Adverse effects. An increase in seizure activity was noted in 4 of 6 children with severe neurological deficits during treatment with melatonin for sleep disorders.[1] Seizure activity returned to baseline values when melatonin was stopped and recurred on re-challenge.

1. Sheldon SH. Pro-convulsant effects of oral melatonin in neurologically disabled children. *Lancet* 1998; **351:** 1254.

Uses. Melatonin has been tried in a number of disorders[1] including, in large doses, as an adjunct to conventional chemotherapy for malignant neoplasms[2,3] and, with norethisterone, as a contraceptive.[4] It is possible that contraceptive use of melatonin may be associated with a reduced risk of breast cancer.[5] For mention of response to melatonin in 2 patients with sarcoidosis, see p.1512. Preliminary studies have also suggested that melatonin may be beneficial in hyperlipidaemias,[6] cluster headaches,[7] tinnitus,[8] alopecia in women,[9] and irritable bowel syndrome associated with sleep disturbances.[10] Repeated bedtime doses may also play a part in reducing nocturnal blood pressure in patients with essential hypertension.[11] Claims for its value as an anti-ageing treatment and for use in conditions such as Alzheimer's disease and AIDS are unfounded.[2,12] The effects of long-term use of melatonin have yet to be assessed.

1. Wetterberg L. Melatonin and clinical application. *Reprod Nutr Dev* 1999; **39:** 367–82.
2. Pepping J. Melatonin. *Am J Health-Syst Pharm* 1999; **56:** 2520–7.
3. Lissoni P, *et al.* Decreased toxicity and increased efficacy of cancer chemotherapy using the pineal hormone melatonin in metastatic solid tumour patients with poor clinical status. *Eur J Cancer* 1999; **35:** 1688–92.
4. Short RV. Melatonin. *BMJ* 1993; **307:** 952–3.
5. Cohen M, *et al.* Hypotheses: melatonin/steroid combination contraceptives will prevent breast cancer. *Breast Cancer Res Treat* 1995; **33:** 257–64.
6. Pittalis S, *et al.* Effect of a chronic therapy with the pineal hormone melatonin on cholesterol levels in idiopathic hypercholesterolemic patients. *Recenti Prog Med* 1997; **88:** 401–2.
7. Leone M, *et al.* Melatonin versus placebo in the prophylaxis of cluster headache; a double-blind pilot study with parallel groups. *Cephalalgia* 1996; **16:** 494–6.
8. Rosenberg SI, *et al.* Effect of melatonin on tinnitus. *Laryngoscope* 1998; **108:** 305–10.
9. Fischer TW, *et al.* Melatonin increases anagen hair rate in women with androgenetic alopecia or diffuse alopecia: results of a pilot randomized controlled trial. *Br J Dermatol* 2004; **150:** 341–5.
10. Song GH, *et al.* Melatonin improves abdominal pain in irritable bowel syndrome patients who have sleep disturbances: a randomised, double blind, placebo controlled study. *Gut* 2005; **54:** 1402–7.
11. Scheer FAJL, *et al.* Daily nighttime melatonin reduces blood pressure in male patients with essential hypertension. *Hypertension* 2004; **43:** 192–7.
12. Brzezinski A. Melatonin in humans. *N Engl J Med* 1997; **336:** 186–95.

INSOMNIA. Although melatonin is considered[1-6] to be potentially useful in the management of various forms of insomnia (p.957), especially those associated with circadian rhythm disturbances, there is little evidence of efficacy from large studies and its long-term safety remains to be established. A meta-analysis[7] of randomised controlled studies concluded that melatonin does not have a significant effect on sleep onset latency in secondary sleep disorders or those accompanying sleep restriction such as jet lag and shift work. In healthy subjects melatonin has been reported[8,9] to reduce the time to onset of sleep and to increase the time spent asleep. Whether this is due to adjustment of the 'body clock' or any hypnotic action of melatonin is unclear. Measurement of nocturnal urinary excretion of the major metabolite, 6-sulfatoxymelatonin, demonstrated that low nocturnal melatonin production is associated with insomnia in patients over 55 years of age, and might identify those more likely to respond to treatment with melatonin.[10] Improved quality of sleep has been reported in elderly patients treated with melatonin for insomnia,[11] and it might be of use in delayed sleep phase syndrome[12] and insomnia in shift workers and totally blind people, although some[13,14] have found no beneficial effects of melatonin in night shift workers or emergency medicine employees. There has also been a report[15] of a patient with somnolence associated with melatonin deficiency after pinealectomy who responded to treatment with melatonin. A preliminary report[16] has suggested that use of melatonin may enable benzodiazepine therapy for insomnia to be stopped without impairing the quality of sleep. However, melatonin might adversely affect sleep patterns in some circumstances.[17]

1. Haimov I, Lavie P. Potential of melatonin replacement therapy in older patients with sleep disorders. *Drugs Aging* 1995; **7:** 75–8.
2. Brown GM. Melatonin in psychiatric and sleep disorders: therapeutic implications. *CNS Drugs* 1995; **3:** 209–26.
3. Anonymous. Melatonin. *Med Lett Drugs Ther* 1995; **37:** 111–12.
4. Arendt J. Melatonin. *BMJ* 1996; **312:** 1242–3.
5. Lamberg L. Melatonin potentially useful but safety, efficacy remain uncertain. *JAMA* 1996; **276:** 1011–14.
6. Skene DJ, *et al.* Use of melatonin in the treatment of phase shift and sleep disorders. *Adv Exp Med Biol* 1999; **467:** 79–84.
7. Buscemi N, *et al.* Efficacy and safety of exogenous melatonin for secondary sleep disorders and sleep disorders accompanying sleep restriction: meta-analysis. Abridged version: *BMJ* 2006; **332:** 385–8. Full version: http://www.bmj.com/cgi/reprint/332/7538/385 (accessed 25/07/08)
8. Zhdanova IV, *et al.* Sleep-inducing effects of low doses of melatonin ingested in the evening. *Clin Pharmacol Ther* 1995; **57:** 552–8.
9. Attenburrow MEJ, *et al.* Low dose melatonin improves sleep in middle-aged subjects. *Psychopharmacology (Berl)* 1996; **126:** 179–81.
10. Leger D, *et al.* Nocturnal 6-sulfatoxymelatonin excretion in insomnia and its relation to the response to melatonin replacement therapy. *Am J Med* 2004; **116:** 91–5.
11. Garfinkel D, *et al.* Improvement of sleep quality in elderly people by controlled-release melatonin. *Lancet* 1995; **346:** 541–4.
12. Nagtegaal JE, *et al.* Effects of melatonin on the quality of life in patients with delayed sleep phase syndrome. *J Psychosom Res* 2000; **48:** 45–50.
13. Wright SW, *et al.* Randomized clinical trial of melatonin after night-shift work: efficacy and neuropsychologic effects. *Ann Emerg Med* 1998; **32:** 334–40.
14. Jockovich M, *et al.* Effect of exogenous melatonin on mood and sleep efficiency in emergency medicine residents working night shifts. *Acad Emerg Med* 2000; **7:** 955–8.
15. Lehmann ED, *et al.* Somnolence associated with melatonin deficiency after pinealectomy. *Lancet* 1996; **347:** 323.
16. Garfinkel D, *et al.* Facilitation of benzodiazepine discontinuation by melatonin: a new clinical approach. *Arch Intern Med* 1999; **159:** 2456–60.
17. Middleton BA, *et al.* Melatonin and fragmented sleep patterns. *Lancet* 1996; **348:** 551–2.

JET LAG. Melatonin has been reported to alleviate jet lag following long flights.[1-4] The most appropriate dosing schedule has yet to be determined but will depend on both the direction of travel and the distance travelled. A systematic review[5] concluded that melatonin was effective in preventing or reducing jet lag in those travelling across 5 or more time zones, particularly in an easterly direction, and especially if jet lag had been experienced previously; travellers crossing 2 to 4 time zones might also derive benefit. However, a meta-analysis[6] of randomised controlled studies concluded that melatonin does not have a significant effect on sleep onset latency accompanying jet lag.

1. Waterhouse J, *et al.* Jet-lag. *Lancet* 1997; **350:** 1611–16.
2. Arendt J. Jet-lag. *Lancet* 1998; **351:** 293–4.
3. Arendt J. Jet-lag and shift work: (2) therapeutic use of melatonin. *J R Soc Med* 1999; **92:** 402–5.
4. Waterhouse J, *et al.* Jet lag: trends and coping strategies. *Lancet* 2007; **369:** 1117–29.
5. Herxheimer A, Petrie KJ. Melatonin for the prevention and treatment of jet lag. Available in The Cochrane Database of Systematic Reviews; Issue 2. Chichester: John Wiley; 2002 (accessed 28/04/05).
6. Buscemi N, *et al.* Efficacy and safety of exogenous melatonin for secondary sleep disorders and sleep disorders accompanying sleep restriction: meta-analysis. Abridged version: *BMJ* 2006; **332:** 385–8. Full version: http://www.bmj.com/cgi/reprint/332/7538/385 (accessed 25/07/08)

Preparations

Proprietary Preparations (details are given in Part 3)
Arg.: Armonil Noche; Buenas Noches; Melatol; Nochix†; Repentil†; ***Chile:*** Novel†; ***Hong Kong:*** Melapure†; ***Hung.:*** Bio-Melatonin; ***India:*** Meloset; ***Mex.:*** Benedorm; Cronocaps; Revenox†; ***Port.:*** Circadin; ***Rus.:*** Melaxen (Мелаксен); ***UK:*** Circadin; ***USA:*** Transzone.

Multi-ingredient: ***Arg.:*** Plenovit Melatonina; ***India:*** Eternex; Stresnil; ***USA:*** Bevitamel; Melagesic PM.

Melilot

Barkūno žolė; Gelber Steinklee; Komonicová nať; Mélilot; Meliloti herba; Rohtomesikkä; Sötväppling; Sweet Clover; Yellow Melilot; Yellow Sweet Clover; Ziele nostrzyka.

Pharmacopoeias. In *Eur.* (see p.vii).
Ph. Eur. 6.2 (Melilot; Meliloti Herba). The whole or cut, dried aerial parts of *Melilotus officinalis*. It contains a minimum of 0.3% coumarin, calculated with reference to the dried drug. Protect from light.

Profile
Melilot is used internally in herbal preparations for chronic venous insufficiency. It contains coumarin (see p.2288) and its derivatives and the dose may be expressed in terms of coumarin. The German expert committee for herbal drugs and preparations (Commission E) also allows the addition or substitution of *M. altissimus* (tall melilot), tall yellow sweet clover.

Melilotus officinalis is also used externally.

Homoeopathy. Melilot has been used in homoeopathic medicines under the following names: Melilotus officinalis; Mel. off.

Preparations

Proprietary Preparations (details are given in Part 3)
Braz.: Vecasten; ***Ger.:*** Meli Rephastasan.

Multi-ingredient: ***Arg.:*** Snell Patch; Snell Progress; ***Austral.:*** Bioglan Zellulean with Escin; ***Chile:*** Celltech Gold; ***Fr.:*** Antinerveux Lesourd; Creme au Melilot Composee; Cyclo 3; Ditavene; Esberiven; Esberiven Fort; Evarose; Sedopal; ***Ger.:*** Phlebodril N; Salus Venen Krauter Dragees N†; Venen Krauter NT; ***Ital.:*** Capill Venogel; Dermilia Flebozin; Diosmina Complex; Facosmina; Flebo-Si; Flebofort; Levital Plus; Lipaven; Pulsalux; RepaVen†; Venodin; Venoton; ***Rus.:*** Cyclo 3 (Цикло 3); ***Singapore:*** Cyclo 3; ***Spain:*** Fabroven; Venofit; ***Switz.:*** Phlebodril; Veino-Gouttes-N†.

Melissa

Citromfűlevél; Lemon Balm; Liść melisy; Meduňkový list; Melisa; Meliss; Melissae folium; Mélisse, feuille de; Melissenblatt; Melisų lapai; Sitruunamelissanlehti.

Pharmacopoeias. In *Eur.* (see p.vii).
Ph. Eur. 6.2 (Melissa Leaf). The dried leaf of *Melissa officinalis*. It contains not less than 4% of total hydroxycinnamic derivatives expressed as rosmarinic acid ($C_{18}H_{16}O_8$ = 360.3), calculated with reference to the dried drug. It has an odour reminiscent of lemon. Protect from light.

Profile
Melissa has been used as a carminative and sedative. It is an ingredient of herbal remedies used for a variety of disorders. It is also reported to have virustatic activity. The chief constituent of melissa is citral (p.2284). Hypersensitivity reactions to melissa have been reported.

Melissa is the source of melissa oil (see below).

Homoeopathy. Melissa has been used in homoeopathic medicines under the following names: Melissa officinalis.

◊ References.

1. Ballard CG, *et al.* Aromatherapy as a safe and effective treatment for the management of agitation in severe dementia: the results of a double-blind, placebo-controlled trial with melissa. *J Clin Psychiatry* 2002; **63:** 553–8.

Preparations

Proprietary Preparations (details are given in Part 3)

Austria: Balm-Mint†; Lomaherpan; ***Belg.:*** Dormiplant; ***Chile:*** Citromel; ***Cz.:*** Lakinal†; Lomaherpan†; Medovka Lekarska†; Medunkovy, Medunkova; ***Ger.:*** Gastrovegetalin; Lomaherpan; Me-Sabona; Sedinfant†; ***Rus.:*** Novo-Passit (Ново-Пассит); ***Switz.:*** Valverde Boutons de fievre creme.

Multi-ingredient: ***Arg.:*** Dr Calm†; Erbonda Noche†; Nervocalm; Sedante Arceli†; Valeriana Oligoplex; Valeriana Relax Diates; ***Austral.:*** Natural Deep Sleep; ***Austria:*** Abdomilon N; Baldracin; Euvekan; Mariazeller; Passedan; Passelyt; Sedogelat; Songha; Species nervinae; The Chambard-Tee; Wechseltee St Severin; ***Belg.:*** Minhavez; Songha; ***Braz.:*** Anevrase†; Balsamo Branco; Calmapax; Camomila; Elixir de Passiflora†; Passaneuro; Passilex†; Sonhare; ***Canad.:*** Herbal Sleep Well†; Natural HRT Nightime; ***Chile:*** Melipass; Recalm; ***Cz.:*** Abdomilon†; Alvisan Neo; Baldracin; Blahungstee N†; Eugastrin†; Euvekan; Fytokliman Planta; Hertz- und Kreislauftee†; Hypotonicka; Iberogast; Klosterfrau Melisana; Melaton†; Nervova Cajova Smes; Nontusyl†; Novo-Passit; Passedan; Persen; Schlaf-Nerventee N†; Senalax; Songha Night†; Species Nervinae Planta; Valofyt Neo; ***Fr.:*** Biocarde; Dystolise; Elixir Bonjean; Mediflor Tisane Calmante Troubles du Sommeil No 14; Mediflor Tisane Circulation du Sang No 12; Vagostabyl; ***Ger.:*** Abdomilon N; Baldriparan N Stark†; Doppelherz Melissengeist†; Dormarist†; Dr. Scheffler Bergischer Krautertee Nerven- und Beruhigungstee; Euvegal; Euvegal Entspannungs- und Einschlafdragees†; Euvegal Entspannungs- und Einschlaftropfen; Gastrol S†; Gutnacht†; Heumann Beruhigungstee Tenerval; Iberogast; JuDorm†; Jukunda Melissen-Krautergeist N†; Lindofluid N; Me-Sabona plus†; Melissengeist; Nervosana†; Oxacant N†; Oxacantsedativ; Pascosedon; Phytonoctu; Plantival novo; Presselin Blahungs K 4 N†; Pronervon Phyto; RubieSed†; Schlaf- und Nerventee; Seda-Plantina†; Sedacur; Sedariston plus; Sedasyx†; Sedinfant N†; Stullmaton†; ***Hung.:*** Euvekan; Sedacur; ***Israel:*** Songha Night; ***Ital.:*** Actenacol; Calmason; Colimil; Dormiplant; Emmenoiasi; Melissa (Specie Composta)†; Sedatol; Tisana Kelemata; Vagostabil; Valeriana (Specie Composta)†; ***Malaysia:*** Circarol; ***Mex.:*** Nordiminty; Plantival; ***NZ:*** Botanica Hayfever; Mr Nits; ***Philipp.:*** Circulan; ***Pol.:*** Amarosal; Aromatol; Calmina; Carmolis; Cravisol; Dormiplant; Klimax†; Lumewal; Melisal; Melisana Klosterfrau; Melissed; Nervinolum; Nervomix; Nervosol; Nerwobonisol; Perfocrat; Persen; Psychotonisol; Relana; Sedomix; ***Port.:*** Erpecalm; Songha†; ***Rus.:*** Doppelherz Melissa (Доппельгерц Мелисса); Doppelherz Vitalotonik (Доппельгерц Виталотоник); Persen (Персен); ***S.Afr.:*** Melissengeist; Spiritus Contra Tussim Drops; ***Spain:*** Agua del Carmen; Caramelos Agua del Carmen†; Dormiplant; Himelan†; Jaquesor†; Melival; Mesatil†; Natusor Aerofane†; Natusor Jaquesan†; Nervikan; Relana; Resolutivo Regium; Solucion Schoum; ***Switz.:*** Alcoolat de Melisse†; Arterosan Plus; Baldriparan; Baldrisedon plus†; Cardiaforce; Carmol; Dormiplant; Dragees pour la detente nerveuse; Gastrosan; Hyperiforce comp; Iberogast; Phytomed Nervo†; Relaxane; Relaxo; Songha Night; Soporin; Tisane calmante pour les enfants; Tisane favorisant l'allaitement; Tisane pour l'estomac; Tisane pour le coeur et la circulation; Tisane pour le sommeil et les nerfs; Tisane pour nourissons et enfants; Tisane relaxante N†; Valverde Detente dragees; Valviska; ***UK:*** Melissa Comp.; Valerina Day Time; Valerina Night-Time; ***Venez.:*** Euvekan; Sedival.

Melissa Oil

Balm Oil; Esencia de Melisa; Lemon Balm Oil.

CAS — 8014-71-9.

Profile
Melissa oil is the essential oil obtained from melissa (*Melissa officinalis*), above. It is used in preparations with other essential oils in a variety of disorders. It is also used in aromatherapy.

Preparations

Proprietary Preparations (details are given in Part 3)

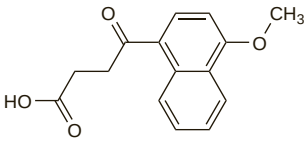
Multi-ingredient: ***Austria:*** Opino; ***Chile:*** Agua del Carmen; Agua Melisa Carminativa; ***Cz.:*** Thrombocid; ***Fr.:*** Stomargil; ***Ger.:*** Amol Heilkrautergeist N; Cor-Select†; Thrombocid; ***Gr.:*** Opino-jel; ***Indon.:*** Opino; ***Ital.:*** Dentosan Azione Intensiva; Dentosan Mese; Neuralta Migren; ***Pol.:*** Amol; Argol Essenza Balsamica; Argol Grip; Argol Rheuma; ***Port.:*** Thrombocid; ***Switz.:*** Anal-Gen†; Thrombocid.

Menbutone *(BAN, rINN)*

Menbuton; Menbutona; Menbutoni; Menbutonum; SC-1749 (menbutone sodium). 4-(4-Methoxy-1-naphthyl)-4-oxobutyric acid.

Менбутон

$C_{15}H_{14}O_4$ = 258.3.
CAS — 3562-99-0.
ATC Vet — QA05AX90.

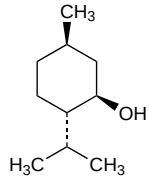


Profile
Menbutone is used as a choleretic to stimulate gastrointestinal function in veterinary medicine.

Menthol

Hexahydrothymol; Mentholum; Mentol; Mentoli; Mentolis. *p*-Menthan-3-ol; 2-Isopropyl-5-methylcyclohexanol.

$C_{10}H_{20}O$ = 156.3.
CAS — 1490-04-6 (menthol); 15356-60-2 ((+)-menthol); 2216-51-5 ((–)-menthol); 89-78-1((±)-menthol).



Description. Menthol is either the laevo-isomer, levomenthol (*BAN*, *rINN*), or a racemic mixture, racementhol (*BAN*, *rINN*). The laevo-isomer may be obtained from the volatile oils of various species of *Mentha* (Labiatae) or it may be prepared synthetically.

Pharmacopoeias. In *Chin.*, *Eur.* (see p.vii), *Jpn*, *US*, and *Viet. Eur.* and *Jpn* have separate monographs for laevo-menthol (levomenthol) and racemic menthol (racementhol).

Ph. Eur. 6.2 (Levomenthol). It occurs as colourless, acicular or prismatic shiny crystals. M.p. about 43°. Practically insoluble in water; very soluble in alcohol and in petroleum spirit; freely soluble in fatty oils and in liquid paraffin; very slightly soluble in glycerol.

Ph. Eur. 6.2 (Menthol, Racemic; Racementhol BP 2008). It occurs as colourless, acicular or prismatic shiny crystals or as a free-flowing or agglomerated crystalline powder. M.p. about 34°. Practically insoluble in water; very soluble in alcohol and in petroleum spirit; freely soluble in fatty oils and in liquid paraffin; very slightly soluble in glycerol.

USP 31 (Menthol). An alcohol obtained from diverse mint oils or prepared synthetically. It may be laevorotatory (*l*-menthol), from natural or synthetic sources, or racemic (*dl*-menthol). It occurs as colourless, hexagonal crystals, usually needle-like, or in fused masses, or crystalline powder. Has a pleasant, peppermint-like odour. M.p. of *l*-menthol 41° to 44°. Slightly soluble in water; very soluble in alcohol, in chloroform, in ether, and in petroleum spirit; freely soluble in glacial acetic acid, in fixed and volatile oils, and in liquid paraffin. Store in airtight containers preferably at a temperature of 15° to 30°.

Compounding. A liquid or soft mass is formed when menthol is triturated with camphor, cloral hydrate, phenol, and many other substances.

Methods of preparing menthol 1% w/w in aqueous cream BP and the stability of the resultant product have been discussed.[1]

1. Cable C. The preparation of menthol (1 per cent w/w) in aqueous cream BP. *Pharm J* 2005; **274:** 469.

Adverse Effects, Treatment, and Precautions
Menthol may give rise to hypersensitivity reactions including contact dermatitis. Ingestion of significant quantities of menthol is reported to cause symptoms similar to those seen after ingestion of camphor (p.2273), including severe abdominal pain, nausea, vomiting, vertigo, ataxia, drowsiness, and coma; they may be managed similarly. There have been reports (below) of apnoea and instant collapse in infants after the local application of menthol to their nostrils.

Administration to infants. Instillation of decongestant preparations containing menthol directly into the nostrils of infants and young children has resulted in acute respiratory distress with cyanosis[1] and respiratory arrest,[2] and must be avoided. In one case,[1] nasal application was associated with concurrent chemical conjunctivitis.

1. Wyllie JP, Alexander FW. Nasal instillation of 'Olbas Oil' in an infant. *Arch Dis Child* 1994; **70:** 357–8.
2. Blake KD. Dangers of common cold treatments in children. *Lancet* 1993; **341:** 640.

Effects on the nervous system. Ataxia, confusion, euphoria, nystagmus, and diplopia developed in a 13-year-old boy following the inhalation of 5 mL of Olbas oil instead of the recommended few drops.[1] It was considered probable that the menthol in the preparation was responsible for the symptoms; the amount of menthol inhaled was approximately 200 mg.

1. O'Mullane NM, *et al*. Adverse CNS effects of menthol-containing Olbas oil. *Lancet* 1982; **i:** 1121.

Pharmacokinetics
After absorption, menthol is excreted in the urine and bile as a glucuronide.

Absorption. The systemic absorption of camphor, menthol, and methyl salicylate from dermal patches containing all three ingredients has been studied.[1] The absolute bioavailability of these compounds could not be determined from this study, but there did not appear to be any substantial systemic accumulation even after unrealistically high exposure for prolonged periods.

1. Martin D, *et al*. Dermal absorption of camphor, menthol, and methyl salicylate in humans. *J Clin Pharmacol*. 2004; **44:** 1151–7.

Uses and Administration
Menthol is chiefly used to relieve symptoms of bronchitis, sinusitis, and similar conditions. For this purpose it may be used as an inhalation, usually with benzoin or eucalyptus oil, as pastilles, or as an ointment with camphor and eucalyptus oil for application to the chest or nostrils (but see Adverse Effects above). However, as mentioned under the section on the management of cough (p.1547), the use of menthol in inhalations is unlikely to provide any additional benefit.

When applied to the skin menthol dilates the blood vessels, causing a sensation of coldness followed by an analgesic effect. It relieves itching and is used in creams, lotions, or ointments in pruritus and urticaria. It has also been applied to the forehead, presumably as a counter-irritant, for the relief of headache.

In small doses by mouth menthol has a carminative action.

Action. It has been suggested that the apparent benefits of menthol in nasal congestion may be due to an effect on calcium channels of sensory nerves.[1] This mechanism has also been implicated in its muscle relaxant action on the gastrointestinal tract when used as peppermint oil (p.1761).

1. Anonymous. How does menthol work? *Pharm J* 1993; **251:** 480.

Preparations
BP 2008: Levomenthol Cream; Menthol and Benzoin Inhalation;
USP 31: Benzocaine and Menthol Topical Aerosol; Menthol Lozenges; Tetracaine and Menthol Ointment.

Proprietary Preparations (details are given in Part 3)
Arg.: Flex-All; Rati Salil Ice; Robitussin Caramelos†; ***Austral.:*** Dencorub Arthritis Ice; Ice Gel; Vicks Throat Drops†; Vicks Vapodrops with Butter and Menthol; ***Braz.:*** Analgen†; ***Canad.:*** Absorbine Jr.; Absorbine Jr Roll-on Ice; Absorbine Power Gel; Antiphlogistine Rub A-535 Ice; Bengay Ice†; Bentasil†; Certified Ice; Cough Drops; Cough Lozenges; Deep Cold; Fisherman's Friend; Flex-All; Ice Gel Therapy; Ice Gel†; Meggezones†; Physiomenthol; Polar Ice; Soothing Ice Rub; Vicks Throat Drops; ***Chile:*** Friorub; Hielorub; Mentholatum Patch; ***Ger.:*** Klosterfrau Franzbranntwein Menthol; Nifint†; ***Hong Kong:*** Counterpain; ***India:*** Dolocide Plus; ***Indon.:*** Counterpain Cool; ***Malaysia:*** Menzza Ice; ***Mex.:*** Friocal†; ***NZ:*** Vicks Throat Drops; Vicks Vapodrops; ***Pol.:*** Deep Relief†; Migrenol; ***Port.:*** Vicks Vaporub; ***Singapore:*** Celatrac; Counterpain Cool; ***Spain:*** Prulit; ***Switz.:*** Perskindol Cool; ***Thai.:*** Centropain; Counterpain Cool; Painza Cool; Stopain; ***UK:*** Arjun; Deep Freeze Cold Gel; Dermacool; Happinose; Ice Cool Stress & Tension Relief; Meggezones; Quool; Vicks Vaposyrup for Tickly Coughs; ***USA:*** Absorbine Jr; Ben-Gay Patch; Ben-Gay Vanishing; Cepacol Sore Throat Post Nasal Drip; Extra Strength Vicks Cough Drops; Halls-Plus Maximum Strength; Icy Hot Back Pain Relief; Icy Hot Pop & Peel; Icy Hot Pro-Therapy; Kof-Eze; Mineral Freez Gel; N'ice; N'ice 'n Clear; Salonpas Aqua Patch; Sportscreme Ice; Therapeutic Mineral Ice; Therapy Ice; Vicks Cough Drops; Wonder Ice; ***Venez.:*** Dencorub Ice; Inquifric†.

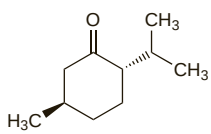
Multi-ingredient: numerous preparations are listed in Part 3.

Menthone

(±)-menthone; (*dl*)-menthone; Menton. (2*R*,5*S*)-*rel*-5-Methyl-2-(1-methylethyl)cyclohexanone; .

Ментон

$C_{10}H_{18}O$ = 154.2.
CAS — 3391-87-5 ((+)-menthone); 14073-97-3 ((–)-menthone); 89-80-5 ((±)-menthone); 1196-31-2 ((+)-isomenthone); 491-07-6 ((±)-isomenthone);.



((–)-menthone)

Profile
Menthone is a constituent of several essential oils. Of the 4 possible stereoisomers of menthone, (–)-menthone (*l*-menthone) is the most abundant in nature. Menthone is reported to be a cholagogue and has been used in preparations for biliary-tract and liver disorders.

Preparations
Proprietary Preparations (details are given in Part 3)
Multi-ingredient: ***Austria:*** Rowachol; ***Braz.:*** Quelodin†; ***Cz.:*** Rowachol; ***Ger.:*** Rowachol; Rowachol comp†; Rowachol-Digestiv; ***Hong Kong:*** Neo-Rowachol; Rowachol; ***Hung.:*** Rowachol; ***Irl.:*** Rowachol; ***Israel:*** Rowachol; ***Malaysia:*** Rowachol; ***Mex.:*** Cholex; ***Philipp.:*** Rowachol; ***Pol.:*** Rowachol; Terpichol; ***Switz.:*** Rowachol; ***Thai.:*** Rowachol; ***UK:*** Rowachol; ***Venez.:*** Rowachol.

Menyanthes

Bitterklee; Bogbean; Buckbean; Folia Trifoli Fibrini; Liść bobrka (bogbean leaf); Marsh Trefoil; Ményanthe; Menyanthidis Folium (bogbean leaf); Menyanthidis trifoliatae folium; Raatteenlehti (bogbean leaf); Trébol de agua; Trèfle d'Eau; Trifolii Fibrini Folium (bogbean leaf); Trilapių pupalaiškių lapai (bogbean leaf); Vachtový list (bogbean leaf); Vattenklöverblad (bogbean leaf); Vidrafűlevél (bogbean leaf).

NOTE. Bog myrtle (see p.2267) has also been used as a common name for *Menyanthes trifoliata*.

Pharmacopoeias. In *Eur.* (see p.vii).

Ph. Eur. 6.2 (Bogbean Leaf). The dried, entire or fragmented leaf of *Menyanthes trifoliata*. It has a very bitter and persistent taste.

Profile
Menyanthes has been used as a bitter. It is used in herbal medicine for rheumatic, gastrointestinal, and biliary-tract disorders. It is also used in folk medicine.

Homoeopathy. Menyanthes has been used in homoeopathic medicines under the following names: Menyanthes trifoliata; Menyan. t.

Preparations
Proprietary Preparations (details are given in Part 3)
Cz.: List Vachty Trojliste†.

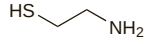
Multi-ingredient: ***Austria:*** Mariazeller; ***Cz.:*** Naturland Grosser Swedenbitter†; ***Fr.:*** Tisane Hepatique de Hoerdt; ***Ger.:*** Gallexier; ***Pol.:*** Krople Zoladkowe; ***Rus.:*** Original Grosser Bittner Balsam (Оригинальный Большой Бальзам Биттнера); ***UK:*** Modern Herbals Rheumatic Pain; Rheumatic Pain; Rheumatic Pain Relief; Rheumatic Pain Remedy; Vegetex.

Mercaptamine *(BAN, rINN)*

Cysteamine *(USAN)*; L-1573; MEA; Mercamine; Mercaptamina; Mercaptaminum; Merkaptamiini; Merkaptamin. 2-Aminoethanethiol.

Меркаптамин

C_2H_7NS = 77.15.
CAS — 60-23-1.
ATC — A16AA04.
ATC Vet — QA16AA04.



NOTE. In the UK, the CSM noted in October 2004 that confusion had arisen between mercaptopurine (p.744) and mercaptamine (formerly cysteamine) after the switch from prescribing by British Approved Name to prescribing by International Nonproprietary Name. Particular care should be taken to distinguish the two, since they are available in oral dosage forms of similar strength.

Mercaptamine Bitartrate *(BANM, rINNM)*

Bitartrato de mercaptamina; Cysteamine Bitartrate; Mercaptamine, Bitartrate de; Mercaptamini Bitartras.

Меркаптамина Битартрат

C_2H_7NS, $C_4H_6O_6$ = 227.2.
CAS — 27761-19-9.
ATC — A16AA04.
ATC Vet — QA16AA04.

Mercaptamine Hydrochloride *(BANM, rINNM)*

Cl-9148; Cysteamine Hydrochloride *(USAN)*; Hidrocloruro de mercaptamina; Mercaptamine, Chlorhydrate de; Mercaptamini Hydrochloridum.

Меркаптамина Гидрохлорид

C_2H_7NS,HCl = 113.6.
CAS — 156-57-0.
ATC — A16AA04.
ATC Vet — QA16AA04.

Adverse Effects and Precautions
Mercaptamine can be unpalatable and may cause breath and body odour. It may cause gastrointestinal disturbances including anorexia, nausea, vomiting, diarrhoea, and abdominal pain, and occasionally, gastrointestinal ulceration. Other adverse effects may include drowsiness, lethargy, headache, rashes, fever, and encephalopathy. Mercaptamine may cause increases in liver en-