Benha University,
Faculty of Science,
Entomology Department
Final Examination, 2nd Semester, 2017
General Entomology (112E)
Time allowed 1 Hour
Date 30/5/2017

Model Answer

A. Anatomy

1. Choose the correct answer from the columns and write its symbol (A or B or C) in front of each statement (7 Marks)

The Statements	A	B	C	
The blood cells of most insects	Kill microbes	Carry O_2 and CO_2	Contain hemoglobin	A
Which structure collects and excretes uric acid	Accessory gland	Rectal pad	Malpighian tubules	C
In male insects, sperm is stored in the	Testes	Spermatheca	Seminal vesicles	C
Egg development without fertilized by males is known as	Ovipary	Ovovivipary	Parthenogenesis	C
In an insect that has a continuous supply of food, which structure would NOT be found	Crop	Gastric caecae	Malpighian tubules	A
The part Prevents excessive water loss in terrestrial insects?	Accessory glands	Rectum	Gastric caecae	B
Ganglia within each segment are linked to one another by	Commissures	Connectives	Dendrites	A

2. Write the scientific term in front of each of the following statements. (9 Marks)

Statements	Scientific Term
Structures used to increase the surface area of the midgut	Gastric caeca
Muscles attached laterally to the walls of each chamber of the heart	Alary muscles
Innervates mouth parts, salivary glands, and neck muscles.	The subesophageal ganglion
Secrete egg shell (chorion) that surrounds and protect the eggs.	Female accessory glands
Insect larvae which have haemoglobin in their blood	Midge larvae
Organs located near the base of the wings or legs to force blood out into the extremities.	Secondary pulsating organs

3. Put the sign ✓ or X in front of each of the following statements (5 Marks)

The Statements	
The hindgut of insects is lined with the peritrophic membrane.	X
Insect's sensory capabilities are similar to those of humans and other vertebrates.	X
Mechanoreceptors detect **the presence of chemical substances in the air (smell or (taste)**	X
An insect's brain is a complex of six fused ganglia.	✓
In some carnivorous insects the saliva is composed entirely of digestive enzymes	✓

4. Complete the missing labels (9 Marks)

The following diagram represents a transverse section (T.S.) in an insect

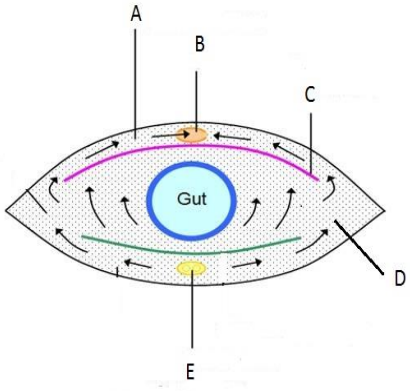
A: Name of the sinus is pericardial sinus

B: Name of the organ is heart

C: Name of the diaphragm is dorsal diaphragm

D: Name of the liquid is heamolymph

E: Name of the cord is Ventral nerve cord

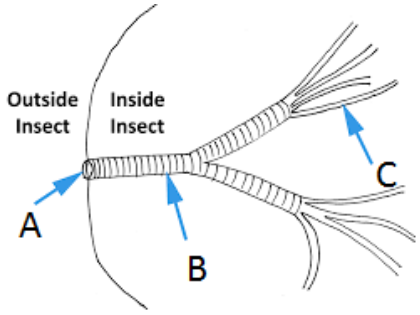


In the opposite figure, Name the following:

A: Spiracle

B: Trachea

C: Tracheoles



B. Taxonomy

5. Compare between Apterygota and pterygota with example (4 Marks)

The class Insecta has **two subclasses** viz., Apterygota and Pterygota.

Apterygota	Pterygota
1. Primarily wingless-from wingless ancestors.	evolved Winged or secondarily wingless-evolved from winged ancestors e.g. Flea, head louse, bed bug.
2. Metamorphosis is totally absent or slight.	Present.
3. Mandibular articulation in head is monocondylic i.e. single	Dicondylic i.e., double.
4. Pleural sulcus in thorax is absent.	Present.
5. Pregenital abdominal appen-dages present.	Absent.
Ex silver fish or collembolan	Example any order of petrygota

6. Compare between Mallophaga and Siphunculata showing, diagnostic characters and economic importance. (8 Marks)

Mallophaga
Synonyms : Phthirapters
Etymology : Mall-wool; phaga-eat.
Common names : Chewing lice, Biting lice, Bird lice.

Characters: They are minute insects. Body is dorsoventrally flattened. Head is large triangular and broder than thorax. Compound eyes are reduced. Mouthparts are biting type with large dentate mandibles. Mandibles are useful to clip off the host's skin debris or feather and cling to the host. Prothorax is invariably free and not fused with pterothorax. Meso and metathorax may be free or fused. Legs terminate in a pair of claws usually which are adapted for clinging to feathers. The tarsus is either unsegmented or two segmented. Wings are absent and are secondarily wingless. Eggs are called nits and are cemented to the feathers.
Importance: They are obligate parasites on birds and less frequently on mammals. They severely infest the poultry bird. Affected birds will become restless and peck at one another continuously, leading to loss of plumage. Louse infestation results in reduced body weight and decline in productivity. Bird lice feed on feathers, hairs, skin scales, scabs and possible blood clots around wounds. They cause irritation while feeding and crawling. In order to obtain relief, birds have dust bath. e.g. *Menopon pallidum* and *M. gallinae* are the two common lice assoicated with poultry.

Siphunculata
Synonyms : Anoplura
Etymology : Siphunculus - a little tube
Common names : Sucking lice

Characters: They are minute insects. Body is dorsoventraly flattened. Head is small, conical and narrower than thorax. Mouth is surrounded by a row of hooks which are anchored ترتكز in the host skin while feeding. Mouthparts are piercing and sucking type. There are three slender stylets which are withdrawn into a pouch in the head capsule at rest. This pouch is variously called stylet sac, buccal sac and trophic sac. Legs are **clinging**, inwardly bent and adapted for clinging to mammalian hair. Tarsus is one segmented and ends in a single large claw which folds back on a thumb like projection of tibia forming an efficient organ of clinging. Wings are absent. They are secondarily wingless. Thoracic spiracles are dorsally located. Abdominal pleurites are highly sclerotised. Eggs are called nits and are strongly glued to the base of the hairs.

Importance: They are obligate blood sucking ecotoparasites on mammals. The prescence of lice lesions on the skin is known as **pediculosis**. Louse infestation causes itching and anaemia. The following lice are associated with man.
1. Head louse: *Pediculus humanus captis*. Eggs are glued to hairs. It is also called cootie.
2. Body louse: *Pediculus humanus corporis*. It infests neck, armpits الآباط and crotch. It transmits epidemic typhus, relapsing fever and trench fever, which are serious and often fatal diseases to humans. Eggs are attached to clothing.
3. Crab louse: *Pthirus pubis*. It infests armpits, pubic and perianal regions. **Pthiriasis** causes intense itching.

7. Compare between Orthoptera and Diptera Showing, adult& immature stages diagnostic characters and metamorphosis (6 Marks)

Orthoptera

Synonyms : Saltatoria, Saltatoptera
Etymology : Ortno - straight; ptera-wings.
Common names : Grasshoppers, Locust, Katydid, Cricket, Mole cricket

Characters : They are medium to large sized insects. Antenna is filiform. Mouthparts are mandibulate. Prothorax is large. Pronotum is curved, ventrally covering the pleural region. Hind legs are saltatorial. Forewings are leathery, thickened and known as tegmina. They are capable of bending without breaking. Hindwings are membranous with large anal area. They are folded by longitudinal pleats between veins and kept beneath the tegmina.
Cerci are short and unsegmented. Ovipositor is well developed in female. Metamorphosis is gradual. In many Orthopterans the newly hatched frist instar nymphs are covered by loose cuticle and are called pronymphs. Wing pads of nymphs undergo reversal during

development. Specialized stridulatory (sound-producing) and auditory (hearing) organs are present.

Diptera

Etymology : Di-two; ptera-wing

Common names : True flies, Mosquitoes, Gnats, Midges,

Characters: They are small to medium sized, soft bodied insects. The body regions are distinct. Head is often hemispherical and attached to the thorax by a slender neck. Mouthparts are of sucking type, but may be modified. All thoracic segments are fused together. The thoracic mass is largely made up of mesothorax. A small lobe of the mesonotum (scutellum) overhangs the base of the abdomen. They have a single pair of wings. Forewings are larger, membranous and used for flight. Hind wings are highly reduced, knobbed at the end and are called **haltere**. They are rapidly vibrated during flight. They function as organs of equilibrium. Flies are the swiftest among all insects. Metamorphosis is complete. Larvae of more common forms are known as maggots. They are **apodous** and **a cephalous**. Mouthparts are represented as mouth hooks which are attached to internal sclerites. Pupa is generally with free appendages, often enclosed in the hardened last larval skin called **puparium**. Pupa belongs to the coarctate type.