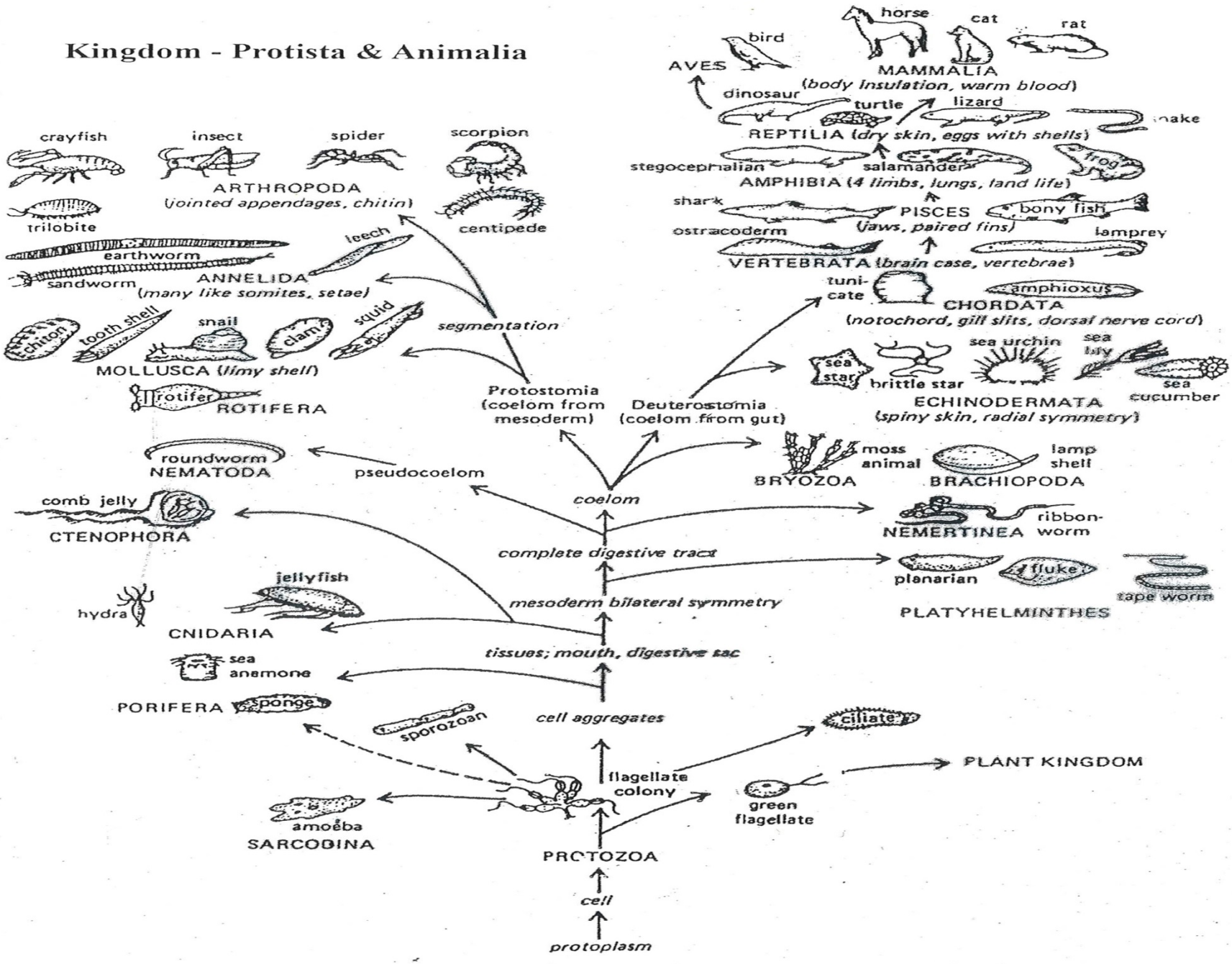
THE VIEWS OF LIFE


Kingdom - Protista & Animalia
horse
cat
rat
bird
AVES
MAMMALIA
(body insulation, warm blood)
dinosaur
turtle
lizard
snake
REPTILIA (dry skin, eggs with shells)
stegocephalian
salamander
frog
AMPHIBIA (4 limbs, lungs, land life)
shark
PISCES
bony fish
(jaws, paired fins)
ostracoderm
lamprey
VERTEBRATA (brain case, vertebrae)
crayfish
insect
spider
scorpion
ARTHROPODA
(jointed appendages, chitin)
trilobite
centipede
earthworm
leech
ANNELIDA
(many like somites, setae)
sandworm
tuni-
cate
amphioxus
CHORDATA
(notochord, gill slits, dorsal nerve cord)
chiton
tooth shell
snail
clam
squid
segmentation
MOLLUSCA (limy shell)
sea
star
sea urchin
brittle star
sea
lily
sea
cucumber
ECHINODERMATA
(spiny skin, radial symmetry)
rotifer
ROTIFERA
Protostomia
(coelom from
mesoderm)
Deuterostomia
(coelom from gut)
roundworm
NEMATODA
pseudocoelom
moss
animal
BRYOZOA
lamp
shell
BRACHIOPODA
comb jelly
CTENOPHORA
coelom
ribbon-
worm
NEMERTINEA
complete digestive tract
planarian
fluke
tape worm
PLATYHELMINTHES
jellyfish
hydra
CNIDARIA
mesoderm bilateral symmetry
tissues; mouth, digestive sac
sea
anemone
PORIFERA
sponge
cell aggregates
sporozoan
ciliate
flagellate
colony
PLANT KINGDOM
green
flagellate
amoeba
SARCODINA
PROTOZOA
cell
protoplasm

THE VIEWS OF LIFE

- **What is life?**

To biologists, life reflects its ancient molecular origins and its degree of organization.

Life is :

- **1. A way of capturing and using energy and materials.**
- **2. A way of sensing and responding to specific changes in the environment.**
- **3. A capacity to reproduce, grow and develop.**
- **4. Capable of evolving**

COMMON ELEMENTS OF LIFE

1. Organization
2. Exchange of materials and energy
3. Self regulation and control
4. Reproduction
5. Evolutionary change
6. Responsiveness and behavior
7. Geographical limits
8. History of life

ORGANIZATION

*__Earth-__ an organization of matter in space is **home** ,for the population of **organisms**.

*__Organizations of living things-__ Forests , coral reefs, polar ice caps & the urban and rural areas

*aggregates of the matter & processes – call **environment**

*

*__Each__ - living –itself a highly organized entity

*__An organism-__ a single bacterium or alga or a cat or human (may consist of great many cells)

*__Each__ - an __organization__ of materials &__function__ (__own survival__)

*__A feature__ - all living things- a pattern of integration (multiple level of organization)

*__cell__ – lowest level of organization (life can exist)

*__tissue__ - cell may be part of a higher organization

*__An organ__ - a brain or a liver (a whole made up of many tissues

*__An organ system-__a __more complex level__ of organization, existing & interacting in a community of other organs.

*__the individual animals-__ have __increasingly higher level of organization__

cells >> tissues >> organs >> organ systems >>

organisms >> populations >> communities >>

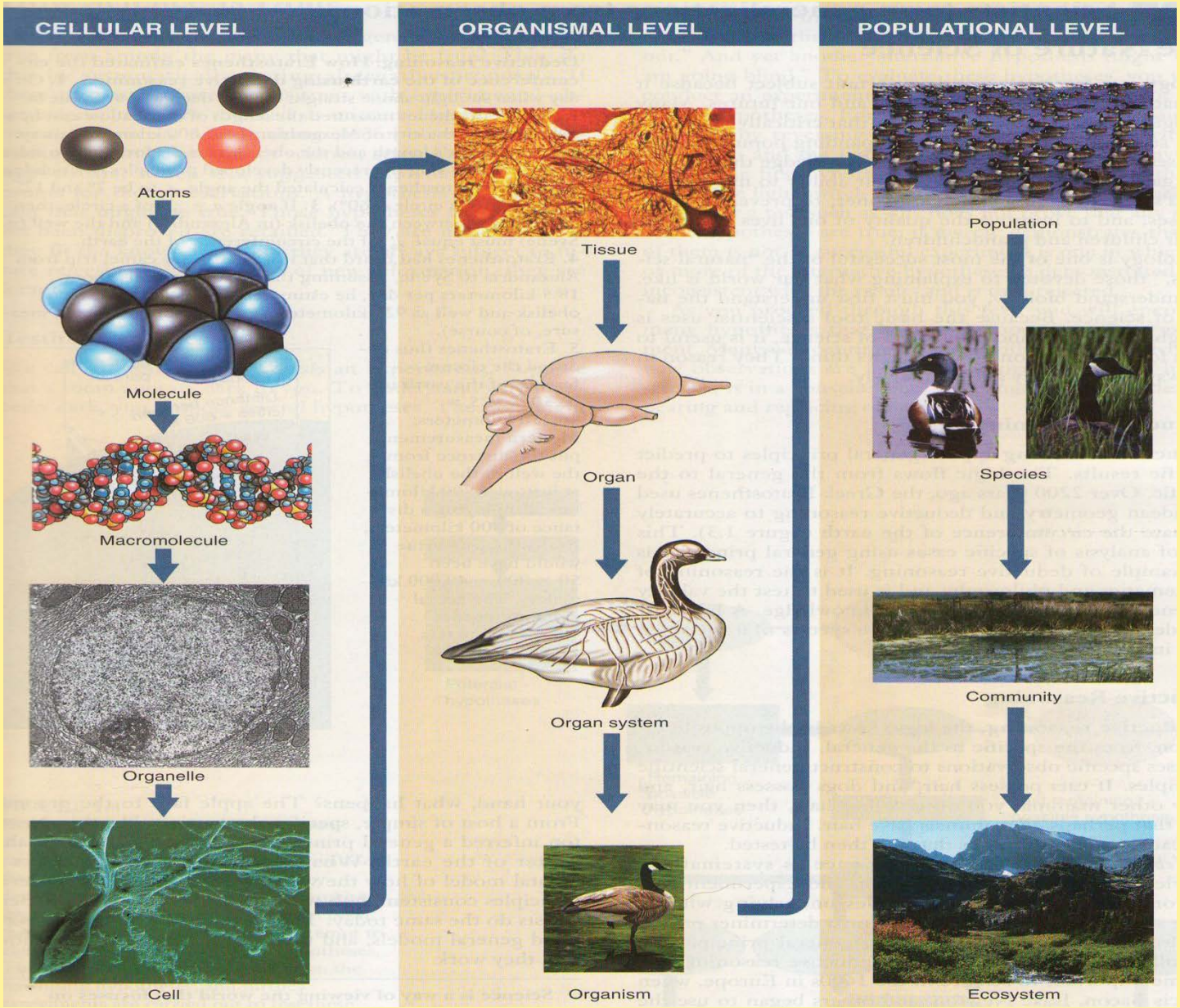
ecosystems >> biosphere

* Animals **interact** with other animals & plants
not with organs or cells.

Increasingly higher level of organization

- **Organisms**
- **Organ systems**
- **Organs**
- **Tissues**
- **Cells**

organization of living things



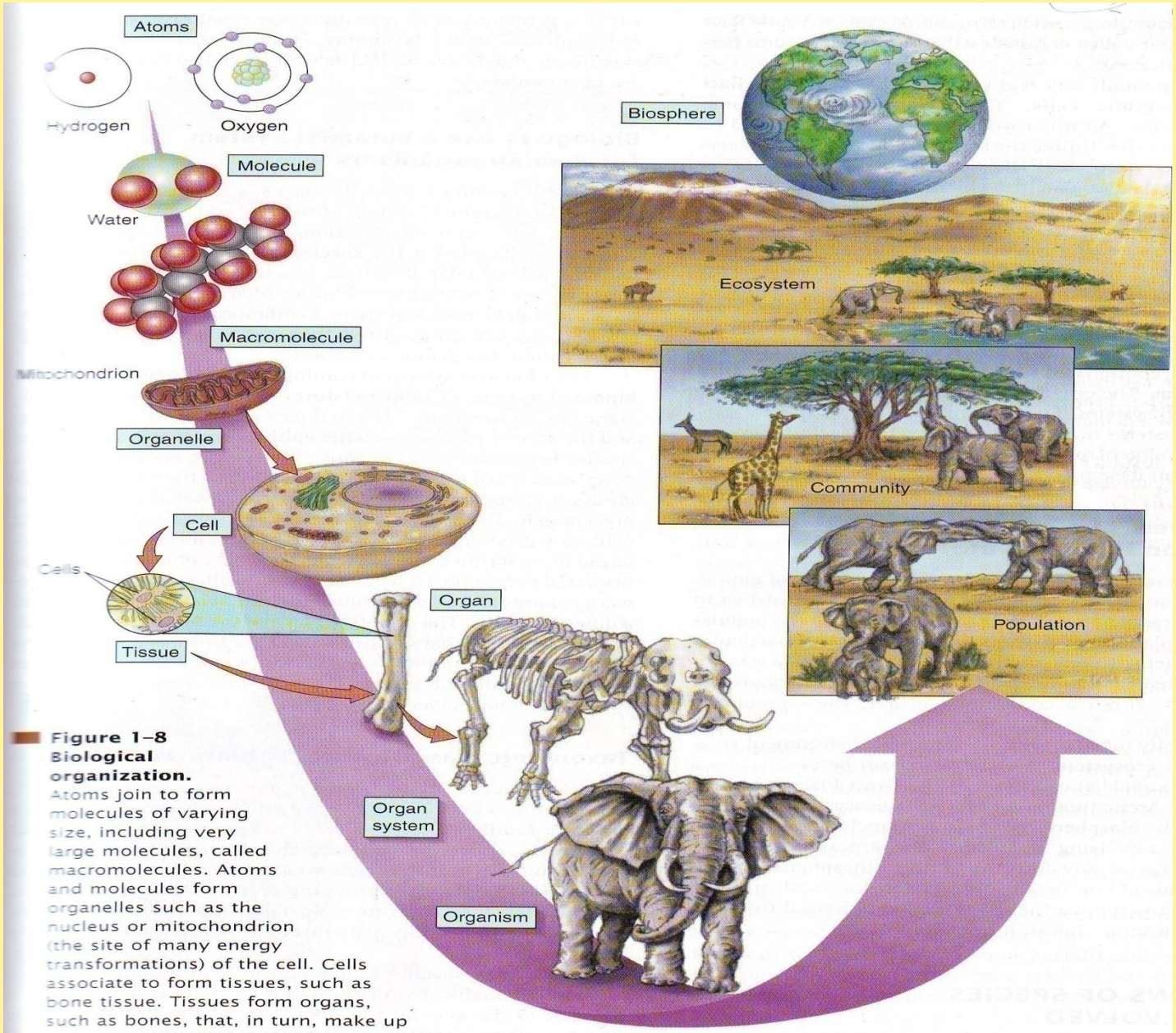
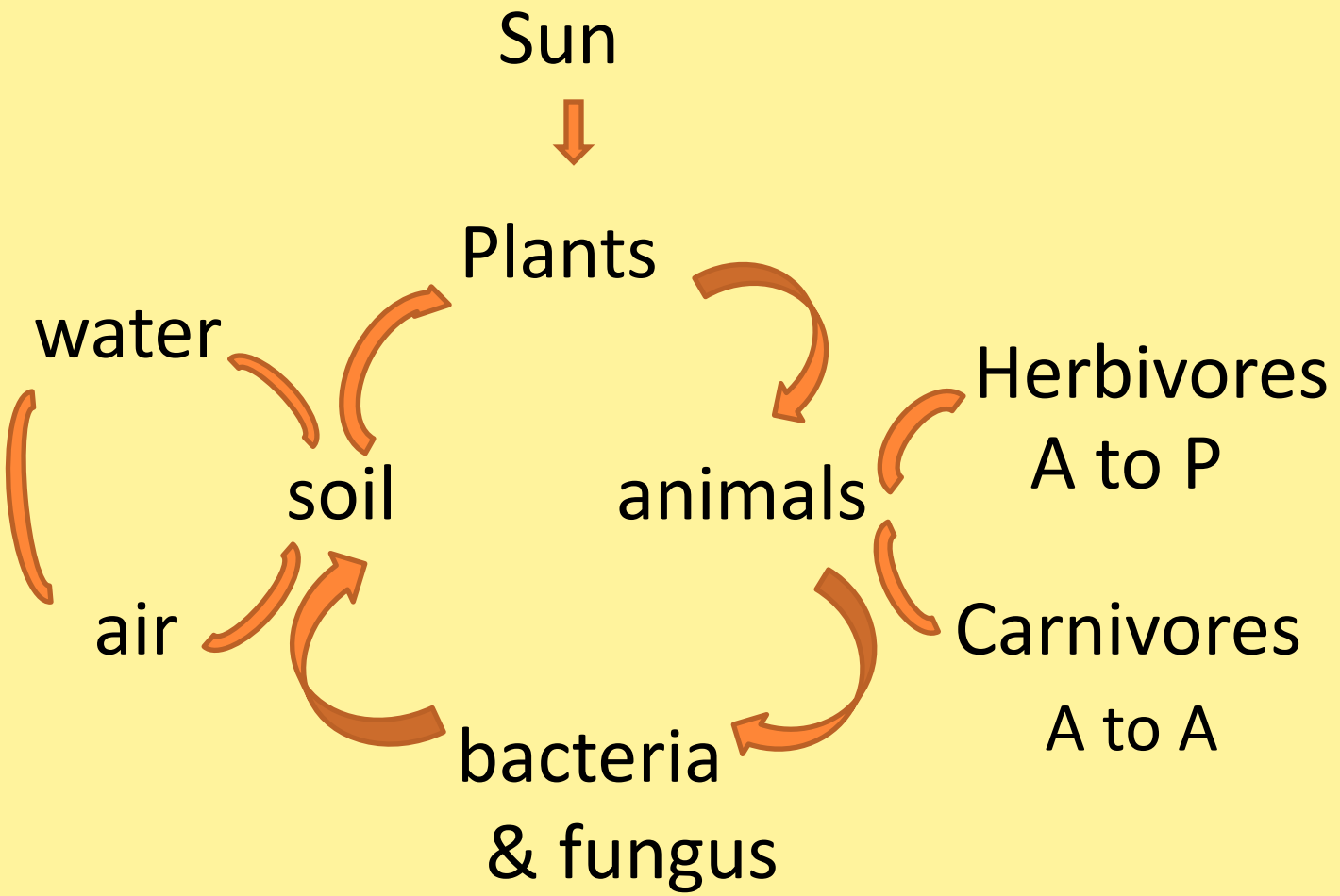
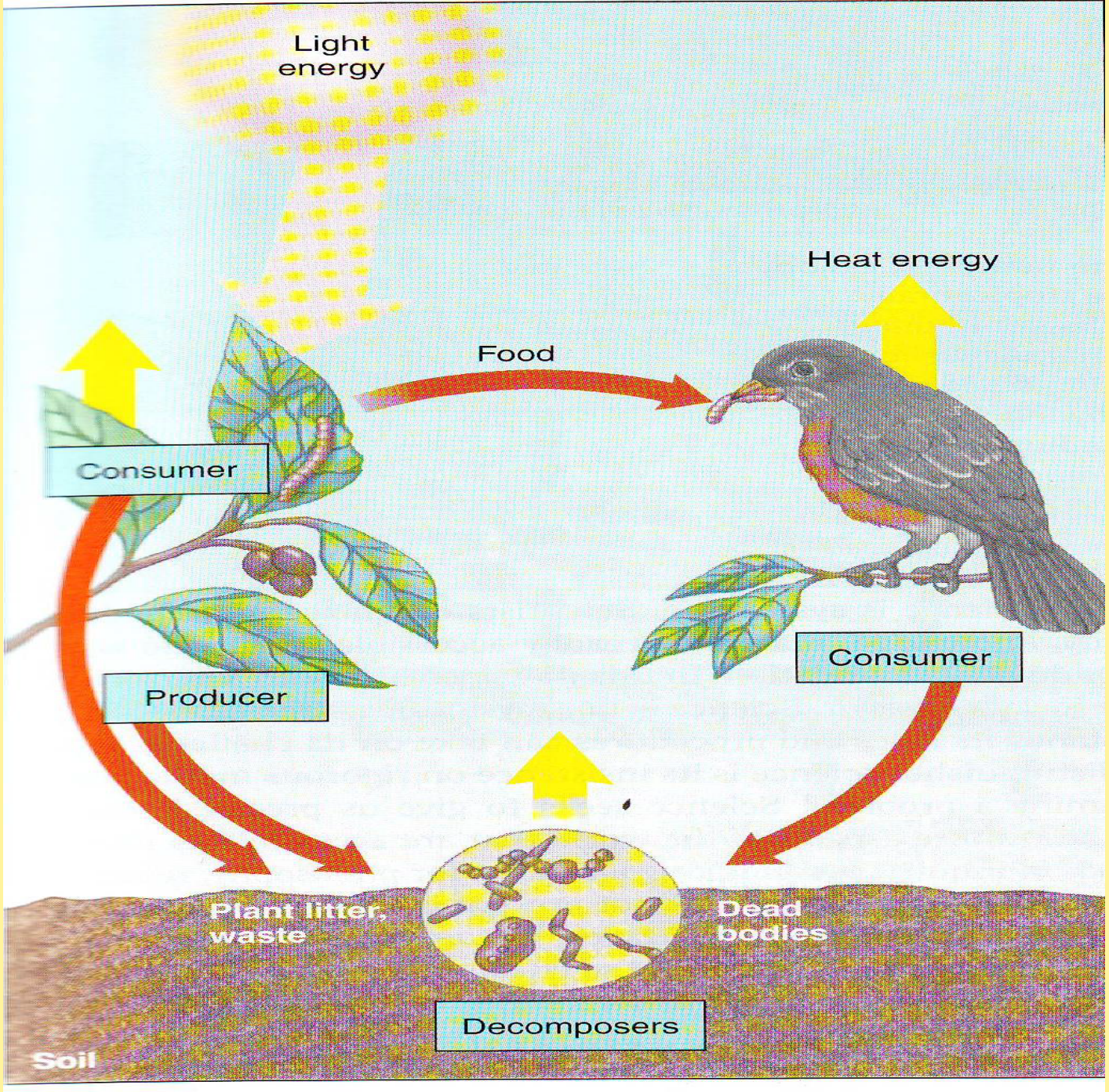


Figure 1–8 Biological organization. Atoms join to form molecules of varying size, including very large molecules, called macromolecules. Atoms and molecules form organelles such as the nucleus or mitochondrion (the site of many energy transformations) of the cell. Cells associate to form tissues, such as bone tissue. Tissues form organs, such as bones, that, in turn, make up organ systems. The skeletal system and other organ systems work together to make up the functioning organism. A population is composed of organisms of the same species. The populations of different species that inhabit a particular area make up a community, which together with the nonliving environment, form an ecosystem. Earth and all its communities make up the biosphere.

Exchange of materials and energy




Light energy
Heat energy
Food
Consumer
Producer
Consumer
Plant litter, waste
Dead bodies
Decomposers
Soil

EXCHANGE OF MATERIALS AND ENERGY

*a **constant flow** of matter on earth

from soil, water, and air **to** plant
from plant **to** animal,
from animal **to** animal,
from dead plant and animal **to** bacterium and fungus,

and

back again to soil , water and air.

Each step of the process **traps** or **liberates** chemical energy.

Such **exchange** of **materials** and their **content** of **chemical energy** are termed **metabolism**.

Metabolism **refers to** cell's capacity to **extract** and **convert energy** from its **surroundings**

and use energy **to maintain itself**, **grow** and **reproduce**.

- **Energy** is the **capicity to do work**.
- Nothing lives without energy.
- With minor exceptions,all energy organisms come from the sun.

- **Every organisms performs work and needs energy**.
- **A hawk** works when its **flies**.
- Its also **uses energy** when it is **still**.
- **Energy** is not only to achieve **organization** but also to **maintain** itself.

- **Organisms must spend energy** or become **disorganized** and **disorganization** leads **inevitably to death**.

SELF REGULATION AND CONTROL

- Maintenance of order is only by self regulation and control.
- These are capacities of the **organismic level of integration**,
- **the first** to possess machinery sufficient to resist the encroachment of a hostile environment.

- That **machinery** operates in a number of ways.
- 1. An **organism exposed** to **cold generate heat**

  in **metabolism** by **breaking down glucose**

  and other energy containing molecules.

- **Depletion** of stored **fuels induces hunger** and stimulates **food seeking** behavior and **eating**, which in **term restocks the fuel supply**.

- 2. Invasion by foreign matter is resisted.
- **Bacteria are ingested** and **destroy** by highly **efficient blood-borne** cells or they are **inactivated** by **chemical substance** produces by the organism to destroy foreign materials.

- 3. **External physical danger** is **thwarted** by

  voluntary movement like **flight**, or by

  involuntary recoil reflexes , **or fight** by use

  of a whole **repertory** of **weapons**,including

electric shock, poisonous chemicals, thorns, teeth, claws, stench and vocal sounds.

4. **Damage** to the body of a **multicellular organism or** to **one** of **its cell is repaired.**

In sum every factors, however subtle, that can disturb the **organism**, whenever **unicellular** or **multicellular** , is **resisted** by **systems** that are activated by the stimulus.

- **Homeostasis** is the **maintenance** of **internal environment**

REPRODUCTION

- All living things produce **near copies** of **themselves**.

- **Each** organism **arises** through **reproduction** in which **DNA instructions** are **transmitted from** parent **to** offspring.

- **DNA** also **guides** development of a fertilized eggs into a **multicellular organism**.

- These **individuals** have **traits** that might better **enable** them to **survive** and **reproduce** in a **changed environment**.

The **reproductive process** is **unchange** that its **explain** how whole **communities** of **organisms** can **persist virtually unchanged** for many **thousands** of **years**.

Reproduction-responsible for the **existence** of **species**.

All individual **organisms dies** ,the **species** is **sustained** by **reproduction**.

Reproduction –another role beyond the **replacement** of **lost individuals**.

- Evolution depends on the occasional production of individuals with potentially useful variations

- unusual traits that might better enable the individual to **survive** and **reproduce** in a **changed environment**.

EVOLUTIONARY CHANGE

- **Evolutionary change** means **changes** that occur over long periods of time in **populations** of organisms.

- Every part of **Earth's surface undergone profound changes** enormous **time span**, and **changes** is **still taking place**.

- **Against** this immense **background** of **terrestrial** and **environmental changes**, living organisms have **come**, **changed** and **gone**.

- **Two** important evolutionary **principles** are **adaption** of organisms and **diversification** of **organisms**.

- **Every** kind of **organism** is **adapted** to **survive** and **reproduce** in a particular **environment**.

- **Each species** in each **community** has **a way** of **life differing** in some respect from that of any **of its neighbours,**
  and each is **adapted** to its **own way of life**.

- **Diversity** is also **a product of evolution**.

- Evolution not only adapted each species to its own way of life,but also parcels out the ways of life among the different species.

RESPONSIVENESS AND BEHAVIOR

- **Responsiveness** means the many **ways organisms react to changes in their environment.**

- Generally **animals** can **move** and all have **evolved complex patterns of behavior**.

- **Behavior** means the **ways organisms act**.

- It is not enough to say that organism **takes** in **matter** and **generates energy**.

- A complete description of an animal ’s life would also have to point out that is **move**, **start** and **stops**, **hunts,communicates,mates** and in one case **reads** and **writes**.

- **Behavior patterns** are **explainable** only at the **level of the whole organism.**

- Consider a cat.

- A **detailed** study of its **metabolism,energy exchange,chemical composition,physical activity, temperature regulation, and**

heridity would yield **deep insides** into the cat's **inner working**.

- **One goal** of behavioral research is a **better understanding of human behavior.**

- Notable **similarities** exist **between human** beings and **other animals**.

GEOGRAPHICAL LIMITS

- **Organisms vary geographically.**

- **No** two places on earth's surface are **identical**, and **geoeraphical differences**.

- **Different species of plants and animals live on different parts** of the **world**.

- The **differences** relate to each **species' own needs** and to **local differences** in the **environment**.

- The **geography of life** does **not depend** only on its **relationships** with the **environment**,

it also **depends** on **evolutionary history**

especially those factors that have **promoted** or **impeded** the spread of species across the **Earth**.

HISTORY OF LIFE

- **Evolution** is the history to **explain life's variety**.

- It is the **actual sequences** of **events** that **have occurred** in the time since **life began**.

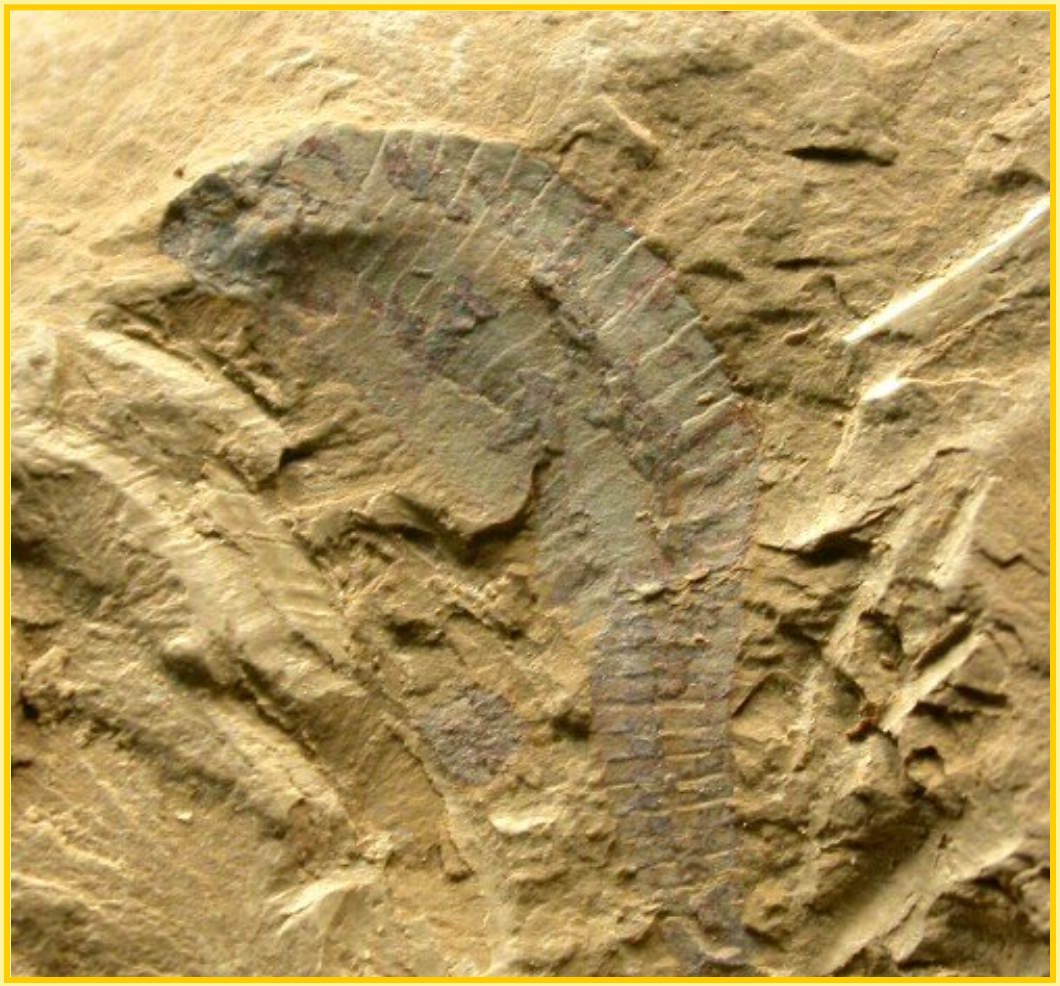
- **Fossils**, which are the **preserved remains** or **traces** of **early organisms**, have provided the **most helpful clues to this history**



Trilobite
(Arthropod)



Trilobite



Early Hemichordate



Early Arthropod