


Phanerozoic - Paleozoic

Phanerozoic – Paleozoic era




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Geological time scale and building height
(1 floor – 60Ma, 72 floors, 12 feet/floor)

- **Major Era**
 - **Phanerozoic**
 - Cenozoic (65 Ma to present time, 72nd floor)
 - Mesozoic (245-65 Ma, 65th to 71st)
 - **Paleozoic (550-245 Ma, 63th to 65th)**
 - Proterozoic (2,500 – 550 Ma)
 - Archaean (3,800 – 2,500 Ma)
 - Hadean (4,500 – 3,800 Ma)



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Most striking is that the cambrian is a massive explosion of animal life in the oceans

Paleozoic periods

- **Paleozoic era**
 - **Cambrian 550-488 Ma**
 - **Ordovician 488-443 Ma**
 - Silurian 443-416 Ma
 - Devonian 416-359 Ma
 - Carboniferous 359-299 Ma
 - Permian 299-245 Ma

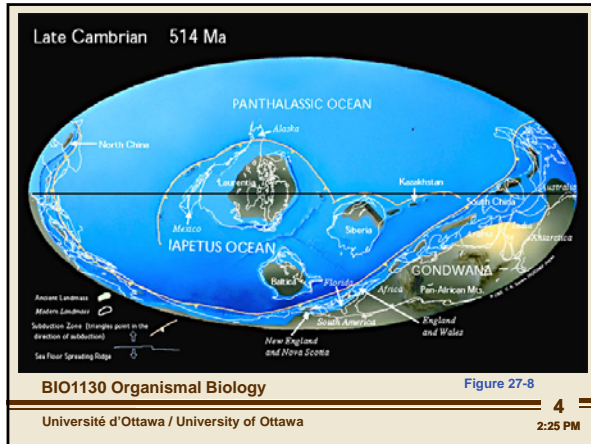


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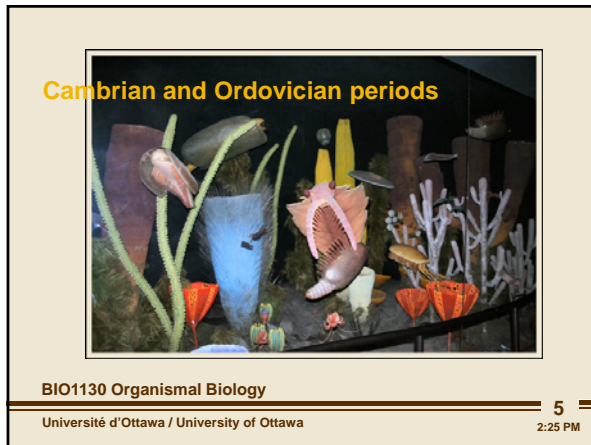
Phanerozoic - Paleozoic



zones of productivity, therefore biodeveristy

desrt zone and dry frozen arctics

very important event in shallow seas, multicellular explosion occurs, fossil record here the soft bodied things would slide off by mudslide and no oxygen therefore no fissilation, and then more sediment on top, so there was a complete sampling of this fauna



very very unusual fauna in these shales/deposits



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The Cambrian explosion



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Burgess shales and its unusual invertebrates



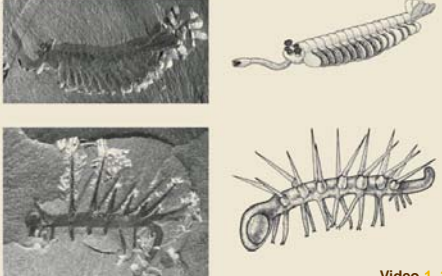
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something happened that created diverse body plans, 31 of them, and all occur here

Burgess shales and its unusual invertebrates



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Video 1, 2

first look of extremely large org. incl. predators

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Colonial choanocyte ancestor

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1 Animalia
(Autapomorphies)

- Multicellular eukaryotes
- Ingestive heterotrophs
- Cells with different functions
- Choanocytes
- Collagen

Porifera
Placozoa
Cnidaria
Ctenophora
Platyhelminthes
Gastrotricha
Gnathostomulida
Cycliophora
Rotifera
Annelida
Mollusca
Sipuncula
Nemertea
Brachiopoda
Phoronida
Bryozoa
Arthropoda
Tardigrada
Onychophora
Nematomorphs
Nematoda
Priapulida
Kinorhyncha
Loricifera
Echinodermata
Hemichordata
Chordata

reproductive ceels cant be the different function
and we need different functions

all animals use collagen as adhesion

green means we track them

Animal architecture

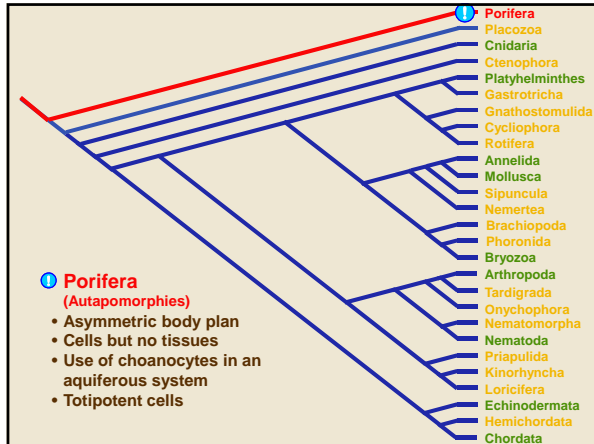
- **Tissues**
 - None, diploblastic, or triploblastic
- **Symmetry and cephalization**
 - Asymmetry, radial, and bilateral symmetry
- **Embryology**
 - Protostome and deuterostome
- **Body cavities**
 - Coelomate, pseudocoelomate, acoelomate

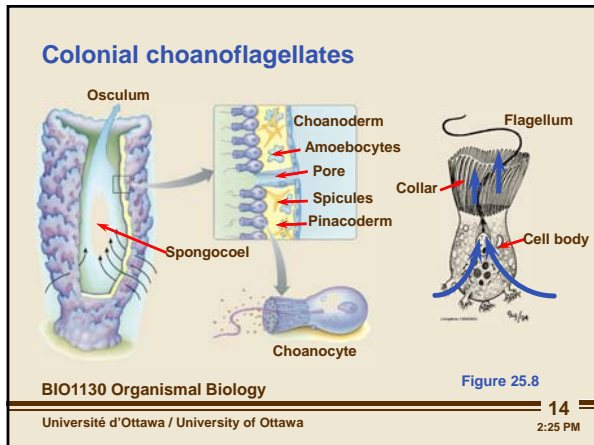
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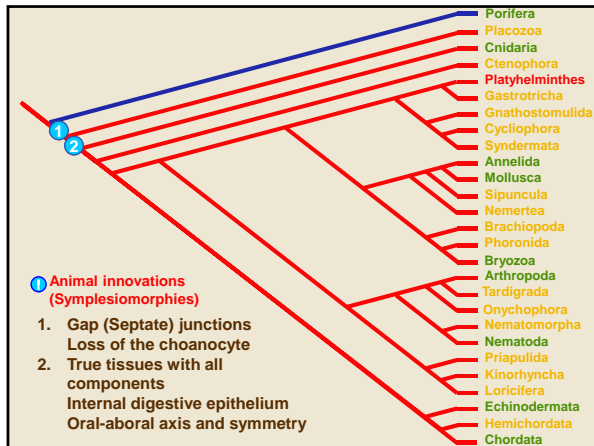


pumps water all life,
~~choanocytes layer that beat with flagellum and propels~~
 water out of sponge. then comes in walls
~~this current is trapping food, fagocytosis too make food~~
 division of labor, the outer body wall is not epithelium so we call it
 derm, pinacoderm.
 this cell cant feed and so fourth cell wanders around and it transports,
 it passes food vacual to all cells, and it moves around

spicules hold it up and gives it shape and are made up of protein or
silica or minerals, and that is the skelloton we use as sponge
 this is one of the first body plants and they are good at it and still
 around today



Phanerozoic - Paleozoic



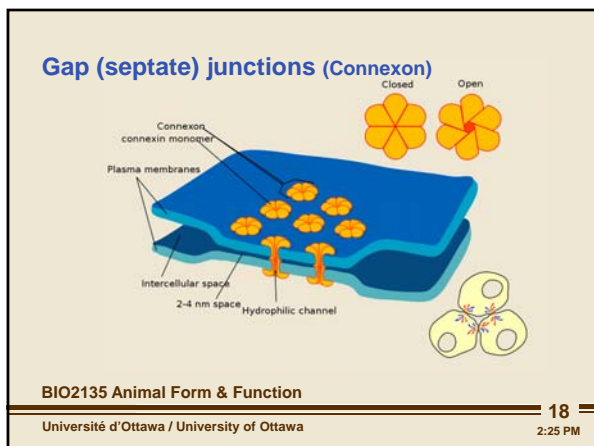
Animal architecture

- **Tissues**
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location where adjacent cells can communicate with an opening who can open and close and when open there cytoplasm continuity and we can send electrical potentials and chemical signals

add basement membrane and all cells sit on that

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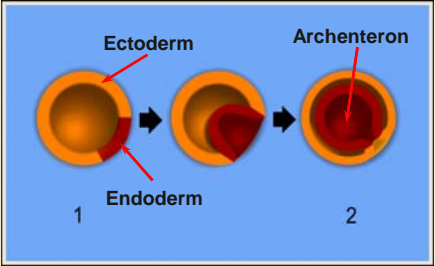
Animal architecture: Tissues

- No tissues
- Diploblastic germ layers
 - Ectoderm and endoderm
- Triploblastic germ layers
 - Ectoderm, mesoderm and endoderm



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Gastrulation - digestive epithelium



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blastula is center cavity,

outer and inner epithelium added this is the gut, or digestive system

the one opening is the archenteron or early mouth

Animal architecture Symmetry and cephalization

- Assymetric
- Radial symmetry
- Bilateral symmetry and cephalization

must have mouth therefore digestive track


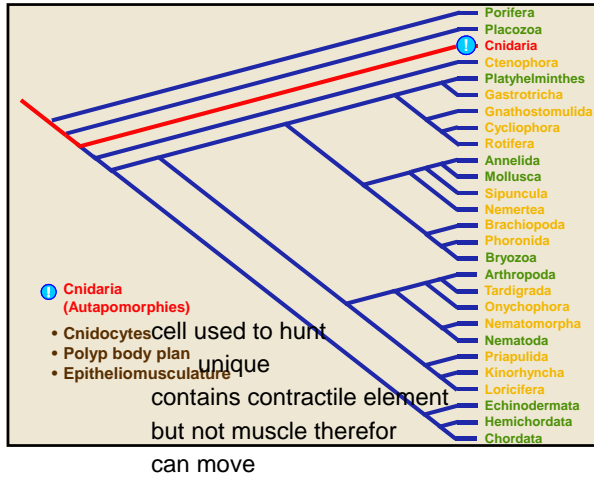
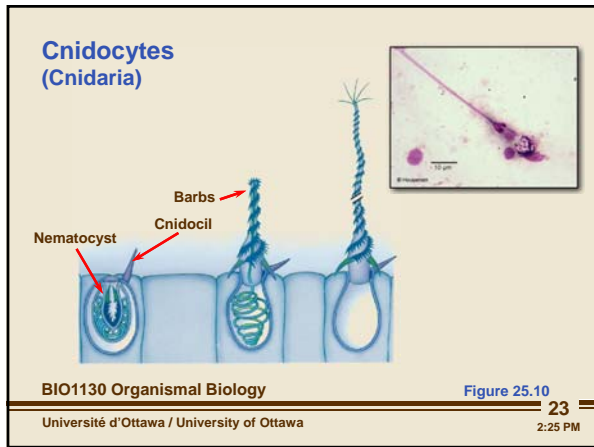


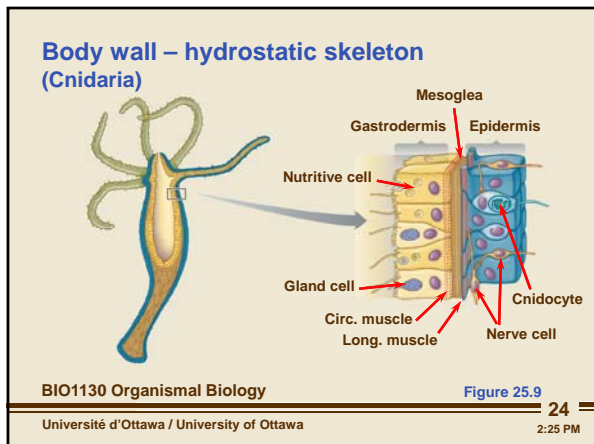
Figure 25.3 21 2:25 PM

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it is organel system
pressurized spring by coiling harnesses energy over time, and if something tweaks the cnidocil it shoot out with enough speed then the barbs penetrate the body wall of the pray and anchor so basically it has secured the pray with this, plus there would be poisons on these

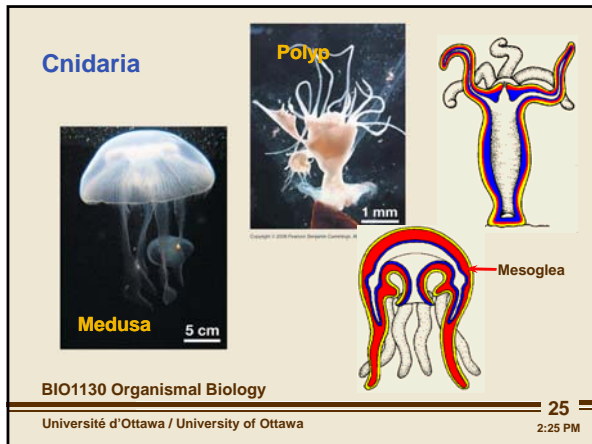


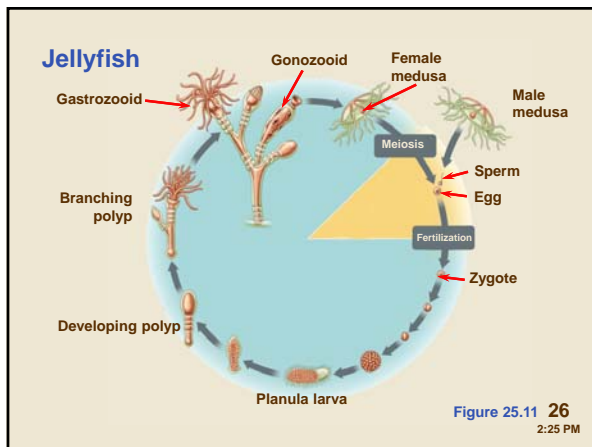
when actin has myosin fibres crawl along it, how do we get it back to the original length? we stretch it back therefore a skeleton provides the mechanical force to be able to return muscle back to the original length

in cavity we have lining of endoderm which also has serious of muscle strands in each cell, so we have the opposite muscle regions, both horizontal and vertical. these can alter the shape of the organism lengthen and shorten, when we stretch each way you push the opposite muscles back to the original.

this has smothing missing, no anus!!! oh no, therefore its a gastrola without mysoderm

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may predate cambrian

exten up and grab onto zooplankton

Phanerozoic - Paleozoic

Coral reefs

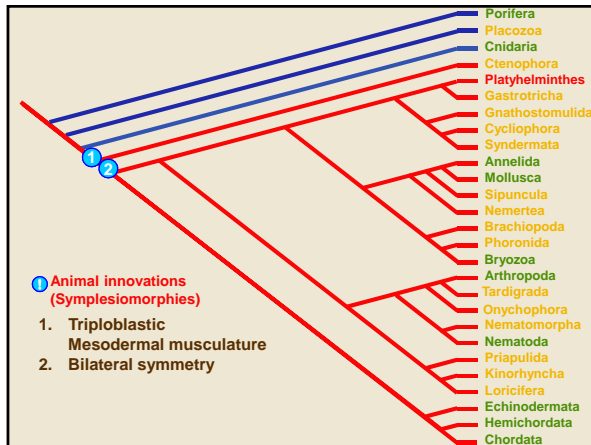
Polyp
Skelton

Figure 25.13

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Animal architecture

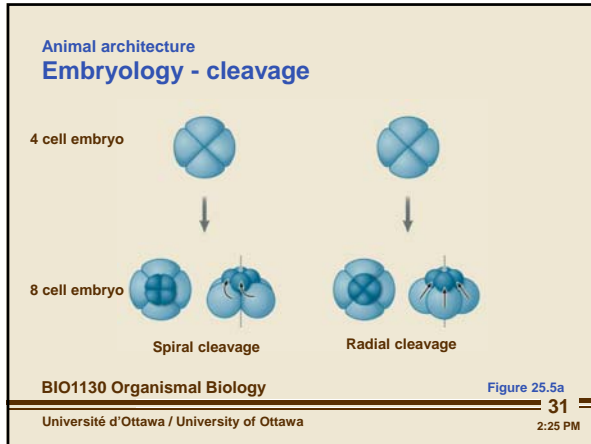
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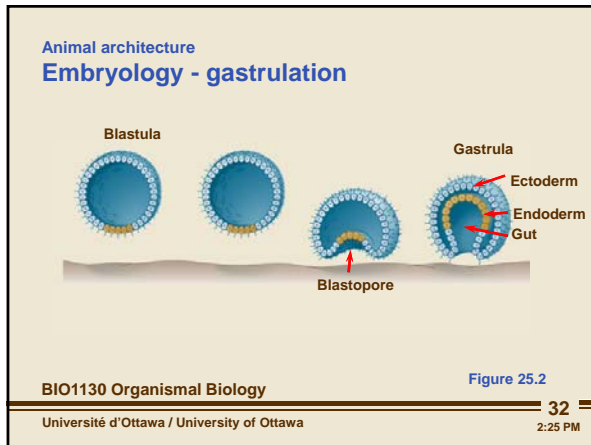
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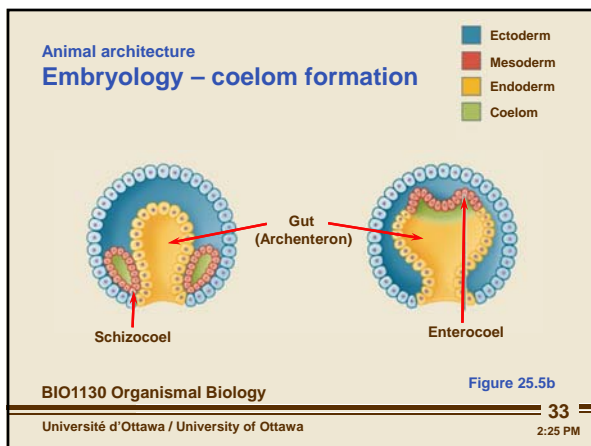
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Phanerozoic - Paleozoic







Phanerozoic - Paleozoic

Protostomes vs deuterostomes

- **Protostomes**
 - Blastopore mouth
 - Spiral cleavage
 - Schizocoely
- **Deuterostomes**
 - Blastopore anus
 - Radial cleavage
 - Enterocoely

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Animal architecture
Body cavities

- **Acoelomate**
- **Pseudocoelomate**
- **Coelomate**

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Animal architecture
Body cavities - Acoelomate

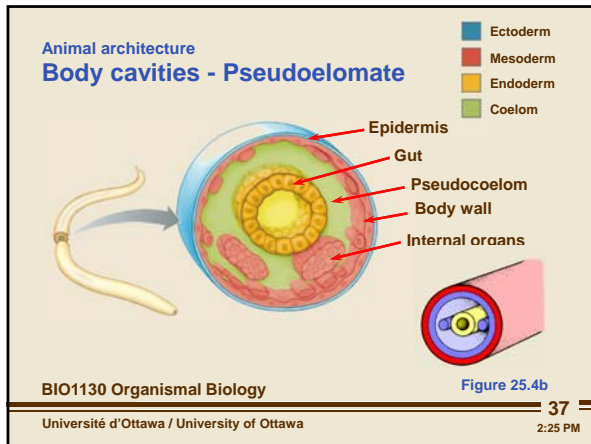
Legend:
■ Ectoderm (blue)
■ Mesoderm (red)
■ Endoderm (yellow)
■ Coelom (green)

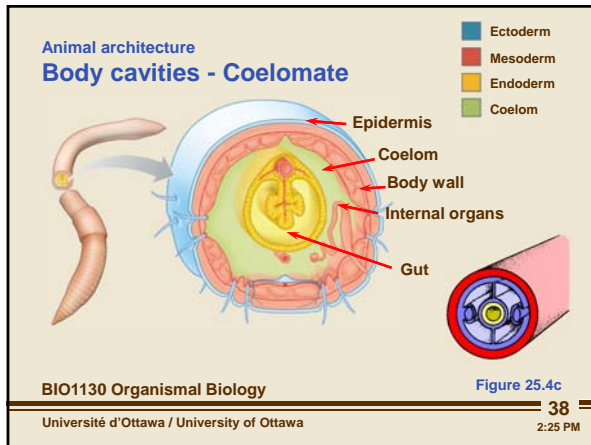
Labels:
Epidermis
Gut
Internal organs
Body wall

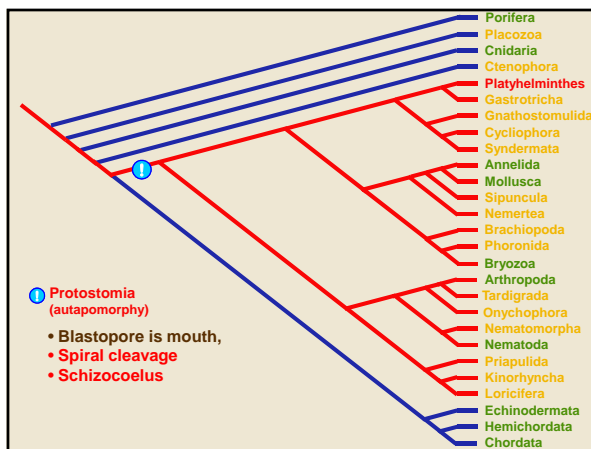
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Figure 25.4a

Phanerozoic - Paleozoic







Phanerozoic - Paleozoic

Animal architecture

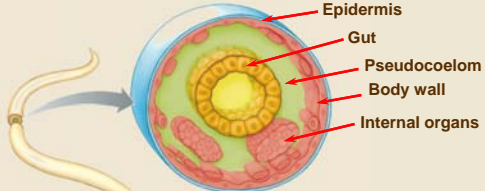
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- **Body cavities**
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Animal architecture
Body cavities - Pseudoelomate

- Ectoderm
- Mesoderm
- Endoderm
- Coelom

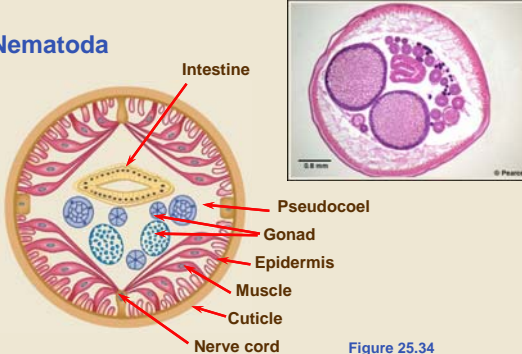


Epidermis
Gut
Pseudocoelom
Body wall
Internal organs

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Nematoda

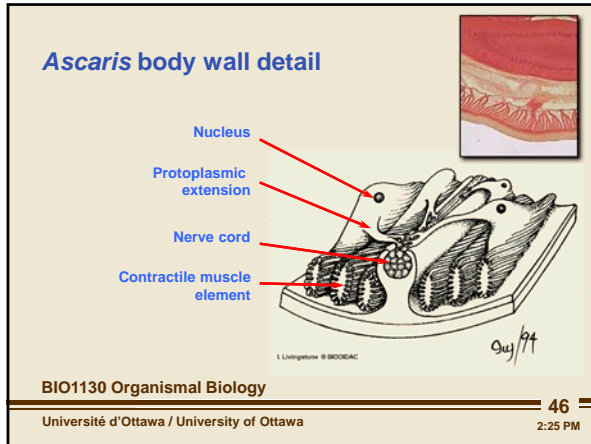


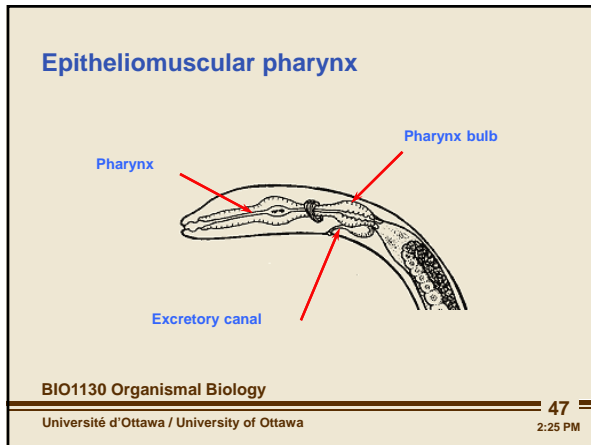
Intestine
Pseudocoel
Gonad
Epidermis
Muscle
Cuticle
Nerve cord

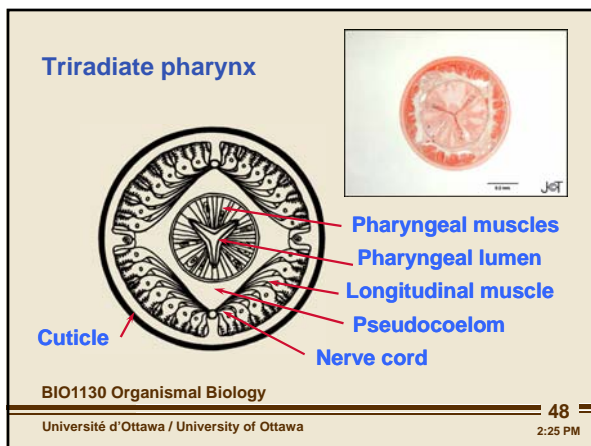
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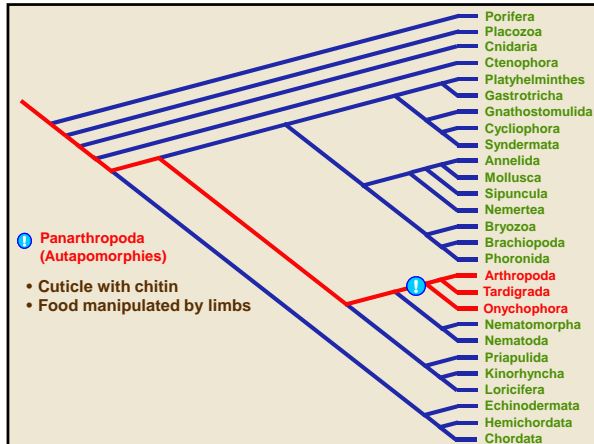
Phanerozoic - Paleozoic

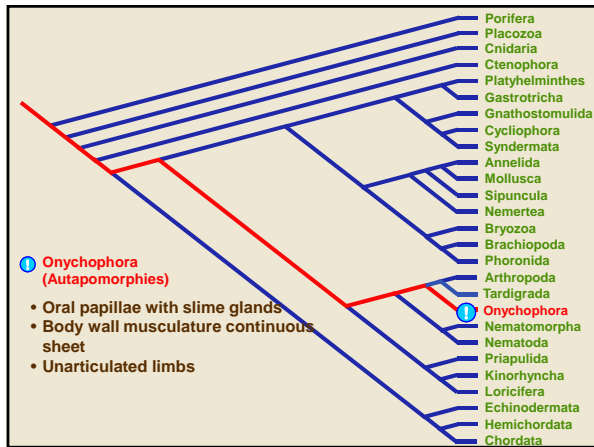






Phanerozoic - Paleozoic





Onychophora

BIO3334 Invertebrate Zoology

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Phanerozoic - Paleozoic

Onychophora
Ecdysozoa

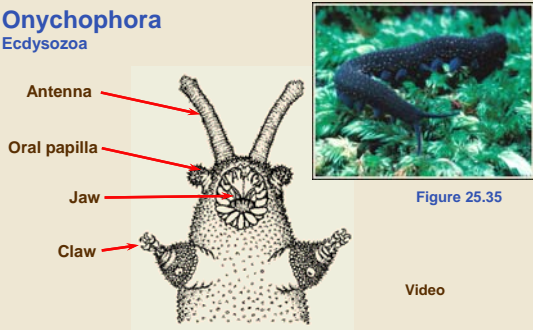


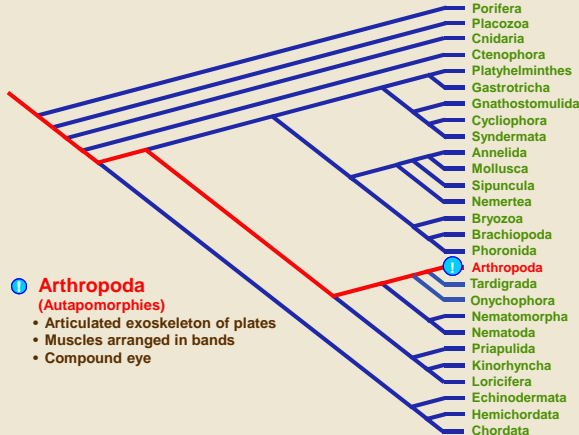
Figure 25.35

Video

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Porifera
 Placozoa
 Cnidaria
 Ctenophora
 Platyhelminthes
 Gastrotricha
 Gnathostomulida
 Cycliophora
 Syndermata
 Annelida
 Mollusca
 Sipuncula
 Nemertea
 Bryozoa
 Brachiopoda
 Phoronida
Arthropoda
 Tardigrada
 Onychophora
 Nematomorpha
 Nematoda
 Priapulida
 Kinorhyncha
 Loricifera
 Echinodermata
 Hemichordata
 Chordata

Arthropoda (Autapomorphies)

- Articulated exoskeleton of plates
- Muscles arranged in bands
- Compound eye

Arthropods: Trilobites
Ecdysozoa

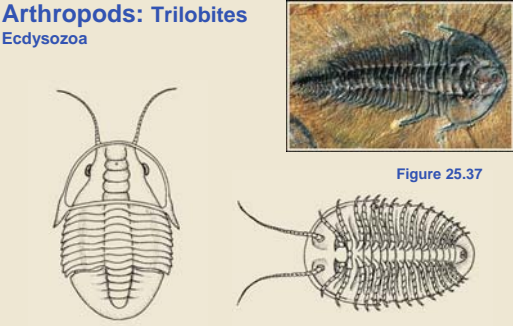


Figure 25.37

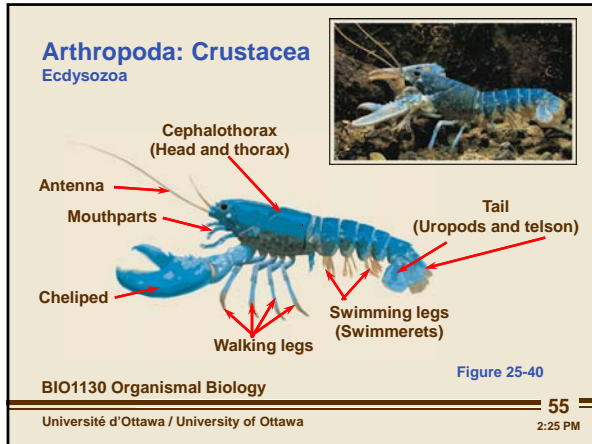
Video

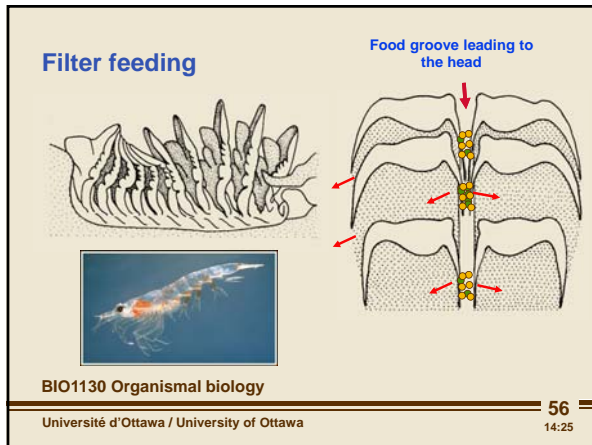
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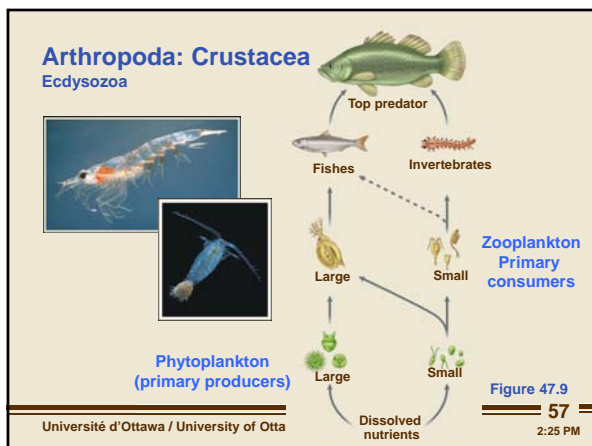
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Phanerozoic - Paleozoic

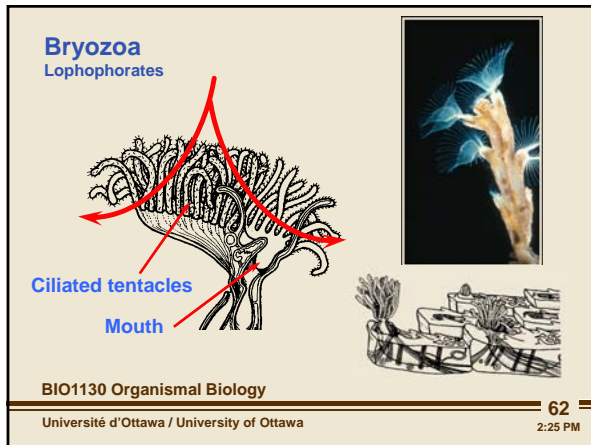


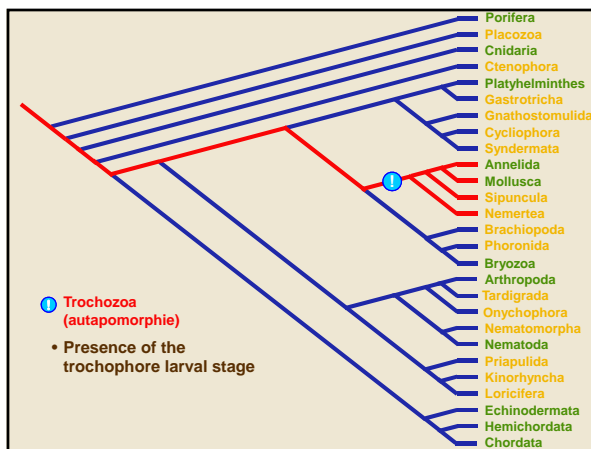




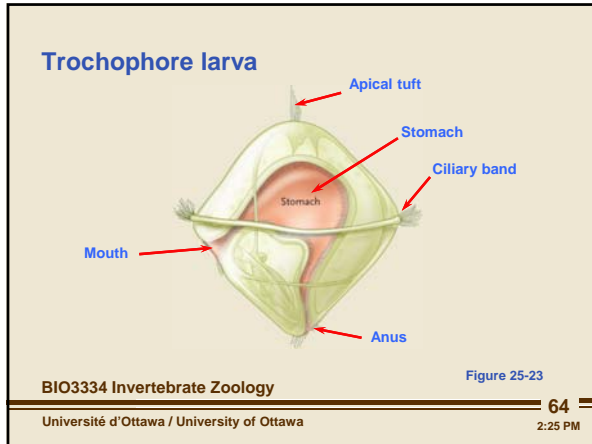
Phanerozoic - Paleozoic

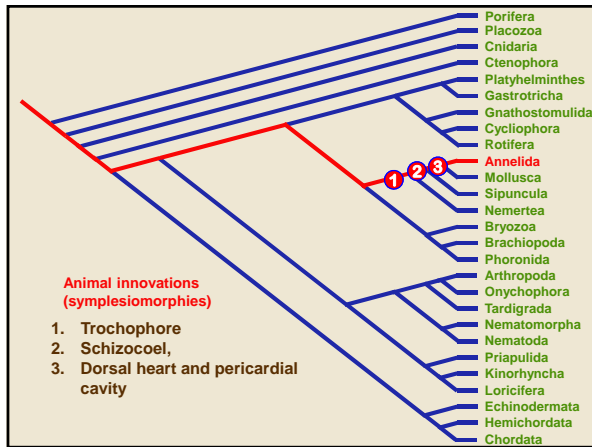






Phanerozoic - Paleozoic







Phanerozoic - Paleozoic

Mollusc traits

Stomach and digestive gland
Mantle and shell
Mantle cavity
Gill
Radula
Foot

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Mollusc radula

Radular teeth

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Snails (Gastropods)

Figure 25.22
Figure 25.25a
Figure 25.25b

Gill
Anus
Mantle
Digestive system
Mouth
Foot

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Phanerozoic - Paleozoic

Squids and octopods (Cephalopods)

Mouth
Mantle
Anus
Gill

Figure 25-22

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Ammonites

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Clams (Bivalves)

Anus
Gill
Mouth
Digestive system
Foot
Mantle

Figure 25-27

Figure 25-27

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Phanerozoic - Paleozoic

Three main protostome groups

- Ecdysozoa
- Lophotrochozoa
 - Lophophore or -
 - Trochophore
- Platyzoa


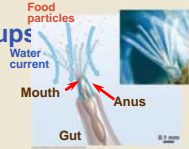


Figure 33-5

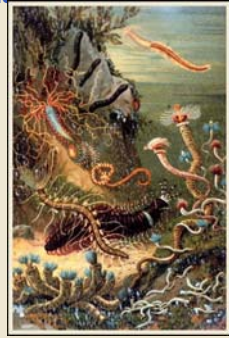


Figure 25-23

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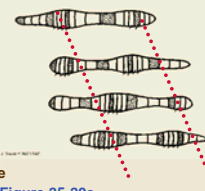
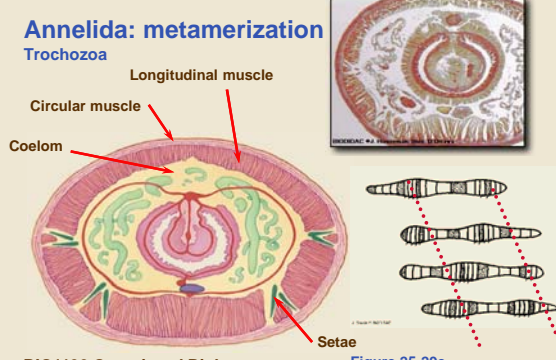
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Annelida: marine worms
Trochozoa



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Annelida: metamerization
Trochozoa



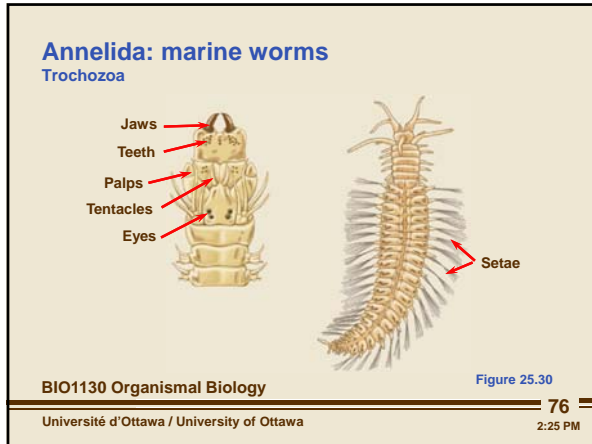
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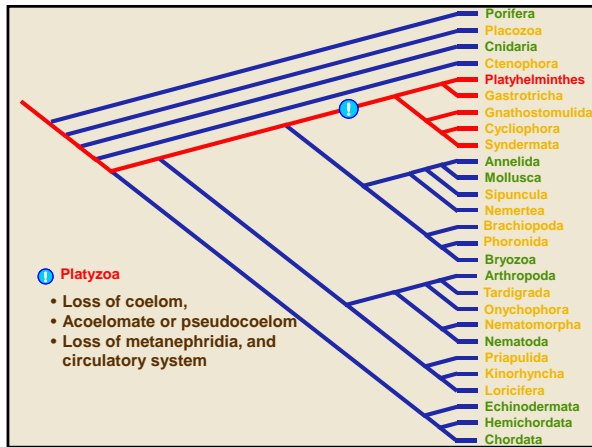
Figure 25-29e

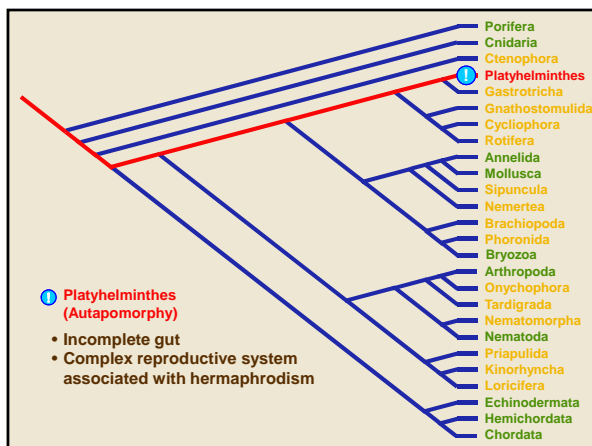
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Phanerozoic - Paleozoic







Phanerozoic - Paleozoic

Animal architecture
Body cavities - Acoelomate

- Ectoderm
- Mesoderm
- Endoderm
- Coelom

Epidermis
Gut
Internal organs
Body wall

BIO1130 Organismal Biology Figure 25.4a

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Flat worms
(Platyhelminthes)

Digestive system
Pharynx
Mouth

BIO1130 Organismal Biology Figure 25.16

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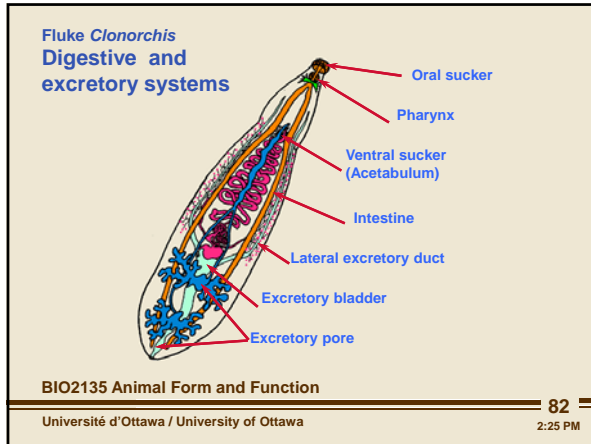
Flat worms
(Platyhelminthes)

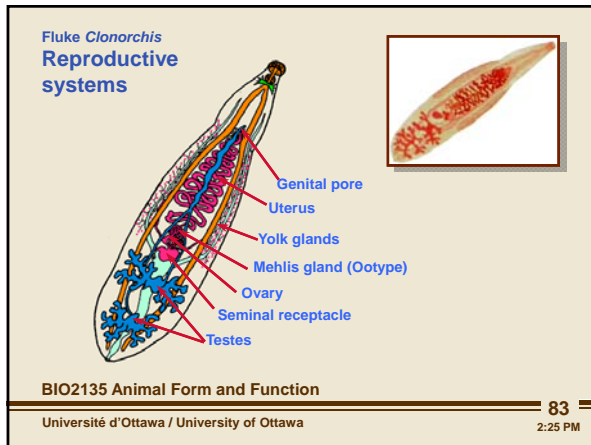
Ovary
Yolk glands
Oviduct
Seminal receptacle
Genital pore
Testis
Sperm duct
Seminal vesicle
Penis

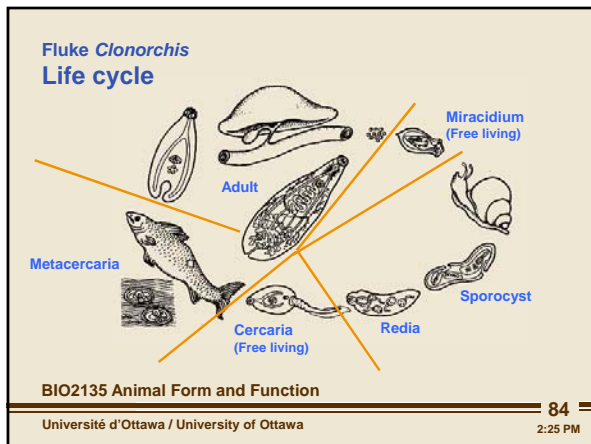
BIO1130 Organismal Biology Figure 25.16

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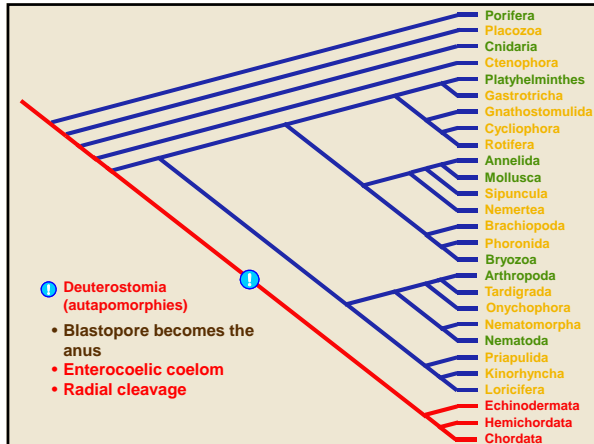
Phanerozoic - Paleozoic

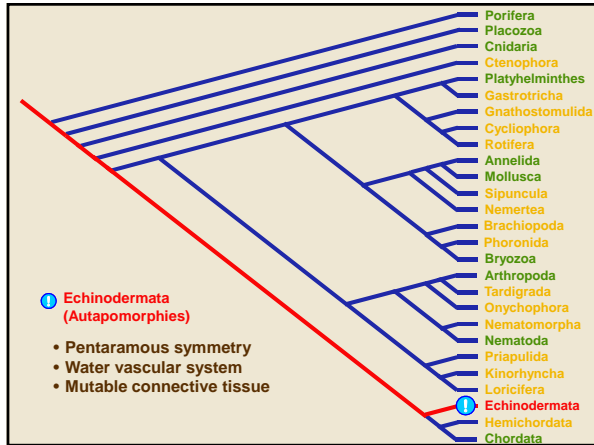


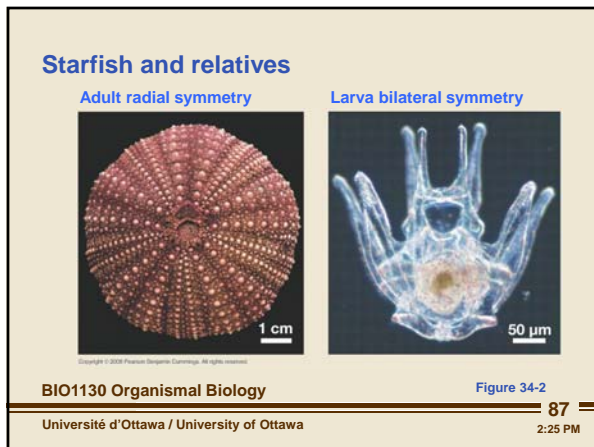




Phanerozoic - Paleozoic

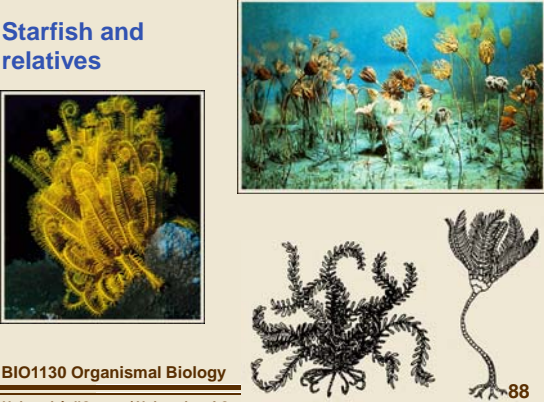






Phanerozoic - Paleozoic

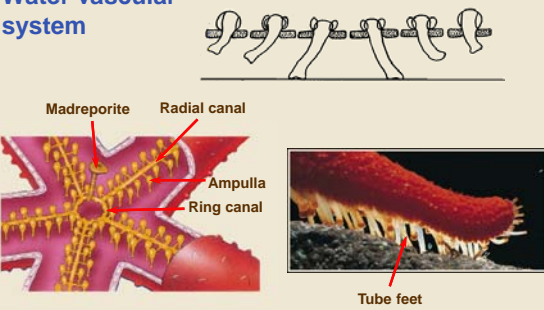
Starfish and relatives



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Water vascular system



Madreporite Radial canal
Ampulla Ring canal

Tube feet

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Figure 26.3
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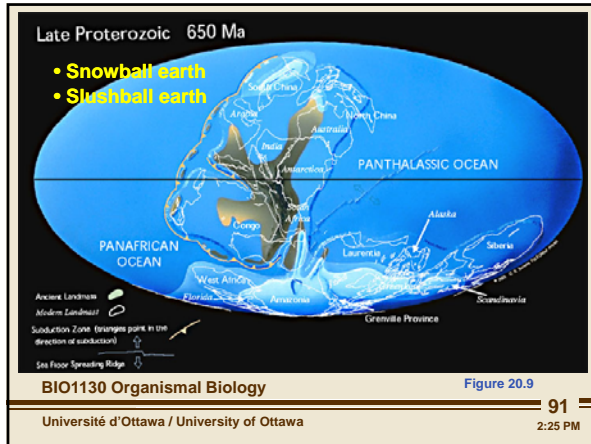
An explanation for the Cambrian explosion

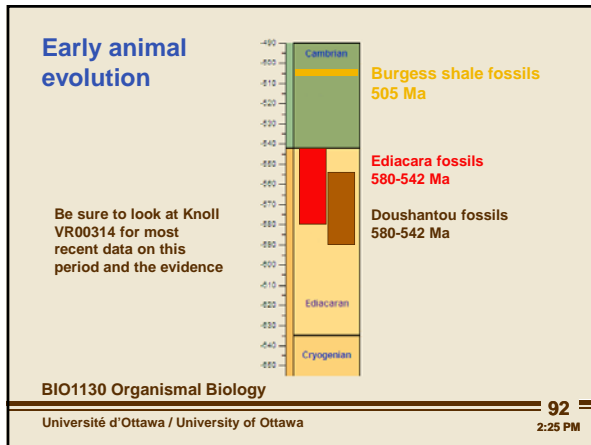
- Snowball earth
- Burrowing
- Shelled arms race
- Developmental – *hox* genes

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Phanerozoic - Paleozoic








Phanerozoic - Paleozoic

Ediacaran fossils
580-542 Ma
(Mistaken point NFLD)



Protoanimals of Mistaken point
Australian footprints

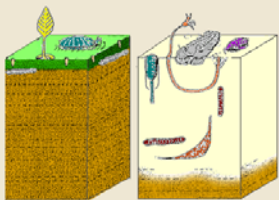
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Cambrian burrowers

- Advantages
 - Feeding
 - Anchorage
 - Protection



Ediacaran benthic zone Cambrian benthic zone

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Homeotic genes

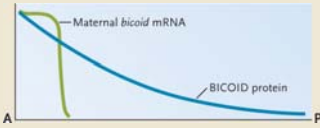
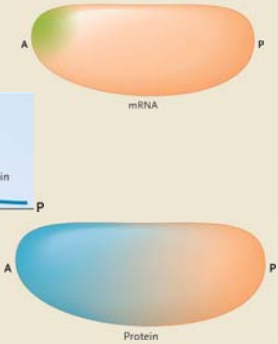


Figure 34.31

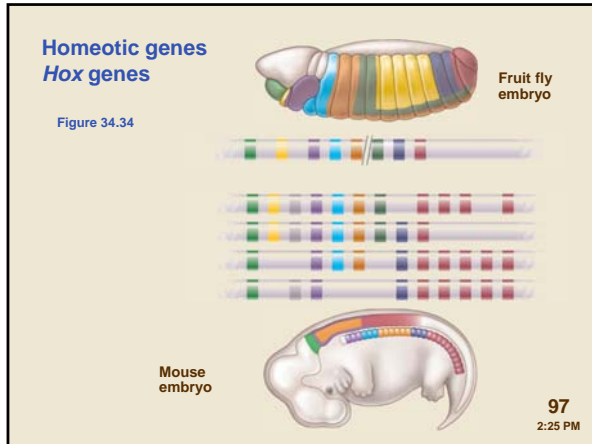


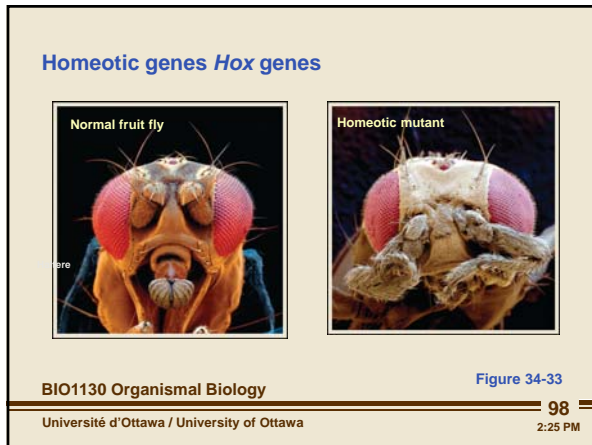
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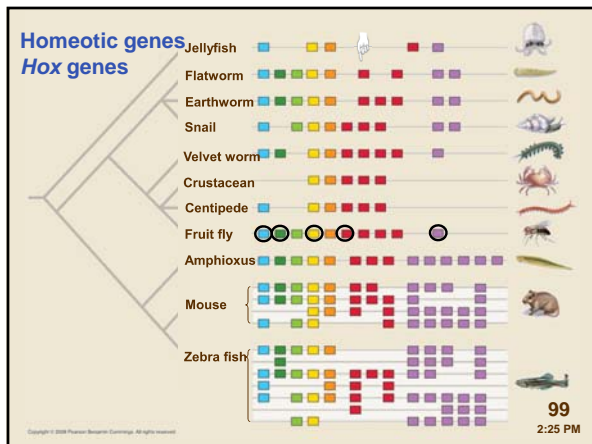
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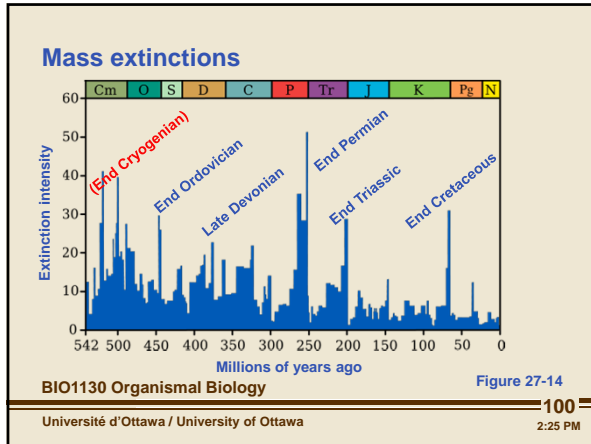
Phanerozoic - Paleozoic

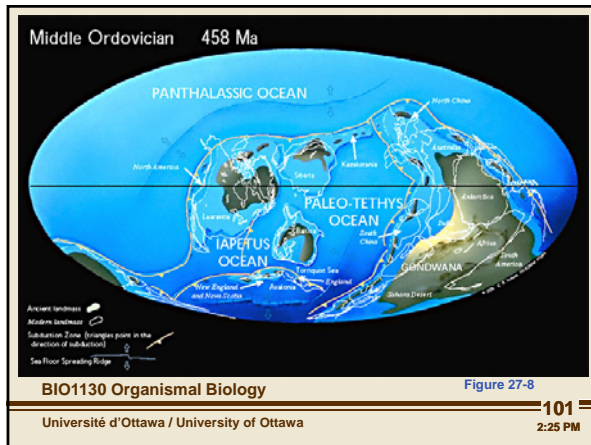


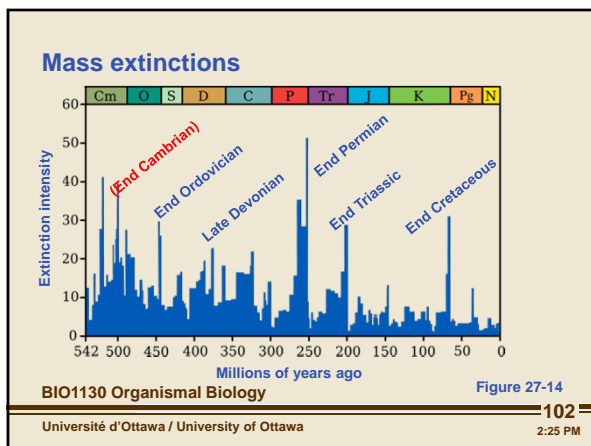




Phanerozoic - Paleozoic







Phanerozoic - Paleozoic

