

Chapter 4

Soil Food Web Microorganisms

Lecture 21 - Nematodes

Nematodes

Bacterial feeding – Fungal feeding
Predatory - Root-feeding - Morphology &
Function

Nematode Functions	Explanation
<p>Reproduction</p>	<p>Nematodes are small, slender worms: typically about 5 to 100 μm thick, and 0.1 to 2.5 mm long. Most nematodes species have male and female individuals; a few species are hermaphroditic (self -fertilizing). Eggs are usually released into the soil, although in some species, the eggs hatch while still inside the female. Once eggs hatch, nematodes go through a few juvenile or larval stages before moulting to mature adults. Bacterial-feeding and root-feeding nematodes usually mature rapidly (2 weeks to 2 months) and while predatory and fungal-feeding nematodes usually live several years.</p>
<p>Consumption of Prey</p>	<p>Bacterial-feeding nematodes pull soil solution containing bacteria into their digestive system. Fungal-feeding nematodes have slender to broad stylets (spears) which puncture fungal-hyphae and the nematode then pulls the internal contents of the hypha into the nematode. Predatory nematodes eat other nematodes and often seem to have a preference for root-feeding nematodes. Root-feeding nematodes have spears, with observable knobs on the posterior end, which they use to puncture the thick cell wall of the plant cells and then pull the internal contents of the plant cell into the nematode. This can cause severe damage to roots if root-feeding nematode density is high. Classic predator - prey cycles can be demonstrated with nematodes which consume bacteria or fungi.</p>

Nematode Function	Explanation
<p>C:N</p>	<p>Nematodes have a thick cuticle made of collagen surrounding their body that is high in carbon. Once the nematode clears any cytoplasm or bacterial soup that it consumed, nematodes have a C:N ratio close to 100:1. Thus either the cytoplasm or bacteria that nematodes consume contain much higher levels of nutrients than the nematode requires. Thus nematodes release nutrients in a soluble, inorganic form that plants can take up.</p>
<p>Predation</p>	<p>Micro- and macro-arthropods with chewing mouth parts will consume nematodes. Nematodes are a nice bite-size treat for earthworms. Nematode-trapping fungi are predators of nematodes as well. Their mechanism to capture nematodes is to produce circular traps which, when touched on the inner surface of the trap, causes water to rush into the cells of the trap, and clamp down on the nematode. The fungus then grows into the nematode, producing miles of hyphae and any spores that can be widely dispersed.</p>
<p>Dormancy</p>	<p>Nematode dormant stages are eggs or dauer larvae (see picture). Endoparasitic nematodes move into root systems and essentially are protected from outside disturbances from that point.</p>

Nematode ID:

Bacterial feeding, Fungal-feeding, Predatory and Root-feeding

- Nematodes are separated into functional groups based on mouth and digestive system characteristics.
- The next slide shows the five major groups, but within these basic characteristics, there can be a great deal of variability, as will be shown by following pictures of a few nematodes.

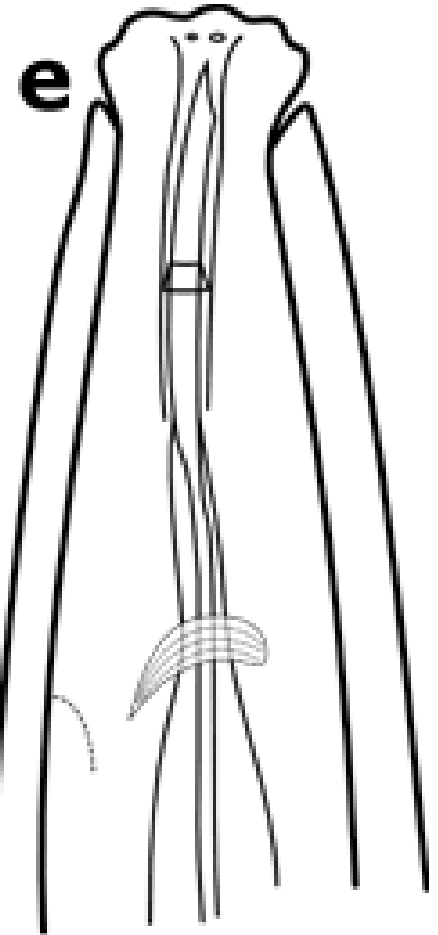
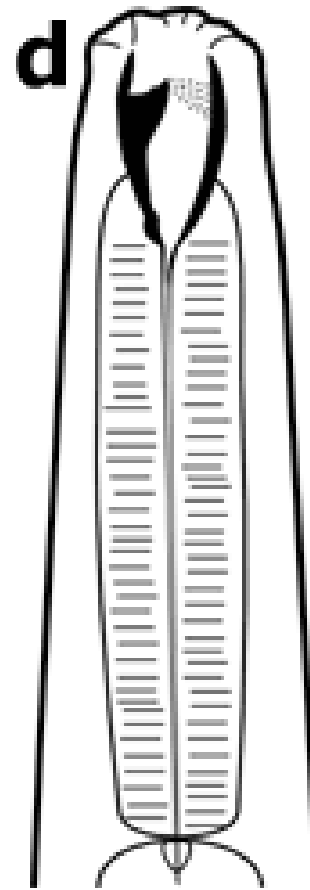
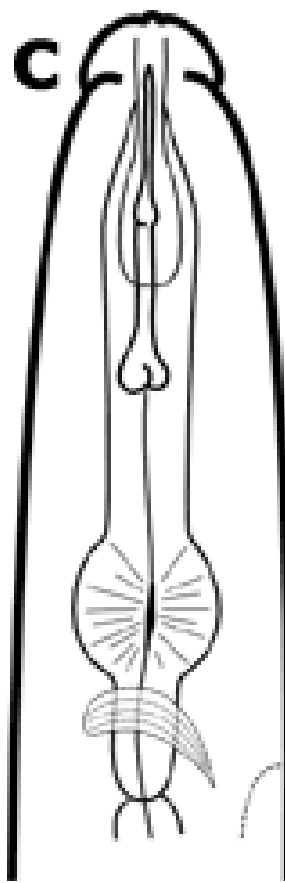
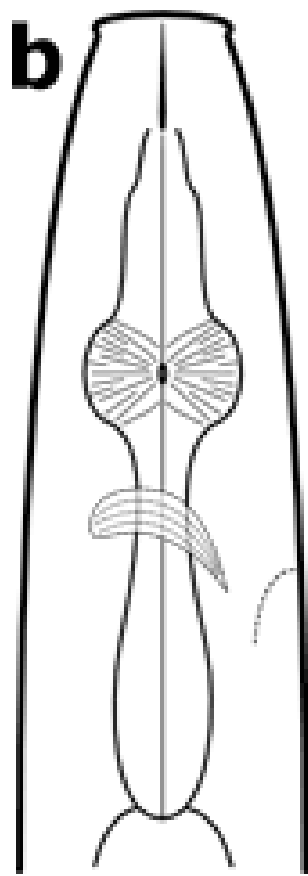
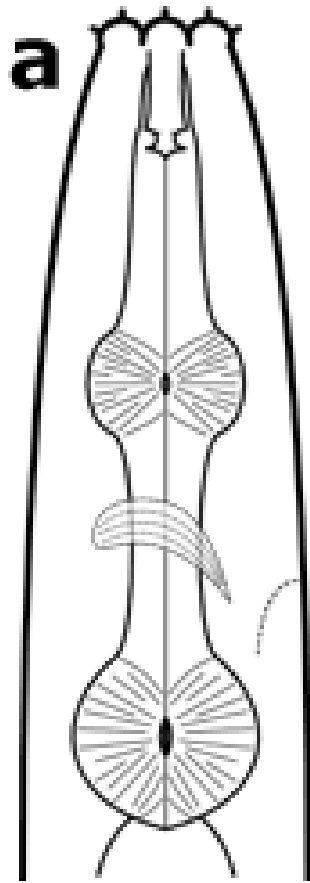
Bacterial

Fungal

Root

Predatory
(Fungal)

Omnivore



Bacterial-feeding Nematode

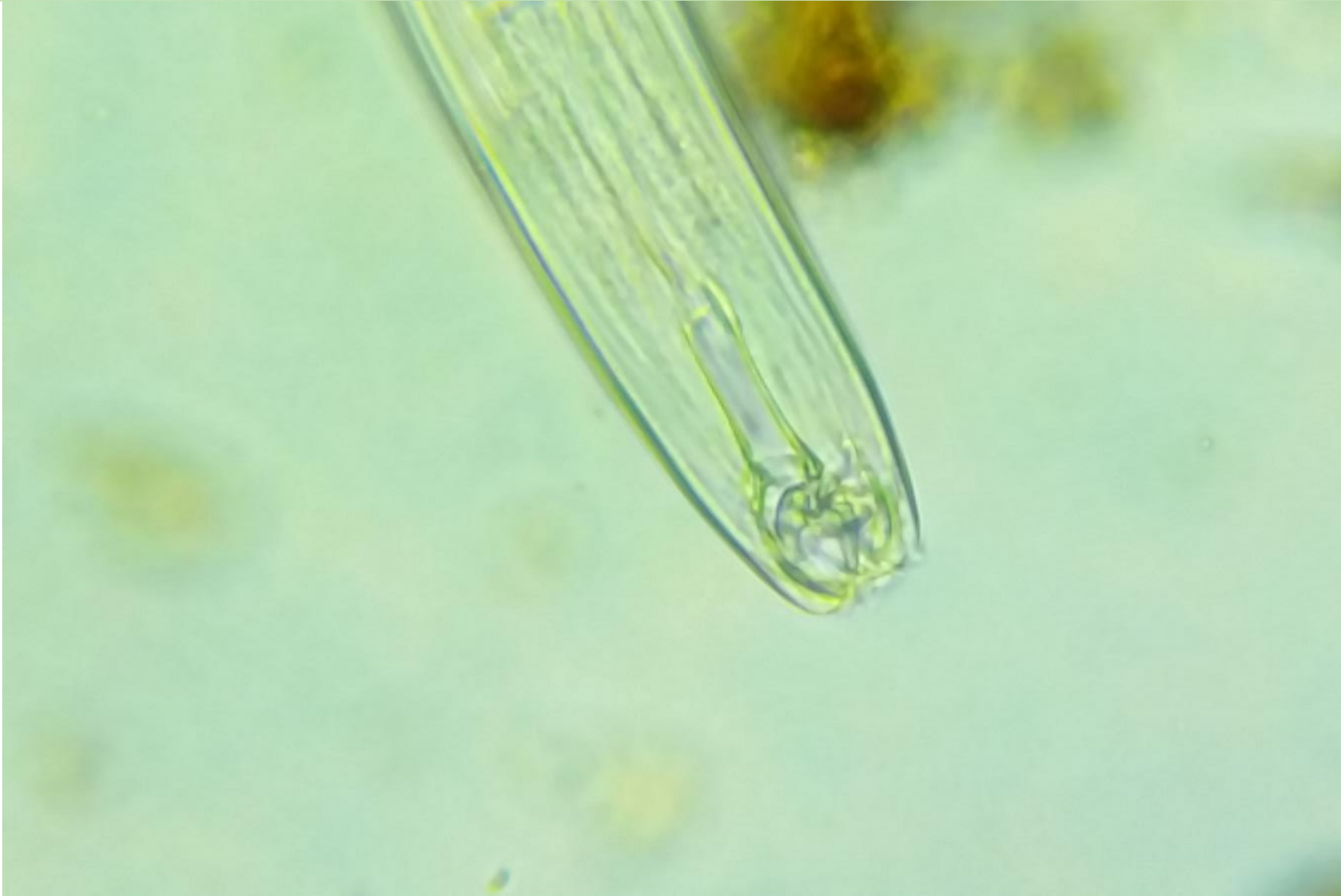




Omnivore Nematode:
mostly they eat bacteria



Omnivore



Fungal-feeding nematode



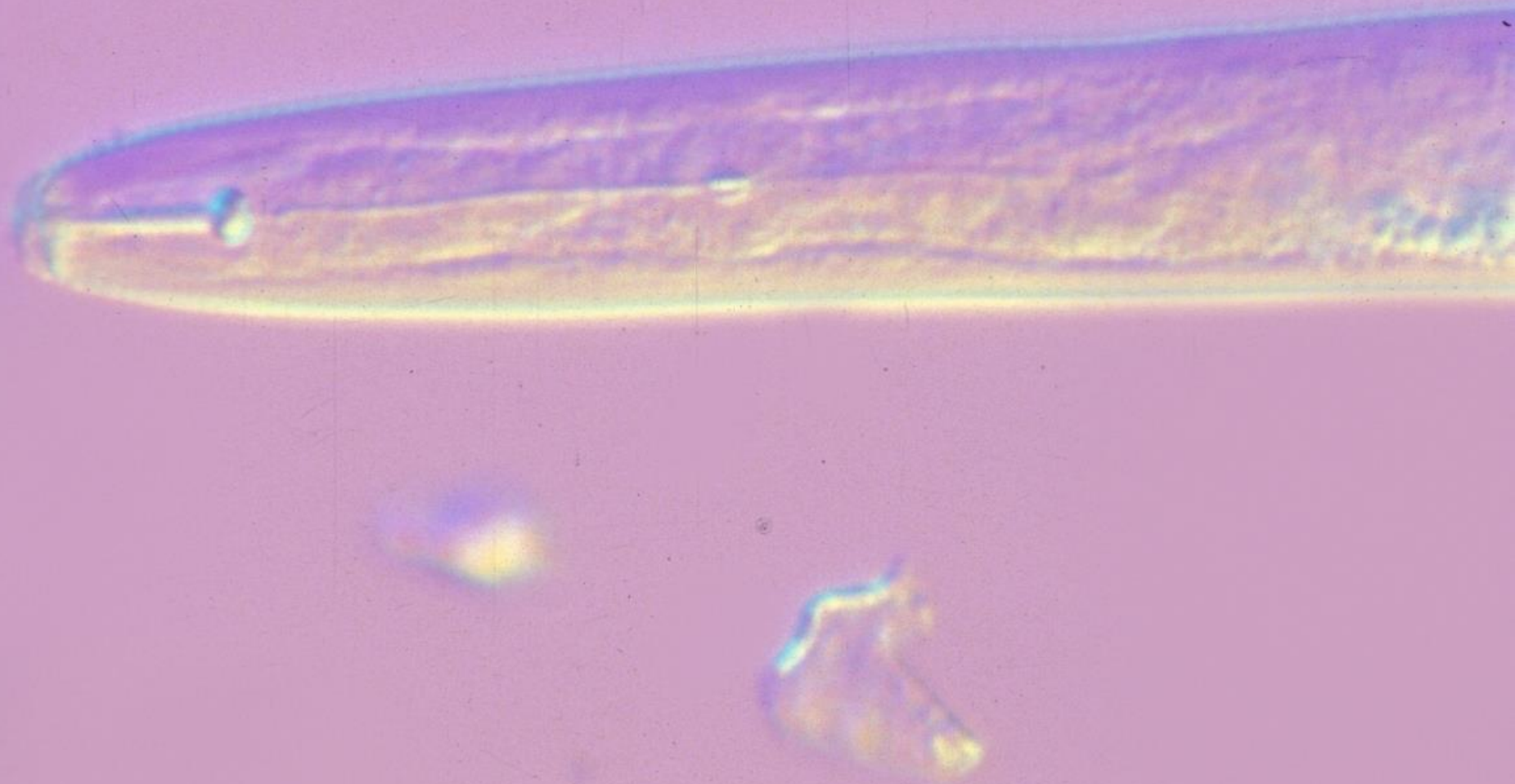
Predatory Nematode



Predatory Nematode



Root-feeding nematode



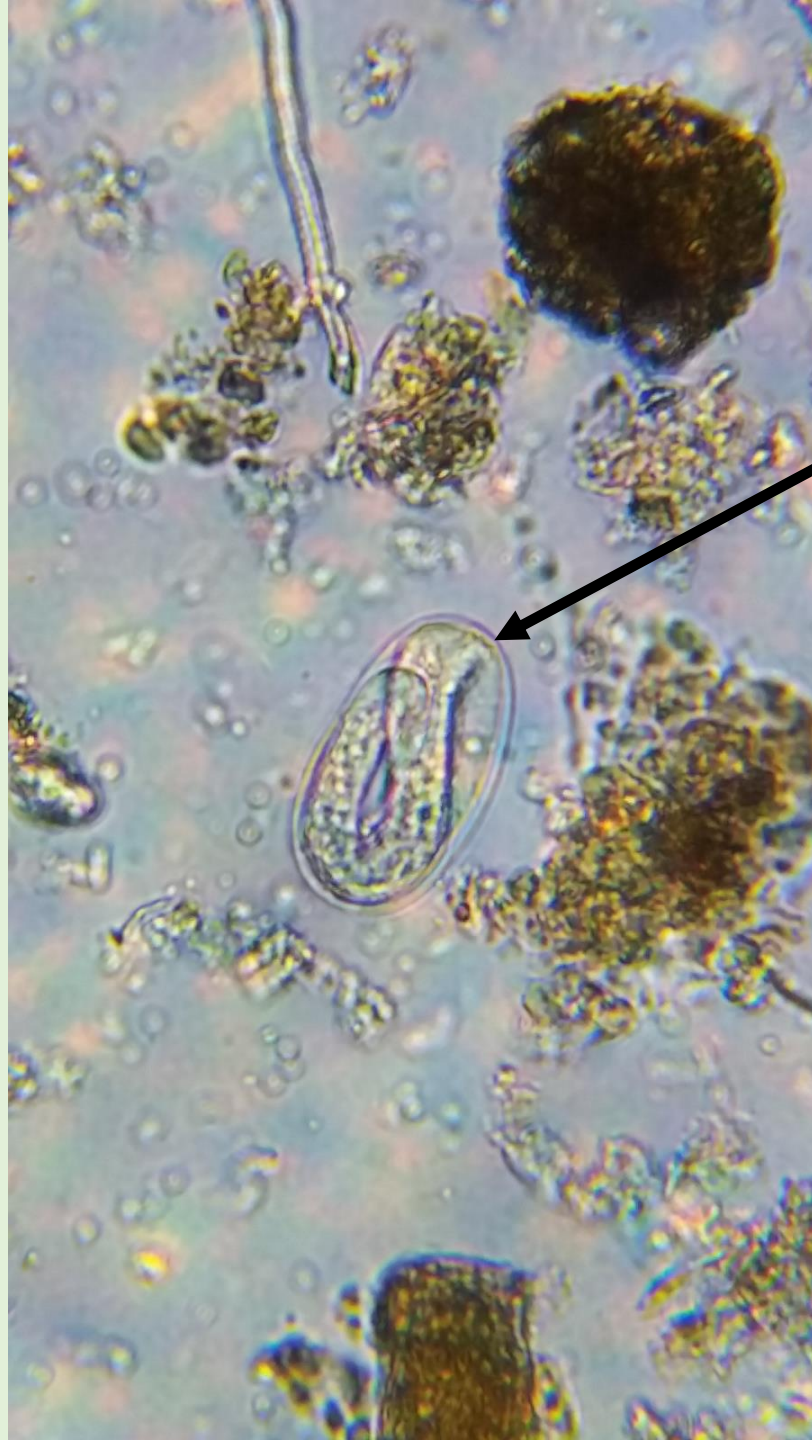
A microscopic image of a root-feeding nematode, showing its elongated, segmented body and head region. The nematode is curved, and its internal structures, including the gut and reproductive organs, are visible. The background is a light blue, slightly textured surface, likely a slide or a water droplet. The text "Root-feeding nematode" is overlaid on the image in a bold, black, serif font.

**Root-feeding
nematode**



Dauer larva

**Dormant stage for
some nematode
species**



Nematode egg

This egg will hatch soon based on how mature the baby nematode inside the egg appears