

cigarette smoking were seen a year or two after starting smoking, instead of 20 years or 30 years, few people would smoke. Why little was done to disseminate the knowledge of the carcinogenic and later the other effects of smoking is not for debate here but would include addiction and government income.

Continued delusion

This article relates to one published in 1961,³ which concluded that “if those who reason in a misleading fashion are permitted to confuse the public and if the tobacco manufacturers consult statisticians who give a one sided view of the argument, people will continue to die unnecessarily of lung cancer”; are we much more advanced after 40 years?

In 1994 Doll et al published the results of a 40 year comprehensive survey of mortality in relation to smoking⁸ and concluded that “about half of all regular

smokers will eventually be killed by their habit.” Nevertheless, in a detailed discussion in 1999 on measures required to curb smoking, Chambers⁹ pointed out that smoking rates had risen for the first time since 1970. How strange that such a pernicious habit, with its concomitant morbidity and mortality, persists.

- 1 *House of Commons official report (Hansard)* 1955-6, Apr 30-May 18; 552: 803-5.
- 2 Medical Research Council. *Tobacco smoking and cancer of the lung*. London: HMSO, 1957. (SO code No 45-13.)
- 3 Cowen PN. A trap for the unwary. *Chest Heart Bull* 1961;25:129-31.
- 4 “Statistician”, does smoking really cause lung cancer? *Chest Heart Bull* 1959;22:101-2.
- 5 A new angle on smoking. [Editorial.] *BMJ* 1959;ii:1465-6.
- 6 Eysenck HJ. Smoking and personality and lung cancer. *Fam Doctor* 1961;6:420-2.
- 7 Quoted in de Moulin D. *A short history of breast cancer*. Boston, MA: Martinus Nijhoff, 1983.
- 8 Doll R, Peto R, Wheatley K, Gray R, Sutherland I. Mortality in relation to smoking: 40 years’ observations on male British doctors. *BMJ* 1994;309: 901-37.
- 9 Chambers J. Being strategic about smoking. *BMJ* 1999;318:1-2.

Dwale: an anaesthetic from old England

Anthony J Carter

I'll imitate the pities of old surgeons

To this lost limb, who ere they show their art

Cast one asleep, then cut the diseased part.

Thomas Middleton (1570-1627), *Women beware Women*

Before the advent of general anaesthesia, it is generally believed, a patient undergoing an operation could have expected little in the way of support other than from the bottle or from an ability to “bite the bullet.” But there is compelling evidence of an earlier age of anaesthesia. Descriptions of anaesthetics based on mixtures of medicinal herbs have been found in manuscripts dating from before Roman times until well into the Middle Ages. Most originated in regions of southern Europe where the relevant herbs grew naturally. A typical one, dated 800 AD, from the Benedictine monastery at Monte Cassino in southern Italy, used a mixture of opium, henbane, mulberry juice, lettuce, hemlock, mandragora, and ivy.¹

There is no evidence to suggest that similar recipes existed in the British Isles at that time.² However, in 1992, an extensive study succeeded in identifying a large number of similar recipes in late medieval (12th-15th century) English manuscripts.³ All identified the anaesthetic, a drink, by the name dwale. A typical manuscript (fig 1), translated into modern English, reads:

“How to make a drink that men call dwale to make a man sleep whilst men cut him: take three spoonfuls of the gall [bile] of a barrow swine [boar] for a man, and for a woman of a gilt [sow], three spoonfuls of hemlock juice, three spoonfuls of wild neep [bryony], three spoonfuls of lettuce, three spoonfuls of pape [opium], three spoonfuls of henbane, and three spoonfuls of eysyl [vinegar], and mix them all together and boil them a little and put them in a glass vessel well stopped and put thereof three spoonfuls into a potel of good wine and mix it well together.

Summary points

Although general anaesthesia is little more than 150 years old, the use of medicinal herbs to render patients unconscious before surgery goes back to Roman times

Recent studies have identified a large number of recipes for a herbal anaesthetic known as dwale, written in medieval English

These include two groups of ingredients, the harmless and ineffectual—bile, lettuce, vinegar, and bryony root—and the powerful and dangerous—hemlock, opium, and henbane

In spite of its dangers, dwale was widely known about, and would have been administered by ordinary housewives, caring for loved ones

“When it is needed, let him that shall be cut sit against a good fire and make him drink thereof until he fall asleep and then you may safely cut him, and when you have done your cure and will have him awake, take vinegar and salt and wash well his temples and his cheekbones and he shall awake immediately.”

This paper discusses the ingredients in the dwale recipe, the recipe’s likely origins, and the possible circumstances and consequences of its use.

Ingredients

In addition to alcohol, the ingredients in dwale are, in order of their listing, bile, hemlock, bryony, lettuce, opium, henbane, and vinegar.

Department of Anaesthetics, North Staffordshire Hospital, Stoke on Trent ST4 6QG
Anthony J Carter
consultant anaesthetist

BMJ 1999;319:1623-6



Fig 1 A typical dwale manuscript. Reproduced by kind permission of the Syndics of Cambridge University Library (MS Dd.6.29, f79r-v)

Bile

Although Shakespeare’s *Macbeth* includes “gall of goat” in the witches’ brew, the use of animal matter in herbal recipes was unusual. Bile, however, was often mixed with fat in the preparation of ointments to aid the emulsification and absorption of ingredients, and it might have been included in dwale for the same reason.³

Hemlock

My heart aches, and a drowsy numbness pains
My sense, as though of hemlock I had drunk.

Keats, *Ode to a Nightingale*

Hemlock, *Conium maculatum*, (fig 2) is a tall umbelliferous plant with a sinister reputation, thanks to the presence in its juice of a number of coniine related alkaloids which work by blocking the nicotinic actions of the autonomic neurotransmitter acetylcholine.⁴ It was the official poison of ancient Greece, and no better account exists of hemlock’s ability to induce a motor paralysis followed by a sensory one than that given by an assistant present at the suicide of the philosopher Socrates: “When he said that his legs were heavy, [Socrates] lay down on his back, and he who gave him the poison ... examined his feet and legs; and then having pressed his foot hard, he asked if he felt it: he said that he did not. And after this he pressed his thighs; and thus going higher, he showed us that [Socrates] was growing cold and stiff.”⁵

The fact that unconsciousness comes late with hemlock poisoning suggests that Keats’s experience was not personal. Because it induces respiratory paralysis, hemlock still causes occasional fatalities,⁶ and it is fascinating to consider whether coniine or related alkaloids could have found a place in modern anaesthesia.

Bryony

Wild neep is one of several synonyms for *Bryonia dioica*, a native plant of the English hedgerow whose fleshy tuberous roots were once used as a powerful purgative. Bryony’s presence in dwale is likely to be the result of another herb’s absence.

Mandragora officinarum, the mandrake, grows naturally all over southern Europe and the Middle East, and was, after the opium poppy, the commonest herb used in Mediterranean recipes, thanks to the presence, in its root, of a number of hyoscine related alkaloids. Like atropine, hyoscine blocks the muscarinic effects of acetylcholine, but unlike atropine it readily crosses the blood-brain barrier. In consequence, it has the ability to produce not only drowsiness but also hallucinations, particularly in elderly people—a phenomenon well known to anaesthetists and a possible explanation for witchcraft.⁷

Mandrake owed its popularity, down the ages, to the resemblance of its root to the shape of a man, causing it to be highly prized as a fertility symbol. In northern Europe, however, mandrake does not grow naturally, so here bryony roots, which have a similarly fleshy appearance (fig 3), were dug up from hedgerows instead and sold to gullible people.^{8,9} Bryony is still used today by practitioners of black magic as a mandrake substitute,¹⁰ and it seems likely that, during translation of the recipe from an (unknown) Latin text, a similar substitution must have occurred.

Lettuce

Lactucarium, the dried juice of the wild lettuce, *Lactuca virosa*, has been associated with a mild sedative action for centuries and is a major component of herbal sedatives today. There is, however, little or no scientific evidence to justify this association.¹¹ Folk tales which associate the garden lettuce *Lactuca sativa* with sleep can more reasonably be attributed to the appetite of Beatrix Potter’s rabbits.



Fig 2 *Conium maculatum* (poison hemlock). The reddish-brown stem markings, said to be the brand of Cain, are characteristic

Opium

The pain killing power of the opium or white poppy, *Papaver somniferum*, was known to the earliest of civilisations, and although only one of the dwale recipes actually specifies it by name, it is likely that this was the poppy intended for use.

Henbane

Hyoscyamus niger, henbane, is, like mandrake, a member of a huge botanical order, the Solanaceae, and like mandrake is capable of inducing a profound and long lasting unconsciousness, thanks to its hyoscine content. Unlike mandrake, however, henbane grows naturally in the British Isles.

Although hemlock never found a place in modern medicine, omnopon and hyoscine, the chief alkaloids in opium and henbane, respectively, did so early this century, both in anaesthesia and, under the name of twilight sleep, in psychiatry and obstetrics.¹²

Vinegar

Eysyl was one of several varieties of vinegar in common use during medieval times.¹³ It had long been used to revive unconscious people and is also mentioned in the dwale recipe as a way of rousing the patient after the operation. According to the scriptures, vinegar, rather than the more usual mandrake wine, was offered to Christ on the cross.¹²

Discussion

A Troy spoon (the standard measurement throughout the period under discussion) held a volume of 11.6 ml.¹⁴ The recipe calls for three spoonfuls (34.8 ml) of each ingredient (243 ml in total) to be mixed, and for three spoonfuls of this mixture (3.5 ml of each ingredient) to be added to a potel (half gallon)¹⁴ of wine.

Dangers

The seven ingredients in the dwale recipe can be divided into two broad groups, those in the first group being harmless and ineffectual (bile, lettuce, vinegar, and bryony root), and those in the second being powerful and dangerous (hemlock, opium, and henbane). Ingesting as little as 1 ml of hemlock juice can prove fatal¹⁵; 3.5 ml opium (normal concentration 4-12% morphine alkaloids) would come close to, or exceed, the fatal dose of around 300 mg, and a similar volume of henbane (normally 0.25-0.5% concentration) would contain 8.75-17.5 mg of hyoscine alkaloids, enough to kill a child.¹⁵ The alcohol in the wine itself cannot be ignored.

However, dwale might not have been quite as dangerous as would at first sight appear. Medicinal herbs grown in northern countries are less potent than those grown in sunnier regions. As their potency is greatest when herbs are freshly collected, much would have been lost in the boiling and storage that the recipe calls for.

Most importantly, the recipe only asks him that "shall be cut" to drink until he falls asleep. A potel (2.276 litres) is the equivalent today of three bottles of wine. It seems most unlikely that the patient would have drunk this entire amount, particularly as the presence of bile and vinegar in the mixture would have given it a bitter taste. The amount consumed would



Fig 3 Mandrakes true and false. Left: *Mandragora officinarum*, the "true" mandrake; right: *Bryonia dioica*, known as wild nelp or white bryony, and as the false, or English, mandrake (one "leg" has accidentally been amputated)

have been enormously variable, and it is this variability in dose that would have made dwale so dangerously unpredictable.

Knowledge

In spite of the dangers, there can be little doubt that dwale was widely known about. The recipes are widely distributed (well over 50 have been identified to date)



Fig 4 The medieval housewife was expected to possess the skills of both herbalist and apothecary (c1470). Reproduced by kind permission of the British Library (Royal Ms 15, D1, f18 recto)

For to make a drink that men call dwale to make a man sleep while men carve him:

Take three spoonfuls of the gall of a barrow swyne and for a woman of a gylte, three spoonfuls of hemlock juice, three spoonfuls of ye wild neep, three spoonfuls of letuce, three spoonfuls of pape, three spoonfuls of hembane, and three spoonfuls of eysyl and mix them all together and boil them a little and put them in a glass vessel well stopped and put thereof three spoonfuls into a potel of good wine and mix it well together. When it is needed, let him that shall be carved sit against a good fire and make him to drink thereof until he fall asleep and then may right you safely carve him, and when you have done the cure and would have him to awaken, take vinegar and salt and wash well his temples and his cheekbones and he shall awake from rest.

and we must therefore consider how they might have been used. A clue is to be found in Chaucer's reference, in the Reeve's tale, to a medieval "ménage à trois":

To bedde went the daughter right soon,
To bedde goth Aleyn and also John,
There was no more—they needed no dwale.

During medieval times, it was to the monastery and almshouse that poor people turned for healing. The better off (and more literate) middle classes received treatment in their own homes, and dwale recipes are found not in medical or religious texts but rather in domestic remedy books—small notebooks of household hints, such as the one being consulted in figure 4.¹⁶ Who then might have administered these early anaesthetics? It certainly would not have been the surgeons themselves, for in spite of Thomas Middleton's lines, medieval surgeons only ever referred to "sleeping medicines" to warn against their use.^{3 12} Almost certainly it would have been ordinary housewives, caring for loved ones who had, perhaps, returned home injured from the wars. How many would in due course have had cause to regret their actions we can only guess.

Sleeping drinks went out of fashion before the arrival of the printed word but were not completely

forgotten about, and their legacy survives today in the role they came to play in Elizabethan drama. Perhaps the most ingenious example is the explanation given by Barabas, in Christopher Marlowe's play *The Jew of Malta*, of how he managed to escape from captivity:

I drank of poppy and cold mandrake juice
And being asleep, belike they thought me dead,
And threw me over the walls.

Barabas eventually regained consciousness, but the outlook for those who took "drowsy syrups" in real life would have been less certain. Although these recipes were rightly abandoned many centuries ago, they can teach us much, even today. They remind us, for example, of the links that once existed between medicine and magic; that, as Shakespeare tells us, "in poison there is physic"; and that much medical advance in the 20th century has come not from new drugs but rather from our ability to measure and administer old ones accurately. At the dawning of a new millennium they serve to remind us, once again, of the enormous debt we owe to the past.

I thank Professor L E Voigts for first bringing the dwale recipes to my attention.

Competing interests: None declared.

- 1 Keys TE. *The history of surgical anaesthesia*. New York: Schuman, 1945:104.
- 2 Cameron ML. *Anglo-Saxon medicine*. Cambridge: Cambridge University Press, 1993:12.
- 3 Voigts LE, Hudson RP. A drynke called dwale: a surgical anaesthetic from late medieval England. In: Campbell S, Hall B, Klausner D, eds. *Health, disease and healing in medieval culture*. New York: St Martin's Press, 1992:34-56.
- 4 Bowman WC, Sanghvi IS. Pharmacological actions of hemlock (*Conium maculatum*) alkaloids. *J Pharm Pharmacol* 1963;15:1-25.
- 5 Ellis ES. *Ancient anodynes*. London: Heinemann, 1946:82.
- 6 Drummer OH, Roberts AN, Bedford PJ, Crump KL, Phelan MH. Three deaths from hemlock poisoning. *Med J Aust* 1995;162:592-3.
- 7 Mann J. *Murder, magic and medicine*. Oxford: Oxford University Press, 1992:76-82.
- 8 Vicary R. *Dictionary of plant lore*. Oxford: Oxford University Press, 1995:393-4.
- 9 Reader's Digest. *Field Guide to the Wild Flowers of Britain*. London: Reader's Digest Association, 1981:157.
- 10 Huson P. *Mastering witchcraft*. London: Rupert Hart-Davis, 1970:146.
- 11 Grieve M. *A modern herbal*. London: Jonathan Cape, 1931:2:476-7.
- 12 Carter AJ. Narcosis and nightshade. *BMJ* 1996;313:1630-2.
- 13 Murray JAH. *New English dictionary*. Oxford: Clarendon Press, 1897:488.
- 14 Connor RD. *The weights and measures of England*. London: HMSO, 1987:125.
- 15 Dreisbach RH, Robertson WO. *Handbook of poisoning*. Prentice-Hall International, 1987:499.
- 16 Rawcliffe C. *Medicine and society in later medieval England*. Stroud: Alan Sutton, 1997:184.

Alien babies

One Saturday afternoon two golfers in Drogheda found what they believed to be a fetus near a waste bin in the car park of their golf course. The Gardai (police) and a local priest were called. The "find" was brought to the local casualty department, where a doctor inspected it. The case was referred to the coroner, and on Monday morning the find was examined by a pathologist. It was immediately clear that it was not human, the first impression being that it was an octopus. Having removed the little adherent grit it became apparent that it was a silicone alien-type doll (figure) on sale in toy shops as Millennium Babies. It later transpired that the Gardai had noted the odd eyes and big pointed ears; the doctor in casualty had noted the long umbilical cord; and the two golfers were a vet and a medical doctor.



Such an occurrence is not limited to Ireland. The next week there was a headline in *The Star* newspaper: "Fetus' was little green toy." An observant gasman in Devizes saw what seemed to be a dead fetus lying in the gutter on the road. The police were called in, and they in turn asked a local GP to take a look. He thought it should be examined by a pathologist. The specimen was covered in straw (Wiltshire being an agricultural county), had a large head, big pointed ears, and four identical limbs. It was a dark grey colour and felt rubbery. One little midline incision in the mortuary revealed all—it was a toy.

John Ryan *pathologist, Drogheda, County Louth, Republic of Ireland*,
Angela Scott *pathologist, Salisbury, Wiltshire*