

## Pre-Case Preparation

**Read:** Mondor EB, Addicott JF. 2003. Conspicuous extra-floral nectaries are inducible in *Vicia faba*. *Ecology Letters*, 6: 495–497. The whole paper is directly relevant.

In addition, please read the following information on plant defenses and an example of response to herbivory in the wildflower, *Plectritis congesta*.

### Induced Responses Versus Constitutive Defenses:

Although plants are not able to physically move themselves away from a threat, they are not completely defenseless in response to herbivore attack. Many plants have morphological characteristics such as thorns, hairs, or thick cuticle that deter herbivores from attempting to consume their tissues. Some plants also produce chemicals that are toxic or make the plant unpalatable to herbivores. Because such structures and chemicals are produced at an energetic cost to the plant, populations are expected to evolve these responses only if they experience a fitness benefit as a result of reduced damage due to herbivory.

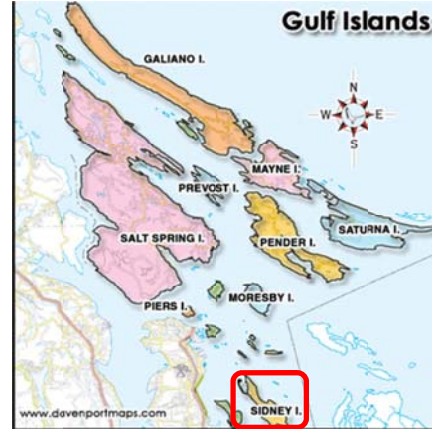
Plant defenses may be constitutive, present at all times, or may be responses induced by herbivore attack. Populations that experience a high frequency of herbivore attack are predicted to benefit most from constitutive defenses. When the frequency of attack is low, the energetic cost of producing a constitutive defense may not be outweighed by an increase in survival and reproduction. Populations that experience low or variable rates of herbivory are predicted to rely more heavily on induced responses. Induced responses may produce defensive structures such as extra-floral nectaries or may result in modification of growth patterns due to herbivory.

### Effect of Herbivory on *Plectritis congesta*:

*Plectritis congesta* is an annual, flowering plant whose native range extends through western North America from southern British Columbia south to California. It is common on Vancouver Island and on the nearby islands of the Salish Sea (Strait of Georgia) near Vancouver, British Columbia (**Figure 1a**). These plants have two common phenotypes: 1) short with lateral branches formed at or close to the ground and small lateral inflorescences (clusters of flowers that will produce seeds) and 2) tall with few lateral branches and a large terminal inflorescence. (**Figure 2a, b, c**). In a study on Sidney Island (**Figure 1b**), plants growing in enclosures protected from herbivory by deer showed a large number with the tall phenotype. Plants grown in the presence of deer showed a large number with the short phenotype. *Plectritis* can also be grown in the lab in controlled-environment growth chambers (**Figure 3**).



**Figure 1a.** Islands in the Salish Sea (Strait of Georgia)



**b.** Gulf Islands. Sidney Island (site of the study) is highlighted in red.



**Figure 2a.** Short phenotype



**b.** Comparison of short and tall phenotypes



**c.** Tall phenotype



**Figure 3.** Plants growing in controlled-environment chambers