Toppersnotes
Unleash the topper in you

NEET - UG

NATIONAL TESTING AGENCY

Botany

Volume - 1

SIERRA INNOVATIONS

Contents

Toppersnotes
Unleash the topper in you

1. The Living World

Ernst Mayr

- "Darwin of 20th Century"
- Proposed the concept of biological species.

Prize (Triple Crown of Biology)

* B = Balzan Prize
* I = International Prize for Biology
* C = Crafoord Prize

Properties of Living Org

A. GROWTH

Twin Character

- Increase in mass
- Increase Individuals / cell number.

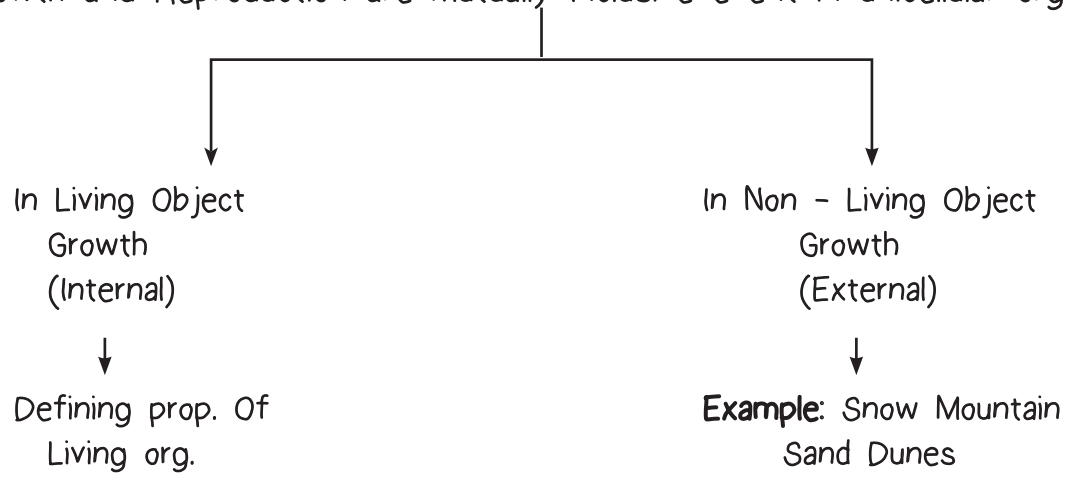
In Multicellular organism

Growth by cell division

Plants	Animals
Growth present Throughout life	Growth present up to a certain age
Due to +nce of meristematic Tissue	due to absence of meristematic Tissue
Site based growth	Diffuse Growth

in unicellular organism

* Growth and Reproduction are Mutually Exclusive event in Multicellular organism.
* Growth and Reproduction are Mutually Inclusive event in unicellular organism.



→ **Growth is not a defining property of living org.**

Reproduction

Biological process in which Parents Participate and produce fertile offspring

Types

"No. of Parents"

- Asexual Reproduction
- Sexual Reproduction

No. of Parents	Single	Double
Gametes formation	√/x	√
Fertilization / syngamy	X	√
Product	Clone	Offspring
Speed	Fast	slow
Special structure involvement	√/x	√

Note: Clone are 100% Morphological and genetically similar to parents Due to the absence of meiosis.

Asexual Reproduction is simple and sexual Reproduction is complex process.

Asexual Rep. (6 types).

1. F = Fission
   - In favorable condⁿ
     - Binary Fission — Bacteria, Diatoms, Euglena
     - Multiple fission
       - Amoeba (Adv condⁿ)
       - Plasmodium (Favorable condⁿ)
2. B = Budding
   - Internal budding ↓ Porifera (Sponges)
   - External budding ↓ Yeast, Hydra
3. F = fragmentation → filamentous fungi, Bacteria,
   Antinomy cites, Protonema of Bryophyte ↓ Bryophyte
4. R = Regeneration → Planaria (Flatewom)
   - → Also Present Hydra
   - → Regeneration is also present in human liver (Up to 25%)
5. S = Spore
   - Fungi
   - Algae
6. V = Vegetative Reprodn ↓ Plant
   - By Root
   - by Stem
   - By Leaves

* Reproduction is NOT a defining property of living organisms.

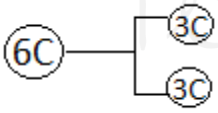
		Living	Reproduction	
1	Mule	Yes	No	Female Horse x Male Donkey
2	Hinny	Yes	No	Male Horse x Female donkey
3	Sterile Male Dron???	Yes	No	
4	Sterile Human	Yes	No	

B. Metabolism

The sum Total of all chemical Rx^n in body

Catabolic Rxn

Cut



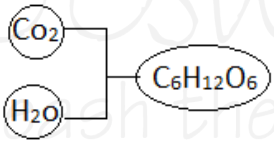
eg → Glycolysis

Glucose → 2 P.A.

(6c) Pyruvic acid
(3C)

Anabolic Rxn

Add



eg → Photosynthesis

$Co_2 + H_2O \rightarrow C_6 H_{12} O_6$

* Catabolic > Anabolic → -ve Growth
* Anabolic > Catabolic → +ve Growth

* Metabolism is a defining property of living organism

Reaction Outside the Body (In-vitro) → (in test tube) → $C_6 \rightarrow 3c + 3c$ → Energy Release → Energy Not used by Test Tube → **Test Tube act as a Non - living thing**

Reaction inside the body (in-vivo) → (In the cell) → $C_6 \rightarrow 3c + 3c$ → Energy Release → Energy used by cell → **Cell act as a living things**

* In both conditions, rx^n are same, but in vitro condition, the byproduct of Rx^n (Energy) cannot be used by test tube
  ∴ test tube acts as a Non-Living Thing.
* In - vivo condn by - product of Rx^n is used by cell which acts as a Living things.
* All the Metabolic Rx^n (In-vitro condn) are living Rx^n but not living things.

C. Consciousness

* Most obvious and complicated feature of Living Organism.
* Consciousness having 2 steps →
  1. Sense to environmental changes
  2. Respond to environmental changes
* "Consciousness is the defining property of living org"

e.g. →

* Bacteria responds to change in → PH, temperature, Humidity
* Most of the animals, plant respond to → Temperature, Light

* Seasonal breeder: the breeding period mainly depends on season.

[Example: Plants and Animal]

Photoperiodic and Vernalization ⟶ These are also an example of consciousness.

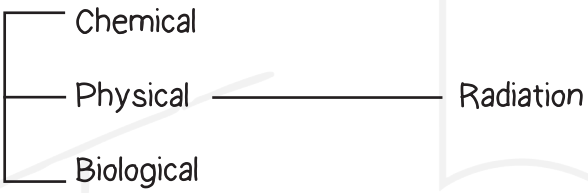
Self-consciousness

It is Present only in Humans.

* Consciousness is defining property of living org but self-consciousness is not a defining Property.

Stimulus

* Any change in environment which can be sensed by organism it can be



* "Coma" patient is → living brain dead condition.
* The level of consciousness in coma patient is less than the threshold Value of consciousness. If this level can recovered by any treatment then that person can respond to any change in environment.

D. Cellular Organization

* Defining prop. of living org
* Minimum 1 cell is Present in every living org.

Virus - does not included in living org due to acellular structure.

A. Unicellular → cell → single

B. Multicellular → cell → than 1

1. Growth → Non - defining property
   - Ext. Growth → Non - defining property
   - Int. Growth → Defining property
2. Reproduction → Non - defining property
3. Metabolism → Defining property
4. Consciousness → Defining property
   - Self-cons. → Non - defining property
5. Cell structure → Defining property

* Properties of Living tissue is Present in Group of Cells which can interact to each other.
* Living object having the
  1. Self-Replication Process
  2. Evolution
  3. Consciousness / Respond to external Stimulus
* All human being share a **common gene pool.**

It is the total gene no. / allele in a particular organism's population.

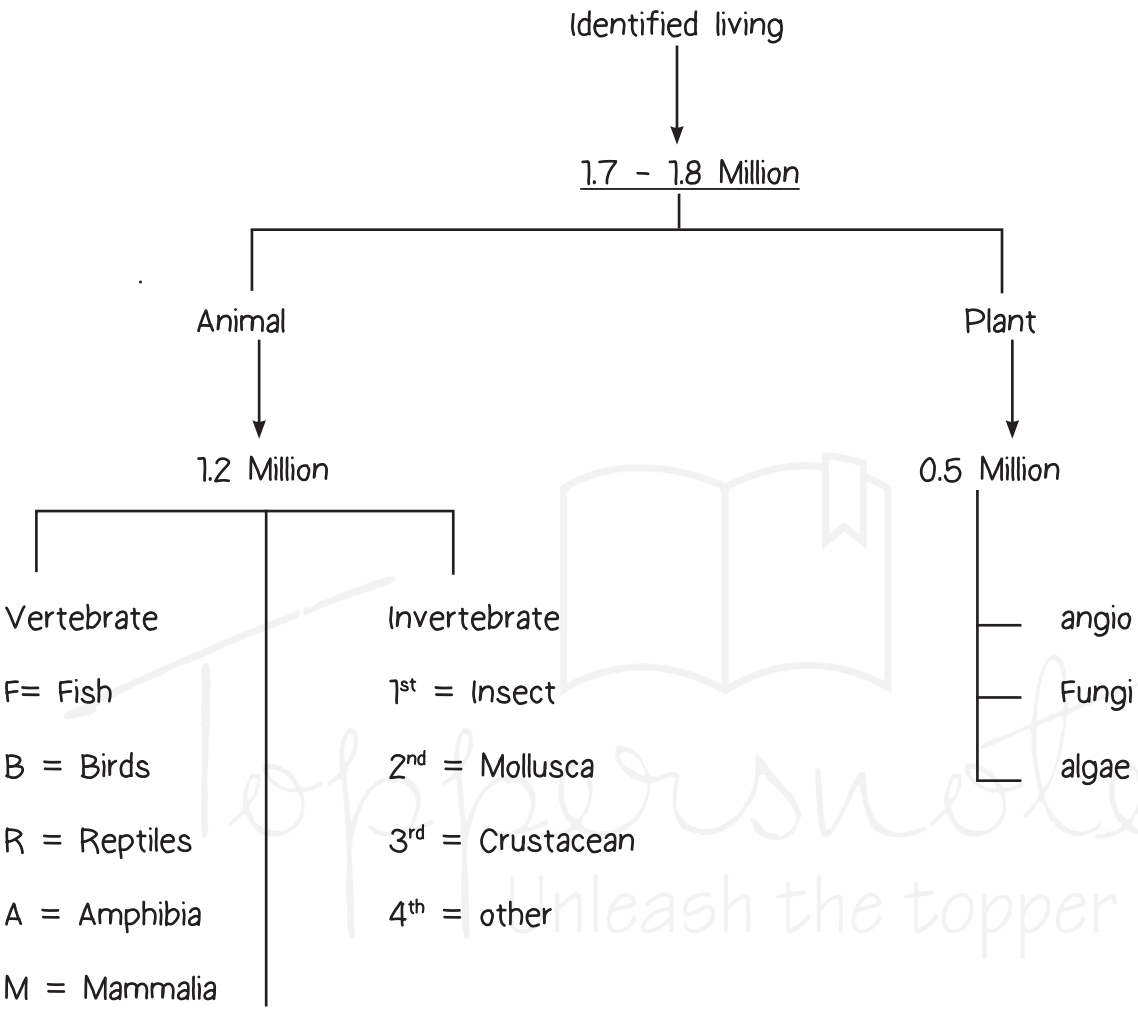
BIO DIVERSITY

↓ ↓

Living type.

* Types of living org in a particular area is called as biodiversity.
* It mainly depends on types and number of individuals.
* Total identified living org in the world is about 1.7 - 1.8 million (17-18 lac)
  - Animal 1.2 M.
  - Plant 0.5 Mill.

Acc. to scientific study (By Robert Mayr) approx. → 7 million, total organism present in biosphere



* Approximately 15,000 species Discovered per year.

Reasons for High Biodiversity:

* **Isolation**

  It always Decrease the competition b/w org. which leads to Increase biodiversity in particular area.

* **Adaptation**

  Responsible for solvability of an org.

* Change in Genetic Material:

  Which leads to Formation of new Character different from in place of which the initial stage for formation of new species.

* **Requirement of classification:**
  - Easy to study
  - Phylogenetical study.

Classification	**Taxonomy**	**Systematics**
Group of org. on the Basis of morphological	Founder of taxonomy	Systematics word derived from
Similarity Dissimilarity	ARISTOTLE Father of taxonomy	Systema c is used by carolos Linnaeus in 'SYSTEMA NATURE'
There is no use of any Principle & rules.	Carolus Linnaeus Taxonomy word was proposed by → A.P. de Candole.	Taxonomy + Phylogeny = systematic
	In taxonomy grouping of org. Based on some principle.	**Step**: 1. Characterization 2. Identification 3. Classification 4. Nomenclature 5. Phylogeny

There is no use of any Principle & rules.

Step involved in Taxonomy:

1. Characterization
2. Identification
3. Classification
4. Nomenclature
5. Type of taxonomy

Classical Taxonomy

Modern (Neo /Bio or New Systematic

Type of taxonomy

1. Classical = Based on only Morphological character. — Word proposed by Huxley
2. Modern Taxonomy :
   Based on morphological
   Anatomy + cytological
   + Developmental +
   characterization +
   Ecological characterization

* Units of new systematic → Population / sub - species.

Nomenclature

A. Local Name / Vernacular Name -

* Generally it is not used in study purpose.
* Because it is Not universal
* Formation of local name on the basis of local language or Local area.

B. Scientific Name

* It is generally used in study because it is Universal.
* ormation of Scientific Name is mainly based on some scientific rules.
* tpes =>

1. Polynomial Nomenclature →

BASIS → Morphological Characters.

→ Not used in study.

2. Trinomial Nomenclature →

- It was proposed by Lamarck.
- Acc. to it 3 components are present in name of Organism.

A — Genus

B — Specific epithet

C — - Sub species (Animal)
- Variety (Plant)
- Strain (Bacteria)

* In case of Bacteria strain is subdivided into serotype.

eg. → Diplodocus pneumonia R II

A B C (Strain)

e.g. → Corves splendens _____ Indian Crow

Gorilla _____ Gorilla

Homo sapiens _____ Human.

C. Binomial Nomenclature →

* It was proposed by Carolus Linnaeus.
* Acc. to it 2 components are +nt in name of Organism

A B

Genus Specific Epithet

* If species diversity is high then trinomial nomenclature is used.

Agencies for Nomenclature for Organism →

* ICBN - International code of botanical nomenclature.
  - 1961 - 1st publication.
  - 1975 - change in ICBN
  - 1978 - 2nd Publication.
* ICZN - International Code of Zoological Nomen.
  - 1964 Publication
* ICNB - International code of Nomenclature for Bacteria.
* ICNCP - International code of nomenclature for cultivated plants.
* ICVN - International code of viral Nomenclature

Q. Which of the following agencies are responsible for nomenclature Of plants.

1. ICNB
2. ICBN
3. ICNCP
4. More than 1 option is correct.

Ans. (4)

Rules of Nomenclature →

* 2 components Present.
* 1st comp - Genus | 2nd → sp. Epithet.
* Language - Latin
  - Because it is Scholar language of Linnaeus
  - Dead language
    - Synonyms absent in Latin language.
* Scientific name printed in italics which represent the Latin origin of name.
* Both components are separately underlined.
* 1st letter of genus - capital

1st letter of sp. Epithet - small.

e.g. →

Naja naja Linn

Or

Naja naja LINNEAUS

* Scientist name printed at the end of specific Epithet any symbol like comma (,) dot (.) are absent in b/w specific Epithet & scientist name.
* Year is placed at the end of scientist name comma (,) is +nt b/w scientist name & year.

Naja naja Linn., 1758

* It more than 1 component is +nt in specific Epithet then both components joins with Hyphens (-) and underlined.
  - Hibiscus rosa-sinensis
  - Capsella bursa pestoris
* Generally later limit of every component is 3-12.

  Exception → Riccia Pathankotensis

* Principle of Priority | Synonyms →
* It any organism having more than 1 scientific name then that name is not valid which was published before 1753 & 1758.

Books of Linnaeus

↓

1. Hortus Uplandicus (first book of Linnaeus)
2. Species Plantarum
   - Contains scientific name of plants
   - 1st May 1753 - Published.
3. Systema Naturae (contains scientific name of Animals)
   - 1st Aug 1758 - Published

* The 1st name after the 1753 or 1758 is valid scientific name for organism.
* Other all names are considered as synonyms for organisms.

Tautonyms → if genus & sp. Epithet is same.

Only +nt in Zoological Nomenclature but not allowed in Botanical Nomenclature.

- *Naja naja*
- *Gorilla gorilla*

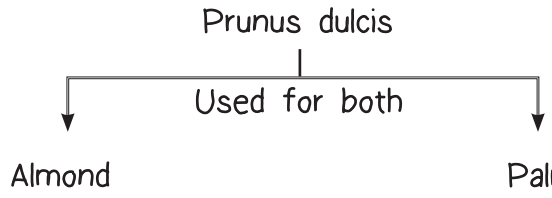
Autonyms → it specific Epithet and sub species / variety are same.

- *Gorilla gorilla gorilla*
- *Corvus splendens splendens*
- *Homo sapiens sapiens*
- *Acacla nilotica nilotica*
- *Brassica oleracea capitata*

Q. Which of the following example represent the autonym condⁿ in animal →

1. Naja naja
2. Rattus rattus
3. Acacia nilotitca nilotica
4. Corvus splendens splendens

Homonyms → if one scientific name is used for 2 different organism.



Taxonomic Categories →

* Every organism is classified into a multiple stage process in which every stage represents the a single taxonomic category.

Types of taxonomic categories.

Obligatory categories

→ Use →→compulsory

→ Number of obligatory categories

↓

(7)

1. Kingdom
2. Phylum / Division
3. Class
4. Order
5. Family
6. Genus
7. Species

Facultative Categories

→ use → not compulsory

→ Number Around.

↓

(21)

- sub – phylum
- super class
- sub – class
- TRIBE – suffix – ini (animal)

  ↓ - Eae (Plant)

it is present in b/w sub – family and Genus.

The sequence of categories may be Be Ascending / descending.

* Decision of family is mainly based on
  Vegetative + floral character (Reprod).

* Reproductive character is mainly in place of rapidly used in classification because vegetative character are easily modified acc. to environmental condⁿ.