

Life Science - Mr. Galloway
Chapters 10 - 11
Animals: Invertebrates

10.1 What is an animal?	11.1 Mollusks
10.2 Symmetry	11.2 Arthropods
10.3 Sponges & Cnidarians	11.3 Insects
10.4 Worms	11.4 Chemical Communication
	11.5 Echinoderms

Recommended Website:

Section 10.1
What is an animal?

- Need water, food, and oxygen to survive

Characteristics:

- Multicellular
- Movement
- Sexual Reproduction
- Heterotrophs
 - * Carnivores (Predators of Prey) (Eat other animals)
 - * Herbivores (Eat plants)
 - * Omnivores (Eat plants and other animals)

Backbone of Classification of Animals

95 % **Invertebrates** (No backbone)
 - jellyfish, worms, snails, spiders, insects)

5 % **Vertebrates** (Backbone)
 - fish, amphibians, reptiles, birds, mammals)

Adaptation through natural selection

- The "Family" or "Genus" level of classification represents a biblical "Kind". The "Dog" kind includes wolves, foxes, dogs, etc.....
- There are many different species (and genera) within each "Kind".
- Mutations always result in a loss of information, never new information. So, only changes within "Kinds" (Dogs: wolf to a poodle) can occur.
- Impossible for one "Kind" to become a new "Kind". (Reptile to a bird)
 "Kinds" of animals do adapt (change), due to environmental pressures. (size, color, hair length, teeth shape, ear length, etc.)



Section 10.2 - Symmetry & Body Direction

When studying and describing animals, some basic body characteristics are important. These include:

Animal Body Symmetry – the way body parts are arranged around a center point.

Directions on the body – used to describe areas on the body of an animal.



Body Symmetry

- GOOGLE research IMAGES for body symmetry:
- You will discover 4 main types
 - Asymmetry
 - Bilateral
 - Radial
 - Spherical

DIRECTIONS on an animal body:

Dorsal
top surface

Ventral
bottom surface

Anterior
front end

Posterior
hind end



Sponges - GOOGLE research IMAGES for SPONGES

Asymmetrical

Live in both salt and fresh water.

Not plants, since they are heterotrophs (take food into their bodies).

A sponge's **body** is like a bag with lots of holes called **pores**.
 * No specialized tissues.

It **feeds** by filtering (straining) food particles from the water.

It gets **oxygen** from the water by diffusion into its cells.

"**Spikes**" all throughout its body give it extra support.

Reproduction is both asexual and sexual.

- Asexual (budding)
- Sexual (each can produce eggs and sperm)
- * After fertilization, a **larva** is produced.
- * The larva looks very different from an adult.

Cnidarians – hydras, jellyfish, anemones, corals

- All have radial symmetry
- Two body plans (Some go through both as stages):
 - Polyp = vase shaped (hydra, anemone, coral)
 - Medusa = bowl shaped (jellyfish)
- All are carnivores using stinging cells to catch prey, and to defend themselves
- They do have specialized tissues
- Digestive tract has only one opening for food & waste

GOOGLE research IMAGES for
**Hydra -
Sea Anemone –
Jelly Fish –**

GOOGLE research IMAGES for
Cnidarian's poisonous nematocyst unfired:

- <http://www.reefkeeping.com/issues/2002-07/rs/images/image004.jpg>

<http://www.jcu.edu.au/interest/stingers/nematocyst%20unfired.jpg>

Portuguese Man-of-War
(NOT a jellyfish but a colony of cnidarians)



Corals = cnidarian polyps with hard skeletons around soft bodies.

Coral Reefs = old skeletons of millions of dead corals.

Coral reefs can form in only a few thousand years, when the water temperature and nutrition are right.
* Not millions as some scientists claim.

Worms: Three Major Phyla

- Flatworms
- Roundworms
- Segmented Worms

What Worms Have in Common:

- Invertebrates
- Bilateral symmetry
- Long bodies without legs
- Tissues, organs, organ systems
- Heads and tails (Brain = knot of nerves in head)
- Reproduction
 - Both asexual and sexual types of worms
 - Asexual by breaking off pieces that grow
 - Some have separate male and females
 - Others are hermaphroditic (both in one)
- Regeneration = regrowth of body parts (earthworm tail)

Flatworms –

- Ocean flatworms
- Land flatworms
- Water planaria

Flatworms

- Most flatworms are parasites (tapeworms, etc)
- Tapeworms can grow to 10 meters (30 feet)

Cephalopods

Camo-capable

Gentle Giants ??

Cephalopods

- Suckers sense touch and taste
- Large eyes with great vision
- Most complex invertebrate nervous system and brain
- Very smart and learn quickly

11.2 Phylum – Arthropod (“Joint Leg”)

- Invertebrate
- Exoskeleton made of Chitin, so it must molt (shed old skin to get bigger)
- Segmented body (Insects 3) (Arachnids 2) (Crustaceans 2 or 3)
- Jointed appendages
 - * Legs (Insects 3 pairs) (Arachnids 4 pairs) (Crustaceans 5 or more)
 - * **Antennae** (Insects 1 pair) (Arachnids 4 pairs) Crustaceans 2 pair)
- Open circulatory system (blood flows freely, not in tubes/vessels)
- Most reproduce sexually, with internal fertilization
- Metamorphosis (body changes dramatically during life cycle)



Major Groups of Arthropods:

- Crustaceans – Crawfish, crabs, lobsters, etc
- Arachnids – spiders, mites, ticks, scorpions
- Centipedes – venomous predators with 1 pair of legs for each segment
(“centipede” means “hundred feet - 100 pairs)
- Millipedes – herbivores with two pairs of legs on each segment
(“Millipede” means “thousand feet”)
- Insects – 3 sections, six legs, 1 pair antennae, usually 1 or 2 pair of wings

11.3 Insects:

Camouflage

- God included this information in the genetic code to make them fun for us to find in nature.
- Now adapted to the predator / prey competition in the “wild” kingdom

Insect Metamorphosis – Two Kinds:

1. **Complete** Metamorphosis
 - a. egg
 - b. **larva** = looks different from adult
 - c. **pupa** = inside a protective case
 - d. adult = emerges from case
2. **Gradual** Metamorphosis
 - a. egg
 - b. **nymph** (looks like a little adult & grows)
 - c. adult

11.4 Chemistry of Communication:

Pheromones = a chemical released by one animal that affects the behavior of another of the same species.

- Animals use them to attract mates, to recognize colony members, to leave a trail to food, etc.

- Pest Control

- * Pheromones can be used to control pest, by attracting them and killing them (electric light bug zappers)

Bioluminescence (Fireflies, etc.) Chemical light

11.5 Echinoderms (Sea stars, sea urchin, etc.)



- Radial Symmetry

- "Spiny skinned", yet supported by an **endoskeleton** of spiny plates made of calcium.

- Legs are 5 or multiples of 5

- Internal water vascular system, to control tube feet.

- No brain, yet sea stars hunt for crabs, etc.

Sand Dollar on my arm – top side



Sand Dollar on my arm – bottom side

