

# Ethnobotany. Lecture 37

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# Outline

## Pharmacognosy

- Anti-cancer plants

- Plants for supportive therapy

## Harmful plants

- Prickly plants



# Outline

## Pharmacognosy

- Anti-cancer plants

- Plants for supportive therapy

## Harmful plants

- Prickly plants



# Pharmacognosy

## Anti-cancer plants



# *Camptotheca acuminata*, Cornaceae, East Asia

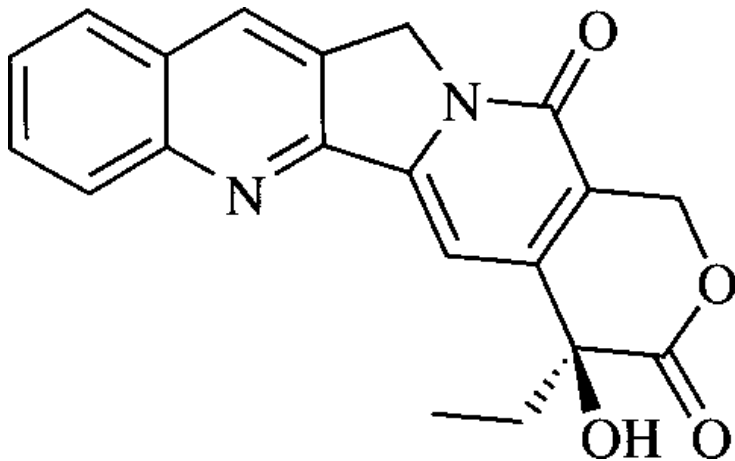
- ▶ TCM plant
- ▶ Study started in the end of 1950s
- ▶ Wood and bark contain camptothecin, highly unsaturated alkaloid (toxic!)
- ▶ Active against gastrointestinal tumors of short duration



# *Camptotheca acuminata*



# Camptothecin



# Pacific yew, *Taxus brevifolia*, Taxaceae, North America

- ▶ Conifer tree with berry-like cones
- ▶ Contains taxol which is active against leukemia: it stops mitosis due to inhibition of tubulin depolymerisation
- ▶ Actually, taxol is produced mostly by yew fungal symbiont, *Taxomyces*

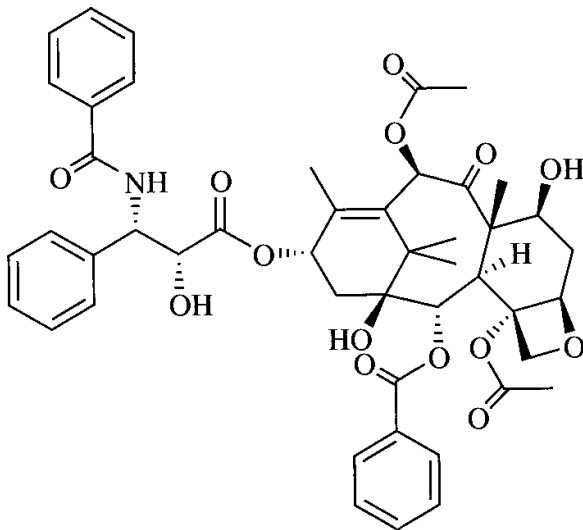




# Yew



# Taxol



# Mayapple, *Podophyllum peltatum*, Berberidaceae, North America

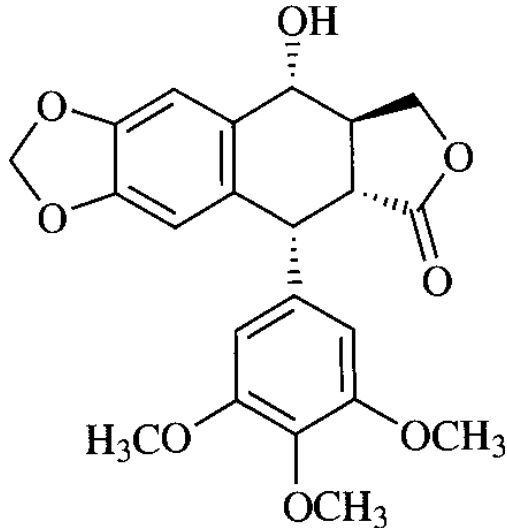
- ▶ Rhizomes contain cytotoxic glycoside podophyllotoxin
- ▶ Working similarly to colchicine: binds to tubulin and prevents microtubule formation



# Mayapple



# Podophyllotoxin



# White birch, *Betula alba*, Betulaceae, Eurasia

- ▶ Betulinic acid (almost non-toxic!) is shown to have inhibiting effect on several tumor cell lines
- ▶ It is believed that birch canker fungus (“chaga”) also contains anti-cancer agents



# Birch canker



# Madagascar periwinkle, *Catharanthus roseus*, Apocynaceae, Madagascar

- ▶ Has multiple effects, long believed to be a “magic plant”
- ▶ Multiple indole alkaloids like vincristine inhibit cell division in many cancer lines, especially sarcomas

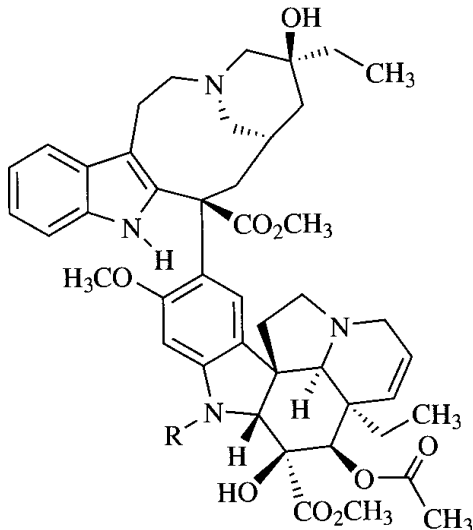




# Madagascar periwinkle



# Vincristine



# Pharmacognosy

## Plants for supportive therapy



# Ashwaganandha, *Withania somniferum*, Solanaceae, South Asia

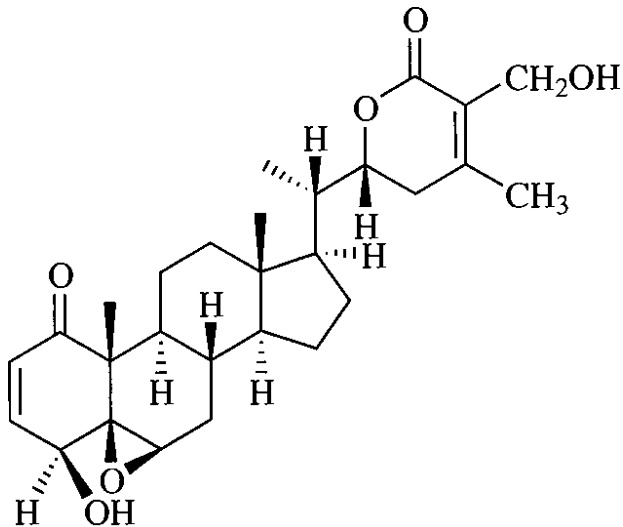
- ▶ Roots are used in Ayurveda from more than 4,000 years
- ▶ Contain different steroidal lactones and alkaloids like withaferin
- ▶ Effects are still under research, plant is believed to have sedative and immunostimulating, adaptogene and anti-stress properties



# Ashwaganandha



# Withaferin



# Golden root, *Rhodiola rosea*, Crassulaceae, North Hemisphere

- ▶ Traditional plant in Siberian medicine, went to Europe and to TCM
- ▶ Roots contain rosavin glycosides
- ▶ Have anti-stress, stimulating and adaptogene properties

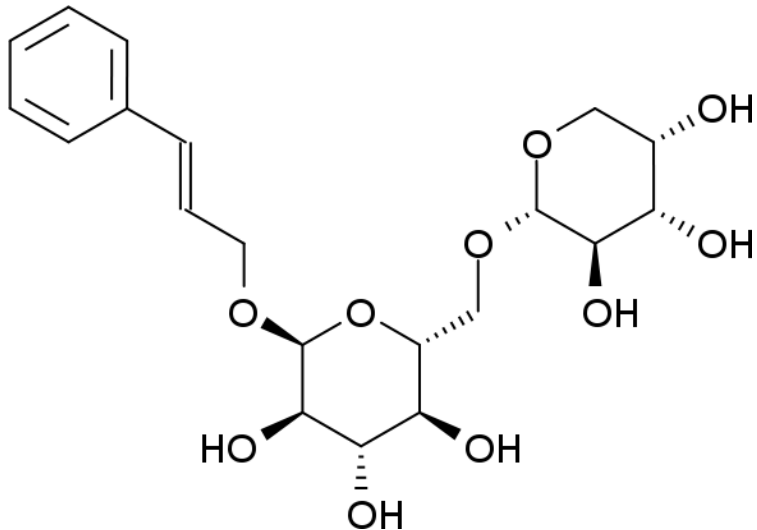


# Golden root





# Rosavin



# Ginseng, *Panax ginseng*, Araliaceae, East Asia

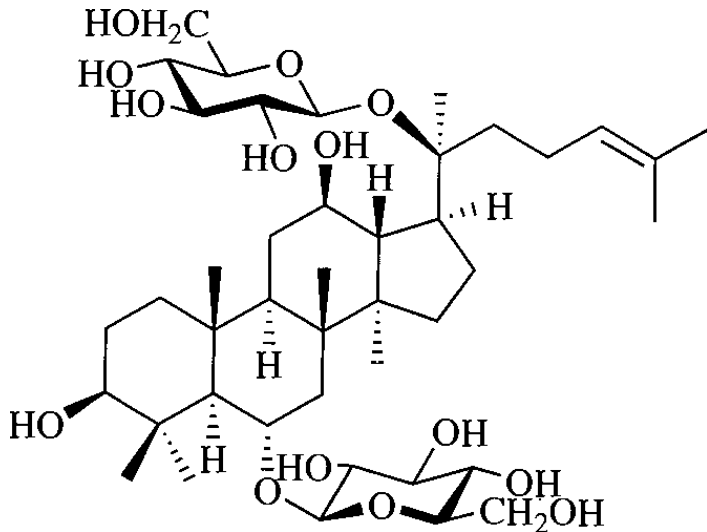
- ▶ Extremely important TCM plant
- ▶ Active components are ginsenosides
- ▶ Facilitate metabolism, improve concentration, increase level of adaptation, etc. etc.
- ▶ American ginseng (*Panax quinquefolius*) and Siberian ginseng (*Eleuterococcus senticosus*) contain similar compounds



# American ginseng



# Ginsenoside



# Gotu kola, *Centella asiatica*, Araliaceae, South Asia

- ▶ Traditional Ayurveda plant, belongs to “rasayana”
- ▶ Contains multiple glycosides (centelloside etc.) which have immunostimulatory and sedative effects



# Gotu kola



# Reishi (Lingzhi) mushroom, *Ganoderma* spp., Polyporaceae, East Asia

- ▶ Important component of TCM, “fungus of immortals”
- ▶ Triterpenes (like ganoderic acids) have general tonic and cholesterol-lowering effects



# Lingzhi





# Magnolia vine, *Schisandra sinensis*, Schisandraceae, East Asia

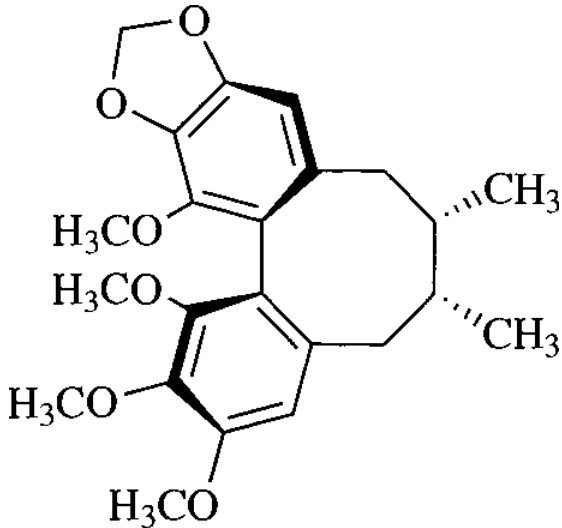
- ▶ Berries contain lignans like schizandrin
- ▶ In TCM, it is believed to prolong life via increasing the “vital energy”
- ▶ Clinical investigations provide some support for antioxidative, brain-stimulating and even anti-cancer activities



# Magnolia vine



# Schizandrin



# Harmful plants

## Prickly plants



# Prickly plants

- ▶ Bear thorns, spines or prickles
- ▶ Cactaceae (like jumping cholla, *Cylindropuntia fulgida*), many Rosaceae (like hawthorn) and some Leguminosae (like *Gleditschia*)
- ▶ Sometimes useful for “live hedges”



# Jumping cholla spines



# Gleditsia thorns



# Summary

- ▶ Anti-cancer plant compounds often suppress cell division
- ▶ Many supportive plants are still waiting for the scientific evidence of their effects





# 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)



Heinrich et al. 2012.

*Fundamentals of Pharmacognosy and Phytotherapy.*

Churchill Livingstone, Edinburgh.

