

Ethnobotany. Lecture 36

Alexey Shipunov

Minot State University

April 29, 2013



Outline

- 1 Pharmacognosy
 - Anti-cancer plants
 - Plants for supportive therapy

- 2 Harmful plants
 - Prickly plants



Outline

- 1 Pharmacognosy
 - Anti-cancer plants
 - Plants for supportive therapy
- 2 Harmful plants
 - Prickly plants



Pharmacognosy

Anti-cancer plants



Camptotheca acuminata, Cornaceae, East Asia

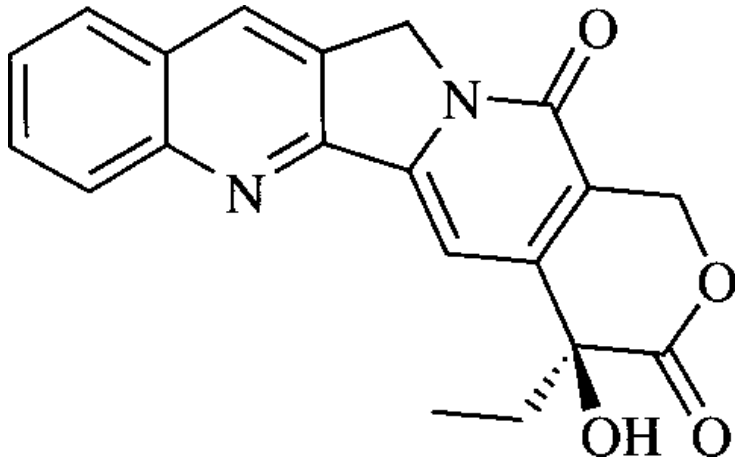
- TCM plant
- Study started in the end of 1950s
- Wood and bark contain camptothecin, highly unsaturated alkaloid (toxic!)
- Active against gastrointestinal tumors of short duration



Camptotheca acuminata



Camptothecin



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

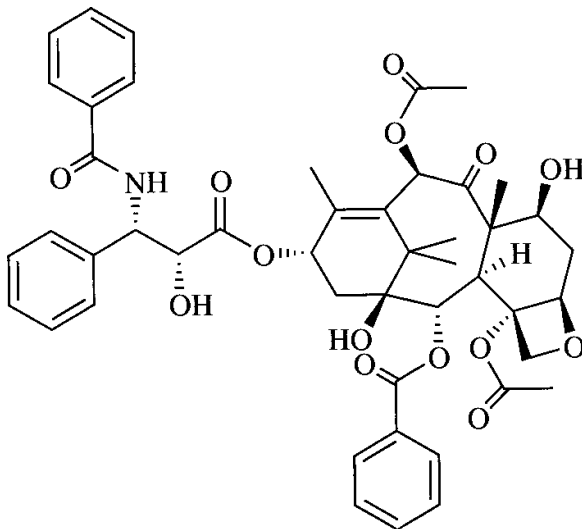
- Conifer tree with berry-like cones
- Contains taxol which is active against leukemia: it stops mitosis due to inhibition of tubulin depolymerisation
- Actually, taxol is produced mostly by yew fungal symbiont, *Taxomyces*



Yew



Taxol



Mayapple, *Podophyllum peltatum*, Berberidaceae, North America

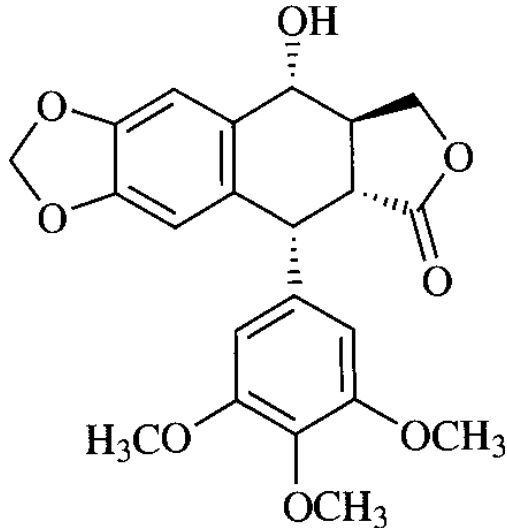
- Rhizomes contain cytotoxic glycoside podophyllotoxin
- Working similarly to colchicine: binds to tubulin and prevents microtubule formation



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

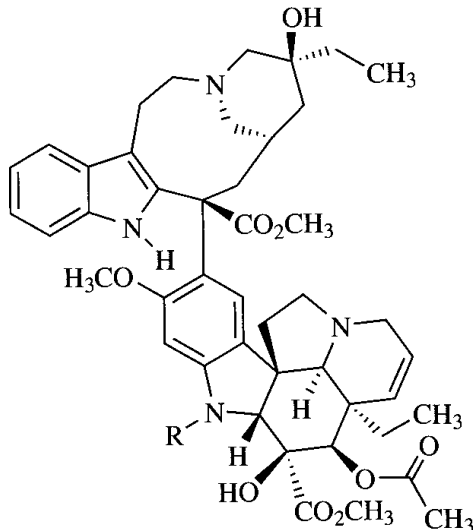
- Has multiple effects, long believed to be a “magic plant”
- Multiple indole alkaloids like vincristine inhibit cell division in many cancer lines, especially sarcomas



Madagascar periwinkle



Vincristine



Pharmacognosy

Plants for supportive therapy



Ashwaganandha, *Withania somniferum*, Solanaceae, South Asia

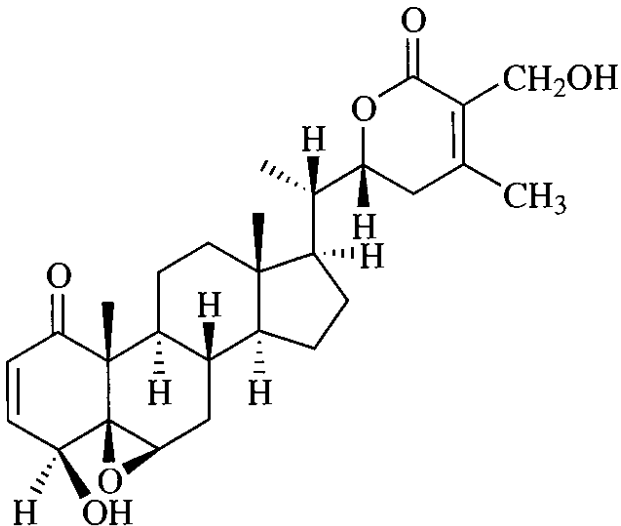
- Roots are used in Ayurveda from more than 4,000 years
- Contain different steroidal lactones and alkaloids like withaferin
- Effects are still under research, plant is believed to have sedative and immunostimulating, adaptogene and anti-stress properties



Ashwaganandha



Withaferin



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

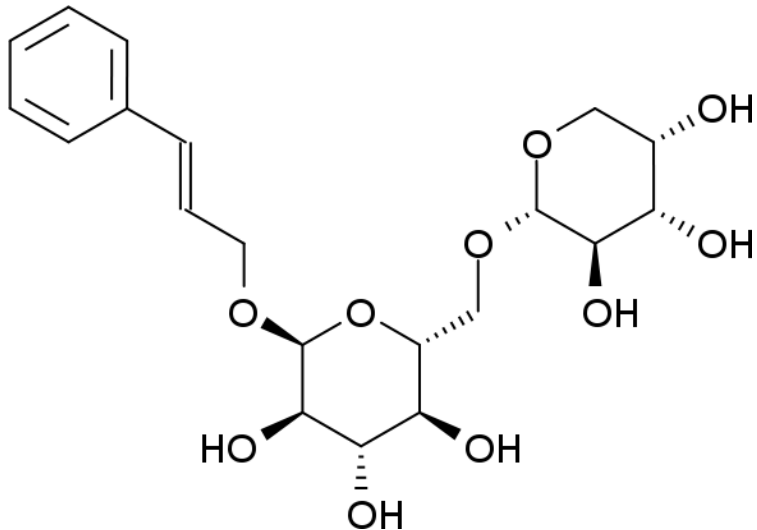
- Traditional plant in Siberian medicine, went to Europe and to TCM
- Roots contain rosavin glycosides
- Have anti-stress, stimulating and adaptogene properties



Golden root



Rosavin



Ginseng, *Panax ginseng*, Araliaceae, East Asia

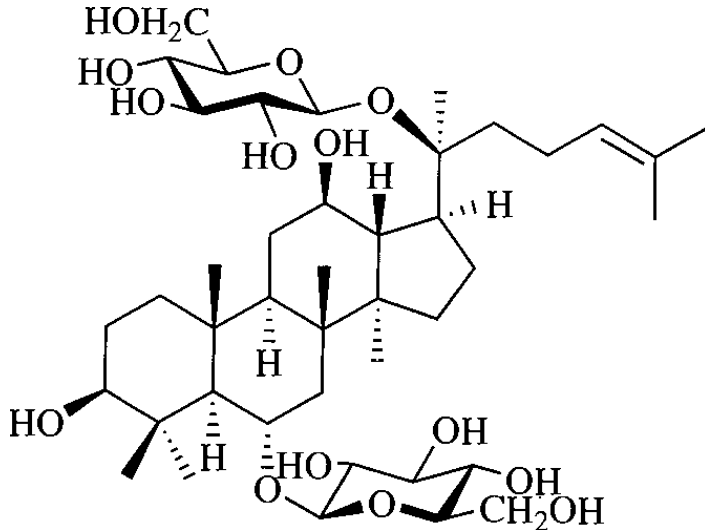
- Extremely important TCM plant
- Active components are ginsenosides
- Facilitate metabolism, improve concentration, increase level of adaptation, etc. etc.
- American ginseng (*Panax quinquefolius*) and Siberian ginseng (*Eleuterococcus senticosus*) contain similar compounds



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

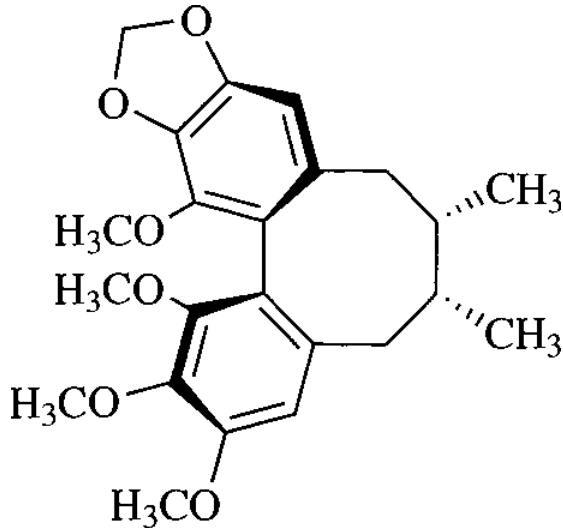
- Berries contain lignans like schizandrin
- In TCM, it is believed to prolong life via increasing the “vital energy”
- Clinical investigations provide some support for antioxidative, brain-stimulating and even anti-cancer activities



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



Measuring spineness of blackthorn



Summary

- Anti-cancer plant compounds often suppress cell division
- Many supportive plants are still waiting for 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



M. Heinrich and others.

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

Churchill Livingstone, 2004.

Mode of access: http://ashipunov.info/shipunov/school/biol_310/heinrich2004_fund_pharm_part.djvu

Chapters 8, 23–24.

