Aegyptus et Pannonia VII.

Acta Symposii anno 2021

BUDAPEST

Aegyptus et Pannonia VII.

Acta Symposii anno 2021

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Plants and Health Conference 2021, and the Proceedings

Dr. Hedvig Győry PhD

HEFT AEC president

In 2021, the HEFS Ancient Egyptian Committee, in partnership with the HNM Semmelweis Museum of Medical History, organised an international conference entitled "*Plants and Health from Ancient Egypt to the Present Day*". The three-day conference focused on topics related to the application of plant material in medicine, but also included other topics connected to the use of plants in any practical or theoretical area of human life. We planned four sections with the following keywords:

History of healing and nutrition from the time of ancient Egypt to the present day
Which plants were used for healing, how, where, by whom and when, which plants were used to maintain health, or prevent disease in different parts of the world; what did people eat in everyday life, what were the festive foods/drinks, what were the expected results; and what are the related issues raised by ethnographic research.

Medicines and pharmaceutical science in historical periods in the light of sources
Who, how and why recorded knowledge of medicine in each period; what principles were used to treat patients or maintain health; what were/are the popular explanations of these issues or principles.

Herbal medicine and contemporary medicine
According to our current knowledge, what can we assess about the active ingredients of a given plant, the mechanism of action and its intensity, and what biochemical relationships can be discerned from their interactions.

Religious views and beliefs about plants
By whom, where, when, and what special magical properties have been attributed to plants, what is the role of plants in the social context, how is it explained, and how have plants been incorporated into everyday life/celebrations or healing practices

The conference was held between 14 and 16 October 2021 with 40 presentations. Due to the COVID pandemic, circumstances did not allow for a face-to-face meeting, so the event was entirely online. However, the possibilities offered by the Internet also allowed for smaller group discussions. The topics presented included the appearance and use of plants in different times and places, from ancient Egypt to contemporary Europe. They were divided into thematic and language (English and Hungarian) sessions, led by recognised scholars. After the lectures, it was possible to discuss the issues raised in front of the general public, and topics of narrower interest could be further discussed in separate rooms created within the Zoom system. Valuable contacts were made and new research ideas were generated. A small exhibition was also organised by the HNM Semmelweis Museum of Medical History for the occasion, as we had hoped until the last minute that the pandemic situation would change. However, it was only available to personal visitors.

During the conference it was possible to learn about new methods, we exchanged ideas and heard about research results and ongoing projects. A significant part of the presentations were given in English, the other part in Hungarian, but the papers included in the proceedings are all in English. The first part of the proceedings, as a result of the presentations and discussions, is published in this volume; the other part can be read in the next volume of the Aegyptus et Pannonia series.

Although not all the presentations are published, most of the aspects we covered are included in the volumes. The programme covered a wider range of topics: We were able to learn about plant finds from recent Egyptian archaeological excavations, the identification and use of plants in textual sources, religious connotations, and even the possibility of reconstructing perfumes. We could also look at the trade in plants between the Hittite Empire and Egypt, and learn which plants were used by the Copts in the Middle Ages. The latest research on Roman herbaria was discussed, and hitherto unknown ancient Egyptian texts were presented. Other presentations were devoted to the reproduction of some medicines based on ancient recipes. In one of the lectures we saw on video the process of preparation and examination of an ancient Egyptian medicine. Several papers dealt with temporal and spatial changes in the everyday and liturgical use and interpretation of a given plant, e.g. pomegranate in Greece. In India, Soma. In Hungary, thorn apple. In Estonia, pelargonium. In Finland and the Arctic, roseroot. And in the Arabian desert of Egypt, the apple of Sodom. The role of plants in religious ceremonies and concepts was also discussed, as well as the variety and significance of the scent they produce.

The lectures presented a wide range of the application of herbs in ancient and medieval medical methodology, with the help of Egyptian, Greek, Anatolian, and Hungarian herbariums. The conference participants were the first to hear that many ancient Egyptian medicines can still be found in the medieval Welsh medicinal knowledge. We also learned that a significant part of Dioscorides' usage of herbs could also be observed in Anatolian folk medicine. Lectures were given on the wide range of magical effects attributed to plants, spanning from antiquity to the Renaissance, in terms of iatromagic, iatromathematics, and iatromythology.

In separate sections, the participants were introduced to Hungarian ethnobotanical research, where, in addition to the methods of the way of collecting ethnobotanical data throughout Transylvania, the lecturers presented both the botanical aspects and the therapeutic potential of the plants included in the various Hungarian medicinal herbariums and pharmacopeias. In addition to the knowledge of plants preserved in the Hungarian witch-trial documents of the 15th to 19th centuries, the possibilities of historical and folk use against various diseases – such as tuberculosis and cholera – were also presented, and in connection with diabetes and surgery we also visited India and China. We got again an idea of how wound care has changed over the centuries, how plants have influenced the toolkit of surgeons, and which plants are still used in modern wound management. In connection with the Székesfehérvár Pharmacy Museum, an overview of the museum's extensive educational activities was presented in addition to its history. We have got acquanted also with the the most important medical tariff book of Hungary in the 18th century and the drawer labels of five apothecary furniture of the same period.

The approach to the flora of ancient Egypt is also diverse, and the study of the Ancient Near Eastern relations encompasses several scientific fields, such as Assyriology, Hittiteology and Biblical studies. The classical Greco-Roman world is also included in the next volume to facilitate comparison. In addition to history, interdisciplinarity also extends to other branches of the humanities, such as – among others – archaeology, history, linguistics, ethnography, philology, the history of religion and magic or iatromathematics.

In recent decades, the development of the sciences has moved in the direction of interdisciplinary cooperation, not only between related sciences, but also between seemingly distant branches of science. In addition to textual and material sources, the results and methods of the natural sciences are of fundamental importance for a more precise understanding of the past. The role of analyses and investigation of the various materials is thus becoming increasingly important, complementing traditional descriptive studies. As we also wanted to play a role in this process, several areas of natural science, such as archaeobotany, phytogenetics, types of data investigation and plant breeding, or various facets of medicine and medical history are also represented in the proceedings.

In this volume, we publish 11 studies that approach the world of plants from different perspectives within the broad framework of the conference. The focus is on ancient Egypt, but the articles also look at other areas. In addition to the data found in the articles and the results obtained, the methodological and theoretical approaches raise many new ideas, give exciting results and draw attention to various possibilities. For example, the multifaceted role of medicinal plants in the museum world or their application from the perspective of medical history and ethnomedicine.

With this volume, we hope to arouse interest in the unique world of the past, especially Egypt, to bring closer the world of nature and its possible effects on human life, and to encourage the birth of further results that will make the ancient Egyptian world better known and our own world better understood.

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Medical herbs: from the ancient Egyptian wound treatment to the current intelligent bandages

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Abstract

Traditional herbs have been used in medicine for thousands of years. Descriptions have survived on several ancient Egyptian papyri, among them one surgical book. The Smith papyrus forms a basis for today's wound care, with its precise formulations and methodology on its recto (front) side. The cases are all injuries, treated in a traditional way. Studying them, we differentiated two development stages. The earlier, simpler one contained no herbal ingredient, while the later one, with prescriptions Sm41 and Sm46, had several herbal drugs, distried in three or four phases. Medical herbs have been used in wound management for debridement, creation of an advantageous environment to encourage the natural healing process and speed up the recovery. Most of the herbal drugs are also employed nowadays for practical uses, thus many aspects of modern medicine can be described as a refined version of ancient Egyptian knowledge. We also looked for wound management in the Graeco-Roman period, comparing drug usage, and identified many changes. This paper also compares ancient Egyptian bandaging used for the care of wounds and their cleaning methods, with modern wound dressing in order to shed light on both shared and distinct concepts.

Keywords: ancient herbal remedies, wound management, negative pressure wound therapy

1. Introduction

The skin is the body's first line of defence; it protects against mechanical shocks from the environment, reduces the impact of temperature changes, prevents the entry of chemicals and bacteria, and limits the effect of radiation, as we now know. In ancient Egypt several plants and their exudates were used

for skin protection, which thus acts as a protective organ and plays a crucial part in the body's defensive mechanisms. If the skin is injured, a wound, which occurs as a result, can undermine a patient's well-being and working capacity because skin damage affects all skin functions. A wound can be classified as chronic if it lasts more than 4 weeks after being treated with professional care, or more than 8 weeks if untreated.

Effective wound treatment is essential for the patient and also for the community. Over the centuries, the science of wound care has had an exciting journey. Wound repair is a coordinated series of phases involving predictable cell types and microenvironment preparations where infection has been a significant problem since ancient times. Many different materials have been used during human history to treat wounds in an attempt to stop bleeding, absorb exudates, and promote healing. These materials included honey, animal oils or fat, cobwebs, mud, leaves, sphagnum moss, or animal dung. The most frequent *materia medica* were, however, plants and their exudates. They were often used also for skin protection.

In ancient Egypt, construction projects, wars, craft, agricultural activities and wild animals of the desert were the main risk of death, together with flies and various parasites which spread several diseases. Not surprisingly, the roots of ancient Egyptian healing strategy – according to medical historical studies – extends back before the foundation of the Egyptian state. Some pictures representing diseased persons, and possible medical objects are known, and many medical procedures documented in Egyptian papyri have survived from the pharaonic period.

The recto (front side) of the Edwin Smith Papyrus[1] is a surgical textbook that includes anatomical observations as well as the examination, diagnosis, treatment, and prognosis of a variety of injuries. The original title of this book has been lost, so we cannot read how exactly ancient Egyptians determined its purpose. There are extant several other medical papyri, the largest among them is the Ebers Papyrus.[2] It contains a collection of 877 prescriptions arranged in more than 30 books, treating a variety of diseases.[3] Several books in it deal with various types of wounds, sometimes with examination, often containing only the drug therapy. Medicaments were made from animal, vegetable or fruit ingredients, as well as minerals and human derivatives.

The results of ancient Egyptian medical interventions are shown by mummies, the investigation of which is a developing field of medical history. Besides the traditional medical and philological methods of interpretation, modern medical technology has also aided in the understanding of ancient

1 For the first publication see Breasted 1930.

2 First publication by Georg Ebers 1875; the standard hieratic text by Wreszinsky in 1913.

3 For a summary see Győry, 2003b.

Egyptian medicine, where wound closure techniques used in the past were extremely similar to modern sutures. Scientists have recently been able to use scientific methods to demonstrate the usefulness of several of these ancient Egyptian medical plants and gain a better knowledge of their mechanisms of action.[4] The field of wound healing by these vegetable absorbing bandages is briefly discussed in this paper.[5]

2. Wound Management in ancient Egypt

Egyptian doctors were extremely advanced in their knowledge of herbal remedies and surgical techniques. Their treatment was based on a physical examination and diagnosis. The examination, which is the most detailed aspect of a physician's profession, is described in the Smith surgical papyrus both in the diagnostic method, and in the recommended therapy. The ancient Egyptian technique of choosing the appropriate treatment would be familiar to today's physicians. In addition, there were many specializations in the field of medicine probably as far back as the 1st Dynasty.[6] By the time of the 3rd dynasty, it was a settled tradition, as the title of Hesy-Ra (CG1426), the first known dentist shows.[7] Doctors learnt in the „*House of Life*", an institution which preserved traditional knowledge, and was usually attached to temples.[8]

Today anatomical knowledge is essential for wound management. However, ancient Egyptian doctors had only a basic understanding of human anatomy. We have no attestation of any mummification made by doctors during the pharaonic period, though the newly published papyrus Louvre E32847 describes in 3 columns the court physician's supervision of the mummification of a high official (*sr*), as the continuation of his medication.[9] Those who practised mummification belonged to a separate, specialised priestly class and had a general knowledge of the location of the inner organs in the abdominal cavity.[10] We also know that the funeral *wt*-priests and the doctors often informed themselves from the same books in the *House of Life*, the priests did not write down the anatomical details, according to the present state of our knowledge. Their attention was focused on theological activities and described only some practical acts, which were absolutely necessary to mention for the understanding of the actual religious moment. Thus, it is uncertain whether

4 Mahomoodally et alii 2005; Kumar et alii 2013.

5 Sullivan 1995; Pećanac et alii 2013.

6 Győry 2002.

7 See the wooden panels found in his mastaba S-2405 (Quibell 1913).

8 Gardiner1938.

9 Bardinet 2018, 211-226.

10 E.g. Millet et alii 1980,

they passed any anatomical knowledge and skill to medical practitioners.[11]

By the New Kingdom doctors had developed two slightly different anatomical systems, one of them is known to us by a physiological description and commentary (Eb854-855) and one by a pathological treatise (Eb856 and the parallel Brl 163).[12] This latter treatise was thought to have been written originally during the reign of a 1st and a 2nd Dynasty kings, namely Den/Udimu and Senedj.[13] Although a process leading to death is described in these papyri, wounds are not mentioned in either system.

In ancient Egyptian texts, the origin of wounds was traced back to trauma (war, accident or punishment), swelling/growth, bite or burn, and treatments were described originally in different books. Several of them can be found collected in the Ebers papyrus, although some are certainly incomplete. The few representations are limited almost exclusively to trauma, specifically to war injuries[14] – always among the enemy, or to injury caused by a lion bite, again of a "*wretched*" or "*defeated*" enemy, as a sign of victory. Accidents at work are represented in the tomb of Ipuy in Deir el-Medina.[15]

Originally the physical examination of skeletons would seem to present only bone injuries, which could be fixed surprisingly well, the latest mummy researches seem to point also to smaller operations. The anthropological material presents also wounds caused by weapons[16] – so deep for instance that the arrowheads severed most of the spinal cord, resulting in instant paralysis of the body below the neck.[17]

Moreover, medical papyri, especially the Edwin Smith surgical book, are very accurate and detailed in the description of various types of injuries and their treatments. It seems to instruct doctors only in trauma cases. It tells us that the healer was able to characterise the most important types of injuries,

11 Halioua – Ziskind 2005.

12 Győry 2002, 50-60.

13 Győry 2003.

14 E.g. Qadesh battle: Sanchez 2003.

15 Building the catafalque – a facsimile from the tomb (TT217) is being surveyed by Kathlin Gablersee using digital means, together with the documentation of the preserved paintings and fragments, for an epigraphic and iconographic analysis, as well as to produce new architectural plans: https://forschdb2.unibas.ch/inf2/rm_projects/object_view.php?r=4603852). The facsimile is made by the expedition of Norman de Garis Davies, and is now in the collection of the Metropolitain Museum, acc. no. 30.4.116 (https://www.metmuseum.org/art/collection/search/548572). Photographique archive in Torino, Museo Egizio (https://archiviofotografico.museoegizio.it/en/archive/theban-region/deir-el-medina/tt217-tomb-of-ipuy/?photo=E00090) Publication of the excavation at Davies 1927, pl. XXXVIII (North wall).

16 E.g. Szvák et alii 2020.

17 E.g. Firth 1915; Winlock 1945.

impressive even by today's standards. They differentiated various types of swellings, fractures and joint injuries. The wound is called here by the general term, *wbnw*.

Ancient doctors used to consult a number of books. We know of one/or two of them, extant only in the title(s), which dealt with the various types of wounds. One was called *ḫ3w n jr(y) n wbnw (/wbnw=f)* / „*the collected book of what pertains to the(/his) wounds*" (Sm5 an Sm41).[18] It explained the various types of wounds. In Sm5 „*fracturing his skull*" (*sd ḏnn.t=f*), in Sm41 „*the disease demon's/foreigner's hot wound in the chest*" (*šm3y n wbnw m k3b.t=f nsry*) was explained with the help of that book.[19] There are several wound types differentiated in the Smith papyrus by describing the actual condition of the wound. There is often used a name for a special type, the *wbnw n kf.t* (Sm1-7, 27, 28 etc.) – a deep *gaping/slash wound* as Breasted/Meltzer translates it. Its severity can be varied, it is always deeper, and more severe than the simple (surface) wound. The expression is a genitive, where the second word is translated in the Wb/TLA as „*Klaff*" („*gape*"), while Aufrère[20] gives a meaning „*flint*" with query. Based on the stone-related meaning of the word, Meltzer[21] translated the expression as „*slash wound*", and presented anthropological cases for this type of injury. In the special case of perforation, the word *thm*[22] is used. The most common complaints are swelling, fever, redness and exudate. They indicate that wounds were often infected. The degree of severity could vary, however. An extreme case is described by the word *šm3y n wbnw* (Sm41), when it is *nsry* / „*hot*", ie. inflamed. The expression was either so important or already old-fashioned for an 18th Dynasty's reader, that it was explained after the protocol. Thus, we know, that the wound is slow to heal ("*hesitant to heal*", *wdf*), and does not want to close ("*pull on*" *ḫ3m*). It is *very hot* (*šmm.t ḳ3.t*), and the sides are red and open. In other words, it was said to be *greatly swollen* (*šdw r 3ḥ.t wr.t*), with the *heat rising* (*nsr r ḳ3t*).

One of the usual surgical treatments of wounds was suturing with the *jdr* stitching (Sm. 3, 10, 14, 23, 26, 28, 47), while another frequent wound management is bandaging (Sm 2, 9, 10, 27, 47). Basic medicaments for curing seem to be originally fresh animal meat and honey with general „*oil/fat*"

18 Interestingly, in Sm5 the title of the book ends with „*his wounds*", while in Sm41 simply „*wounds*". Allen 2005 translates both as „*The Nature of Wounds*", Sanchez – Meltzer 2012, 62 translate it with „*Treatise of What Pertains to His Wounds*" or „*Compilation of That Which Pertains to His? Wounds*", p. 253: „*Compilation of What Pertains to Wounds*".

19 Sanchez – Meltzer 2012, 129.

20 Aufrere 1991, vol. 2, 566, 569. Also Meeks 1978, 397, no. 78.4378. Another translation by HW is: „*obsidian*", also given by Meeks 1978, 397, no. 78.4379.

21 E.g. Sanchez – Meltzer 2012, 42 with explanation and passim.

22 E.g. on the skull of Sequenenre, s. Fleming – Fischerman 1980.

(the *mrḥ.t*), , in specific cases, many other ointments and poultices could also be applied in an elaborated sequential approach (Sm41, Sm46). This latter method seems to be the more developed later way of application. The wound could be anointed or bandaged (*wt*), as in cases Sm41 and Sm46 – suggesting the use of textile on top of the poultice/ointment. The Smith papyrus gives a medical protocol for both methods. These last wound-treatments are most comparable to the modern ones.

Although the basic meat and honey-oil treatment is also known in the Ebers papyrus, it suggests mostly a composition of several different materials (e.g. Eb 510-542 for the simple wounds), sometimes also in a sequential approach (Eb 522), usually simplified into one phase. The wound type is usually given only by the ancient *terminus technicus*, *wbnw*; the book of growth/ tumours being an exception with its protocols.

They had, certainly, several other practical books, not known to us, and special medical kit. This last is specifically mentioned in Sm9, where *ḥ3y.t*, determined with the linen classifier (*ḥbs*) is explained as belonging to the doctor's set of equipment (*ḫn*). Taking into account the original meaning of the word, *ḥ3y* „*to shine" / „to come, to blow" / „to flow, to flood*", all with a different classifier, it must be a specially prepared piece of *ʿ3.t* / „*linen fabric*". We learn only from the gloss, that it was a „*linen strip, bandage*" (*šsḏ*) intended to put on the head, and under the charge (*ḫr-ʿ*) of the embalmer. Thus, as we know from mummies,[23] it was a densely woven piece of linen, which was not whitened shining bright, impregnated with various balsams.

The main activity of the doctors seems to be drug therapy; they only rarely made surgical interventions. They were indeed skilled pharmacists, which enhanced the medicine's effectiveness. They had to select the most effective drugs according to the disease. For wound dressing, drugs were produced mainly from vegetable, animal or mineral ingredients based on the characteristics of the patient's symptoms. Mineral compounds such as simple salt, copper salts, and various types of ground stones were also used to make medications. Drugs were again made with eggs, liver, hairs, milk, horns, fat, honey, wax and other animal products, herbs were the most popular. They were very important in Egyptian medicine – they even prepared herbal wine.[24] We have no sources which describe how these materials were collected and handled; however, medicinal herbs were most probably picked by hand, dried naturally or maybe in specific containers after harvesting, if they were not needed to be used fresh. Flowers, leaves, seeds, ground material, powder, dust, and other finished products were delivered according to the final specifications. Things were made more difficult as some medications were

23 Bertóty 2022.

24 McGovern et alii 2009.

only used seasonally, some were rare or very expensive, others could be used easily all of the year.[25] Drugs were mixed in various ways in ancient Egyptian prescriptions, and applied in many forms.[26]

The potential use of plant-based drugs in wound healing is described in various sources. The plant-materials and the method of putting them on the wound depended on the given situation. Sometimes it was enough only to sprinkle the wound with a powder, other times drugs were applied in poultice form, or as an ointment, and again there were times when they applied the drugs on the wound by wrapping bandages around it. Sometimes the canvas itself was soaked in the substance intended for medicine. In the Smith papyrus the *put on* (*wdj / rdj*) and the *tie/bandage* (*wt*) command is written. In the latter case, possibly a textile or solid material was meant, depending on the choice of the doctor.

In the next paragraphs – without the claim to be exhaustive – we give an overview of ancient Egyptian wound dressings in the Smith papyrus, and review the relevant cases of wound management focusing on vegetal ingredients.

2.1. Wound dressing in the Smith papyrus

Basic medicaments for wound repair was fresh animal meat for the first day,[27] then a composition of honey and *mrḥ.t*-oil/fat.[28] In specific cases, other ointments and poultices were also applied such as ostrich egg, alum(?, *jmrw*) or fibre (*ftt*). Different materials were used for two cases, the protocols of which resemble each other (Sm41, Sm46).

Therapy	Cases
fresh meat the first day	1a, 2a, 3a (no bandage), 10a, 16a, 17a, 18a, 26a, 28a, 29, 30, 30a, 40a, 47a
oil and honey + *ftt*-dressing (*ftt* – Wb/TLA: fibre pad, plucked linen HW: fibre pad, fibre, absorbent linen	1b, 2b, 3b, 7a, 10b, 11b, 12b, 14, 15b, 16b, 17b, 18b, 19, 23, 26b, 27, 28b, 34, 37b, 40b, 47c
only oil/fat	4, 6, 11a, 12a, 20, 30b,
soup of carob	7b
ostrich egg + oil/fat	9a
figs, oil/fat, honey	9b
jmrw (?alum)	15a, 30c, 35c, 36c, 37a, 38a, 41a, 43a,
jmrw (?alum) and honey	25, 30,
dry *ftt*-fibre	28b,
only honey	30d, 35d, 36d, 38b, 42b, 43b,
cooling + drying + powder	41
cooling + drying + astringent + powder	46

25 Zucconi 2007.

26 Sanders 1963; Rosen 1979; Győry 2011a-b.

27 For its possible beneficial effect see Sanchez-Meltzer 2012, 37.

28 For explanation see Sanchez – Meltzer 2012, 37-38.

Although honey is the product of bees, a processed form of pollen, it is important to mention here, as it was one of the most ancient, if not the most ancient wound dressing. It was employed as an internal and external medicament both because of its medicinal and pleasant-tasting characteristics. In wound repair its antibacterial and hygroscopic qualities were very important; they prevented or reduced the opportunities for infection and speeded up the healing process of the wound.[29] As it was believed to come from the tears of Ra, it was also important from a religious point of view.[30]

Interestingly, there is the word *ḏ*, which is used expressly for the animal material, the fat, while *mrḥ.t* is the name for the basic greasy material, which can be both oil or fat, although it often refers to the vegetal oil. Its classifier says nothing in this direction, as it depicts in this papyrus its ancient container, the *bꜣs*-jar, with its tight-fitting lid. It is written sometimes only with this sign, the usual orthography is to write out the word with hieroglyphs. Its use effectively sealed the wound from external contamination, and it protected it from excessive dehydration. It waas so important that even gods were anointed each day during the temple ritual.

2.3. ftt – IMPREGNATED LINEN POULTICE

In papyrus Smith, *ftt* is an often-prescribed ingredient for wound repair from the second day until the patient recovers. For its application the usual expression is *srwḫ* / *to treat* (Sm1, 3, 11, 12, 16, 17, 19, 27, 28, 37, 40, 47),[31] there is a few times *wt ḥr* / *to bandage above* (Sm7, 14), or *wdj/rdj* / *to put* (Sm41, Sm46). All these expressions are also known in other medical books. In the Ebers papyrus, case Eb516 is dealing again with *wbnw*-wound management, the writer by chance has left out the verb for the application. As Breasted has already stated, *ftt* was used not only in surface treatment, also for insertion into the body orifices, impregnated with various materials, according to the cases treated (Eb145: anus, Eb783, also Ram C.3:[32] vulva, Eb766, 767: ear). It was *poured / moistened* (*jwḫ ftt*w *jm*) *with* the given mixture in case Eb783, similar to the prescription in the fragmented Ramesside C papyrus. It was simply put (*rdj*) into the anus in case Eb145 and into the ear in Eb766, Eb767. Thus, it could be used as a sort of tampon, poultice or bandage, most often it was just applied, with the same verb which was used to *mrḥ.t*-oil/fat and honey, when these two materials were used without *ftt* (Sm10, 18, 20, 26, 34)[33].

29 For detailed discussion in general see e.g. Pasupuleti et alii 2017 or Hofmann 2008.

30 Kritsky 2015; Feierabend 2009. In general in the ancient Near-East: Head 2008.

31 Sm2: unknown, the papyrus is fragmentary at this spot.

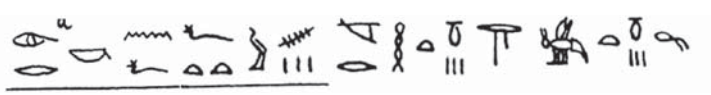
32 Deines – Westendorf 1961, 308. It is mentioned as a possible addition in Kah 25, after the same *jwḫ* verb at Deines – Grapow 1959, 210-211.

33 Sm15 is an exeption, the verb *rdj* is written there.

The application of *ftt*:

way of treatment	Prescriptions	body part	composition
wt ḥr	Sm2, Sm7, Sm14	head, nose	oil/fat+honey
šrwḫ	Sm1, 2, 3, 11, 12, 16, 17, 19, 27, 28, 37, 40, 47	head, nose, cheek, temple, chin, throat, upper arm, chest	oil/fat+honey
jwḥ	Eb783, Ram C.2-3, Kah25	vagina	different drugs
rdj	Eb145, Eb766, 767, Sm23	anus, ear	different drugs oil/fat+honey
unknown	Eb516	wound in general	jwryt-bean + oil/ fat+honey

Looking at the composition of materials connected to *ftt*, there are just a few exceptions, where oil/fat+honey are not listed with it. In pSmith these compositions always follow the order *mrḥ.t, bj.t, ftt*, as it also does in Eb516 and Eb767. Eb766 gives yet another order: *ftt, mrḥ.t, bj.t*, and the *ftt* is highlighted by red paint, as part of the instruction: *jrr=k n=f ftt.w* (*make for him fibres*). The *mrḥ.t* and the *bj.t* follow it – and this is the only case, when the amount is given: 2/3 of *mrḥt*-oil/fat, the other part, thus the missing 1/3 is honey, without writing out this amount:[34]



We know that the earliest prescriptions listed only the ingredients without giving the amount, which became later a standard for newly noted prescriptions.[35] The older ones were usually left unchanged while making the new copies. It thus seems probable that here a traditional general wound dressing was described as updated. It means then, that *ftt* is in this case a *terminus technicus* for the type of wound dressing, written instead of oil/fat-honey-dressing. This complex is defined by the cord (V12) classifier at the end of the ingredients – which makes no sense either with honey or with *mrḥ.t*-oil/fat, suggesting that the *ftt* was some rope-made material to fix the medicament to the wound, and the three constituents together made one expression. Thus, even where *ftt* is not written out, the two general materials for wound repair might mean the same fixed mixture.

34 All the hieroglyphic transcriptions are taken from GRAPOW 1958.

35 GYŐRY 2011.

The *ftt* was at the same time not only a material to fix, also a special instrument in wound management, as in Eb145 it is said to *jrj m ftt* „*make them into a ftt*", and various vegetal and mineral materials are listed, such as myrrh, incense, garden *Cyperus*, *mḥtt* from the riverbank, celery, coriander, oil/fat and salt, all with one unit (*ꜥntjw 1, sntr 1, gjw n ḫspt 1, mḥt.t n.t wḏb 1, mꜣt.t 1, šꜣw 1, mrḥ.t 1, ḫmꜣ.t 1*). In Eb783, among the ingredients there was no type of oil/fat, a preparatum made of solid parts of acacia, carob (*ḏꜣr.t*) and date mixed into honey. Concerning the ear, it was made as the usual wound dressing, with *mrḥt*-oil/fat and honey. The prescriptions with different ingredients thus seem to give the meaning of a kind of "*dressing*", as in the other, gynaecological prescriptions (Ram C 2-3, Kah25), and the one for the anus gives this word in the application instruction summarising the earlier listed ingredients.

So, *ftt* seems to be a sort of impregnated fibre, originally with oil/fat and honey, in special cases, with other materials. As the mixture was applied fresh, the fibres were usually wet. In Sm28, however, the *ftt* is prescribed to be dry for the *wbnw n kft*-wound in the throat. Here the treatment starts with the usual wound treatment, if the patient had high temperature, the *mrḥt*-oil/fat and honey dressing was taken off, and the wound stitched and kept together with the dry fibres.

The question then is what sort of fibre *ftt* could originally mean. The word itself has also a classifier (F37b), a variant of the shape of the spine and ribs, which points to a material in similar form. And indeed, Eb516 uses this material in the plural with an indirect genitive: *ftt.w n.w dby.t*. As the *dby.t* has an herbaceous plant classifier (M2), the *ftt* belongs to this group of plants. It has another classifier as well, the same F37b as the *ftt*, thus it is a fibrous plant with several branches resembling the backbone:

(Eb516)

Looking for actual physical fibre plants and wicker materials, there are a number of grasses and rushes to be found in Egypt. For ropes, mats and baskets the products of the date palm, rushes/*Juncaceae*, sedges /*Cyperaceae*, sweet grasses /*Gramineae*, bulrush plants/*Typhaceae* and *Ceruana pratensis* were identified.[36]

36 Germer 1979, 187-188, used for brooms. For *Ceruana pratensis* see Forskål 1775. lxxiv: no. 463-469, and p. 153-154: giving as its Egyptian name *karuan*. According to the Global Composite Cheklist it is present in wild (https://archive.ph/20141113021453/ http://dixon.iplantcollaborative.org/CompositaeWeb/Default.aspx?Page=NameDetails&T

A common fibre-plant is hemp, and some researchers see this plant in the word *šmšm.t*. It has an herbaceous plant classifier, and is used relatively often in medical texts for cooling various parts of the body (eyes, toes, vagina, anus), its use as a fibre is never mentioned, and never has the above F37b classifier.[37] Were *šmšm.t* hemp,[38] its non-application as fibre is unexpected. Moreover, Renate Germer rejects the knowledge of hemp in Egypt, including identification with *šmšm.t*. And indeed, the few cases of finds where hemp is said to be used as a textile material, „these identifications are not certain and more work needs to be carried out on the textiles in question."[39]

The same F37b classifier has the *nbj.t*,[40] *ḫsꜣw*,[41] and *mḥj* / ***flax***. The identification of the first two words are uncertain or unknown. The last one was already in use as raw material for yarn in predynastic times. Besides *Linum usitatissimum L*., however, there are other flax species, which might be cultivated in Egypt, so the actual flax species might be varied.[42] In medical texts *mḥj* means ***flax fibre***, based on its ability to be knotted. Hildegard von Deines and Hermann Grapow[43] identified its other parts used in medical practice as *jnj.t n.t mḥj* to be the seed, *ḏrḏ n mḥj* the leaf, *kfꜣw n mḥj* the stem end, and *bnn.t n.t mḥj* as the seed pod (pellets at the end of the stem). If we identify *kfꜣw*, as Renate Germer does in her book, in its original meaning "***end, basis***" as the lower end of the plant, then this last one is "***pellets from the root of linen***".

The *ftt*, as investigated already by Breasted,[44] is made of *dby.t* plant, based on Eb516 and Eb522, thus neither of the above-mentioned ones. The *dby.t*, not identified by Deines-Grapow,[45] is used a few times in Ebers papyrus (Eb484, 497 (burns), 516, 522, 529 (wounds), 565 (swelling), MuK H (*bꜥꜥ*-

abNum=3&nameId=40dbbd27-5ffa-463a-9de3-51efc168459a). Synonime: *Buphthalmum pratense* (Forsk.) *Vahl* . (http://plantgenera.org/illustration.php?id_illustration=272413&id_taxon=0&mobile=0&SID=sfu84ne1m2ea8g73jplm292v45&language=English&thumbnails_selectable=0&selected_thumbnail=0&query_type=epithet&query_broad_or_restricted=0&group=0&lay_out=0&uhd=0) – no known medical use, and it seems to be too harsh to be used as fiber.

37 Germer 2008, 132-133.

38 It is accepted by Hannig (HW) and Manniche 1989, 82-83.

39 Vogelsang-Eastwood 2000, 269.

40 The identification with *Arundo donax* (given in Grapow 1959, 219) is rejected by Germer, 2008, 82-83.

41 Unidentified, it was mainly used as fuel, HW 619.

42 Germer 1979, 58-61; Germer 2008, 162.

43 Deines – Grapow 1959, 201-202.

44 Breasted 1930, 101-102.

45 Deines – Grapow 1959, 576.

disease of babies)[46]). The *dby.t* plant's *ftt* and *dkw* / ***flour*** were always only applied externally. There is just one internal treatment including the *ftt n dby.t*, in treating the *b*ᶜᶜ-disease, where the wet-nurse drinks it mixed with the other ingredients.

Renate Germer raised its eventually possible identification as flax, assuming that all the vegetable yarns identified so far in Egypt were made of flax and that there was no other vegetable fibre that could be used as a binder. As flax gives yarns of different qualities at different stages of ripening, she has suggested that it could mean the plant in its green or yellow ripening stage (not the usual brown one) – then its yarn is soft or strong not yet mature enough to spin a rope. She concludes, however, that it is only a theory that has to be investigated to confirm or more probably refute.

All in all, the material of *ftt* is still unsolved.

2.4. Sm 41 and Sm46

Two protocols are outstanding in the collection, because of the complexity of the treatment. Both have three phases, containing cooling and drying media with a special powder as the last phase. They both handle wounds on the chest, it is stressed, in case 46 at the beginning of the second phase of the treatment, in case 41 at the end of the protocol, that these are general application methods. The process to be carried out is expressed with different words: *wt ḥr=s* / ***bandage it*** or *wdj r=s* / ***place upon it***, because of the parallelism of the ingredients and the generality highlighted by the comments in the prescriptions, they should mean the same activity, that is to apply the ingredients to the wound, so that they could exert their effects.

Similarity can also be seen among the phases: although there are different numbers of phases, the same process is described: cooling (*ḳbw* and *jtḥ*), drying (*zšr*) and powdering (*tmtw*). Interestingly, in case 46, they sometimes experienced that the cooling material had no effect – in this case the advice was to take the mixture off and dry the „***wound with raised head***", before continuing with the cooling.

As "***fever***" or "***warm***" (*srf*) of the wound meant inflammation, the cooling must mean in these cases to cool the temperature of the wound, thus, to reduce the inflammation. The name of the *jtḥ* phase suggests another way of reducing the inflammation of the wound by "***drawing***" its sides nearer or together, while the drying phase seems to relate to extracting the exudation from the wound, thus drying it, then the powdering phase might be to close it on the outside or relieve locally the pain. They could see these changes either by the naked eye or feel.

46 Both *šmšm.t* and *dby.t* plants are used here together, thus it is excluded, that *ftt* is a part of *šmšm.t* plant, even if it is hemp.

Based on the places of the prescriptions in the papyrus, the preparatory phase in Sm46 is perfectly understandable, since the description of treatments in the papyrus has progressed from the milder to the more serious cases, following the system of the ancient world. Thus, this extra treatment served to bring the wound to the condition of about the average chest-wound (*wbnw m ḳ3b.t*) condition shown in Sm41. Because the *r3-pw* / „*or, respectively*" is not written for the cooling, and in Sm41 two different mixtures are given also for the drying, possibly this list means similarly two different poultices following each other, though the possibility of an alternative option can even so not be excluded.

Sm41		Sm46	
		0) *zpw ḳ(3)b r sḥr pf …* / cooling medium for this *sḥr*-boil … - *sḫ.t, nṯr.t, ḳsnty* - *dḳr šz, ḳsnty, dbn jḳdw, mw* *jr ḥsf r=f nn zpw ḳbw,* *z3.jn=k, nf3 pḫr.t r h33 mw nb, nty m sḥr tp*	*wt ḥr=s* / bandage it
1) *zpw ḳbw n jtḥw srf m r3 n wbnw* / medium for cooling and extracting inflammation: - *dr̲d ṯr.t, nbs, ḳsntj* - *dr̲d jm3, bnf, ḥn(y)-t3, ḳsnty*	*wdj r=s* / place on it	1) *zpw jtḥw srf m r3 n wbnw m ḳ3bt.f* - / medium for extracting inflammation: - *dr̲d šnd.t, dr̲d nh.t, mw, dr̲d jm3, bnf n k3, ḥny-t3*	*wt ḥr=s* / bandage it
2) *zpw n zšr.t wbnw* / drying medium: - *šz.t n.t w3d̲w, wšb.t, tḥn.t, ʿd̲* - *ḥm3.t mḥj.t, ʿd̲ nj3w*	*wt ḥr=s* / bandage it	2) *zšrw n wbnw m ḳ3bt.f* - / drying medium for the wound: - *šz.t n.t w3d̲w, d̲3r.t, ʿš, ʿd̲, mrḥ.t, ḥm3.t mḥj.t, ʿd̲ nj3w*	*wt ḥr=s* / bandage it
3) *tmtw* - *špnn, dšr, ns-š, d̲3r.t, dr̲d nh.t*	*wt ḥr=s* / bandage it	3) *tmtw:* - *špnn, dšr, nh.t*	*wdj r=s* / place on it
jr ḫpr mjtt m ʿ.t nb.t, dj=k sw ḫft šs3w jpn		*srwḫ=k sw m srwḫ wbnw*	

2.4.1. Phase 0 / preparatory phase

In case 46 a specific treatment would be expected before the general one, with only one plant material used. Two different mixtures are listed, in both cases, we find one particular material, the *ḳsntj*, as yet unidentified. Based on the classifier, it was a kind of powder. Deines-Grapow suggests that it is a sort of mineral, based on parallel usage.[47] The *nṯr:t* is a name for natron.

The *sḫ.t* is the plant, known as the 6-rows species barley (*Hordeum polystichum Döll., ssp. hexastichum* or *Hordeum hexastichum*),[48] a grain often mentioned in economic records, used in its green or white stage of maturation, which also had a *dšrw n sḫ.t* „*red of the barley*" form, which seems to be the coarse flour, a mixture of bran and flour. The first mixture bandaged upon the wound (*wt ḥr=s*) was thus a roughly crushed composition of barley, natron and another powdered mineral. We can assume that the process was first to apply the poultice, and then tie it up with a piece of linen, as this was the only bandage we can identify.

The second composition contained not any vegetal material, as it was made of the unknown powdered mineral (*ḳsntj*), the powdered calcite (*šz*), mortar (*dbn*) used by builders, and water. This second mixture had to be treated the same way: to bandage on the wound of the chest.

As Sanchez and Meltzer[49] concluded, these agents were primarily „to reduce the bulk of the mass/cyst" having topical dehydrating and anti-inflammatory effects, and antiseptic properties. Thus, they served to debride the wound, and dehydrate as much as needed for the customary herbal wound management. Both bandages had to be removed, however, if the wound exudates excessively, which is probably a sign that it had become severely infected.

2.4.2. Phase 1.

Comparing the materials used in Sm41 and Sm46 in both first phases, though there are several different ingredients, some are similar. This is not surprising, as the first phase in Sm41 is called both cooling (*ḳbw*) as phase 0 was in Sm46 and extracting (*jtḥw*), thus it unites the two first phases of the Sm46 prescription, which means that some exudate was taken as natural for the ancient Egyptians. The *ḳsntj* in the Sm41, phase 1, was already used in the previous phase 0 of Sm46, so it is no longer there in Sm46, phase 1.

47 Deines-Grapow 1959, 522.

48 HW, 752, although in Qubbet el Hawa, the barley found in jars with inscription *sḫ.t*, was indentified as *Hordeum vulgare* (Edel 1975, 25), the common barley was usually called *jt*. See Germer 2008, 122. For botanical differences see e.g. Shulz 1913, 87-88.

49 Sanchez – Meltzer 2012, 281.

Probably this was the most important material in reducing the fluid of the boil-injury, and used to reach the open wound stage. All the other materials are new ones. They were thus the media for the extraction. The Sm46 has only one prescription in this phase, while the Sm41 contains two in phase 1.

Sm41

The first medicament in Sm41 has the leaves of the willow and most probably also the leaves of the Christ's thorn tree together with the *ḳsntj*. The willow[50] has a well-known analgesic effect, the Christ's thorn astringent and demulcent ones, so they certainly contried to the healing, which also meant the reducing of the temperature of the wound – even if we do not take into account the effect of the *ḳsntj*.

In the second cooling and extracting prescription of Sm41, we can find the bile (*bnf* – in Sm46 the animal is named as ox, and because of the parallelism, most probably the same is true for the Sm41), and even two plants common with Sm46: the leaves of the tagart bush (*Maerua crassifolia*, *jm3*),[51] and the plant *ḥny-t3*.

This last one, the *ḥny-t3* is used in powder form, was an herbaceous plant. It was used twice in pEbers: for softening the *mtw* of the knee (Eb634) and making an enema for the vagina (Eb817). Renate Germer considers it to be the same as *ḥny*, having here an epithet *t3*, which has a meaning „*of the earth*".[52] She suggests that it might mean the part belonging to the earth, thus root and rhizome. Probably the upper end of the plant (*tp n ḥny*) was mentioned once in medical texts (Eb386) as part of an eye-ointment to ward off the pain. Kuhlman, based on the notes of Ludwig Keimer, gave its probable identification as foxtail sedge / *Cyperus alopecuroides Rottb*.,[53] the ancient Egyptian use of which is proven from the predynastic to the Roman period, especially as material for matting.[54] It has also ancient Egyptian representations.[55] Its essential oil, obtained from the rhizome of the plant, contains among others many sesquiterpene hydrocarbons and sesquiterpene

50 Keimer 1931, for the use in medicine analysed at 192-195. Vartavan et alii 2010, 211: attested it only from the 18th Dynasty onward.

51 For identification see Baum 1988,183-196, for finds: Vartavan et alii 2010, 156: although rare, from Paleolithic time throughout the pharaonic period.

52 Germer 2008, 95.

53 Kuhlmann, Rohr. LÄ. V. 286-287. – LÄ V, 287 no. 2, note 22.

54 Vartavan et alii 2010, 94. It is also cultivated nowadays for mat-making (Täckholm 1974, 789, pl. 292)

55 Borchard 1902, 37; Petrie 1894, pl. III.3.

derivates.[56] As the investigation of El-Gohary attests,[57] its oil has a significant cytotoxic effect on *Ehrlich Ascites Carcinoma*, and an antimicrobial effect against several *Streptococcus* species, among them also *S. aureus*, while its effect is moderate against *Sarcina lutea, Mycobacterium phlei, Proteus species* and *Bacillus subtilis*. Thus, if *ḥny-t3* is indeed foxtail sedge, it was a good component against several infections (cooling material) – although *Esherichia coli* and *Pseudomonas aeruginosa*, other frequent infections inducing bacteria were not affected.

The use and parts of the *jm3* tree[58] mentioned in medical prescriptions is very similar to that of the willow, as Renate Germer[59] has already ascertained in her early study on ancient Egyptian medical plants, thus suggesting its identification with a tree having common characteristics with it. Later she added her support[60] to the opinion of Baum, that the name is probably identical with the evergreen tagart bush (*Maerua crassifolia Forsk./* Tuareg: agar).[61] A sort of cake was made of its fruit during the Old Kingdom.[62] The leaves are consumed as a vegetable, and animals readily graze on the branches. Ancient Egyptians used it from the Predynastic until the Roman period,[63] especially its wood for small coffins, statuettes, other small objects also for elements of a ship.

Its leaves were also used in the New Kingdom Egypt for the repair of broken bones (H221, H226 – plus the fruit and seed, in H14: fruit), softness of the *mtw* (Eb663 – together with the fruit), and a preparatum is given to treat hardness of hearing (Eb764). (At the end of the pharaonic period its use is attested against snake bite (Brk87a)). In addition, the branch (*ʿḫm*) was thought to be effective for wound management (Eb535). For the *ʿ3gy.t*-discharge of a wound the *ʿ3gj.t* of the *jm3* was used (Eb539), as well as for body perspiration (Eb710). It has also an *ḫs3* part, again as yet unidentified, which had several application-aims, among others to deal with hair growth at a wound (Eb472)

56 Mekem Sonwa et alii 1997, 1435; Mekem Sonwa 2000, 57-58, 106: Its essential oil contains a few patchoulane, rotundae and saryophyllane sesquiterpenoids, much more eudesmane than other Cyperaceae – with its unique alcoholic eudesmane, and also its special norsesquiterpene: the norrotundene. The main constituent is cuperene.

57 El-Gohary 2004.

58 For further details see Győry 2011c.

59 Germer 1979, 237.

60 Germer 2008, 25-27.

61 Baum 1988, 183-196, no. 18.

62 Baum 1988, 190 = Edel 1967, 21, note 1, pl. 20, 34h5. The *jm3* tree was already well known during the Old Kingdom, and had religious significance in the Pyramid Texts. Even its fruit had a special name, *jm3.t*. (See Hannig 2003, 135)

63 Vartavan et alii 2010, 156.

and as a burn treatment (Eb482).

The tagart bush is native to North and tropical Africa, Arabia and the Syrian-Palestinian seashore. The white or yellow flowers are on the lateral shoots, the sweet cylindrical fruit has a pointed apex. Its leaves, eaten in soup in Nigeria, contain significant amounts of selenium and phosphorus,[64] and it is probably rich in protein, vitamins A and iron, thus it contries essential nutrients to the diet.[65] In Mauritania, the twigs are used as a toothbrush after fibres are produced by rubbing the unbarked part. The ground fruit is given to cattle, sheep and goats when their tongues are painful because of licking their damaged hooves, and the triturated leaves are used as purgative for horses with constipation or intestinal parasites.[66] Nathalie Baum[67] mentions that in folk medicine the leaves are used internally to reduce intestinal troubles. When used externally, they treat wounds and reduce pain caused by fractures. The decoction of the leaves and bark is febrifuge, reduces headache, toothaches and skin infection.

Thus, these leaves worked not only as inflammation reducers, also as painkiller agents.

Sm46:

In Sm46 phase 1, there is only one prescription for this phase, which contains all the constituents of the second cooling treatment of Sm41, and two more types of leaves, that of acacia and sycomore. Water is also mixed to the preparatum.

The sycomore (*nh.t*) is native in Egypt and was a widely used plant for various purposes, in many prescriptions. Almost all parts of it were applied in several ways in drug therapy. The leaves – apart from two cases – occur in bandages mixed together with other leaves, where acacia is also a frequent element (see table 2 below).

Sycomore leaves could be put into ointment (Bln95: against the dead and the shadow of a god), and we find its leaves also among the treatments per oral in Eb250,[68] where an obstruction (*šnꜥ*) of the right side of the belly, accompanied by high temperature, is treated. Among the many drugs used

64 Freiberger et alii 1998.

65 Edible perennial plants native to hot deserts – the solution to the invading sand desert. Eden Foundation 1989: http://www.eden-foundation.org/project/semmoroc.html; Cook et alii 1998.

66 Cf. Bellekhdar 1997; Bernus 1981.

67 Baum 1988, 194.

68 The Bt37 is also a per oral medicament, and here the leaves of the sycomore appear again together with acacia and Christ's thorn leaves, the aim is unclear because of the fragmentary state of the papyrus.

with sycomore leaves, we can find most often the leaves of ash, tagart and Christ's thorn. All these usages hint that its characteristic use seems to be indeed to decrease the inflammation (*jtḥ srf* / „*pulling out the temperature/ inflammation*"), that is for the anti-inflammatory effect, especially for broken bones most probably with an open wound, caused by trauma. The softening of the *mtw* might also be connected to inflammation, which needs cooling. Its effect might be realised by the analgesic property of the sycomore leaves,[69] which seem to be used as a main constituent in treating a hippopotamus bite (Eb243).

	šnḏ.t	*nbs*	*jm3*	*ṯrt*	*jḥj*	Others	purpose
Eb663	X	x	X			+ many other drugs	to soften the *mtw*
H221	X		X			*bjt, ḳmy.t*	for broken bone
H226		x	X			*ḏ3r.t, mjmj, mw*	for cooling the broken bone
H234	X			x		*mjmj, mw n.w ḳmy.t*	for cooling the broken bone
H243						*ḥnḳ.t nḏm.t* (incomplete)	for treating a hippopotamus bite
H250					x	+ several other drugs	for cooling the *mtw*

Table 2. prescriptions with sycomore leaves

Similar properties can be attried to ash leaves (*Acacia nilotica*, *šnḏ.t*), which are used even more frequently, and in several preparatum-forms (oral medication, chews, eye medicine, powder, ointment, suppositories, enemas) as well as in bandaging. Ash was used together with the leaves of sycomore, Christ's thorn, willow, tagart and *m3f.t* tree. The main purpose of these prescriptions[70] is the treatment of the *mtw*, especially in connection with its cooling effects – in general or connected to the lower limbs –, often treating the *wḫḏw*-symptom, was also found beneficial for the healing of wounds, even when there are different types of infections. Probably the anti-inflammatory effect was used in the few eye treatments mentioned as well. In the Duke Database 84 chemical components are given for the plant.[71]

69 Sanches – Meltzer 2012, 282, note 290.

70 Győry 2010.

71 Beside aluminium, calcium, magnesium, manganese, potassium, silicon, sodium, there are also listed: dicatechin, epigallocatechin, catechin, gallocatechol, Leucocyanidin, pyrocatechol, éeucocyanidin-gallate, Beta-L-arabinofuranosyl-l-arabinose, tetrahydoxyflavonoid, quinolyl-acid, trihydroxyflavonoid, aldobiouronic-acid, hydroxyquinoline, coumarinyl-acid, hydroxyquinoline, aldobionic-acid, aldobiotriouronic-acid, alpha-sitosterol, amylase, arabic-acid, asorbi-acid,

2.4.3. Phase 2

After cooling, the next step was drying (*zpw n sšr*), where in Sm41, two prescriptions are again listed, both containing only animal and mineral constituents, while Sm46 seems to have united those two prescriptions and modified them by substituting the mineral *wšb.t* and *ṯḥn.t* by the *ḏ3r.t* and *ꜥš* plant.

The *ḏ3r.t* was thought for a long while to be colocynthus (*Citrullus coloquinthis*),[72] now it is established as being carob fruit (*Ceratonia siliqua* L.)[73]. The tree originates from the Eastern part of the Mediterranean, and can be male, female or hermaphrodite. It is called by another word, the *nḏm*, which tree is known in written sources first in the First Intermediate Period, in Dendera,[74] while the *ḏ3r.t* fruit's first attestation is known from a Middle Kingdom snake spell.[75] These facts seem to suggest, that the tree was introduced or domesticated before the Middle Kingdom period, and was linked to the concept of sweetness, since the meaning of *nḏm* was already in the Old Kingdom "*sweet, pleasant (i.e. taste, smell, sound, speech, song, life, journey, age), happy, cheerful, feeling good*", and *nḏm-jb* became a permanent expression for "*joy, happiness, well-being, heart's content*", *nḏm-stj* for "*good smell*" and *nḏmm.t* also developed for "*passion, sexual satisfaction*" by this time, so the name of the tree is might be secondary.[76] The pod tastes sweet; thus, its consumption may justify the "*sweet*" name of the tree. Another question is why *ḏ3r.t* ("*scorpion*") became the name of the sweet pod. Here, the possibility emerges that the shape of the pod with winding end was reminiscent of the scorpion, and – perhaps precisely because of the similarity – it was used against scorpion stings and snake bites, at least in the early days.

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ascorbic-acid-oxidase, beta-coarotene, betulin, carbohydrates, cellulose, chlorogenic-acid, D-catechol, D-galactose, D-glucuronic-cid, diastase, dicatechol, epicatechol, epicatechol-gallate, fructose, galacturonic-acid, hydroquinon, indole-acetic-acid, isoquercetin isophamnetin-3-rutinoside, kaempferol-3-0-glucoside, kaurenic-acid, lactone, L-arabinose, lignin, linoelic-acid, lysolecithin, malic-acid, naltase, M-aminophenyl-glycoside, monoyrinase, mucilage, myrecetin-4-methylether-3-rhamnoside, oleic-acid, oxalic-acid, oxidase, peroxidase, phlobaphene, phlobatanin, phloroglucinol, polyphenol-oxidase, pyrogllol, quercetin, quercetin-3-0-rutinoside, quercetin, riboflavin, robidandiol, rosin, saponin, tannase, thiamin, uronic-acid, xanthurenic-acid. See Dr. Duke's Phytochemical and Ethnobotanical Databases: https://phytochem.nal.usda.gov/phytochem/plants/show/15?qlookup=acacia+nilotica&offset=0&max=20&et=

72 E.g. Deines – Grapow 1959, 586-592, it also gives the carob meaning as another interpretation.

73 Aufrere 1983, 28-31.

74 Hannig 2003, 688: Petrie, Dendera, pl. 7A, fragment, PM 5:1, 112, nos. 6-8.

75 pTurin CGT 54003, recto, 1-8, 1st spell (Roccati 1970, 23-24 and plate)

76 See Győry in print.

Different parts of the tree can be used for medicinal purposes, in ancient Egyptian medical texts usually only the fruit is given, without any details.[77] This points to a well-established general use, and suggests that this word meant a clear form of the fruit. The fruit has two main parts, the pod and the seeds. The latter ones are uniform[78] and very hard, and can be only used in ground form. Based on ethnographical observation and modern experience, the pod is eaten not only by people, is a staple food for animals all over the world. In the New Kingdom period, however, it was often used as part of prescriptions made for consumption or as external medicament, mainly for wounds, including those caused by fire and animal bite, swellings and growths, or for the treatment of the *mtw*.[79]

According to chemical analyses, it contains several antioxidants,[80] is astringent, laxative and purgative. It can be used for coughs, catarrh, hepatitis and in Egyptian popular medication also for treating warts.[81]

Concerning *ꜥš*, we often meet it in Old Kingdom texts both as a foreign tree and as a special oil – specifically made from the plant. The Egyptian name is often classified by the plank or board signs, thus it is possible to assume it is a frequently imported fir timber.[82] Although Sm46 does not specify which part of the fir tree they used, both needles and resin would be effective in reducing infection, and with it the fluid content of the wound. Concerning a more precise identification, Loret determined it to be the *Abies cilicica*,[83] a type of fir known from Asia, often found among imported materials, throughout the pharaonic and Graeco-Roman eras. Dayisoylou and Alma identified 49 chemical components in the essential oils from the cone's resin of the true Cílician/ Taurus fir in 2009.[84] The crude extracts were also found to have antimicrobial

77 Although the *pr.t nḏm* is also mentioned, it is used in Eb80 against the *pnḍ*-worm.

78 This leads to its use as measurement for gold: carat from the word carob.

79 Beside the above mentioned sites see also Germer 2008, 166-170.

80 E.g. Kumazawa et alii 2002.

81 Dr. Duke's Phytochemical and Ethnobotanical Databases: https://phytochem.nal.usda.gov/phytochem/ethnoPlants/show/4699?et=

82 Glanville 1932, 8-10.

83 Loret 1916; Claudia Kemna proposed the identification of the *ꜥš*-tree with the ash tree (*Acacia nilotica*) in her monograph (Kemna 2018), which seems to be surprising, and cannot be confirmed yet.

84 Dayisoylu et alii 2009. Not in Dr. Duke's Phytochemical and Ethnobotanical databases. Another analysis made on the needles of four native Anatolian firs resulted in showing that the percentages of santene and germacrene-D, the ratio of percentage of β-pinene to the percentage of myrcene can be used to distinguish carene-containing Turkish firs from each other, and *A. cilicica* contained large quantities of δ-3 carene, unlike the others (Uçar et alii 2010.). The *A. Caucasia* also did, its distriion occurs further North.

and antifungal activities.[85] The resin is an antiseptic, a diuretic, and is used to treat wrinkles, extract worms and promote hair growth.[86]

Another identification is the cedar tree (*Cedrus libani*). Because of being decay- and weather-resistant, the use of cedar wood was widespread among the elites in ancient Egypt. Ships, doors, roof beams, shrines, coffins, furniture and statues were made of it, and the scent was compared to that of the lotus – it is not surprising, therefore, that the Egyptians linked it to regeneration. Indeed its fragrant oil[87] and spicy sawdust were used to help the deceased in the Afterlife, since both were used for embalming.[88] This resinous oil rubbed in and on the body provides protection against bacteria, fungi and insects,[89] by its chemical constituents – cedrene, cedrol, thujopsene and various terpenoids.[90] It is a hemostatic, antibacterial, and antioxidant wound healing material.[91]

It was recommended that all three mixtures be bandaged, thus they were tied on probably with the help of linen bands.

2.4.4. Phase 3

The final treatment was a powder, *tmtw* made of *špnn*, *dšr* and sycomore (*nht*) at Sm46, extended in Sm41 with carob (*ḏ3r.t*) and the unidentified *ns-š* plant. Here the sycomore is specified, by saying that the leaves are needed, as in phase one in Sm46. Carob was used there in the second phase.

Concerning *dšr* its classifiers point to a type of plant, as it can be both the herbaceous plant (M2) and the powder sign (N33); the primary meaning of the word is „*red*". Based on Coptic etymology (ϩϵⲣⲱ), Černý determined it to be flax seed,[92] which is accepted by most scholars.[93] For the common flax plant *Linum usitatissimum L.*, there is the name *mḥj*, several parts of which were used for medical purposes, as *bnn.t n.t kf3.w n.w mḥj* / „*seed pod at the ends of the flax*", *ḏrḏ* / „*leaf*" and *jnj.t n.t mḥj* / „*linseed*". On average flax yields 6 to 10 yellow or red-brown seeds per boll, depending the species and varieties

85 Sale – Al-Mariri 2016.

86 Sidebotham – Zych 2009.

87 For its possible composition see Sarret et alii 2017.

88 Amorós – Vozenin-Serra 1998; Koler et alii 2003; Abdel-Maksoud – El-Amin 2011.

89 Abdel-Maksoud et alii 2019. It is used even now, as an official insect repellent, cf. 8000-27-9, Cedarwood Oil by Chemical Selection Working Group (CSWG), at https://ntp.niehs.nih.gov/ntp/htdocs/chem_background/exsumpdf/cedarwood_oil_508.pdf

90 Adams 1991.

91 Tamer et alii 2022.

92 Černý 1976, 43.

93 E.g. Germer 2008, 163-164; Westendorf 1999, 510.

used, as there are also other species of flax, among others the red petalled scarlet flax (*Linum grandiflorum*), also native to Northern Africa. It tolerates heat and drought, and needs full sun.

Oil can be taken from all species of flax, the common one is the most productive. In ancient Egypt, we know of linseed oil from the Ptolemaic period, meet – as early as the Ramesside period – *mrḥ.t dšr.t*, an artificial „*red oil*", which is made using the *dšr* plant (Brl185).[94] This time, the classifier at the end of the word is not the powder sign (N33), the herbaceous plant sign (M2). The oil is called red, and most probably the *dšr* -plant is responsible for producing this colour, the other components being *bjꜣ n sw.t* 1/8 / a special part of the wheat, *jmj.t n.t ḏꜣr.t* 1/32 / „*inner part of the carob pod*", *bj.t* 1/8 /"*honey*" and *mw* 150 ro/"*water*". Thus, the red flower or the linseed might be used to give its colour.

Either the common or the scarlet flax was used for the last phase of treatment, and in both cases it was classified as a powder, most probably of the seed. Linseed (*jnj.t n.t mḥj*) was used in Eb663, Eb734 and H187, for bandaging the *mtw*, the „*blood-growth*" and for the toe nails. The *dšr* was more popular in this respect. It can be found to be used for *wḥꜣ.w*-skin disease (Eb110, 120), burns (Eb489, 490), the bladder (Eb549), swelling (Eb565), painful toe (Eb620, H175) and the *mtw* (Eb663) either as part of an ointment or in bandages. Both flax species had similar application aims and method, and these fit well into the usage described in the Smith papyrus.

All linseeds are cyanogenetics, accumulating significant amounts of cyanogenic glycosides. Linseed has anodyne, astringent and demulcent effects, is used for boils, burns, carbuncles, against bronchitis, cancer, conjunctivitis, colds and coughs.[95]

The *špnn* originated from the *špn* as is explained in Eb782, where it was suggested that it should be given to a child who was crying too much – mixed into one mass with *fly dirt from the wall* (*ḥs ꜥff, wnn r jnb*). All the other applications known to us (Eb440, Eb443, Eb445) are used against the *ḫnsy.t*-disease of the head, either as an ointment or a powder, similar to the cases in

94 A simplified variation can be found in Eb268, where, however, the components are expanded by the unidentified *jḫw*-plant (*dšr 1/8, jmy n ḏꜣr.t 1/32, swt sḫm.t 1/4, ꜥd-sꜣ 1/8, bj.t 1/8, jḫw 1/8, mw 10 rꜣ*), the quantities of the components and the aim of the prescription are changed, and the *dšr* is given the powder classifier (N33). The name of the medicament is not given, they are clearly two different items.

95 Dr. Duke's Phytochemical and Ethnobotanical Databases for *L. usitatissimum*: https://phytochem.nal.usda.gov/phytochem/ethnoPlants/show/1714?qlookup=Linum+usitatissimum+&offset=0&max=20&et= L. grandiflorium is not investigated, only its cyanogenetic character is indicated.

the pSmith. This disease is thought by Ebbel to be a wet rash on the scalp,[96] where the drying effect would be really needed.[97] Because of the above first usage, *špn* is usually identified as the opium-poppy (*Papaver somniferum L.*), which yields a sedative liquid.

In Egyptological studies, two types of poppies are mentioned, the corn/field poppy (*Papaver rhoeas L.*)[98] and the opium-poppy[99]. The *špn* is often identified with the second one, based on the strong sedative effect which is suggested by the use of the above Eb782 prescription. However, Renate Germer warns that this type of poppy is native to the Western Mediterranean, and is attested only from the New Kingdom period in Crete (Gazi) and in Cyprus (Kition), from where ancient Egyptians might have imported it. By contrast, the red field poppy is well attested in the paintings of the New Kingdom. And indeed, both poppy species could be used similarly. The red corn/field poppy was called *nanti* by the Egyptians, according to Dioscorides,[100] and the head and the seeds were made up into a sleep-inducing material, while the leaves and heads healed inflammation. He also states (4.65) that the leaves and heads of the opium poppy cause sleep and that the heads pounded into small pieces and mixed into poultices with polenta, could be used to treat inflammation and a skin infection, called erysipelas – besides many other treatments. He says this poppy is called in Egyptian *wanti*.

The special Egyptian names mentioned suggest the considerable popularity of these plants in Egypt – latest from the early Roman imperial period, when Dioscorides lived. Its knowledge was, however much earlier. Not only the 18th Dynasty representation of the field/corn poppy can be found in paintings, also the plant itself.[101] Its decorative function is thus, well attested. Concerning the opium poppy, we have only indirect sources at that time (see below). The question is therefore when and how these plants were introduced, and what properties the Egyptians of this period attried them.

The *nanti*'s petals,[102] seeds and leaves are now collected according to modern ethnobotanical standards, and are applied as *Papaveris rhoeados flos* for coughing, hoarseness and as sedative and emollient, especially effective for children. As it is poisonous, it can only be used in small doses.

96 Deines – Westendorf 1961, 661. – in TLA the scurf is given.

97 Grapow 1959, 490.

98 Germer 2008, 309-310; Hepper 2019, Tutankhamun

99 Germer 2008, 311-313.

100 Dioscorides, De Materia medica 4, 64.

101 E.g. in the garden of Kha in Deir el Medine. See Askitopoulou et alii, 2002, 29; Koschel 1996, 160; Hall 1928.

102 It was also in the mortuary garland of the princess Nesi-Khonsu (22nd dynasty), see Loret 1892, 110, no. 191.

The red colour is caused by the anthocyanins, as e.g. mecocyanin, the main chemical constituent of the drug is the alkaloid rhoeadine,[103] with the highest concentrate in the white latex it exudes when a green part (especially the capsule/pod) of the plant is damaged. The seeds can be used like those of the opium poppy, although they are much smaller.

The *wanti*, or opium poppy might also have been known by the Egyptians of the New Kingdom, probably via Cyprus, or even through Crete[104], although the Mycenaean culture[105] also knew it well and ancient Egypt had good commercial contacts with them. Thus, the use of this poppy was theoretically also possible from the New Kingdom onwards. This last opportunity is confirmed by the Cypriot Base- Ring I juglets or „bilbils", which have the shape of an upside-down poppy head with part of the stalk. These appeared in Egypt during the 18th Dynasty,[106] and the opium product could be used either "by inhalation, as in today's pipes, or as a drink made of crushed poppy seeds with water, wine or beer (such as the *mekonion* juice), as these were the main liquid carriers used to introduce medicinal prescriptions into the body."[107] Later, in the Graeco-Roman period, the opium poppy was harvested in Egypt, and opium was also known.[108] The poppy pod's juice (*opos* from which the Latin *opium* is derived) could be used even without drying. Classical authors gave elaborate details of how to use it for insomnia, inflammation, pain relief, colic, diarrhoea and constipation, bladder pain and difficult urination, bronchial problems, erysipelas, scorpion sting or to extract splinters from the bone.[109] Egypt's Roman period physicians were thus familiar with the various ways of using opium, and based on Dioscorides (4.64-67) it is possible that they also used it for surgical inventions as a narcotic – which probably went back to much earlier experience, based on the bilbils, a renewed transmission might also happen in later time. Dioscorides also warned against overdose for analgesic and hypnotic effects, because it could lead to coma and even death. Concerning *špnn* nothing fatal is mentioned.

Wanti has a significant amount of morphine, and other narcotic agents

103 Other chemical constituents are e.g. papaverine, allocryptopine, berberine, coptisine, roemerine, sinactine, depside, meco-acids etc.

104 Julyan – Dircksen 2011, 75-76, Németh 2018, 60-61. He cites Behn 1986, 193-197, I–III. and Saunders 2013; Askitopoulou et alii 2002, 24.

105 Askitopoulou et alii 2002, 23-29.

106 E.g. Petrie 1890, 47; Shaw – Hagen 2014, 3-5. For typology and analysis see Merrillees 1968, 287-292; Boekhoud 2003, 297.

107 Veiga 2017, 212.

108 Pliny XIX,1,53 and XX,76 – The Poppy, http://www.perseus.tufts.edu/hopper/text?doc=Perseus:abo:ph i,0978,001:19#note-link402.

109 Julyan – Dircksen 2011.

such as codeine, papaverine, thebaine and noscapine, and is useful for a number of diseases and complaints. It is in addition analgesic, anodyne, aphrodisiac, astringent, bactericidal, calmative, demulcent, emollient, febrifuge, hypnotic, narcotic, sedative, sudorific and tonic.[110]

2.4.5. Assessment

Thus, by the New Kingdom the treatment of wounds had developed into a complicated procedure, which contained three main phases with a coherent, sequential series of aims: 1) cooling/anti-inflammatory, 2) extracting/astringent, 3) sedative /probably pain-relieving. This method seems to be, however, a relatively new achievement, replacing the meat and honey plus oil/fat application.

The plants used for wound repair during this period, which started from the beginning of the New Kingdom and as yet unidentified earlier period, were the acacia, sycomore, willow, tagart and Christ's thorn trees' leaves, the carob and fir/cedar, probably the foxtail sedge (*ḥny-t3*), with a final application of a preparation made very simply of linseed, sycomore leaves and probably poppy, and the final addition of other vegetable materials. All these drugs took into account the conditions of the wound and had beneficial effects on a faster healing process (absorbing exudate or bleeding and epithelial formation), and with the various antimicrobial agents which were used (without actual knowledge) and served to prevent contamination and the development of infection.

All these remedies were kept on the wound for a time by bandaging, which was at this time linen tissue. There existed textiles of different weaves, among the extant texts, we do not know any which were classified as being specifically for medical use. With the dressing Egyptians prevented desiccation of the wound edges, and kept the moisture level and temperature constant. The oil/fat content also served, even if only partially, as anti-adherent agent. The dressings had to be changed from time to time, to ascertain how the wound was developing, and to see when the new mixture had to be applied under the bandage. The bandages closed the wounds off from the outside world, preventing re-infection. All these protective effects provided favourable circumstances, thus promoting the healing process.

During the 18th Dynasty and the Ramesside period, other methods were also used or introduced, although we do not know at what precise date: prescriptions in the Ebers, Hearst, Berlin and London medical papyri attest, and – although the Egyptians adhered to tradition –, they continually

110 Dr. Duke's Phytochemical and Ethnobotanical Databases: https://phytochem.nal.usda.gov/phytochem/plants/show/1429?et= and https://phytochem.nal.usda.gov/phytochem/ethnoPlants/show/744?qlookup=Papaver+somniferum&offset=0&max=20&et=

updated their medical and surgical knowledge by adding newly learnt materials and methods – and not only during the New Kingdom and earlier periods, all over their history, even in Roman times, when according to Dioscorides Siculos a treatment going wrong – if did not follow tradition –, resulted in death penalty. In the next chapter we will enumerate a few other plants to show how considerable the changes were which one and half millenia could bring.

3. Materials for wound treatment in the Roman period

Looking at later notes on wound healing, we can find a number of earlier not attested vegetal materials. Various fruits and vegetables are primary sources of flavonoids, as we now know – and the ancients used them after observing these effects – they could be used as anti-inflammatory, and pain-relieving, healing agents. Phenolic acids, just like tannins, are also compounds found in plants.

Greek and Roman authors left a fairly abundant source of contemporary Egyptian medical knowledge. Dioscurides is one of the authors who uses plentiful examples drawn also from Egyptian sources. Before giving a detailed discussion of some of the newly introduced, or for earlier not attested way applied plants, here is a choice of his Egyptian medical plants, used for the treatment of injuries. ***Iris (Iris Germanicus)*** He says, for example, that the iris plant – in ancient Egyptian *nar* – was good for fistulas, and all sorts of sores and wounds as it fills them up with flesh (I.1.). When dried, its use was also suggested with balsamum especially for head wounds (I.18).[111] To draw and purge ulcers they prepared a special mixture, called *metopion* (I.71). ***Henna (Lawsonia inermis)***. The decoction of the henna plant could be applied as a poultice on hot inflammation, carbuncles and as a decoction for burns caused by fire. The leaves were chewed to cure ulcers in the mouth (I.124). ***The Chaste-tree (Vitex agnus castus),*** whose seeds and leaves – according to Dioscorides *sum* in ancient Egyptian – were used to heal dislocated joints and wounds (I.135). **Dates (*Phoenix dactylifera*)** when unripe, were rubbed on, and glued the wounds by an astringent effect (I.148). ***Egyptian lupin (Lupinus albus)*** was used for breaking carbuncles, and it was also suggested that it should be boiled in vinegar, and a warm pack of its decoction with rue and pepper was recommended for gangrene, wild ulcers and new scabs (II.132). ***Rape (Brassica napus)*** was known to be beneficial, when prepared with fenugreek and vinegar, not only for viper bite also for gout in the feet and joints, and foul or old ulcers; while with salt it was said to break carbuncles, and boiled and mixed with honey it was used for erosive gangrenes (II.146). ***Pomegranate (Punica granatum)*** The juice of the seeds was used as an

111 Dioscorides I.1. (Osbaldeston 2000, 1-2 and 24.)

astringent, and was said to be good for ulcers in various parts of the body, including those in gangrenous form or with abnormal growth (I.151), besides being a delicacy. Its flowers and rinds could be used to agglutinate bloody wounds (I.152, 153). ***Water lilies (Nymphaea caerulea)*** were revered as symbols of youth, regeneration and the sun, although the plant itself possesses analgesic effects and may have been consumed for that purpose on occasion.[112] ***Frankincense (Boswellia carterii)*** could also be effective as an after treatment, because it stops bleeding and extends fibrotic reaction.[113]

3.2. Garlic (Allium sativum L.)

According to Pliny (NH XX,23) and Dioscorides (II.182), an essential therapeutic agent for Graeco-Roman Egyptians was garlic. Dioscorides also distinguished a small and sweet Egyptian species (it was described in 1901 by Sickenberger as a subspecies[114]). They inform us that freshly crushed garlic was given to promote good sleep. It was used to relieve hoarseness, as a purgative and aphrodisiac, for relieving toothache and quinsy, as ear drops, raw for asthma, and was used also for wound management: for bruises the garlic was roasted in oil, or salted in vinegar and pounded. They even thought that it warded off snakes and scorpions, and mixed into honey, it healed dog-bites.[115] The effect of both internal and external applications can be easily explained by garlic's bactericide effect due to such components as alliin or allyl disulphide.[116]

Taking into account all the many applications, it is surprising that garlic (*ḥtn*)[117] is mentioned only in the Brooklyn ophiological papyrus, where it is part of a medicament against the bite of the horn viper (75b),[118] and it does not appear in any other known pharaonic prescription. It occurs more often in

112 Emboden 1989; Farrell et alii 2016; Prasad – Savithramma 2016.

113 Sahinfard et alii 2015; Moussaieff – Mechoulam 2009.

114 Loret 1904, 135.

115 Manniche 1989, 70-71: During the middle ages, Coptic people used a garlic-diet to clean the head and intestines (Coptic Ryland 4 papyrus). They used it also against psora (ZB22) and as a galactagogue (BA6). Herodotos (II.125) wrote that pyramid builders lived on garlic, radish and onion, this was a story made up by the Egyptian guide, who claimed to read it written on the pyramid.

116 See also Lemar 2005. For further details see Dr. Duke's Phytochemical and Ethnobotanical Databases: https://phytochem.nal.usda.gov/phytochem/plants/show/88?et= and https://phytochem.nal.usda.gov/phytochem/ethnoPlants/show/477?qlookup=Allium+sativum+&offset=0&max=20&et=

117 Loret 1904,141 transcribed it as *khidjana*.

118 It is attested also from the Roman period, e.g. Pliny, NH 20,50-57, Dioscorides II. 181. See also Germer 2008, 190-191.

offering lists – e.g. an offering-list of Ramses III mentions a huge amount.[119] It is possible that it had another ancient Egyptian name.

The botanical appearance of garlic is attested from the 18th Dynasty onward, both in Thebes and Saqqara,[120] which fits well with the syllable writing of the *ḫtn*-word, and the plant's presumed Asian origin – the New Kingdom is the period when the Egyptian Empire received significant Asian influences, partly through its Asian possessions and partly through Asian trade, and the importation of Asian craftsmen and materials, so it is easy to imagine that this plant was established in Egypt at this period, or during the previous Intermediate Period.

Its domestication, however, must go back a very long time, as the sterility of the flowers means that it can only be grown under cultivation. Thus, without a wild ancestor, its origin remains questionable.[121] This means that garlic might be present even earlier, together with the onion, which is attested by a bulb in a mummy from the 13th dynasty.[122] There is also an explanation given by Lefebvre, that the *ḥdw* might not only mean onion (*Allium cepa L.*), also garlic.[123]

3.3 Coriander (Coriandrum sativum).

In the case of coriander, both the seeds and the plant were used.[124] Dioscorides (3.71) mentions several ways it was used. It was thought to have cooling, stimulating, carminative, and digestive effects, and was also used as a tea for stomach and urinary ailments, including cystitis. He also suggested its use for creeping ulcers and for erysipelas, a streptococcal skin lesion, when applied with bread or polenta, it was also found to be good for carbuncles when mixed with honey and raisins. The bruised seeds could be applied to goitres and bone inflammation, also to expel worms, as was the pomegranate root. Dioscorides warns, however, that excessive amount is dangerous, as it clouds the mind – it seems that men used to apply it regularly to promote the creation of sperm – another beneficial property attried to it. During his time, the Egyptian name was *ochion*. (Possibly a Greek word?)

119 Loret 1904, 142-143.

120 Vartavan et alii 2010, 41; Manniche 1989, 70-71; Loret 1892, 37, no. 43. The actual remains might hint to nutritional use, as is attested in Herodotos II.125.

121 Brewer – Redford, Domestic plants, 67.

122 Vartavan et alii 2010, 40.

123 Lefébvre 1956, 102-103, note 10.

124 Interestingly, most of the finds are dated to the Roman period, although it appears from the 18th Dynasty at various sites. There is just one half seed listed from an earlier period: Vartavan et alii 2010, 86: Predynastic Adaima. See also GERMER 2008, 237-238.

In the New Kingdom papyri, coriander can be found with all probability under the name *šȝw*,[125] which is usually mixed to *materia* for internal treatments, or when used for external treatment: generally with the purpose of straightening the *mtw* system. Nevertheless, we can also find its application at a painful place (Eb243, H71) and once for binding a broken bone (H220), which may be a local treatment on an open wound. It seems that ancient Egyptians did not yet realise at this time how beneficial it could be for wound management, although they knew it from the predynastic period.[126] It contains many chemicals, among them coumarins, alanine, carotene, chlorogenic acid, aldehyde, geraniol, camphor, linoleic acid, palmitic acid, quercetin, stigmasterol, thiamine, iron, magnesium, nickel, potassium, sodium, zinc and vitamin B2 / riboflavin, B3 / niacin, and vitamin C. Thus, it has many beneficial effects, as e.g. it is detoxicant, stomachic, carminative, antispasmodic, anti-inflammatory, antimicrobial, a nerve tonic, sedative and antiseptic.[127]

3.4. Cumin (Cuminum cyminum L.)

Changes can be observed in the use of cumin. Although not native to Egypt, it was a locally produced spice in Egypt, common during the 18th dynasty and was also favourite spice to offer to the gods. For example, the seeds were placed in the tomb of Kha,[128] an architect, who was active from the reign of Thutmose III to Amenhotep III. Later, Ramses III gave a large amount of cumin – among his offerings – in honour of Ra of Heliopolis. As the homeland of *Cuminum Cyminum L*. is considered Turkmenistan, its introduction can be considered the result of early Asian relations.

The cumin, ancient *tpnn*, had a wide range of uses,[129] along with several other ingredients, without naming the part . It was typically applied for treating various forms of pain, fever, mucus and cough. Its external use is relatively wide in New Kingdom papyri: it occurs for the elimination of *wḥȝ.w* rash[130] (Eb111), purulent burns (Eb491, L61), exudated boils (Eb859, 861, 862), and swellings (Eb563 = H125, H136). In these cases, external local

125 Héthelyi – Győry 2013.

126 Vartavan et alii 2010, 86-87.

127 In Dr. Duke's Phytochemical and Ethnobotanical Databases: https://phytochem.nal.usda.gov/phytochem/plants/show/526?qlookup=Allium+sativum+&offset=0&max=20&et= and https://phytochem.nal.usda.gov/phytochem/plants/show/526?qlookup=Allium+sativum+&offset=0&max=20&et=

128 Germer 1979, 102, referring to Luigi Saffirio, in Donald Reginald Brothwell – Brunetto Anton Chiarelli, Population Biology of the Ancient Egyptians. London – New York: Academic Press 1973, 302. Finds in the tomb of Kha in Turin, Museo, Egizio; Vartavan et alii 2010, 90-91.

129 Győry 2017.

130 Westendorf 1999, 312-313.

treatment is typical, where its astringent and drying ability could have produced visible results.

In Roman times Pliny also mentions a Theban version,[131] and Dioscorides describes its domesticated and wild varieties, highlighting the good quality of the Egyptian one, and mentioning as only an external application, that when „*chewed and applied with honey and grapes it takes away bruises*" (III.68-69). Here an adverse process manifests in the plant use. Although the plant, when introduced, had a wide range of uses for wound management, it completely fell out of use, although its qualities remained famous. The cumin seed is rich in minerals and vitamins, and in various antioxidants and essential oils.[132] Due to its carvone content, it also has a disinfectant, mild bactericidal and fungicidal effect. It can be used effectively even in small amounts. It is also known in folk medicine worldwide for the treatment of scabies, injuries and ulcers.[133]

3.5. Mandrake (Mandragora officinarum L.)

It was brought into Egypt probably via Canaan and grown locally from the New Kingdom onwards, as the many representations of its fruit during banquet scenes, or of the plant represented in gardens, attest. We know an Egyptian name, *rrm.t* for it, which does not appear, however, in known medical texts. It might also have another name, as with its many medicinal properties, it was certainly part of ancient Egyptian medical *materiae*. It is said by Dioscorides to be called by the Roman Egyptians *aperioum* (IV.76), which may hint at its popularity there. Based on pharaonic representations, it had a symbolic meaning of love, connected perhaps to its supposed aphrodisiac effect, which might be in connection with the pleasant fragrance of the ripe fruit,[134] which

131 Plinius NH XIX, 47. We can also read in his opus (XX, 48, 163) that, similarly to the Ethiopian cumin, the Theban cumin was sprinkled under the bread in Alexandria and used in certain sauces. Later (XX.58) he adds, that it is also mixed with other spices.

132 Na, K, Fe, Cu, Mn, Mg, Se, Zn, P - vitamine A, B1 / thiamine, B2 / riboflavin, B3 / niacin, B6 / pyridoxine, B9 / folic acid, C, D2, D3, E vittamins – carotenes, zeaxanthin, lutein, quercetin, coumarin, catechin – cumene and cuminol / cuminaldehyde (4-isopropylbenzaldehyde), pyrazines, 2-methoxy- 3-sec-ylpyrazine, 2-ethoxy-3-isopropylpyrazine, and 2-methoxy-3-methylpyrazine. See e.g. Mnif – Aif 2015, 733-742, In Dr. Duke's Phytochemical and Ethnobotanical Databases: https://phytochem.nal.usda.gov/phytochem/plants/show/557?et= and https://phytochem.nal.usda.gov/phytochem/plants/show/557?et=

133 In Dr. Duke's Phytochemical and Ethnobotanical Databases: http://www.ars-grin.gov/cgi-bin/duke/ethnobot.pl

134 It is also referred to in the Song of the Songs 7,13. According to the 13-15th c. *Tacuinum Sanitatis (Maintenance of Health,* translation of the work of Ibn Ian, d. 1065) the fruit's fragrance alleviates headache and is effective against insomnia.

soon, however, becomes unpleasant. We learn from Dioscurides, that it induced sleepiness when mixed with alcohol, and a it was also given to those who were injured. In his words "*applied with polenta, the new leaves are good both for inflammations of the eye and ulcers*".[135] He also claimed that the root or leaves removed scars without ulcerating, and the root pounded into small pieces with vinegar was used for erysipelas, while with honey or oil for snake bites. Again, the bark of the root macerated in sweet wine served as anaesthetic during operations of amputation and cauterization, putting the patient to sleep for 3-4 hours, and rendering them insensible of anything. This use was known from the time of Hippocrates.[136] According to Roman authors, it was one of the most important pain relievers and sedative drugs of antiquity, and then of Byzantine medicine.[137] It needs, however, thorough research to determine when this praxis started in Egypt.

Dioscorides also draws attention to the fact that too much drink kills – as modern science has confirmed: through its alkaloids, especially atropine, mandragorine, apoatropine, hyoscyamine, belladonnine, scopoletin, scopolamine, cuscohygrine and tropanic.[138] These antimuscarinic, psychoactive, highly toxic drugs paralyse breathing. They are also deliriant, hallucinogenic tropane alkaloids, which explain the plant's narcotic character. It might indeed have an aphrodisiac effect.[139]

3.6. Aloe vera (Aloe barbadensis Miller)

During the Roman period, *Aloe vera* was widely used throughout the empire. And indeed, this plant speeds up the wound healing process, slows down bleeding, disinfects and helps skin regeneration. Dioscorides (III.25) writes that the plant grows at several places in the Eastern Mediterranean and Arabia, the juice can be produced only in India where it grows abundantly and thickly. It was imported to the Roman Empire, and was used in many treatments of different diseases by several methods of application or consumption. Only a few applications are mentioned for the surface of the body. When, for instance, it is "*sprinkled on dry, it heals wounds, and brings boils to a scar and represses them*"[140] – he explains. We also learn that besides the Indian, the other varieties could be used to close open cuts, sores and wounds when the leaves were applied pounded in small pieces.

135 Translation by Osbaldeston 2000.

136 Mion 2017; Randolph 1905.

137 Ramoutsaki et alii 2002; Scarborough 1984; Rätsch 2005, 796-7; Diaz-Arnesto 2010.

138 In Dr. Duke's Phytochemical and Ethnobotanical Databases: https://phytochem.nal.usda.gov/phytochem/plants/show/1252?et= .

139 Fleisher – Fleisher 1994; Mou et alii 2019.

140 Translation by Osbaldeston 2000.

It does not seem to be characteristic for Egypt, however, as Dioscorides does not mention any Egyptian name. Neither can we trace any plant remains among the vegetal materials there.[141] In ancient Egyptian texts, there is a name: *ḫ.t-ʿw3*, which can be translated as "*foul wood*". It is said to be *Aloe vera* by Ebbell and Lefebvre, according to the drug-dictionary, this identification is not acceptable:[142] The *ḫ.t-ʿw3* is used typically for eye-treatment (13 prescriptions), once for cooling the head (Eb259), once for nasal drip (Eb418), and in a prescription known in two varieties for strenghtening the *mtw* (Eb627=H96). None of these methods are characteristic for *Aloe vera* in classical antiquity's sources or later medical practice.

Today it is promoted for the management of various health issues, among them burns, ulcers, skin diseases and allergies.[143]

3.7. Essential oils

In ethnobotany and aromatherapy, essential oils, produced from plants with distillation, are widely used. The process was used in Graeco-Roman temples, we do not know when it started. They are often components in perfumes, cosmetics and soaps and we can also find a number of essential oils that have much potential for wound treatment. Some of them can be traced back to antiquity as attested for instance by Diocorides. Lavender (*Lavandula angustifolia*), Greek *stoichas*, has been used mixed with antidotes, and had a special Egyptian name, the *suphlo* (Dioscorides III.31). Its oil has antibacterial and antifungal characteristics. Chamomile (*Matricaria chamomilla*), popular already in Roman times (III.154), is still used in this way. Its oil, when added to conventional dressings, greatly reduces the weeping and drying associated with dermabrasion wounds.

Today the potential of essential oils is more widely known, with modern technologies identifying plants from all over the world. Tea tree (*Melaleuca*

141 Vartavan et alii 2010 does not contain any data, not even the name.

142 Deines-Grapow 1959, 404-405. Lise Manniche (1989, 72) follows the *Aloe vera* identification, illustrating it also by a picture which is frequent in ancient Egyptian garden scenes. It might be indeed the picture of the *aloe*, the same picture is often represented together with the fruits, which identifies it clearly with the mandrake. The Copts used the aloe following the Graeco-Roman medical tradititon. According to Manniche, the Assyrian herbal named it *sibaru*, from which the modern Egypian-Arab name, *sabir*, might originate. As the plant is not native to Egypt, and seems not to be cultivated in Egypt, an aloe-preparation might be imported, and we might expect to find it under another name.

143 Hekmatpou et alii 2019; In Dr. Duke's Phytochemical and Ethnobotanical Databases: https://phytochem.nal.usda.gov/phytochem/plants/show/97?qlookup=aloe+vera&offset=0&max=20&et= and https://phytochem.nal.usda.gov/phytochem/plants/show/97?qlookup=aloe+vera&offset=0&max=20&et=

alternifolia) oil for example has antiseptic, antibacterial, antifungal, and anti-inflammatory properties in chronic wound healing. Thyme *(Thymus vulgaris)* essential oil, extracted by steam distillation from the plant's leaves, stems, and flowers, is considered to reduce the quantity of nitric oxide produced in response to the burns and also aids wound healing. Ocimum oil *(Ocimum basilicum L.*) from the leaves will affect the healing of full-thickness excisional and incisional wounds.

4. Modern clinical wound dressing

Today there are four basic principles involved in choosing an optimal dressing for a wound. If a wound proves to be dry or desiccated, it will need hydration. If a wound produces excessive exudates, the fluid needs to be absorbed. If a wound has necrotic tissue or evident debris, it will need debridement. Lastly, if a wound is infected, it needs to be treated with the appropriate antibacterial agent. A dressing ideally provides a level of protection mimicking the epithelium's function.

All interactive dressing materials have the ability to manipulate the wound environment.[144] Mull and fleece sheets are today made of 100 percent cotton and are ideal for cleaning, wiping, and winding. Gauze is inexpensive, reliable, available, and highly absorbent. Gauze comes in woven and nonwoven forms, with the latter made of synthetic fibres pressed together and having a greater absorbency. It is highly permeable and non-occlusive and can be used as a primary or secondary wound dressing. It is commonly used on both infected and non-infected wounds, large or irregularly shaped wounds. The average nursing time and costs per patient may be significantly affected, as this dressing type often requires dressing changes three times a day.

Transparent film dressings are thin flexible transparent sheets with adhesive backing, composed of polyurethane or co-polyester. They are permeable to water vapour, oxygen, and carbon dioxide impermeable to bacteria and water. They provide a moist healing environment and promote autolytic debridement.

Foam dressings are made from a polyurethane base and are permeable to both gases and water vapour. Their hydrophilic properties allow high absorptive properties while they also provide thermal insulation. These highly versatile dressings are indicated for wounds with moderate-to-heavy exudates, granulating or slough covered partial and full-thickness wounds.

Hydrogels are complex hydrophilic organic cross-linked polymers, consisting of an 80%–90% water base. They can absorb a minimum amount of fluid by swelling, they also can donate moisture to a dry wound, thereby facilitating autolytic debridement and maintaining a moist wound environment

144 Sood et alii 2014; Wright et alii 1998.

that is thermally insulated. They have also been shown to promote granulation and epithelialization and reduce the temperature of a wound bed. They can be used on a variety of wounds including pressure ulcers, partial and full thickness wounds, and vascular ulcers.

Hydrocolloid dressings contain an inner layer that is self-adhesive, gel forming, and composed of hydrophilic colloid particles such as carboxymethylcellulos e (CMC), pectin, gelatine, or an elastomer. This layer absorbs exudates and comes in a paste, powder, or granule form. They are indicated for partial and full-thickness wounds with low-moderate exudates, granular and necrotic wounds, minor burns, and pressure ulcers. They must be avoided in clinically infected wounds.

Alginates are yet another dressing for clinicians to use in highly exudative wounds. They contain alginic acid from seaweeds and are covered in calcium/sodium salts. These dressings are highly absorbent, non-adherent, biodegradable, contain non-woven fibres derived from brown seaweed, and may contain controlled-release ionic silver. When placed on a wound, sodium and calcium ions interact with serum to form a hydrophilic gel. Alginates are useful because they allow formation of a moist wound environment, are highly absorptive, and can prevent microbial contamination.

NPWT was developed in the early 1990s and since has become familiar to any practitioner dealing with wounds. The principle of NPWT is its ability to create micro deformation of cells. One of its benefits is stimulation of VEGF by creating an area of relative hypoxia, as well as stimulation of other proliferative cytokines such as TGF-band basic FGF (bFGF).[145] NPWT also helps to keep wounds moist, relying on a semi occlusive dressing, which prevents desiccation of wound edges. The suction apparatus also aids in the removal of fluid around the wound, limiting wound oedema and maceration, which limits inflammation in chronic wounds.[146] This medical device involves the application of a wound dressing through which negative pressure is applied and tissue fluid drawn away from the area. A key benefit with NPWT is that it minimizes dressing changes, typically, 3 times per week.[147]

5. Conclusions

The Edwin Smith surgical papyrus, dated to the beginning of the 18th Dynasty, is one of the most significant ancient Egyptian medical finds to date, unique in its detailed description of surgical cases. The protocols contain a great many details of healing procedures, which give us the opportunity to study the methods and concepts of ancient wound management. These are, however,

145 Lu et alii 2011.

146 Heit et alii 2012.

147 Erba et alii 2011.

documents from a very different time and culture, which means that the medical system, way of expressing issues and the vocabulary is significantly different from our perception, which in turn means that we can't always understand them or precisely interpret them. Moreover, they contain parts which were outdated even in antiquity, when they were copied, because concepts had evolved – although slowly, continuously. Additionally, we no longer have access to the ancients' mental processes, especially when symbolism, mysticism, or spiritual values are involved. They experienced different outcomes of the same cases with the same prescription, could not find a physical explanation, thus could only look at the divine world. This also confirmed their conviction, that they also needed religious acts for a successful healing act. Thus, they not only treated the physical features, also kept connection to the supernatural world, which they believed to contrie to success. Surprisingly, this side is, however, missing in the Smith surgical papyrus. Only the rational side is written down, the result of facts, which are based on experiments. These were studied in this article, in an attempt to understand and link their knowledge to modern terminology.

By analysing in detail the phytotherapic side of wound management in the Smith papyrus, we can conclude that ancient Egyptians purposely chose the appropriate plants for each phase of the treatment. Moreover, the standardised compositions of the poultices point to the idea that they must also have taken into consideration the interaction of the various materials. Today we have several types of ready-made bandages for wounds. We do not know to what extent their bandages were the result of a degree of preparation, or what was the regulation and choice for their usage for a given surgical state, we learnt that the *ftt* could be an impregnated fibre, eventually made into a tissue. There were some poultices, which were most probably tied to the body by linen tissues. We should suppose that these were simple, untreated canvas, woven in different thread densities and used in various sizes, as nowhere is there any instruction about them.[148] They were irrelevant for the healing process, and just kept the medicament in place.

Thus, they used only rarely ready-made special bandages, and instead of impregnating the canvas, the emphasis was on the poultices and ointments, which contained material formulated with ingredients of proven efficacy in healing and also in preventing further infections. Their knowledge in composing them for bandaging wounds are still amazing today. It reflects the fact that the wound healing process was closely monitored and the active ingredients were chosen on this basis. Their work set the basis for current medical research. The compositions show that mineral and animal materials were used as well, when they were required. Ancient Egyptian physicians relied heavily on natural

148 Original ancient Egyptian dressing was found by CT in a child mummy, see Panzer et alii 2021.

medicines, particularly on medicinal herbs. We can confidently claim that the ancient Egyptians laid the groundwork for natural healing in this respect.

Many of the skills and information acquired by them have been passed down to today's physicians through classical and Middle Eastern authors or by oral tradition among people in Egypt and in the Near East, also by the physicians' practice. We could also point to the fact that ancient Egyptian medicine was not a rigid, permanently frozen knowledge; It changed slowly, steadily, as it can clearly be demonstrated through their plant usage comparing the earlier and New Kingdom period's wound care, and the notes of the Roman authors. Egyptian doctors were eagerly looking for better and better solutions, in both the choice and usage of the *materia medica* and the methods applied.

Beside the precise methodology and drug choice, one of their most significant achievements was the prophylaxis, which allowed disease prevention or spread. This mainstay of Egyptian medicine is a strong foundation for the advancement of modern medicine.

Abreviations

Wb = Adolf Erman - Hermann Grapow, Wörterbuch der ägyptischen Sprache I-VI. Berlin: Akademie-Verlag 1926–1961.
TLA = Thesaurus Linguae Aegyptiae (https://aaew.bbaw.de/tla/servlet/BwlSearch?u=guest&f=0&l=0)
HW = Hannig, Rainer, Großes Handwörterbuch, Ägyptisch-Deutsch, Hannig-Lexica 1. Mainz: Philipp von Zabern 2000.
Sm = EdwinSmith papyrus
Eb = Ebers papyrus
Brl = Berlin medical papyrus

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