Department of biology

((Entomology II))

2 stage

المحاضرة الثالثة

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Study of insect orders: Protura, Collembola, Diplura, Microcoryphia

1. Order: Protura (Proturans)

The proturans are minute whitish hexapods, 0.6 to 1.5 mm in length. The head is somewhat conical, and there are no eyes or antennae. The mouth parts do not bite, but are apparently used to scrape off food particles that are then mixed with saliva and sucked into the mouth. The first pair of legs is principally sensory in function and is carried in an elevated position like antennae. The tarsi are one-segmented. Styli are present on the first three abdominal segments. On hatching from the egg, the proturan abdomen consists of 9 segments. At each of the next three molts, segments are added anterior to the apical portion (the telson), so that the adult abdomen appears to have 12 segments (11 metameric segments and the apical telson). These hexapods live in the moist soil or humus, in leaf mold, under bark, and in decomposing logs. They feed on decomposing organic matter and fungal spores. They are found worldwide and approximately 200 species are known at present.

Important identification characteristics

a) Minute insects, with entognathous piercing mouth parts
b) Antennae and eyes are absent
c) Abdomen 11 segmented with a terminal telson, first 3 segments with a pair of small appendages called styli
d) Forelegs sensory and held above the head, like antennae
e) Metamorphosis slight, chiefly evident as an increase in number of abdominal segments following each moult (anamorphosis)

e.g. *Eosentomon indicus*

2. Order: Collembola

Synonyms : Oligentoma, Oligoentomata
Etymology : coll-glue; embol - wedge or peg.
Common names : Spring tail, Snow flea

Characters: They are minute insects. Body is globose or tubular. Compound eyes are absent. One to several pairs of lateral ocelli form an eye patch. Antenna is four segmented. Mouthparts are entognathous biting type and found within a pouch. Tibia is fused with tarsus to form tibio-tarsus. They are primarily wingless. Abdomen is six segmented with there medially situated pregenital appendages.

* **Ventral tube** or **Collophore** or **Glue peg**: It is a bilobed adhesive organ found on the first abdominal sternite. It is beleived to be associated with respiration, adhesion and water absorption.

* **Hamula** or **Tenaculum** or **Retinaculum**: It is present on the third abdominal sternite. It consists of a fused basal piece, corpus and free distal part called rami. It holds the furcula.
* **Furcula** or **Springing organ**: It consists of a basal manubrium, paried dens and distal claws called mucro. It is held under tension beneath the abdomen by retinaculum when at rest.

Malpighian tubules, tracheal system and metamorphosis usually absent.

Importance: *Sminthurus viridis* is a pest on alfalfa. It can be collected from moist places in soil. They are also found in mushroom houses as a pest.

3. Order: Diplura (Diplurans)

The diplurans appears somewhat similar to the silverfish and bristletails, but they lack a median caudal filament and thus have only two caudal filaments or appendages. The body is usually not covered with scales; compound eyes and ocelli are absent; the tarsi are one segmented; and the mouthparts are mandibulate and withdrawn into the head. The antennae are long and multisegmented; styli are present on abdominal segments 1-7 or 2-7. These hexapods are small (generally less than 7 mm in length) and usually pale in color. They are found in damp places in the soil, under bark, under stones or logs, in rotting wood, in caves, and in similar moist situations.

Identification characteristics

a) Small to large, narrow bodied entognathous insects
b) Antennae moniliform, with intrinsic musculature
c) Compound eyes and ocelli absent
d) Abdomen with 10 segments, ending in a pair of cerci
e) Larval development epimorphic

e.g. *Campodea staphylinus*
e.g. *Sminthurus viridis*

Class: INSECTA

Subclass: APTERYGOTA

4. Order: Microcoryphia (=Archaeognatha) – Bristle tails

The Microcoryphia resemble the silverfish in the order Thysanura. However, they are more cylindrical, with the thorax somewhat arched; the compound eyes are large and contiguous; ocelli are always present; each mandible has a single point of articulation with the head capsule; the tarsi are three-segmented; and the middle and hind coxae usually bear styli. These styli are sometimes lacking on the middle coxae, or they may be completely absent. The abdomen bears a pair of styli on segments 2-9, and segments 2-7 each bear three ventral sclerites (the coxopodites and a median sternum; the sternum is sometimes much reduced). Segments 1-7 usually bear one or two pairs of eversible vesicles.

These insects live in grassy or wooded areas under leaves, under bark, in dead wood, under stones, under rocks and cliffs, and in similar situations. Most are nocturnal, and their eyes glow at night when illuminated with a flashlight. The largest members of the order are about 15 mm in length.
The Microcoryphia are quite active and jump when disturbed, sometimes as far as 25-30 cm. The eversible vesicles on the abdomen function as water absorbing organs. Before these insects molt, they cement themselves to the substrate (the cement appears to be fecal material). If the cement fails, or if the substrate (such as sand) is not firm, they are unable to molt, and die. The bodies of the insects are covered with scales, which sometimes form distinctive patters. The scales are often lost during the collecting process or when the insects are preserved in fluid. The jumping bristletails feed chiefly on algae, but feed also on lichens, mosses, decaying fruits, and similar materials.

Identification characteristics

a) Fusiform, subcylindrical, apterygotes with ability to jump
b) Body bearing pigmented scales
c) Compound eyes large, contiguous, ocelli present
d) Mandibles with single articulation, maxillary palpi 7-9 segmented
e) Thorax strongly arched, terga extending over pleura
f) Styli often present on mid and hind coxae, tarsi 3 segmented
g) Abdominal segments 2-9 with ventral styli, 1-7 with eversible vesicles.
e.g. *Graphitarsus sudindicus*