Drugs and Medicines in the Roman World

John Scarborough

The doctor stepped softly out of the sickroom, where Licinius was breathing his last. Rattling, rasping, wheezing, gasping for air, the senator had accepted death and requested that his friend and physician, the medicus *Marcus Junius Asclepiades, leave the opos lozenges next to the bedside. Caecina's son, Publius Licinius Caecina, was last to leave the room, misty with the rich stench of smoking* libanotos. *Soon there was the faint tinkle of the lozenges dropping to the bottom of a glass cup, followed by a crackle as the lozenges snapped and melted over a flame; and then the mellow gurgle of wine poured into the cup escorting the hiss of cooling. Silence. A quick gulp. Marcus Junius Asclepiades whispered, "He will sleep, now. A death of gentle descent, freeing him from his unbearable body, a death by the earliest glimpse of Apollo's chariot in the dawn."*

Licinius' wife of three decades had suggested that they burn the far less expensive glechon *in the sickroom, but the medicus noted that this* medicamentum *was useful in the birthing chambers specifically. It was not appropriate for the production of reverential aromas in the resting place of the gravely ill. Julia had reflected a moment and remembered: "Indeed, yes, the attending* obstetrix *did use* glechon *when Publius was given to us. So much blood, nicely staunched by the smoke from the* glechon." *Marcus Junius Asclepiades quietly wept. "Summon the undertakers and the mourners: we will shortly need them."*

FIG. 1. OPIUM POPPY (*Papaver somniferum*). The seeds and latex of the opium poppy were used either directly or in processed form—decoction, capsule, lozenge, poultice—to treat insomnia, coughs, diarrhea, boils, indigestion and other conditions.
Wien, Österreichische Nationalbibliothek, Cod. Med. gr. 1, *folio 221v*

The scene here depicted is part of social and medical history in the Roman Empire. Publius Licinius Caecina is a real historical figure, recorded as the son of a senator who had committed suicide in Roman Spain a generation before Pliny the Elder set down his *Natural History*. (Pliny dedicated his 37-book compendium to Titus the Emperor in AD 77.) A brief account of the suicide is in *Natural History*, XX, 199.

Medicamenta ("drugs," "remedies," sometimes "poisons," "cosmetics," or "dyes") were prominent in the lives of the Romans. The best physicians were well-schooled in pharmaceutical lore, with an armamentarium of drugs (Fig. 2) derived generally from botanicals, but often from animals and minerals. The quasi-fictional scene of the elder Licinius' suicide includes an attending physician, usually called a *medicus* in Latin or a *iatros* in Greek. Here Marcus Junius Asclepiades is marked as a friend of the dying man. (Many *medici* styled themselves with the cognomen Asclepiades, presumably to be identified with Asclepius, the ancient god of medicine.) Good physicians frequently were clients of powerful families in the Roman Empire, sometimes with both families and physicians interlocked over several generations. Marcus the medicus probably had learned his art as an apprentice to an experienced physician. Or perhaps he had gained some valued years attached as a medicus to one of the legions which had conquered Britain after AD 43.

Julia's recollection of her *obstetrix* ("midwife") also reflects the ordinarily assumed knowledge of drugs by these experienced women. Midwives were recognized as professionals in their own right, particularly in terms of knowledge of drugs, medicines, and poisons. Roman

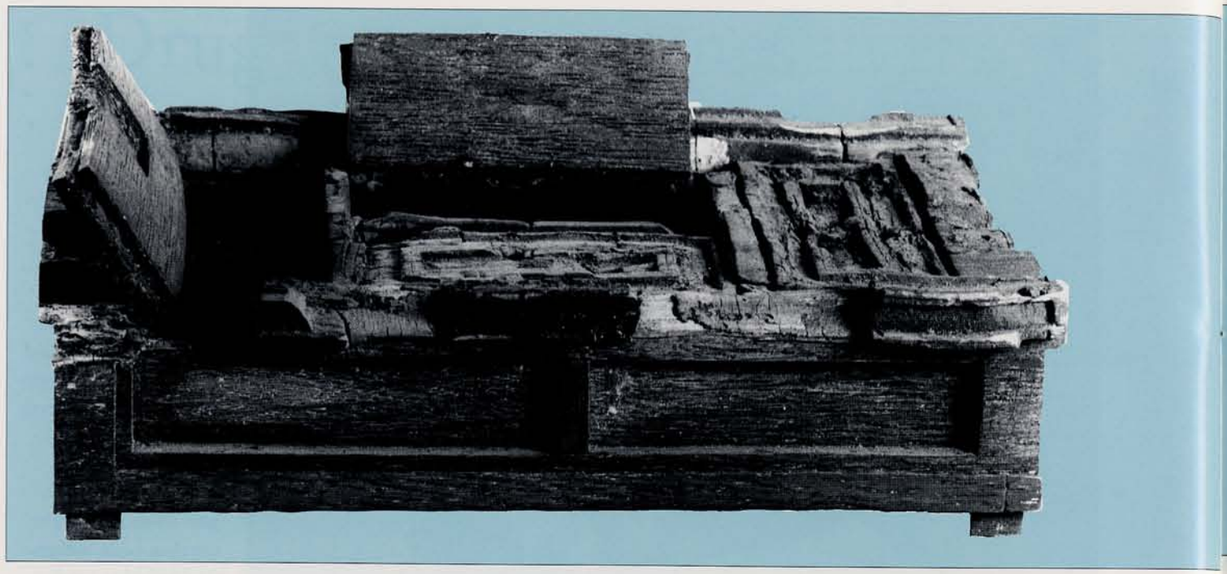


FIG. 2. A PHYSICIAN'S WOODEN DRUG BOX. A "drug box" did not carry medicaments in a prepared form as one might buy a pill or tincture or salve in a modern pharmacy; rather the boxes would have carried the crude drugs to be mixed or melted or pounded as needed either for a single dosage or in some larger bulk which had a reasonably long shelf life. Moist drugs stored in wood containers would not include anything oily, but could include beeswax and perhaps aged animal fats, although both would leech after a time into the wood. A drug box might hold, in separate chambers, tears or chunks of frankincense and myrrh, saffron, some selected flower petals (rose petals keep for a week or so, iris petals about two weeks), and perhaps the dry bulbs of squill or rhizomes of iris.

With the exception of the saffron, frankincense, myrrh, and beeswax, fresh supplies would have to be gained in season. Itinerant physicians, as most were in Roman times, no doubt asked in each locality what (folk) drugs were used in any given season. In northern Europe, drug boxes might hold mistletoe, mushrooms, perhaps ground-up seahorses, and calcined shells if on the coast of Gaul, among the Batavians, or even in Roman Britain south of Hadrian's Wall. If wormy parasites afflicted a given legionary camp, the doctor could come calling with boxes full of the male fern, a well-known antihelminthic since Aristotle's day and nicely documented in the 6th century by Alexander of Tralles' *Letter on Intestinal Worms*. A doctor of less than good repute might carry about the wing covers of blister beetles from which to make a popular aphrodisiac, or the fresh leaves and stems of the pennyroyal to provide contraceptive potions for women in any of the sprawling legionary camps of Europe.

One of many medically related grave goods found in a sarcophagus in Nijmegen (The Netherlands); 3rd century AD (Künzl 1983).

Courtesy of Rijksmuseum van Oudheden

jurisconsults were certain of this special expertise, and one reads in the *Digest* that *obstetrices* were the "experts" to certify or deny a pregnancy. Such women were also skilled in administrating fertility drugs (*Digest* XXV, 4.4 and XLVIII, 8.3.3).

Three drugs are conspicuous in the death scene of Licinius: *opos*, *libanotos*, and *glechon*. Each of the three was widely known, with libanotos (the famous frankincense) normally reserved for the wealthy due to its cost. Opos is the very common latex of the opium poppy (Fig. 1), easily obtained in any market square in the towns and cities of the Roman empire. Opos was frequently employed by Romans who wished a painless death, especially when an illness was deemed incurable. Glechon (or *blechon*) is the cosmopolitan pennyroyal, known since early Greek times as a contraceptive (made into a tea) for women. It was also a preferred herb for burning in the birthing chambers due to its sweetish odor, so one learns from the *Gynecology* of Soranus of Ephesus (flourished ca. AD 117). Not only did the medicus know the useful properties of these three drugs, but so did Licinius' wife and Licinius himself.

These glimpses of a common knowledge of drugstuffs among the Romans suggest several aspects of ancient life very much at variance from modern, city-based living in the West. Almost everyone, from the most noble to the lowest levels of society, was in some way intimately connected with the land. Wealth almost always was measured in land and its agricultural production, whether for a known market in cash crops, or in terms of what a given plot of land might produce for subsistence.

Henna was an item treasured by Roman women who used the finely ground green powder to color their fingernails, toenails, and hair a fashionable reddish-brown.

Nearly everyone knew plants of many varieties from earliest childhood. Most knew the numerous teas brewed from "weeds" (usually unnamed) gathered by the roadsides or in fallow fields quickly accessed from all but the very largest urban centers. Almost everyone knew something about the finest vegetables and fruits, the best grains employed for the highest grades of breads. Anyone who had any pretense to high culture knew by definition the best wines and the grapes from which these vintages were fermented. Roman wine-fanciers could easily identify locale and year with a precision perhaps unmatched even today. Good cheeses (and poor ones) were known by their distinctive tastes and aromas, and high-quality olive oil was treasured for its clarity (for cooking) and for its lubricant properties. Oil seeds and their marvelously varied oils—sesame, linseed (flax), poppy (totally free of any narcotic properties), and many others—were known by consistency and clarity, especially by the talented cooks who were members of all Roman households claiming any sort of status.

Cosmetics, including the famous henna or camphire (Fig. 3), were always available in a daily-fresh supply. Henna was an item treasured by Roman women who used the finely ground green powder to color their fingernails, toenails, and hair a fashionable reddish-brown. Drugs, foods, and cosmetics were intermeshed in Roman perceptions, much as we think of spices as drugs while also using them to enhance the flavors of foods, or as we think of fragrant emollients as useful in both perfumes and moisturizing creams for the skin.

BOTANICALS

The first surviving herbal in Greek is that by Theophrastus of Eresus (ca. 370–288/5 BC), the most brilliant of Aristotle's students. Theophrastus put down his *Inquiry into Plants* about 300 BC, and Book IX of this important tract on botanical morphology is devoted to medicinals. The ultimate sources for practical data were the ever-present *rhizotomoi* ("rootcutters") and *pharmakopolai* (sing. *pharmakopoles*: "drug seller" or "apothecary"), who provided Theophrastus with much information on what parts of what plants were useful as drugs (*pharmaka*, sing. *pharmakon*). Of the 500 or so plants that can be identified in Theophrastus with some assurance, about 70 are medicinals, a fraction of the drugs known and derived from plants and animals in Greek antiquity. Poisons are here as well, including the infamous hemlock quaffed by Socrates at the behest of the Athenians in 399 BC. Not surprisingly, Athenians knew exactly how hemlock was to be prepared, and the democracy had a Committee of Eleven elected to supervise executions for capital crimes. The Committee of Eleven directed the preparation of this poison, and everyone was presumed to know the process and its results.

Citizens of Attica, the large *polis* that boasted Athens as its fortified urban and cultural center, also knew well the plants of contraceptive use. Aristophanes (ca. 457–385 BC) could assume easy comprehension of jokes and puns on blechon/glechon in his uproarious and earthy comedies *Peace* (421 BC) and *Lysistrata* (produced in 411 BC). The commonplace and conventional pennyroyal tea was, after all, indispensable for prostitutes of all levels to stay in business. Call girls could also have employed the garden-variety rue (Fig. 4), a decoction of its leaves giving control over menstruals, as well as providing early abortions as necessary. Tragedies, too, had their botanicals. Sophocles' (ca. 496–406 BC) lost play *The Rootcutters* had a vivid scene in which Medea in a frenzy dances naked in the moonlight after imbibing the juice of the so-called deadly carrot (*Thapsia garganica* L.). This plant was another of the widespread wild species known to all who maintained small or large plots anywhere among the *poleis* of Greece.

The Athenian *agora*, much as would be true for marketplaces in later Hellenistic and Roman times, featured stalls designated for the sale of particular vegetables, always fresh, always "the best." One reads of specialized vendors who hawked various kinds of olive oils, the oils of seeds, fruits, and pharmaka that included sage, several types of mint (e.g., spearmint (Fig. 5), horsemint, Bergamot mint, woolly mint, and pennyroyal),

FIG. 3. HENNA (*Lawsonia inermis*). Roman women used powdered leaves of henna to color their fingernails, toenails, and hair a fashionable reddish-brown.

Courtesy of K. Jayaram and A-Z Botanical Collection

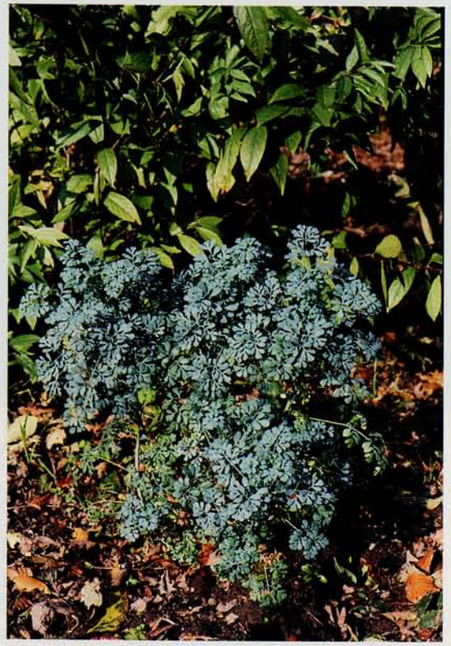


FIG. 4. RUE (*Ruta graveolens*). An extract of the leaves of ordinary rue was thought to be effective in contraception and early abortion.

Courtesy of Maurice Nimmo and A-Z Botanical Collection

mallows (especially the high mallow, used for mucilage, as an expectorant, and a decoction of the flowers as an excellent gargle and mouthwash; Fig. 6), and often exotics brought from somewhere in the "East." Generally one could find black pepper (*Piper nigrum* L.), depending on trade and sailing conditions to and from India and points further east. (The red peppers (*Capsicum* spp.) were unknown in European or Asiatic diets or pharmacopeias until the discovery of the New World.)

Greek and Roman diets were quite healthy and highly flavored: some of the favored additives were *garum* (fermented fish entrails), pepper from India, cinnamon, and cassia. Local spices known from Mycenaean times (ca. 2500 to ca. 1000 BC) included saffron (Fig. 7), cumin, and a number of others. The Linear B tablets from Mycenaean Pylos (dated to ca. 1200 BC) suggest a thriving perfume industry, so that from earliest times pharmaceuticals were important in the culinary arts, perfumery, and medicinals.

ANIMAL PRODUCTS

Pharmaka also incorporated animal products: honey, beeswax, the ill-famed solution made from blister beetles (usually *Lytta* spp., still around as "Spanish fly"), fats, marrows, milks, crushed cockroaches, concoctions of boiled snakes, and even the rennets procured from the stomachs of seals, goats, oxen, and other animals. Honey is an excellent ingredient for wound dressings. Its high pH (3.9 on average) enabled Greek and Roman physicians to apply fats, oils, and honey in bandages on wounds

FIG. 5. SPEARMINT (*Mentha spicata*). Any of the *Mentha* species could be carried as leaves in the physician's box. Leaves and stems of the pennyroyal (*Mentha pulegium* L.) were made into a contraceptive tea or burned in the birthing chamber on account of its sweetish, minty odor. Mints also gave flavoring to wines of many varieties; Disocorides, Book V, mentions several.

Courtesy of Dan Sams and A-Z Botanical Collection

FIG. 6. MALLOW* (*Malva sylvestris* L.). Pharmaka that included mallows, mints, pennyroyal, sage, and even exotics brought from somewhere in the "East" were the kinds of items found in the specialty stalls of the Greek, Hellenistic, and Roman marketplace.

Wien, Österreichische Nationalbibliothek, Cod. Med. gr. 1, *folio 16v*

and injuries, effectively "drying" them out and killing many bacteria in the process. Beeswax was another item of commerce, and any owner of a set of hives knew the flowers whence his bees gained their nectar and constructed their combs. Not only could physicians use beeswax as the finest of foundations for their poultices and plasters—wax is easily melted and applied, and adheres harmlessly to the wound—but these "cerates" (*cera* is Latin for "wax") could be sold in bulk for making sealants of many kinds, from jar-stoppers to the seals attached to letters. Wax tablets took the place of portable chalk boards in the primary schools of classical antiquity; writing in wax is quickly smoothed out and the "erased" tablet reusable indefinitely. Wax and honey aficionados could tell a particular kind by locale, each having its own unique consistency and taste. (Poison honeys were also known.)

Honey is an excellent ingredient for wound dressings.

The use of blister beetles in aphrodisiacs and poisons was common enough in the Greco-Roman world to engender a large literature. The odd hexameter poems by Nicander of Colophon (fl. ca. 130 BC), *Theriaca* and *Alexipharmaca*, detail characteristics of presumably poisonous animals, as well as poisons derived from plants and minerals, along with antidotes. *Kantharis* (the solution made from two species of blister beetles) is prominent, and Nicander and his sources suggest a number of antidotes, with one actually being beneficial (a quick and massive dosage of chalk, quite similar to our kaolin).

Many fats are listed by Dioscorides in his brilliantly conceived *Materia Medica* of ca. AD 70. Here are the fats of bears, goats, and lions, and the more easily obtained fats and greases from sheep (lanolin or "wool grease" is recognized), ducks, geese, and other animals.

FIG. 7. CROCUS (*Crocus sativus*). Local spices known from Mycenaean times (ca. 2500 to ca. 1000 BC) included the costly saffron (*Crocus sativus* L.), cumin (*Cuminum cyminum* L.), and a number of others. Saffron, mixed with myrrh or frankincense, frequently turns up in ancient treatises as an ingredient in *collyria* (generally "eye salves"); Galen and Dioscorides describe its use as a dye and a menstrual-control drug.
Courtesy of A-Z Botanical Collection

Marrows are likewise listed, as are milks and bloods of many species of reptiles, birds, and mammals, including humans.

DIOSCORIDES AND THE *MATERIA MEDICA*

Dioscorides of Anazarbus is one of the great figures in the history of medicine and pharmacy, and his *Materia Medica* became *the* text on drugs of all kinds. Galen of Pergamon, the polymathic philosopher and physician (AD 129–after 210), quotes and gives Dioscorides enormous respect, while ignoring the Anazarban's prescient "drug affinity" system, that is, what drugs did when administered to patients for particular ailments. Dioscorides' methodologies demanded that a physician be a field botanist, knowing plants in all of their stages of growth, knowing the best ways in which to gather herbs and their specific preparation techniques, and observing the detailed actions of these drugs when given for treatments to alleviate illnesses.

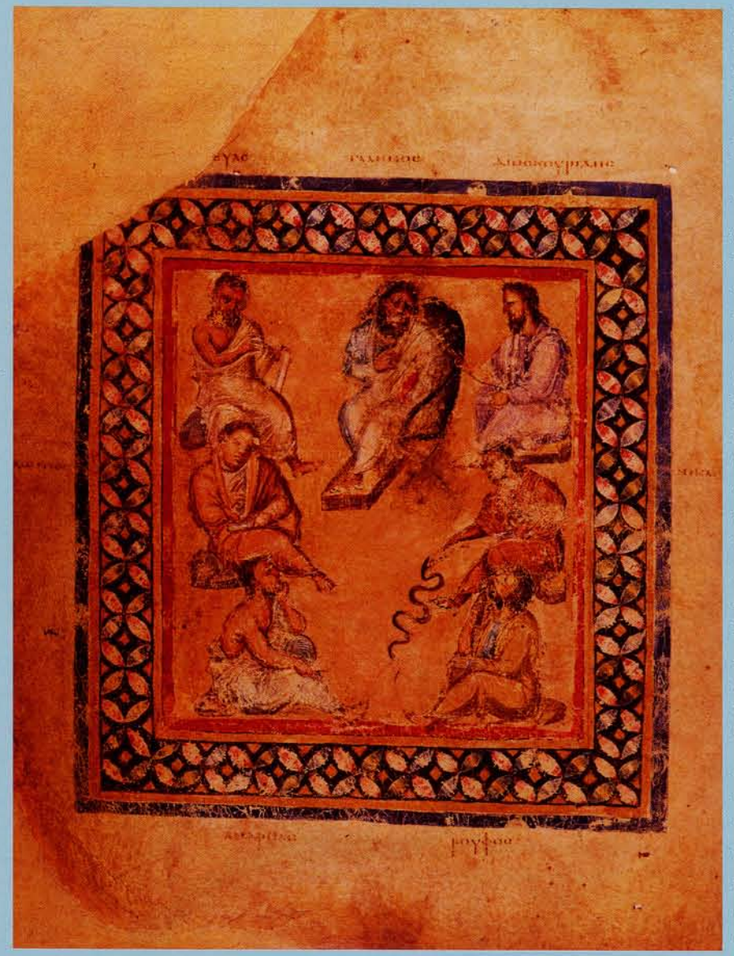
Dioscorides had little patience for the "vain prating" of philosophers as they attempted explanations for pharmacal actions. But he does employ the venerated concepts of the Four Elements (the Aristotelian Fire, Earth, Air, and Water) and the Four Qualities (the Hot, the Wet, the Cold, and the Dry) to propound how compound drugs could be mixed and how simples could work against diseases characterized by any one of the Qualities. There is no trace of the famous Hippocratic-Galenic humoral pathology, which speaks of disease as an excess (Greek *plethora*: sometimes a "fullness" or "satiety") of one of the Four Humors (Blood, Phlegm, Yellow Bile, and Black Bile), but many physicians in the Roman Empire did assume a set of humors as explanation of health and disease. (*Krasis* was the state of perfect "balancing" among the Four Humors, *dyskrasia* the "imbalance" of disease.)

Painstaking observation distinguishes Dioscorides' drug lore, and many details in the *Materia Medica* are replicated by Galen and other Roman authors on medicine. Although Dioscorides loathed alphabetical lists of drugs and plants, this is exactly what happened to his collection of data in the *Materia Medica*. Galen chose to rearrange the ordering of the 600-odd pharmaceutical substances, and alphabetical tabulations of Dioscorides' drugs were in circulation (in Greek) at the latest by the middle of the 4th century.

Crateuas, physician to Mithridates VI of Pontus (ca. 120–63 BC), produced an illustrated herbal, but Pliny the Elder (*Natural History*, XXV, 8) complained about its badly mauled images, perhaps indicative of the difficulty in depicting colored plants in the usual rolls of papyrus. Once the form of the "book" shifted from the

FIG. 8. "THE SEVEN PHYSICIANS": folio 3v of the Vienna Dioscorides codex, dated to AD 512.

The Byzantine artists commissioned to illuminate the numerous plants, snakes, insects, and animals in this early scientific manuscript also provided "portraits" of the authors of basic Greek texts in medicine and drug lore.



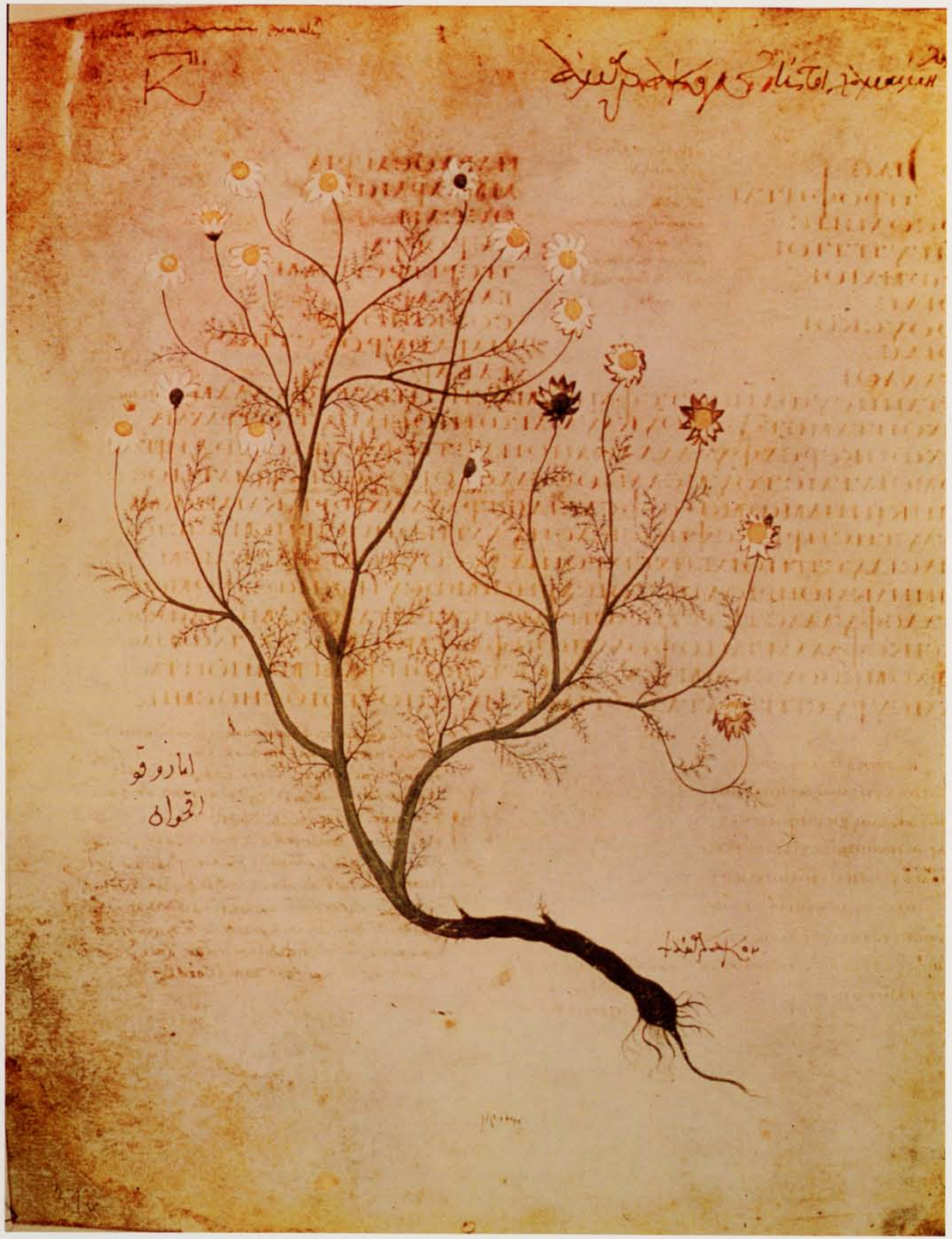
Seated prominently in an armchair (top center) is Galen of Pergamon (AD 129–after 210), whose huge collection of writings had become standard by the 4th century. Galen's absolute authority is reflected in almost all other medical works of the 5th and 6th centuries.

To Galen's left is Dioscorides of Anazarbus (fl. circa AD 70), whose *Materia Medica* forms the majority of the text in the Vienna Codex. Seated below Dioscorides is Nicander of Colophon (fl. circa 130 BC), shown, appropriately, with a snake. (Nicander's hexameter poems on toxicology were quoted in the early 6th century as definitive on poison lore.) Below Nicander and gazing up with respect at Galen is Rufus of Ephesus (fl. circa AD 120), whose collected works on diagnosis, prognosis, and therapies enjoyed widespread respect.

To Galen's right is Crateuas (fl. circa 90–70 BC). Infamous as the toxicologist-physician to Mithridates VI of Pontus, Crateuas' "experiments" with poisons on live human subjects led to Mithridates' equally infamous ability to quaff any or all toxic substances without ill-effect. Like Dioscorides, Crateuas has his hand raised in the Byzantine artistic convention representing conversation. Below Crateuas is the famous Alexandrian pharmacologist, Apollonius Mys (fl. circa 50 BC), noted by Galen as one of the best in his day. Last of the seven, seated on a rock, is Andreas. The personal physician of Ptolemy IV Philopater (r. 222–204 BC), Andreas was known for his skills in preparations of potions and complicated, multi-ingredient drugs.

This "Seven Physicians" folio, 3v, represents the basic medical authorities for the Byzantines in the early 6th century. A preceding "Seven Physicians" folio, 2v, includes two mythical physicians, Cheiron and Machaon, and five historical figures: Pamphilus of Alexandria, Xenocrates of Aphrodisias, Sextius Niger, Heracleides of Tarentum, and Mantias. Taken together, these two folios provide a concise pictorial history of medicine from classical Greek days to the early 6th century. Notably absent from the pantheon is Hippocrates of Cos, usually thought of as the father of western medicine.

Wien, Österreichische Nationalbibliothek, Cod. Med. gr. 1, *folio 3v*



◀ FIG. 9. CHAMOMILE (*Matricaria recutita*). Dioscorides tells us that chamomile, prepared as a drink or a sitz-bath, has heating and thinning properties useful in disorders of the liver, intestines, bladder, and the female reproductive system. Applied as a plaster, the herb cures ulcers of the eye (viz. lachrymal fistulas), and chewed, it cures thrush in children. (*Materia Medica*, III, 137.2 [ed. Wellmann, II, p. 146])

Wien, Österreichische Nationalbibliothek, Cod. Med. gr. 1, *folio 31v*

FIG. 10. PALE BLUE JAR with an indented sidewall, 3rd–4th century AD. In both the drug vendor's stall and the home, glass vessels were used to mix and store the materials for drugs and cosmetics. This jar was probably used to mix together an oil—perhaps carefully clarified olive oil—with one or more sweet-scented ingredients such as crushed and pounded rose hips, cinnamon, or saffron. Provenance unknown.

UPM no. 86-35-109. Donated by George and Henry J. Vaux (1986). H. 7.8 cm

papyrus roll to the flat sheets of the codex after AD 350 or so, illuminations of all kinds could be incorporated in the recopied texts. One of the earliest surviving of these illustrated manuscripts is the Codex Anicia Juliana, dated to AD 512 (Fig. 8). This is the most luxurious of Byzantine scientific manuscripts: it contains 498 miniatures, mostly of the plants in Dioscorides' *Materia Medica* arranged alphabetically (see Figs. 1, 6, 8, 9). The Codex (listed as Greek medical MS No. 1 in the National Library in Vienna) also has illuminations accompanying prose-summaries of Nicander's *Theriaca* and *Alexipharmaca*. The plants-as-drugs pictured are occasionally masterpieces of painting and occasionally simply dreadful. Among the folios that provide rather good depictions is folio 221v, labeled MHKO HMEPOC KHΠAIOC, the opium poppy (see Fig. 1), about which Dioscorides writes:

> a common property among the poppies is cooling . . . the leaves and capsules are decocted (viz. "boiled down") in water and applied as fomentations to induce sleep; and the decoction is drunk for insomnia, and the capsules triturated (viz. "pounded finely") and mixed with a poultice of hulled barley and made into plasters are fitting for inflamed boils and cases of erysipelas. One should make them into lozenges—pounding them in a mortar while they are still green—and drying them to lay them up in storage and thereby employ them . . . the capsules themselves being boiled down in water as far as one half, then again boiled with honey until the moisture condenses out, they make a drug which is a pain-killing lozenge for coughs and discharges of the windpipe and disorders of the bowels . . . (2)
>
> (3) The seed of the black poppy triturated is drunk with wine for diarrhea and excessive menstrual flow; it is applied as a plaster with water to the foreheads and temples of insomniacs. The latex itself is, however, yet more cooling and thickening and drying and taken in as small a quantity as a bitter vetch seed, it is an anodyne and sleep inducer and promotes digestion, being useful for coughs and intestinal disorders; but too much being drunk plunges one into a lethargy in sleep, and it kills. (*Materia Medica*, IV, 64 [ed. Wellmann, II, pp. 218-221])

Folio 31 pictures *anthemis* (*Anthemis* spp., the chamomile; Fig. 9), and on anthemis Dioscorides says:

> The roots and flowers and the whole herb have heating and thinning properties: taken in a drink, or administered in a sitz-bath, they draw out a woman's menstrual flow as well as an undeveloped fetus, bladder stones, and urine. These are also drunk for treatment of bowel gas and for intestinal

Glossary of Plants

Arabian myrrh	*Commiphora myrrha* (Nees.) Engl.
black pepper	*Piper nigrum* L.
chamomile	*Anthemis* spp.
cumin	*Cuminum cyminum* L.
deadly carrot	*Thapsia garganica* L.
frankincense	*Boswellia carteri* Birdw.
hemlock	*Conium maculatum* L.
henna or ***camphire***	*Lawsonia inermis* L.
high mallow	*Malva sylvestris* L.
mints	
Bergamot mint	*Mentha aquatica* L.
horsemint	*Mentha longifolia* (L.) Huds.
pennyroyal	*Mentha pulegium* L.
spearmint	*Mentha spicata* L.
woolly mint	*Mentha rotundifolia* (L.) Huds.
opium poppy	*Papaver somniferum* L.
rue	*Ruta graveolens* L.
saffron	*Crocus sativus* L.

obstructions and for jaundice, and they cleanse and cure liver complaints. And decocted, these are used in fomentations as treatments for the bladder. But more useful for those who suffer from stones are those colored purple; the white-flowered and gold-flowered kinds are more diuretic. They are also curative for ulcers of the eye (viz. lachrymal fistulas) being laid on as plasters, and chewed they cure thrush in children. (*Materia Medica*, III, 137.2 [ed. Wellmann, II, p. 146])

In his Preface to the *Materia Medica* (ed. Wellmann, I, pp. 1-5), Dioscorides offers a clipped synopsis of why his compendium of pharmacal lore improves markedly on the efforts of his predecessors. He also admonishes anyone reading his account to constantly augment the mass of details by "extending . . . the range of preparations and mixtures and . . . trials on patients, for the knowledge of each individual drug has a great deal to contribute" (Preface, 3 [ed. Wellmann, I, p. 2]). The Preface presents the most precise and inclusive summary of drug preparation and storage that we have from classical antiquity, and modern pharmacists can appreciate the specifics:

> Extract juices from plants by infusion [or decoction] when the stems are recently sprouted, and similarly with leaves; but to gain juices and drop-like gums by tapping, take the stems and cut them while still in their prime. Gather roots for laying up in storage, as well as roots for juices and root barks, when the plants are beginning to shed their leaves. The clean roots should be dried out immediately in areas free from moisture, but roots with earth or clay adhering should be washed with water. Flowers and such parts that have a sweet smelling fragrance should be laid down in small dry boxes of limewood, but occasionally they can be wrapped serviceably in papyrus or leaves to preserve their seeds. As for moist drugs, any container made from silver, glass, or horn will be suitable. An earthenware vessel is well adapted provided it is not too thin, and, among wooden containers, those of boxwood. Copper vessels will be suitable for moist eye-drugs and for drugs prepared with vinegar, raw pitch or juniper oil. But stow animal fats and marrows in tin containers. (Preface, 9 [ed. Wellmann, I, pp. 4-5])

'Flowers and such parts that have a sweet smelling fragrance should be laid down in small dry boxes of limewood'

The drug booths in Roman fora featured a large variety of concoctions, compounds, and simples used in culinary recipes, medications, and cosmetics. The substances incorporated many land and sea creatures, as well as plants. Typical are the following from Dioscorides' *Materia Medica*:

Fig. 11.
Unguentarium of pale green glass, 1st century AD. This small bottle probably stored the kind of sweet-scented medicinal oils prepared in jars such as that in Figure 4. Provenance unknown.
UPM no. MS 5285A. Donated by Mrs. William Pepper (1914). H. 11.3 cm

> A sea horse is a small sea creature, which being burned, the ash is prepared as an ointment with raw pitch, or hog's fat, or oil of marjoram, and smeared on a bald spot brings back hair to those afflicted with alopecias. (*Materia Medica*, II, 3 [ed. Wellmann, I, p. 122])

> Reduced to ash (viz. "calcined"), a purple shellfish has a dessicant property for detersive cleaning of teeth, for checking fleshy overgrowths, and for cleaning out sores and causing them to scar over. And trumpet shells calcined have the same properties as the purple shellfish, but the trumpet shells are more caustic; and if one fills them with salt and calcines them in an unfired earthenware pot, they are beneficial as a tooth powder, as well as for burns, being used as an ointment smeared on. But the drug should be allowed to become dry and hardened like a potsherd: for the burn having scarred over, the ointment falls off spontaneously. (*Materia Medica*, II, 4 [ed. Wellmann, I, pp. 122-23])

> Fresh clams are good for the bowels, but the soup made from them is best. Pickled, reduced to ash, pounded smooth with Greek juniper oil and dropped on plucked eyelids, the eyelashes will not grow back again. And the soup made from the small rectangular bivalves and from other cockle-like shellfish move the bowels (viz. act as laxatives), being boiled with a little water. And this kind of soup is taken with wine. (*Materia Medica*, II, 6 [ed. Wellmann, I, p. 123])

> Triturated with myrrh and frankincense and applied as a plaster, the flesh of these snails close up wounds, particularly the wounds in and about the tendons; and triturated with vinegar, they stop bleeding from the nostrils. And the living animal gulped down (especially the Libyan snail) alleviates stomach pains. Pounded whole with its shell and a small portion drunk with wine mixed with myrrh, the snail cures pains of the bowels and the bladder. And the land snail also glues hairs together: one inserts a needle down into the snail's flesh and attaches or fastens the hair with the gummy matter brought out on the point of the needle. (*Materia Medica*, II, 9. 3 [ed. Wellmann, I, p. 125])

Dioscorides and other medical and pharmaceutical sources reveal a tumbling series of details on plants, animals, spices, oils, wines, vinegars, and minerals—clear indications of deep and venerated expertise necessarily shared by shoppers in the agora and forum. Drug fraud was expectedly common, and Dioscorides frequently adds instructions for detection of fakes from the "real stuff," as in the case of the latex of the opium

poppy (*Materia Medica*, IV, 64.5–6 [ed. Wellmann, II, p. 220]). A modern scholar can identify a number of snails, sea creatures and shellfish, insects, plants, and minerals, so clear are the descriptives in both their drug actions and morphologies in what we would term natural history. Equally interesting is how Dioscorides indicates particulars of fashion in his own century. One can but wonder about eyelash removal as a statement of an attractive appearance (although this treatment could reflect a long-term therapy for infected eyelashes: pluck the lashes, prevent them from growing back, and the affliction is cured).

THE MARKETPLACE

Frankincense and myrrh are frequently prescribed in the writings of Dioscorides, Galen, and Pliny the Elder, and in many other medical texts from the Roman Empire. This indicates that the two "Arabian spices" were ordinarily available, if somewhat expensive, much as was the *very* costly saffron, which was almost always a local product. Saffron is gained from the styles of the flowers of *Crocus sativus* L. (see Fig. 7), and it takes 100,000 flowers to produce 1 kilogram.

Drug markets and spice markets in the Roman Empire generally mirrored "going prices" for valued condiments. Pliny the Elder tells us that Arabian myrrh fetched 16½ denarii for a Roman pound, and that the best grade of frankincense cost 6 denarii for a pound (Pliny, *Natural History*, XII, 70, 65); however, there is no mention of saffron. Yet when the famous Price Edict was promulgated by Diocletian in AD 301, saffron's fixed price was 2000 denarii for a Roman pound, a price reflective of the rampant inflation characteristic of 3rd century economics. As costly as saffron became, one can presume *krokos* remained available to forum shoppers for many centuries, since saffron is listed as part of a quince jam recipe prescribed by Alexander of Tralles in the last part of the 6th century.

In spite of official attempts, sporadic at best, to regulate prices and products in the Roman Empire, most people bartered and bargained in the forum or agora as had generations before them. Even the great warehouses (the *horrea*) had limited impact, although the *Horrea Piperataria* in Rome (established under Domitian [AD 81–96]) functioned to store "exotic drugs and peppers [and] the convenient retailing of them in one place where adequate control would be exercised" (Rickman 1971:106). Since the great majority of settlements in the Roman Empire were small country towns, most markets flourished far from official sanctions, and Dioscorides' recommendations for on-the-spot testing of drugs and spices remained pertinent.

One easily pictures the rhizotomist's booth in the marketplace, stuffed with limewood boxes, various containers of boxwood, and copper vessels running over with the always-in-demand *collyria* ("eye-salves") or giving forth the pungencies of pine resin, the sharp odors of juniper oil, or the ordinary tartness of vinegar. The pharmakopoles would have his array of glass flasks filled with semi-fluids to be examined (one rolled the substance between thumb and forefinger to test consistency) or smelled once stoppers were removed (Figs. 10, 11). These semi-pasty ointments were also stored in the hollow horns of diverse bovines; the rootcutter and drug seller would have most preparations in horns, the cheapest containers. Silver canisters (perhaps in the form of the well-known *pyxis*) would be set toward the back of the stall to hold the expensive drugstuffs, perhaps ready-made myrrh in oil, or frankincense melted down by the vendor for the day's sales. And there would be many brightly colored flower petals scattered along the rude shelving on each side of the stall, each type of flower wrapped in Egyptian papyrus or some carefully arranged selection of local leaves. Anyone entering the booth would be met by a melange of aromas, a potpourri of scents that cantillated the medley of drugstuffs, spices, cosmetics, and medicines.

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