Questions for Lecture 13: Glycobiology of Plants and Lectins,
Tuesday, May 10. 2016

1 .Name three distinct differences between plant and vertebrate animals.
- inside out
- seed dormancy
- limited movement,
- no nervous system
- no adaptive immunity.

2. Name three shared features between plants and animals.
- imprinting over parental conflict,
- longevity,
- self-non-self distinctions, self incompatibility.

3. What are the key types of interactions between plants and animals?
- pollination,
- seed predation
- herbivory
- seed dispersal via frugivory
- symbiosis ant-pant or hemipteran-plant.

4. What are the major plant storage glycans?
- Starch (amylose)
- Amylopectin

5. What are the major plant structural glyoconjugates
- Cellulose
- Hemicelluloses
- Pectins
- proteoglycans (arabinogalactan protein)

6. What type of secretions exist in plants?
- Secretions (nectar/ sap), (but no mucins) pollination and other plant animal symbioses.
- Mucilage
- Nectar, flora, extra-floral
- Sap, resin, milks
- phloem

7. How can plants entice pollinators other than by offering nectar?
- Offering agg laying opportunities (fig syconia)
- Offering rotten flesh smell (Raffleasia, Arum, Carob trees)
- Sex lures (bee orchids)

8. Pollen: What functions are required of the pollen coat?
- Resistance
- Recognition
- Response to stimuli

9. How do plant store nutrients in seeds?
    Smallest (orchids e.g. vanilla) to largest (coconut)

10. Seeds: what are there biggest threats to survival?
    Seed predation by insects, birds and mammals
    Fungal infections
    Bacterial infections

11. How do plants transform fat into glycans?
    Glyoxalate cycle (coconut fat to cellulose)

12. What are examples of plant defenses against microbes, fungi and herbivores?
    Structural defenses: bark, hair, spikes, thorns cuticle,
    Induced defenses, pheromones, necroses, callusing
    Anti-nutrients: tannins, lectins, alkaloids and other toxins
    Gums, sap to swamp invaders and clog mouth parts

13. What are the difficulties of producing therapeutic glycoproteins (IgG) in transgenic plants?
    Plant N-glycans are unlike mammalian glycans (core xylose, fucose and lack of Sia)
    Plant O-glycans are on Ser and hydroxyproline and mostly are initiated by arabinose.
    These can be antigenic, IgE bind to core Xylose and O-linked arabinose.

14. Any advantages of producing vaccine antigens in plants?
    Natural adjuvant functions of plant glycans

15. Are Complex N-glycans required for plant growth?
    Based on ko experiments in Arabidipsis apparently not.

16. Do plants produce O-Glycans?
    Yes, but these are not initiated by ppGalnAcTs and are linked to Ser and Hydroxyproline.

17. Do plants produce preoteoglycans?
    Yes, but these are arabinogalactan proteoglycans, very different from HS- or CSPGs in animals.

18. Plants produce lectins that recognize glycans not produced by plants. What could be the functions of such lectins?
    Anti-nutrients
    Anti-seed predation
    Antifungal

19. What is the connection of early lectins research to immunology?
    Paul Ehrlich used Ricin and Abrin as model antigens.

20. What are the lectin families shared between plants and animals?
    R-type lectins

Calnexin, Calreticulin