

# Myrrh: magi, medicine and mortality

Following an article last Christmas, on frankincense, this year Sarah Marshall takes a look at myrrh



For many people, such as these Bedu women in Oman, traditional medicine, such as myrrh, remains more culturally acceptable and available than orthodox medicine

The words “frankincense” and “myrrh” evoke images from Christmas cards and nativity plays. The Bible relates how magi or wise men from the East travel to pay homage to the King of the Jews. When they find Jesus, likely to have been about two years old by this time, they present him with gifts of gold, frankincense and myrrh. The giving of such gifts was important in the ancient East, when approaching a superior.<sup>1</sup> Both frankincense and myrrh were as valuable as gold, their origins shrouded in mystery and their acquisition costly and hazardous, therefore, a sign of wealth and sacrifice.<sup>2,3</sup> To Christians, the gifts given by the magi have added symbolism: gold for kingship, frankincense emphasising Jesus as God and myrrh for its association with mortality (being used in the ancient world for embalming) and reflecting the death Jesus would die.<sup>4</sup>

## Where myrrh is from

Both myrrh and frankincense are oleo-gum-resins derived from members of the botanical family Burseraceae. This family comprises some 18 genera and 540 species, most with prominent resin ducts in the bark, and oleoresin canals in the phloem and sometimes pith.<sup>5</sup>

Myrrh (probably derived from the Arabic and Hebrew word “mur” for bitter)<sup>6</sup> is ob-

tained from species of the genus *Commiphora*, (from the Greek for gum-bearing)<sup>7</sup> comprising some 250 species spread throughout tropical Africa and Asia.<sup>2</sup> The principal source of myrrh today is *C myrrha*, a small thorny tree or large shrub up to two metres tall, with peeling bark. It grows in Saudi Arabia, Yemen, Somalia, Ethiopia and Kenya.<sup>3</sup> The bark of the tree forms cracks and fissures that spontaneously, or when cut, exude a yellowish white viscous fluid. This soon solidifies and darkens in the heat to form reddish-brown masses, which are then collected. The bulk of the myrrh is harvested in Somalia and Ethiopia. Myrrh occurs in irregular tears or masses weighing up to 250g, with a reddish-brown or reddish-yellow colour, fragrant scent and aromatic, bitter and acrid taste.<sup>6</sup> Myrrh has also been obtained from the stems of *C molmol* and *C abyssinica*, and possibly other species in a genus much in need of revision.

There is some debate as to which species the myrrh mentioned in biblical times may have been obtained from, perhaps *C myrrha*<sup>8</sup> or possibly *C erthyraea* var *glabrescens*<sup>6</sup> found on the lower areas of either side of the Red Sea. The latter produces what is known commercially as perfumed bdellium or bissabol and looks like soft myrrh, but is more aromatic and chemically distinct.<sup>6</sup>

## Traditional and historical uses

Myrrh has been an item of commerce for thousands of years, transported along ancient spice routes, by land or sea, to places as far

apart as Rome, China and North Africa. The domestication of the camel in about 1100BC enabled the resin to be transported across the deserts of the Arabian Peninsula, swelling the incense trade further.<sup>9</sup>

Early Muslim writers recorded many medicinal uses for myrrh, for example, to treat wounds, intestinal parasites, diarrhoea, persistent cough and chest ailments. Chewed with vinegar, it was reputed to strengthen the teeth. Myrrh is still used in traditional medicine in the Middle East. In Oman, for example the resin is smeared onto cloth and used to bind a fractured limb or applied to an aching or carious tooth and the resin then burnt with a hot metal rod. It is also used to treat colds and fevers and to aid digestion. In Yemen the resin is made into a paste and applied to the penis as an aphrodisiac. It is also applied to wounds and snake bites. In Saudi Arabia, the resin is applied to the breast to wean infants, presumably because of its bitter taste.<sup>5</sup> It is also commonly used to treat diabetes.<sup>10</sup>

The Egyptians are thought to have traded in myrrh and frankincense since at least 2900BC and the oleo-gum-resins were used in many aspects of Egyptian daily life. The Egyptians also used myrrh in their embalming procedures, removing the intestines of the corpse and filling the peritoneal cavity with myrrh and spices. The scent of myrrh is so persistent that still potent samples have been discovered in archaeological excavations of Egyptian tombs.<sup>3</sup>

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Herbal remedies on sale in a souk in Oman

models of periodontal disease.<sup>23</sup> Some of the furanosesquiterpenes isolated from myrrh have shown local anaesthetic, antibacterial and antifungal activity. The antimicrobial and antifungal properties are of interest because they might have contributed to the effectiveness of myrrh in the embalming process. Local anaesthetic and bactericidal activity of pure furanosesquiterpenes, and inhibition of cytokine production by the essential oil, give credence to the use of myrrh tincture in treating inflammatory conditions of the mouth and pharynx.<sup>24</sup> Other furanosesquiterpenes have demonstrated morphine-like properties, acting on opioid receptors in the central nervous system. This provides support for the use of myrrh as an analgesic throughout the ages and raises the question as to whether wine mixed with myrrh was offered to Christ at his crucifixion to alleviate pain.<sup>25,26</sup>

Myrrh extracts have also demonstrated hypoglycaemic activity (rat models indicate the mode of action might involve a decrease in gluconeogenesis and an increase in peripheral utilisation of glucose), so when taken in traditional remedies it thus has the potential to interfere with orthodox treatment of diabetes.<sup>12</sup> Aqueous suspensions of myrrh have

shown cytotoxic effects in solid tumours in rodent models. *C. molmol* extracts have demonstrated anti-inflammatory and antipyretic activity.<sup>12</sup> Myrrh pre-treatment appears to protect gastric mucosa from ulcerogenic agents in rats.<sup>27</sup>

### Conclusions

Myrrh has been used for thousands of years all over the world. Experimental studies have provided some support for the historical and traditional uses of the oleo-gum-resin and these leads are worthy of further investigation. Maybe, as one author suggests, a new discipline is ready to emerge: that of "archeopharmacology" — drug research based upon the study of ancient texts<sup>28</sup> alongside studies of ethnobotany and ethnopharmacology. Gift of the Magi, symbol of mortality and medicine over the millennia, there is certainly more to myrrh than meets the eye.

**ACKNOWLEDGEMENTS** I thank Dr S. Ghazanfar, botanist, Royal Botanic Gardens, Kew, for information on *Commiphora* species and J. D. Phillipson, emeritus professor, The School of Pharmacy, University of London, for reading an early draft.

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Like frankincense, myrrh can be burned to generate fragrant smoke, however its oilier texture allows it to be dissolved in oils.<sup>3</sup> There are many references to myrrh in the Old Testament. It was an ingredient of the sacred oil that God instructed Moses to prepare to anoint all the items to be used in worship. In addition myrrh oil or ointment was used as a cosmetic, or to scent the body, clothes or furniture. In the New Testament Mark's gospel describes how Jesus refuses wine mixed with myrrh, which was offered to him while he hung on the cross. Myrrh was one of the materials used to anoint the body of Jesus before his burial.<sup>11</sup>

The Romans had many medicinal uses for myrrh, including alleviation of inflammation, induction of menstruation and the treatment of eye, ear, throat and mouth infections. Pliny (23–79AD) records the use of the resin to treat snake bite, toothache, sore tonsils and halitosis, as well as testicular ailments.<sup>11</sup> Being gums, frankincense and myrrh are malleable, a property exploited in the great extravaganzas at the peak of the Roman Empire. For example, Plutarch mentions a statue of a bull sculpted from frankincense, myrrh and other costly ingredients by a vegetarian winner of a horse race, to replace the meat more usually offered at a celebratory feast.<sup>2</sup> The Romans even used the word for myrrh as a favourite term of endearment (“my myrrh, my cinnamon”) perhaps as Americans use the word “honey” today.<sup>9</sup>

Greeks, Romans and Egyptians mixed myrrh into wine to perfume it; an additional beneficial effect may have been the retarding of fermentation in the warm climate.<sup>3</sup> In the US today myrrh is still used in alcoholic beverages.<sup>12</sup> The Greek herbalist Dioscorides compiled an extensive materia medica in which he recommends myrrh for its “warming, rheum-stopping, soporiferous, glutinating, drying and astringent facultie” and, in addition, for “rigor especially of the quartan type” (ie, malaria). Myrrh was “chewed for the stinking of the breath” and for “the grief of the arme pitts,” perhaps the most poetic description of body odour still!<sup>11</sup>

In Western herbal medicine, the resins of various *Commiphora* species have been used for centuries for their astringent, tonic, emetic and stimulant properties. Externally, they have been used to treat ulcers and skin complaints.<sup>2</sup> The earliest physical evidence of myrrh being used in Britain comes from traces of myrrh pollen found in a pestle in the ruins of an 11th century leprosy hospital in Scotland.<sup>9</sup> Culpeper in his ‘Pharmacopoeia Londinensis’ of 1656 advocated “oyl of mirrh” to keep wounds from putrefaction, induce labour, kill worms, treat coughs and halitosis and “fasten the teeth”. He also used it as ear drops to cure deafness.<sup>13</sup> Myrrh was advocated in Europe to protect against plague, although it was later observed to be singularly ineffective during the Great Plague of London.

In the 18th century, myrrh was one of the ingredients of the “Elixir of Vitriol” used to

treat scurvy on Royal Navy ships until in one of the earliest controlled clinical trials, surgeon James Lind demonstrated the benefit of citrus fruit.<sup>9</sup> The first ever British Pharmacopoeia, published in 1864, lists various preparations containing myrrh including “decoctum aloes compositum” (a mixture of aloes, myrrh, potassium carbonate and liquorice) and “Pilula Aloes et Myrrhae” (Aloes and Myrrh Pills).<sup>14</sup> Myrrh mixed with borax was a popular Victorian toothpaste.<sup>9</sup> Myrrh was often administered with aloes and iron to treat anaemia and amenorrhoea, according to the British Pharmaceutical Codex of 1911, as well as being a common ingredient of mouthwashes.<sup>15</sup>

In China, myrrh is used to invigorate the blood and dispel congealed blood, reduce swelling and alleviate pain. It is also used topically to promote healing of chronic sores.<sup>16</sup>



Myrrh resin

### Use of myrrh today

Monographs for myrrh oleo-gum-resin still appear in Martindale, the British Pharmacopoeia and other modern pharmacopoeias.<sup>12</sup> Tincture of myrrh, prepared by extraction with 90 per cent alcohol,<sup>6</sup> is used in mouthwashes and gargles for its astringent effect on mucous membranes, particularly for mouth ulcers, gingivitis and pharyngitis. It has also been applied to the skin for wounds and abrasions<sup>12</sup> although there are reports of contact dermatitis developing as a result of topical application of myrrh-containing plasters.<sup>17</sup> Other myrrh-containing products include toothpastes, hairsprays, perfumes, aromatherapy oils and toiletries.<sup>3</sup> Myrrh is also permitted to be used in foodstuffs in small quantities.<sup>12</sup> Teething-gels containing myrrh have been used to relieve teething pain in infants.<sup>18</sup>

Traditional remedies containing frankincense and myrrh were encountered by doctors admitting children to a London hospital — they are used by West Indian practitioners in a remedy for cough in children.<sup>9</sup>

One of the newest developments in the use of myrrh has also been the most controversial and relates to its role in treating schistosomiasis. This disease, also known as bilharzia, results from infection by parasites of the genus *Schistosoma*. It affects about 200 million people, 85 per cent of whom live on the African continent. Other affected areas include China, Brazil, Venezuela, the Caribbean and the Philippines. Depending upon the parasite involved, symptoms include haematuria, bladder wall pathology and kidney and liver damage.<sup>19</sup>

In a recent clinical trial in Egypt a purified extract of myrrh was used to treat 204 patients with schistosomiasis at a dose of 10mg/kg body weight for three days, with a cure rate of 91.7 per cent. Side effects were limited to a low incidence of giddiness, somnolence and fatigue.<sup>20</sup> On the basis of these results a pharmaceutical company in Egypt began marketing the drug in gelatin capsule form, naming it “Mirazid”. Each capsule contains 300mg of purified *Commiphora* extract and the package insert claims amelioration of all symptoms in one week.<sup>19</sup> Mirazid has been, reportedly, widely prescribed by Egyptian private physicians, especially in rural areas. However, independent clinical trials since carried out in Egypt have reported low cure rates, it appears difficult to reproduce the original published claims for Mirazid both in humans and in multi-centre *in vivo* studies.<sup>19,21</sup> On the basis of these results, this unstandardised herbal remedy (the active ingredients of which have yet to be identified) cannot be recommended for the treatment of schistosomiasis.<sup>21</sup> Concern has also been expressed because the use of an ineffective agent prevents the individual from using proven effective drugs such as praziquantel. This has potential repercussions for the national schistosomiasis eradication programme, which had dramatically reduced the serious morbidity due to the disease in Egypt by 2001.<sup>19,21</sup>

### Phytochemistry

Myrrh is an oleo-gum-resin and, as the term implies, contains 7–17 per cent of volatile oil, 25–40 per cent of resin, 57–61 per cent of gum together with some 3–4 per cent impurities. Steroids and terpenoids have also been isolated from myrrh.<sup>6,12</sup>

The volatile oil contains terpenes (C10 compounds), sesquiterpenes (C15 compounds), esters, cinnamaldehyde, cuminaldehyde and eugenol among other ingredients.<sup>6,12</sup> The presence of eugenol is of particular note because this is also an active ingredient of clove oil, used for its local anaesthetic action in treating toothache. This gives credence to the use of myrrh in treating dental problems across many cultures. The sesquiterpene fraction contains furanosesquiterpenes.<sup>6</sup>

The chemistry of the resin portion is complex and yet to be fully elucidated. The larger ether-soluble fraction contains  $\alpha$ -,  $\beta$ -, and  $\gamma$ -commiphoric acids, esters and two phenolic resins. The smaller ether-insoluble portion includes  $\alpha$ - and  $\beta$ -heerabomyrrholic acids, named after the Indian traders' name for myrrh “heerabol”.<sup>6</sup> The gum portion contains some 18 per cent protein and 64 per cent carbohydrate, associated with an oxidase enzyme.<sup>6</sup>

### Pharmacology

Extracts of myrrh have shown a wide range of pharmacological activities. The essential oil has been shown to inhibit the growth of Gram-positive organisms<sup>22</sup> and to decrease production of pro-inflammatory cytokines in *in vitro*