

# Ethnobotany. Lecture 32

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# Outline

- 1 Plant remedies for nervous system: others



# Khat, *Catha edulis*, Celastraceae, East Africa

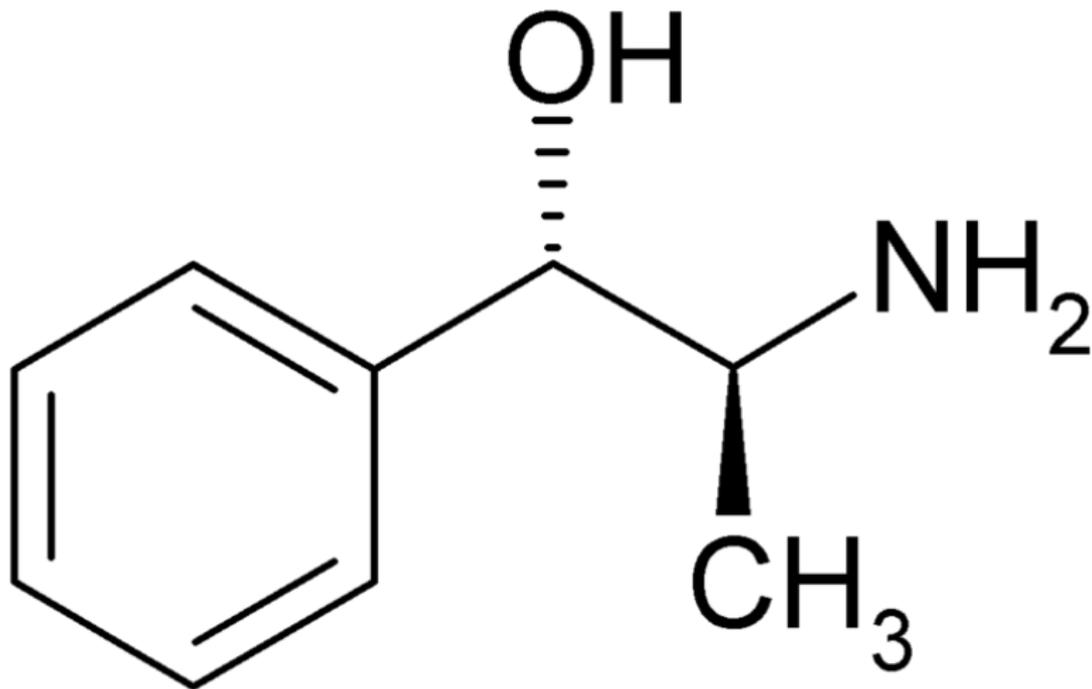
- Evergreen shrub ecologically similar to coffee
- Leaves contain cathine (pseudonorephedrine), agonist of noradrenaline receptors, which mild psychoactive effects



# Khat



# Cathine



# Areca nut, *Areca catechu*, Palmae, Southeast Asia

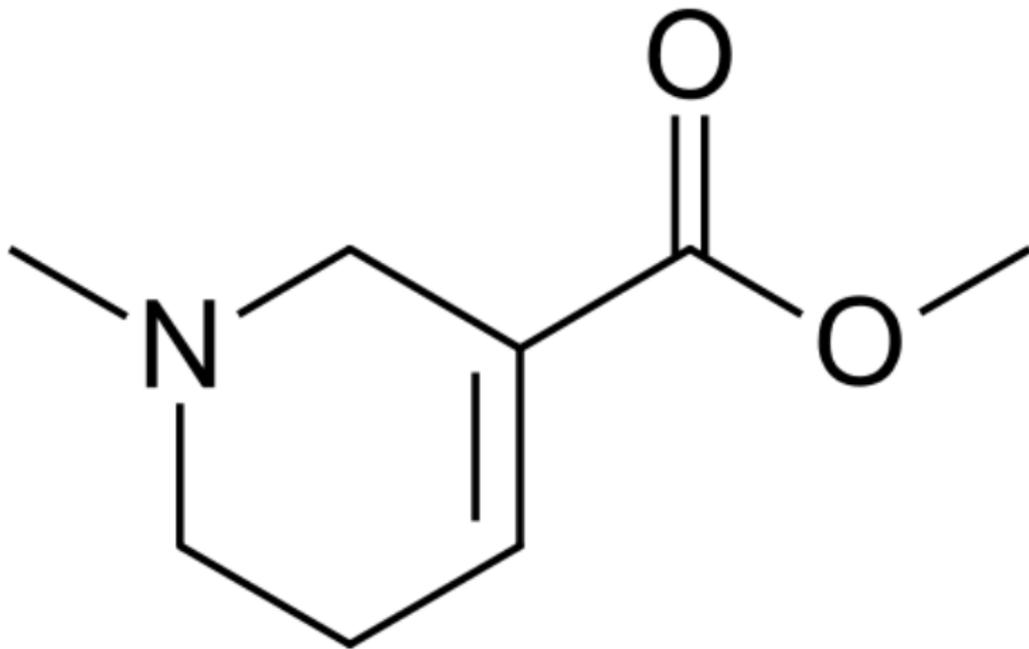
- Nuts are chewed with betle pepper (*Piper betle*, Piperaceae) leaves and slaked lime ( $\text{Ca}(\text{OH})_2$ )
- Chemical reaction will free arecoline alkaloid (similar to nicotine), agonist of acetylcholine receptors



## Areca nut vendor (Hainan, China)



# Arecoline

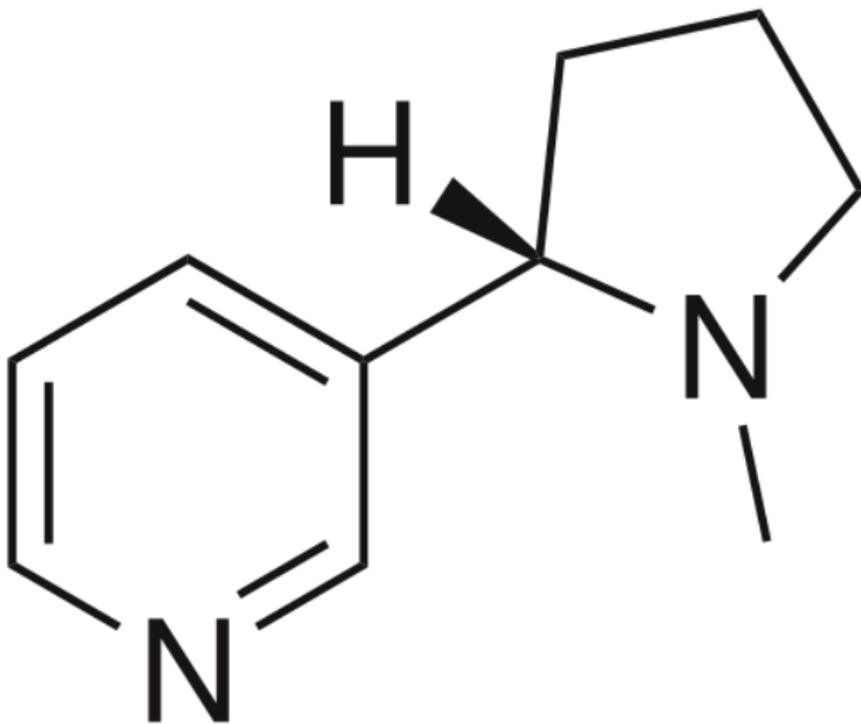


# Tobacco, *Nicotiana tabacum*, Solanaceae, Central America

- Perennial herb with large glanduliferous leaves
- Contain alkaloid nicotine binding to acetylcholine receptors and (among other effects) increases the level of brain dopamine
- Nicotine is a also a well-known natural insecticide



# Nicotine



# Kava, *Piper methysticum*, Piperaceae, Pacific

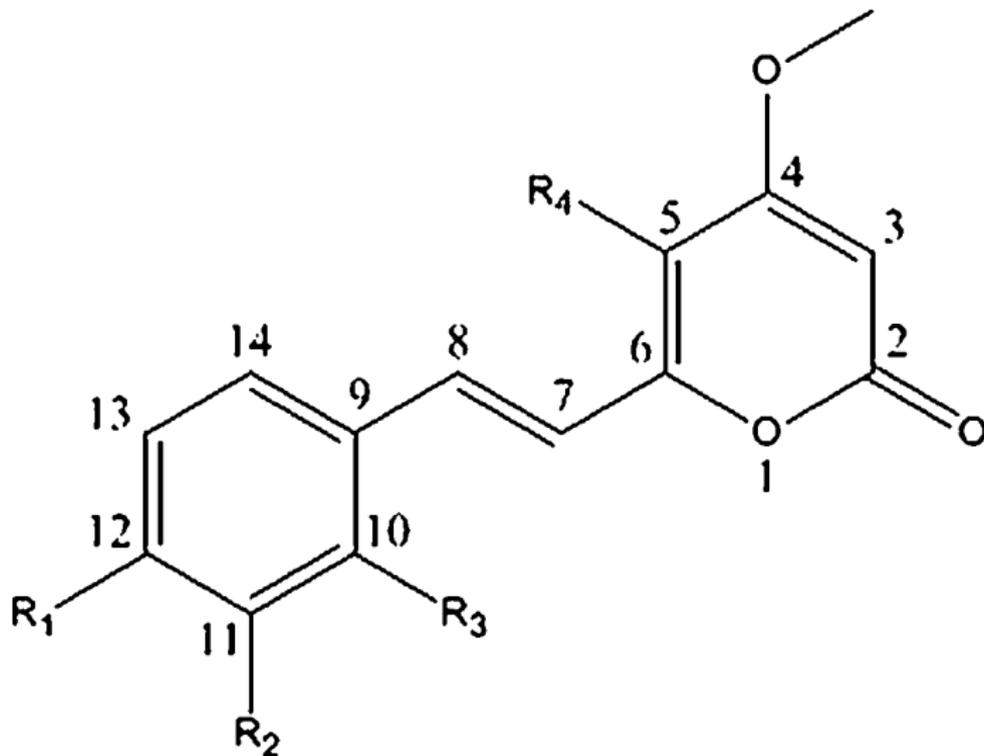
- Small shrub, roots are used to prepare sedative drink
- Active components are kavactones, stimulate inhibitory  $\gamma$ -aminobutyric GABA receptors



# Kava



# Kavactone



# Hibiscus tea, *Hibiscus sabdariffa*, Malvaceae, Mediterranean

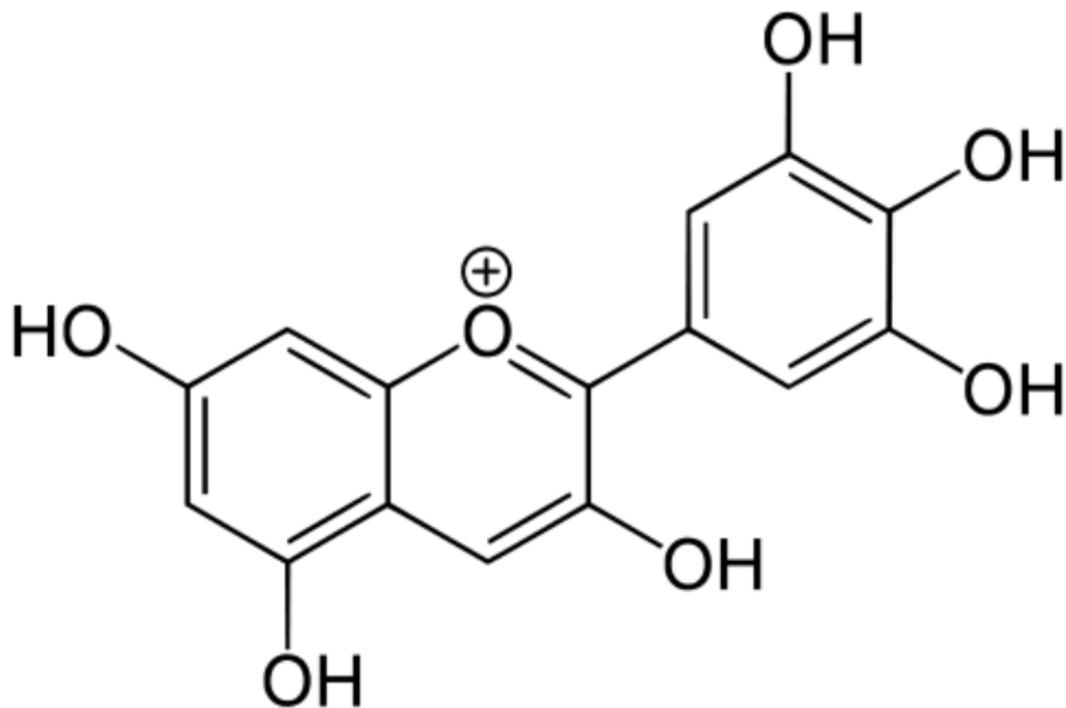
- Flower calyces (sepals) are dried and boiled
- Contain flavonoids (e.g., anthocyanin dephlinidin) and organic acids with multiple medicinal effects, e.g., lowering blood pressure



# Hibiscus tea plant



# Delphinidin anthocyanide



# Rooibos tea, *Aspalathus linearis*, Leguminosae, South Africa

- Small shrub of Cape province
- Leaves contain high level of antioxidants such as aspalathin and nothofagin, fermented similarly to tea or yerba mate



# Rooibos



# Sedatives

- Are often calling “hypnotics”, difference is mainly in a dose
- Plant sedatives are much safer than synthetic



# Valerian, *Valeriana officinalis*, Caprifoliaceae, Eurasia

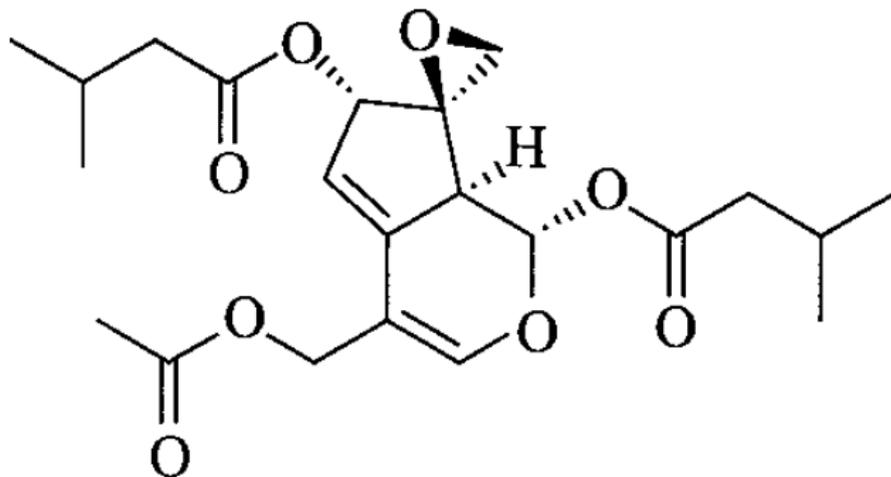
- *Valerianae radix*
- Active components are valerian oils and iridoids valepotriates
- Interact with GABA receptors



# Valerian



# Valtrate valepotriate



# Hops, *Humulus lupulus*, Cannabaceae, Eurasia

- *Lupuli flos*
- Active components are unusual organic acids humulone and lupulone and their derivatives
- Helps to normalize sleep, also have antibacterial effects



# Hops (female inflorescences)



# Lemon balm, *Melissa officinalis*, Labiatae, Eurasia

- *Melissae folium*
- Active components are multi-component volatile oils including aldehydes
- Improve nervous disorders and also gastrointestinal problems; has antibacterial effects



# Melissa



# Red passion flower, *Passiflora incarnata*, Passifloraceae, South America

- Dried leaves are used pharmaceutically
- Active components suspected to be flavonoids
- As effective as oxazepam (serax) in treating nervous disorders (e.g., hysteria)



# Mandrake, *Mandragora officinarum*, Solanaceae, Central Asia

- Dried root contains atropine, scopolamine, hyoscyamine and podophyllin: all alkaloids
- Poisonous and hallucinogenic in large doses, hypnotic/sedative in small doses



# Mandrake, from Tacuinum Sanitatis (1474)



# Mandrake



# Mandrake roots



# Antidepressants

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

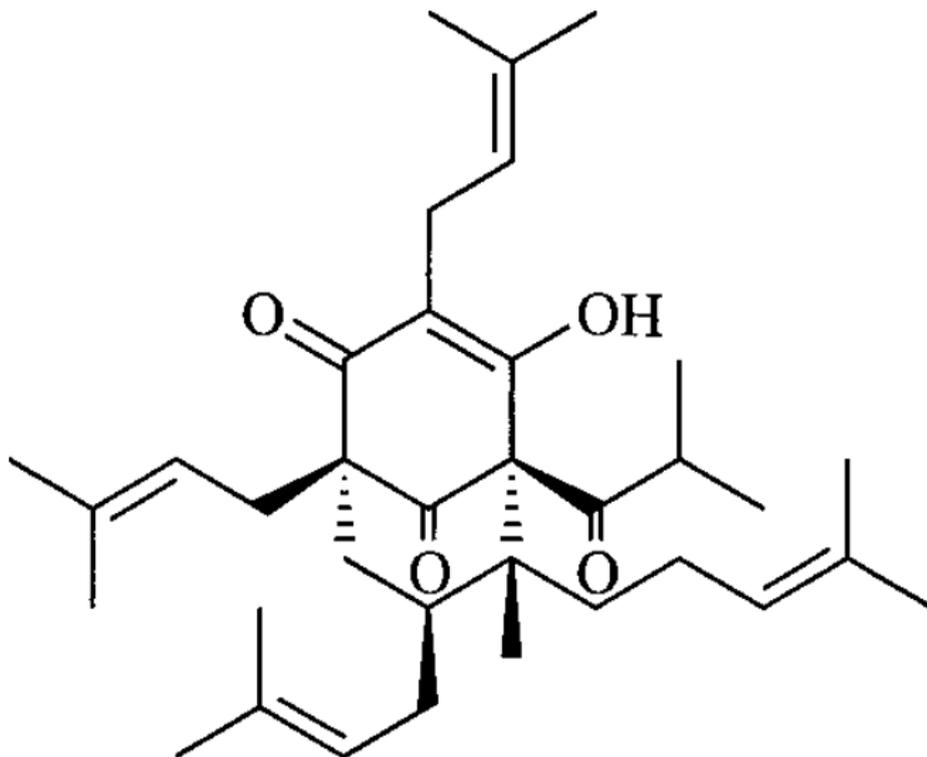


# St. John's wort, *Hypericum perforatum*, Hypericaceae, Eurasia

- *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

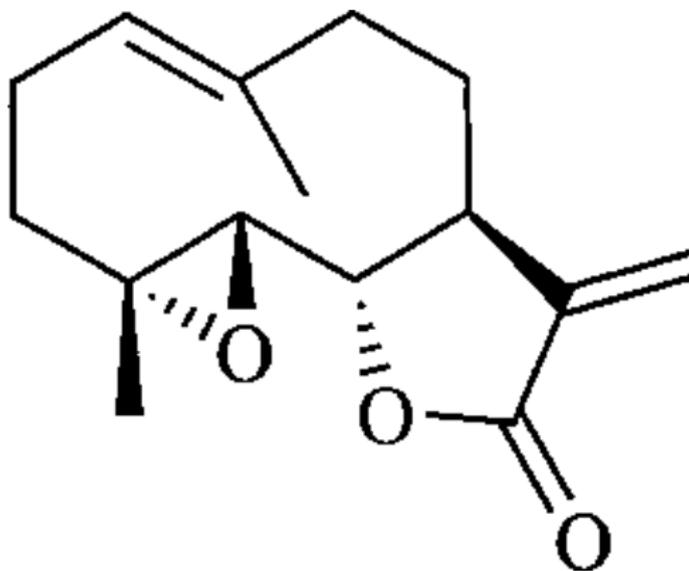


# Feverfew, *Tanacetum parthenicum*, Compositae, Eurasia

- *Tanaceti 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

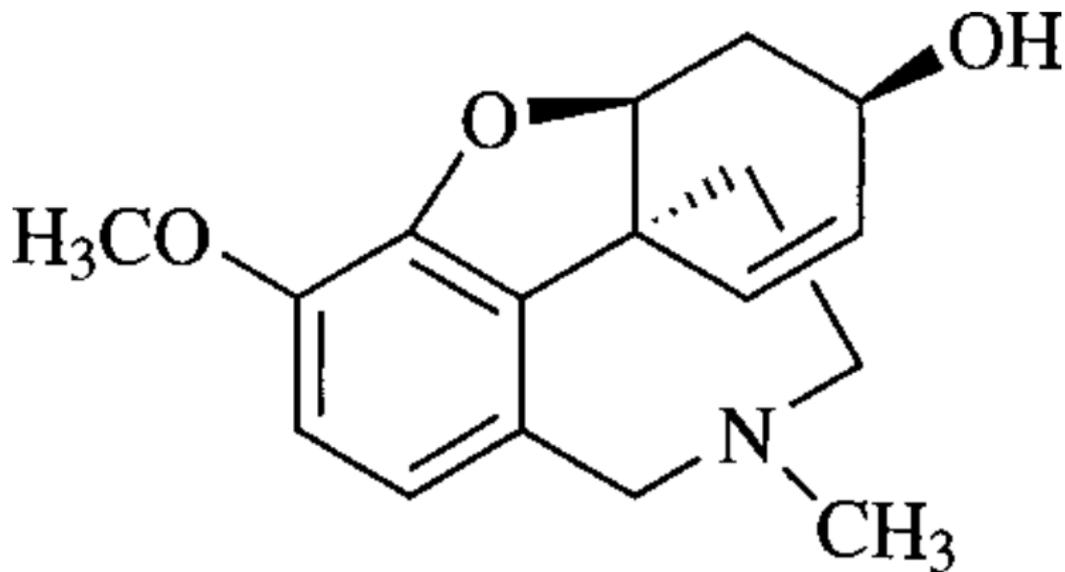


# Snowdrop, *Galanthus nivalis*, Amaryllidaceae, Mediterranean

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



# Galanthamine



# Snowdrop



# Ginkgo, *Ginkgo biloba*, Ginkgoaceae, China

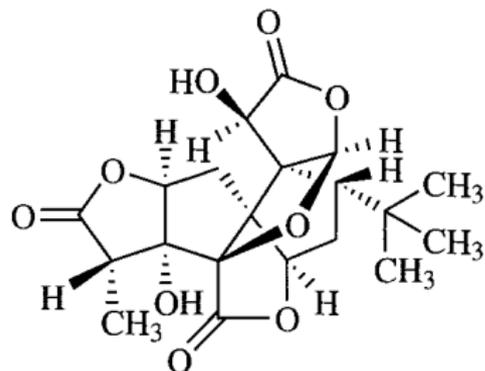
- “Living fossil” from China, natural habitats are lost
- Active components are diterpene lactones ginkgolides and glycosides such as ginkgetin
- Improve blood circulation in brain, have antioxidant effects, prevent degradation of synaptic receptors
- Also used to heal varicose veins



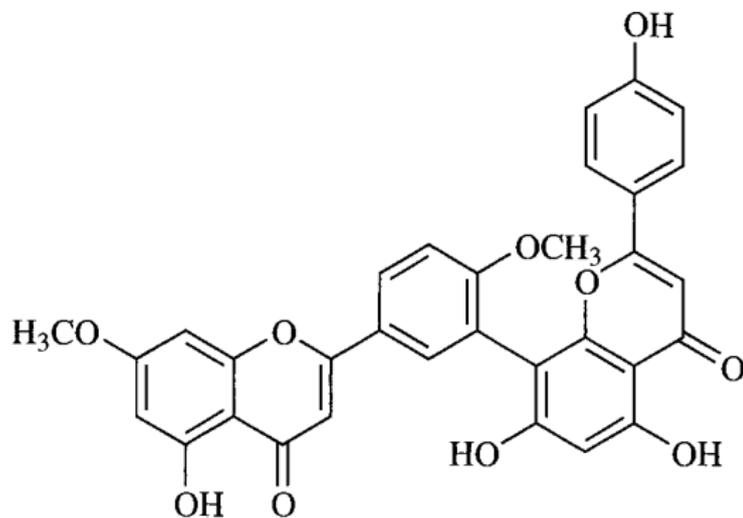
# *Ginkgo biloba*



# Ginkgolides and ginkgetins



**Ginkgolide A**



**Ginkgetin**



# Summary

- Sedative and hypnotic chemicals are often non-alkaloids
- Mandrake is a real plant!



# For Further Reading



A. Shipunov.

*Ethnobotany* [Electronic resource].

2011—onwards.

Mode of access:

[http://ashipunov.info/shipunov/school/biol\\_310](http://ashipunov.info/shipunov/school/biol_310)



M. Heinrich and others.

*Fundamentals of pharmacognosy amd phytotherapy* (selected chapters). [Electronic resource].

Churchill Livingstone, 2004.

Mode of access: [http://ashipunov.info/shipunov/school/biol\\_310/heinrich2004\\_fund\\_pharm\\_part.djvu](http://ashipunov.info/shipunov/school/biol_310/heinrich2004_fund_pharm_part.djvu)

**Chapter 16.**

