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Kidney Diseases in the Treatise *Dynameron* of Aelius Promotus (2nd Century AD) A Comparison with Dioscorides and Nikolaos Myrepsos

Abstract. *Dynameron* is a medical treatise from the 2nd century AD, written in Greek by an Alexandrian physician named Aelius Promotus. A copy made in Sicily during the 16th century is kept in the Marciana Library of Venice (Codex gr. Z. 295). In 130 chapters, *Dynameron* contains 870 recipes for the treatment of various diseases. Regarding the kidneys, Aelius describes 32 recipes with herbal (59), animal (6) and mineral (1) ingredients, with diuretic, spasmolytic, analgesic, or antiseptic properties, suitable for treating nephrolithiasis, strangury, dysuria and renal inflammations. Several diuretics of Aelius Promotus are similar to those found in *De Materia Medica* of Dioscorides (1st century AD). On the other hand, all of them are also included in the treatise *Dynameron* of Nikolaos Myrepsos, written in the 13th century AD. When the recipes are evaluated as a whole, it is evident that Aelius Promotus was a competent practising physician in a city with a glorious tradition in medicine and sciences.

Keywords: Alexandrian medicine, Aelius Promotus, *Dynameron*, Dioscorides, Nikolaos Myrepsos

Introduction

In the Hellenistic and late Roman eras, between 288 BC and 300 AD, Alexandria was an important financial and cultural centre, gathering famous scientists and physicians from many other places. A central role was played by Ptolemy II Philadelphus (285–246 BC), who established the Library of Alexandria and allowed and encouraged anatomical studies of the human body, as also did his successor Ptolemy III the Benefactor (246–221 BC). Many archaeological findings show the existence of a large variety of elaborate surgical instruments[1],

[1] J.S. Milne, *Surgical Instruments in Greek and Roman Times, with Illustrations*, Oxford 1907, p. 14.

made mainly of bronze[2]. By the end of the so-called Imperial Rome (27 BC to AD 476), religious and social upheavals led to the gradual decline of the Alexandrian economic and cultural life, and eventually to the destruction of the famous Library[3].

Many physicians lived and worked in Alexandria or visited the city. Some of them had written treatises on various diseases, therapies, or surgical and orthopaedic procedures. As a rule, these manuscripts were lost and only fragments can be found in the treatises of later authors, whenever they acknowledge their sources. Galen (c. 129–216 AD) practised medicine from a very early stage of his life in his home town Pergamum and, before going to Rome, in order to complete his medical education[4], he visited Smyrna, Corinth and Alexandria[5].

One of the physicians who lived and worked in Alexandria was Aelius Promotus, who wrote a large treatise titled *Dynameron*, containing detailed recipes for the treatment of numerous diseases. A copy of *Dynameron* was made in 1470 by a monk named Cosmas, in a Sicilian monastery close to Messina. This copy was made on the order of the cardinal bishop of Sabina Bessarion, a Greek scholar and clergyman, who donated his collection of manuscripts to the Senate of Venice. Promotus' *Dynameron*, kept today in the Marciana National Library (Cod. gr. Z. 295), has been edited by Daria Crismani[6].

Each recipe of *Dynameron* describes the composition, the preparation and the administration of a remedy, usually containing many ingredients. Composite remedies were common among the followers of the Empiric school, although in the text there are also easily recognizable influences from other theoretical sects, especially the Methodic school[7].

This article presents and discusses for the first time the parts of *Dynameron* referring to remedies for kidney diseases. Emphasis has been given to diuretics, which are examined in comparison with *De Materia Medica* of Dioscorides (1st century AD)[8], as well as with *Dynameron* of Nikolaos Myrepsos (13th century AD)[9].

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[2] R. Jackson, S. La Niece, *A Set of Roman Medical Instruments from Italy*, Brit 17, 1986, p. 119–167.

[3] R. MacLeod, *Alexandria in History and Myth*, [in:] *The Library of Alexandria*, *Centre of Learning in the Ancient World*, ed. idem, New York–London 2000, p. 1–18; L. Casson, *Libraries in the Ancient World*, New Haven Connecticut 2001, p. 31–47.

[4] *Galeni in Hippocratem de natura hominis commentarius*, [in:] *Claudii Galeni Opera Omnia*, vol. XV, ed. C.G. Kühn, Leipzig 1828, p. 136.

[5] V. Nutton, *The Chronology of Galen's Early Career*, CQ 23, 1973, p. 158–171.

[6] Elio Promoto Alessandrino, *Manuale della salute*, ed. D. Crismani, Alessandria 2002 [= Hel, 9] (cetera: Aelius Promotus, *Dynameron*).

[7] V. Nutton, *Ancient Medicine*, London–New York 2013, p. 381–383.

[8] *Pedanii Dioscoridis Anazarbei De Materia Medica*, *libri V*, vol. I–III, ed. M. Wellmann, Berolini 1906–1914 (cetera: Dioscorides, *De Materia Medica*).

[9] The title *Dynameron* is also found in the well-known medical book of Nikolaos Myrepsos, written in the middle of the 13th century. In the present article, we have used the following critical edition:

The author and the manuscript

Little is known about Aelius Promotus and his life. At the very beginning of the treatise *Dynameron*, it is stated that the text is of Aelius Promotus of Alexandria[10], indicating that the author was born in Alexandria. Although not clearly stated in the manuscript, Alexandria also seems to have been the place where he lived and practised medicine. Apart from *Dynameron*, Aelius Promotus also wrote a short treatise with the title Ἰατρικά, φυσικὰ καὶ ἀντιπαθητικά which has been edited by Max Wellmann[11]. Moreover, an anonymous manuscript with the title Περί ἰοβόλων θηρίων καὶ δηλητηρίων φαρμάκων has also been considered as of his authorship[12].

The *Dynameron* of the Marciana Library (15th century) consists of 79 folia. Another manuscript from the 16th century is in the Library of the Holy Royal Monastery of El Escorial in Spain (Real Bibliotheca, manuscript code FI.02) and consists of 52 folia. Finally, there exists a fragment of an older (14th century) manuscript, which is kept in the Vatican Library (Bibliotheca Apostolica Vaticana, manuscript code Vat. gr. 0299) and consists of only two folia, that is, it covers only four pages[13].

Dynameron has the form of a practical manual of therapeutics, with 870 different recipes for the treatment of 130 pathological conditions. Based on historical data, one can conclude that Aelius Promotus practised medicine during the first half of the second century AD. In *Dynameron*, he acknowledges three other physicians as his sources: Soranus (recipe 6, Chapter 3)[14], Menemachus (recipe 1, Chapter 19)[15] and Hermogenes (recipe 4, Chapter 63)[16]. At least Soranus of Ephesus lived and worked in Alexandria during the turn of the first and second century[17]. Additionally, the author mentions that one recipe for the treatment of respiratory diseases had been used by the troops of Emperor Trajan (recipe 8 in Chapter 35). We know that Trajan (*Marcus Ulpius Traianus*) died in 117 AD, while still in charge of a military expedition against Parthians in the northern Mesopotamia[18]. This recipe should be considered a *terminus post quem* for the time this

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Nikolaos Myrepsos, *Dynameron. Critical Edition*, vol. I–II, ed. I. Valiakos, Heidelberg 2020 (cetera: Myrepsos, *Dynameron*).

[10] Aelius Promotus, *Dynameron*, p. 40.

[11] Aelius Promotus, *Ἰατρικά, Φυσικὰ και Ἀντιπαθητικά*, ed. M. Wellmann, SKBAWM.HC 2, 1908, p. 772–777.

[12] *Der Traktat περί τῶν ἰοβόλων θηρίων καὶ δηλητηρίων φαρμάκων des sog. Aelius Promotus*, ed. S. Ihm, Wiesbaden 1995 [= SeGr, 4].

[13] Aelius Promotus, *Dynameron*, p. 17–24.

[14] Aelius Promotus, *Dynameron*, p. 46.

[15] Aelius Promotus, *Dynameron*, p. 80.

[16] Aelius Promotus, *Dynameron*, p. 154.

[17] *Soranos Ephesios*, [in:] *Suidae Lexicon*, ed. I. Bekker, Berlin 1854, p. 1003.

[18] J. Bennett, *Trajan Optimus Princeps*, Abingdon 1997, p. 183.

particular information was added to the text of *Dynameron*. Galen, on the other hand, in his book on *Synthetic remedies*, describes a collyrium for trachoma referring to it as a *recipe of Aelius*[19]. Indeed, in *Dynameron* there are several ophthalmological preparations with ingredients similar to the ones described by Galen. Therefore, the hypothesis that the *Aelius* mentioned by Galen was indeed Aelius Promotus seems plausible, as also seems the assumption that the two men had met and exchanged views on medical matters. As already mentioned, Galen visited and spent some time in Alexandria before returning to Pergamum at the age of 37 (around 165 AD), according to his own writings[20]. This is a *terminus ante quem* Promotus had written down at least some recipes pertaining to ophthalmological diseases.

Aelius used the Greek language of late antiquity, known as *Biblical Greek* or Κοινή Ἑλληνική (*Koinē Hellēnikē*), the *lingua franca* of much of the Mediterranean region and the Middle East, following the expedition of Alexander the Great[21]. The word *Dynameron* is related with the word *dynameis* (δυνάμεις: actions or properties of medicinal products), where also the modern term *Pharmacodynamics* originates from.

Recipes in *Dynameron* referring to kidney diseases[22]

Aelius Promotus describes in *Dynameron* 32 different recipes of nephrological interest, which are found in the following 3 chapters:

- ***Chapter 15:*** *To patients with kidney diseases* (Πρός νεφριτικούς).
- ***Chapter 16:*** *To patients with nephrolithiasis and diuretics* (Πρός λιθιῶντας καί διουρητικά).
- ***Chapter 17:*** *Diuretics* (Διουρητικά).

The recipes of each chapter are presented in ascending numerical order. A standard recipe includes: (a) the pathological condition for which it is indicated; (b) all required ingredients and excipients, with their respective weight or volume units; (c) instructions for the proper mixing of the ingredients for the formulation of the medicine; (d) dosage, along with directions for administration and (e) incidental data related to comments of Aelius on efficacy and prognosis. Approximately the same structure is found in the recipes of *Corpus Hippocraticum*, as well as in early medieval recipes[23].

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[19] *Galeni De compositione medicamentorum secundum locos I–VI*, [in:] *Claudii Galeni Opera Omnia*, vol. XII, ed. C.G. Kühn, Lipsiae 1826, p. 730.

[20] V. Nutton, *Ancient Medicine*…, p. 160.

[21] G. Horrocks, *Greek. A History of the Language and its Speakers*, New York 2010, p. 80–83.

[22] The numbering of chapters and recipes is according to: Aelius Promotus, *Dynameron*.

[23] L. Totelin, *Hippocratic Recipes. Oral and Written Transmission of Pharmacological Knowledge in Fifth- and Fourth-Century Greece*, Leiden–Boston 2009 [= SAM, 34], p. 48.

For the reason of simplicity, only the names of the ingredients are mentioned in the recipes cited here, without the respective weight or volume units. All ingredients applied in the formulations of these recipes are presented in Table 1, with comments on their probable scientific name[24], as well as on their pharmacological properties[25].

Chapter 15. *To patients with kidney diseases.*

1. Patients with kidney diseases, suffering from empyemas, gastric ailments and recent or chronic catarrh.
Ladies' seal, *Crocus*, *Torchwood*, *Myrrh*, *Spikenard*, *Dog rose*, *Storax*, *Camel's hay*, *Frankincense*, *Costmary*, *Apple*, *Raisins*, *Wild carrot*, *Honey*, *Sweet wine*. Give with honey diluted with water, or with sweet wine, a quantity equal to an Aegyptian bean or to a hazelnut.

2. Patients with kidney diseases and difficulty in micturition (strangury).
Costmary, *Parsley*, *Black pepper*, *Sweet wine*. Crush and dilute in sweet wine and give the half with a probe.

3. Kidney diseases.
Wild carrot, *Anise*, *Cucumber*, *Celery*, *Alexandrian senna*, *Bay laurel*, *Giant fennel*, *Alpine valerian*. Dilute with water and make lozenges having the size of the seed of lupine. Give on an empty stomach, at bedtime, with up to three cups of water.

Chapter 16. *To patients with urolithiasis and diuretics.*

1. Patients with urolithiasis, from my own experience.
Bay laurel, *Black pepper*. Give a large spoonful, with honey diluted in warm water.

2. Diuretic for patients with urolithiasis, or difficulty in micturition.
Henbane, *Hemlock*, *Opium poppy*, *Celery*, *Cucumber*, *Pine cones*, *Mallow*, *Almonds*, *Walnuts*. Give until improvement.

3. Diuretic for patients with urolithiasis.
Myrrh, *Wild carrot*, *Crocus*, *Bitter almonds*. Give to drink with water.

4. Suitable for dissolving kidney stones.
Bay laurel. Boil pieces of bark of bay laurel in water, until it evaporates to one third. Give to drink. It is very effective.

5. To those who urinate blood.
Myrrh, *Cabbage*, *Opium poppy*. Dilute with sweet wine. Make pills and give to the patient.

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[24] B. Langkavel, *Botanik der spaeteren Griechen vom Dritten bis Dreizehnten Jahrhundert*, Berlin 1866; J. André, *Les noms des plantes dans la Rome antique*, Paris 1985; *The Plant List*, http://www.plantlist.org [30 X 2022].

[25] P. Schauenberg, F. Paris, *Guide des plantes médicinales*, Neuchâtel 1977.

6. Breaking down the stones of the kidney and expelling them.
Baldmoney, *Purple betony*, *Parsley*, *Rock foil*, *Gromwell*, *Flax seed*, *Wild carrot*, *Skirret*, *Jews'-stone*, *Black pepper*, *Wine*, *Honey*.

7. Suitable for urolithiasis, in order to urinate the stone.
Soapwort, *Rhubarb*, *Caper bush*, *White wine*. This remedy dissolves completely the kidney stones in eight days.

8. Provokes the urination of the kidney stones.
Turtle dove, *Wine with honey*.

9. Other similar.
Alexandrian senna, *Myrrh*, *Frankincense*, *Wild carrot*, *Anise*, *White opium poppy*, *Nut grass*, *Jews' stone*, *Parsley*, *Crocus*, *Bitter almonds*, *Asarabacca*, *Storax*, *Black pepper*, *Honey*, *Wine*. Dilute with warm water and honey. Give a dose the size of an Aegyptian bean with wine to feverless patients, and with water to those with fever.

10. Other similar.
Mullein. A handful of bark from the root of verbascum should be crushed with a wooden mortar and pestle. Then treat with hot water and filter. Give the patient to drink for nine days, then stop for one or two days and then give to drink again for eleven days. After drinking, the patient must take a long walk and have something to eat from time to time. It is very important to note that the patient and the physician should not have on them any iron items, neither in the fingers nor in the shoes or elsewhere. In addition, take care that the root of verbascum is taken from the earth without any iron instrument, and also that once it is taken it should not touch the earth again. This remedy I have used successfully many times.

11. Another remedy for urolithiasis, tested with success by me.
Cicadas, *Parsley*, *Ladies' seal*, *Wine (aromatic)*. Give a spoonful of aromatic wine (containing pepper and honey), together with crushed cicadas, which should be collected when the vines are ripe and should be dried up in the shadow. Collect and dry many cicadas, so you may have them whenever you need them.

12. To patients who urinate sand.
Alpine valerian, *Parsley*, *Black pepper*, *Rhubarb*, *Iris*, *Cabbage*, *Wine (aromatic)*. Give a small spoonful with aromatic wine or wine with honey.

13. Other remedy, for expelling stones, for nephropathies and for urination.
Alexandrian senna, *Celery*, *Myrrh*, *White pepper*, *Frankincense*, *Jews' stone*, *Wild carrot*, *Anise*, *Storax*, *Opium poppy*, *Nut grass*, *Spikenard*, *Bitter almonds*, *Sweet flag*, *Asarabacca*, *Cucumber*, *Honey*, *Sweet wine*. A dose the size of a fava bean is given with honey diluted in water. To feverless patients can be given together with a cup of sweet wine.

14. Other. It breaks and expels stones.
Scorpions (mottled), *Wine (aromatic)*. Burn down scorpions and mix up the ashes with diluted sweet wine. Give a small spoonful and you will be amazed with the results.

15. Other.
Oreganon. Boil oreganon in water, until it condenses to one third. Give a cup of the decoction, and the patient will urinate the stones.

Chapter 17. *Diuretics.*

1. *Cucumber*, *Celery*, *Liquorice*. Boil equal parts in water and give to the patient. You may observe the colour of blood in the urine.

2. Other. To patients with difficulty urinating.
Celery, *Anise*. Boil together and give to the patient to drink.

3. Other. To patients with difficulty urinating.
Thyme, *Bay laurel*, *Hyssop*, *Oreganon*, *Parsley*, *Black pepper*, *Chicken egg (raw)*. Cut, mix up and give together with a raw egg.

4. Other. A good diuretic, for patients with difficulty urinating.
Thyme, *Fennel*, *Bay laurel*, *Wine*, *Chicken egg*. Trim, mix up and give with egg, or diluted wine.

5. Other. To patients with painful urination (dysuria).
Parsley, *Black pepper*, *Wine (sweet)*. Give a small spoonful with sweet wine, in the morning and the evening.

6. Other. For those seriously ill, men and women, who suffer from difficult and painful urination.
Costmary, *Honey*, *Water*. Give the patient to drink a cup with a mixture of these. Ask for your payment beforehand.

7. Diuretic with the name "diabetes" (διαβήτης).
Alexandrian senna, *Cyclamen*.

8. Other.
Crocus, *Liquorice*, *Wine*. Dissolve in wine and make lozenges. Give one at a time, with wine.

9. Other. To patients with painful urination (dysuria). It is also digestive.
Myrrh, *Black pepper*, *Castoreum*. Give a mixture of equal parts, on demand.

10. Other. To patients with strangury.
Celery, *Alexandrian senna*, *Thyme*, *Iris*, *Anise*, *Black pepper*, *Oreganon*, *Water*. Give as a warm water solution.

11. Other. To patients with strangury. It is effective in expelling stones.
Black pepper, *Jews' stone*, *Spikenard*, *Parsley*, *Cardamom (green)*, *Grass*. Give a decoction, together with wild grass (agrostis).

12. Other. To patients with dysuria.
Parsley, *Figs*, *Water*, *Honey*. Boil in water and give with wine and some honey.

13. Other.
Nut grass, *Wine diluted with water*. Give a small spoonful, together with diluted wine. The patient will urinate immediately.

14. Other. To patients with dysuria.
Fennel, *Asarabacca*. Boil together and give the patient to drink.

A closer examination of the classification of the recipes above, as they have been grouped together by Aelius Promotus, reveals an overlap in both the ingredients as well as in indications. Thus, the 2nd recipe of Chapter 15, describes a diuretic medicine indicated for patients with kidney disease and strangury. On the other hand, in Chapters 16 and 17, the recipes referred to as *diuretic* are intended mainly for nephrolithiasis, as can be deduced by the indications of difficult urination (strangury) and painful urination (dysuria). It is probable, that Promotus describes with the adjective *diuretic* recipes facilitating the flow of urine rather than an increased volume of urine, as the term implies in modern medicine.

Table 1

Ingredients in the recipes of *Dynameron* referring to kidney diseases

Name	Description	Properties
Alexandrian senna – Κασία	*Senna* (*Cassia*) *alexandrina* (*Fabaceae*).	Laxative and fungicide.
Almonds – Κάρυα Θάσια	*Amygdalus communis* or *Prunus dulcis* (*Rosaceae*).	Source of minerals and other useful nutrients. Mild purgative.
Alpine valerian – Νάρδος [Κελτική]	*Valeriana celtica* or *Valeriana officinalis* (*Caprifoliaceae*).	Strong diuretic. Sedative, anxiolytic, analgesic and spasmolytic.
Anise – Ἄνισον	*Pimpinella anisum* (*Apiaceae*).	Carminative (reducing flatulence) and expectorant.
Apple – Μῆλον	*Pyrus malus* (*Rosaceae*) (the fruit).	Digestive and diuretic.
Asarabacca – Ἄσαρον	*Asarum europaeum* (*Aristolochiaceae*) (the root).	Diuretic and emmenagogue.

Name	Description	Properties
Baldmoney – Μῆον	*Meum athamanticum* (*Apiaceae*) (the root).	Antiseptic and antitussive. Used as a diuretic.
Bay laurel – Δάφνη	*Laurus nobilis* (*Lauraceae*) (the dried fruit or the bark).	Digestive (the essential oil of the fruit and the leaves). Used in strangury.
Bitter almonds – Κάρυα [πικρά]	*Amygdalus communis var. Amara* (*Rosaceae*). The nuts (bitter almonds).	They contain amygdalin, which eventually yields glucose, benzaldehyde and traces of hydrocyanic acid.
Black Pepper – Πέπερι [μέλαν]	*Piper nigrum* (*Piperaceae*).	Orexigenic. Irritant for the mucosa of the alimentary and the urogenital system.
Cabbage – Κράμβη [σπέρμα]	*Brassica spp.* (*Brassicaceae*) (the seeds).	Mild laxative.
Camel's hay – Σχοινανθός	*Cymbopogon schoenanthus* (*Graminaceae*) (the essential oil).	Diuretic and antiseptic.
Caper bush – Κάππαρις [ῥίζα]	*Capparis spinosa* (*Capparaceae*) (the root).	Diuretic, emmenagogue and carminative.
Cardamom (green) – Καρδάμωμον	*Elettaria cardamomum* (*Zingiberaceae*).	Expectorant and gastroprotective.
Castoreum – Καστόριον	Secretion of the perineal glands of European beaver *Castor fibre* (*Castoridae*).	Anti-inflammatory.
Celery – Σέλινον [κηπαίον]	*Apium graveolens* (*Apiaceae*).	Diuretic, especially the seeds.
Chicken egg – Ὠιόν [ῥοφητόν]	The raw egg of *Galus galus* (*Phasianidae*).	A source of protein.
Cicadas – Τέττιγες	Dried cicadas (*Tibicen plebejus*, *Cicadidae*), collected during summer.	Possibly, a source of protein.
Costmary – Κόστος	*Saussurea lappa* (*Asteraceae*).	Digestive, astringent and antiseptic.
Crocus – Κρόκος	*Crocus sativus var. graecus* (*Iridaceae*) (the stigmas of the flower).	Diuretic (the stigmas and the root) when taken with wine.
Cucumber – Σίκυς [ἥμερος]	*Cucumis sativus* (*Cucurbitaceae*) (the seeds).	Diuretic, laxative and vermifuge. Suitable for ulcerations of the bladder.
Cyclamen – Κάσσαμος	*Cyclamen hederifolium* (*Primulaceae*) (the bulb).	Purgative and diuretic.

Name	Description	Properties
Dog rose – Ῥόδα [φύλλα]	*Cynorrhodom* (*Rosa canina*, *Rosaceae*) (the leaves and the seeds).	Anti-inflammatory, antimicrobial and astringent. The seeds are diuretic.
Fennel – Μάραθρον	*Foeniculum vulgare* (*Apiaceae*) (the seeds and the leaves).	Carminative, digestive, lactogogue and diuretic.
Figs (dried) – Ἰσχάδες	*Ficus carica* (*Moraceae*) (the dried figs).	Laxative and diuretic.
Flax seed – Λινόσπερμον	*Linum spp*. (*Linaceae*) (the seeds).	Diuretic, digestive and purgative.
Frankincense – Λίβανος	*Boswellia sacra* (*Burseraceae*) (the resin).	Sedative and diuretic.
Giant fennel (oleoresin) – Ἀμμωνιακόν [θυμίαμα]	*Ferula communis var. brevifolia* (*Apiaceae*) (the resin).	Digestive and against dysentery.
Grass – Ἄγρωστις βοτάνη	*Agropyrum repens* (*Poaceae*).	A potent diuretic, with antiviral and antimicrobial properties.
Gromwell (common) – Λιθόσπερμον	*Lithospermum officinale* (*Boraginaceae*).	Sedative and antipyretic.
Hemlock – Κώνειον	*Conium maculatum* (*Apiaceae*).	A strong poison. At very low doses, it has been used for urinary bladder infections.
Henbane – Ὑοσκύαμος	*Hyoscyamus niger* (*Solanaceae*).	At very low doses, as a spasmolytic.
Honey – Μέλι	Honey, often referred as "honey of Attica", was usually diluted with water.	As an excipient, for improving the taste of the active ingredients.
Hyssop –Ὕσσωπος [Κρητικός]	*Hyssopus officinalis* (*Labiatae*) (Cretan).	For sore throat and as an expectorant. It is spasmolytic and has been used in urinary tract infections.
Iris (bearded) – Ἶρις	*Iris germanica* (*Iridaceae*) (the rhizome).	Expectorant, emollient and diuretic. Suitable as an excipient, because it contains aromatic viscous substances.
Jews' stone – Τηκόλιθος ἄρρην και θῆλυς ("male" and "female")	*Lapis Judaicus*, *Lapis Syriacus*, *Phoenicites* or *Tecolithos* ("*solvent stone*").	Fossil spines of the sea urchin *Balanocidaris* (now extinct). Powder or shaves were used with the belief that they dissolve urinary stones.
Laceflower – Ἄμμι	*Ammi visnaga* (*Apiaceae*).	It is suitable for dysuria. May inhibit the formation of oxalate stones in the kidneys.

Name	Description	Properties
Ladies' seal (or Red bryony, or Cretan bryony) – Φύλλον	*Tamus communis* (*Dioscoreaceae*). The curcubit ampelos leuké (ἄμπελος λευκή) of Dioscorides.	A strong purgative, which has been used for gastro-intestinal disorders. Also a diuretic.
Liquorice – Γλυκύρριζα	*Glycyrrhiza glabra* (*Fabaceae*) (the root).	Beneficial in gastritis and gastric ulcers. Also, as an expectorant. It has been used in inflammations of the kidneys and the urinary bladder.
Mallow (common) – Μολόχη [ἀγρία, σπέρμα]	*Malva silvestris* (*Malvaceae*) (the seeds).	Diuretic, emollient and astringent. The seeds have soothing properties in ailments of the urinary bladder.
Mullein – Φλόμος [φλοιός ρίζας]	*Verbascum thapsus* (*Scrophulariaceae*) (the bark of the root).	Astringent and expectorant. Has been used in dysuria and diarrhoea.
Myrrh – Σμύρνα (Smyrna) (the resin)	*Commiphora myrrha* (*Burseraceae*).	A resin with antiseptic and diuretic properties.
Nut grass – Κύπερος [σπέρμα]	*Cyperus rotundus* (*Cyperaceae*) (seeds and the stem of the flower).	Digestive and anti-inflammatory.
Opium poppy – Μήκων	*Papaver somniferum* (*Papaveraceae*) (the sap of the fruit).	Sedative with strong analgesic and antitussive properties.
Oreganon – Ὀρίγανον	*Origanum vulgare* (*Labiatae*) [boil to reduce to one third].	Smasmolytic, digestive, carminative, expectorant and diuretic.
Parsley – Πετροσέλινον [Μακεδονήσιον]	*Apium petroselinum* (*Apiaceae*).	Diuretic for patients with pain in the kidneys or the bladder.
Pine cones – Στροβίλια [πεφωσμένα]	*Pinus halepensis* (*Pinaceae*) (the small cones, roasted).	Diuretic (the seeds), for patients with ailments of the bladder.
Purple betony – Βεττονίκη	*Stachys officinalis* (*Lamiaceae*).	Diuretic. An astringent with many uses in traditional medicine.
Raisins – Σταφίδες [ἐκγιγαρτισμέναι]	*Vitis vinifera* (*Vitaceae*) (the raisins, without the seeds).	Raisins are a valuable source of sugars and minerals.
Rhubarb – Ῥῆον [Ποντικόν]	*Rheum officinale* (*Polygonaceae*).	Astringent, digestive, cholagogue, laxative and diuretic.
Rock foil – Σαρξιφάγον (σαξίφραγος)	*Saxifraga spp*. (*Saxifragaceae*).	It has been used for patients with respiratory complaints, strangury and urolithiasis.
Scorpion (mottled) – Σκορπίος [τέφρα]	*Mesobuthus europeus* (*Buthidae*) (the ashes).	No data available.
Skirret – Σίνων	*Sium sisarum* (*Apiaceae*).	Digestive. Also as a diuretic, suitable for nephrolithiasis.

Name	Description	Properties
Soapwort – Στρουθίον	*Saponaria officinalis* (*Caryophyllaceae*).	Emollient, antiseptic and strong antifungal.
Spikenard – Ναρδοστάχυς	*Patrinia grandiflora* (*Nardaceae*) (the essential oil of the root).	An essential oil with pleasant odour and diuretic properties.
Storax – Στύραξ	*Styrax officinalis* (*Styracaceae*) (the oleoresin).	As an antiseptic together with frankincense and galbanum.
Sweet flag – Ἄκορον	*Acorus calamus* or *Calamus aromaticus* (*Acoraceae*) (the rhizome).	Digestive, carminative, antibacterial and diuretic.
Thyme – Θύμος	*Thymus vulgaris* (*Labiatae*) (the essential oil).	The essential oil (thymol) has antiseptic, diuretic, mucolytic and emmenagogue properties.
Torchwood – Ξηροβάλσαμον	*Amyris elemifera* (*Rutaceae*) (the resin).	The resin has antiseptic and diuretic properties.
Turtle dove – Τρυγών [ὄρνεον, κόπρος]	*Streptopelia turtur* (*Columbidae*) (droppings).	No data available.
Walnuts – Κάρυα [βασιλικά]	*Juglans regia* (*Juglandaceae*) (fruit).	The green peel of the nut is a strong astringent.
White Opium poppy – Μήκων [λευκή]	*Papaver somniferum*, *var. album* (*Papaveraceae*).	A sedative with strong analgesic and antitussive properties.
White pepper – Πέπερι [λευκόν]	*Piper album* (*Piperaceae*). The exfoliated seeds of *Piper nigrum*.	Orexigenic. Irritant in the mucosa of the alimentary and the urogenital system.
Wild carrot – Δαῦκος	*Daucus carota* (*Apiaceae*) (the root).	Digestive and diuretic.
Wine [aromatic] – Κόνδιτος οἶνος Wine [sweet] – Γλυκύς οἶνος Wine [white] – Λευκός οἶνος Wine [with honey] – Μελίκρατος οἶνος	Various types of wine and wine admixtures have been used as remedies (*pharmaceutical* wines). The so-called *aromatic* wine contained pepper and honey.	Wines have been used mainly as excipients, for dissolving the ingredients of a recipe and also for improving the taste. The ethanol contained in wines (usually 12–15%, per volume) is known for its diuretic properties.
Brackets contain additional specific information in the original text of Promotus' Dynameron.		

Diuretic remedies in Dioscorides' *De Materia Medica*

In the book *De Materia Medica* (Περί Ὕλης Ἰατρικῆς)[26], written in the 1st century AD, Dioscorides gives a full account for each of his remedies, suggesting various therapeutic indications according to their pharmacological properties. The structure of his text is therefore more akin to a book of Pharmacology than to a therapeutic index, as is the case with Promotus' *Dynameron* and Myrepsos' *Dynameron*. The plant species which Dioscorides classified, among many other properties, as διούρησις have been thoroughly examined with the aim of validating their effectiveness. The published scientific data is based on studies on both humans and experimental animals[27]. We have used the list of these published evaluations, for the comparison with the diuretic plants mentioned in *Dynameron* of Aelius Promotus.

Examining the diuretic remedies of Dioscorides, it is apparent that the book *De Materia Medica* classifies considerably fewer species as diuretic, when compared with the book of Aelius Promotus (Table 2). Of the total 59 diuretic ingredients in Promotus' *Dynameron*, only 30 can be found in the text of Dioscorides.

Diuretic remedies in Nikolaos Myrepsos' *Dynameron*

Dynameron of Nikolaos Myrepsos was written approximately in the middle of the 13th century[28]. It is a complete therapeutic index, with more than 2667 recipes intended for the treatment of a variety of diseases. Of the 320 recipes of nephrological interest, 265 recipes are cited as diuretic and are recommended for specific disorders, such as urolithiasis, dysuria, strangury etc. The ingredients of these diuretic recipes are mostly medicinal plants[29], although one can find also ingredients of animal[30] and mineral origin[31], as is the case with Dioscorides and Promotus.

As shown in Table 2, all 59 diuretic ingredients described in the recipes of Aelius Propotus' *Dynameron* can be found in the text of Nikolaos Myrepsos.

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[26] Dioscorides, *De Materia Medica*, p. 78.

[27] E. Yarnell, A. Touwaide, *Accuracy of Dioscorides', De materia medica (First Century C.E.), Regarding Diuretic Activity of Plants*, JACM 25.1, 2018, p. 1–14.

[28] Myrepsos, *Dynameron*, p. XLVII–XLVIII.

[29] E. Valiakos, M. Marselos, N. Sakellaridis, T. Constantinidis, H. Skaltsa, *Ethnopharmacological Approach to the Herbal Medicines of the "Antidotes" in Nikolaos Myrepsos' Dynameron*, JEph 163, 2015, p. 68–82; and E. Valiakos, M. Marselos, N. Sakellaridis, T. Constantinidis, H. Skaltsa, *Ethnopharmacological Approach to the Herbal Medicines of the "Elements Alpha to delta" in Nikolaos Myrepsos' Dynameron. Part II*, JEph 205, 2017, p. 246–260.

[30] E. Valiakos, M. Marselos, M.E. Grafakou, H. Skaltsa, N. Sakellaridis, *Remedies of Animal Origin and their Indications in Nikolaos Myrepsos' Dynameron*, JEph 276, 2021, p. 114–191.

[31] E. Valiakos, M. Marselos, H. Skaltsa, *Inorganic Substances and their Uses in Nikolaos Myrepsos' Dynameron. Recent Applications in Modern Therapy*, ToxR 8, 2021, p. 1792–1802.

Table 2

The comparison of ingredients of diuretic recipes and of their respective uses in Aelius Promotus' *Dynameron*, Dioscorides' *De Materia Medica* and Nikolaos Myrepsos' *Dynameron*[*]

Dynameron of Aelius Promotus	*De Materia Medica* of Dioscorides	*Dynameron* of Nikolaos Myrepsos
1. Alexandrian senna *Senna* or *Cassia alexandrina* (*Fabaceae*)	–	+
2. Almonds *Prunus dulcis* (*Rosaceae*)	+	+
3. Alpine valerian – *Valeriana celtica* or *Valeriana officinalis* (*Caprifoliaceae*)	+	+
4. Anise *Pimpinella anisum* (*Apiaceae*)	+	+
5. Apple *Pyrus malus* (*Rosaceae*)	–	+
6. Asarabacca *Asarum europaeum* (*Aristolochiaceae*)	+	+
7. Baldmoney *Meum athamanticum* (*Apiaceae*)	+	+
8. Bay laurel *Laurus nobilis* (*Lauraceae*)	+	+
9. Bitter almonds *Amygdalus communis var. Amara* (*Rosaceae*)	+	+
10. Black pepper *Piper nigrum* (*Piperaceae*)	+	+
11. Cabbage [the seeds] *Brassica spp*. (*Brassicaceae*)	+	+
12. Camel's hay *Cymbopogon schoenanthus* (*Graminaceae*)	+	+
13. Caper bush *Capparis spinosa* (*Capparaceae*)	+	+
14. Cardamom *Elettaria cardamomum* (*Zingiberaceae*)	–	+
15. Celery *Apium graveolens* (*Apiaceae*)	+	+
16. Chicken egg [raw] *Galus galus* (*Phasianidae*)	–	+
17. Cicadas *Tibicen plebejus* (*Cicadidae*)	–	+

***Dynameron* of Aelius Promotus**	***De Materia Medica* of Dioscorides**	***Dynameron* of Nikolaos Myrepsos**
18. Costmary *Saussurea lappa* (*Asteraceae*)	–	+
19. Crocus *Crocus sativus var. graecus* (*Iridaceae*)	+	+
20. Cucumber *Cucumis sativus* (*Cucurbitaceae*)	+	+
21. Cyclamen *Cyclamen hederifolium* (*Primulaceae*)	–	+
22. Dog rose *Cynorrhodom* (*Rosa canina*, *Rosaceae*)	–	+
23. Fennel *Foeniculum vulgare* (*Apiaceae*)	+	+
24. Figs [dried] *Ficus carica* (*Moraceae*)	–	+
25. Flax seed *Linum spp.* (*Linaceae*)	–	+
26. Frankincense *Boswellia sacra* (*Burseraceae*) (the resin)	–	+
27. Giant fennel [oleoresin] *Ferula communis var. brevifolia* (*Apiaceae*)	–	+
28. Grass *Agropyrum repens* (*Poaceae*)	+	+
29. Gromwell *Lithospermum officinale* (*Boraginaceae*)	+	+
30. Hyssop *Hyssopus officinalis* (*Labiatae*)	–	+
31. Iris *Iris germanica* (*Iridaceae*)	+	+
32. Jews' stone *Lapis Judaicus* or *Lapis Syriacus*	+	+
33. Laceflower *Ammi visnaga* (*Apiaceae*)	–	+
34. Ladies' seal *Tamus communis* (*Dioscoreaceae*)	+	+
35. Liquorice *Glycyrrhiza glabra* (*Fabaceae*)	–	+
36. Mallow *Malva silvestris* (*Malvaceae*)	–	+
37. Mullein *Verbascum thapsus* (*Scrophulariaceae*)	–	+

***Dynameron* of Aelius Promotus**	***De Materia Medica* of Dioscorides**	***Dynameron* of Nikolaos Myrepsos**
38. Myrrh *Commiphora myrrha* or *Commiphora gileadensis* (*Burseraceae*)	–	+
39. Nut grass *Cyperus rotundus* (*Cyperaceae*)	+	+
40. Opium poppy *Papaver somniferum* (*Papaveraceae*)	–	+
41. Oreganon *Origanum vulgare* (*Labiatae*)	–	+
42. Parsley *Apium petroselinum* (*Apiaceae*)	+	+
43. Pine cones *Pinus halepensis* (*Pinaceae*)	+	+
44. Purple betony *Stachys officinalis* (*Lamiaceae*)	+	+
45. Raisins *Vitis vinifera* (*Vitaceae*)	–	+
46. Rhubarb *Rheum officinale* (*Polygonaceae*)	–	+
47. Rock foil *Saxifraga spp*. (*Saxifragaceae*)	–	+
48. Scorpion (mottled) *Mesobuthus europeus* (*Buthidae*)		+
49. Skirret *Sium sisarum* (*Apiaceae*)	–	+
50. Soapwort *Saponaria officinalis* (*Caryophyllaceae*)	+	+
51. Spikenard *Patrinia grandiflora* (*Nardaceae*)	+	+
52. Storax [oleoresin] *Styrax officinalis* (*Styracaceae*)	–	+
53. Sweet flag *Acorus calamus* or *Calamus aromaticus* (*Acoraceae*)	+	+
54. Thyme *Thymus vulgaris* (*Labiatae*)	+	+
55. Torchwood *Amyris elemifera* (*Rutaceae*)	–	+
56. Walnuts – Κάρυα [βασιλικά] *Juglans regia* (*Juglandaceae*)	–	+

***Dynameron* of Aelius Promotus**	***De Materia Medica* of Dioscorides**	***Dynameron* of Nikolaos Myrepsos**
57. White pepper *Piper album* (*Piperaceae*)	–	+
58. Wild carrot *Daucus carota* (*Apiaceae*)	+	+
59. Wine, plain or "pharmaceutical" *Vitis vinifera* (*Vitaceae*)	+	+

* *The presence or absence of an ingredient is denoted with + or –, respectively. Brackets contain additional specific information in the original text of Promotus' Dynameron.*

Discussion and conclusions

It is a well-established fact that medicinal tradition flourished in the region of eastern Mediterranean basin throughout antiquity, starting with the centres of Kos and Knidos, in the fifth century BC, and eventually expanding to the mainland of Greece, Asia Minor, southern Italy, Cyprus and Egypt. In the Hellenistic era, Alexandria gradually became a famous centre of innovation, both in medicine as well as in surgery, due to a remarkable progress in the physiology and anatomy of the human body. The book of Aelius Promotus with the title *Dynameron* reflects the high level of Alexandrian medicine. Unlike *De Materia Medica* of Dioscorides, which gives a detailed account of each remedy, *Dynameron* of Aelius Promotus represents a *vade mecum*, a short manual for everyday use by a physician, written with the intention of giving practical solutions to common medical problems. It has the structure of a book of Pharmacotherapy, with 130 chapters on various diseases and their treatment. We also find the same structure in the books of Galen, as well as in the *Dynameron* of Nikolaos Myrepsos.

In the cited 32 recipes related to kidney ailments, Aelius Promotus describes the use of 59 different herbs, 6 ingredients of animal origin, as well as 1 mineral. As excipients, he uses water, wine and honey. For the treatment of nephrological diseases, he cites several well established remedies suitable for diuresis and for alleviating symptoms related to urolithiasis and renal inflammation. The author quite frequently added personal comments on the efficacy of a recipe, referring to his previous experience. This indicates that *Dynameron* is an account of treatments proposed by an experienced physician, and not a mere compilation of recipes from earlier medical texts.

Many of the recommended herbal ingredients are intended for diuresis in case of difficulty in micturition (strangury) or pain in micturition (dysuria), related to nephrolithiasis. Several other pathological conditions may not be specified (as e.g. nephritis, or renal neoplasms), but they are implied indirectly as *urination*

of blood. It is worth noticing that "hematuria" does not occur in ancient texts; it is a relatively new medical term coined at the beginning of 19th century[32].

Several medicinal plants are proposed as diuretics by Aelius Promotus, some of which, according to our current knowledge of Pharmacognosy, possess genuine diuretic properties. On the other hand, there are also plants facilitating diuresis due to their high-water content, since a greater urine output is to be expected after an increased fluid intake. This is the case with many herbal medicines and it may explain the rather frequent use of the term "diuretic" encountered in the texts of many physicians in antiquity[33]. Moreover, wine or water with honey are used as excipients and they are reasonably expected to add to the production of urine, due to the known diuretic properties of ethyl alcohol, as well as due to the increased intake of water (e.g., in recipe 3 of Chapter 15, the directions are: *Give [the remedy] with three cups of water*).

There are, in turn, herbal medicines which have entirely legitimate applications in the treatment of patients with nephrolithiasis, such as the spasmolytic henbane (*Hyoscyamus niger*) and the analgesic opium poppy (*Papaver somniferum*). As a matter of fact, the active ingredients of these plants (scopolamine and morphine, respectively) continue to be irreplaceable agents in the armamentarium of modern medicine.

Some of the diuretic remedies proposed by Aelius Promotus can also be found in the book *De Materia Medica* of Dioscorides, where they are granted similar clinical uses. A high proportion of these herbs indeed possess significant diuretic properties, as has been shown in clinical studies on humans and laboratory animals[34].

Promotus does not mention the name of Dioscorides in his book, despite the fact that he is usually very eager to acknowledge the origin of a recipe, a very common practice among the authors of the Roman period[35]. It is true that the time gap between these two authors is rather narrow (only a few decades), leaving room for a speculation that Aelius was not aware of the work of Dioscorides. The fact that many herbal remedies are advocated for the same indications by both writers may simply show that their use was well-established at that time, either as an official knowledge in written texts or as an oral tradition in folk medicine.

The text of Nikolaos Myrepsos contains virtually every single diuretic of Promotus, as opposed to the book *De Materia Medica* of Dioscorides, where only

[32] *Hematuria*, [in:] *Merriam-Webster.com Dictionary*, https://www.merriam-webster.com/dictionary/hematuria [30 X 2022].

[33] M.M. Shoja, S.R. Tubbs, A.N. Bosmia, M.A.A. Fakhree, A. Jouyban, M.W. Balch, M. Loukas, K. Khodadoust, M. Khalili, G. Eknoyan, *Herbal Diuretics in Medieval Persian and Arabic Medicine*, JACM 21.6, 2015, p. 309–320.

[34] E. Yarnell, A. Touwaide, *Accuracy of Dioscorides*…, p. 8.

[35] L. Totelin, *Hippocratic Recipes*…, p. 89.

half of the diuretics of Promotus can be found. It is impressive that after eleven centuries all 59 diuretics described in the Alexandrian *Dynameron* are also included in the Byzantine *Dynameron*. We do not know if Myrepsos had access to the manuscript of Promotus *per se*. It is probable that some parts of his manuscript were preserved in the works of subsequent medical writers. To date, this issue has not been addressed in detail, but some obvious similarities between the two texts are easily detectable.

Although Aelius Promotus was apparently a knowledgeable physician, some of his remedies are obscure and questionable. Perhaps the most typical example is *Jews' stone* as an agent that contributes to the dissolution of renal stones. This rather peculiar product was included in the official British Pharmacopoeia until the middle of the 19th century[36], but the scientific community has not come yet to a conclusion on its therapeutic efficacy[37]. The detailed description of how mullein is harvested (Chapter 16, recipe 10) is, in turn, definitely relating a superstitious ritual. In other chapters of *Dynameron*, not presented here, there are several examples of superstitions, usually referring to the phase of the moon, or to the need of invoking a divine power while preparing or administering a recipe. Magic remedies and superstitious beliefs, not uncommon among medical writers of that time (including Dioscorides), have gradually been eliminated and they are virtually absent in medical texts of the late Byzantine era[38].

Aelius Promotus describes the treatment of many kidney ailments, using almost seventy different ingredients, several of them easily recognisable for their effectiveness even in the light of modern science. By adding various comments to his recipes, he enriched the medical information with hints of the everyday clinical practice. In most instances, Aelius is very confident and he does not hesitate to praise the efficacy of a recipe. However, there is one exception. In the 6th recipe of Chapter 17 (*For those seriously ill, men and women, who suffer from difficult and painful urination*) he seems almost cynical in his final advice: *Give the patient to drink a cup with a mixture of these. Ask your payment beforehand.*

In the prologue of the manuscript, Aelius Promotus states clearly that after having practised medicine for his entire life, he is writing down the recipes of *Dynameron* as an account of his professional experience and as a spiritual patrimony to the younger physicians. According to reasonable chronological estimations, this

[36] T. Redwood, *Gray's Supplement to Pharmacopoeia: Being a Concise but Comprehensive Dispensatory*, [2]London 1848, p. 743.

[37] P. Faridi, H. Seradj, S. Mohammadi-Samani, M. Vossoughi, A. Mohagheghzadeh, J. Roozbeh, *Randomized and Double-blinded Clinical Trial of the Safety and Calcium Kidney Stone Dissolving Efficacy of Lapis judaicus*, JEph 156, 2014, p. 82–87. S.A.A. Makbul, N. Jahan, G. Ahmad, *Hajrul yahood (Lapis judaicus): An Important Mineral Drug of Unani System of Medicine for the Management of Urolithiasis*, JEph 222, 2018, p. 165–170.

[38] I. Grimm-Stadelmann, *Untersuchungen zur iatromagie in der Byzantinischen Zeit. Zur Tradierung gräkoägyptischer und spätantiker iatromagischer Motive*, Berlin–Boston 2020 [= BArchiv, 1], p. 233.

happened in the middle of the 2nd century AD. The fact that the manuscript of the Marciana Library is a copy made in 15th century implies that his medical knowledge was highly esteemed by many future generations of physicians. The chapters on kidney diseases analysed in the present paper show that Aelius Promotus's *Dynameron* is a detailed therapeutic manual written at a time when Alexandria was still a city with a glorious medical tradition. The historical and scientific value of this text has not yet been given the attention it deserves, especially when its possible influence on the work of subsequent medical writers comes into consideration.

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