

Ethnobotany. Lecture 27

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Outline

- 1 Natural product chemistry
 - Introduction
 - Polyketides and other small molecules



Natural product chemistry

Introduction



Types of drugs

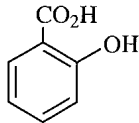
- Fully natural
- Semisynthetic
- Fully synthetic



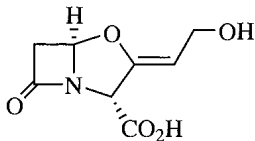
Types of medicinal agents

Medicinal agents from natural sources

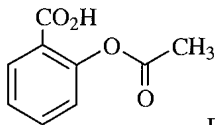
- (a) Fully natural
- (b) Semisynthetic
- (c) Fully synthetic



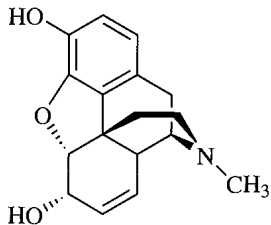
salicylic acid



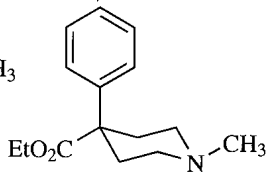
(a) clavulanic acid



(b) aspirin



morphine



(c) pethidine



Drug discovery

We need new drugs, and plant secondary compounds of plants could accidentally have medicinal value.

- Sampling: soil, markets, natural habitats
- Extraction
- Bioassay screening
- Structure elucidation
- Chemical modification
- Clinical trials
- Drug



Natural product chemistry

Polyketides and other small molecules

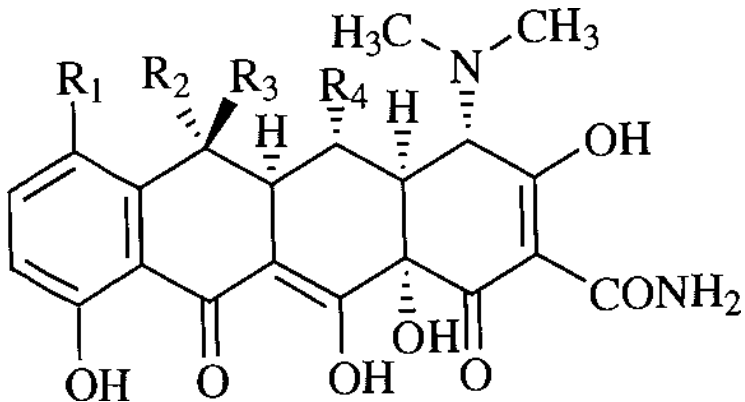


Polyketides and derived products

- Short molecules with interleaving ketogroups
- Many antibiotics (e.g., tetracycline, erythromycin)



Tetracycline



Glycerides

- Saturated fats
- Unsaturated fats, especially omega-n-unsaturated

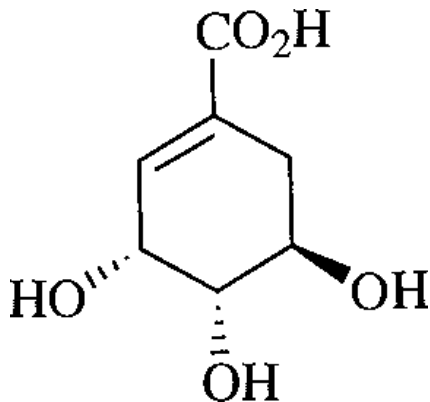


Shikimic acid and derived products

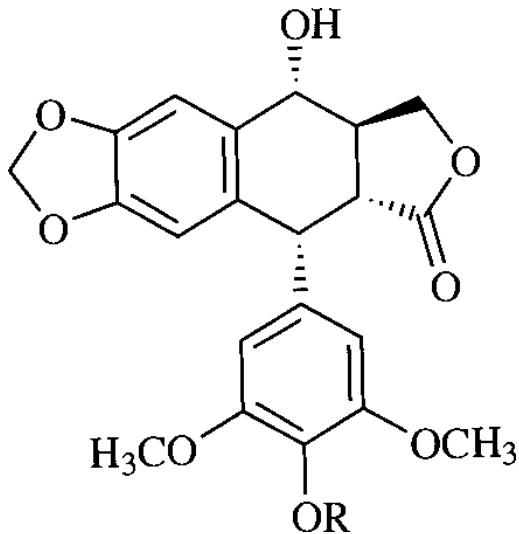
- Phenylpropenes, like eugenol
- Lignans like podophyllotoxin



Shikimic acid



Podophyllotoxin

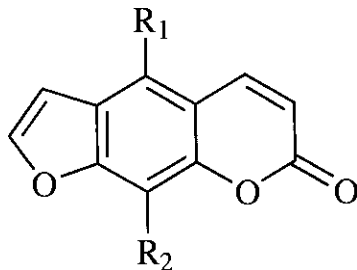


Coumarins

- Phytoalexins with anti-bacterial properties
- Some (psoralens from umbel family plants and bergapten from citrus family) are phototoxic



Psoralen

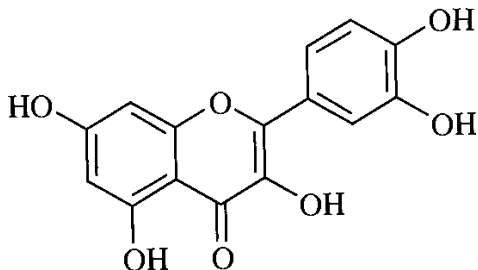


Flavonoids

- Derivatives of phenylpropane (C_6-C_3)
- Strong antioxidants
- Examples: naringin from grapefruit, quercetin from oak and other plants, resveratrol from grapes



Quercetin (flavonoid)



Tannins

- Similar to flavonoids, but much heavier
- Bind to proteins and provide astringent taste



Summary

- Polyketides are source chemicals to many antibiotics
- Derivatives of shikimic acid are phenylpropenes, lignans, coumarins, flavonoids and tannins



For Further Reading



A. Shipunov.

Ethnobotany [Electronic resource].

2011—onwards.

Mode of access:

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



Heinrich et al. 2012 (or 2004).

Fundamentals of Pharmacognosy and Phytotherapy.

Churchill Livingstone, Edinburgh.

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

