Notes

Chapter-2

Taxonomy :- Branch of biology that deals with identification, nomenclature and classification on the basis of its morphological, biochemical or ecological features.

* It is also called Systematics which acc. to simpson is defined as scientific study of diversity of organisms and the relationship between them.

Taxonomy	Systematics
theory and practise of classifying organism	Science of diversity of organisms and has interrelations with evolution, genetics, ecology, physiology, etc.

Basic aims of systematics

* Provides a convenient method of identification and communication.

* To detect the ongoing process of evolution so that the evolutionary history of the organism can be reconstructed.

* To provide an system of classification which may also exhibit evolution occurred within the group.

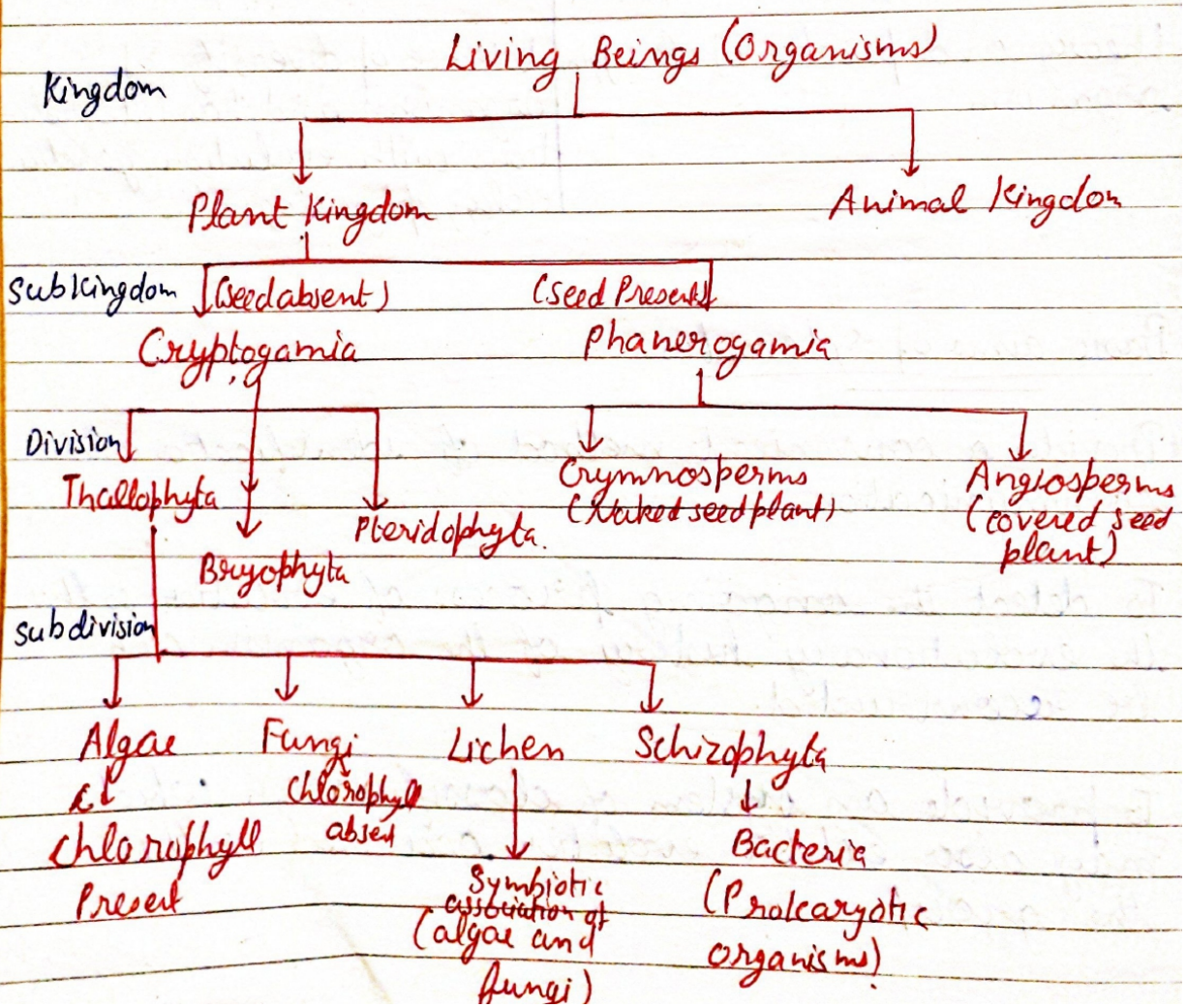
Notes

* To provide an inventory of the plants and animals present in the world.

Classification (Based on the basis number of kingdom and on various criteria of categorization)

1) **Two kingdom classification.**

+ oldest classification proposed by Linnaeus.



Notes

Kingdom Plantae (plant) possesses following characters.

* Prepare their own food material by the process called photo synthesis.
* Cell wall is composed of cellulose present in them.
* Do not possess the ability to move.
* includes green plants, algae, etc.

Kingdom Animalia includes animals like

* Not capable of synthesising their own food material.
* Cell wall is absent.
* move or show the property of locomotion.

objections :-

* Fungi are kept in Plantae kingdom but they lack chlorophyll and derive food from dead organic matter.
*

Notes

Three Kingdom classification

* Proposed by German zoologist Ernst Haekal (1866)

The living Being

All organism lacking tissue-system, morphological complexities and division of labour

↓

diversified type of modes of nutrition

↓

Kingdom Protista (include unicellular organism that exhibited characteristic of both plant & animal or neither of them)

↓

Algae, Fungi, Bacteria, Protozoa

All organism having diverse tissue-system with well defined division of labour and max. morphological complexities.

↓

autotrophic mode of nutrition (capable of synthesizing its own food)

↓

Kingdom Plantae

↓

Bryophytes (a small flowerless green plant)

Pteridophytes eg - ferns

Gymnosperms जीम्नोस्पर्म

Angiosperms अन्जीओस्पर्म

↓

a plant of a large group that comprises those that have flowers and produce seeds

holophagic mode of nutrition

↓

Kingdom Animalia

↓

Invertebrates

Vertebrates

Phagotrophic

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Notes

Drawbacks

* Acellular and cellular organism were kept undersame catogery.

* Bacteria and fungi which are not related to each other were grouped togethes.

* Prokaryotes and eukaryotes were also put togethes.

Four Kingdom classification -

* To overcome the drawback of 3-kingdom classification Copeland (1956) proposed this model.

* Prokaryotes were seperated and placed under a diff. Kingdom Monera.
  - प्रोकार्योट → a microscopic single celled organism which has neither a distinct nucleus with a membrane nor other specialized organelles including bacteria

* Other eukaryotes were furthes categorised as:
  1) Protista or Protoctista → included eukaryotic unicellular organisms

  2) Metaphyta → consists of eukaryotes that were autotrophic and possessed embryo during their development.

  3) Metazoa → Heterotrophic eukaryotes possessing embryo.

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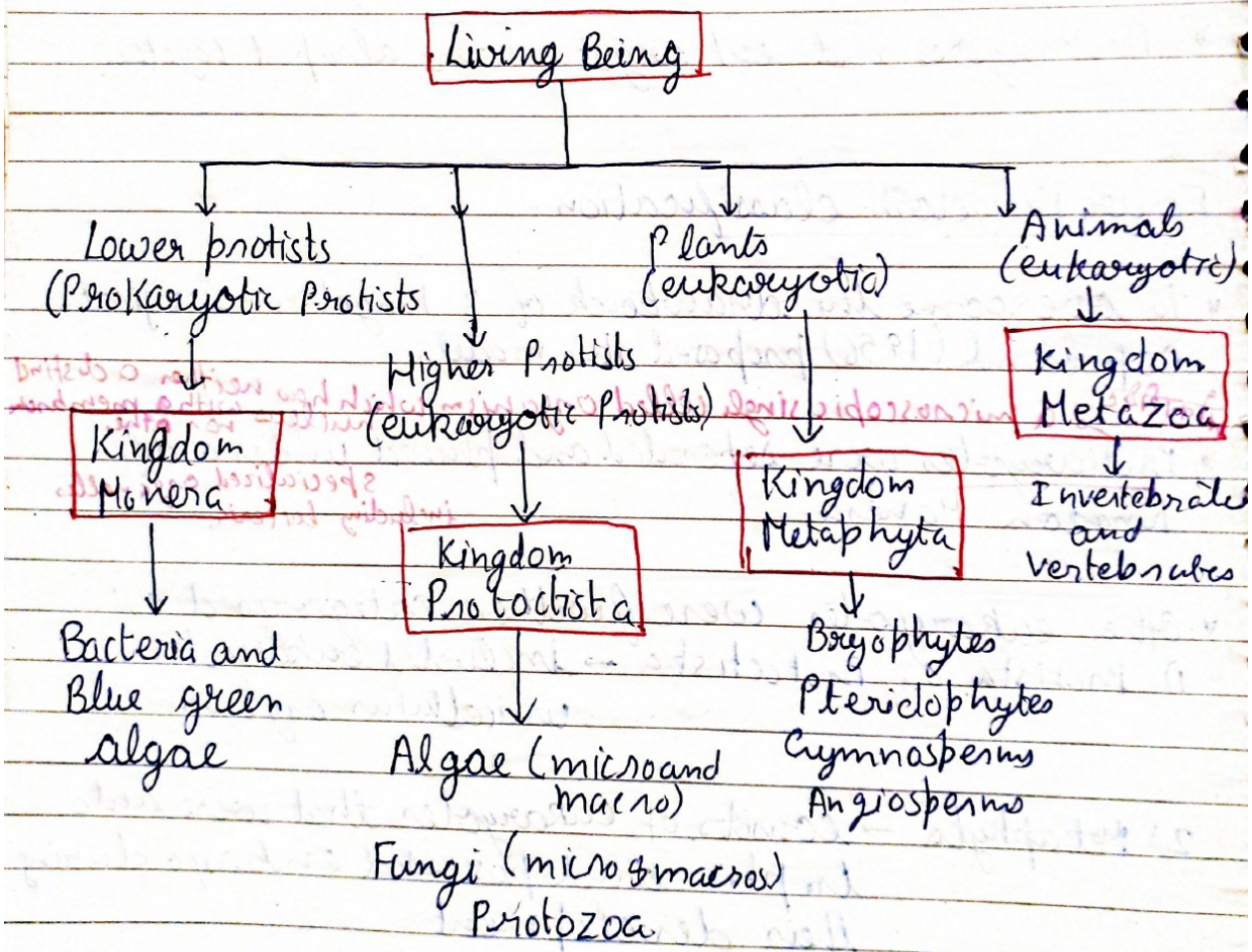
Notes

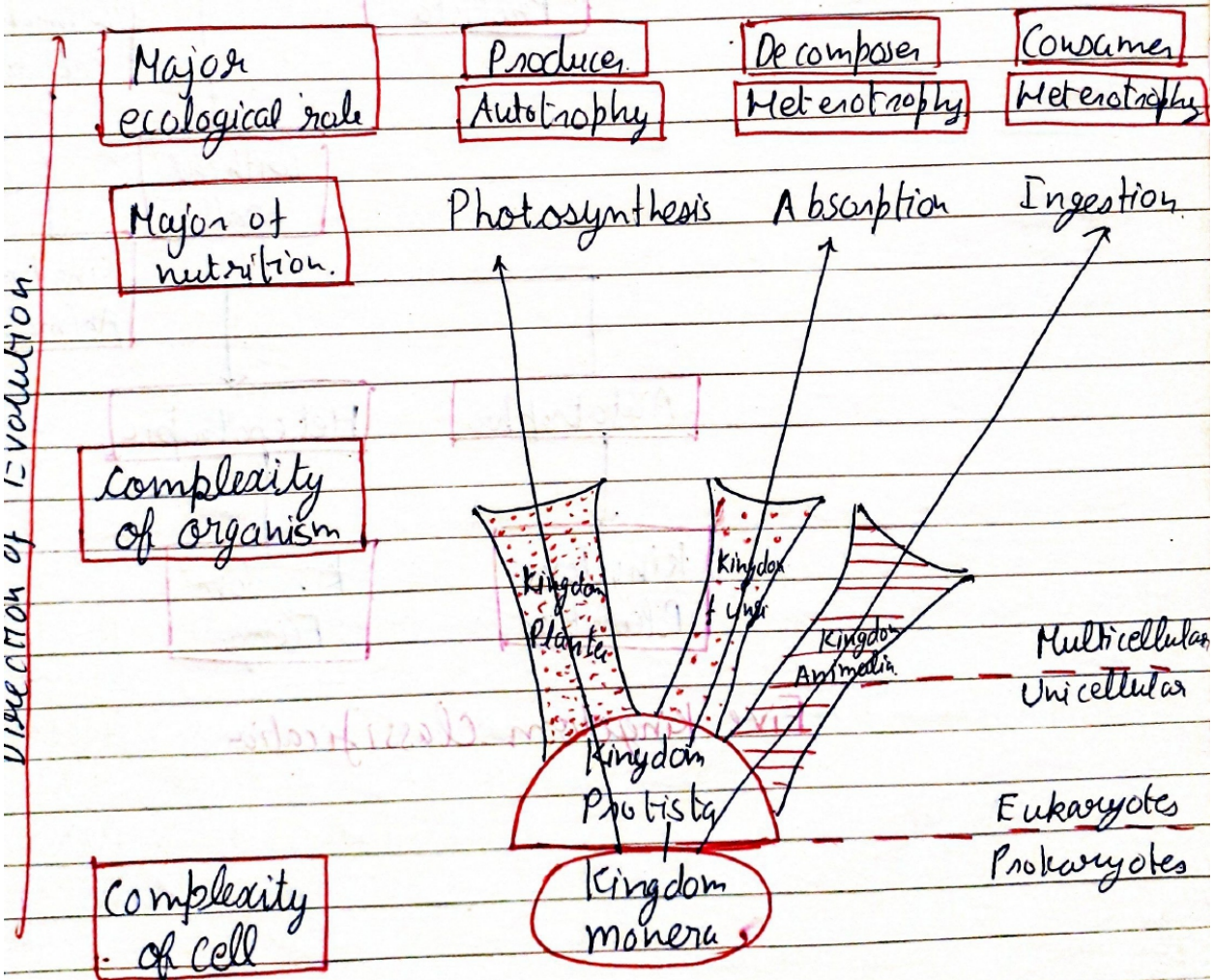
Drawback:

* No proper place was assigned to fungi.
* did not relate the organisms on evolutionary basis.



Five Kingdom Classification

* Proposed by an American taxonomist R.H. Whittaker (1969),
* Classification based on following criteria:
  1) Type of cell i.e. cell structure - Prokaryotic or Eukaryotic.
  2) Cellular organism - Unicellular or multicellular.
  3) Mode of nutrition - Autotropic or heterotropic.



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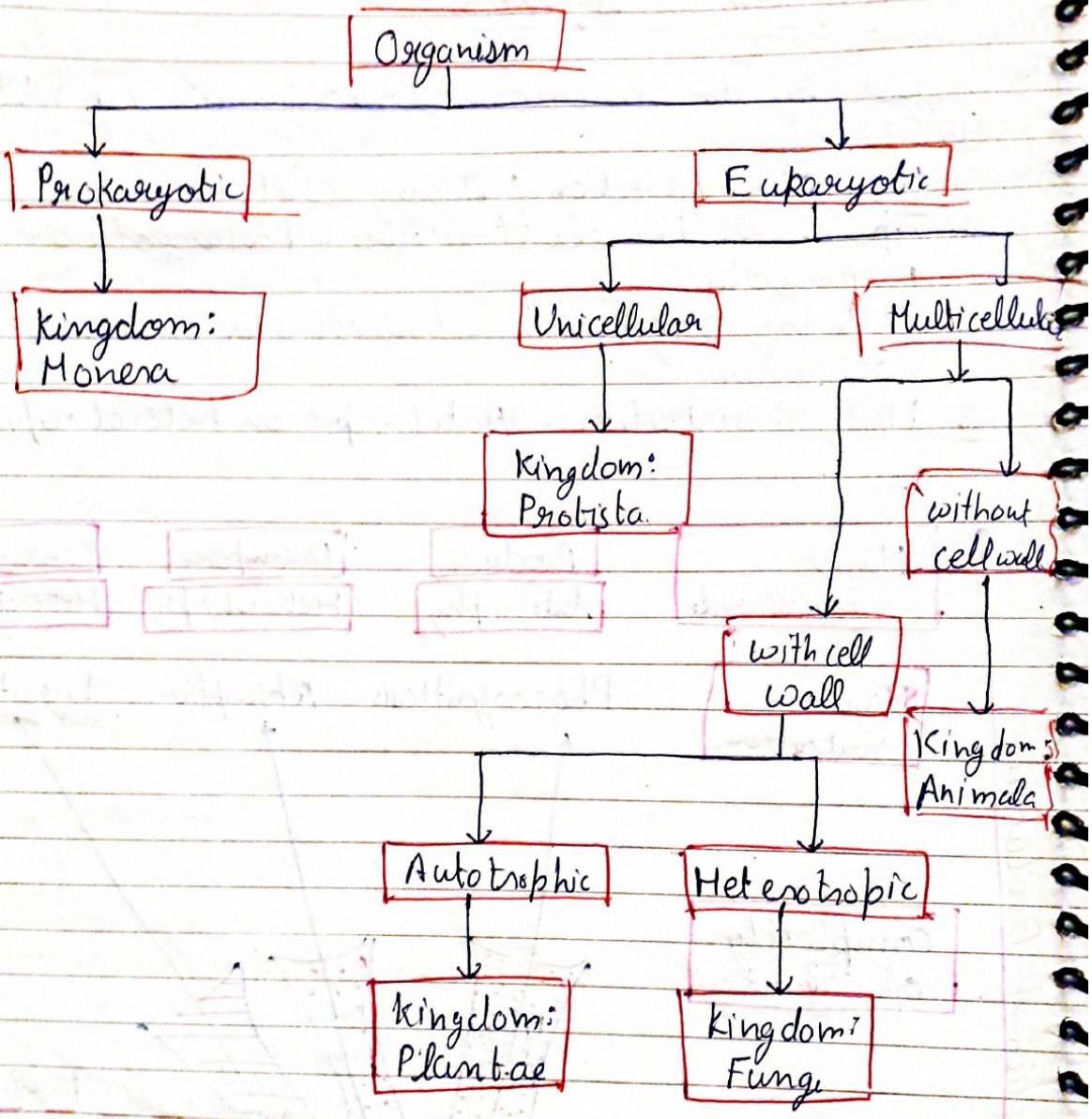

Five kingdom classification

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Kingdom Monera :

* Unicellular, prokaryotic organism. eg:- bacteria & blue green alga.
* Mode of nutrition was primitive and may be either autotropic, heterotropic or chemotrophic.
* Cell wall present but was not composed of cellul
* Motile or non-motile forms.

Kingdom Protista :

* Unicellular, eukaryotes
* Mode of nutrition may be autotrophic or heterotrop
* Cell wall may or may not be present.

Kingdom Fungi :

* Multicellular eukaryotes
* Heterotrops with absorptive mode of nutrition. (chloroplast and chlorophyll absent)
* Cell wall present but generally not made up of cellulose.

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Notes

Kingdom Plantae:-

* Multicellular euk caryotes.
* Autotrophs that possess well defined chloroplast
* Cell wall made up of cellulose mostly.

Kingdom Animalia:-

* Multi cellular eukaryotes
* Heterotrophic organism with ingestive mode of nutrition
* Cell wall absent and outermost layer of cell is cell membrane.

Demerits:-

* Monera and Protista included diverse organisms from nutritional point of view.
* Separated unicellular ~~eg~~ algae from multicellular algae.
* Six Kingdom System or Three Domain Classification
* Can be categorised into three categories (each called domain.)
  1) Bacteria 2) Archea 3) Eukarya
* Domain is highest taxonomic rank.

Classification of Living Things

Domain	Bacteria	Archaea	Eukarya			
Kingdom	Eubacteria	Archaebacteria	Protista	Fungi	Plantae	Animal
cell type	Prokaryote	Prokaryote	Eukaryote	Eukaryote	Eukaryote	Eukary
cell Structures	Cell walls with peptidoglycan	Cell walls of Cellulase in some Some have Chloroplasts	Cell walls of chitin.	Cell walls of Cellulose en Chloroplasts		No cell walls.
Number of cells	Unicellular	Unicellular	Most Unicellular. Some multicellular.	Most Unicellu some multicellu	Multi cellula	Mu ce
Mode of Nutrition	Autotroph or heterotroph.	Autotroph or heterotroph.	Heterotroph or Autotroph	Hete Autotroph	Autotroph	Hel Org
Examples	Streptococcus Escherichia Coli	Methanogens halophiles	Amoeba Paramecium, Slime molds gia			

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1) Domain 1. Archea :-

includes archaebacteria.

2) Domain 2. Bacteria :-

* Organism belonging to this domain passes prokaryotic cells.
* Some are heterotropic form and some are photosynthetic having pigment other than chlorophyll.

3) Domain 3. Eukarya :-

* have a well defined nucleus.

Further divided into 5 kingdom :-

a) Kingdom Protista :-

* Eukaryotic organism with a single cell only.
* Show diversity in food habits and further s subdivision of the kingdom
  1) Autotrophs :- Unicellular alga in which nutritional mode is of autotrophic/ primary producer (which produce complex organic comp. from simple substance present).
     → single celled organism
  2) Heterotrophs :- Unicellular protists which cannot synthesis their own food material and thus dep. on other organism for food.

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3) Saprophytes - These are also unicellular heterotrophs that feed on dead organic matter.

b) Kingdom Fungi -

Prokaryotes - microscopic single-celled organism which has neither a distinct nucleus with a membrane nor other specialised organelles.

Eukaryotes - An organism consisting of cell

* Bacteria were seperated from plant kingdom
* Generally multi-cellular but may be unicellular.
* heterotrophic in nature
* stored food material exists as glycogen.

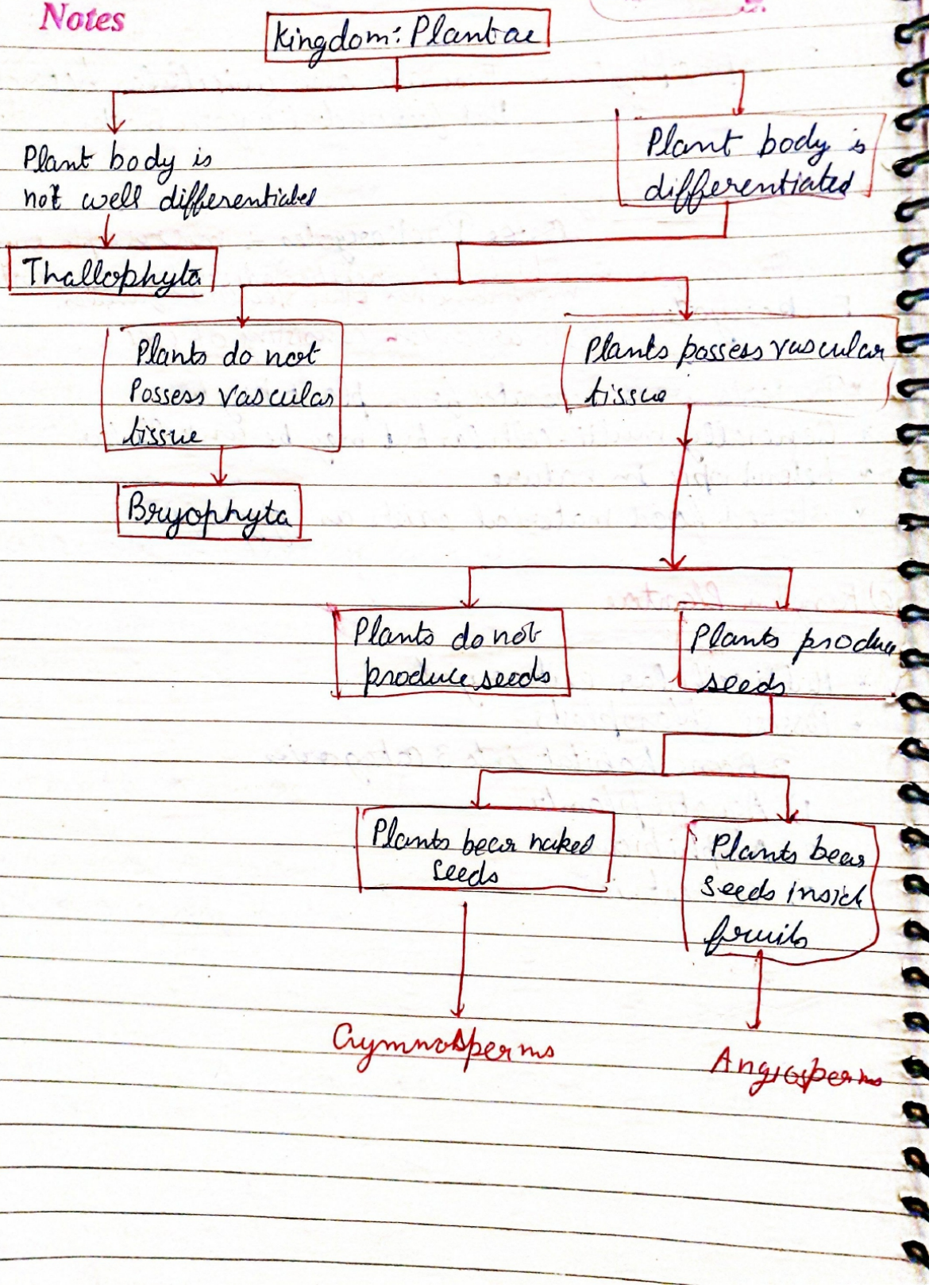
c) Kingdom Plantae

* Multicellular eukaryotes.
* Possess chloroplasts,

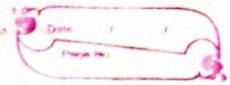
3 Basic habitat into 3 categories

1) Aquatic plants
2) Amphibians
3) Terrestrial

Notes


Kingdom: Plantae
Plant body is not well differentiated
Plant body is differentiated
Thallophyta
Plants do not Possess vascular tissue
Plants possess vascular tissue
Bryophyta
Plants do not produce seeds
Plants produce seeds
Plants bear naked seeds
Plants bear seeds inside fruits
Gymnosperms
Angiosperms

carries blood and lymph nodes.



Notes

Categories of plants diff. :-

1) Atracheophytes / non vascular Plants :-

Algae and bryophytes are grouped in this category as it lack vascular tissues. (arrangement of multiple cell types in vascular plants which allows for the transport of water, minerals and products of photosynthesis to be transported throughout the plant.)

2) Tracheophytes / Vascular plants :-

plants which possess vascular tissues and include pteridophytes, gymnosperms and angiosperms.
↳ seedless vascular plants

Classified further on the basis of presence and absence of seed habit.

1) Aspermatophytes :- vascular plants that are seedless and no seed formation is observed in their life cycle.

2) Spermatophytes :- which posses seed habits. eg :- Gymnosperms and Angiosperms.

Categories on the basis of the presence and absence of cover on the seed ie. naked seed and covered seed.

embryo :- a baby, an animal or a plant in the early stages of development before birth

Notes

On the basis of presence and absence of embryo stage in the life cycle plant form :-

a) Non embryophytes :- do not posses embryos stage
eg :- algae.

b) Embryophytes - Bryophytes and all tracheophytes (water conducting cells) that possess embryo in their life cycle

d) Kingdom Animalia :-

characteristics :-

* eukaryotic organisms with well defined nucleus.

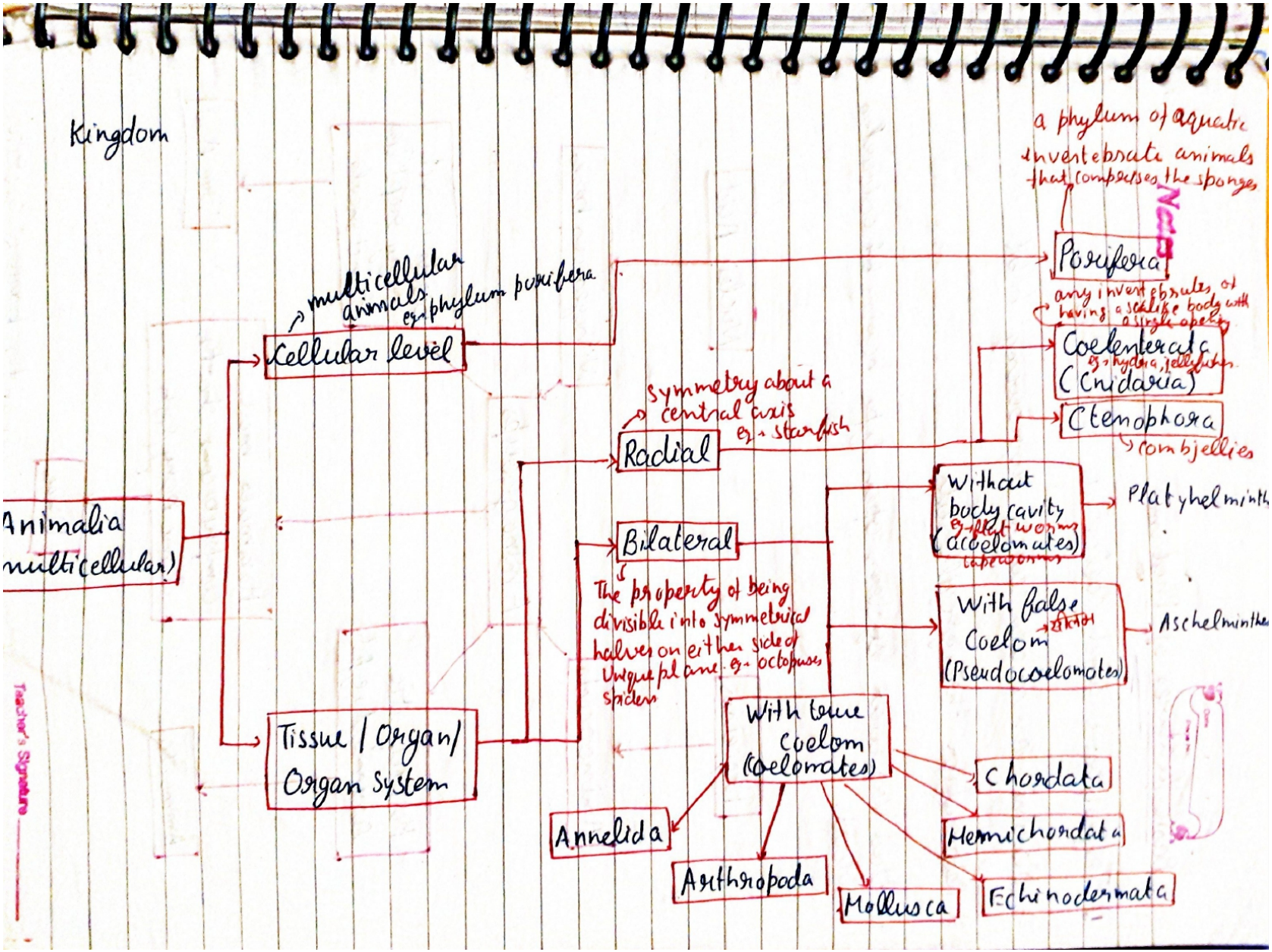
* cells of the members of this kingdom are devoid of cells walls so the outermost boundary of the cell is cell membrane.

* Heterotropic organism as they do not possess Chloroplast

* On the basic of presence and absence of vertebral column :- a) Invertebrates
b) Vertebrates.

Central axis :- Axis which runs from mouth to adoral end.

Phylum :- a group into which animals, plants etc are divided, smaller than a kingdom and larger tha


Kingdom
Animalia (multicellular)
Cellular level
multicellular animals eg phylum porifera
Tissue / Organ / Organ System
Radial
symmetry about a central axis eg - starfish
Bilateral
The property of being divisible into symmetrical halves on either side of unique plane eg - octopuses spiders
Porifera
a phylum of aquatic invertebrate animals that comprises the sponges
Coelenterata (Cnidaria)
any invertebrates of having a sac like body with a single opening
eg - hydra, jellyfish
Ctenophora
comb jellies
Without body cavity (acoelomates)
eg - flat worms
Platyhelminth
With false Coelom (Pseudocoelomates)
Aschelminthes
With true coelom (coelomates)
Annelida
Arthropoda
Mollusca
Chordata
Hemichordata
Echinodermata
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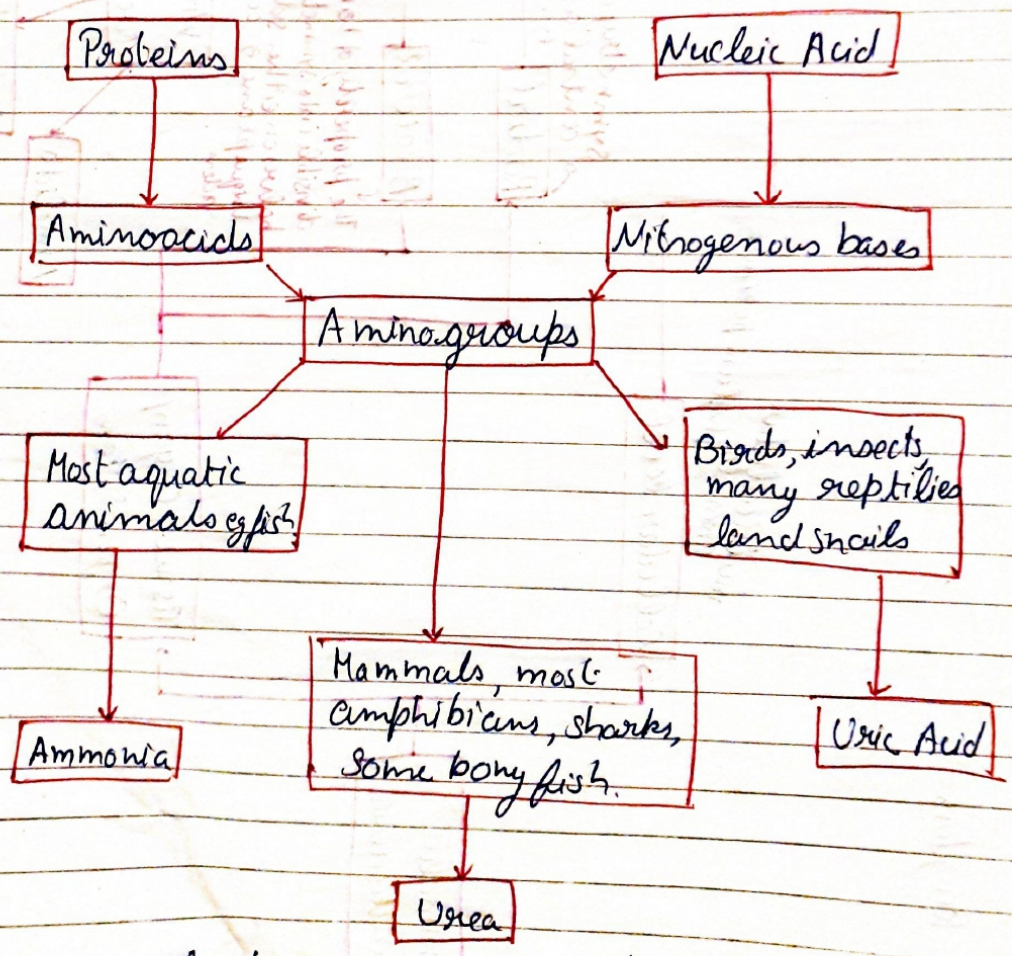
Notes

Basic features of Phylum-

1) Triploblastic and coelomate organism
2) Marine animals with burrowing habit.
3) Respiration through gill slits.
4) Blood vascular system open type having ~~bl~~ colourless blood.



Classification of animals on the basis of excretory Compound

Notes

Taxonomic Hierarchy of Life forms:-

Hierarchal forms

Molecule → Smallest unit of biological syst. which has specific chemical & physical properties

Macromolecule → Group of molecules inter with each other and be

cell → macromolecules co-ordinate & organ themselves to form simples structures

Tissue

Organs

Organ system

Organism

Population

Community

Ecosystem

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Largest group

Kingdom 1

Group of classes with related characteristics ← Division for Plants / Phylum for animals 2

Group of related order ← Class 3

Group of related families ← Order 4

All related genera form a common group ← Family 5

Group of similar or related species ← Genus 6

Species 7

Taxonomical hierarchy of biological organisms

Common Thread that weaves Hierarchy of life forms:

*