Chapter-4

Animal Kingdom

Basis of classification-

1. Level of organization-

a. Cellular level- Cells are arranged as loose cell aggregates. Some division of labour (activities) occur among the cells. Eg- Sponges

b. Tissue level- the cells performing the same are arranged into tissue. E.g- Coelenterates

c. Organ level- tissues are grouped together to form organs, each specialised for a particular function. Eg- Platyhelminthes, aschelminthes

d. Organ system level- Organs are associated to form functional systems, each system concerned with a specific physiological function.
Eg- Annelids, Asthropods, Molluscs, Echinoderms & chordates.

2. Symmetry

a. Asymmetrical- any plane that passes through the centre does not divide body into equal halves
Eg- Sponges.

b. Radial symmetry - when any plane passing through the central axis of the body divides the

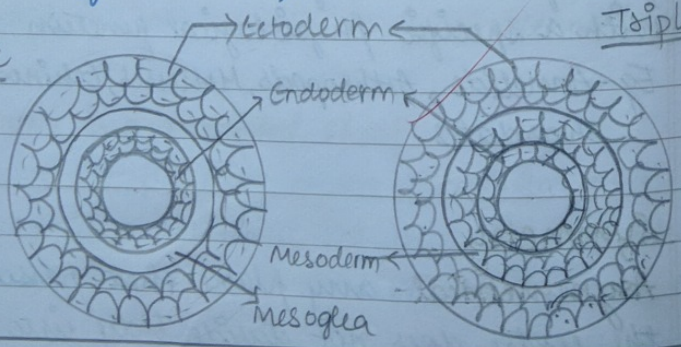
anism into two identical halves.
Coelenterates, ctenophores, echinoderms (only adults)

ateral symmetry - the body can be divided
identical left and right halves in only one
ne eg. Annelids, Arthropods, Echinoderms (larvae)
d Urochordates.

mLayer -
bloblastic - Animals in which cells are arranged
o two embryonic layer, ectoderm (external) &
doderm (internal).
oglea (undifferenciated layer) present between two layers
- Sponges, Coelenterates.

bloblastic - Animals in which cells are arranged
three embryonic layer, ectoderm (external),
soderm (middle), & endoderm (internal).
- Platyhelminthes, Aschelminthes ... etc.

Triploblastic

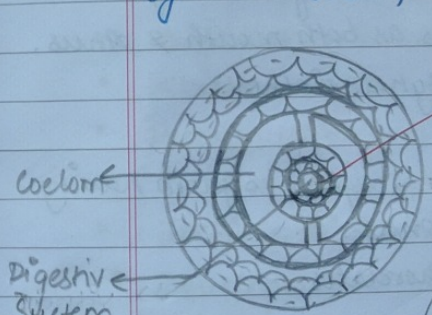


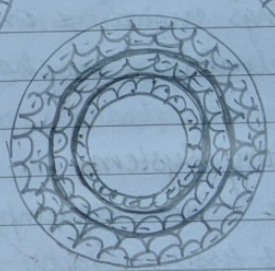
elom
body cavity which is lined by mesoderm
both side is called coelom

a. Acoelomates - body cavity absent
Eg sponges, coelenterates, platyhelmint

b. Pseudocoelomates - animals in which b
is not lined by mesoderm. Instead, m
is present as scattered pouches b/w ecto
endoderm. Such cavity is called pseu
- Eg - aschelminthes.

c. Coelomates - body cavity present
Eg - annelids, molluscs --- etc.





a) Acoelomate

5 Segmentation -
- In some animals, body is external &
divided into segments with serial repet
at least some organs.
- The body shows this patter called meta
segmentation and phenomenon called
- Eg - Earthworms.

lotochord -
esodermally derived rod like structure formed
n dorsal side during embryonic development.
hordata - Animals without Notochord, all this life.
g - Fishes, Amphibians, Birds, Mammals etc

on-Chordates - Animals without Notochord.
g - porifera, echinoderms

igestive system -
ncomplete digestive system - digestive system has
nly single opening serves as both mouth & anus.
g - coelenterates, Platyhelminthes.

omplete digestiv system - digestiv system having
wo openings mouth & anus.
g - aschelminthes to chordates.

Circulatory System -
pen type - Blood is pumped out of the heart and
the cell & tissue directly bathed in it

osed type - Blood is circulated through vessels.

CLASSIFICATION OF ANIMALS
PHYLUM
Porifera - (sponges)
Habitat - Aquatic, generally marine; some fresh water
Organization level - Multicellular with cellular level of organisation. - diploblastic
Body cavity - absent / acoelomates.

- Symmetry - Asymmetric
- canal system - Sponges have water tran
canal system - Water enters through ostia
pores in sponges) in the body wall into a
cavity, spongocoel, from where water g
through osculum.
This path way is helpful in food gathering,
exchange, removal of waste.
- Special cell - Choanocytes or collar cel
line the spongocoel and the canals. These
are flagellated.
- Digestion - Intracellular,
- Skeleton - Made of spicules or sponging
- Reproduction - Bisexual or hermaphrodite
asexually (fragmentation) or sexually.
- Fertilisation - Internal
- Development - Indirect (have larval st
- Example - Sycon (scypha), Spongilla (fresh
sponge) & Euspongia (Bath spo

(2) Coelenterata - (Cnidaria)
- Habitat - Aquatic - mostly marine, sessile or f
- Organisation level - tissue level - diploblo
- Symmetry - Radially symmetrical
- Body cavity - Absent, central gastro vasc
cavity present with single opening (hypos
- Special cell - Cnidoblasts / cnidocytes (co
stinging capsules or nematocytes) prese
tentacles & body; Help for anchorage,
- Digestion - Extracellular & Intracellular
Incomplete

leton - Some Cnidarians (like corals) have
eleton of $CaCO_3$
sic body form - have two basic form.
POLYP - sessile & cylindrical, eg Hydra, Adamsia.
MEDUSA - umbrella-shaped & free swimming
eg Aurelia or jelly fish.
eration of generation :
ETAGENESIS - Cnidarian exist in both polyp &
dusa forms & exhibit alteration of generation.
yps produce medusa asexually } eg-Obelia
dusa produce/form polyps sexually } (sea fur)
mples - Hydra, Aurelia (Jelly fish), Adamsia.
a, anemone)

enophora - (sea walnuts / comb jellies)
bitat - Exclusively marine
mmetry - Radial
el of organisation - tissue level -
ecial organ - eight external rows of ciliated
mb plates that help in locomotion.
gestion - extracellular & intracellular, Incomplete
ecial property - BIOLUMINESCENCE -
he property of living organisms to emit light.
hroduction - (Bisexual or Hermaphroditics)
nly sexual reproduction
rtilization - External
velopment - indirect-
ample - Pleurobrachia and Ctenoplana
dy cavity - absent.
rm layer - diploblastic

④ Platyhelminthes - (flatworms)
- Habitat - Endoparasites (found in an
- Symmetry - Bilateral
- Body organisation - organ level
- ~~Coelom~~ - triploblastic - Germ layer.
- Special structure - Hooks & suckers a
in parasitic forms for absorption. Some
nutrients from host directly through the
- Body cavity - Absent / acoelomates.
- Reproduction - ~~As~~ Bisexual animals (He
- Fertilisation - Internal
- Development - Indirect through many lar
(Planaria posses high regenration capcity
- Body shape - dorso-ventrally flattened
called flatworms
- Example - Taenia (Tapeworm), Fasciola (Li

⑤ Aschelminthes - (Nemathelmenthes, K
- Habitat - free living, aquatic, terrestrial
- Level of organisation - organ system
- ~~Coelom~~ - ~~Germ~~ layer - triploblastic
- Symmetry - Bilateral
- Body cavity - ~~triploblastic~~ Pseudocoelom
- Digestive System - Alimentary canal is
with well developed muscular pharynx.
- Excretion - Excretory tube present (re
waste from body cavity through excretor
- Reproduction - Unisexual (dioecious).
Shows sexual dimorphism (females
than ma

rtilisation - Internal
velopment - Direct and Indirect
y shape - Circular in cross-section
Ascaris (Round worm) Wuchereria (Filaria worm)
Ancylostoma (Hookworm).

nelida
itat - aquatic (marine - free living) and
rrestrial ; free-living, sometimes parasitic.
metry - Bilateral
l of organisation - organ - system level
m layer - triploblastic
Cavity - present or Coelomates
motory organ - posses longitudinal & circular
cles. Some aquatic annelids (Nereis) possess
al appendages, parapodia (for swimming)
latory system - Closed
etory organ - NEPHRIDIA (help in
osregulation & excretion.
vous system - Consist - paired ganglia
nected by lateral nerves to a double ventral
ve cord.
production - Some are unisexual/dioecious
reis) and bisexual/monoecious (earthworms)
produce Sexually.
y shape - Body divided into segments or
rameres
mple - Nereis, pheretima (earthworm)
udinaria (Blood sucking leech).

(7) Arthropoda - (Largest Phylum)
- Level of organisation - Organ system
- Symmetry - Bilateral
- body cavity -
- Germ layer - triploblastic
- Skeleton - exoskeleton made of chi
- Body design - Body is segmented
  Body divided into head, thorax, ab
- Locomotion - by jointed appendages
  (arthro - joint, poda - appendages) he
  called arthropoda.
- Respiration - by gills, book gills, book
  tracheal system
- Circulatory system - open type
- Sensory organs - antennae, eye (compo
  Statocysts or balance organs are presen
- Excretion - Malpighian tubules
- Digestive system - Complete
- Reproduction - dioecious
- Fertilisation - Internal, mostly ovipar
- Development - direct or indirect
- Example - Economically important in
  Apis (honey bee), bombyx (silkworm), Laci
  Vectors : Anopheles, Culex, Aedes (Mo
  Gregarious pest : Locusta (Locust)
  Living fossils : Limulus (King crab)

ollusca - (Second Largest phylum)

bitat - terrestrial or aquatic (marine or fresh water)
mmetry - Bilateral
lom - coelomate / present
m layer - triploblastic
dy skeleton - body covered with calcareous shell
dy shape - Unsegmented, with distinct
ad, muscular foot & visceral hump
cial structure - soft-spongy layer of skin
n a mantle over visceral hump.
spiration & excretion - They have features
gills (between hump and mentle called
ntle cavity). They have respiratory &
cretory functions.
nse organ - anterior head region has tentacles
eding organ - Mouth contain file-like rasping
gan called radula.
vel of organisation - organ-system
production - dioecious and oviparous
velopment - Indirect
xample - Pila (Apple snail), Octopus (devil fish)
Sepia (cuttlefish).

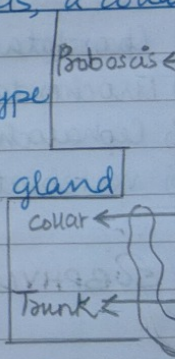
chinodermata -

abitat - All marine
ymmetry - Radial but larvae are bilateral
igestive system - Complete, with mouth on
lower (ventral) side and anus on upper (dorsal) side
Excretory system - absent
evel of organisation - organ system
oelom; Germ layer - coelomate; triploblastic.

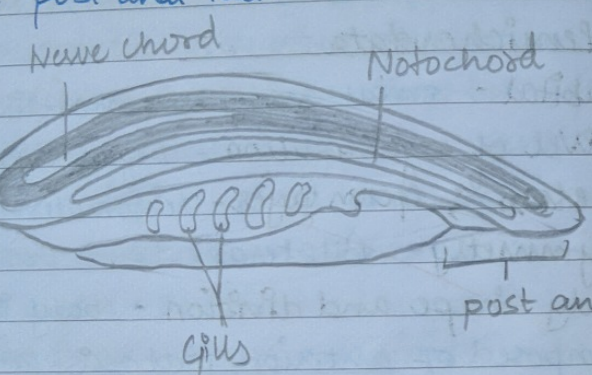
- Reproduction - Dioecious, Reproduce - se
- Fertilisation - usually external
- Development - Indirect, with free living
- Water vascular system - distinctive fe help in locomotion, capture & transport food and respiration
- Example - Asterias (Star fish), Echinus (cucumaria (sea cucumber)

(10) Hemichordata

- Habitat - small group of worm-like mar
- Level of organisation - organ-system
- Coelom; Germ layer - coelomate, triplo
- Symmetry - Bilateral
- Body shape and division - body is cyl composed of anterior proboscis, a colla a long trunk
- Circulatory system Open type
- Respiration - through gills
- Excretory organ - proboscis gland
- Reproduction - Diocious.
- Fertilisation - External
- Development - Indirect
- Notochord - Absent but have a rud structure in the collar region called st similar to notochord.
- Example - Balanoglossus and Sacc



rdata –
chord – present
metry – Bilateral
of organisation – organ-system level
m ; Germ layer – coelomate ; triploblastic
latory system – closed
dorsal hollow nerve chord
paired pharyngeal gill slits.
post anal tail.



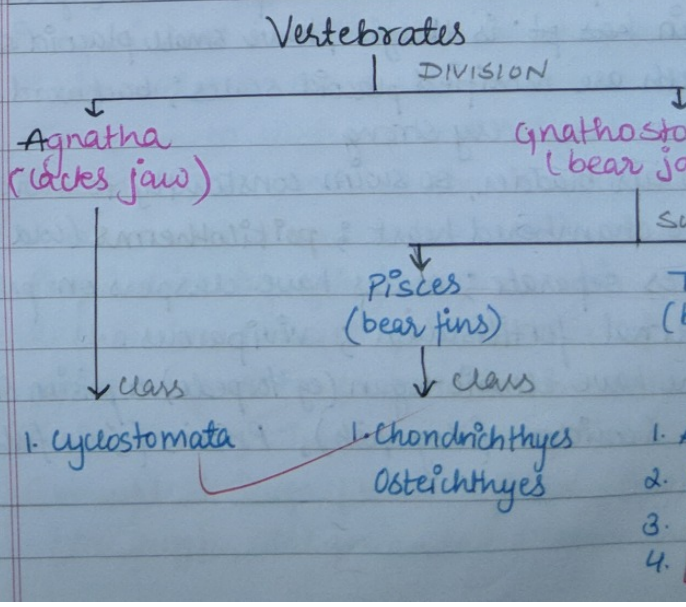
rdata is divided into three subphylum
chordata / Tunicata,] – protochordates.
nalochordata
tebrata

BPHYLUM OF CHORDATA

ochordata (Tunicata)
lusively Marine
otochord is present only in larval tail
mple : Ascidia, Salpa, Doliolum

(ii) Cephalochordata –
- Notochord extends from head to tai
and is persisted throughout their li
- Example : Branchiostoma (Amphioxu
Lancelet).

(iii) Vertebrata
- Possess notochord during the embryo
- Later notochord is replaced by a co
or bony vertebral column in adul
- Thus all vertebrates are chordates b
chordates are not vertebrates.
- They have ventral muscular heart
two, three or four chambers.
- have kidney for excretion and os
- have paired appendages (may be fi
– Vertebrates are further divided into



OF SUBPHYLUM VERTEBRATES

ha (Jaw less)

stoma

1- Marine - ectoparasite on some fishes.
sucking and circular mouth; without jaw
eles, no paried fins
lits for respiration
m & vertebral column is cartilagenous
, migrate to fresh water spawning then die.
returns the ocean after metamorphosis
Petromyzon (Lamprate). Myxine.

ostomata (Bear Jaw)

r class - Pisces (have fins)

drichthyes -

al - Aquatic & Marine
cartilagenous endoskeleton; Streamlined body.
Gill slits without operculum (gill cover)
as pt is rough, have small placoid scales.
are modified placoid scales; backword directed
are very strong
r bladder, so swim constantly to avoid sinking
hambered heart; poikilotherms (cold blooded)
separate; males have claspers on pelvic fins
al fertilisation; viviparous.
have electric organ (eg torpedo) or poision sting (trygon)
Scoliodon (dog fish), Pristis (Saw fish)

2. Osteichthyes -

- Habitat - Aquatic (Marine & fresh
- Have bony endoskeleton; Streamlined bo
terminal mouth.
- gills slits (4 pairs) covered by operculu
- Two chambered heart; cold blooded.
- Skin has cycloid/ ctenoid scales.
- Have air bladder to regulate buoyan
- Sexes separate
- Usually oviparous; External fertilisation;
- Eg - Hippocampus; Exocoetus (flying
Fresh water: Labeo (Rohu), Catla (C
Aquarium: Betta (Fighting fish), Pte

3. Super - class - Tetrapoda (have

1. Amphibia -

- Habitat - Aquatic & terrestrial both
- Body divided into head, & trunk; hav
- Skin moist; No scales.
- Tympanum represents ear; Eye have
- Cloaca is the common chamber wher
canal, urinary and reproductive tract
- Respiration by gills, lungs or skin.
- 3-chambered heart; cold blooded
- Sexes separate; fertilisation exte
- oviparous; Indirect development
- Example: Bufo (toad), Rana (Frog
(tree frog), Salamandra (Salaman

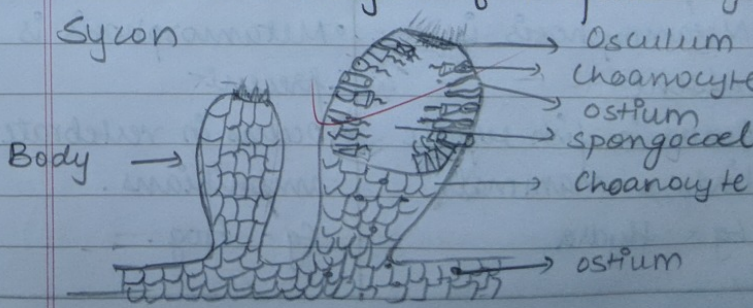
ptilia
bitat - Mostly terrestrial
ep or crawl to locomote
ly has dry & cornified skin and epidermal
lus or scutes.
npanum represent ear.
nbs (when present) are two pairs
hambered heart [Exception - Crocodile - 4-chamber]
es separate ; fertilisation internal ;
parous ; Direct Development
d Blooded
mple - Chameleon (tree lizard) Naja (cobra)
nidactylus (wall lizard)

es
nce of feathers, except flightless birds ; have
k (modified jaw) without teeth .
limbs modified into wings.
d limbs have scales, modified for walking,
imming or clasping.
skin as no glands on skin except oil
nd (prue gland) at base of tail
e ossified (bony) endoskeleton with air
ity (pneumatic) & hollow bones to assist in flight
& Gizzard - additional chamber in digestive tract
sacs are connected to lungs to supplement
piration
n - Blooded (homoiothermous); 4-chambered heart
rate sexes ; Internal fertilisation ;

- Oviparous ; Direct Development-
- Example : Corvus (crow), Columba (Pig
Pavo (Peacock).

4 Mammalia -
- Habitat - found in variety of habitat-
desert, mountains, grasslands, Aquatic
- Have mammary gland to nourish you
- Have two pairs of limbs, adapted to per
special work.
- Skin has hairs
- External ear or pinna present.
- Different types of teeth in jaw.
- Homoiothermous (warm- blooded) ;
- 4-chambered heart ; Lungs for respir
- Sexes are separate ; Internal fertilis
Viviparous ; Direct Development-
- Example Mainly viviparous Exception
and echidna they are oviparous
- Example - Camelus (camel), Macaca
Rattus (Rat), Elephas (Elephant).

Ques Draw labuled diagram of Porifera (sy



fferenciate between the following
tracellular and Extracellular Digestion.

racellular gestion	Extracellular Digestion
ur within cells	• occurs within cavity of alimentary canal, outside the cell
ccur in lower & icellular organisms	• It occurs in multicellular organisms
ymes associated are y few	• Large no. of digestive gland and enzymes required
s efficient	• highly efficient-

irect Development & Indirect development

rect Development	Indirect development
e embry develops to a well-groun dividual without wolving in a larval tage	• It involves a immature larval stage.
letamorphosis is absent	• Metamorphosis is present-
ccurs in fish reptile irds & Mammals g- Hydra	• Occurs in vertebrate amphibians. Eg- Frog.

(ii)	Chordates	Non-chord
•	Notochord present	• Notochord abs
•	central nervous system is dorsal, hollow and single.	• central nerve is ventral, so double.
•	Pharynx perforated by gill slits	• Gill slits are
•	Heart is ventral	• Heart is dorsa
•	A post-anal part (tail) is present-	• Post anal ta absent.