

Essay and Study Questions (December)

NB: I will chose two (2) of these as essay questions for the final exam! (approximately one neatly written page.)

- preparing for these will also help integrate some of the information from the course, and be a study tool

- the exam will be cumulative, with approximately one-third of points from the pre-midterm material

1. Plant secondary metabolism is often dynamic, and allows plants to adapt to variable, heterogeneous and stressful environments. Discuss, and provide evidence to support this statement. Try to use specific examples from different types of stresses to illustrate your answer.

2. A number of secondary plant metabolites are known to be used for communication or signaling between plants and other organisms (insects, soil bacteria, fungi, etc), as well as between different plants. Provide examples of such signaling chemicals and describe their biological or ecological function, using **three** examples from diverse interactions.

3. Primary metabolic pathways tend to be tightly controlled via key regulatory enzymes. Describe the different mechanisms by which such enzymes are regulated **at the protein level**. Give specific examples of enzymes studied to illustrate your answer.

4. Biotechnology and genetic engineering has found practical applications in the agricultural and food industries. Illustrate (using two examples) how knowledge of plant biochemistry has contributed to improved genetically-engineered crop plants. Note that the improvements could relate to both agronomic or consumer (nutritive/health) characteristics. Be sure to describe the biochemical background that made the modifications possible.

5. "A major function of alkaloids in plants is protection against herbivory." In an essay, present specific examples and evidence from plant-insect interactions which support this statement.

6. Plants contain a wide array of defensive secondary metabolites that help to protect them against herbivores. Both animal and humans have adapted to such toxin by various strategies. Give at least one example each of how specialist insects can tolerate such toxins, and how humans have adapted to toxin-containing plants in their diet.

7. Amino acids are used for the biosynthesis of proteins, but as the building blocks and precursors of a variety of bioactive secondary metabolites. Describe two examples of such pathways in general terms. Include the names of any key enzymes for such pathways that you have learnt about.