

# Ethnobotany. Lecture 36

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# Outline

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



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# Pharmacognosy

## Anti-cancer plants



# *Camptotheca acuminata*, Cornaceae, East Asia

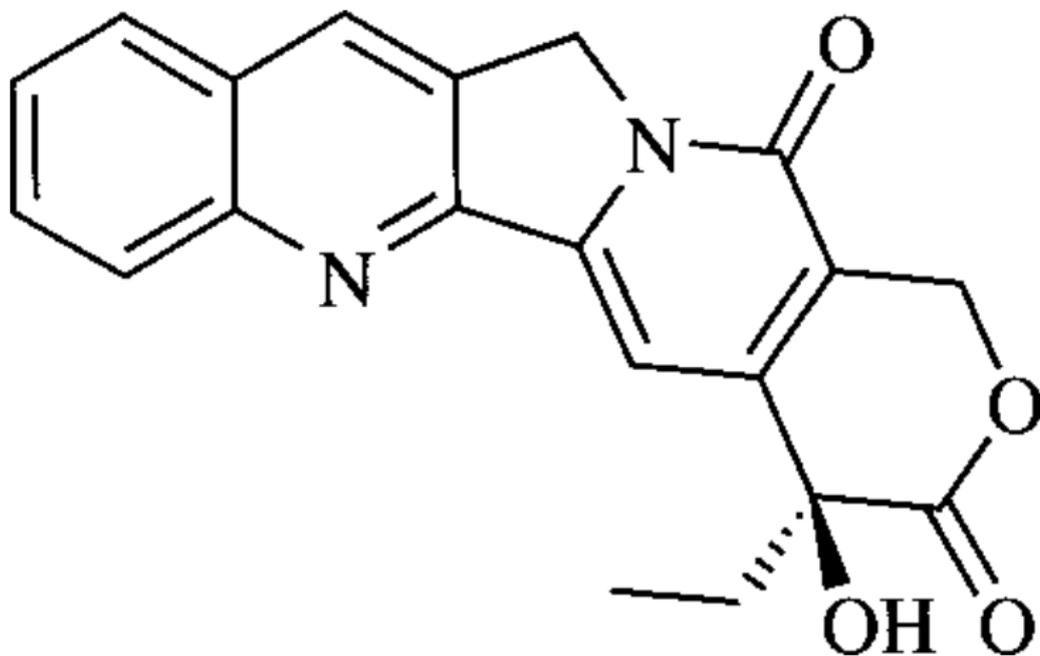
- TCM plant
- Study started in the end of 1950s
- Wood and bark contain camptothecin, highly unsaturated alkaloid (toxic!)
- Active against gastrointestinal tumors of short duration



# *Camptotheca acuminata*



# Camptothecin



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

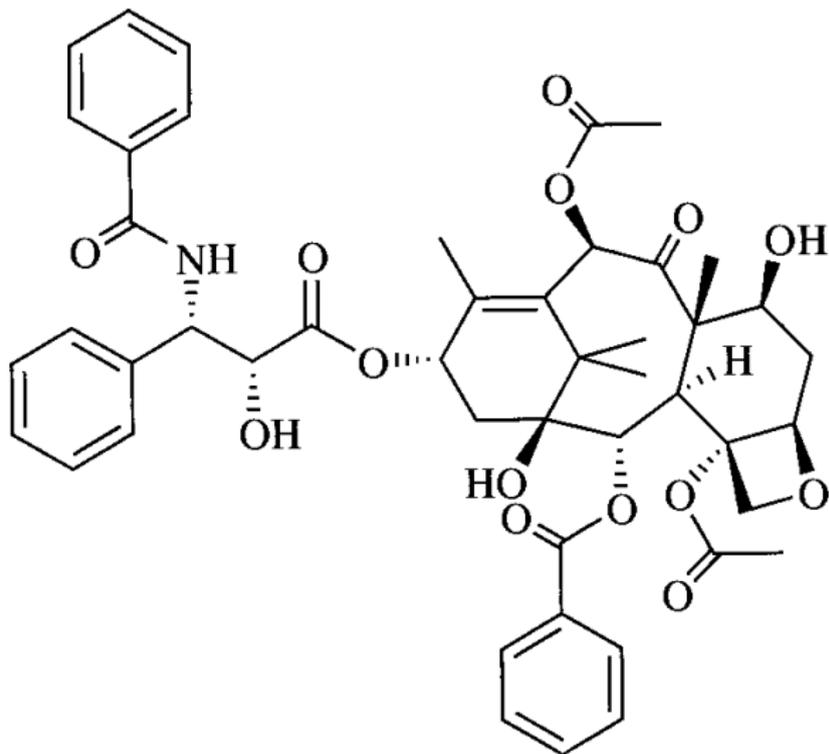
- Conifer tree with berry-like cones
- Contains taxol which is active against leukemia: it stops mitosis due to inhibition of tubulin depolymerisation
- Actually, taxol is produced mostly by yew fungal symbiont, *Taxomyces*



# Yew



# Taxol



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

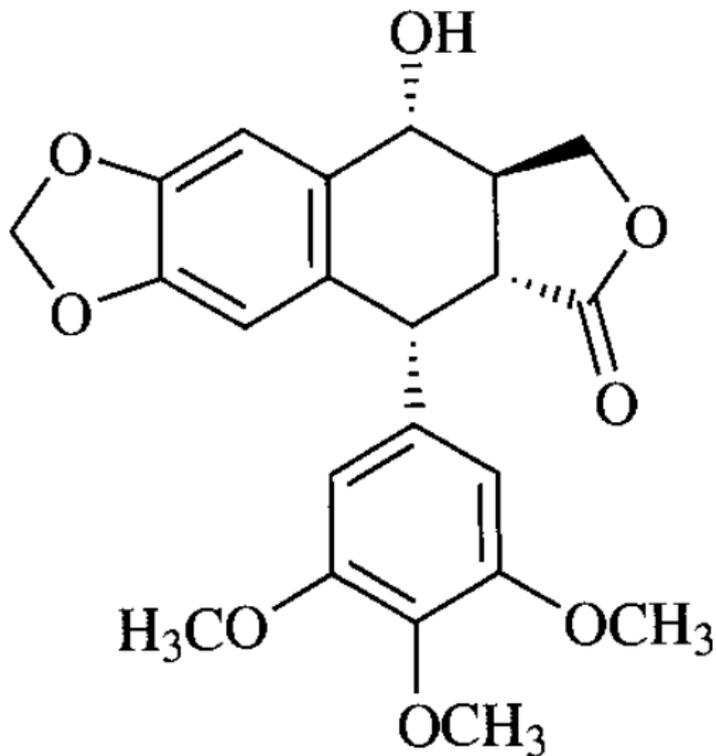
- Rhizomes contain cytotoxic glycoside podophyllotoxin
- Working similarly to colchicine: binds to tubulin and prevents microtubule formation



# 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

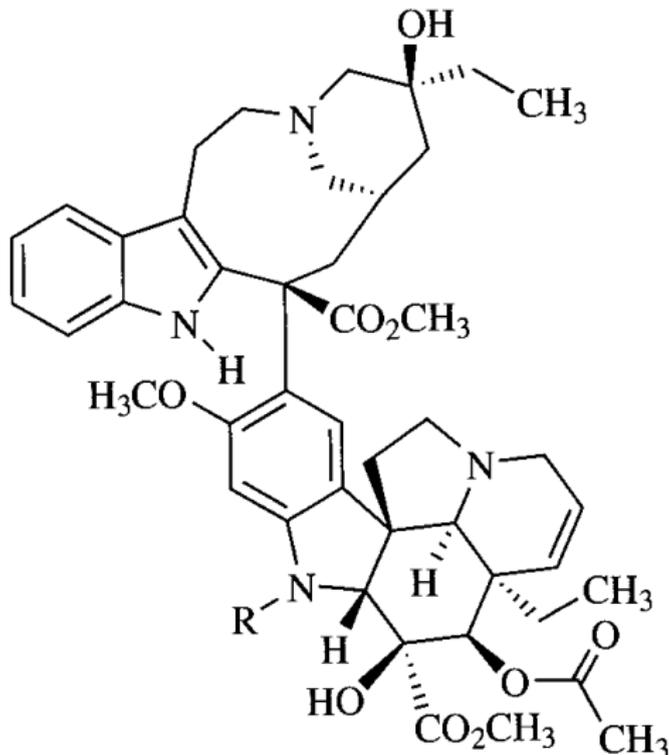
- Has multiple effects, long believed to be a “magic plant”
- Multiple indole alkaloids like vincristine inhibit cell division in many cancer lines, especially sarcomas



# 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





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

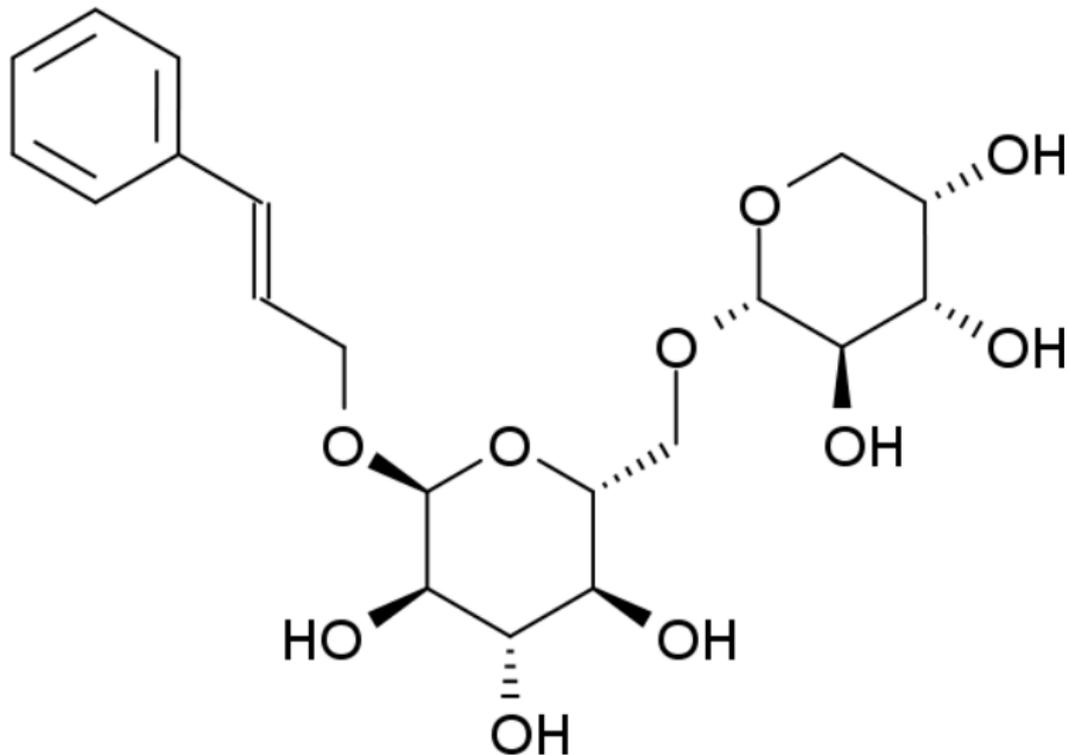
- Traditional plant in Siberian medicine, went to Europe and to TCM
- Roots contain rosavin glycosides
- Have anti-stress, stimulating and adaptogene properties



# Golden root



# Rosavin



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

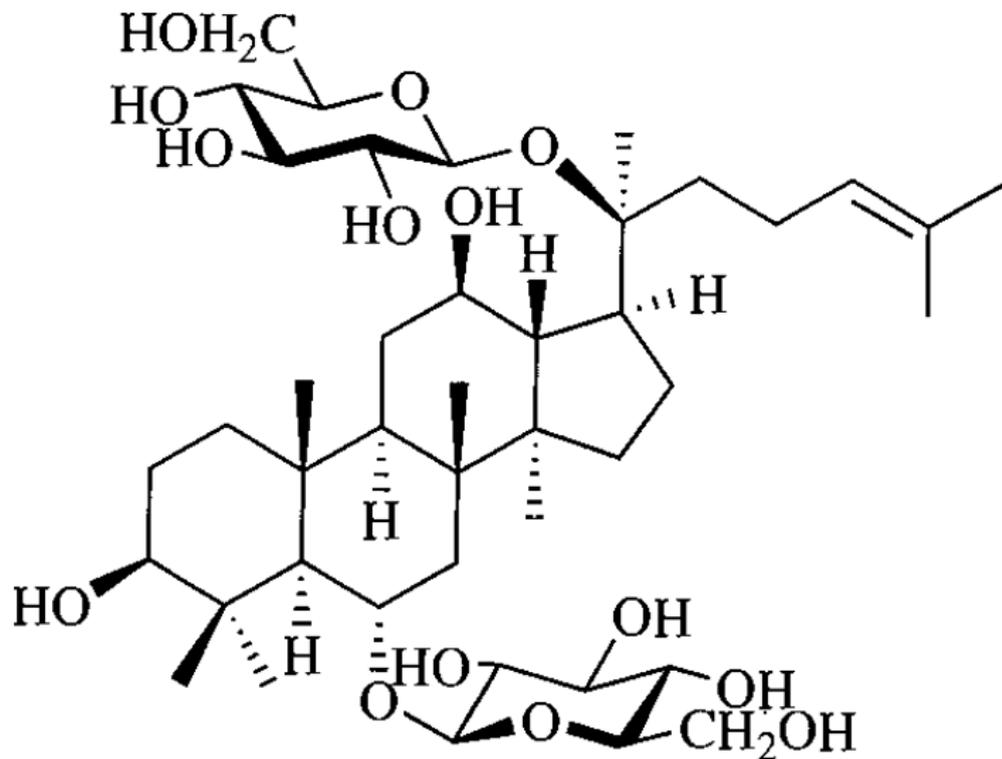
- Extremely important TCM plant
- Active components are ginsenosides
- Facilitate metabolism, improve concentration, increase level of adaptation, etc. etc.
- American ginseng (*Panax quinquefolius*) and Siberian ginseng (*Eleutherococcus senticosus*) contain similar compounds



# 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

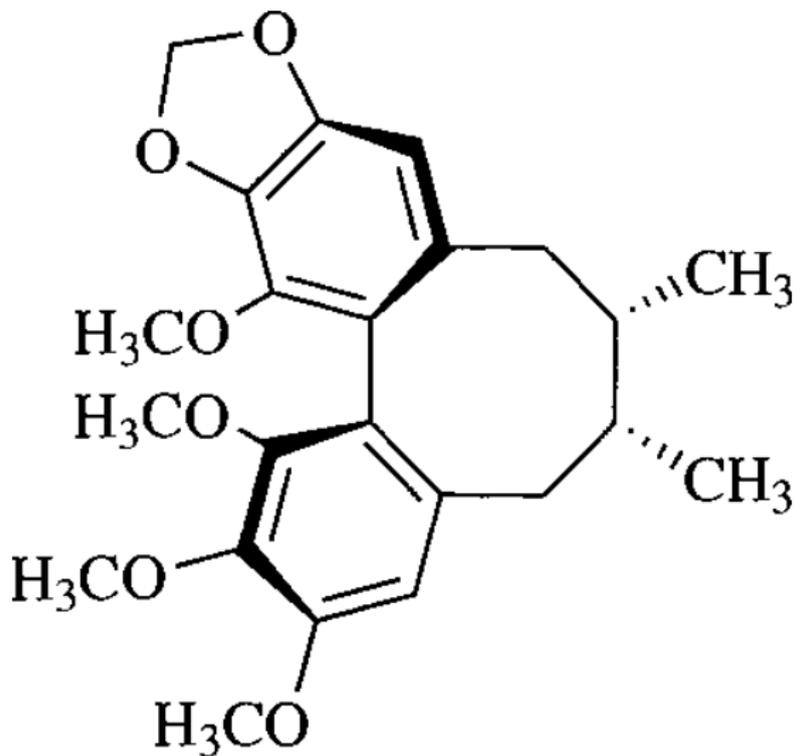
- Berries contain lignans like schizandrin
- In TCM, it is believed to prolong life via increasing the “vital energy”
- Clinical investigations provide some support for antioxidative, brain-stimulating and even anti-cancer activities



# 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](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)

**Chapters 8, 23–24.**

