

Topic 08 – Secondary Metabolites

Reading:

- 1) Hoefnagles p. 379 (Pacific Yew), 460-461 (Cash Crop; Candy, Herbs, and Drugs)
- 2) The relevant chapter on the Ethnobotany of Secondary Metabolism in Lab Manual

I. Plant Secondary Metabolites

A. Definitions

1. Primary vs. Secondary Metabolism

B. Some Secondary Metabolites

Compound	Example Source	Human Use
1. ALKALOIDS		
Codeine	Opium poppy	Narcotic pain relief; cough suppressant
Nicotine	Tobacco	Narcotic; stimulant
Quinine	Quinine tree	Used to treat malaria; tonic
Cocaine	Coca	Narcotic, tea, anesthetic, stimulant
2. PHENOLICS		
Tannin	Leaves, bark, acorns	Leather tanning, astringents
Salicin	Willows	Aspirin precursor
Tetrahydrocannabinol	Cannabis	Treatment for glaucoma & nausea
3. TERPENOIDS		
Camphor	Camphor tree	Component of medicinal oils, disinfectants
Menthol	Mints & eucalyptus	Strong aroma; cough medicines

C. Ecology

1. Defense
2. Attraction

D. Storage

II. Caffeine Case Study

A. Caffeine

B. Alkaloids in General

C. Ecological Role Caffeine in Nature

1. Excess can over-stimulate CNS
2. Vertebrate diuretic

D. Caffeine's Effects on CNS

E. Caffeine and Parkinson's Prevention?

F. Caffeine and Theobromine are Similar in Structure and Action

G. Caffeine Content in Some Beverages

Table 6. Average caffeine content in products (most amounts from the Center for Science in the Public Interest, 2007; chocolate amounts from Simpson and Orzogoly 1995).

<u>Product</u>	<u>Caffeine (to the nearest mg)</u>
<u>Coffee (Starbucks)</u> 12 oz drip coffee 1 oz espresso 12 oz drip decaf coffee	240 75 19
<u>Tea (various)</u> 12 oz brewed tea 12 oz Nestea 12 oz Snapple	80 (60-180) 26 14-32
<u>Cocoa and chocolate (various)</u> 12 oz, from powder 1 oz baking choc 1 oz dark choc 1 oz milk choc	14 (4.5-20) 35 20 6
<u>Soda (various)</u> 8.3 oz Red Bull 12 oz Jolt Cola 12 oz Mountain Dew 12 oz Dr. Pepper 12 oz Pepsi 12 oz Coca-Cola Classic	80 72 54 42 38 35

III. *Coffea*

- A. Systematics
- B. Flowers and Berries
- C. Seeds
- D. Coffee as a Major Global Commodity
- E. Coffee Origins
- F. Coffee Timeline