For a persistent affliction of the ‘hand of the ghost’ which the incantation priest is not able to remove): *ašqulālu* plant, *ankinūtu* plant, *ēdu* plant,[15] *ardadillu* plant, fresh *azupīru* plant, fruit of *kalbānu* tree, fruit of *baltu*-thorn (var. sprout of *baltu*-thorn) : sprout of *ašāgu*-thorn (var. sprouts of *ašāgu*-thorn), *arzallu* plant, *taramuš* plant, *elkulla* plant, tamarisk seed, *amīlānu* plant (var. human bone). You pound[16] (them) in oil : in cedar oil[17] rub him and wrap (them) in leather : leather of gazelle[18] place (it) around his neck (var. place (it) around his neck and he will recover.)

The modern edition of the prescription was published by Scurlock in 2006 and later in 2014, using five manuscripts.[19] The single missing manuscript in Scurlock’s editions is the fragment from the CTMMA 2, 33 which was published by Lambert in 2005.[20] The discussed prescription provides a healing treatment against sufferings ‘caused by the hand of ghost, which the incantation priest is not able to remove’. The treatment consists of two consecutive steps: an ointment made of various plants mixed in oil or cedar oil and a leather bag supposedly filled with the same drugs and applied on the patient’s neck. Based on the Middle-Babylonian tablet, the text tradition of this prescription goes back to the second millennium and in the Neo-Assyrian period the prescription was incorporated into the therapeutic series but different versions of the text coexisted together within the Neo-Assyrian medical corpus. No manuscript from the Neo- or Late Babylonian period is known, but this, by no means indicates that this text was unknown in that period. It is important to note that manuscripts of the discussed prescription are not duplicates and several orthographical and textual differences can be detected. The text tradition will be more complicated if we take into account the glosses preserved on three manuscripts.

[15] Omitted in Ms.C and probably broken in Ms.D1 and Ms.D2.
[16] Omitted in Ms.C and probably broken in Ms.D1 and Ms.D2.
[17] Gloss in Ms.A Ms.B and Ms.a. Scurlock referred to the gloss as ‘variant’ in her transliteration (‘variant: Ì ^{giš}ERIN’) and her translation (‘*erēnu*-cedar oil’) of BAM 323 (Scurlock 2014, 696 and 700).
[18] Gloss in Ms.a.
[19] Scurlock 2006, 605-606, no. 289 and Scurlock 2014, 696 and 699-700) The German translation of the prescription in BAM 323 was recently published by Daniel Schwemer in TUAT (Schwemer 2010, 126).
[20] Lambert 2005, 172.

The glosses

The MB BAM 385, and two multi-column NA tablets (BAM 471 and the BAM 221) contain five glosses altogether. Lines with glosses were written in bold in my transliteration. In the case of BAM 385 three glosses in three different lines can be attested. These glosses were already indicated on Köcher's hand-copy who provided them with separate line numbers suggesting that the glosses were written in blank lines. I do not have time now to discuss the problem of line numbering of glosses on various hand-copies of the BAM series but I would like to emphasize that interlinear glosses on further hand-copies in BAM were not always provided with separate line numbers.[21] The gloss on BAM 471 was already indicated on Thompson's (AMT 95, 2) and Köcher's hand-copies but the gloss on BAM 221 has a different story. The tablet was first published by Louis Speleers[22] but the relevant part of the tablet appears as fragmentary on Speleers's hand-copy which supposedly means that the salt crystals were not removed from the clay tablet at that time. Köcher published a new hand-copy of the tablet in 1964. Although Köcher did not mark the fragmentary condition on the relevant part of the text the gloss was not indicated on his hand-copy. Notably, in the prologue of the relevant volume of BAM Köcher mentioned that for making the hand-copy of BAM 221 he used photos made by Georges Dossin, which may suggest that glosses were not visible on Dossin's photos. All modern editions followed Köcher's hand-copy, and therefore this gloss did not appear before in any transliteration or translation of the tablet. Recently, a new photo of BAM 221 was uploaded on CDLI (P285308), with the gloss recognisable on it. I present the two hand-copies and CDLI photo below.



Let us take a closer look at the five glosses which were written in three different passages of the text. The first one can be found in the list of drugs, the second relates to the liquid used for the ointment and the third is connected to the material of the amulet bag. The table below shows the relevant part of the six manuscripts.

[21] For example, in the case of lines BAM 216 rev. 62' none of the interlinear glosses has a separate line number. Cf. in its first publication (KAR 182) Ebeling gave a line number and wrote next to the gloss 'kleinere Schrift'). Similarly, the gloss written in lines BAM 30 obv. 21' or BAM 403 obv. 9, didn't have separate line numbers on Köcher's hand-copy.

[22] Speleers 1925 no. 313 plate 38.

	BAM 385	BAM 221	BAM 471	BAM 323	CTMMA 2, 33	Ryder amulet
drug	^{giš}DÌḪ **: NUNUZ ^{giš}KIŠI$_{16}$**	^{giš}DÌḪ NUNUZ ^{giš}KIŠI$_{16}$	[…]	GURUN ^{giš}DÌḪ	[…]	[…]
liquid	*ina* Ì **: Ì ^{giš}[EREN?]**	*ina* Ì **: *ina* ˹Ì ^{giš}EREN xx?˺**	*ina* Ì **[:] *ina* Ì ^{giš}EREN**	*ina* Ì	[…]	[…]
material of the amulet bag	*ina* KUŠ **: KUŠ MAŠ.DÀ** DÙ.DÙ	*ina* KUŠ DÙ.DÙ-*pí*	*ina* KUŠ DÙ. DÙ-*pí*	*ina* KUŠ DÙ.DÙ	*ina* KUŠ DÙ.DÙ-*pí*	*ina* KUŠ DÙ.DÙ-*pí*

It can be observed that only a single manuscript includes three glosses and another two manuscripts contain only one gloss. On the other hand, the oil which served as a liquid to the ointment has glosses in all of the three manuscripts. The BAM 323 does not include any glosses on the other hand the relevant parts of the text are broken in CTMMA 2, 33 and in the Ryder amulet.

In the next part of this paper, I would like to examine the formal, the functional and the semantical aspects of the glosses. Concerning the formal aspect, the glosses in all manuscripts belong to the type of interlinear glosses introduced by *Glossenkeil*. The glosses were written in subscript which is the most widely attested type in our corpus. In the investigated manuscripts the glosses were written close to the glossed terms and they never anticipated the glossed terms. In the case of the discussed glosses, based on the parallels we can decide the formal position easily but I would like to emphasize that, in absence of any parallels, the position of the interlinear glosses cannot always be safely ascertained, therefore in several prescriptions we cannot be sure that the gloss was written in subscript or superscript. For example, in the first column of the therapeutic series tablet BAM 480+ the interlinear gloss between the lines ii 61 and 62 was interpreted by Martin Worthington as a superscript gloss related to the glossed term in line 62: *ina* U$_4$-3-KÁM $^{\text{: U}_4\text{-5-KÁM}}$ LÁL = ‘you bind (him) for three days $^{\text{(gloss) five days}}$’.[23] Unfortunately, parallels to this prescription are not known, but based on the frequency of the subscript gloss in the corpus the possibility cannot be excluded that the gloss was written in subscript related to the similar terms in line 61: *ina* U$_4$-15-KÁM $_{\text{: U}_4\text{-5-KÁM}}$ LÁL = ‘you bind (him) for fifteen days $_{\text{(gloss) five days}}$’. I would like to stress that one of the most relevant problems is the correct identification of the position of the interlinear glosses because the question of their position has a close connection with their interpretation and their semantical function.

According to the functional typology of Krecher, the discussed glosses can be categorized as ‘variant glosses’ which present textual variants related to the glossed text.[24] Following the categorisation of Eckart Frahm the variant glosses introduced by Glossenkeil indicate an alternate text variant originated from the different versions of the same text.[25] Following this logic at least 6 text variants can be individualized but it may also be possible that the three glosses in BAM 385 may represent three different text variants. Moreover, if we take into consideration the textual differences between the six manuscripts, the total number of the text variants is eight. Concerning the medical incipit of the manuscripts, two partially different versions can be observed. The medical incipit ‘If a man has been seized by the ‘hand of the ghost’ and the incantation priest is not able to release (him)’ can be found just in three manuscripts (BAM 471, BAM 221, BAM 323). Another version of the incipit is preserved on CTMMA 2, 33 and the Ryder amulet, but both of them are fragmentary and their reconstruction made by Farber and later Scurlock seems quite hypothetical to me. The

[23] Worthington 2005, 10 and 19.
[24] Krecher 1957-1971.
[25] Frahm 2011, 16.

medical incipit on BAM 385 is also fragmentary, but the preserved part of the text follows the first version. In the list of drugs, three sub-types of differences can be detected among the manuscripts. As usual in therapeutic texts, the different parts of the same plant were used in different text variants. In the discussed prescription the 'sprout of *baltu*-thorn' occurs at least in BAM 385, BAM 221 versus the 'fruit of *baltu*-thorn' at least in BAM 323. It does not appear in BAM 471, CTMMA 2, 33 and the Ryder amulet but this part of the text is broken in these texts. It is also well attested that sometimes the text variant omits drugs or provides an alternate drug. In the discussed prescription the 'sprouts of *ašāgu*-thorn' and the '*ēdu* plant' were omitted for certain in BAM 323 and probably in CTMMA 2, 33 and in the Ryder amulet. The ingredient 'sprout of *ašāgu*- thorn' was written on BAM 385 in gloss which can also refer to a text variant without this plant. On the other hand, we also find an example for an alternate drug: the '*amīlānu* plant' attested in BAM 385, BAM 471, BAM 221 was replaced by the 'human bone' in BAM 323, CTMMA 2, 33 and Ryder amulet. The glosses related to oil in three manuscripts (BAM 385, BAM 471, BAM 221) may also represent text variants. Two of them (BAM 471 and BAM 221) definitely mention 'cedar oil' and the fragmentary BAM 385 seemingly also refers to this type of oil. Finally, the gloss related to the ingredient of the amulet bag in BAM 385 also indicates an alternate text variant.

In the last part of this paper, I would like to discuss the semantic aspect of these glosses. The aim of this investigation is to identify the semantic connections between the gloss and its related glossed term. The study of the semantic connection between gloss and glossed term is crucial in answering the question whether the glosses linked to various drugs can be interpreted as an alternate text variant or whether they represent a substitute healing material which could probably be based on differing medical practice or various symbolic or lexicographical correlations between the gloss and the glossed term. Let us take the gloss 'sprout of *ašāgu*-thorn' connected to the term 'sprout of *baltu*-thorn' in BAM 385. As we have seen in the table above, this plant name is written as a part of the normal text in another manuscript which raises the possibility that the gloss represents a simple text variant. An alternate interpretation was suggested by Köcher who proposed that the gloss is a correction made by the scribe after checking the text. The so-called 'correction glosses' provide corrections or complementation of the relevant part of the text which was perhaps damaged or maybe incorrect in the original text but can be completed or corrected by its parallels. Besides the discussed prescription I provide two further references below.

BAM 579 iv 15

1/5 GÍN ^{šim}GAM.MA ½ GÍN ^{ú}KUR.KUR 3 GÍN ^{šim}ŠE.LI : 2 GÍN ^{ú}ḪAR.ḪAR 2 GÍN ^{šim}GIG

BAM 54 obv. 6-7

4 GÍN ^{šim}GAM.MA ½ GÍN ^{ú}KUR.KUR 2 GÍN ^{šim}ŠE.LI 2 GÍN ^{ú}ḪAR.ḪAR / ˹2˺ GÍN ^{šim}GIG

… one-fifth (var. four) shekel of *ṣumlalû* aromatic, half shekel of *kukru* plant, 3 (var. 2) shekels of *kikkirânu* aromatic : 2 shekels of *ḫašû* plant 2 shekels of *kanaktu* aromatic …

BAM 216 rev. 63'

[…] NAGA NUMUN ^{giš}MA.NU ^{ú}*ka-zal-lum* : NUMUN ^{ú}EME.UR.GI7 ^{ú}ḪAR.LUM.BA.ŠIR

BAM 470 obv. 14'-15'

[…] NAGA NUMUN ^{giš}MA.NU / […….] ^{ú}EME.UR.GI$_7$ [^{ú}Ḫ]AR.LUM.BA.ŠIR

… seed of *ēru*-tree, *kazallu*-plant : seed of "dog's-tongue"-plant, *ḫarmunu*-plant …

We can observe the same characteristics in each reference above: the text of the gloss occurs in the same place and is written with normal size signs in its parallel text. I would like to explain the phenomenon to the effect that the gloss is a correction made by the scribe who copied and checked the text of the prescription and inserted the missing part of the text into

it.[26] We also have to stress that the mentioned examples are more likely exceptions and the majority of the glosses attested in therapeutic texts cannot be identified in their parallels.
The next interpreted gloss is the 'cedar oil' which is linked to the term 'oil' in three manuscripts. First of all, I would like to say that several types of liquids have glosses including water, milk or animal urine, but most references are connected to various types of oil. In the discussed prescription the gloss provides a semantic variant of the liquid used for ointment. The semantical connection between oil and cedar oil is probably based on the interchangeability of the two types of oil in Mesopotamian medical praxis but in another therapeutic text, the cedar oil appears as an alternate for the ghee (BAM 494 ii 63: *ina* Ì ^{giš}*e-re-ni*: *ina* Ì.NUN). Unfortunately, further references for the compatibility of cedar oil and oil in therapeutic text corpus are not known to me.
The last discussed gloss is the 'leather of gazelle' related to the general term '(animal) leather'. The gloss provides a semantic variant of the material of an amulet bag. In this case, the gloss and the glossed term represent the same material (i.e. animal leather). In this case, the semantical connection between the gloss and glossed term is twofold: the gloss could be a longer version of the same term or it may be a correction or interpretation of the scribe. I provide another reference for the first option. In this reference the gloss could be an abbreviated form of the glossed term: *ina* KUŠ ANŠE EDIN : ˹KUŠ˺ EDIN (BAM 403 Obv. 9). Notable, the term 'leather of gazelle' is also known as a drug (for example BAM 216 rev. 52 // BAM 469 obv. 44' // AMT 33, 3 obv. 13 // BAM 197 rev. 33 // BAM 220 iii 2' // AMT 84, 2 8') but I do not know any further references for the interchangeability of 'leather' and 'leather of gazelle'.

Conclusions

As a summary, I would like to stress that writing glosses in the therapeutic prescriptions can be associated with the copying and editorial activity of the ancient scholars and scribes and the various functional types of the glosses can be connected to these scientific activities. Although I do not know of any further Middle-Babylonian or Middle-Assyrian therapeutic prescriptions that contain glosses, the presented Neo-Assyrian parallels with the same glosses raise the opportunity that one part of the glosses preserved on Neo-Assyrian therapeutic tablets has earlier forerunners. Moreover, the same gloss on tablets from Nineveh (*ina* Ì [:] *ina* ì ^{giš}EREN BAM 471 iii 20') and from Aššur (*ina* Ì : *ina* ˹ ì ^{giš}EREN x? x?˺ BAM 221 iii 17') is probably based on the same original tablets copied by Assyrian scholars in both libraries which may have their origins in Babylonia.[27]

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[26] It is important to note that the tablet which includes the prescription with the gloss and the tablet which preserved the parallel text come from different libraries in each mentioned example. A similar type of glosses was suggested by Schuster-Brandis (Schuster-Brandis 2008, note 390 to line iv 10).
[27] In her recent article Jeanette Fincke identified 78 tablets in Ashurbanipal's library which were written in Babylonian ductus and contain 'medical and magical treatments of sick people' (Fincke 2017, 379). For the import of the Babylonian scholarly texts and Babylonian scholars into Nineveh, see recently Fincke 2017, 381-384 with references to the earlier literature.

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