



INVERTEBRATES



The Earth
and
Living Things.

How many animals can you see?



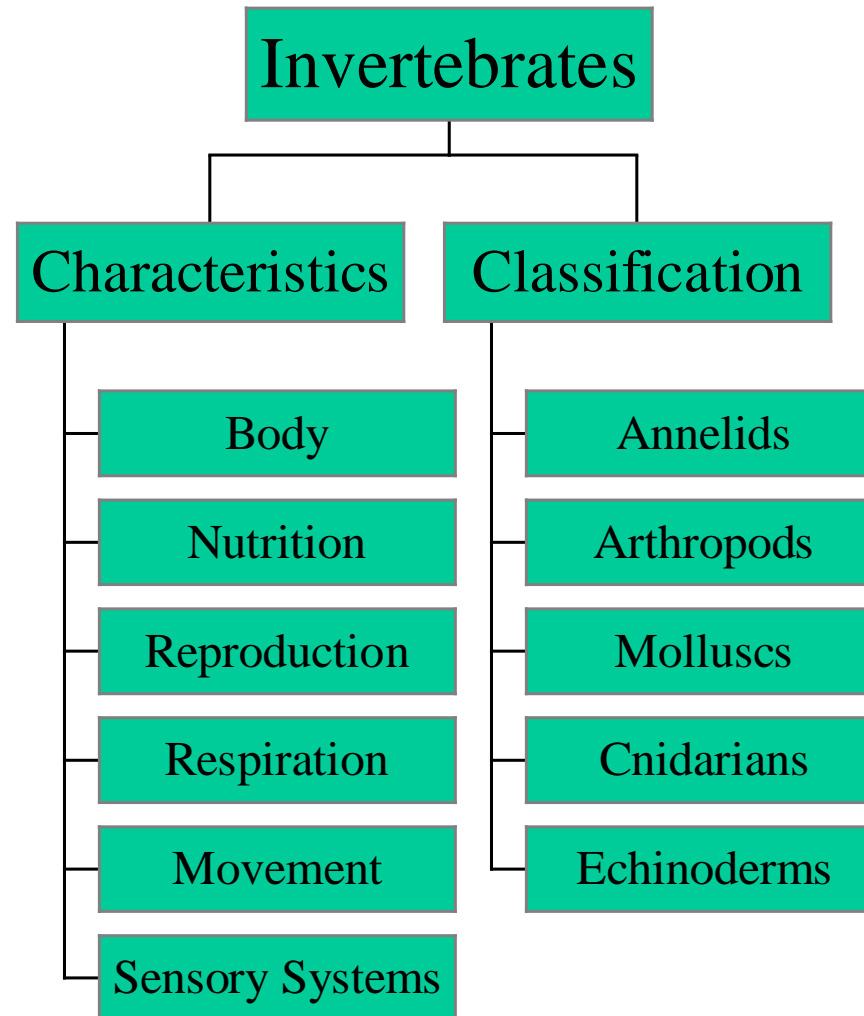
ant rose coral snake anemone fish grass bee



Invertebrates

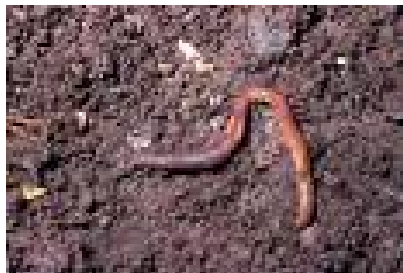
- **There are animals without either a backbone or an internal skeleton.**
- **This group includes the Giant Squid at 18m long and gall mites, which are less than 25 mm long.**
- **They can be found in most habitats.**
- **There are between 3 million and 15 million species in the world.**
- **About 97% of creatures on Earth are invertebrates.**

In this unit we will learn



ANNELIDS

- They are usually called **worms**.
- Their **body** is **soft** and **long**, made of rings or segments.
- They can **live** on the **land** or in the **water**.



earthworm



nereis



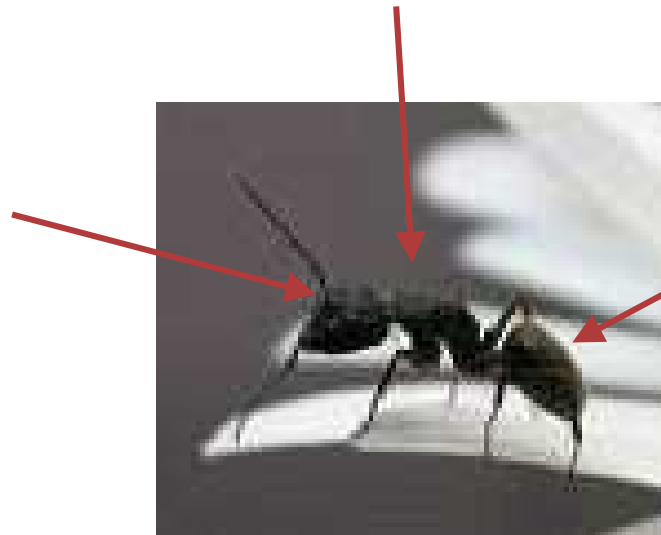
ARTHROPODS

- Their **body** has an **exoskeleton**.
- The exoskeleton protects their organs inside.
- They have **jointed legs** and **segmented bodies**.
- They are the largest invertebrate group (75% of all animal species).
- **Insects, arachnids, crustaceans and myriapods are arthropods.**

Insects

- An insect's body is made up of **thorax.**

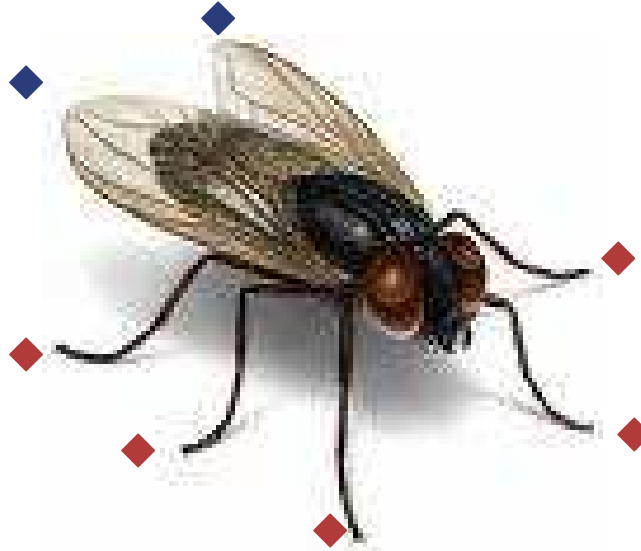
head



abdomen

Insects

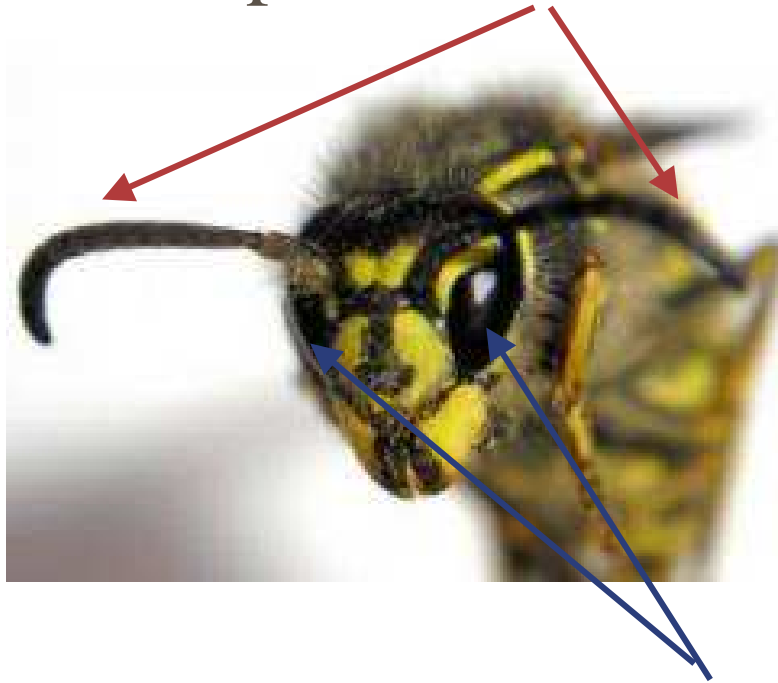
- Insects have **six jointed legs**.



- Many insects have **wings** and these are also attached to the **thorax**.

Insects

- An insect has a pair of **antennae**



- on its head and a pair of **compound eyes**.



Myriapods

- Myriapod means '**many-legged one**'.
- They can have anything between **about 10 and 200 pairs of legs**.
- Most of them **live in dark, damp places**.

Myriapods

- They have **lots of segments** to their body
- **Centipedes** have **one pair of legs** per body segment.
- **Millipedes** have **two pairs of legs** per body segment.



?



Arachnids

- They have **eight legs**.
- Arachnids include



spiders,



scorpions,



mites



and ticks.

Arachnids

- Arachnids have **two parts to their body** - the **cephalothorax** and the **abdomen**.



- The **cephalothorax = head and thorax** .
It contains the legs, mouthparts and sense organs.
- The **abdomen** contains the main **organs**, just like insects.

Crustaceans

- They have:
 - a hard exoskeleton
 - five pairs of legs or more.
 - one or two pairs of antennae.
 - lots of crustaceans live in water.



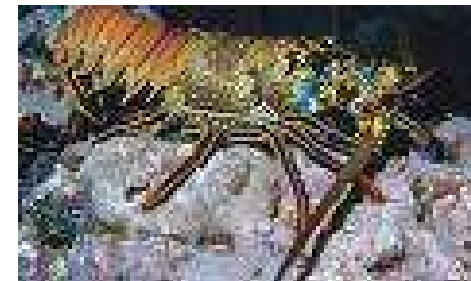
crab



shrimps



woodlouse



lobster

MOLLUSCS

- Their **body** is **soft**.
- Some have **shells** to protect their body.
- Many molluscs **live** in the **water**.



snail



slug



shellfish



mussel



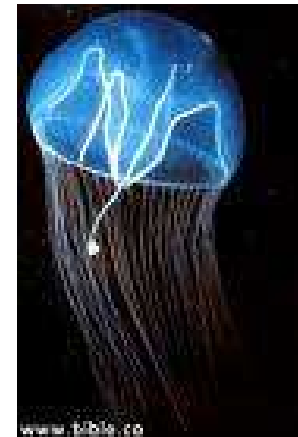
squid



octopus

CNIDARIANS

- This diverse group of very **simple-bodied animals**.
- All they have is a **stomach and a mouth surrounded by tentacles**.



- It includes **sea anemones and jellyfishes**.

ECHINODERMS

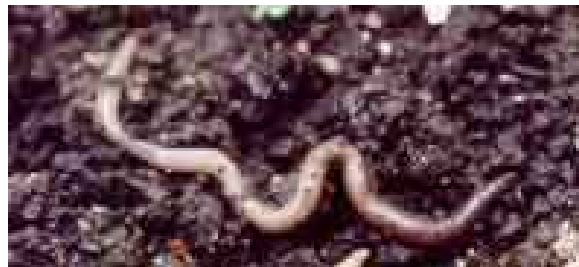
- They have a **soft body** encased in a **hard rigid shell**.
- Many echinoderms have spines covering their shell.
- They **live** on the **sand or rock ocean bottom**.



- It includes the **sea urchins** and **starfishes**.

NUTRITION

- Some of them have a very **simple digestive system** and they can feed themselves with **nutritive particles** from the **soil** or **dissolved in water**.
- E.g. Earthworms and mussels.



NUTRITION

- Some invertebrates are **herbivores**.



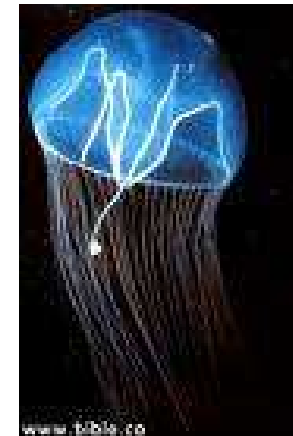
e.g. Snails and many insects (grasshoppers, bees, butterflies...).



NUTRITION

- Some are **carnivores**.

e.g. Octopus, praying mantis, jellyfish,



sea anemones, and starfish.



NUTRITION

- Some invertebrates eat plants and meat. They are **omnivores**.
e.g. Ants





RESPIRATION

- Invertebrates can present three types of respiration:
 - **with a kind of lung** (terrestrial snail only)
 - **with gills** (some which live in water)
 - **through the skin**, (worms)
 - **tracheal system**, (arthropods)
- Terrestrial snails are the only ones that have a kind of lung.

Tracheal system

- Insect's **trachea** is a **network** of **tiny tubes** that go **throughout** the **insect's body** .
- These **tubes connect** each **cell** of the body to the **outside**, through **holes** in the **abdomen**.
- So, the **cells** get **oxygen directly** from the **outside air**.





REPRODUCTION

- The invertebrates present two types of reproduction:
 - **Sexual.**
 - **Asexual.**



Sexual reproduction

- **All of them are oviparous.**

They come from eggs, laid by their mothers.

- **Most of them are unisexual.**

They are males or females.

- **Some are hermaphrodite.**

Each animal has two sexes.

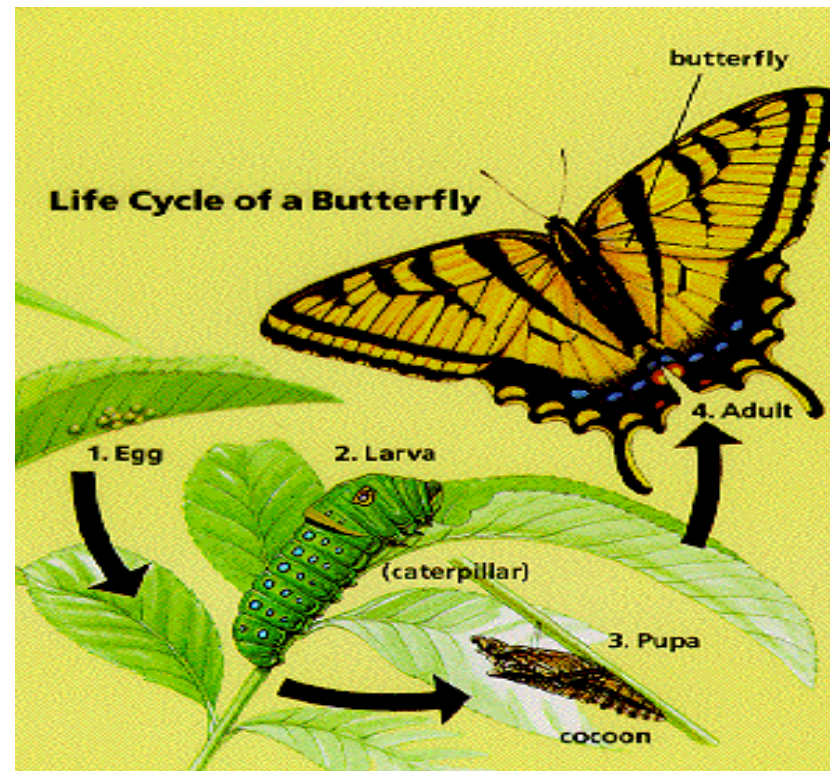


Development

- The **development** can be **direct** or **indirect**.
 - In a **direct development**, the **young** has the **form** of an **adult**.
e.g. squid.
 - In an **indirect development** the **young** **hasn't** the **form** of an **adult**.
It has a **metamorphosis** (change) .

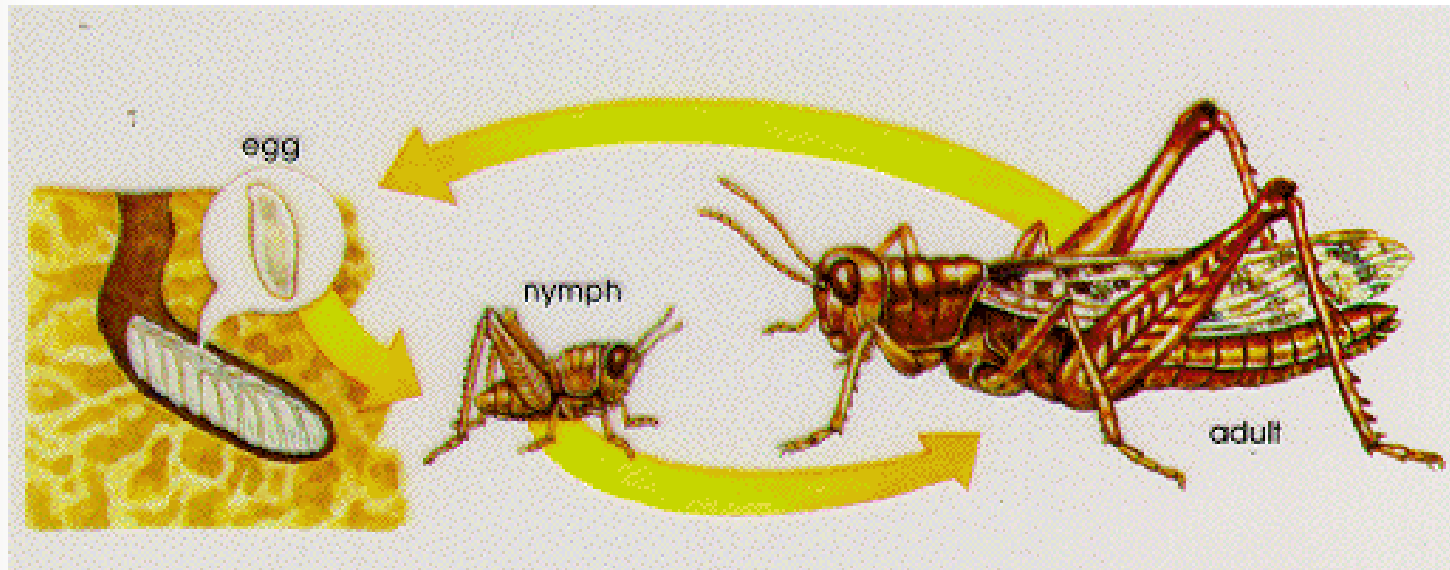
Metamorphosis

- Complete



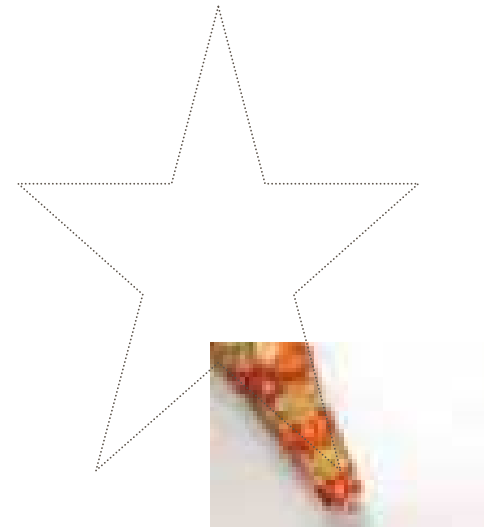
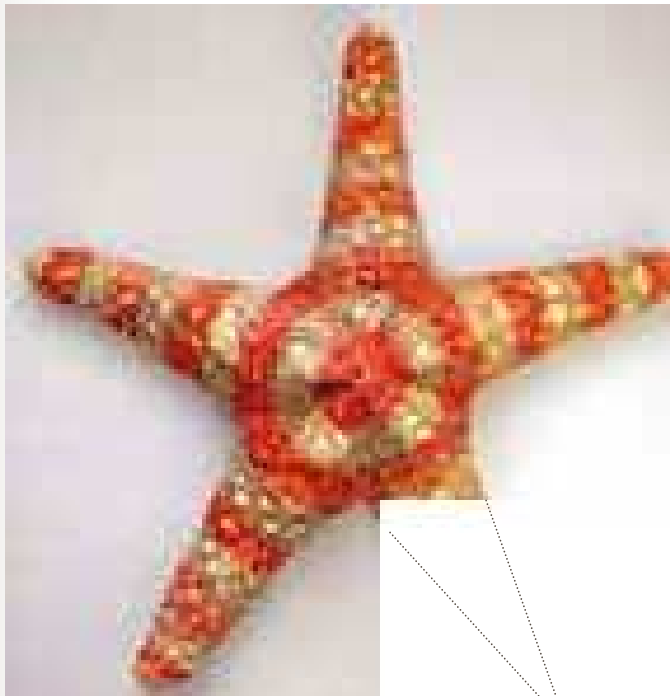
Metamorphosis

■ Incomplete



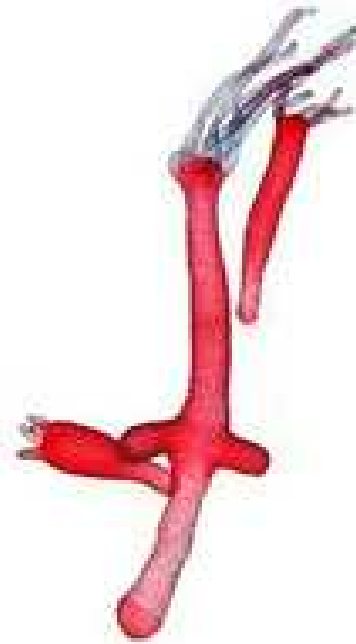
Asexual Reproduction

■ Fragmentation



Asexual Reproduction

- Budding



cnidarians



MOVEMENT

- Invertebrates move in different ways depending on which group they belong to and where they live.
 - Flying.
 - Hopping.
 - Walking.
 - Slithering
 - By expelling water from their bodies.
 - With a row of adhesive suckers.

SENSORY SYSTEMS

- Both **squid** and **octopus**:
 - have excellent **eyesight**.
 - Their **senses of touch, taste and smell** are **highly developed** and **can detect movement** up to about 30 meters away.

- **Snails** have 2 pairs of **tentacles**.
 - The longest ones with **eyes**.
 - The shortest with **sense of touch**.



SENSORY SYSTEMS

- Arthropods (insects, centipedes,...)

They have **eyesight**.

Their **antennae** are their sense of **smell**,
taste and **touch**.

