Ethnobotany. Lectures 34–35

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Outline

1. Pharmacognosy
   - Plants for musculosceletal system and skin
   - Plants for eye, ear, nose and pharynx

Pharmacognosy

Plants for musculosceletal system and skin

Arthritis, rheumatism and muscle pain

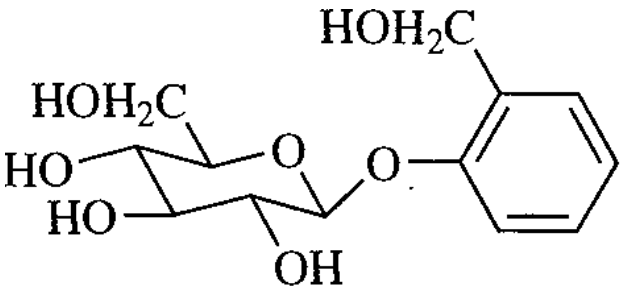
- Numerous unrelated diseases, from infections to psychological
- As a result, no general treatment available
- Main synthetic non-steroidal anti-inflammatory drugd (NSAIDs: aspirin, ibuprofen) are cyclo-oxygenases which inhibit prostaglandin synthase enzymes

Willows, *Salix* spp., Salicaceae, Northern Hemisphere

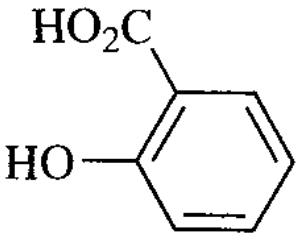
- *Salicis cortex*
- Contains salicylic acid
- Work much better with stomach than pure salicylis or acetylsalicylis acids (aspirin)

Willow

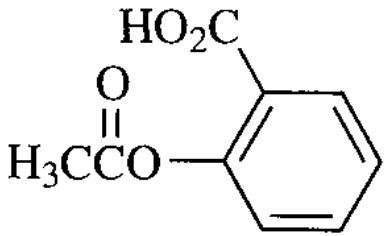
Salicylates



Salicin



Salicylic acid



Acetylsalicylic acid (Aspirin)

Meadowsweet, *Filipendula ulmaria*, Rosaceae, Eurasia

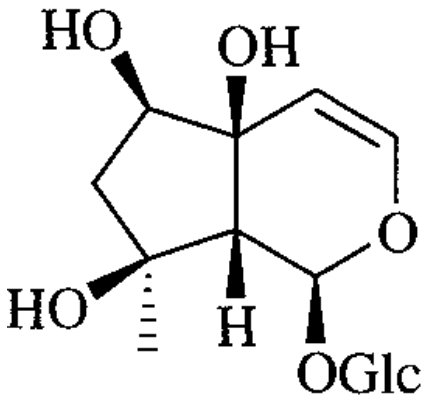
- Perennial herb growing in wet places, leaves and flowers are used
- Contain high amounts of salicylic acid, “aspirin” is a derivarive from old name of plant, “spiraea”

Meadowsweet

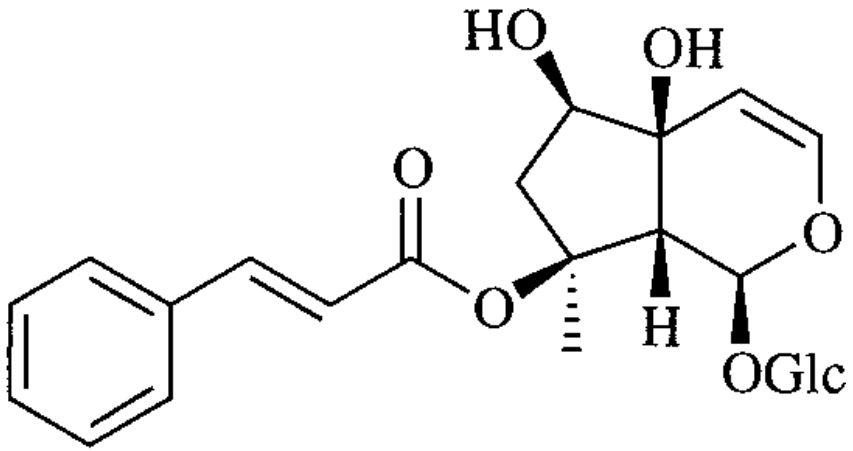
Devil's claw, *Harpagophytum procumbens*, Pedaliaceae, South Africa

- *Harpagophyti radix*
- Plant with extremely spiny fruits; roots are collected
- Contains bitter iridoids harpagide and harpagoside working well in arthritus

Devil's claw



Harpagide



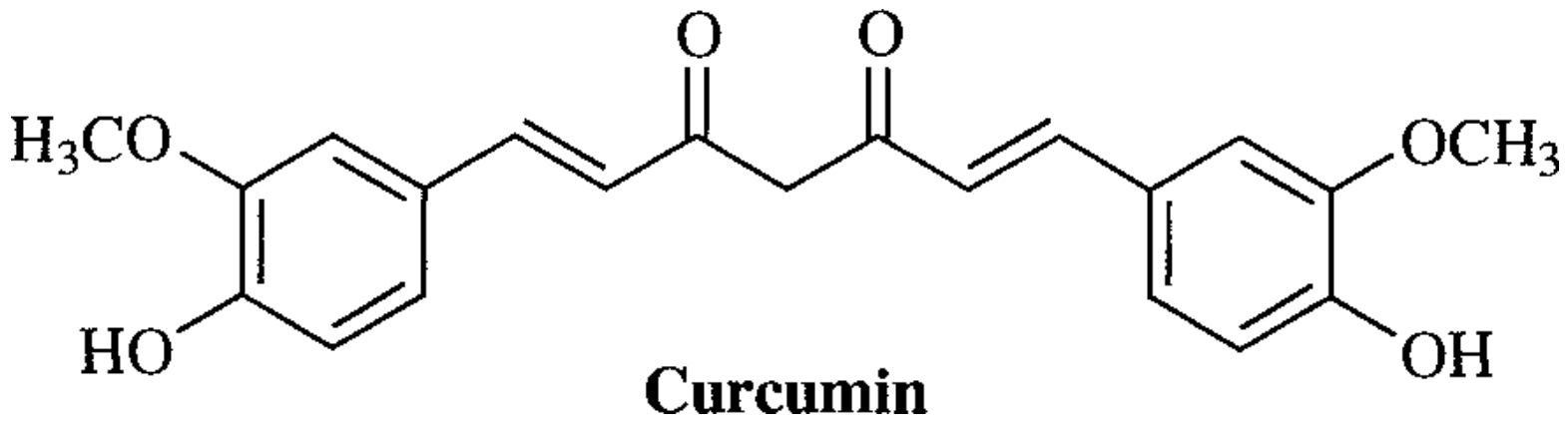
Harpagoside

Turmeric, *Curcuma domestica*, Zingiberaceae, South Asia

- *Curcumae domestuicae rhizoma*
- Herbaceous plant similar to ginger, rhizomes are used
- Plant came from Ayurveda and TCM
- Curcuminoid phenolic compounds are active, antagonist of some inflammatory factors

Turmeric

Cucrumin



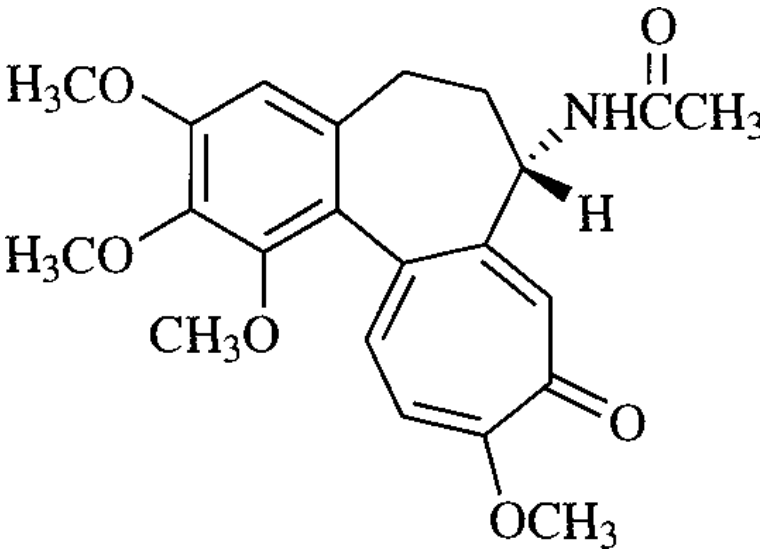
Curcumin

Autumn crocus, *Colchicum autumnale*, Colchicaceae, Eurasia

- Used against gout: severe inflammation of foot joints caused by formation of uric crystals
- Colchicine is an active compound; extremely toxic!

Autumn crocus

Colchicine



Cold and influenza

- Mixture of diseases, anti-inflammatory, antiviral drugs and immunostimulants are used
- Demulcents and emollients used for symptomatic treatment

Linden, *Tilia* spp., Malvaceae, North Hemisphere

- *Tiliae flos*
- Deciduous trees with insect-pollinated, fragrant flowers
- Active components are different essentioal oils, polysaccharides; some are capable to bind with inhibitory GABA receptors

Linden

Coltsfoot, *Tussilago farfara*, Compositae, Eurasia

- Herb with dimorphic leaves and early flowering (both flowers and leaves are used)
- Main active components are acidic polysaccharides

Coltsfoot

Common marshmallow, *Althaea officinalis*, Malvaceae, Eurasia

- *Althaeae radix*
- High herbaceous perennial plant
- Tissues are rich of mucilage polysaccharides and flavonoids

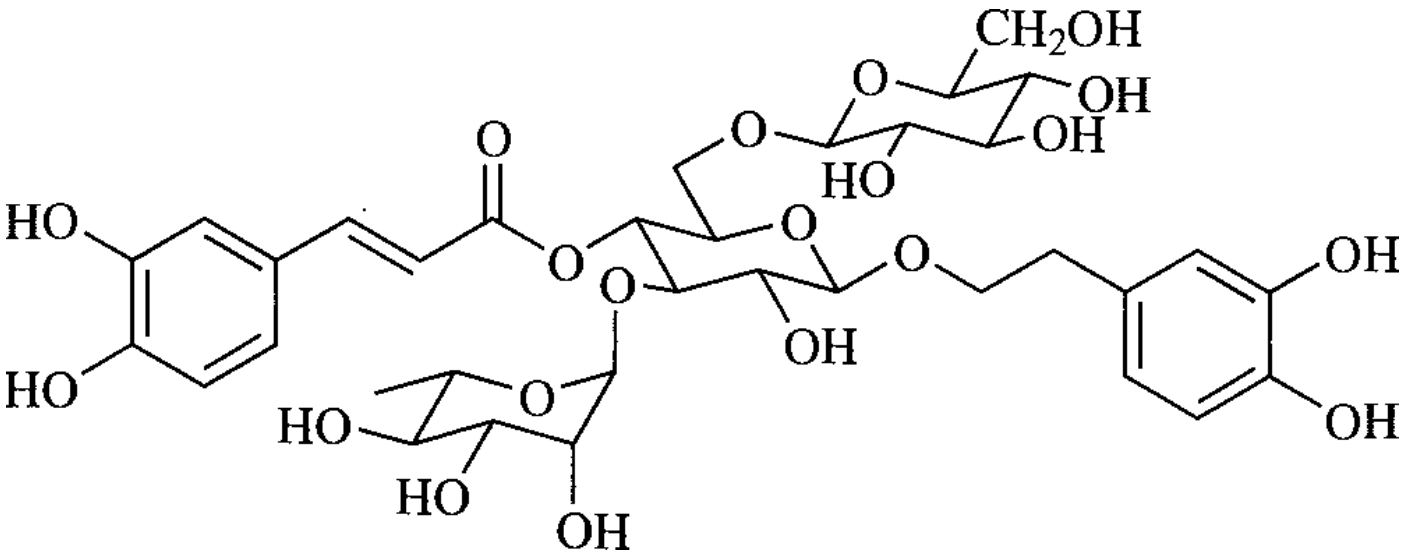
Marshmallow

Echinacea, *Echinacea purpurea* and other species, Compositae, North America

- Perennial herb, widely used by native tribes
- Contain numerous glycosides and other compounds, e.g., echinacoside
- Immunostimulant and anti-allergic plant, often combined with garlic

Echinacea

Echinacoside



Wintergreen, *Gaultheria procumbens*, Ericaceae, North America

- Leaves and stems contain oils rich of methyl salicylates
- Often used topically, e.g., for many kinds of muscular pains

Wintergreen

Red pepper, *Capsicum* spp., Solanaceae, Central America

- (Already covered)
- Provides the revulsive effect

Skin diseases

- Eczema, dry skin, infectious diseases, local inflammation etc.
- Anti-inflammatory, antimicrobial and some specific drugs are used

Yarrow, *Achillea millefolium*, Compositae, Eurasia

- Perennial plant with dissected leaves, all parts are used
- Essential oils and tannins are responsibe for anti-inflammatory and astringent effects

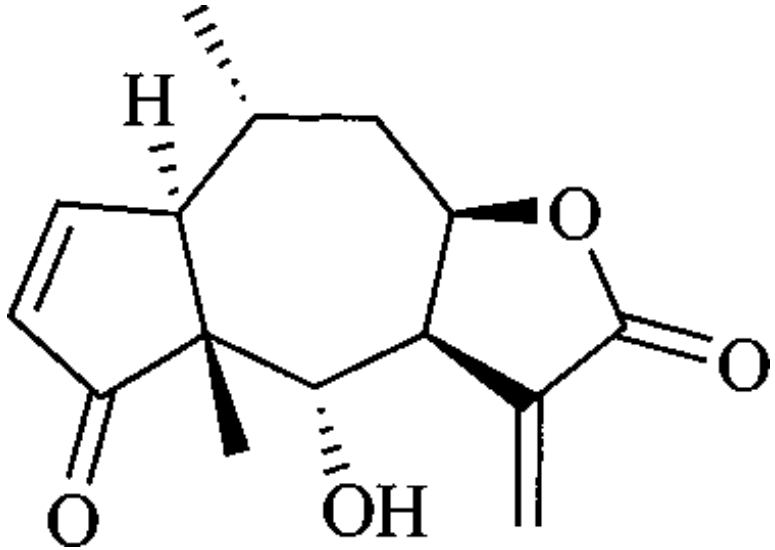
Yarrow

Arnica, *Arnica montana*, Compositae, Eurasia

- Perennial mountainous plant from Alps
- Contain a rich combination of active compounds: proteins, essential oils, sesquiterpene lactons (e.g., helenalin)

Arnica

Helenalin



Aloë vera, Asparagaceae, Africa

- African tree with succulent leaves
- Mixture of different components with antibacterial, anti-inflammatory and other effects

Aloë vera

Calendula, *Calendula officinalis*, Asteraceae, Eurasia

- Herbaceous plant with bright yellow or orange inflorescences
- Oils, polysaccharides, saponins (like calenduladiol), carotenes—with anti-inflammatory and antiseptic effects

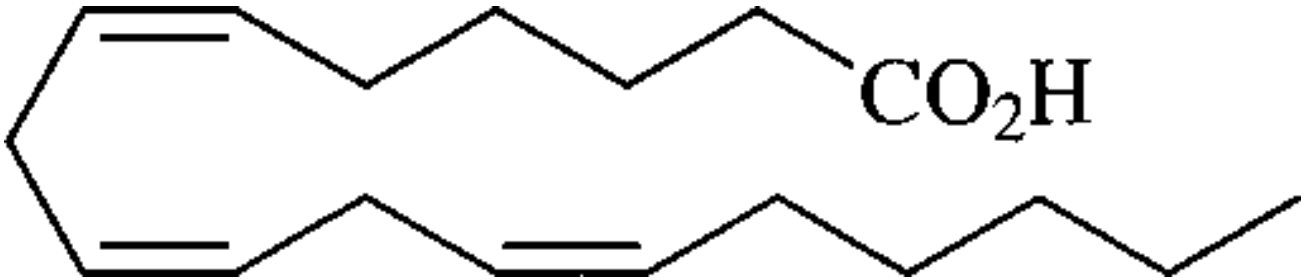
Calendula

Evening primrose, *Oenothera* spp., Onagraceae, North America

- Used by local tribes
- Active is γ-linolenic acid which has topical anti-inflammatory and anti-eczematic effects

Evening primrose

γ-linolenic acid



Witch hazel, *Hamamelis virginiana*, Hamamelidaceae, North America

- Shrub with hazel-like leaves and extremely early (or late) flowering
- Leaves and bark contain tannins with positive astringent effects to skin

Witch hazel

Pharmacognosy

Plants for eye, ear, nose and pharynx

Eyebright, *Euphrasia* spp., Orobanchaceae, Eurasia

- Traditional European plant remedy
- Active components are iridoid glycosides: aucubin, euphroside etc., lignans and tannins
- Helps in conjunctivitis

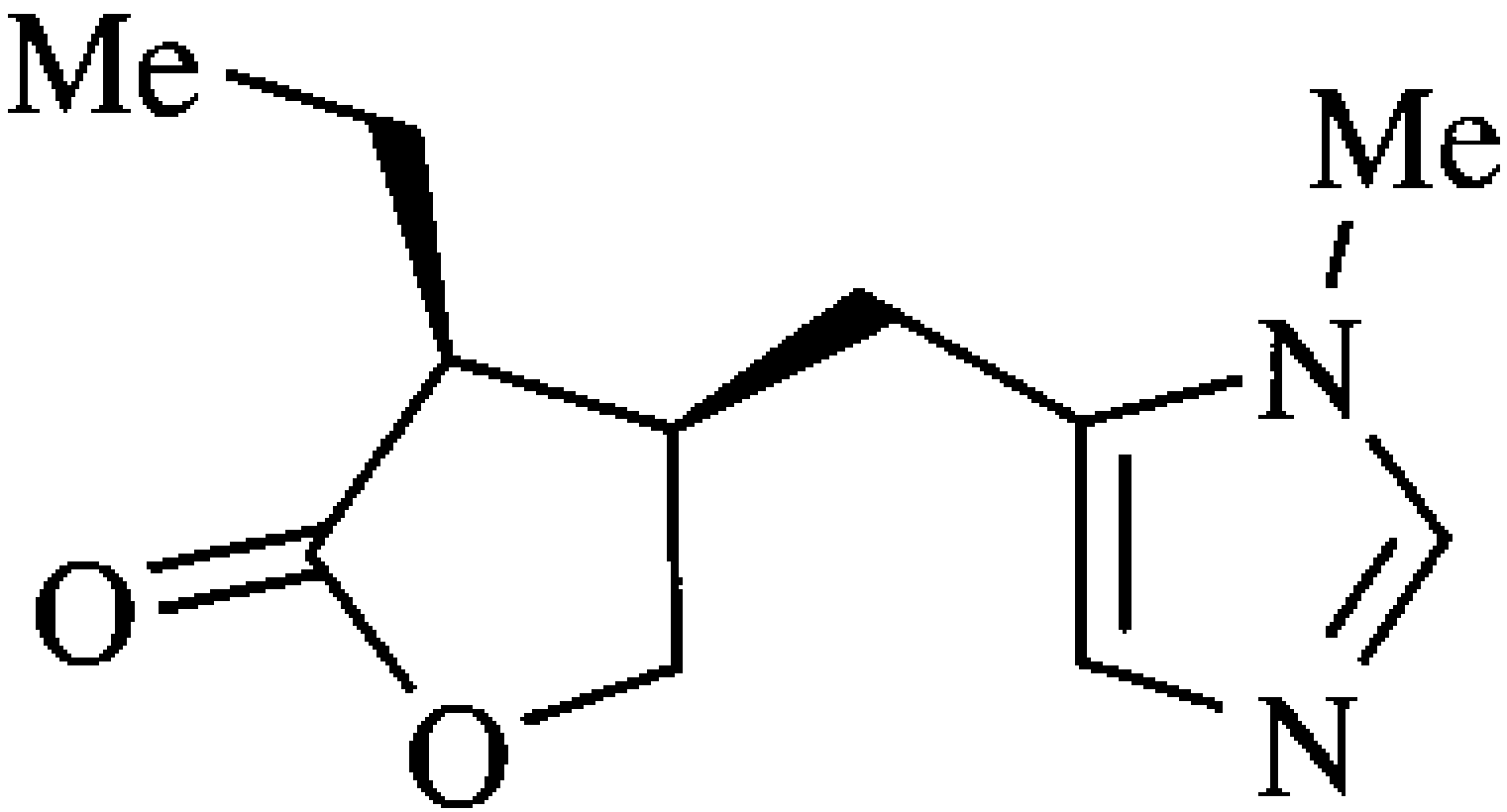
Eyebright

Jaborandi leaf, *Pilocarpus* spp., Rutaceae, South America

- Contains alkaloid pilocarpine
- Stimulating eye muscles, contracting pupils after atropine; used against glaucoma

Jaborandi leaf

Pilocarpine

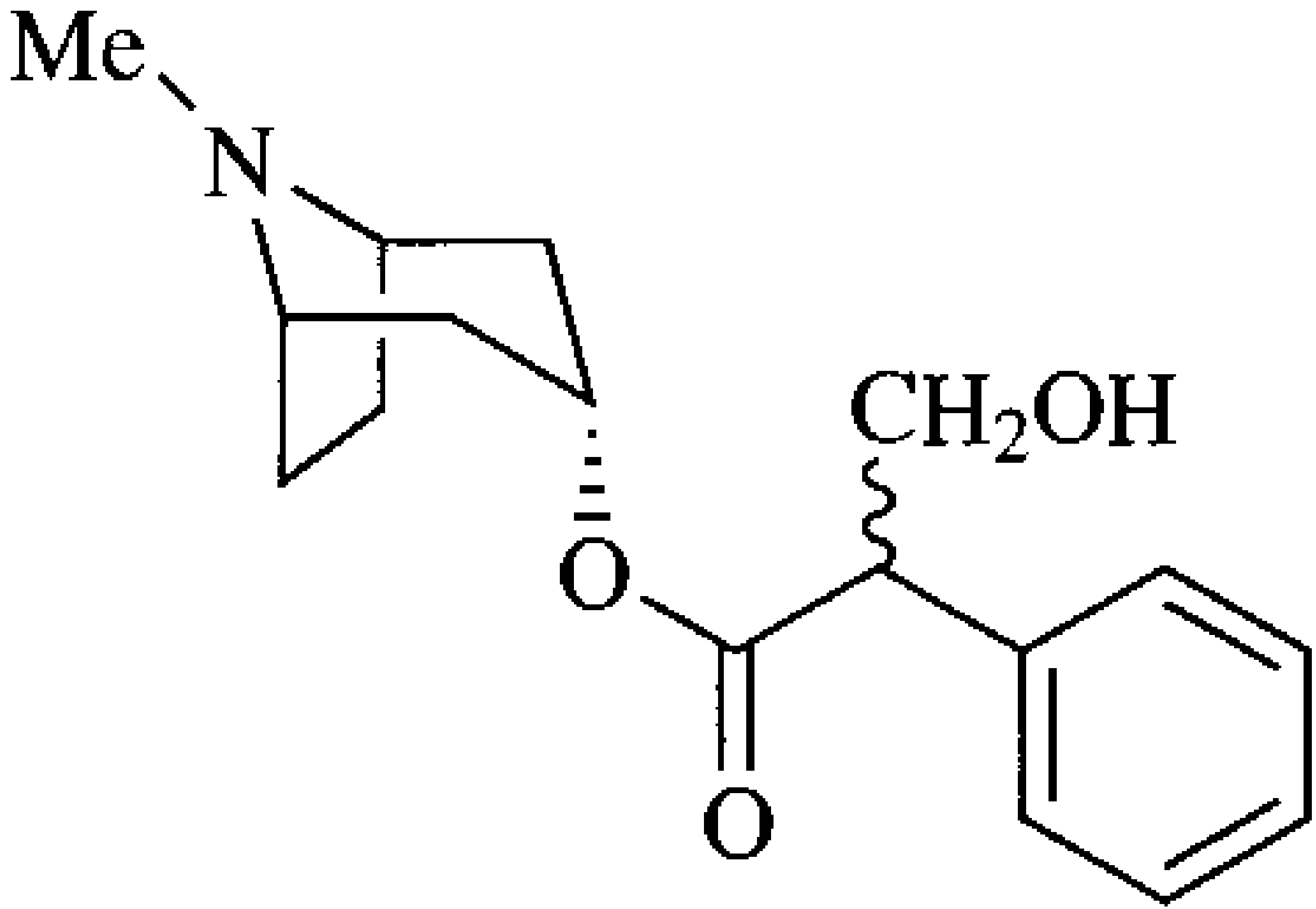


Deadly nightshade, *Atropa belladonna*, Solanaceae, Mediterranean

- Contains alkaloid atropine
- Used for medical examination to open iris

Deadly nightshade

Atropine



Essential oil plants for nose and orthopharynx

- Essential oils are using as antiseptic and anti-inflammatory agents
- Sage (*Salvia officinalis*), eucalyptus (*Eucalyptus* spp.) and peppermint (*Mentha* $\times$ *piperita*) are most frequently used

Clove, *Syzygium aromaticum*, Myrtaceae, Southwest Asia

- *Caryophylli flos*
- Flower buds extremely rich of eugenol
- Used also as a culinary spice

Clove

Summary

- Anti-inflammatory, antibacterial and astringent compounds are most important for treating cold and skin diseases

For Further Reading

A. Shipunov.
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2011—onwards.
Mode of access:
http://ashipunov.info/shipunov/school/biol_310

M. Heinrich and others.
Fundamentals of pharmacognosy amd phytotherapy (selected chapters). [Electronic resource].
Churchhill Livingstone, 2004.
Mode of access: http://ashipunov.info/shipunov/school/biol_310/heinrich2004_fund_pharm_part.djvu
Chapters 19–21.