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## Enteric Protozoan Fauna (Cephaline gregarines) in the Larval Stage of *Tenebrio molitor*

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Cephaline gregarines, which inhabit the alimentary canal of insects, have complex bodies that clearly distinguish them from acephalines (Figures 5 and 6).

The cephaline sporozoan attaches itself to an epithelial cell of its host (Figure 4) by the epimerite, a knob-like structure. Most cephalines' bodies, behind the epimerite, are divided into three regions by a transverse septum; these gregarines are tricytid. The three regions are the epimerite; the protomerite, distinguishable only by a difference in its cytoplasm; and the posterior deutomerite, the largest region, containing the nucleus.

Cephalonts—fully developed adult forms—eventually break away from the epimerites and live freely in the gut lumen as sporonts, which grow into gametocytes. Sporonts associate in syzygy laterally, or head to tail; the anterior sporont is termed the primate; the rest are called satellites (Figure 4). The great number of individuals in syzygy inspires the name of the order gregis—a “flock”. Larger groups are sooner or later reduced to pairs of gametocytes, which encyst (Figure 8). The cysts are expelled from the body with the feces. Reinfection occurs by coprophagia.

Mealworms of the larval stage of the beetle *T. molitor* generally harbor three species of cephaline gregarines: *Gregarina cuneata*, *Gregarina polymorpha*, and *Steinina ovalis*. The cockroach, *Periplaneta americana*, is host to *Gregarina blattarum* (Figure 7). Monocystids (*Monocystid agilis*, Figure 6) are very common in the seminal vesicles of earthworms.

### Studying the Organisms

#### Cephaline gregarines

Gregarines (Figures 2–8) look like elongated, short-necked bowling pins, transparent when young, opaque and brownish gray when fully developed.

1. Remove the head from the larva.
2. Posteriorly dissect and cut obliquely through the body wall.
3. Pull away the hind end with the gut attached.
4. Float the gut in physiological saline.

**Note:** *Gregarine species are not haphazardly distributed through the gut. G. cuneata occurs anteriorly where the pH is generally lower; G. polymorpha occurs posteriorly while S. ovalis is overlapping (Figure 1).*

5. Remove the hind-gut and cut the mid-gut into two separate pieces.
6. Place each on a clean microscope slide; add a drop of saline solution.
7. Tease the fragments open and mix the contents; cover and observe.

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## Acephaline gregarines in *Lumbricus terrestris*

Simpler in their trophozoite structure than cephalines, acephalines' bodies are monocystid, with a primitive holdfast organ (the mucron).

1. Dissect the earthworms to expose the seminal vesicles.
2. Cut off the lateral tip of one and smear the white fluid on a microscope slide; cover and observe.

## Common Enteric Protozoa

Figure 1  
Gut of *Tenebrio molitor*

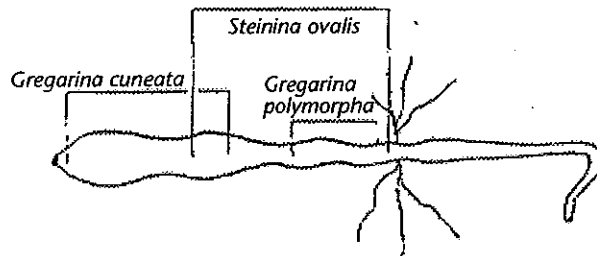


Figure 2  
*Gregarina cuneata*

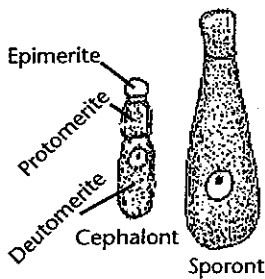


Figure 3  
Intracellular Stages of *Gregarina cuneata*

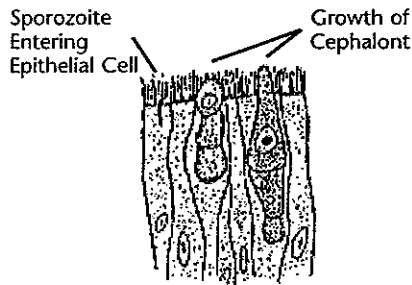


Figure 4  
*Gregarina polymorpha*

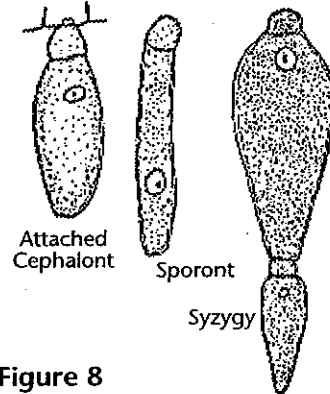


Figure 5  
*Steinina ovalis*

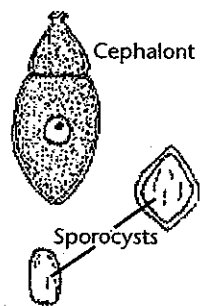


Figure 6  
*Monocystis agilis*

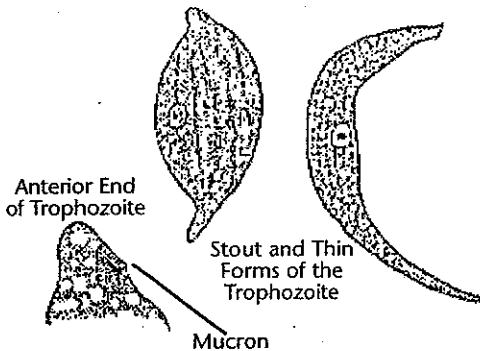


Figure 7  
*Gregarina blattarum*

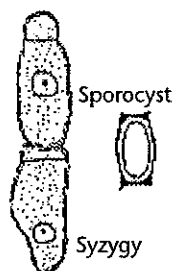


Figure 8  
Cyst Formation Following Association of Gametocytes

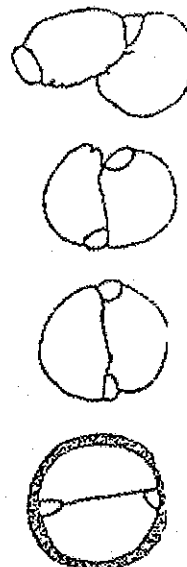


Figure 10  
*Nyctotherus cordiformis*

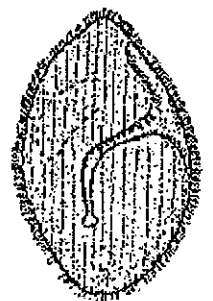


Figure 9  
*Opalina ranarum*

