Lec.8

Muscular system & Immunity in insects – innate immunity

Muscular system

Myology : Is the study of the **muscular system**, including the study of the structure, function and diseases of muscle. The muscular system consists of skeletal muscle, which contracts to move or position parts of the body.

Muscles power all the movements, external and internal, in insects. All insect muscles are striated, like vertebrate cardiac and skeletal muscle. Insect muscles show high levels of homology to these vertebrate muscles in their structure, protein content, contractility and regulation.

Insect muscles are mostly translucent, colourless or grey, though the flight muscles often show a yellowish or brown tinge.

In most skeletel muscles, especially those of the appendages, one end of the muscle is attached to a movable part.

FUNCTIONS OF THE MUSCULAR SYSTEM

1. Support of the body.
2. Helps maintain posture.
3. Movement of the limbs, including ovipositor.
4. Movement of the wings-insects are the only invertebrates that fly.
5. Movement of the viscera.
6. Locomotion.
7. Closure of spiracles.
8. Operation of various pumps such as cibarial pump and the pumping of the poison glands.

9. Generation of heat by ‘shivering’.

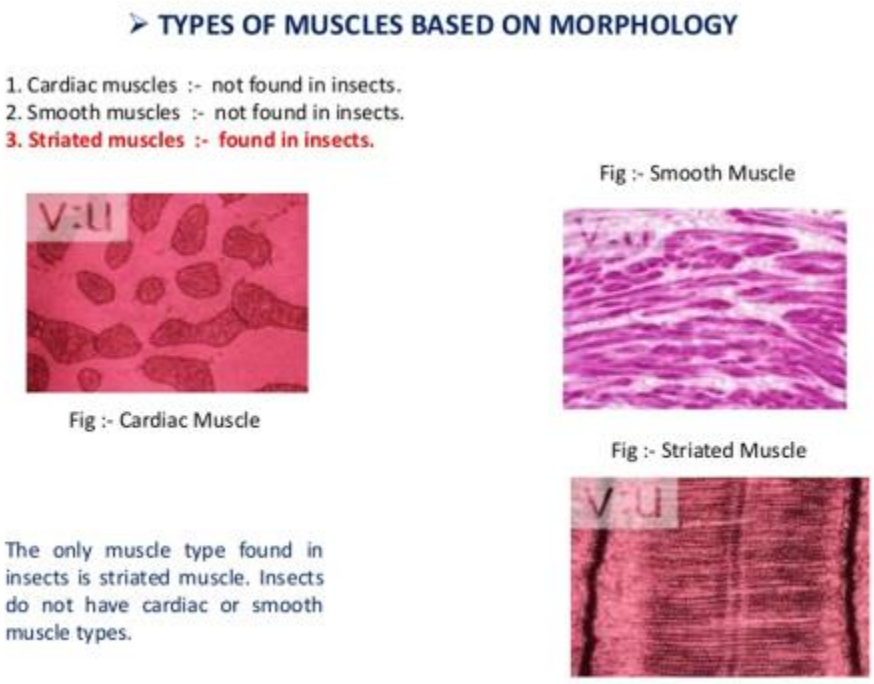
TYPES OF MUSCLES BASED ON MORPHOLOGY

1. Cardiac muscles :- not found in insects.

2. Smooth muscles :- not found in insects.

3. Striated muscles :- found in insects.

The only muscle type found in insects is striated muscle. Insects do not have cardiac or smooth muscle types. Fig :- Cardiac Muscle Fig :- Smooth Muscle Fig :- Striated Muscle.



TYPES OF MUSCLES BASED ON LOCATION

1. Skeletal muscles : a. Cephalic Muscles b. Thoracic Muscles c. Muscles of Flight d. Abdominal muscles

2. Visceral muscles : a. Alary muscle b. Dorsal blood vessel c. Accessory pulsatile organs and various diaphragms d. Alimentary canal, including the crop e. Reproductive organs and ducts f. Venom glands g. Repugnatorial glands h. Organs of defense i. Malpighian tubules

Histology of the Muscles

Each muscle is made up of a number of fibers, which are long, usually multinucleate cells running the length of the muscle. The characteristic feature of muscle fibres is the presence of myofibrils, these are embedded in the cytoplasm i.e Sarcoplasm and extend continuously from one end of the fibre to the other. The fibrils are long serial arrays of contractile units known as Sarcomeres.

The skeletal muscles of insects

The skeletal muscles have a complex structure, which have:

i. The fibrous contractile system
ii. The mitochondria
iii. The tracheal and nervous supply
iv. The membrane systems
v. Variations in the histology and ultrastructure of these components are associated with functional differences between different groups of muscles.

Types of Skeletal Muscles

A. Cephalic Muscles ⎫ The principal muscles of head may be divided into:-

1. Cervical Muscles :- These control the movement of head.

2. Muscles of the Mouthparts

3. Muscles of Antennae

B. Thoracic Muscles ⎭ The principal Thoracic Muscles may be divided as follows :-

a) Longitudenal c) Sternal

b) Dorsoventral d) Intrinsic Leg Muscles e) Pleural

C. The Abdominal Muscles

a) Longitudenal

b) Transverse

D. Muscles Of Flight The flight movements are caused by three sets of muscles , the indirect, direct and accessory.