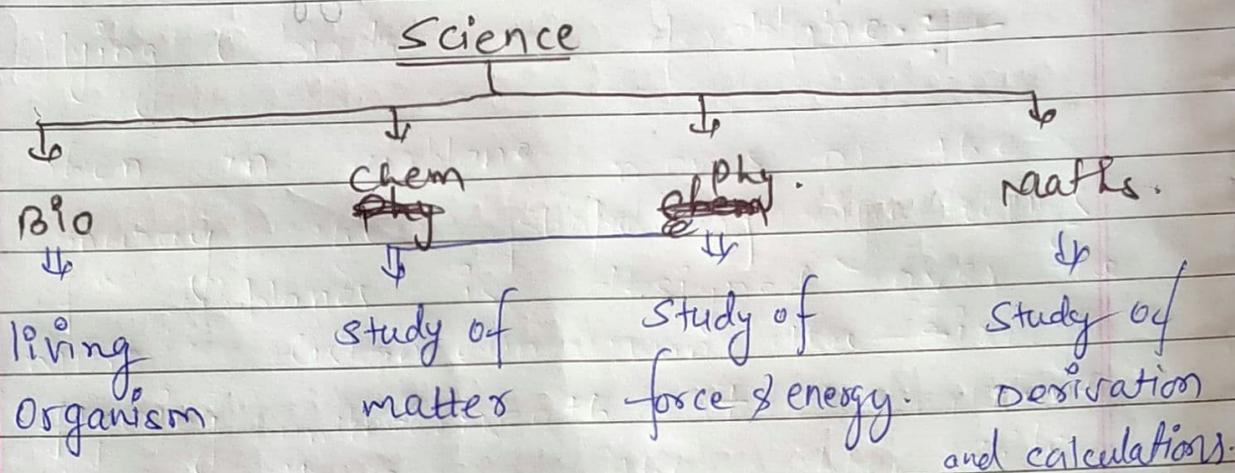


Introduction to Biology

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Science: - The word Science implies the knowledge, understanding and implementation of phenomenon occurring in the universe relevant to human beings. It is learned through experiments and observations.



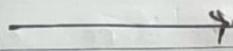
⇒ Similarities b/w camera and Human eye.

Part of camera → Human eye → functions.

- ① Aperture → pupil → Light enters the eye through the pupil / aperture.
- ② Diaphragm → Iris → Regulates the amount of light.
- ③ Lens → lens → focus light and image on the retina in eye and film.
- ④ film → Retina → The part on which images are formed.
- ⑤ Black paint → choroid → The dark-coloured melanin pigment in the choroid absorbs light and limit the reflection.

⇒ Differences b/w camera and human eye.

Camera



Human eye.

- | | |
|---|---|
| ① focal length of lens is fixed | ① focal length of lens can be changed. |
| ② photographic film retains the image permanently. | ② Retina retains the impression of an image for only $1/16^{\text{th}}$ second. |
| ③ A photograph has to be changed for getting next image. | ③ same retina can be used for viewing unlimited images. |
| ④ Image is formed on photographic film and processing can be done through computer. | ④ Image is formed on retina which is further processed in brain. |

~~Birds~~ The basic principle of flying is based on Bernoulli's principle :-

- ① The particles in air are always moving.
- ② Air like a fluid will always move from a high pressure area to a low pressure.
- ③ He found fast moving air has lower pressure and slow moving air has higher pressure.
- ④ Where the velocity of flow increases pressure decreases.

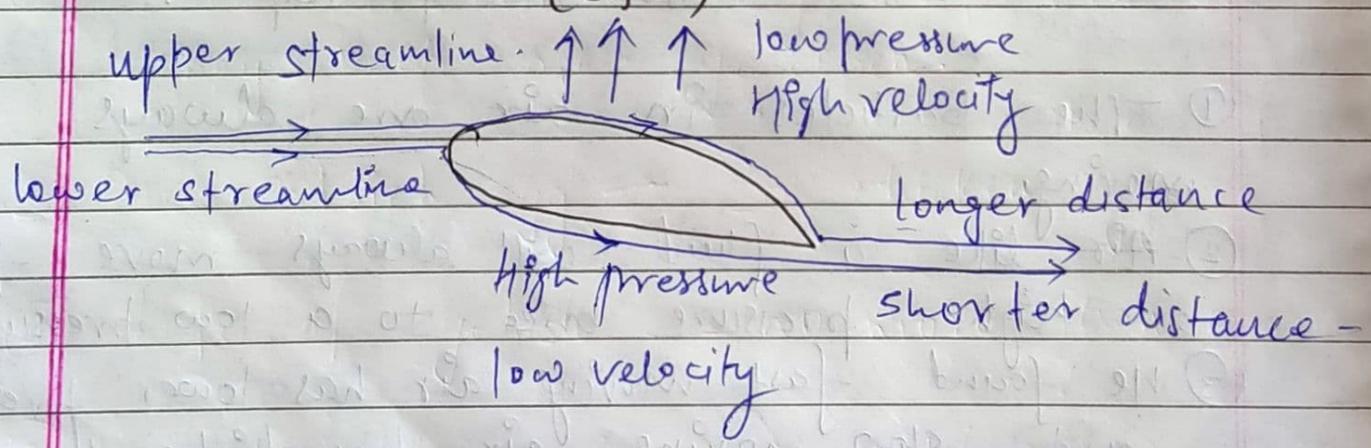
⇒ Most important factors contributing to a successful flight?

- ① Take off
- ② maintain zero "Net force" during flight.

According to Bernoulli's principle for flying birds or Aeroplane:—

When an airplane moves on the runway, the shape of the wings of airplanes is designed over the more distance than the air flowing underneath at the same time. Hence, on the upper side of the wing, air velocity is higher than the lower side, and the pressure is lower on the upper side of the wing; making the aircraft take off when the air tries to move from higher pressure to lower pressure.

(Lift)



- ① Lift:- The force that pushes upward, created by the movement of air over and under the wings.
- ② Drag:- The force of the air pressing against the bird and slowing them down.
- ③ Thrust:- The force that moves the bird forward.
- ④ Propulsion:- It means to push forward or drive an object forward. A propulsion system is a machine that produces thrust.

⇒ Comparison b/w flying of birds & Airplane:

Function → Part of plane → Part of bird.

- ① Lift → Airfoil/wings → Muscles
- ② Drag → Streamlined shape → light weight skeleton and streamlined shape.
- ③ Thrust → Propulsion → flapping of wings.
- ④ Control → wings → tail and wings.
- ⑤ Propulsion → Engine → Muscles.

① Why the colour of our blood is Red?

The iron present in our blood forms a ring of atoms called porphyrin.

② The femur supports the weight of our body which is more powerful compared to a solid concrete of the same weight.

③ Largest organ of human body → skin

④ Relation b/w thumb and nose → length of thumb is equal to length of nose.

⑤ Every nucleus in the human body has DNA of 6 feet long.

⑥ Magnetoreception is magnetic compass present in some migratory birds.

⑦ Dolphins sleep → They sleep half awake. They keep one eye open.

⑧ One ostrich egg → 30 chicken eggs.

⑨ Life of eyelash → no more than 5 months

⑩ largest flower in the world →
Rafflesia Arnoldii

- (11) Smallest flowering plant \rightarrow Wolffia.
- (12) Armadillos \rightarrow spend 80% of their life in asleep.
- (13) Ants cannot chew their food, they move their sideways jaws like scissors to extract the juices from the food.
- (14) Male Seahorses \rightarrow Give birth to a young one.
- (15) Human nose and ears \rightarrow do not stop growing.

Terms

- (1) Ecology: \rightarrow Studies the relationship b/w animals, plants, and the human environment.
- (2) Immunology: \rightarrow Studies about our immune system.
- (3) Pathology: \rightarrow Studies of diagnoses diseases and what causes them.
- (4) Virology: \rightarrow Studies about viruses that may cause harm to us.

⇒ Need to study biology

- ① Biology has endless array of species. Estimated 8.7 million species on earth out of which only 1.9 million species have been discovered.
- ② Every creation which is a part of nature is so adorable and unique in its own way.
- ③ Biology exists every second.
 - when we Inhale and exhale
 - function of heart
 - Emotions and gestures.
- ④ Study of biology has helped humans to understand the similarities b/w all forms of life (DNA).
- ⑤ Biology has also helped doctors learn how to keep people healthy and fight off diseases.
- ⑥ Biology also studies the origin of diseases and plagues.

⇒ Observations of 18th century :-

- * Aristotle (384-322) BC was one of the first biologists who study human anatomy and marine science.
- ① Humboldt (1769-1859) and Bonpland (1773-1858) They collecting the data ~~about~~ and cataloging of flora and fauna.
- ② Carolus Linnaeus (1707-1778) :- He proposed a system for naming and classifying plants and animals.
- book ↓
species plantarum.
↳ 6000 plants - binomial name.
- ③ Lavoisier (1743-1794) :- His chemical discoveries were instrumental in the development of physiology and biophysics.
- ④ Edward Jenner (1749-1823) :- He was an English physician and scientist who pioneered the concept of vaccine including creating the smallpox vaccine
- The world first vaccine.
 - The father of immunology.
 - vaccine and vaccination are derived from Variolae vaccine known as the cowpox.

(5) Hanaoka Seishu (1760-1835) :- was a Japanese surgeon. Hanaoka is said to have been the first to perform surgery using general anesthesia.

→ Brownian motion (1827)

Robert

Brown

observe } Sexual organs of plants under
the microscope, the scientist
found that pollen grains
seemed to be darting around
in random manner.

Albert Einstein (1905)

Brownian motion is the results of the particles colliding with molecules.

Jean Perrin

Einstein's thesis of Brownian motion is correct.

Def.:- Brownian motion is the continuous random movement of small particles suspended in a fluid, which arises from collisions with fluid molecules.

Eg -

- ① The motion of pollen grains in still water.
- ② Movement of dust motes in a room.
- ③ Diffusion of pollutants in air.
- ④ Diffusion of calcium through bones.

Importance of Brownian motion:-

- ① It supported the modern atomic theory.
- ② Brownian motion are used in maths, economics, engineering, physics, biology, chemistry and other disciplines.

Robert Mayer (1814-1878) German Physician

- ↳ 1st statements of the conservation of energy.
- ↳ motion is converted into heat.

⇒ Observations -

1st obs. - The agitation, motion, or mechanical action of the waves had been converted into heat.

2nd obs. - Venous blood was lighter in colour in the tropics as compared with colder areas, then this was due to the higher oxygen consumption in order to maintain body temperature.

⇒ Laws of Thermodynamics

1. first law of thermodynamics is the law of conservation of energy - "Energy can neither be created nor destroyed".
2. The second law stated that heat flows spontaneously from a hot object to a cold object.
3. The Zeroth law states that If A is in thermal equilibrium with B,

and B is in equilibrium with object C, then C is also in thermal equilibrium with A.

⇒ Eg. of 1st and 2nd Law of Thermodynamics

① Melting of Ice.

↳ Every day, ice needs to be maintained at a temperature below the freezing point of water to remain solid.

↳ The total amount of heat in the system has remained the same but has just gravitated towards equilibrium;

② Sweating in a Crowded Room

↳ feel warm → start sweating → body cooled itself → heat from your is transferred to the sweat. → Sweat absorb more and more heat → evaporated from your body → Heats up temperature of the room.

↳ both law in action.
Because no heat is loss, it is merely transferred.