CLASSIFICATION

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BIOLOGY

2.1 Concept and use of a Classification System.

Understand that organisms can be classified into groups by the features that they share.

Classification

Arranging organisms into groups and sub groups on the basis of similarities and differences or the establishment of a hierarchical system of categories on the basis of presumed natural relationships among organisms is called classification.

Each group or category is known as Taxon.

Basis for classification.

There are many possible ways of classifying organism. Biologist look for a natural system of classification using important features that are shared by large groups.

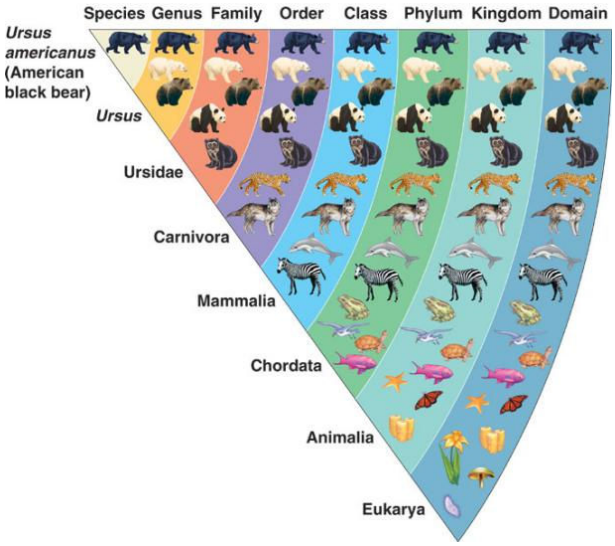
Following may be describe as the basis for classification.

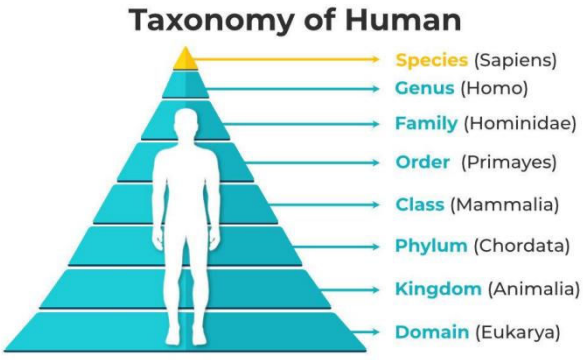
- Type of cell (prokaryotic or eukaryotic).
- Number of cells (unicellular or multicellular).
- Mode of nutrition (autotrophic or heterotrophic).
- Levels of organization and development of organisms.

Organisms are classified on their external features or internal features i.e. on the basis of their morphology and anatomy. More recently the organisms are being classified on the basis of DNA.

Taxonomic Hierarchy

Taxonomic hierarchy is the process of arranging various organisms into successive level of the biological classification either in a decreasing or an increasing order from Kingdom to specie and vice versa.





Describe a species as a group of organisms that can reproduced to produce fertile offspring.

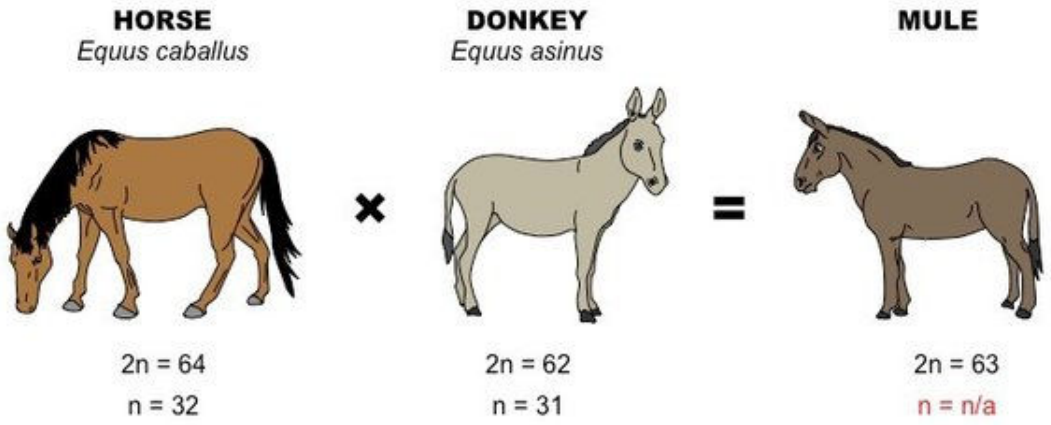
Species

A group of similar organisms that can reproduce with one another in nature and produce fertile offspring.

It is the smallest natural group of organisms. Apart from small variations members of a species are almost identical in their anatomy, physiology and behavior.

If male and female horses are crossed together, they produce fertile offsprings. Similarly, if male and female donkeys reproduce together their offspring produced are fertile and can have more offsprings. However, if a male donkey and a female horse are crossed together, they will have an offspring which called mule which is infertile. Mules cannot reproduce further so they are not fertile.

It means that horses and donkey do not belong to one specie in other cases the members of different species don't even reproduce together.



Describe the binomial system of naming species as an internationally agreed system in which the scientific name of an organism is made up of two parts showing the genus and species.

Binomial System of naming an Organism.

It is the biological system of naming the organisms in which the name is composed of two terms where the first indicates the genus and the second term indicates the species of the organism.

- Binomial names are printed in Italics.
- When hand written first letter of genus name is always capitalized.
- Specie name is always in small letters.
- Both the names are underlined.

Common English Name	**Binomial Name of Species**
Human	*Homo sapiens*
Cat	*Felis domesticus*
Onion	*Allium cepa*
Mustard Plant	*Brassica campestris*

Binomial system is important to standardize the naming of living organisms.

Naming of living organisms should be such that a particular organism is known by the same name all over the world.

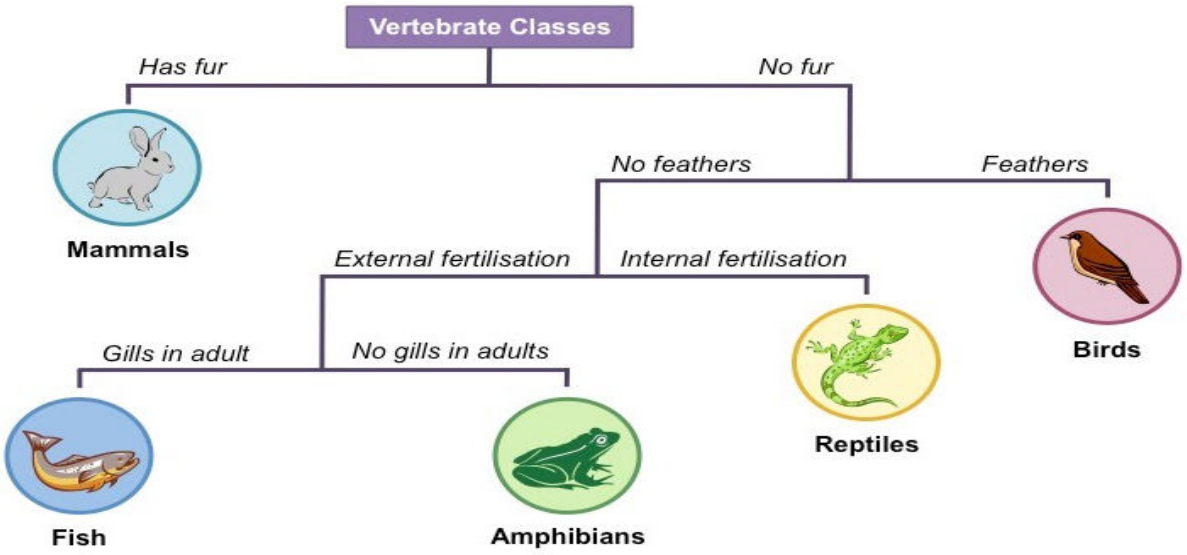
Common names are not unique, unlike scientific names, hence the use of common names can lead to great confusion and conflict as to what animal or plant is being referred to and what is its relationship with other plants or animals. 'Money plant' and 'devils Ivy' are two common names for the same wild plant. If you are not aware that these are alternative names, this could lead to confusion. If the botanical name *Epipremnum aurem* is used there is no chance of error.

Construct and use dichotomous keys based on identifiable features.

'Di' means '2' and 'chotomous' means 'branches'

A dichotomous key is an important scientific tool used to identify different organisms based on the organism's observable traits.

Dichotomous keys consist of a series of statements with two choices in each step that will lead users to the correct identification. With each description the user choose leads on to another pair of descriptions until the user end up with the name of the organism.



1.	Has green colored body .....go to 2
	Has purple colored body ..... go to 4
2.	Has 4 legs .....go to 3
	Has 8 legs ..... *Deerus octagis*
3.	Has a tail ..... *Deerus pestis*
	Does not have a tail ..... *Deerus magnus*
4.	Has a pointy hump ..... *Deerus humpis*
	Does not have a pointy hump.....go to 5
5.	Has ears .....*Deerus purplinis*
	Does not have ears .....*Deerus deafus*

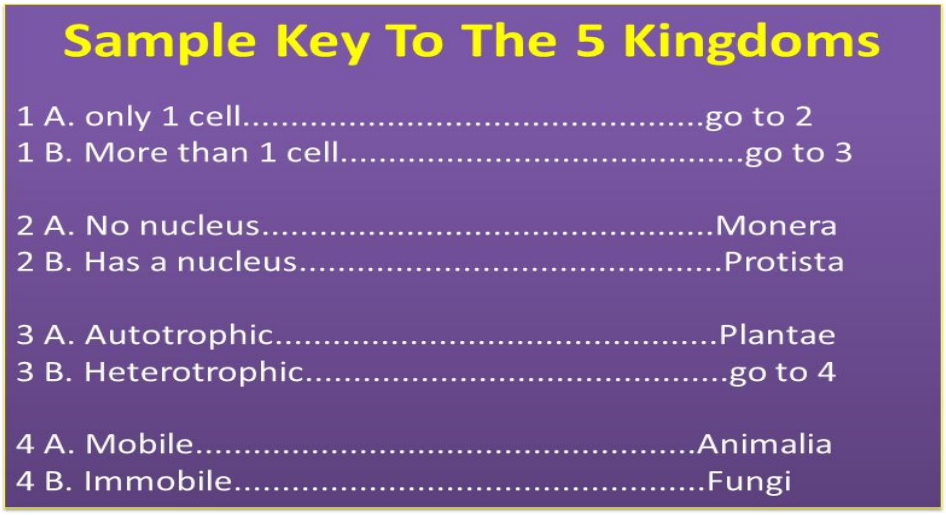
2.2 Features of organisms.

State the main features used to place all organisms into one of the five kingdoms: Animal, Plant, Fungus, Prokaryote, Protoctists.

Living Organisms are classified into five kingdoms. Following are some main features on the basis of which organisms are classified into groups.

Sr. No.	Features	Prokaryotes	Protoctist	Fungi	Plants	Animals
1.	Body Organization	Unicellular	Unicellular, Colonial	Unicellular\ multicellular	multicellular	multicellular
2.	Cell Nature	Prokaryotic	Eukaryotic	Eukaryotic	Eukaryotic	Eukaryotic
3.	Mode of nutrition	Autotrophic or heterotrophic	Autotrophic or heterotrophic	heterotrophic	Autotrophic	Heterotrophic
4.	Nucleus	No	Yes	Yes	Yes	Yes
5.	Chromosomes	Circular	Linear	Linear	Linear	Linear
6.	DNA	Naked	Protein coated	Protein coated	Protein coated	Protein coated
7.	Cell Wall	Peptidoglycan or murein	cellulose	chitin	cellulose	Absent
8.	Cell division	Binary fission	mitosis	mitosis	mitosis	mitosis
9.	Ribosomes	70S	80S	80S	80S	80S

Other factors such as cytology, genetics, and reproduction.



State the main features used to place organisms into groups within the animal kingdom, limited to:

(a) the main groups of vertebrates: mammals, birds, reptiles, amphibians, fish. (b) the main groups of arthropods: myriapods, insects, arachnids, crustaceans.

Vertebrates

Vertebrates are animals with back bones. They are 5 classes of vertebrates.

Table features the five classes of vertebrates.

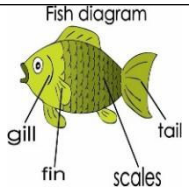
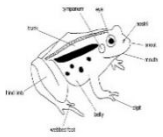
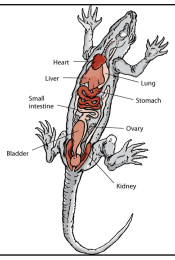
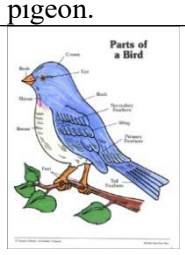
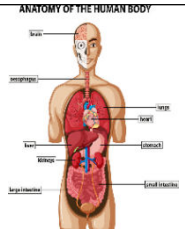
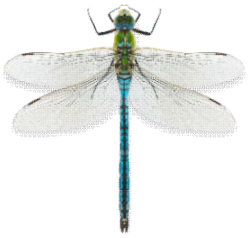
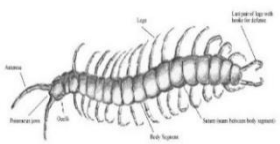
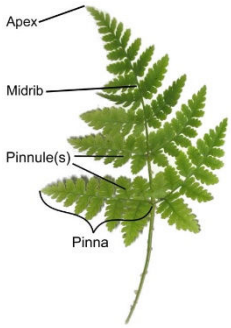
Features	Fish	Amphibian	Reptiles	Birds	Mammals
Body	Stream line body with scales.	Moist skin, no scales.	Dry skin with scales.	Feathers with scales on legs.	Fur.
Movement	Fins (also used for balancing).	Four limbs, back feet are often webbed for swimming.	Four legs (apart from snakes)	Two wings and two legs.	Four limbs
Reproduction	External fertilization. Jelly covered eggs in water.	External fertilization. Jelly covered eggs in water.	Internal Fertilization. Rubbery eggs on land. Eggs hatch outside.	Internal Fertilization. Hard shelled eggs on land. Eggs hatch outside.	Internal fertilization. Produce live young.
Sense Organs	Eyes, no ears, lateral line along body for detection of vibrations.	Eyes, ears.	Eyes, ears.	Eyes, ears.	Eyes, ears with a pinna.
Other details	Cold blooded, gills for breathing, 2 chambered heart.	Cold blooded, lungs and skin for breathing. 3 chambered heart.	Cold blooded, lungs for breathing. 3 chambered heart.	Warm blooded, lungs for breathing, 4 chambered heart.	Warm blooded, lungs for breathing, females have memory glands for milk feeding. 4 chambered heart, 4 types of teeth.
Examples	Trout, Perch, Sharks.	Frog, toad, newt.	Lizard, snake.	Sparrow, pigeon.	Mouse, human, whale.
Figures					

Table features the 4 classes of arthropods.

Crustacea	Insects	Arachnids	Myriapods
➢ Five or more pairs of legs. ➢ Body divided into cephalothorax and abdomen. ➢ Two pairs of antenna. ➢ One pair of compound eyes. ➢ Exoskeleton is made of salts and chitin. ➢ Aquatic. ➢ Have gills. ➢ **e.g.** crab, woodlouse.	➢ Three pairs of legs. ➢ Body divided into head, thorax and abdomen. ➢ One pair of antenna. ➢ One pair of compound eyes. ➢ Exoskeleton with cuticle. ➢ Usually 2 pairs of wings. ➢ Largest group of organisms. ➢ **e.g.** dragonfly, wasp.	➢ Four pairs of legs. ➢ Body divided into cephalothorax and abdomen. ➢ No antenna. ➢ Several pairs of simple eyes. ➢ Chelicerae for biting and poisoning prey. ➢ Two pairs of pedipalps for reproduction and preying. ➢ Respiration is by gills. ➢ **e.g.** spiders, mites.	➢ Ten or more pairs of legs. ➢ Body not clearly divided. ➢ One pair of antenna. ➢ Simple eyes. ➢ Usually 1 pair of legs per segment. ➢ **e.g.** millipede, centipede.
			

State the main features used to place organisms into groups within the plant kingdom, limited to ferns and flowering plants (dicotyledons and monocotyledons)

Ferns



- Do not produce flowers.
- Have leaves called fronds.
- Stem is usually completely below ground.
- Reproduce by spores.
- Produce gametes but no seed.

Flowering Plants

- Produce flowers.
- Reproduce sexually by means of seeds.
- Plants with roots, stem and leaves.
- Seed are enclosed in flowers.
- Flowering plants are divided in monocots, dicots.

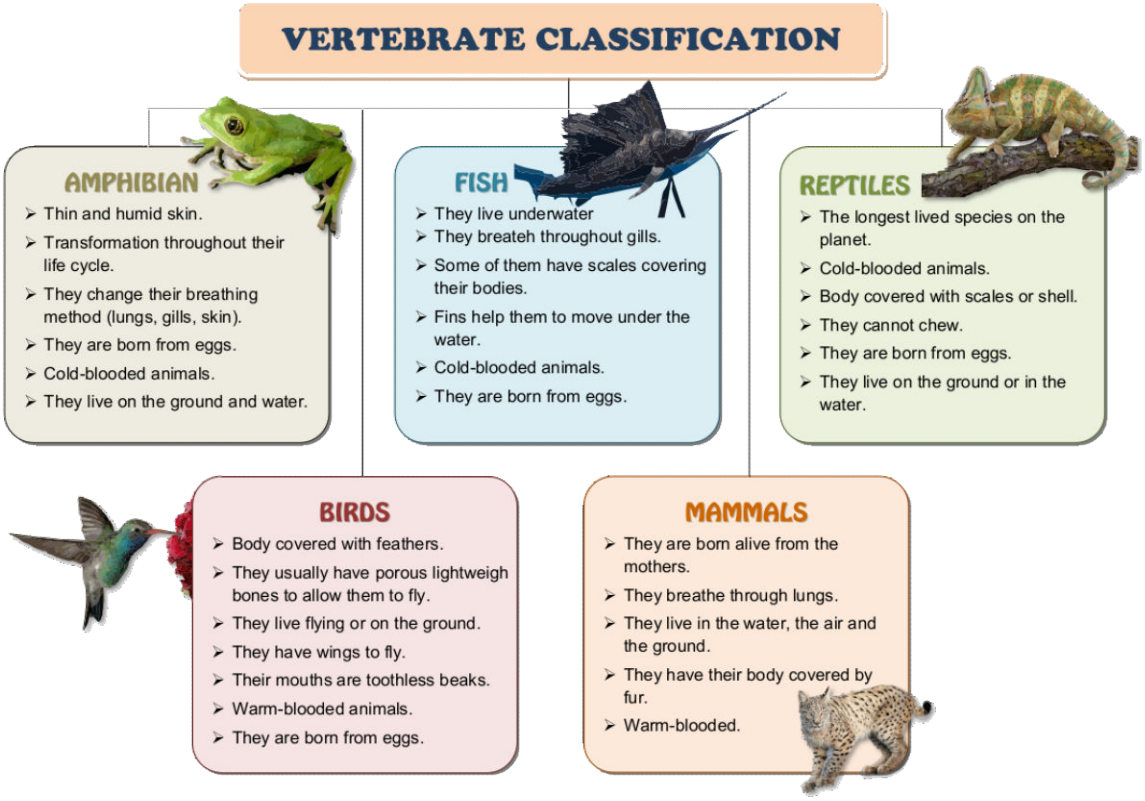
Monocots.

A chiefly herbaceous angiospermous plant having an embryo with a single cotyledon.

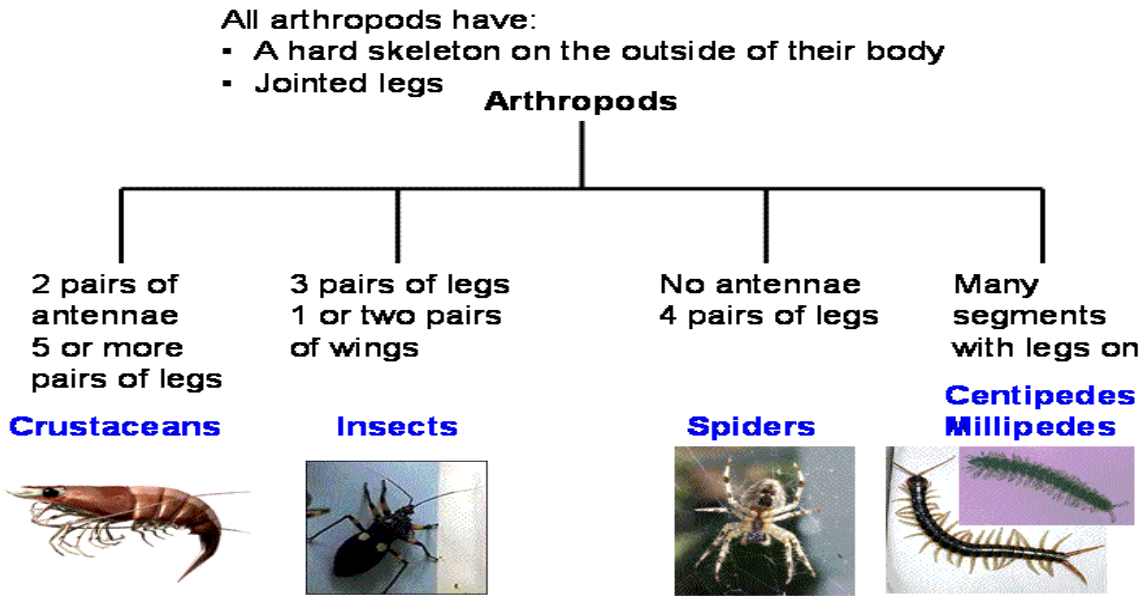
Dicots

A herbaceous angiospermous plant having an embryo with two cotyledon.

Classify organisms using the features identified in 2.2.1, 2.2.2 and 2.2.3.



Arthropods

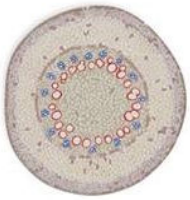
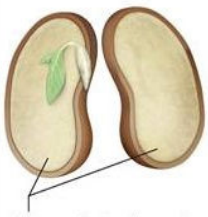
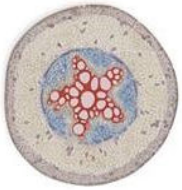


Ferns and Flowering Plants

Ferns

- Have leaves called fronds**.**
- Do not produce flowers but instead reproduce by spores produced on the underside of fronds.

Flowering Plants

	Seed	Root	Stem	Leaf	Flower
Monocots	 One cotyledon in seed	 Root xylem and phloem in a ring	 Vascular bundles scattered in stem	 Leaf veins form a parallel pattern	 Flower parts in threes and multiples of three
Eudicots	 Two cotyledons in seed	 Root phloem between arms of xylem	 Vascular bundles in a distinct ring	 Leaf veins form a net pattern	 Flower parts in fours or fives and their multiples

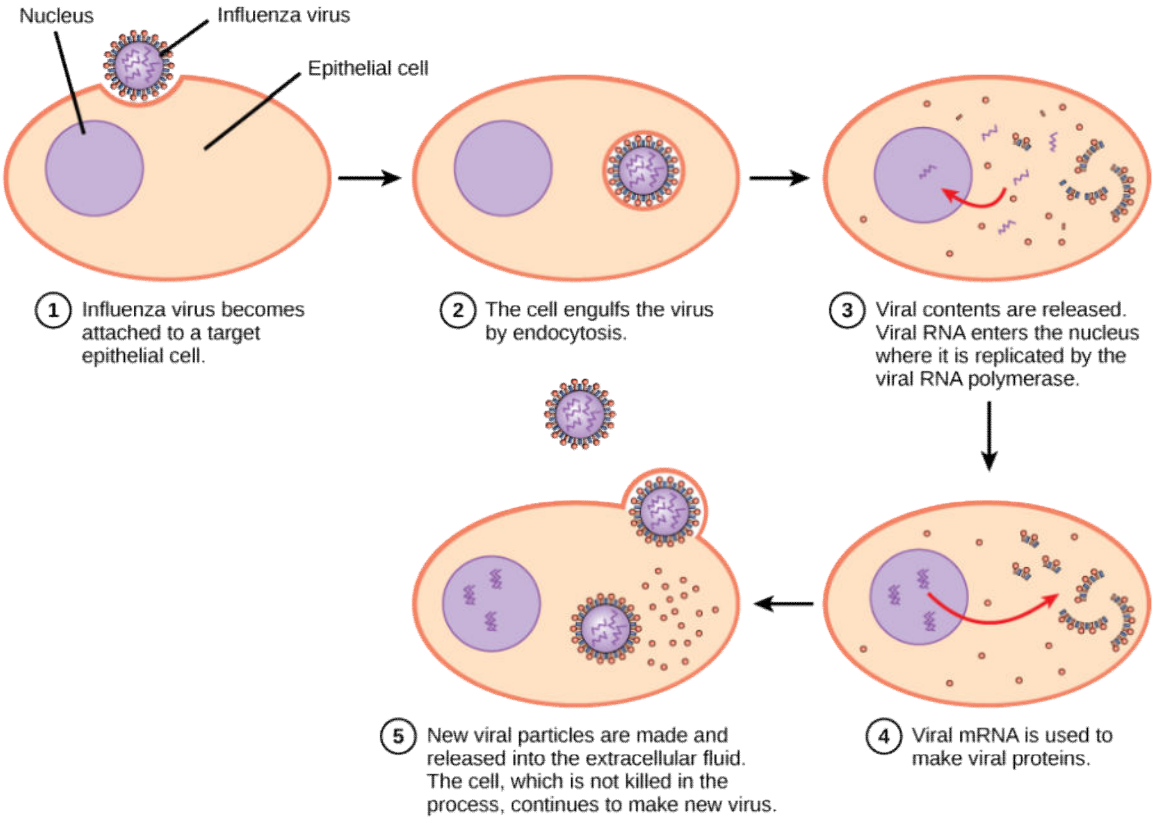
State the main features of viruses, limited to protein coat and genetic material.

Understand that viruses can only replicate in living cells.

Virus

- Viruses are not considered as living organisms hence are not classified in the five kingdoms classification system.
- Virus structure is simple genetic material inside a protein coat.
- Genetic material may be DNA or RNA.
- Virus protein coat is called as capsid.
- They are parasitic.
- They have no nucleus, cytoplasm, cell organelles, or cell membrane.
- No living activity outside host cell.

Viruses do not possess ribosomes and cannot independently form proteins from molecules of messenger RNA because of these limitations viruses can replicate only within a living cell therefore viruses are obligated intracellular parasites.



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