

The Living World

CHAPTER

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1

# THE LIVING WORLD

## KDS BIOLOGY

Doubt Experts

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Life is a unique, complex organisation of molecules, expressing through chemical reactions which lead to growth, development, responsiveness, adaptation & reproduction.

## PROPERTIES OF LIVING ORGANISMS

### 1. GROWTH

It is the increase in number & mass of cells by cell division. In plants, growth continues throughout their lifespan. In animals, growth is seen only up to a certain age. However, cell division occurs to replace lost cells.

Basically, growth is the increase in mass & size. Thus non-living objects also grow (surface accumulation of material). So growth is not a defining property of living organisms.

In living organisms, growth is from inside. (Intrinsic growth)

### 2. REPRODUCTION

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It is the production of progeny having features similar to those of parents.

Organisms reproduce asexually and sexually.

In unicellular organisms, growth & reproduction are same because they reproduce by cell division.

Lower organisms reproduce by different methods such as budding, regeneration, etc.

Many organisms do not reproduce (e.g. mules, worker bees, infertile human couples, etc). Hence, reproduction is not a perfect defining property of living organisms.

### 3. MĒTĀBŌLĪSM

1

It is the sum total of all biochemical reactions taking place inside a living system. (**Catabolism + Anabolism**)

2

It is the defining feature of living organisms.

3

Metabolic reactions can be demonstrated outside the body in cell-free systems. Isolated metabolic reactions, *in vitro* are not living things but are living reactions.

### 4. ĶĒLLŪLĀR ŪRGĀŅĪZĀTIŌŅ

It is the defining feature of living organisms. Organisms are made up of one or more cells. [AIPMT 2007]

### 5. ĶŌŅŖĪŪSŅĒSS

01

It is the ability of organisms to **sense** their environment and **respond** to environmental stimuli (like light, water, temperature, other organisms, chemicals, pollutants, etc).

All organisms are 'aware' of their surroundings. So, it is the defining property of living organisms.

02

03

Human is the only organism having self-consciousness.

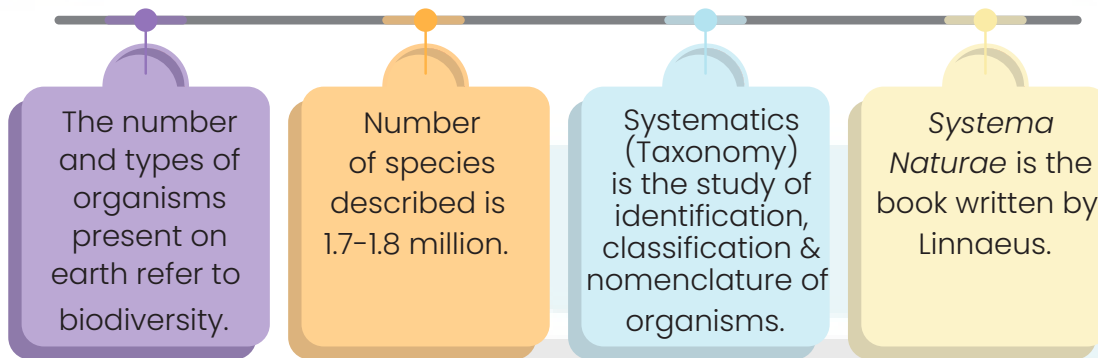
### 6. ĪŅTĒRĀĶĪŅŌŅ

All living phenomena are due to underlying interactions.

Living organisms are self-replicating, self-evolving and self-regulating interactive system capable of responding to external stimuli.

# KDS BIOLOGY

## DIVERSITY IN THE LIVING WORLD



## BASIC PROCESSES OF TAXONOMY

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**Characterisation:** It is the understanding of characters of organisms such as external and internal structure, structure of cell, development process, ecological information etc.

**Identification:** It is the correct description of the organism, so that the naming is possible.

**Classification :** It is the grouping of organisms into convenient categories (taxa) based on characters.

**Nomenclature** (naming) : It is the standardisation of names of the organisms such that an organism is known by the same name all over the world. The system of naming with two components is called **binomial nomenclature**. It is proposed by **Linnaeus**.

1

Botanical names are based on the rules in

Botanical Nomenclature (ICBN). **[AIPMT 2007]**

2

Zoological names are based on the rules in

Code for Zoological Nomenclature (ICZN).

3

International Code for Nomenclature of Bacteria (ICNB)

4

International Code for Viral Nomenclature (ICVN)

## UNIVERSAL RULES OF BINOMIAL NOMENCLATURE

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Scientific names are in Latin or Latinised and **written in italics**. When handwritten, they are **underlined separately**.

The **first word** is genus name (Generic name) and second word is the species name (**specific epithet**), e.g., *Homo sapiens*. *Homo* represents the genus name and *sapiens* represents the species name.

The Genus name starts with capital letter and the species name starts with small letter.

Name of the author (in abbreviated form) appears at the end of the biological name. E.g., *Mangifera indica* Linn. It indicates that this species was first described by Linnaeus. [NEET 2019]

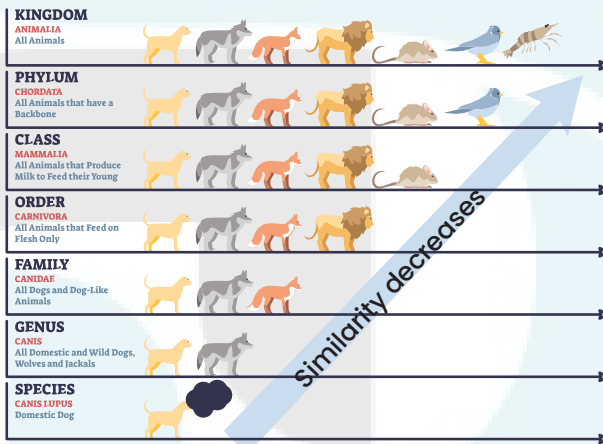
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### TAXONOMIC CATEGORIES

Classification involves hierarchy of steps in which each step represents a taxonomic category (rank).

All categories together constitute a taxonomic hierarchy.

Each category is a unit of classification.



A group of organisms occupying a particular category is called a taxon (pl. taxa), e.g., Class Mammalia.

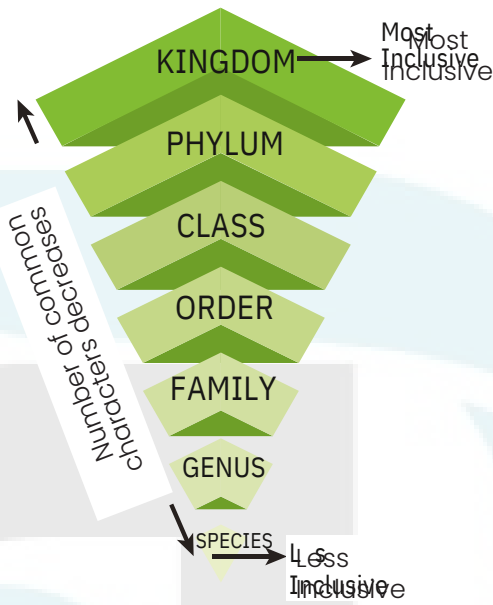
### SPECIES

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It is a group of closely related organisms capable of interbreeding to produce fertile offspring. It is the lowest category. (AIPMT 2003)

COMMON NAME	GENERIC NAME	SPECIFIC EPITHET
Mango	<i>Mangifera</i>	<i>indica</i>
Potato	<i>Solanum</i>	<i>tuberosum</i>
Nightshade	<i>Solanum</i>	<i>nigrum</i>
Tomato	<i>Solanum</i>	<i>lycopersicum</i>
Brinjal	<i>Solanum</i>	<i>melongena</i>
Lion	<i>Panthera</i>	<i>leo</i>
Tiger	<i>Panthera</i>	<i>tigris</i>
Leopard	<i>Panthera</i>	<i>pardus</i>
Modern man	<i>Homo</i>	<i>sapiens</i>

It is the aggregate of closely related species. E.g. Potato, tomato & brinjal are species of genus *Solanum*. Lion, leopard & tiger are species of genus *Panthera*. This genus differs from genus *Felis* (genus of cats).



## FAMILY

It is a group of closely related genera. E.g. Family Solanaceae includes Genus *Solanum*, Genus *Petunia* and Genus *Datura*. Family Felidae includes Genus *Panthera* and Genus *Felis*.

## ORDER

It is the assemblage of related families. E.g. Order **Polymoniales** includes Family **Convolvulaceae** and Family **Solanaceae**. Order **Carnivora** includes Family Felidae & Family Canidae.

## CLASS

It is the assemblage of related orders. E.g. Order Primata, Carnivora etc. is placed in class **Mammalia**.

## PHYLUM (DIVISION IN CASE OF PLANTS)





It is the assemblage of related class. E.g. Classes Amphibia, Reptilia, Aves, Mammalia etc. come under phylum Chordata.

## KĪŅGDØM

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The assemblage of related phyla. It is the highest category.  
E.g. Kingdom Plantae, Kingdom Animalia etc.

## ØRGĀŅĪSMS WITH THEIR TĀXØŅØMĪÇ ÇĀTÈGØRĪÈS

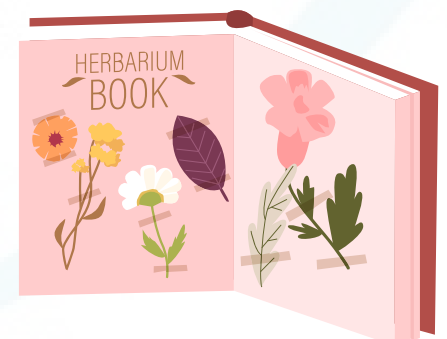
				
Common name	Man	Housefly	Mango	Wheat
Biological name	<i>Homo sapiens</i>	<i>Musca domestica</i>	<i>Mangifera indica</i>	<i>Triticum aestivum</i>
Species	<i>sapiens</i>	<i>domestica</i>	<i>indica</i>	<i>aestivum</i>
Genus	<i>Homo</i>	<i>Musca</i>	<i>Mangifera</i>	<i>Triticum</i>
Family	Hominidae	Muscidae	Anacardiaceae	Poaceae
Order	Primata (AIPMT 2011)	Diptera Insecta	Sapindales	Poales
Class	Mammalia		Dicotyledonae	Monocotyledonae
Phylum/ Division	Chordata	Arthropoda	Angiospermae	Angiospermae
Kingdom	Animalia	Animalia	Plantae	Plantae

## TĀXØŅØMĪÇĀL ĀĪDS

## A. HÈRBĀRĪŪM

Herbaria serves as **quick referral system** in taxonomical studies. It is a store house (repository) of plant **specimens that are dried**, pressed and preserved on sheets and are arranged according to universally accepted classification. (AIPMT 2013)

Herbarium sheets are labelled with information about date and place of collection, English, local and botanical names, family, collector's name etc.



## B. BŌTĀNĪĀL GĀRDĒNS [ĒX-SĪTŪ ĆŌŅSĒRVĀTĪŌŅ]

Specialised gardens having collections of living plants for reference and identification.

Each plant is labelled with its botanical name and family.



Famous botanical gardens:

- Royal Botanical Garden at Kew (England)
- Indian Botanical Garden, Howrah (India)
- National Botanical Research Institute, Lucknow (India)

## Ć. BĪŌLŌĢIĀL MŪSĒŪM [WWW.DOUBTEXPERTS.COM](http://WWW.DOUBTEXPERTS.COM)

1

It is a collection of **preserved plant and animal specimens** for study and reference.

2

A museum contains specimens preserved in preservative solutions in containers or jars.

3

Preserved **dry specimens** of plants and animals.

Insects preserved in insect boxes after collecting, killing and pinning.

4

**Stuffed** larger animals like birds and mammals

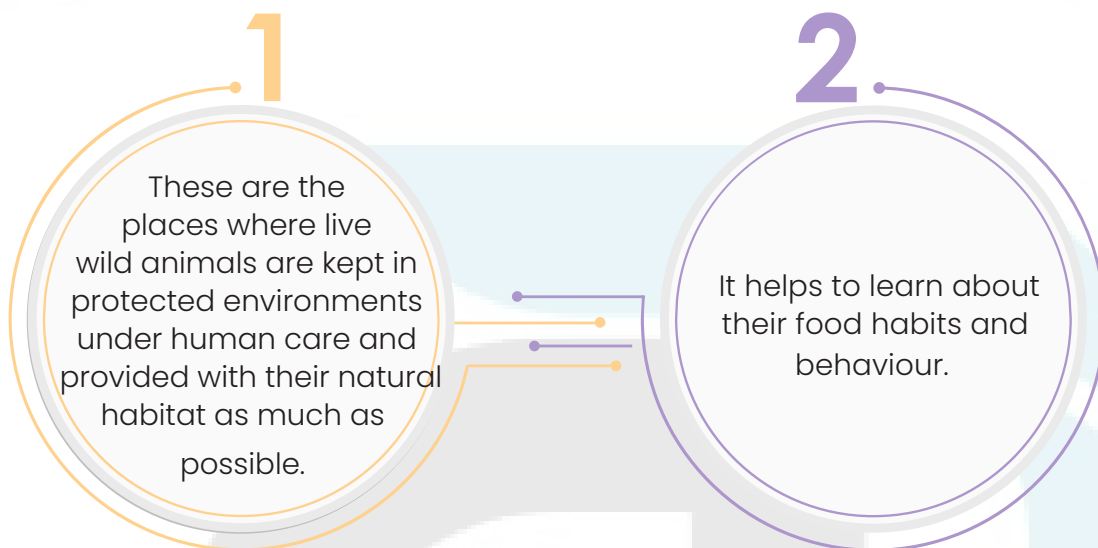
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Collections of animal **skeletons**

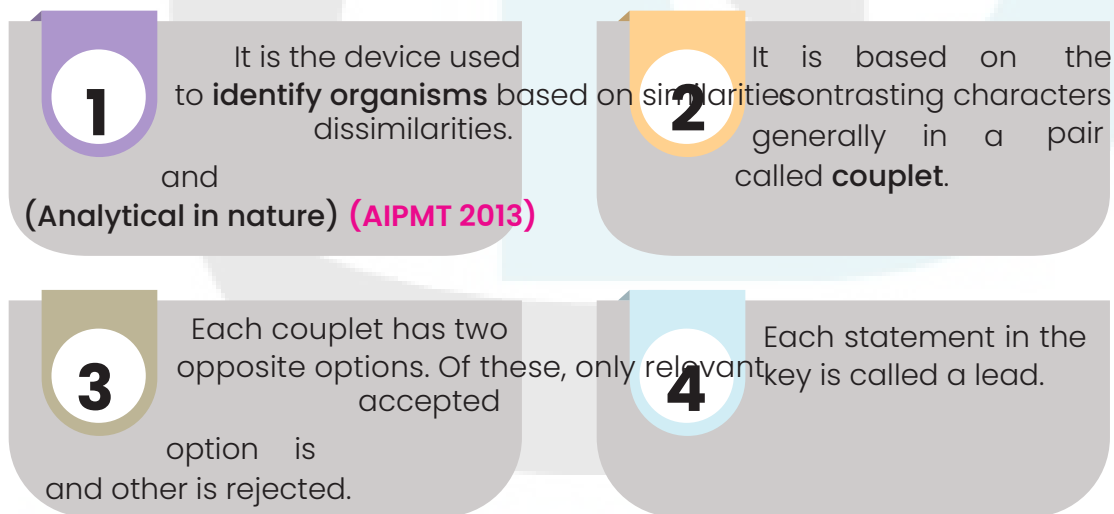
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## D. ZOOLOGIČĀL PĀRKS [ĒX-SĪTŪ ČŌŅSĒRVĀTĪŅĪ]



## Ē. KĒY



## F. FLORĀ. MĀŅŪĀLS. MŌŅŌGRĀPHS & ČĀTĀĻŌGŪĒS

**Flora** is the actual account of habitat and distribution of **plant species** of a given area.

**Manuals** are the record that contains information for **identification of names of species** found in an area.

**Monographs** are the records that contain information on any **one taxon**.

