

Ethnobotany. Lecture 34

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Outline

Pharmacognosy

- Plant remedies for neural system

- Plant remedies for infectious and parasitic diseases



Pharmacognosy

Plant remedies for neural system



Antidepressants

- ▶ “Nerve tonics”
- ▶ Plants with anti-depressant activity are rare

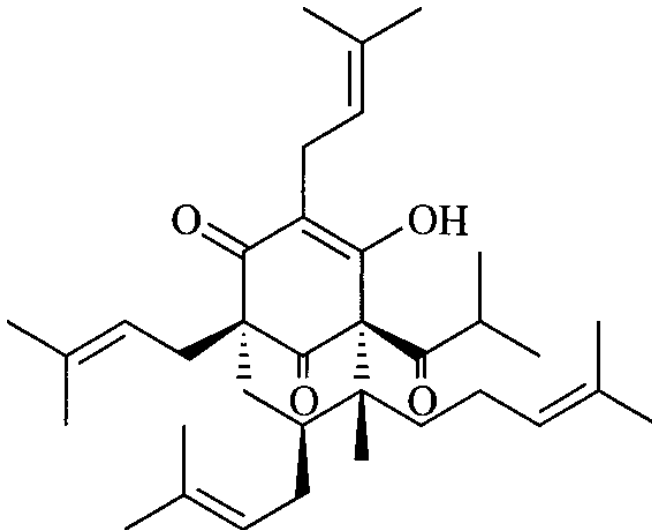


St. John's wort, *Hypericum perforatum*, Hypericaceae, Eurasia

- ▶ *Hyperici herba*
- ▶ Hyperforin (derivative of terpenes) is the most active component
- ▶ Inhibition of synaptic uptake of several neurotransmitters: serotonin, dopamin, GABA etc.



Hyperforin



Hypericum perforatum



Analgesics

- ▶ Cocaine and morphines are sometimes used as analgesics
- ▶ Aspirin-related anti-inflammatory drugs will be covered later

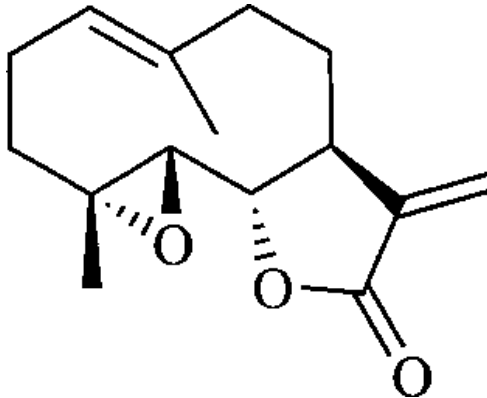


Feverfew, *Tanacetum parthenicum*, Compositae, Eurasia

- ▶ *Tanacetum parthenii herba*
- ▶ Sesquiterpene lactones like parthenolide are responsible for the activity
- ▶ Suppress prostaglandine production



Parthenolide



Feverfew



Memory enhancement

- ▶ Especially important in case of Alzheimer's disease (dementia)
- ▶ Often are inhibitors of acetylcholinesterase

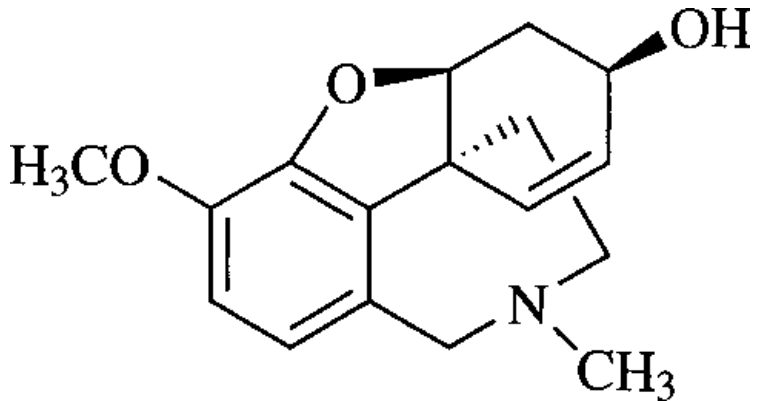


Snowdrop, *Galanthus nivalis*, Amaryllidaceae, Mediterranean

- ▶ Contains alkaloid galantamine
- ▶ Slow down the progression of Alzheimer's disease



Gаланthамine



Snowdrop



Ginkgo, *Ginkgo biloba*, Ginkgoaceae, China

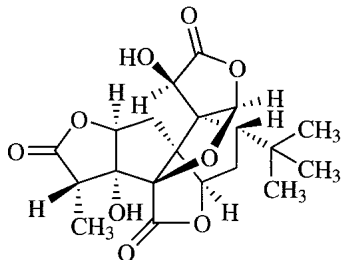
- ▶ “Living fossil” from China, natural habitats are lost
- ▶ Active components are diterpene lactones ginkgolides and glycosides such as ginkgetin
- ▶ Improve blood circulation in brain, have antioxidant effects, prevent degradation of synaptic receptors
- ▶ Also used to heal varicose veins



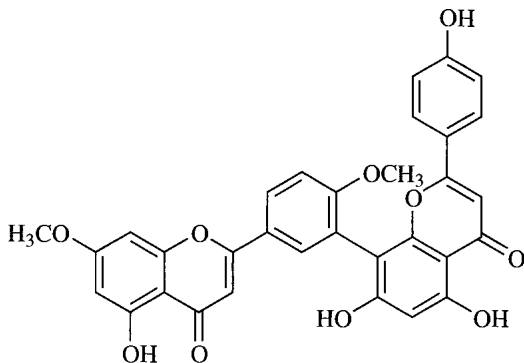
Ginkgo biloba



Ginkgolides and ginkgetins



Ginkgolide A



Ginkgetin

Pharmacognosy

Plant remedies for infectious and parasitic diseases



Antiprotozoal and antihelminth drugs

- ▶ Most of these diseases are restricted to tropics
- ▶ Sometimes, control on the transmission is much more effective than any treatments



Cinchona, *Cinchona* spp., Rubiaceae, South America

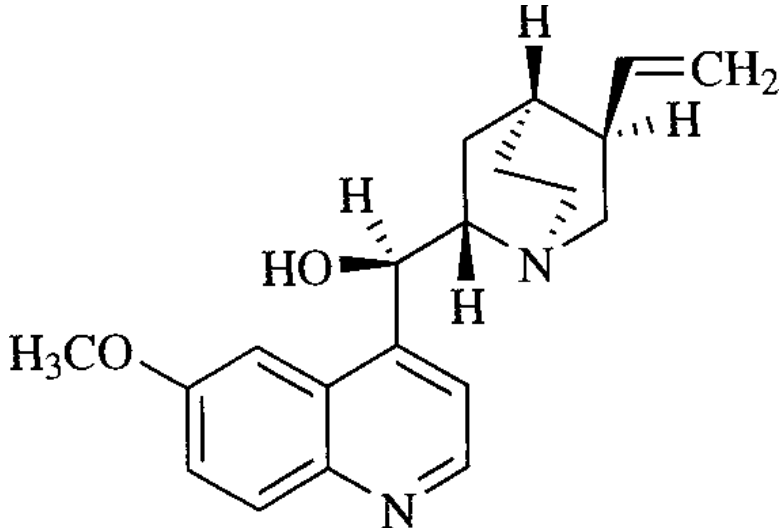
- ▶ *Cinchonae cortex*
- ▶ Quinoline alkaloids, such as quinine toxic to malarian parasite but in large doses also to humans
- ▶ Extremely bitter



Cinchona



Quinine



Lapacho, *Tabebuia* spp., Bignoniaceae, South America

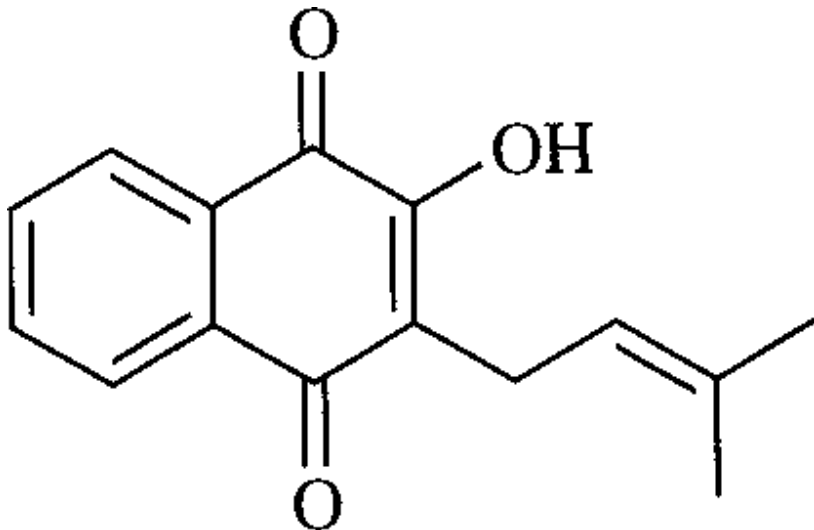
- ▶ Large tropical trees, inner bark is used
- ▶ Naphthoquinones, especially lapachol are active against multiple protozoan diseases and even cancers; cytotoxic in big doses



Tabebuia



Lapachol

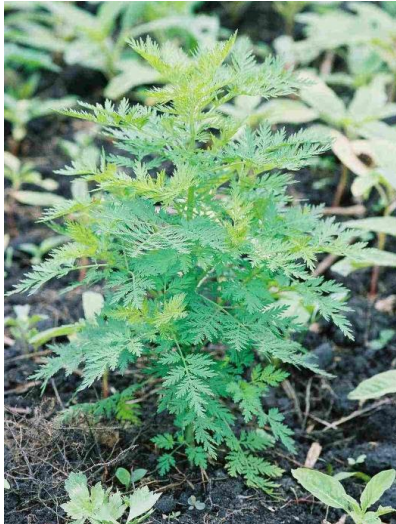


Sweet wormwood, *Artemisia annua*, Compositae, China

- ▶ Small annual herb, leaves and stems are used
- ▶ Sesquiterpenes like artemisinin are active against malarian parasite, *Plasmodium*
- ▶ Non-toxic (!)



Sweet wormwood



Moringa, *Moringa oleifera*, Moringaceae, South Asia

- ▶ Large tropical tree with edible leaves and oil-containing seeds
- ▶ Contains multiple active compounds like alkaloid spirochin with antibacterial and antihelminth effects



Moringa



Wild bergamot, *Monarda fistulosa*, Labiatae, North America

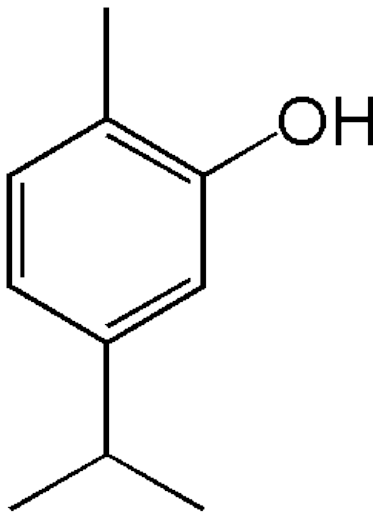
- ▶ Prairie herb with large clusters of flowers
- ▶ Contains rich set of essential oils: thymol, pinene, carvacrol, antibacterial and antihelminth



Wild bergamot



Carvacrol



Antiviral, antibacterial and antifungal agents

- ▶ Unlike antibiotics, have a broad spectrum of activity
- ▶ Most can be taken in form of herbal teas (like balm tea from *Melissa*)



Garlic, *Allium sativum*, Amaryllidaceae, Eurasia

- ▶ (Covered previously)
- ▶ Contains allicin, and different diallyls



Tea tree, *Melaleuca alternifolia*, Myrtaceae, Australia

- ▶ *Melaleuca atheroleum*
- ▶ Medium-sized tree from north-west coast of Australia
- ▶ Oils (in form of tea) are widely used as antiseptics: contain cineole and other essential oil monoterpenes



Melaleuca, tea tree



Urinary tract infections (cystitis)

- ▶ Majority of women have some form of this infection
- ▶ Plant remedies are often work better because they do not have side effects (however, they are not recommended to patients with blood problems)



Bearberry, *Arctostaphylos uva-ursi*, Ericaceae, North Hemisphere

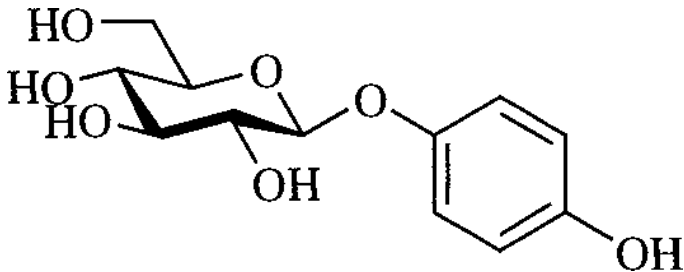
- ▶ *Uvae ursi folium*
- ▶ Small prostrate evergreen shrub
- ▶ Traditionally used in cystitis; glycoside arbutin and its derivatives have stable antimicrobial activity



Bearberry



Arbutin



Cranberry, *Vaccinium macrocarpon*, Ericaceae, North America

- ▶ Minuscule shrub from bogs and coasts
- ▶ Contains anthocyanins which are suspected to be active compounds: cranberry juice suppresses urinary infections



Insecticidal agents

- ▶ Most derived from terpenoids and essential oils
- ▶ Alkaloids like veratridine (from *Veratrum* spp.) were used in the past but now abandoned due to toxicity



Pyrethrum, *Chrysanthemum/Tanacetum* spp., Compositae, North America

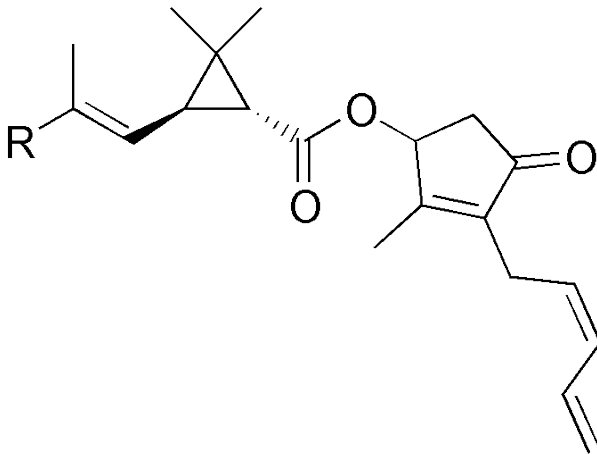
- ▶ Multiple herb species, all contain pyrethrin widely used as a spray, for fumigation etc.
- ▶ Synthetic pyrethrins are often subjects for increased resistance from insects



Pyrethrum



Pyrethrin



Quassia, *Picrasma excelsa* and *Quassia amara*, Simaroubaceae, Japan and Central America

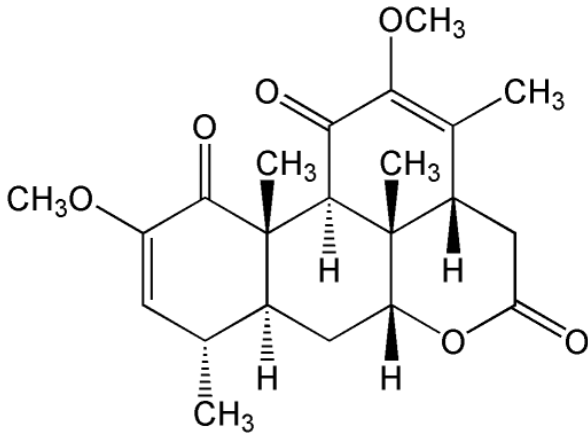
- ▶ Wood of these trees is normally used (e.g., for smoke)
- ▶ Quassinoids like quassin are not only insecticides but also anthyheminth and antibacterial drugs



Quassia



Quassin



Summary

- ▶ Plant quinones and essential oils tend to be antimicrobial



For Further Reading



A. Shipunov.

Ethnobotany [Electronic resource].

2011—onwards.

Mode of access:

http://ashipunov.info/shipunov/school/biol_310



Heinrich et al. 2012.

Fundamentals of Pharmacognosy and Phytotherapy.

Churchill Livingstone, Edinburgh.

