

Welcome to Biology 458 - Plant Biochemistry & Biochemical Ecology

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4. What is this course about? Why Plant Biochemistry?
5. Some simple biochemical ecology: What could determine caterpillar feeding preference?

What is Plant Biochemistry? - *"the study of chemical reactions which form the basis of plant life"*

- these reactions are catalyzed by **enzymes**
 - thousands of enzyme-mediated reactions in a cell
- = **metabolism:** *the sum of enzyme-catalyzed transformations of organic molecules in living cells.*

NB: our focus is on plant-specific processes and chemicals

Why study Plant Biochemistry?

-> plants are the world's best chemists and have incredible biosynthetic capacities.

- i) plants synthesize essential nutrients for us
- ii) plants produce important industrial materials
- iii) plants make health-promoting chemicals, therapeutic drugs (toxins) and stimulants

We should know how and why the plant makes these!
(i.e. not for humans, but for their adaptation)

(Bio)chemical Ecology - *the study of how plant chemicals mediate interactions between organisms (i.e., plants & insects)*

Most substances of importance to chemical ecology are "secondary plant metabolites".

Secondary plant metabolites: (SPMs) (= phytochemicals, natural products)

= "*small organic molecules not required for basic physiological processes or day-to-day functioning, but which allow for adaptation to the plant's environment*".

Examples:

- plant-insect and plant-microbe interactions
- adaptation to UV, heavy metals, other stresses
- traditional use by humans is an ecological interaction

There are more than 100,000 known SPMs - why so many? (biochemical adaptation!)

What factors could determine caterpillar feeding preference? *[Think broadly about what might determine food choice/palatability in leaf-eating insects?]*

Data from Constabel et al, Plant Physiology 124 (2000)

