VIDEO GUIDE: Metamorphosis, Growth, and Development

Directions: Watch the video and answer the following questions.

1. Define the following terms related to reproduction:
   a. Parthenogenesis – **reproduction without males**
   b. Haplodiploidy – **unfertilized eggs become males, while fertilized eggs become females**
   c. Oviparous – **insect hatches from an egg**
   d. Ovoviparous – **insect hatches within the female and the first growth stage is laid**
   e. Viviparous – **insect is actively developed and immature when laid**
2. Fill in the words from the word bank.
   The sperm enters the egg through the **micropyle**. When larva or nymph emerges from the egg or when an adult insect emerges from a pupa, it is called **eclosion**. It sheds its exoskeleton during **molting** and develops into the next growth stage or **instar** for a particular time or stadium.
   Word Bank: molting or ecdysis, eclosion, micropyle, stadium, instar
3. Describe the three types of metamorphosis listed below (including wing development and stages) and provide an Order that would go through that this metamorphosis.
   a. Ametabolous - **the simplest form of metamorphosis where the only difference between immature and adult members of a species are sexual and size. These insects do not have wings.**
      Order: **Zygentoma**
   b. Hemimetabolous (incomplete/gradual) - **the nymphs or naiads are similar to adults but have morphological changes, namely wing development, before they are adults. The nymphs or naiads also eat similar food to the adults.**
      Order: **Hemiptera**
   c. Holometabolous (complete) - **the insect completely changes morphologically throughout its life cycle.**
      Order: **Coleoptera**
4. Describe the 5 types of larvae with an example of a type of insect with it.
   a. Eruciform – **long cylindrical bodies with thoracic legs with additional prolegs to help move**
   b. Elateriform – **long cylindrical body with thoracic legs but no abdominal prolegs, prognathous mouthparts**
   c. Scarabaeiform – **grub-like, sluggish, and generally inactive**
   d. Campodeiform – **developed thoracic legs, with visible cerci and antennae. Dorsoventrally flattened, elongated body.**
   e. Vermiform – **Long cylindrical body with no legs**
5. Describe the 3 types of pupae with an example of a type of insect with it.
   a. Exarate – **appendages are free from the body and easily visible. For example, stag beetle pupa have all their appendages loose from the body.**
   b. Obtect – **appendages are connected to the body, for example a monarch butterfly in a cocoon.**
   c. Coarctate – **the whole pupa is surrounded by the hardened skin of the previous instar. The crane fly is an example species.**

6. Fill in the words from word bank.
   Univoltine insects tend to have one generation per year and use resources that are seasonally restricted such as **grasshoppers** and corn rootworms. Bivoltine insects have **two** generations per years such as the green cloverworm. **Multivoltine** insects tend to be small and fast-developing having **several** generations per year. Examples include house flies, thrips, and **aphids**.
   Word Bank: grasshoppers, aphids, multivoltine, univoltine, two, several

7. Differentiate between quiescent and diapause.
   Quiescence is a pause in development as the result of unfavorable environmental conditions, with the return of normal development once conditions become more favorable. Diapause is a pause in development as the result of unfavorable environmental conditions, but it includes physiological changes to adapt to the new conditions without the guarantee that normal development continues once conditions are more favorable. Insects in diapause will only continue development in response to a particular physiological stimulus.