



**Benha University,  
Faculty of Science,  
Entomology Department  
Final Examination, 2<sup>nd</sup> Semester, 2013  
General Entomology (Z 222)  
Time allowed 1 Hour  
Date 26/5/2013**

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## **Answer the following questions**

- 1. Discuss two only of the following statements (15 Marks)**
  - a. The number of insect species proves its dominance on other organisms.**
  - b. Small size is a reason for insect success.**
  - c. Negative Economic impacts of insects.**
  - d. Insects have an important Therapeutic value.**
  
- 2. Write on two only of the following (15 Marks):**
  - a. Metamorphosis in insects.**
  - b. Malpighian tubules.**
  - c. Midgut in insects.**
  
- 3. Make a labeled diagram of two only of the following (10 Marks):**
  - a. Female reproductive system of insects**
  - b. Central nervous system of insects.**
  - c. Insect cuticle.**

**WITH MY BEST WISHES**

**PROF. ABDELWAHAB IBRAHIM**



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## **Answer the following questions**

**4. Discuss two only of the following statements (15 Marks)**

**a. The number of insect species proves its dominance on other organisms.**

- Over 800,000 insect species have been named and described.
- The entire plant kingdom contains between 400,000 and 500,000 species.
- The "lower" invertebrates account for around 200,000 species, while vertebrates total only about 50,000 species.
- Insects represent more than half (about 53%) of the 1.5 million species of living organisms known to science.
- Discovery of a new species of vertebrate is a rare. Entomologists describe hundreds of these new species each year.
- Two of every three living species may be insects.

**b. Small size is a reason for insect success.**

- Most insect species are between 2 and 20 mm in length.
- The smallest insect is a parasitic wasp of other insects' eggs (0.14 mm in length), nearly 1/3 smaller than some single-celled protozoa.
- Small size is a big advantage to insects due to the minimal resources needed for survival and reproduction, and allows them to avoid predation.
- Small size, together with adaptations in body shape and coloration, gives many species the ability to become virtually undetectable.

### c. **Negative Economic impacts of insects.**

- Insects have a direct impact on agricultural food production by chewing the leaves of crop plants, sucking out plant juices, boring within the roots, stems or leaves, and spreading plant pathogens.
- Insects feed on natural fibers, destroy wooden building materials, ruin stored grain, and accelerate the process of decay.
- The economic impact of insects is measured not only by the market value of products they destroy and the cost of damage they inflict but also by the money and resources expended on prevention and control of pest outbreaks.
- Economists generally agree that insects destroy around 10% of gross national product in large, industrialized nations and up to 25% of gross national product in some developing countries.

### d. **Insects have an important Therapeutic value.**

- Insects were studied for their medicinal value.
- During World War I, medics noticed that gunshot wounds infested with blow fly maggots seldom developed bacterial infections. Their observation led to the use of **maggot therapy** (sterile-reared fly larvae for cleaning necrotic tissue from deep wounds), and the later discovery of **allantoin**, a chemical secretion of the larvae that inhibits bacterial growth. Synthetically produced allantoin was commonly used as an antibacterial ointment until penicillin and other antibiotics became commercially available in the 1940's.
- Honey bees (or their products) have been used for medicinal purposes. This practice, known as **apitherapy**. Bee stings are used as a treatment for patients who suffer from arthritis, multiple sclerosis, Parkinson's disease, and other auto-immune conditions.
- Research has uncovered other substances with anti-viral, anti-fungal, and anti-inflammatory activity in a variety of other insects.
- Some entomologists believe that pharmaceutical companies will find enough new drugs in the class Insecta to keep them busy for many hundreds of years.

## 2. Write on two only of the following (15 Marks):

### a. Metamorphosis in insects.

- and adults may consume different types of food, exploit different Most insects undergo significant developmental changes as they grow from immatures to adults. These changes known as metamorphosis, may involve physical, biochemical, and/or behavioral alterations that promote survival, dispersal, and reproduction of the species.
- In primitive insects, most of these changes occur gradually, does not include all body tissues (incomplete metamorphosis) the immatures and adults share many characteristics, they often live in similar habitats and feed on similar types of food.
- More advanced insects, undergo complete metamorphosis -- a dramatic transformation in form and function between the immature and adult stages. larva molts into a transitional stage, called the pupa, and begins a period of massive internal and external reorganization.
- Only 9 out of 28 orders undergo complete metamorphosis. In some cases, immatures environmental resources, and even occupy different habitats.

### b. Malpighian tubules.

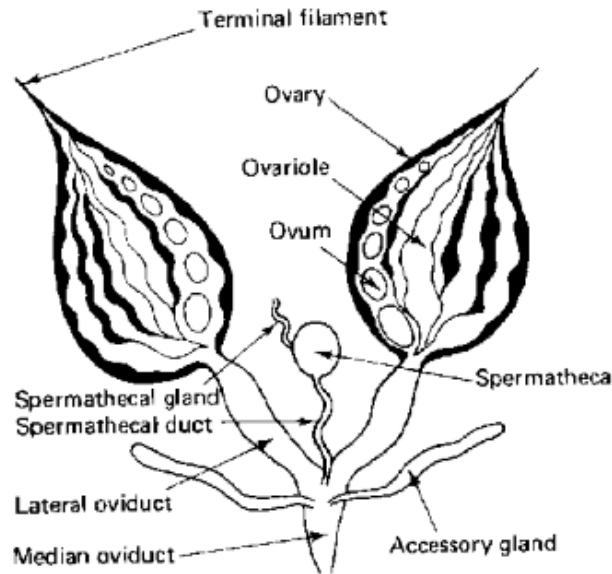
- In insects the Malpighian tubules function as the main excretory system; they are blind-ending, tube-like appendages of the intestine and open at the border between the mid- and hindgut.
- The number of Malpighian tubules is species-specific.
- The main function is the absorption of uric acid (as sodium and potassium salts) and their discharge into the lumen of the intestine, from where the excretory products are passed with the feces.

### c. Midgut in insects.

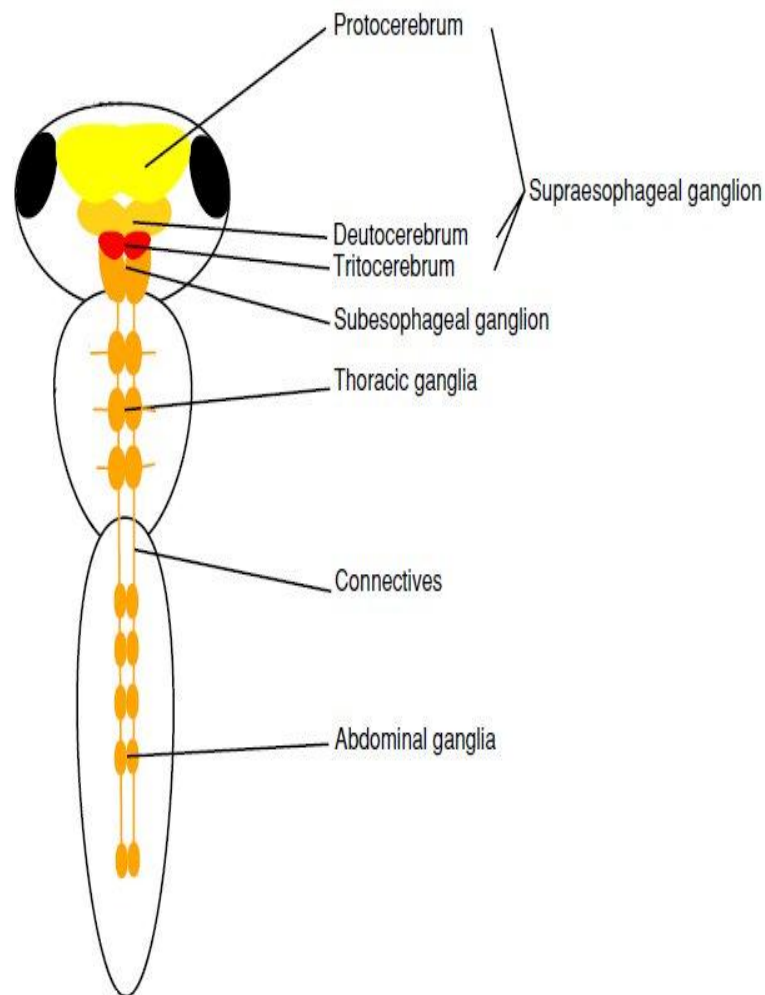
- The midgut (Mesenteron) runs from the 'digestive or gastric caeca (a number of tubes) to the Malpighian tubules (a series of long thin tubes), in between these two is the stomach or ventriculus which is the area of most active digestion.
- The gastric caeca increase the surface area of the midgut, thus increases both its ability to secrete digestive enzymes and absorption.
- The midgut is lined by a semi-permeable membrane composed of protein and chitin like the cuticle which allows the passage of only liquids and dissolved substances to the midgut.

3. Make a labeled diagram of two only of the following

a. Female reproductive system of insects



b. Central nervous system of insects.



c. Insect cuticle.

