

# al-dukkān

a dice game for 2 to 4 players



**al-dukkān** casts its players as owners of competing apothecary shops in 13th century Damascus. Players try to stock their shops with the most valuable medicines, using dice to determine which of the available recipes they are able to make.

This game was created in collaboration with the Museum of the History of Science (MHS) in Oxford as part of the public engagement element of the Literary History of Medicine Project, and its development was funded by the Wellcome Trust.

It is a simple game of dice rolling and was designed for use with children who visited the MHS in school groups, or as part of the family activities hosted at the museum.

Through the game's recipe cards, players will learn about different medieval recipes for prescriptions, what they were used to treat, and the various ingredients which were used to make them.

This booklet contains instructions on how to play the game, along with further information about each of the ingredients and their historical uses.

## How to play

The game comprises this rulebook, 32 recipe cards, four green dice, one blue die, and one red die.

Start by shuffling the recipe cards, and then deal three cards face-up to the table.

Place the remaining deck face down next to the three revealed cards. This is the 'draw deck', and the face-up cards on the table are the recipes that can currently be created.

Next, turn the card at the top of the draw deck face up and place it on the top of the deck.

**Note:** *Recipe cards show a number of bits of information: in the top right corner of the card is its value for scoring; the main text gives the name of the medicine; below this is some text explaining what the medicine was used for; towards the bottom of the card there is coloured text listing the ingredients of the recipe, and finally there are one or more icons showing different coloured amphora.*

*In addition to the above, each recipe card also features an icon that indicates the area of the body that the medicine was used for - the mind, the gut, the body, or the eyes.*

Choose a starting player, and have them gather together all six dice, and roll them to begin the game.

The player now looks at the symbols they have rolled. Each symbol represents a different types of ingredient (green amphora for plants, blue amphora for minerals, and red amphora for animal matter).

By matching the available symbols on the dice with those shown on the three face-up recipe cards, the player may be able to add one or more medicines to their shop.

The player passes any spent dice to the player to their left, and then adds any cards for recipes they have created to their shop by placing them in front of them on the table, face up.

Unspent dice are left untouched on the table, and any removed cards are replaced with cards from the draw deck. As when setting up the game, after filling the available cards back up to three, turn over the top card of the draw deck and place it on top of it.

Play now passes to the player to the left. They may choose to keep the symbols shown on the dice left by the previous player, or to re-roll as many of these dice as they wish. They **must** roll the dice that the previous player passed to them.

As with the previous player, they will try to create one or more of the available recipes. Play then proceeds as outlined above until the end of the game is triggered, after which all players total up the score values of the cards in their shop.

The player with the highest score wins. In the event of a tie, the player with the most medicines in their shop is declared the winner.

## End game

There are two ways to end the game. The first is by simply running out of cards - if at any point it is not possible to refresh the available cards up to a total of three, the game is declared finished and players work out their scores.

*Alternatively, the game may end when a player manages to create a medicine relating to each of the four areas of the body (the gut, the mind, the body, and the eyes). This is an optional rule that adds a little more strategy to the game.*

## Scoring

Players calculate their scores at the end of the game by adding up the values of all of the cards in their shop. The player with the highest score wins. In the event of a tie, the player with the most medicines in their shop is declared the winner.

*Optionally, you can play the game with additional scoring awarded for 'tricks'. Before scoring, players organise the cards in their shop into 'sets' based on the four classes of areas of the body. Players score an additional two points for each pair in their shop, three points for each trio, and five points for any sets of four cards that each show a different area of the body.*

## Notes

Statistically, all dice are most likely to provide a player with green amphora, which represent plant-derived *Materia Medica*, but the blue die adds an additional chance to provide blue amphora, representing mineral-based resources, and the red die does the same for red amphora, which represent animal-derived produce. The dice-based spread of these three groups broadly mirrors the spread of ingredient types in Al-Kūhīn al-‘Aṭṭār’s *Minhāj al-Dukkān*, from which all of the recipes are taken.

Many of the claimed treatments may seem fanciful to modern medicine, based on the ingredients used in the recipes. However, recent research has shown that many of these treatments may have been genuinely effective. If you are interested in finding out more about this, please search online for the *Ancientbiotics* project, which began life at the University of Nottingham but is now based in the United States, and prepare to be amazed.

## Plant materia medica

**Agaric**, or 'tree-fungus' (taken from the Latin *agaricum*), features as an ingredient in many recipes from the period, and was regarded as having strong purgative qualities. In this game, agaric forms part of the recipe for **Black bile medicinal powder**, which was used to treat melancholy.

**Almond** occurs frequently in recipes from the medieval period, as do by-products such as almond resin, almond syrup, and almond oil. These products were seen as having soothing qualities, and were often used in remedies for coughs. In this game, almond oil features in the recipe for **Success paste**, which was used to treat epilepsy and melancholy.

**Aloe** was used to treat eye inflammations and related ailments. In this game, aloe features in the recipe for **Sharp red eye-salve**, which was used to treat mange, scabies, styes, and thickening of the eyelids.

**Bugloss** (*Anchusa arvensis*) is an annual herb which bears small blue tubular flowers, four nutlets per flower, and one seed per nutlet. The plant is native to Europe but is well-known elsewhere as a noxious weed. It appears in a number of recipes in *Minhāj al-Dukkān*, and, in this game, forms part of the recipe for **Black bile medicinal powder**, which was a medicine used to treat melancholy.

**Camphor** is an aromatic waxy resin that is found in the wood of the camphor laurel (*Cinnamomum camphora*), as well as occurring in rosemary leaves. It is used for its scent, as an ingredient in cooking, as an embalming fluid, for medicinal purposes, and in religious ceremonies. In this game, camphor features in the recipe for a **Pill for sweetened breath**, which was used to stop vapour, cleanse the brain, and as an aphrodisiac.

**Cardamom** is a spice made from the seeds of several plants native to India, Bhutan, Indonesia and Nepal. It features in many recipes, particularly for electuaries and stomachics, and has a strong, unique taste, with an intensely aromatic, resinous fragrance. In this game, cardamom wood features in the recipe for a **Strengthening digestive**, which was used to strengthen the stomach and improve appetite, and cardamom pods are used in the **Pill for sweetened breath**.

**Celery** (*Apium graveolens*) is a marshland plant in the family Apiaceae that has been cultivated as a vegetable since antiquity. Celery leaves were used in the garlands that decorated the tomb of Tutankhamen, who died in 1323BC and, in the Classical period, according to Pliny the Elder, the garland worn by the winners of the sacred Nemean Games was also made of celery. In writings on prophetic medicine, such as those by Ibn Qayyim al-Jawziyya, celery is recorded as being useful in the treatment of obstructions of the liver and spleen, and its seeds were regarded as having use as both an aphrodisiac and for the treatment of bad breath. In this game, celery juice is used in the recipe for a **Hiera pill**, which was used to treat ailments of the head.

**Chamomile** was used during the middle ages as a painkiller, diuretic and digestive aid, as well as a calming agent to reduce stress and aid in sleep. In this game, chamomile features in the recipe for **Philosophers' paste**, which was used to improve memory, and dried chamomile flowers are a key ingredient in the recipe for **Ointment of chamomile**, which was used to treat exhaustion.

**Cinnamon** is a spice obtained from the inner bark of *Cinnamomum cassia*, an evergreen tree native to southern China. In this game, cinnamon features in the recipe for **Philosophers' paste**, which was used to improve memory, the recipe for a **Pill for sweetened breath**, which was used to stop vapour, cleanse the brain, and as an aphrodisiac, and the recipe for **Hot cordial paste**, which was used to treat palpitations and to strengthen the heart and stomach.

**Clover** or trefoil are common names for plants of the genus *Trifolium*, consisting of about 300 species of plants. In this game, clover seeds feature in the recipe for a **Paste to help the aged retain memory**, which was used to combat dementia.

**Cloves** are the aromatic flower buds of the *Syzygium aromaticum* tree, that is native to Indonesia. Today, cloves are commercially harvested in Bangladesh, Indonesia, India, Madagascar, Zanzibar, Pakistan, Sri Lanka, and Tanzania, and are used for both cooking and in traditional medicine. In this game, cloves feature in the recipe for **Hot cordial paste**, which was used to strengthen the heart and stomach, and the recipe for a **Pill for sweetened breath**, which was used to stop vapour, cleanse the brain, and as an aphrodisiac.

**Coconut** is the fruit of the coconut tree (*Cocos nucifera*), which is a type of palm. Writing in the mid-twelfth century, al-ʿIdrīsī recorded that coconut was traded alongside other goods such as camphor, lead, and pepper at the port of Aden, which was frequented by ships from Sind, India, and China. Both the flesh of the coconut and its milk are used extensively in cooking, particularly in South Asia, and the palm's roots are also used to create dyes. Coconut has historically been used as a treatment for diarrhoea and dysentery. In this game, coconut features in the recipe for **Philosophers' paste**, which was used to improve memory.

**Cumin** (*Cuminum cyminum*) is a flowering plant native to southwestern Asia and the Middle East. The seeds that are contained in the fruit of this plant are used in cooking as well as medicine, both in seed form as well as a ground powder. It has been used as a spice for thousands of years, and seeds have been found at the archaeological site of Tell ed-Der in Syria and dated to the second millennium BC. Cumin was also used in the mummification process in Ancient Egypt. References to cumin in medieval literature may also refer to the seeds of the unrelated plant *Nigella sativa*, which were referred to as 'black cumin' or 'Indian cumin' during the period. Black cumin was believed to have many medicinal uses, with Abū Salma recording that Mohammad himself said 'Take note of this black grain (*al-ḥabba al-sawdā*), for it contains healing for every illness except the poisonous.' In this game, white cumin (which may actually refer to caraway, which was known as 'Persian cumin') appears in the recipe for a **Medicinal powder for stopping hiccups**.

**Dill** (*Anethum graveolens*) is an annual herb in the celery family. In Arab countries, dill seed, called *ain jaradeh* (grasshopper's eye), is used as a spice in cold dishes such as *fattoush* and pickles. Dill is called *shibint* and is used mostly in fish dishes. Contemporary scientific study has shown that dill demonstrates antibacterial activity against *Staphylococcus aureus*. In this game, dill features in the recipe for **Ointment of hyena & fox**, which was used to treat joint pains, gout, convulsions, and tetanus.

**Dodder** (*Cuscuta*) is a genus of parasitic plant belonging to the morning glory family. Its folk names include beggarweed, lady's laces, hellbine, and witch's hair. Dodder (*kashūth* in Arabic) contains chemicals that act like antioxidants, and it features in several recipes in *Minhāj al-Dukkān*. In this game, dodder features in the recipes for **Black bile medicinal powder**, which was a medicine used to treat melancholy, and for **Success paste**, which was used to treat epilepsy, as well as also treating the symptoms of melancholia.

**Dragon's blood** is not as mythological as it may sound, but is a bright red resin that has been in continuous use since ancient times as varnish, medicine, incense, and dye, and is obtained from different species of a number of distinct plants, including *Croton tiglium*, a shrub native to Southeast Asia, which is used in herbal medicine as a violent purgative, and *Daemonorops*, a rattan palm found primarily in the tropics and subtropics of southeastern Asia, with a few species extending into southern China and the Himalayas. In this game, dragon's blood features in the recipe for a **Sharp red eye-salve**, which was used to treat mange, scabies, styes, and thickening of the eyelids.

**Fennel** (*Foeniculum vulgare*) is a flowering plant species in the carrot family. The Roman natural historian Pliny, writing in the first century, cites fennel in more than twenty remedies, and it continued to be used in medicines in the medieval period. Arab traders introduced fennel to India and China, where it became used in both cooking and traditional medicine. In this game, fennel water is used in the recipe for an **Eyewash that brings light to the eye**, which was used to help improve sight.

**Fenugreek** (*Trigonella foenum-graecum*) is believed to have been brought into cultivation in the Near East, and charred fenugreek seeds found at Tell Haleb in Iraq have been carbon dated to 4000 BC. It is used extensively in cooking, and also in traditional medicine, where it is believed to help the digestion. In this game, fenugreek is used in the recipe for **Ointment of chamomile**, which was used to treat exhaustion.

**Frankincense** is a highly aromatic resin that is obtained from the *Boswellia sacra* tree, which is native to the Arabian peninsula and north-eastern Africa, and is particularly remarkable due to its ability to grow in fairly harsh environments. The Greek historian Herodotus was familiar with frankincense and knew it was harvested from trees in southern Arabia. He reported that the gum was dangerous to harvest because of venomous snakes that lived in the trees. It is commonly used in perfumery, as well as in folk medicine. In this game, frankincense appears in the recipe for a **Medicinal powder for stopping hiccups**.

**Ginger** (*Zingiber officinale*) is a flowering plant whose root is widely used as a spice and in folk medicine. Ginger belongs to the same family as turmeric, cardamom, and galangal, all of which are also extensively

used in cooking and traditional medicine. Ginger was believed to being particularly useful in treatments for ailments of the liver and stomach, aiding digestion, and in helping to improve memory. In this game, ginger is an ingredient in the recipe for **Philosophers' paste**, which was used to improve memory.

**Grape** is a fruit, botanically a berry, of the deciduous woody vines of the flowering plant genus *Vitis*. Grapes can be eaten fresh as table grapes or they can be used for making wine, jam, grape juice, jelly, grape seed extract, raisins, vinegar, and grape seed oil. In this game, grape juice appears in the recipe for is used in the recipe for **Plain licorice syrup**, which was used to treat coughs and hoarseness.

**Hiera picra** is a mixture of powdered aloe and canella (the aromatic inner bark of *Canella winterana*, which is used as a spice and has similar properties to cinnamon). In pre-modern medicine it was employed as a purgative to induce catharsis in the treatment of mental and physical complaints. More recently, in the 19th Century, hiera picra was used by women in England to promote miscarriage, as abortion was illegal at that time. In this game, hiera picra appears in the recipe for a **Hiera pill**, which was used to treat ailments of the head.

**Hyssop** (*Hyssopus officinalis*) is native to Southern Europe, the Middle East, and the region surrounding the Caspian Sea. Due to its properties as an antiseptic, cough reliever, and expectorant, it is commonly used as a medicinal plant. In this game, hyssop is used in the recipe for a **Pill for sweetened breath**, which was used to stop vapour, cleanse the brain, and as an aphrodisiac.

**Lavender** (*Lavandula*) is found across Europe, the Mediterranean, northern and eastern Africa, southwest Asia and southeast India. It is cultivated extensively for garden and landscape use, as well as for use in cooking, and for the extraction of essential oils. In this game, lavender is used in the recipe for **Success paste**, which was used to treat epilepsy, as well as also treating the symptoms of melancholia.

**Lemon-balm** (*Melissa officinalis*) is native to south-central Europe, the Mediterranean, Iran, and Central Asia. It is widely used in aromatherapy. In this game, lemon-balm leaves are used in the recipe for **Black bile medicinal powder**, which was a medicine used to treat melancholy.

**Licorice** (or Liquorice) is native to southern Europe and parts of Asia, and its name is derived from the Greek *glukurrhiza*, which means 'sweet root'. Licorice is a very common ingredient in medicine from the medieval period, and is still used in contemporary traditional medicine. In this game, liquorice is used in the recipe for **Plain licorice syrup**, which was used to treat coughs and hoarseness.

**Mace** is the dried "lacy" reddish covering of the nutmeg seed, which is the fruit of several species of tree in the genus *Myristica*, which grow in tropical Southeast Asia. Mace and nutmeg originated in India, and was traded from around the 6th century onwards. It was used in both cooking and medicine, and was thought to be effective at strengthening the stomach and improving appetite. In this game, mace is used in the recipe for a **Pill for sweetened breath**, which was used to stop vapour, cleanse the brain, and as an aphrodisiac.

**Mastic** is produced from the sap of the mastic tree (*Pistacia lentiscus*), which is sun-dried into pieces of brittle, translucent resin. When chewed, the resin softens and becomes a bright white and opaque gum. Mastic was used to help with digestion, and its use dates back to the Classical period. In this game, mastic is used in the recipe for a **Sharp red eye-salve**, which was used to treat mange, scabies, styes, and thickening of the eyelids, as well as recipes for a **Pill for sweetened breath**, which was used to stop vapour, cleanse the brain, and as an aphrodisiac, **Hot cordial paste**, which was used to treat palpitations, and to strengthen the heart and stomach, and as a key ingredient in **Mastic medicinal powder**, which helped to ease flatulence.

**Myrobalan** refers to a variety of different fruit-bearing plants, most of which are native to India and surrounding countries, and is among the most common medicinal ingredients mentioned in the prescriptions in the Cairo Genizah, and Ibn Qāḍī Baʿalbakk wrote about its use to promote good spirits. It is evident that myrobalan was used extensively in the Islamic world in the medieval period, and the efficacy of several of its therapeutic applications has been confirmed by modern scientific studies. In this game, myrobalan features in several recipes, including: **Black bile medicinal powder**, which was a medicine used to treat melancholy; a **Hiera pill**, which was used to treat ailments of the head; **Philosopher's paste**, which improved memory; **Success paste**, which was used to treat epilepsy and melancholia; and a **Strengthening digestive**, which was used to strengthen the stomach and improve appetite.

**Myrrh** is a natural resin extracted from a number of small, thorny tree species of the genus *Commiphora*, most of which are native to Northeast Africa and the Arabian peninsula. It is mentioned frequently in the texts held in the Cairo Genizah, and also in Byzantine texts dating to the 9th Century. In this game, myrrh is used in the recipe for a **Sharp red eye-salve**, which was used to treat mange, scabies, styes, and thickening of the eyelids.

**Nigella** is native to southern Europe, north Africa, south and southwest Asia, and the fruit of these plants contain numerous seeds. These seeds are used in many medical recipes in *Minhāj al-Dukkān*, and were believed to be effective at treating indigestion and other bowel complaints, as well as intestinal worms, nerve defects, and flatulence. In this game, nigella is used in the recipe for a **Medicinal powder for treating hiccups**.

**Nutmeg** is the fruit of several species of tree in the genus *Myristica*, which grow in tropical Southeast Asia. Mace and nutmeg originated in India, and was traded from around the 6th century onwards. It was used in both cooking and medicine, and was thought to be effective at strengthening the stomach and improving appetite. In this game, nutmeg is used in the recipe for a **Pill for sweetened breath**, which was used to stop vapour, cleanse the brain, and as an aphrodisiac.

**Olive** (*Olea europaea*) is a species of small tree found in the Mediterranean, the Arabian Peninsula, and southern Asia as far east as China. The oil extracted from the fruit of these trees was highly valued, both in culinary and medical uses. Olive oil was used in many treatments from the period, and was regarded as particularly effective for treating ulcers and other skin conditions. In this game, olive oil is used in the recipes for a **Petroleum ointment**, which was used to treat various wounds, **Ointment of hyena & fox**, which was used to treat joint pains, gout, convulsions, and tetanus, **Ointment of eggs**, which was used to stimulate hair growth, and **Clastarion poultice**, which was used to treat eye pain.

**Opium** (*Lachryma papaveris*), the dried latex obtained from the opium poppy (*Papaver somniferum*), was used extensively in medicine from the period. al-Rāzī made use of opium as an anaesthetic, and also recommended its use in the treatment of melancholy, and al-Zahrāwī relied on opium and mandrake as surgical anaesthetics. In this game, opium is used in the recipe for **Another agent which causes sneezing**, which was used to treat nosebleeds.

**Pepper** and cooked peppercorns have been used since antiquity, both for flavour and as a traditional medicine. Pepper is native to South Asia and Southeast Asia, and has been known to Indian cooking since at least 2000 BCE. Black peppercorns were found stuffed in the nostrils of Rameses II, placed there as part of the mummification rituals shortly after his death in 1213 BCE, and black pepper was a well-known and widespread, if expensive, seasoning in the Roman Empire. Apicius' *De re coquinaria*, a third-century cookbook probably based at least partly on one from the first century CE, includes pepper in a majority of its recipes. In medical writings from the medieval period, black pepper was employed to cure several illnesses, including constipation, insomnia, oral abscesses, and toothaches. Pepper was also used in medicines to treat eye problems. In this game, pepper appears in the recipe for **Philosopher's paste**, which improved memory.

**Pine nuts** are the edible seeds of pine trees, and are prominently consumed in several cuisines worldwide, with evidence of their use in Europe and Asia dating back to the Paleolithic period. Pine nuts contain vitamin B1 and protein, and appear in the recipe for **Philosopher's paste**, which improved memory.

**Polypody** (*Polypodium*) is a genus of 75–100 species of ferns, which are widely distributed throughout the world. Polypody has a bitter-sweet taste and is unusual among ferns in that it is used in cooking; in this case as a spice in nougat. In this game, polypody is used in the recipe for **Success paste**, which was used to treat epilepsy and melancholia.

**Pomegranate** (*Punica granatum*) derives its name from medieval Latin *pōmum*, meaning “apple”, and *grānātum*, meaning “seeded”. It is widely cultivated throughout the Middle East and Caucasus region, north and tropical Africa, South Asia, Central Asia, the drier parts of southeast Asia, and parts of the Mediterranean Basin. In India's ancient Ayurveda system of traditional medicine, the pomegranate is frequently described as an ingredient in a variety of remedies. In this game, pomegranate appears in the recipe for **Pomegranate cooling eye-lotion**, which was used to treat blurred vision.

**Poppy** is a flowering plant in the subfamily *Papaveroideae* of the family *Papaveraceae*. When eaten with dates and almonds, poppies were thought to help to strengthen the liver. The general term may be taken as referring to opium poppies in some recipes. In this game, poppies are used in the recipe for **Fresh poppy syrup**, which was used to treat coughs and chest pains.

**Quince** is the sole member of the genus *Cydonia* in the family *Rosaceae* (which also contains apples and pears, among other fruits). The main medicinal uses of Quince fall in the domain of dietary therapy, and it was thought to help strengthen the stomach and liver. In this game, quince is used in the recipe for **Astringent quince paste**, which was used to treat flatulence.

**Resin** is produced by many plants in response to injury. The resin acts as a bandage protecting the plant from invading insects and pathogens. Common resins mentioned in pharmaceutical recipes from the period included myrrh, frankincense, and mastic gum. In many recipes they act primarily as a medium or binding agent, so a specific type is not named. In this game, an unnamed resin is used in the recipe for a **Petroleum ointment**, which was used to treat various wounds, as well as in the recipe for **Clastarion poultice**, which was used to treat eye pain.

**Rhubarb** (*Rheum rhabarbarum*) is a species of plant in the family *Polygonaceae*. In traditional Chinese medicine, rhubarb roots have been used as a laxative for several millennia, and rhubarb also appears in medieval Arabic and European prescriptions. It was one of the first Chinese medicines to be imported to the West from China. In this game, rhubarb is used in **Rhubarb syrup**, which was used to strengthen the stomach, and **Another poultice**, which was used to treat warts, eczema, and ringworm.

**Rose** is a woody perennial flowering plant of the genus *Rosa*, of which there are over one hundred species. Pharmaceutical recipes from the medieval period make use of rose petals, and also of rosewater. In this game, rosewater is used in the recipes for an **Eyewash that brings light to the eye**, which was used to help improve sight, and for a **Strengthening digestive**, which was used to strengthen the stomach and improve appetite. Fresh rose petals feature in the recipe for **Rose syrup**, which was used to treat fever, thirst, and burning of the stomach.

**Saffron** is a spice derived from the flower of *Crocus sativus*, commonly known as the "saffron crocus". Saffron is used commonly in middle eastern cooking, and is also thought to have beneficial medicinal uses. It features in recipes for ophthalmological medicines, and was believed to be useful for clearing and removing matter from the eyes. In this game, saffron is used in the recipe for a **Sharp red eye-salve**, which was used to treat mange, scabies, styes, and thickening of the eyelids, and the recipe for **Hot cordial paste**, which was used to treat palpitations, and to strengthen the heart and stomach. It also appears in the recipe for **Another agent which causes sneezing**, which was used to treat nosebleeds.

**Sarcocolla** (*anzarūt*) is a shrub native to Persia. Both Dioscorides and Galen refer to its use in the treatment of wounds, and Al-Kindi used sarcocolla as a component of many recipes in his medical formulary, particularly in medicines used to treat leprosy. In this game, sarcocolla features in the recipe for **Angelic eyewash**, which was used to treat eye inflammations. This recipe specifies that the sarcocolla should be cooked in asses milk.

**Scammony** (*Convolvulus scammonia*) is a bindweed native to the countries of the eastern part of the Mediterranean basin; it grows in bushy waste places, from Syria in the south to the Crimea in the north, its range extending westward to the Greek islands. In medical recipes from the period, scammony was used for its purgative qualities. In this game, scammony features in the recipe for **Black bile medicinal powder**, which was a medicine used to treat melancholy.

**Senna** (*Cassia acutifolia*) is native throughout the tropics, with a small number of species in temperate regions. Its primary use in medicine was as a purgative, and it was one of the most commonly used traditional drugs in the pharmacies of the period. In this game, Meccan Senna is used as part of the recipe for a **Softening suppository**, which was used to treat constipation. Senna also features in the recipe for **Black bile medicinal powder**, which was a medicine used to treat melancholy.

**Sesame** grows in tropical regions around the world and is cultivated for its edible seeds, which grow in pods. Sesame oil (*shīraj* in Arabic), made from the seeds of these plants, was widely used in medicines from the period. Ibn Qayyim al-Jawziyya, writing in the early 14th Century, says "The most useful of the simple oils is oil (*zayt*), then clarified butter or ghee (*samn*), followed by sesame oil (*shīraj*)". In this game, sesame oil



is used in **Ointment of wormwood**, which dries and strengthens cold organs, and **Ointment of Chamomile**, which was used to treat exhaustion.

**Squill** (*Drimia maritima*) is a flowering plant from the same family as asparagus that is native to southern Europe, western Asia, and northern Africa. Squill has been used as a medicinal plant since ancient times. It is noted in the Ebers Papyrus of the 16th century BC, one of the oldest medical texts of ancient Egypt, and Hippocrates used it to treat jaundice, convulsions, and asthma. During the medieval period its primary medicinal use was as a treatment for edema, then called dropsy, because of its diuretic properties, and it was also used as a laxative and an expectorant. In this game, squill juice appears in the recipe for a **Squill confection**, which was used to treat asthma and shortness of breath.

**Starch** is the most common carbohydrate in human diets and is contained in large amounts in foods like potatoes, wheat, maize, rice, and cassava. It has been suggested that starch paste was used to glue papyrus in the Ancient Egyptian period, and rice starch has been used in paper production in China since around 700 CE. In the pharmaceutical industry, starch is often used as a binding agent, and the Romans used it also in cosmetic creams, to powder the hair. In this game, starch appears in the recipe for a **waxy ointment**, which was used to remove hair and soften the skin.

**Sugar** has been produced in the Indian subcontinent since ancient times, but was quite rare and expensive up until the early modern period, and honey was more often used for as a sweetening agent in cooking and pharmacy. However, it features in a considerable number of medicinal recipes from the medieval period. In this game, sugar is used in the recipes for **Angelic eyewash**, which was used to treat eye inflammations, **Black bile medicinal powder**, which was a medicine used to treat melancholy, **Fresh poppy syrup**, which was used to treat coughs and chest pains, **Mastic medicinal powder**, which helped to ease flatulence, **Plain licorice syrup**, which was used to treat coughs and hoarseness, **Rhubarb syrup**, which was used to strengthen the stomach, **Rose syrup**, which was used to treat fever, thirst, and burning of the stomach, a **Strengthening digestive**, which was used to strengthen the stomach and improve appetite, and red sugar is used in the recipe for a **Softening suppository**, which was used to treat constipation.

**Sweet flag** (*Acorus calamus*) is a perennial flowering herbaceous plant that grows in wetland areas in India, central Asia, southern Russia, and Europe. Its first mentioned use in medicine and perfume-making dates back to Ancient Egypt in approximately 1300BC, and it was still being used in the medieval period. In this game, sweet flag is used in the recipe for a **Paste to help the aged retain memory**, which was used to combat dementia.

**Turmeric** (*Curcuma longa*) is a flowering plant of the ginger family, and its roots have been used in cooking and folk medicine for thousands of years. In addition to its use in culinary and medical spheres, turmeric has also been used as a dye on account of its golden yellow colour. During the medieval period, turmeric was referred to as 'Indian Saffron'. There is no evidence of its use in Europe or Arabia during the Classical period. In this game, turmeric is used in the recipe for **Philosophers' paste**, which was used to help improve memory.

**Turpeth** (*Operculina turpethum*) is a plant in the morning glory family, and grows widely in India. In medical recipes from the medieval period, its root was often employed for its purgative qualities. In this game, Turpeth is used in the recipes for a **Hiera pill**, which was used to treat ailments of the head, and **Success paste**, which was used to treat epilepsy and melancholia.

**Verbena** (*Verbena officinalis*) has long been associated with folk magic, as well as traditional medicine. It was called "tears of Isis" in ancient Egypt, and later called "Hera's tears". It was thought to have antiseptic qualities, and also to have the power to ward off spells and curses. In this game, verbena is used in the recipe for a **Clastarion poultice**, which was used to treat eye pains.

**Vinegar** is a water-based solution of acetic acid. The word vinegar arrived in Middle English from Old French (*vyn egre*; 'sour wine'), which in turn derives from Latin: *vinum* (wine) + *acer* (sour). Vinegar is commonly used in food preparation, in particular pickling liquids, vinaigrettes and other salad dressings, and white vinegar is often used as a household cleaning agent. Traces of vinegar have been found in Egyptian urns dating from around 3000 BC, and there is also archaeological evidence suggesting that it was used both as a condiment and for conservation by the Babylonians in the same period. Vinegar has been used in folk medicine for millennia, and in this game it appears in the recipe for **Astringent quince paste**, which was used to treat flatulence, **Another poultice**, which was used to treat warts, eczema, and

ringworm, and wine vinegar is used in **Another agent for causing sneezing**, which was used to treat nosebleeds.

**Violet** refers to plants of the *Viola* species, which are largely found in the temperate Northern Hemisphere. Many *Viola* species contain antioxidants, and the plants were used in many medical recipes during the medieval period, and recent clinical trials have suggested that violet syrup can be helpful in treating coughs in children suffering from asthma. In this game, violets appear in the recipe for a **Softening suppository**, which was used to treat constipation, and violet oil is used in the recipe for an **Enema**, which was used to treat constipation.

**Wine** has been produced for thousands of years, with the earliest archaeological evidence of its production dating back to 4000BC in Armenia. Wine is an alcoholic drink made from fermented grapes, and it has been used in cooking and medicine since that time or earlier. The use of wine in an Islamic context may seem at odds with the religion, but its use in medicine was not prohibited, and many of the recipes from the Classical writers such as Hippocrates and Galen would have called for its use. In this game, wine appears in the recipe for a **Sharp red eye-salve**, which was used to treat mange, scabies, styes, and thickening of the eyelids, a **Strengthening digestive**, which was used to strengthen the stomach and improve appetite, and wine vinegar appears in the recipe for **Another agent for causing sneezing**, which was used to treat nosebleeds.

**Wormwood** (*Artemisia absinthium*) is a herbaceous perennial plant with fibrous roots that is native to Eurasia and Northern Africa. In the Middle Ages, wormwood was used to spice mead, and it is an ingredient in the spirit absinthe, as well as being used for flavouring in other spirits including bitters and vermouth. As a medicine, it is used for dyspepsia, as a bitter to counteract poor appetite. In this game, wormwood shoots appear in the recipe for **Ointment of wormwood**, which was used to dry and strengthen cold organs.

## Animal materia medica

**Asses' milk**, or donkey's milk, is mentioned in medical treatments in texts written in Ancient Egyptian, and Hippocrates recorded its continued use in the Classical period. The national drink of Mongolia, *koumiss*, is made from fermented donkey's milk and a local saying claims it 'cures 40 diseases'. In this game, asses' milk is used in the recipe for **Angelic eyewash**, in which it states that sarcocolla should be cooked in asses milk, which was used to treat eye inflammations.

**Beef suet** is made from the hard fat around a cow's loins and kidneys. It is used in cooking, and is a key ingredient in traditional recipes for Christmas pudding. Beef suet may be rendered down into *tallow*, which was used in medieval medicine to produce salves to treat skin conditions. In this game, beef suet is used in the recipe for a **Paste to help the aged retain memory**, which was used to combat dementia.

**Egg yolk** (*vitellus*) is the part of an egg whose primary function is to supply food for the development of the embryo, and is rich in nutrients. In this game, egg yolk is used in the recipe for **Ointment of eggs**, which was used to help make hair grow.

**Foxes** are small omnivorous mammals from the canine family. The most common fox in the Arabian peninsula is the fennec fox (*vulpes zerda*), which is relatively small in size and has comparatively large ears. This breed of fox is the inspiration for Saint-Exupery's fox in *The Little Prince*. In this game, fox is used in the recipe for **Ointment of hyena and fox**, which was used to treat gout, convulsions and tetanus, and to help strengthen the nerves.

**Honey** is a sweet substance made by bees from the pollen of plants. It appears in a great many pharmaceutical recipes from the medieval period, and was thought to have antiseptic qualities, making it very useful in the treatment of burns. It was also used to help treat coughs and other respiratory ailments, as well as a simple sweetening or binding agent. In this game, honey is used in a number of recipes: **Astringent quince paste**, which was used to treat flatulence; **Hot cordial paste**, which was used to treat palpitations and strengthen the stomach and heart; **Paste to help the aged retain memory**, which was used as a treatment for dementia; **Philosophers' paste**, which improves memory; **Plain liquorice syrup**, which was used to treat coughs and hoarseness; **Squill confection**, that was used to treat asthma and shortness of breath; and **Success paste**, which was used to treat epilepsy, melancholy, phlegm, and black bile.

**Hyenas** may look very similar to dogs, but they are actually genetically much closer to cats. Striped hyenas are common in the Middle East, and are often referred to in folklore as symbols of treachery and as physical incarnations of *jinn*s. In this game, hyena is used in the recipe for **Ointment of hyena and fox**, which was used to treat gout, convulsions and tetanus, and to help strengthen the nerves.

**Mouse's dung** is rendered in the form of droppings that are about 3-6 mm long, with a granular shape and black in colour. For comparison, they are a bit smaller than a rice grain. Mouse droppings can transmit numerous dangerous diseases, such as *hantavirus* and *Salmonellosis*, and should not be handled, let alone ingested. Their most likely function in medical recipes from the medieval period was as a binding agent, and in this game they are used in the recipe for a **Softening suppository**, which was used to treat constipation.

**Musk** is a highly aromatic substance that is produced by the male of a small deer from the Hindu Kush mountains and Himalayas, the *moschus moschiferus*, that marks its territory dropping small balls of the Musk that is produced in two purses attached under its belly that look very much like testicles. Crocodiles also have two pairs of musk glands, one pair situated at the corner of the jaw and the other pair in the cloaca (a crocodile's rectum), and musk glands are also found in some snakes. In this game, musk is used in the recipe for an **Eyewash that brings light to the eye**, which was used to help improve eyesight, and the recipe for **Hot cordial paste**, which was used to treat palpitations and to strengthen the heart and stomach.

**Pearl** is a hard, glistening object produced within the soft tissue of a living shelled mollusk, and is composed of calcium carbonate in minute crystalline form, which has been deposited in concentric layers. When used in medieval medicine, the pearl would be ground down to a fine powder. In this game, pearl is used in the recipe for an **Eyewash that brings light to the eye**, which was used to help improve eyesight.

**Pig fat**, or Lard, is used extensively in baking and cooking, and rendered lard is also used in soap-making. During the medieval period, it was also used in pharmacy, and in this game pig fat is used in the recipe for **Petroleum ointment**, which was used to close and heal various wounds.

**Rabbit's rennet** was made by drying and cleaning a rabbit's stomach and cutting it into small pieces which were then put into salt water and left for several days, after which time the solution was filtered and could then be used. Due to its coagulative qualities, rennet is primarily used in the production of cheese, but it has also had medicinal uses since the classical period. According to Athenaeus of Attalia, the rennet obtained from rabbit (*Lepus capensis*) can be used to treat ulcerative cancers, by rubbing it onto the wound. In this game, rabbit's rennet is used in the recipe for an **Enema** for the treatment of constipation.

**Sea crabs** are found in all of the world's oceans, and are generally covered with a thick exoskeleton, and armed with a single pair of claws. Crabs are prepared and eaten as a dish in many different ways all over the world, and their meat is highly prized in some cultures. In medical recipes from the medieval period, both the meat and the shell were employed, with the latter being ground down to a powder for some uses. In this game, sea crab is used in the recipe for **Glaucoma powder**, which was used to treat glaucoma, which can cause loss of vision.

**Wolf's dung** is unlikely to be top of anyone's list as an element of something that they rub on their face, but in this game it appears in the recipe for **Glaucoma powder**, which was used to treat glaucoma, which can cause loss of vision. Wolves (*Canis lupus*) and other predators that ingest bone have traces of phosphates in their droppings, but the medicinal benefits of this content is highly doubtful, and its most likely function would be as a binding agent or similar.

## Mineral materia medica

**Antimony** is a lustrous grey metalloid, being of both metal and mineral content. Antimony compounds have been known since ancient times and were powdered for use as medicine and cosmetics, often known by the Arabic name, *kohl*. In this game, antimony is used in the recipe for an **Eyewash that brings light to the eye**, which was used to help improve sight.

**Ash** was quite a difficult material to classify, as it could be a byproduct of both plant or animal matter, but it is essentially a reduced mineral form of either source matter, so it is defined as a mineral for the purposes of this game. Ash is used in the recipe for a **Pill for sweetened breath**, which was used to stop vapour and clean the brain, and acted as an aphrodisiac.

**Borax** is an important boron compound, a mineral, and a salt of boric acid. When powdered, it is white in colour, and dissolves in water. Borax is a component of many detergents, cosmetics, and enamel glazes, and it is also found in some commercial vitamin supplements. Borax occurs naturally in mineral deposits produced by the repeated evaporation of seasonal lakes. In this game, Borax is used in the recipe for a **Softening suppository**, which was used to treat constipation.

**Gold scoria** is a volcanic rock that is more commonly dark in colour, and is pitted with many cavities, rather like a sponge. The top knots of the famous statues on Easter Island are carved from red-coloured scoria which was gathered from a local quarry (Puna Pau). In this game, gold scoria is used in the recipe for **Glaucoma powder**, which was used to treat glaucoma, which can cause loss of vision.

**Hematite** is a common iron oxide with a distinctive reddish-brown colouration. The name hematite is derived from the Greek word for blood αἷμα (*haima*), due to this colouration, and hematite lends itself to use as a pigment. Rich deposits of hematite have been found on the island of Elba that have been mined since the time of the Etruscans. In this game, hematite appears in the recipe for a **Sharp red eye salve**, which was used to treat mange, scabies, styes, and thickening of the eyelids.

**Lapis Lazuli** is a deep-blue semi-precious stone that has been prized since antiquity for its intense colour. It was used in the funeral mask of Tutankhamen (1341–1323 BCE), and lapis beads have also been found at Neolithic burial sites across the Caucasus. Archaeologists have determined that lapis was being mined in northeast Afghanistan as early as the 7th millennium BCE, and it was highly valued by the Indus Valley Civilisation (3300–1900 BCE). In this game, lapis lazuli appears in the recipe for **Black bile medicinal powder**, which was used to treat melancholy.

**Lime** is a mineral composed primarily of oxides, which is typically derived from limestone or chalk. It is used in large quantities as material for building and engineering, including limestone products, cement, concrete, and mortar. The Romans made concrete by mixing lime and volcanic ash and placing them in seawater, which solidified the mixture. In this game, lime is used in the recipe for a **waxy ointment**, which was used to remove hair and soften skin.

**Meerschaum** (or *sepiolite*) is a soft white clay mineral, often used to make tobacco pipes. When first extracted, meerschaum is soft, but it hardens on exposure to heat. It is obtained chiefly from the plain of Eskişehir in Turkey, where it occurs in alluvial deposits. In this game, meerschaum appears in the recipe for **Glaucoma powder**, which was used to treat glaucoma, which can cause loss of vision.

**Petroleum** is a naturally occurring, yellowish-black liquid found in geological formations beneath the Earth's surface. Petroleum, in one form or another, has been used since ancient times, and crude oil was often distilled by Persian chemists, with clear descriptions given in Arabic manuscripts by authors including al-Rāzi. In the 13th century, Marco Polo described the oil fields in the area around modern Baku, Azerbaijan, estimating the output of the wells there to be in excess of a hundred shiploads. In this game, petroleum appears in the recipe for **Petroleum ointment**, which was used to close and heal various wounds.

**Raw amber** originates as a soft, sticky tree resin, and may sometimes contain animal and plant material, making it hard to categorise for the purposes of this game. As amber also occurs in coal seams, it is classed as a mineral for the game, but this is admittedly a highly debatable classification. Amber has long been used in folk medicine for its purported healing properties, and amber was used from the time of Hippocrates in ancient Greece for a wide variety of treatments through to the Middle Ages. In this game,

amber appears in the recipe for a **Strengthening digestive**, which was used to strengthen the stomach and improve appetite.

**Salt** is a mineral that is present in vast quantities in seawater, where it is the main mineral constituent. Some of the earliest evidence of salt processing dates to around 6,000 BC, when people living in the area of present-day Romania boiled spring water to extract salts, and a salt-works in China dates to approximately the same period. Salt was also prized by the ancient Hebrews, the Greeks, the Romans, the Byzantines, the Hittites, Egyptians, and the Indians. Salt is present in most foods, but in naturally occurring foodstuffs such as meats, vegetables and fruit, it is present in very small quantities, but is often added as part of the cooking process. In this game, salt is used in the recipe for a **Hiera pill**, which was used to treat ailments of the head, and **Ointment of hyena and fox**, which was used to treat joint pains, gout, convulsions, and tetanus, and to strengthen the nerves.

**Verdigris** is the common name for a green pigment obtained through the application of acetic acid to copper or the natural patina formed when copper, brass or bronze is weathered and exposed to air or seawater over time. Its vivid green colour made verdigris a much used pigment, and it was frequently used in painting. In this game, verdigris appears in the recipe for a **Sharp red eye salve**, which was used to treat mange, scabies, styes, and thickening of the eyelids.

**Water** is a transparent, tasteless, odourless, and nearly colourless chemical substance, which is the main constituent of our planet and most living organisms. It is by nature omnipresent, so its frequent use in pre-modern medicine is unsurprising. It was used both in its pure form, and also combined with other elements. In this game, water appears in a number of recipes: **Astringent quince paste**, which was used to treat flatulence; **Fresh poppy syrup**, which was used to treat coughs and chest pains; **Ointment of hyena and fox**, which was used to treat joint pains, gout, convulsions, and tetanus, and to strengthen the nerves; and **Rose syrup**, which was used to treat fever, thirst, and burning of the stomach.

**White wax**, or Chinese wax, is used chiefly in the manufacture of polishes and candles, but it has also been employed medicinally. Taken internally, it has been used as a remedy for hoarseness, pain, worms, nervousness, and to aid the mending of broken bones. Externally, it has been used as an ointment for treatment of wounds. **Errata:** Chinese wax is obtained from the wax secreted by certain insects, so this entry should come under Animal Materia Medica and have a red amphora rather than blue. As blue and red have the same statistical chances in the game, this should not affect scoring, but the error is unfortunate. In this game, white wax appears in the recipe for a Clastarion poultice, which was used to treat eye pains, and **Petroleum ointment**, which was used to close and heal various wounds.

**Yellow arsenic** and other arsenic sulfides such as orpiment and realgar have been known and used since ancient times. In around 300AD, the Egyptian alchemist Zosimos of Panopolis describes roasting *sandarach* (realgar) to obtain a cloud of arsenic, which he then reduced to gray arsenic. In the Victorian era, arsenic was mixed with vinegar and chalk and eaten by women to improve the complexion of their faces, making their skin paler to show they did not work in the fields. Owing to its use by the ruling class to murder one another and its potency and discreetness, arsenic has been called the "poison of kings" and the "king of poisons". In this game, yellow arsenic is used in the recipe for a **waxy ointment**, which was used to remove hair and soften skin.

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