

Lecture Objectives

- Define ecology and its related terms.
- Construct insect based food webs for primary, secondary, and tertiary trophic levels.
- > Describe aquatic and terrestrial adaptations in insects.
- Discuss the advantages of biological monitoring and the indications of poor water quality.







Lets explore some of the specific habitats...



...and take a journey with insects!

	TERMS AND CONCEPTS
Ecology	The study of the interactions between organisms and their environment.
Environment	The environment is the physical world that affects the life of its constituents. It is composed the Biotic which includes all living organisms such as plants, animals and microbes, and the Abiotic or non-living factors such as temperature, light, water, and nutrients.
Habitat	A habitat is the locality or site and type of environment that an organism lives on or in. A pond, field or oak tree are all examples of habitats.
Niche	A niche is the ecological role a species plays in a community such as an insect that feeds on root of grasses or one that eats aphids on leaves. It is what an organism does for a living within a habitat.
Population	A population is a group of individual organisms that belong to the same species and live in a particular geographic location.
Community	A community is all the organisms living in a particular area and includes populations of different species of plants and animals.
Ecosystem	An ecosystem is the combination of the community of organisms in an area and the abiotic factors.





Water Quality Indicators

When sampling there are several common indicators to consider.

- Mayflies indicate an increase in particulate matter.
- Bloodworms (Chironomidae) increase when oxygen levels drop.
- Plecoptera decline as water temperature increases.
- Many species disappear with pesticide run-off.
- There will be an abundance of only a few species with eutrophication (abundance of organic matter).

Aquatic Habitats

There are different kinds of aquatic habitats, and with each habitat comes different insect fauna and different functional feeding groups. The aquatic habitats we will discuss include:

- Lentic (ponds and lakes) standing water
 Lotic (streams and rivers) running water
 Marine (inter-tidal and littoral)
- •Temporary bodies of water puddles, crab-holes, tree holes

Important factors when considering aquatic habitats include: water speed, water temperature, and dissolved solvents.

Functional Feeding Groups

- <u>Collectors</u> feed on fine particulate matter by filtering particles from aqueous suspension. (black fly larvae)
- <u>Shredders</u> feed on living or decomposing plant tissues, including wood which they chew, mine or gouge. (water boatman)
- <u>Scrapers</u> feed on attached algae and diatoms by grazing solid surfaces. (dytiscid water beetles)
- <u>Scavengers</u> feed on dead plant or animal materials (detritus). (water striders)
- <u>Predators</u> feed on living animal tissue. (Helgrammites, Megaloptera,-only found in clean waters.)

Piercers - feed on cell and tissue fluids from vascular plants of

larger algae by piercing the cell wall and sucking out the contents.

Parasites - feed on living animal tissue as external or internal parasites of any stage of another organism

See if you can fit the examples from the following diagram to their correct functional feeding groups.



Is the water moving fast or slow? Is it deep or shallow? Is it rocky or muddy?

On the next few slides we will discuss the location of these insects in the aquatic habitat. You may want to refer back to this diagram from time to time.

Aquatic InsectsImage: Distance of the sectorImage: Distance of the

Breath through a snorkel-like tail

They hang from the surface using a special ring of hairs that surround spiracle. The hairs, spiracle opening, and trachea are all **hydrofuge** structures (water repellant).



Aquatic Insects - continued

Mayfly (Mud dwellers)

- o Burrows at the bottom of still or slow moving water
- Collect food particles
- Caddisfly (Water bed) o Builds a body case out of rocks
 - and debris
 - o Grazes on algae and other
 - plant matter Some spin webs between rocks to collect food

Stonefly (Water bed)

- Adapted for strong currents
 Flattened body and strong legs
 Feeds on insects or decaying
- plant matter



Video – Brine Flies



IMPORTANT NOTE: Throughout the course units, you will be asked to view short video clips. Please understand that many of these video clips are copyrighted and are NOT to be used outside of this class and only may be used for this semester. Please do not copy or distribute these clips.







Many insects that live their entire lives in the soil are very small. Many insects that live their entire lives in the soil are very small. Why do you think being small would be an advantage in the soil? This is only a thought question and does not have to go in the journal.



Recycling Nutrients - Leafcutter Ants

Ants:

- · Aerate soil with intricate burrows
- o Pull seeds and miscellaneous organic material underground

Leafcutter ants are known for farming organic material in order to grow the fungus that is intrinsic to their diet.





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This energy is passed on when an organism is eaten by another organism as indicated by the arrows.







Learning Game Placeholder Learning Game: Choices **Title: Review Quiz**

Conclusion

 $\mathsf{Ok},$ we covered a lot of ground in this unit and hopefully your head is above water. (I couldn't resist the pun.)

- ✓ Review terms given in lecture
 ✓ Be able to create a food web with different trophic levels
 ✓ Be able to identify kinds of insect based on feeding function

Soil feeding groups:

Saprophage – detritus eating Xylophage – wood eating Coprophage – excrement eating Necrophage – corpse eating Mycophage – fungus eating



The #1 Nation, the Gator Nation