Study Questions

This list is fairly thorough, but is not exhaustive - it is meant to give you an idea of the kind of questions or topics that might be on the exam, but it does not cover all of the possible questions or topics. However, the exam will include at least one question from this list. Note that the exam will cover all material from Unit I on the syllabus.

1) What are the components of the insect cuticle? What are the main functions of the cuticle? What are the common structural modifications of the cuticle? How is the cuticle produced? How is the exoskeleton molted? What is the endocrine control over this process?

2) Be familiar with the directional terms used in reference to the insect body (e.g. dorsal/ventral, distal/proximal, etc.). Also, be sure that you are familiar with the various morphological terms that were highlighted in lecture, so that you could match them to descriptions of their location.

3) What is the basic theory of how the insect body plan evolved? What evidence is there to support this theory?

4) What are the types of modifications seen in various appendages, such as legs, ovipositors, wings, and mouthparts?

5) Describe the structure of the insect digestive system. What is the role of each part of this system, and how is that role achieved?

6) Describe the structures of the insect respiratory system and their functions. How do insects ventilate this system? How is this system evolutionarily modified for the different respiratory needs of different insects (e.g. aquatic vs. terrestrial)?

7) What are the main components of hemolymph? How is it circulated? Describe the immune system functions of the cells in hemolymph.

8) What are the main elements of the insect nervous system? How is coordination among these elements achieved?

9) How is the insect muscular system different from that of vertebrates? Why are insects capable of "superhuman" feats of strength? How does the muscular system interact with the exoskeleton?

10) What are the differences between the direct vs. indirect mechanisms of flight? How are the rapid wingbeats of insects such as flies achieved?

11) What is mechanoreception? What roles do mechanoreceptors play for insects. How do the structures of these receptors work?

12) What receptors do insects use to detect chemicals in their environment? Where are these receptors typically located? Why is it important for insects to be able to detect specific chemicals?

13) What types of insect photoreceptors exist? Describe their structure and function.

14) How are the male and female reproductive systems organized? Be able to describe the structure and processes involved in copulation and fertilization. What are the possible advantages of internal fertilization? Aside from sexual reproduction, what other kinds of reproduction are exhibited in insects?

15) Describe the role of males and females in parental care in insects. How does sexual selection theory allow us to better understand why females are often the choosy sex in mating and why males often compete with one another for the opportunity to mate. What kinds of behaviors and/or structures has this type of selection led to in insects?

16) How and why is the formation of the insect blastula different from blastula formation in sea urchins and frogs? What developmental roles are played by segmentation genes and homeotic genes?

17) How do patterns of development differ for endopterygotes and exopterygotes? What is the key difference between paurometabolous and hemimetabolous (strict sense) insects? How is the production of adult structures achieved in holometabolous insects?

18) Describe the sequence of events (both hormonal and histological) that are involved in insect molting.

19) What factors influence the rate of insect development? What factors influence the onset and termination of diapause?