

Insects, their abundance and diversity

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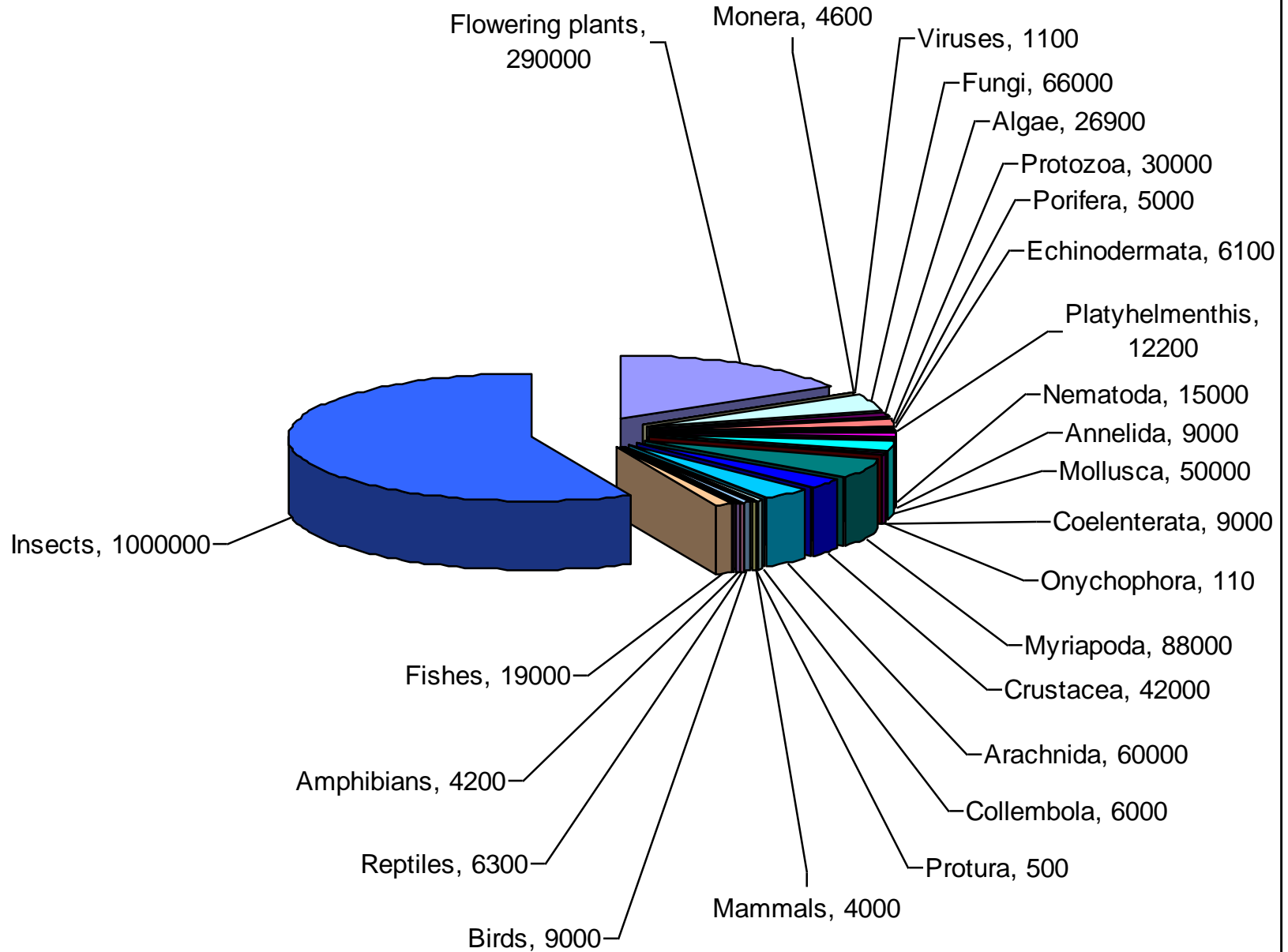
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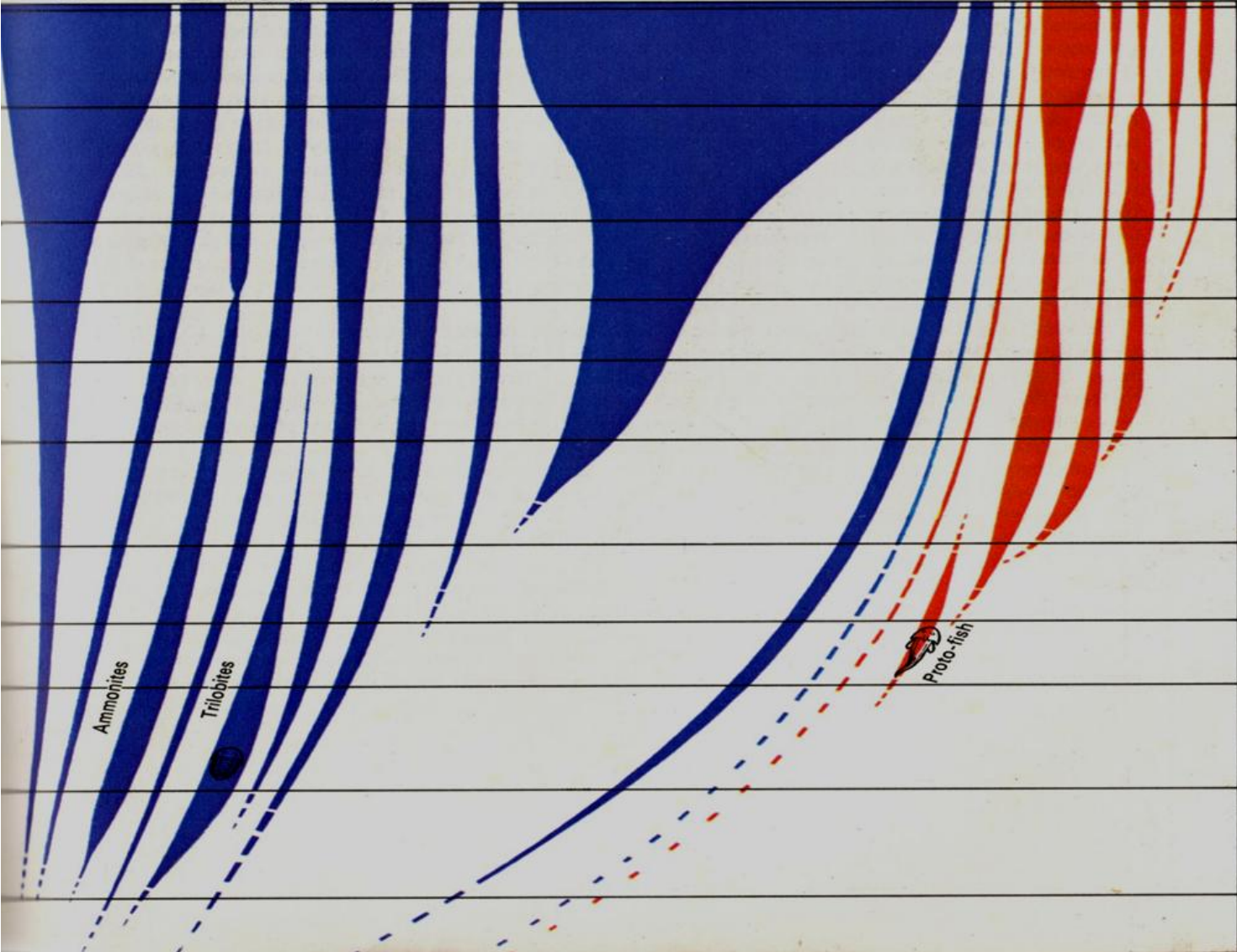
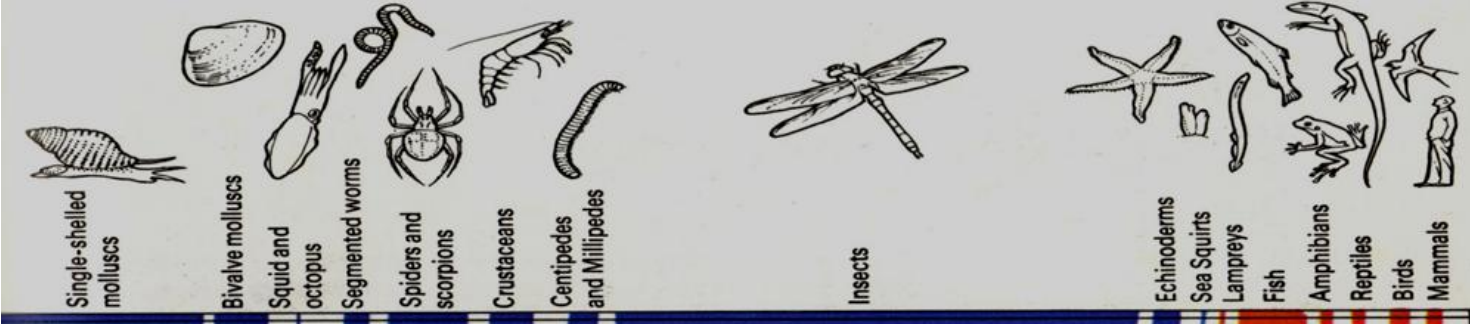
- Insects as a group are highly successful organisms.
 - (a) Their tremendous success relative to organisms other than human beings
 - (b) Their extreme importance from the human point of view.

Success on the universe

- ◎ One of the yard stick for their success is the number of extant species.
- ◎ Insects probably outnumber all the other species of animals and all the species of plants combined.
- ◎ It is believed that there are nearly 10 million species of insects existing on the earth and out of which we know only 1 million.
- ◎ The adaptability of the insects has been phenomenal. Insects can be found in nearly every conceivable terrestrial habit.

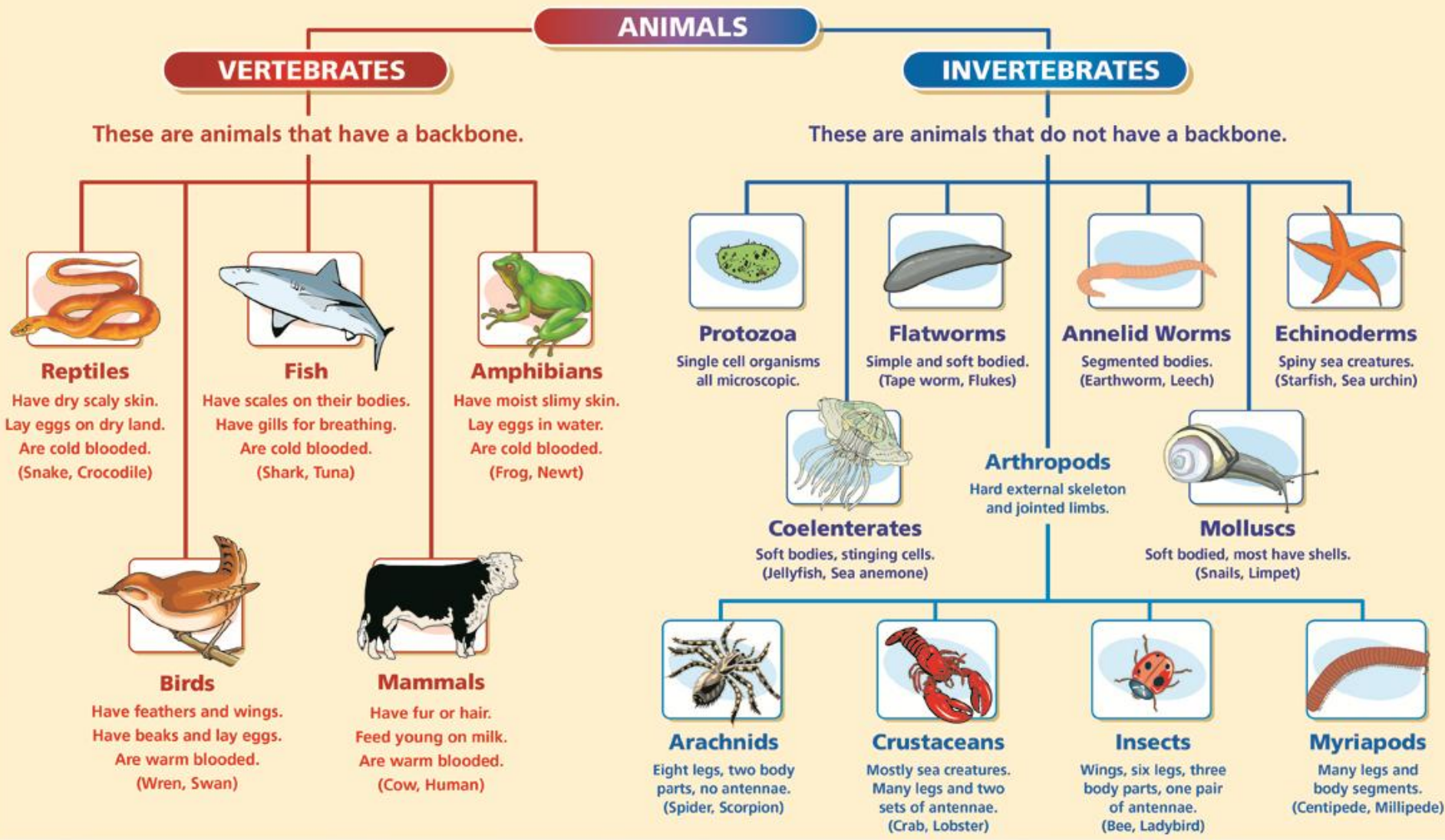
How many Insects ? Compared to other life forms





CLASSIFICATION OF ANIMALS

This is the grouping together of animals with similar characteristics. Animals can be classed as either vertebrates or invertebrates.



Darwin's Theory of 'Evolution by Natural Selection' has five basic premises which very well fits to insects.

1. Many more individuals are born in each generation than will survive and reproduce (**natality**)
2. There is variation among individuals; they are not identical in all their characteristics. (**variability**)
3. Individuals with certain characteristics have a better chance of surviving and reproducing than individuals with other characteristics (**survivorship**)
4. At least some of the characteristics resulting in differential reproduction are caused by have different genes. (**heritability**)
5. Enormous spans of time available for slow, gradual change. (**Time**)

REMEMBER: Insects, as a taxon, have long inhabited this planet!!!!

TIME EVENTS OF NOTE

- Earth 4.5 billion years old
- *Precambrian*: 3.1 billion, single celled organisms, bacteria *et alia* assorted prokaryotes
- *Cambrian* :600 mya (million years ago), 1st period of abundant fossils (metazoans)
- *Silurian* :425 mya, invasion of land by arthropods
- *Devonian* :405 mya, first true insects
- *Carboniferous* :345 mya, first great radiation of insects
- *Cretaceous* :135 mya, second great radiation of insects
- *Tertiary* :63 mya, dominance of the land by mammals, birds, & insects
- *Quaternary* :2 mya, first *Homo* sp.

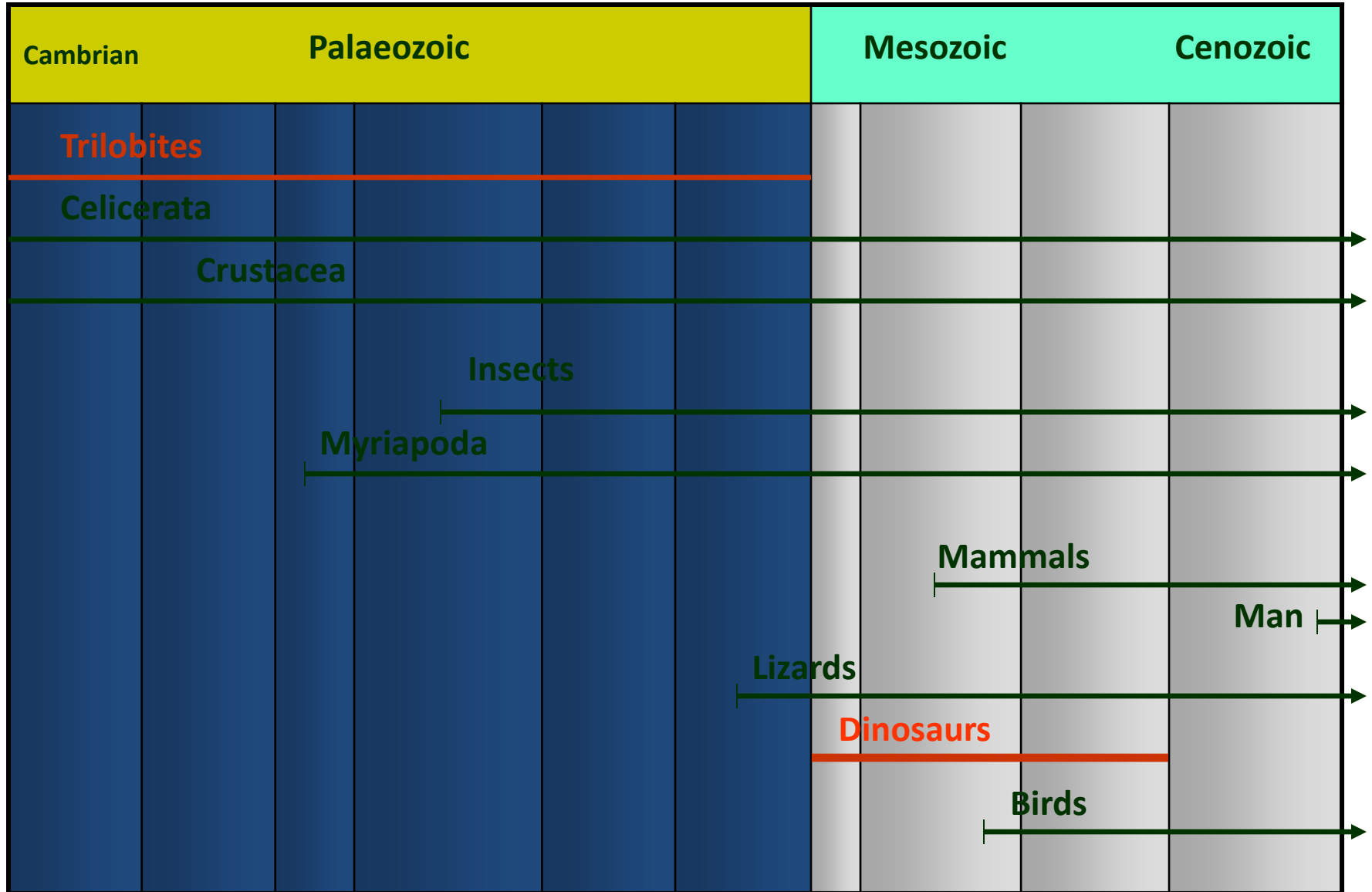
544 mya

345 mya

248 mya

65 mya

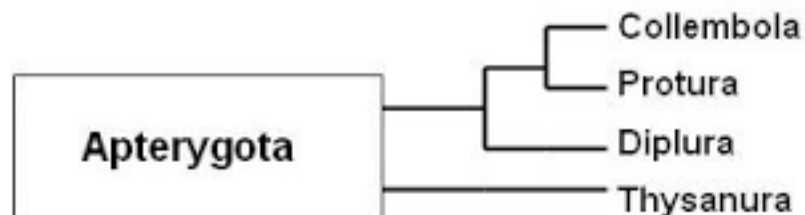
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mya : Million Years Ago

INSECT MACROEVOLUTION – THE DEFINING EVENTS

- 1) Appearance of primitive, wingless insects!!! The **APTERYGOTES** (Devonian Period: ca. 400 million years ago)



2) Development of Wings!!! The **PTERYGOTES**
(Late Devonian to Lower Carboniferous Period: 350 million years ago)



Primitive Winged Insects or **PALEOPTEROUS** insects with simple wing articulation - at rest held out from body (Odonata and Ephemeroptera)



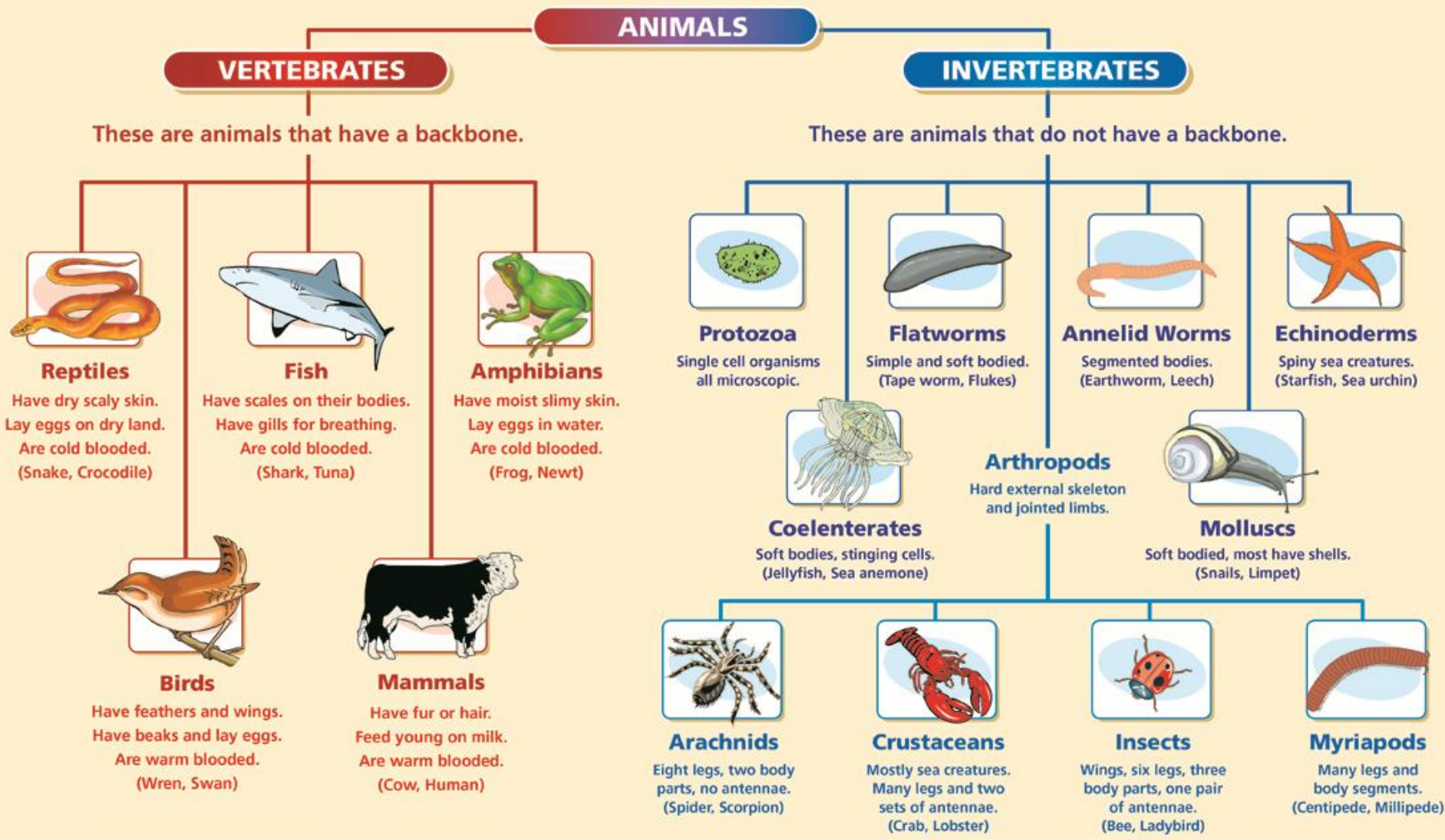
3) Development of the **WING-FLEXION** mechanism!!!! – Allows exploitation of terrestrial habitats (niches) and more efficient escape from predators. **NEOPTEROUS** – (Lower Carboniferous Period: 300 million years ago).

Today **NEOPTEROUS** insects comprise the majority of insect orders and 97% of species.



CLASSIFICATION OF ANIMALS

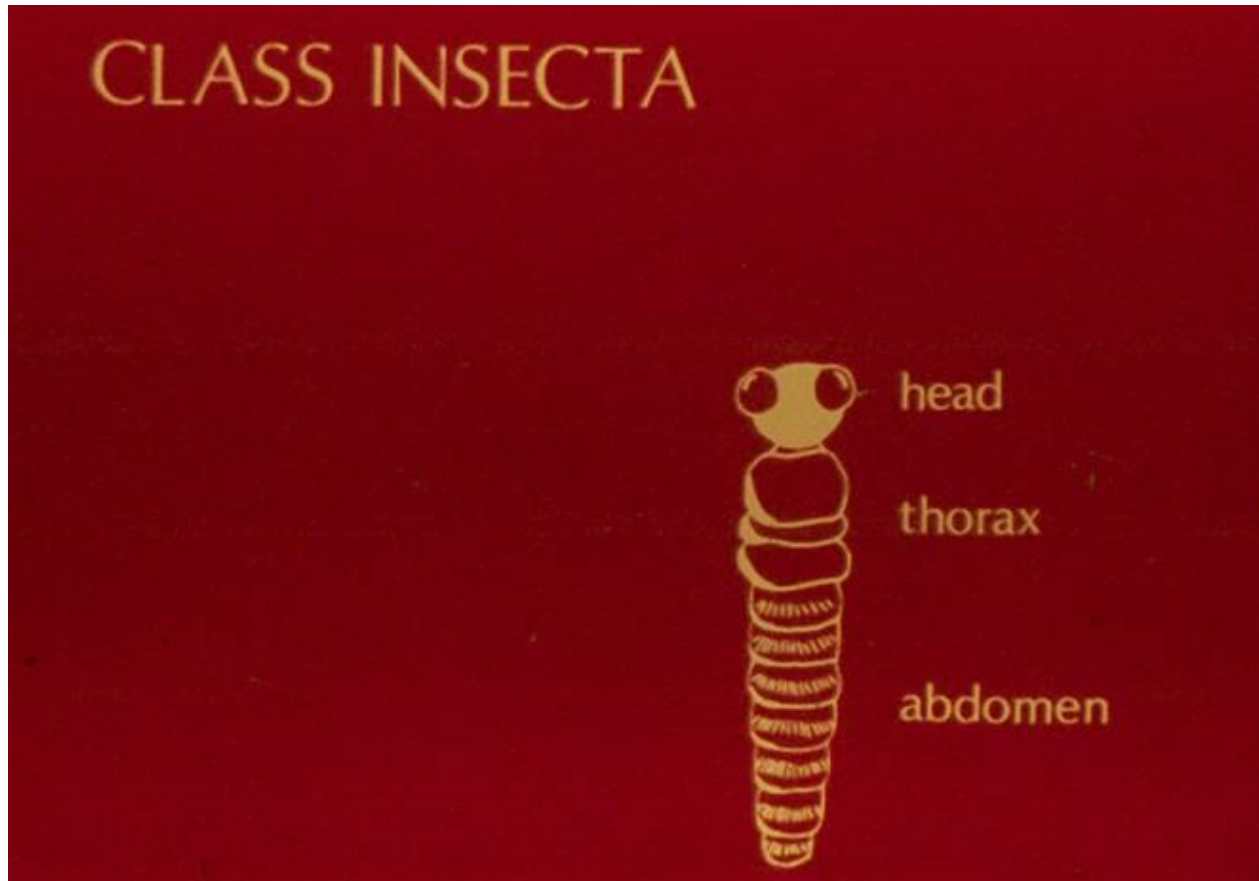
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Arthropods= Insects and their relatives

- arthro = Joint or segment; poda= legs
- Segmented body
- Paired, segmented appendages
- Bilateral symmetry
- A chitinous exoskeleton (periodically sheds)
- Open circulatory system
- Pseudocoelom

Hexapoda (= Insecta)



Body divided into three regions

Insect -characters



Three sets of legs

Insect -characters



One pair of antennae

Insect -characters



Wings