

## Menthae piperitae folium

(DAB 10, Ph. Eur. 2, etc.), Peppermint leaf (BAN; BHP 1/1990), Peppermint (USAN; USP XXII)



Fig. 1: Peppermint leaf

**Description:** The drug consists of thin, brittle, oval lanceolate leaves, 3-9 cm long, with pinnate, often let-taged venation (Mitcham variety - the best quality) and a sharply serrate margin. On examination with a hand lens, the glandular trichomes can be seen as yellow dots (Fig. 3).

**Odour:** Characteristic, very strong.

**Taste:** Spicy and aromatic, and cooling.

Fig. 2: *Mentha x piperita* L.

A triple hybrid, *Mentha longifolia* x *M. sylvestris* (= *M. spicata*) x *M. aquatica*, of English origin plant, with a distinctly 4-angled stem and decussate leaves, growing to a height of about 60 cm. Pale flowers in spicate whorls.



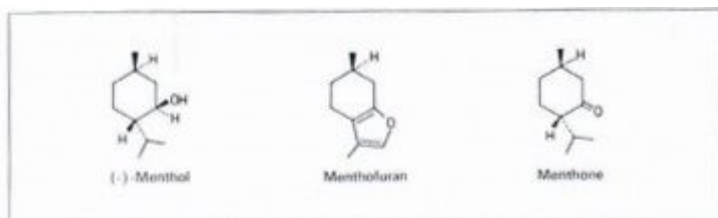
DAB 10: Pfefferminzblätter  
ÖAB: Folium Menthae piperitae  
Ph. Helv. VII: Menthae piperitae folium  
St. Zol. 1499.99.99

**Plant source:** *Mentha x piperita* L., peppermint (Lamiaceae).

**Synonyms:** Pfefferminzblätter, Katzenk (Ger.), Menthe poivrée, Feuilles de menthe (Fr.).

**Origin:** Entirely from cultivation (for ger reasons, only through vegetative multiplication by means of runners (stolons)). No days, exports come mainly from: Bulgaria, Greece, Spain, and a few other Balkan countries; a small amount of the drug is produced in southern Germany. Northern Europe and the USA also export the leaf.

**Constituents:** 0.5-4% essential oil (menthol and menthyl esters [especially the acetate and isovalerianate], menthone, menthofuran, and other monoterpenes, and small amounts of sesquiterpenes). The yield depends on the age of the plants and on



cut - the first cut in the second year tending to give the best yield, which decreases thereafter; the composition of the oil is less affected [5]. Moderate osmotic stress leads to an increase in oil yield with a decrease in biomass; the proportion of menthol/menthone is not affected, but with greater stress the proportion of sesquiterpenes increases somewhat [6]. On the other hand, exposure of plants to a continuing short photoperiod induces in young leaves the oxidative pathway from pulegone to menthofuran rather than the reductive pathway leading to menthone/menthol [7]. Flavonoids, among them a range of free lipophilic aglycones, with *O*-methylation patterns that vary with age and that point to sequential 4'- and 6'-*O*-methylation [8]. Also, 6-12% tannins; triterpenes; bitter substances (?).

**Indications:** As a spasmolytic, carminative, and cholagogue; mixed with other herbal drugs, also as a sedative. The action is mainly, but not entirely, due to the content of essential oil, the direct action of which on organs with smooth-muscle tissue causes a stronger spasmolysis than some of its individual components [1]. Peppermint tea brings about a considerable increase in the production of bile [2]; the effect is due to the essential oil, but presumably the flavonoids also play a part [3]. Peppermint tea is indicated in acute and chronic gastritis and enteritis, in colicky disorders of the gastrointestinal tract, and in flatulence; and also in chronic cholecystopathies. It is free from injurious side effects on prolonged use, provided it is not used to excess [1, 4]. Reported side effects relate chiefly to peppermint oil and/or its constituents menthol and menthone or to products in which they are significant components of the formulation, e.g. confectionery, menthol cigarettes, peppermint-oil capsules. Peppermint teas usually contain only ca. 25% (ca. 5 mg or less) of the oil present in the drug and thus only small amounts of menthol and menthone [9, 10].

**Making the tea:** Boiling water is poured over 1.5 g drug, covered, and stood for

*Extract from the German Commission E monograph (BAnz no. 223, dated 30. 11. 1985)*

**Uses**

Cramp-like complaints in the gastrointestinal tract and the gall bladder and biliary tract.

**Contraindications**

When gallstones are present, only to be taken after consultation with a doctor.

**Side effects**

None known.

**Interactions with other remedies**

None known.

**Dosage**

Internally: 3-6 g drug; 5-15 g tincture (as in Erg. B. 6); preparations correspondingly.

**Mode of administration**

Chopped drug for infusions and extracts of peppermint leaf for internal use.

**Note:** There is a separate monograph for Peppermint Oil.

**Effects**

Direct spasmolytic action on the smooth muscle of the digestive tract; choleric and carminative.

5-10 min. before being passed through a tea strainer.  
1 Teaspoon = ca. 0.6 g, 1 tablespoon = ca. 1.5 g.

**Herbal preparations:** The drug is also available as an instant tea (usually a spray-dried extract) and in tea bags (1.3-1.5 g). Note: The contents of peppermint-tea bags when indicated to be of "herbal-tea quality" do not always conform to pharmacopoeial requirements (higher proportion of stem and lower essential-oil content).

**Phytomedicines:** Peppermint leaf or extracts prepared from it are included in many (ca. 50) prepared cholagogues and bile-duct remedies, e.g. Cholagogum Nattermann® (capsules, drops), etc., gastrointestinal Remedies (ca. 50), e.g. Gastricholan®, Iberogast®, Ventridigest®, etc., liver remedies (more than 10), hypnotics/sedatives (more

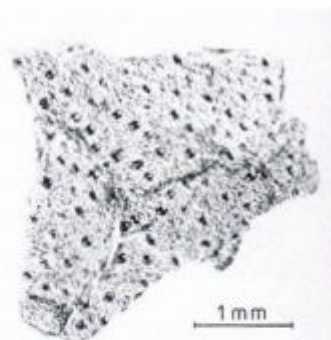


Fig. 3: Lower surface of the leaf, showing the numerous brown dots (pellate glandular trichomes)

than 10), e.g. Nervettec Stada®, Esber-Nervin® drops, etc., and laxatives.

**Regulatory status (UK):** General Sales List - Schedule 1, Table A.

**Authentication:** Macro- and microscopically, following the Ph. Eur. 2, etc. The characteristic glandular trichomes have 8 secretory cells, with a ballooned cuticle (Fig. 4); the cuticle of the long covering trichomes is striated or warty (Fig. 5); crystals are absent. Leaves attacked by the mint rust, *Puccinia menthae*, must be discarded. The microscopy of the powdered drug is described and illustrated in [11].

**Quantitative standards:** Ph. Eur. 2, etc.: Volatile oil, not less than 1.2%. Foreign matter, not more than 5% stem fragments greater than 1 mm in diameter; not more than 2% other foreign matter; and not more than 10% leaves with brown spots caused by *Puccinia menthae*. Water, not more than 11.0%. Acid-insoluble ash, not more than 1.5%.

*Wording of the package insert, from the German Standard Licence:*

**6.1. Uses**

Gastrointestinal and biliary complaints.

**6.2. Dosage and Mode of administration**

Hot water (ca. 150 ml) is poured over a tablespoonful of Peppermint leaf and after 5-10 min. passed through a tea strainer.

Unless otherwise prescribed, a cup of the freshly prepared infusion is drunk warm three or four times a day between meals.

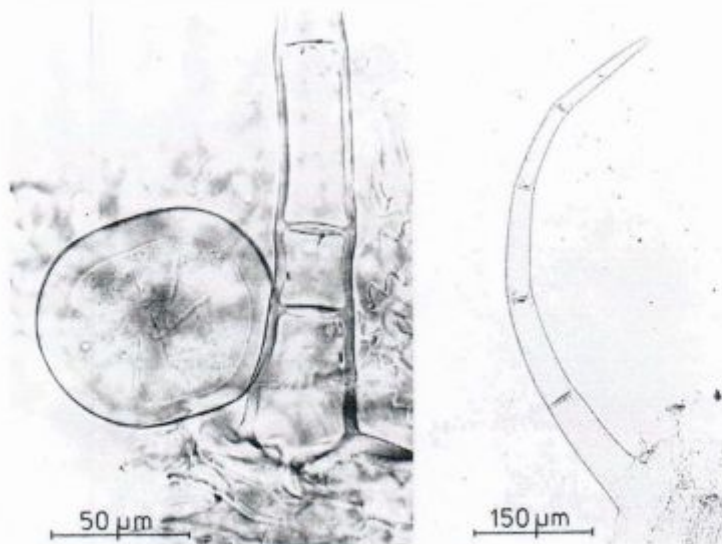


Fig. 4: Lamellicious (peltate) glandular trichome with 8 secretory cells and the base of a covering trichome  
Fig. 5: Large covering trichome with striated cuticle

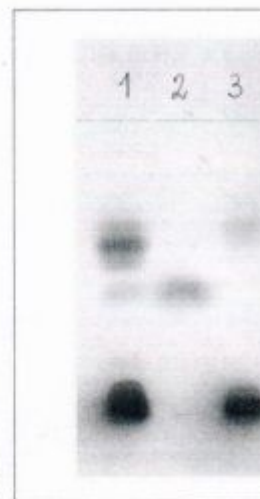


Fig. 6: TLC on 4 x 8 silica-gel foil

1: Peppermint leaf  
2: Menthofuran  
3: *Mentha arvensis* var. *piperascens*  
For details, see the text

USP XXII: Stems and other foreign organic matter, not more than 2% stems more than 3 mm in diameter and other foreign matter.

**Adulteration:** Relatively rare, since the drug is derived from cultivated plants; it is necessary to ensure that inadmissible amounts of stem are not present.

In recent times, because of the increasing demand for menthol, leaf material of *Mentha arvensis* l. var. *piperascens* (L.) HOLMES, so-called Japanese mint, has come on to the market. Small amounts of it cannot be detected in Peppermint leaf because of the very similar morphological and anatomical characters. However, the TLC detection of menthofuran, which is present in *M. piperita*, whatever its origin, and which is absent or present only in traces in *M. arvensis*, offers a suitable means of differentiation:

**Test solution:** oil (+ xylene) carefully collected after the pharmacopoeial determination of the essential-oil content.

**Reference solution:** 10 mg menthofuran dissolved in 2 ml *n*-hexane.

**Loadings:** 1 µm test solution and 1 µm reference solution.

**Solvent system:** *n*-hexane, 5 cm run.

**Detection:** after evaporation of the solvent, sprayed with anisaldehyde reagent and then heated for ca. 1-2 min. at 100-105 °C.

**Evaluation:** in daylight. Reference solution: menthofuran as an orange-yellow zone at Rf ca. 0.5. Test solution: besides several violet zones, a more or less comparable orange-yellow zone at about the same Rf as the reference substance - with leaves of *M. arvensis* var. *piperascens*, this zone is absent (Fig. 6).

The Ph. Eur. 2, etc., TLC test of purity examines a dichloromethane extract run in the solvent system: ethyl acetate + toluene (5 + 95), with menthol, cineole, thymol, and menthyl acetate as reference compounds; the chromatogram is evaluated in UV 254 nm light and after being sprayed with anisaldehyde reagent and heated at 100-105 °C for 5-10 min.

Enantioselective capillary GLC of mint oils (and presumably also of oils obtained from the drug) can detect adulteration with racemic menthol and menthyl acetate, which is not otherwise possible with present official methods of analysis [12].

**Storage:** Cool, dry, and protected but not in plastic containers.

#### Literature:

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