Biology / Life Science

"Biology" - Greek word [Bios - Life + Logous - study]

study of [Flora - Plants, Fauna - Animals and Micro-organisms]

Aristotle is called Father of Biology, "Father of Zoology".

Theophrastus is called Father of Botony"

Lamark and Trevironus gave the term "Biology".

Lamark gave theory of inheritance of acquired characters according to which characteristics acquired by individual in his own generation are passed on to next generation.

Weismon gave "Germplasm theory" by performing experiments on rats.

- he rejected Lamark's theory.
- According to Weismon body of an individual is made up of two types of cells.

a) Somatic cells / Body cells - visible. Somatic changes are not inhereted.

b) Germ / sex cells / sperms in male & ovum is female.- They contain Genes on which genetic changes passed to next generation.

Charles Darwin:

- performed experiments on birds of Galapages Island. populorly called as "Darwin's finches"
- He mentioned theory of evolution in his book "Origin of species.

Louis Pasteur:

- He is known as "Father of microbiology".
- He invented anti-rabies vaccine.
- He gave Germ theory of disease.
- Pasteurisation is process used to kill Micro-organisms.

Jhon Salk developed Polio vaccine.

Edword Jenner is called Father of Immunisation.

Virus is connectivity link between Living & non-Living.

Virus has DNA or RNA - never both

e.g. AIDS - virus - HIV + RNA virus. (Retrovirus)

Robies is caused by virus (Rhabdo) and it is transmitted by Canines (Most commonly - dogs)

Moloria is caused by protozoo (plasmodium) and it is transmitted by female onapheles Mosquitoes.

Dengue or break bone fever is caused by Dengue virus and it is transmitted by bite of mosquito Aedes Aegyptil- which remains active during daytime.

Chickenguniea is caused by chikvirus and it is transmitted by bite of mosquitoes of Culex species.

Japonese Encephalities - Brain fever causing virus (J.E.) and it is transmitted by bite of Culex mosquito. that normally breads in freshwater.

Mendel died due to kidney failure.

- He is called Father of genetics
- 1900 A.D. is famous for re-discovery of Mendelism (Correns, Tshemarks & Devries associated with it)

Gene is the basic unit of heredity.

Mendel called "Gene" as factor. & Johnson gave the term "Gene".

Atavism or reversion

Microbiology is the study of DNA and RNA gene.

Note:

Allec Jeffrey discovered technique of DNA Fingerprinting also called "DNA typing" or "DNA profiling".

DNA finger printing:

It is based on V.N.T.R. sequences. (variable number of tandom repeats). which is different in each and every individual.

DNA fingerprinting is used to solve problems of parental disputes, baby exchange. criminal cases and to identify rapiest.

Technique used in this process is called Southern blotting.

Species is the basic unit of classification.

Carolous Linnaeus is called father of Texonomy (Study of Nomendature and Classification)

He gave Binomial system of Nomenclature according to which every scientific name has two parts. "Genus" and "Species"

Cobra :- Naja Naja

Moder mon : Homo sapiens

Gorden pea : Pisuro rativum

Mango : Mongifera indica.

Pisticulture	-	Cultivation of fishes
Silviculture	-	forestry
Sericulture	-	Silk.
Arboriculture	-	cultivation of trees.
Agrostology	-	Grasses.
Agriculture	-	Cultivation of crops.
Oncology	-	Cancer

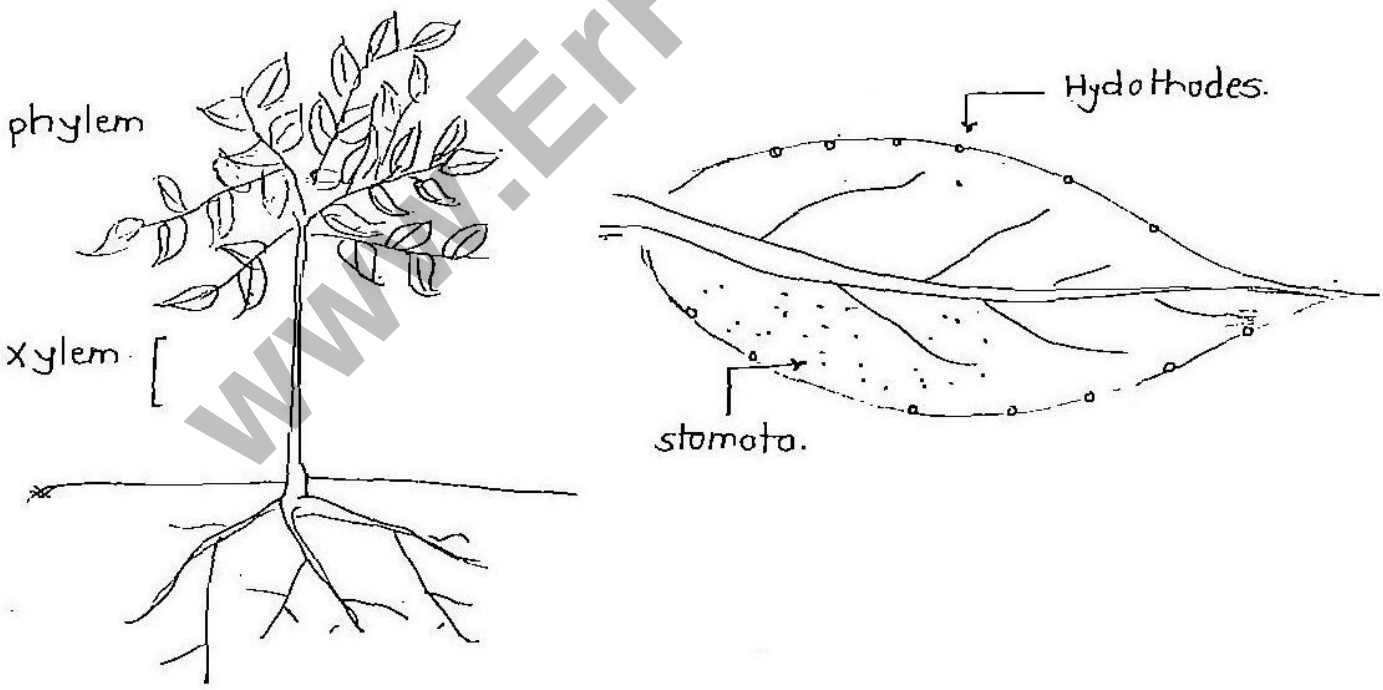
Oncogene	-	Gene causing Cancer.
Olericulture	-	vegetables
Pharmacognosy	-	Medicinal plant
Pharmacology	-	Action of drugs.
Palynology	-	Pollen grains.
Paleo botony	-	fossil plants.
Pomology	-	fruits.
Anthology	-	study of flowers.

Note:

Wolffia is rootless, floating, hydrophyte having smallest flower.

Roflesia - Largest Flower (1m dia)

Hayfever is caused due to Allergy by pollen grains.



Holord = Chesard + Echord

(Total water present in soil) (water avail. to plants) (non-available water)

Plants absorb water and soluble nutrients from soil with the help of roots and then it is transported upward against force of gravity. This process is called "Ascent of sap" which occurs through Xylem.

The most accepted theory of Ascent of saps is Cohesion-tension transpirational pull theory" given by Dixon and Jolly.

Phloem is responsible for transportation of food which is mainly in the form of "Sucrose."

In Human being. food is present in form of "Glucose".
In plants Glucose form of food is manufactured and starch form is stored.

Transpiration is loss of water in form of water vapour (pure form) through specialised pores present at the surface of leaves called stomata.

Stomata normally remains open during daytime and closed during night time except night (desert plants)

In desert plants, stomata opens during night for goses exchange and remains closed during day in orde to reduce wate losses.

Guttation is loss of water in the form of liquid droplets (impure form) through a specialised pores present on margin of leaves called as "Hydathodes".

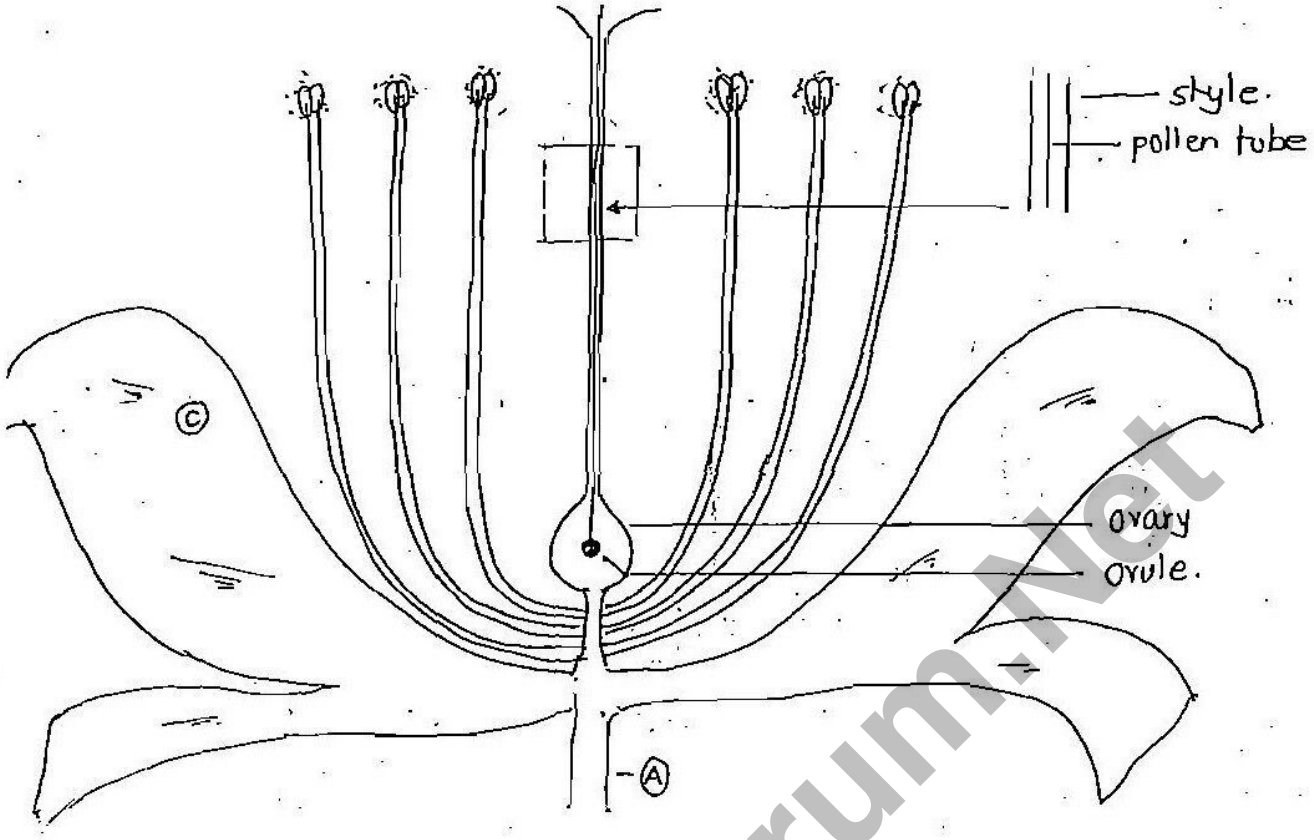
Transpiration occurs during daytime whereas Guttation occurs during nighttime.

Micro-nutrients:

Zn, Mn, Mo, B, Fe, Cu, Cl

Macro nutrients:

C, Mg, O, N, K, P, Ca, S, H



Ⓐ - Pedicel - stalk of flower
Ⓑ - Sepals - Green bracts
© - Petals - Coloured bracts
Ⓓ - Calyx - Group of Sepals (Non-essential part)
Ⓕ - Corolla - Group of petals.

True fruits have "Ovary"
Seed is the "Ovule" - Modified ovule of plant.
Pseudo - False fruits
e.g. Apple, Pear, Cashewnut.

Stigma + Style + Ovary = Gynoecieum
(Female reproductive part ♀)
Group of filaments = Androecieum
(Male reproductive part ♂)

Pollination :

It is transfer of pollen grains from Anthem to Stigma.
If this process occurs in same Flower. it is called "Self pollination. It is possible in bisexual Flowers.
When pollination occurs between two different Flowers it is called cross pollination. It is common in unisexual Flowers
When pollination occurs in bisexual Flowers sometimes. called Dichogamy.

During Dichogamy male and female parts mature at different times. If Male matures first. it is called "Protandry" and if Female matures first it is called "Protogyny".
After pollination. acceptance and rejection of pollen grains occurs at surface of stigma.

Germination of pollen grains occurs at surface of stigma and pollen tube is formed which penetrates in style and enters into ovary,. where it releases male gomets and ovary is modified into fruit. Such fruits are called True fruits - Matured / Fertilised / Ripen fruits or Modified ovary.

Seeds - Modified ovules.

False fruits / pseudo fruits have Thalamus modified into fruit. - Apple. Cashewnut.

Ethylene is goseous plant harmone that helps in ripening fruits.

Pollination	Agent	Pollination	Agent
Entemophily	Insects	Malacophily	Snails
Ornithophily	Birds	Myrmecophily	Ants
Hydrophily	Water	Cantharophilly	Beetles
Zoophily	Animals		

Water Hyacinth
- promote eutrophication
- cause algal bloom
- decreases DO
was brought as Ornamental plant in India.

2. G. Mesquite Mexicana
- Exotic plant
- Soil (Non-native)
At

caused the Drought in India

roots penetrates deep for water

Warghari Malhar

1970's - Eucalyptus trees

Native Australia

to ↑ green plantation in Africa

- brought to India by Rajiv Gandhi

Mango becomes - deciduous (tropical) (full own leaves) to use their trees - in

Q. 1. Which of the following has maximum protein content?

(a) Milk (b) Soyabin (c) Spirulina (d) Chlorella.

Q. 2. Which of the following is longest grass?

(a) Congress Gross (b) Elephant grass (c) Parthenium gross

(d) Aigemone gross (e) Bamboo (2-25 m in Savanna) - zone of transition between grassland & forest.

Q. 3. Which of the following is tallest tree?

(a) Eucklyptus (b) Whitewood (c) Redwood (d) sequoia.

Q. Which of the following is recently declared Hot spot of biodiversity in India.

(a) Western ghats (b) Eastern Himalaya

(c) Andman & Nicobar (d) North-East.

Q. Which of the following condition is required for being HOT spot.

(a) High value of biodiversity (b) High no. of endemic species (Restricted in distribution)

(c) High degree of threat (Habitated loss and fragmentation)

(i) Phycology - study of Algoe - contains chlorophyll & performs photosynthesis. Thus called Autotrophs.

(ii) Mycology - study of fungi - don't contain Chlorophyll. Called as Heterotrops. (mainly Saphrotroph - feed on dead decaying matter)

e.g. Mushrooms, puff balls, Tood balls, slime moulds, yeast (used in Brewing industry)

(iii) Algae has light absorping green pigment chlorophyll which shows max. absorption of blue light followed by Red light & minimum green light.

(iv) Algae is responsible for 90% of Marine photosynthesis.

(v) Algae like Chlorella is sources for Antibiotic Chorellim.

(vi) Spirulina & Chlorella both are algae with max. protein used as "Space food".

(vii) Some mushrooms are edible like 'Morchella' whereas some are poisoinous like 'Amanita'. (used as poison in Ancient India) from Amanita, Amanitine is obtained which is used as Medicine against Snake bite.

(viii) In Buffallow milk, Coesson is more (More whiteness) while in Cow milk has more Riboflavin (More yellowish)

pollen grains cause - Asthma.
Aran Bell Morwell
- Meghalai [illegible]

Exotic species
- transfered into the area

Biodiversity :

(i) The Indian domestic food grain was less yielding more immunity potential.

DDT was banned in 70's in US. We used it 15-20 yrs

(ii) In growing population we required to import the Wheat grain from US. We started using High Yielding Variety (HYV) Crops.

(iii) US exported us the species of wheat (having pollen grains causes Asthma). We didn't use that & thrown it away.

(iv) The plant grown due to imported grain - Congress grass, or Carrot grass.

(v) Wanghari Mathai started program of "Green Belt Movement in 1970's in South Africa for increasing green plantation using "Eucalyptus tree". She was awarded Nobel Peace prize

(vi) International norm is, any country's 1/3rd of geographical area must be under forest. India has grown 21% of its geographical area under forest.

(vii) Eucalyptus tree is Native of Australia. It was brough to India for increasing green plantation inspiring from Wanghari Mathai, but it caused reduction in water table & caused draught.

(viii) Gouro Devi (Tree-woman of India) & Sundar lal Bahuguna (Tree man of India) are associated with Chipko movement which is against cutting of tree, i.e. deforestation.

(ix) Water Hycinth was brought to India as Ornamental plant for lakes etc. (height 1 - 1½ feet)

(x) Bamboo is longest grass & it is Monocarpic (Flowers grow only once in lifetime)

Hot Spot:

(i) Norman Myer gave the concept of hot spot.

(ii) Habitat loss and fragmentation is main cause responsible for loss of biodiversity.

(iii) According to Arthur & Wilsons' biogeographic principle: 1/10th loss of habitat is responsible for 1/2 loss of biodiversity.

(iv) Introduction of Exotic or not/non-native or alien species is 2nd main cause responsible for loss of biodiversity.

e.g

(a) Parthenium or Carrot grass or Congress grass: It's roots secrets chemicals which causes destruction of wheat & domage to tomato, potato and bringel, and its pollen grains causes asthma.

(b) Eucalyptus or Whitewood tree :

It is responsible for depletion of groundwater level and thus promotes draughts.

(c) Water Hycinth :

It clogs or covers lakes, plants and rivers and causes their extinction.

(d) R.G. Moon :

When its seeds mixed with Mustard causes disease Dropsy.

Plant	Edible part	Plant	Edible part
Potato	stem (Tuber)	Sugarcane	stem
sweet potato	root	Amorphallus	stem
Radish	root	Colocasia	
Carrot	root	Cloves (लवंग)	Flower bud.
Turnip	root	Cumin (जिरा)	seed.
Ginger	stem (Rhizome)	Saffron	stigma & style.
Turmeric	stem (Rhizome)	Wheat	Fruit / Coryopsis
Onion	stem (Bulb)	Legumes	Fruit / Legume
Garlic	stem (Bulb)	Cauliflower	Inflorescence
Rice paddy	Fruit - Caryopsis	Cabbage	Leaf
Brinjel	Fruit	Tomato	Fruit

(i) Potato is rich source of starch as it is storage tissue.
(increase in starch will increase glucose in body)

(ii) Radish is rich in Nitrogen containing secondary Metabolite.
(Primary metabolite - growth & dweloping is main function)
It is rich in colourless plasted Leaucoplast.

(iii) Carrot is rich source of Carotine which is pre-cursor of vitamin-A i.e. Retinal which helps in formation of retinal pigments of eyes.

(iv) Features and flavour of Ginger is due to presence of Gingiberin.

(v) Anti-septic property of termeric, its aroma, colour is due to presence of Curcumin.

(vi) Onion is rich in Sulphur containing secondary Metabolite which are highly sensible to Lacrymal gland or tear gland.

(vii) Clove has essential oil - Eugenol, responsible for its features.

(viii) Inflorescence - group of flowers

Biotechnology :

(i) Branch of science using concepts from different other branches to creat products using Plants, animals or micro-organism.

(ii) Products may - Hormones, Enzymes, Antibotics, Vitamins, Organic Acids.

(A) Harmones :

protein	steroids
Insulin, Humulin (Human insulin)	Testosterone ♂
	Estrogen ♀
Somato-tropin (Main growth hormone is both Male - Female)	

(B) Enzymes :

- Mainly proteinaceous
- except Ribozyme (R.N.A. based - by Thomas Cech who received Nobel prize)
- e.g. Ptyalin / Salivary amylase.

(C) Antibiotics :

- e.g. Penicciline by Alexander Hemming
- Streptomycin - to destroy cell wall of bacteria.

① Vitamins :

- Ascorbic acid - Vitamin C - water soluble.
- Folic acid - Vitamin B-9
- Metabolic regulators, do not provide energy.

Ⓔ Organic acid :

- Citric Acid
- Acetic Acid (Vinegar)

Genetic Engineering :

(i) It is sub-component of biotech in which genetic Manipulation is done i.e. construction, re-construction & design of genetic material - DNA or RNA is done.

e.g.

(a) Tomato + Brinjal = Biomato.
(Red colour is due to Lycopene)

(b) Tomato + Potato = Pomato

(c) Wheat Triticum + Secale (rye) = Triticale.
(1st Man made grain)

(d)

(d) Genetically modified Tomato - Flover-savr - tasteless

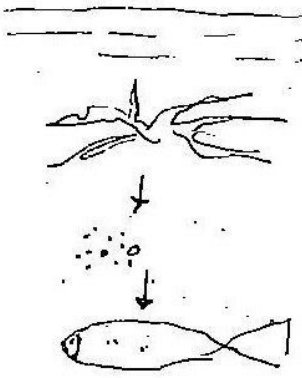
(e) Superbug : pseudomonas pudita.

(f) B.T. cotton & B.T. brinjal.

(ii) Proff. Anand Mohan Chakravarti developed Superbug pseudomonas Pudita - which is Genetically Modified bacteria, it is oil eating bacteria and thus grows exponentially in oil spills.

(iii) As it is used to clean oil spill, it becomes excellent example of Bioremediation (use of living organism in pollution control & Management)

process of eating & being eaten - Food chain



↓

Algae (Phytoplankton)

↓

Zooplankton (insects

↓

Fishes

Q. Which of the following statements regarding B.T. cotton & B.T. Brinjal is NOT true.?

✓(a) B.T. stands for Bio-Technology.

(b) It is genetically modified crop, disease resistance having high yield.

(c) Gene from soil bacterium / bacteria is inserted.

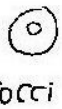
(d) Bacterial gene forms Cryprotein, which becomes toxic under highly alkaline pH.

(e) Seeds are known as 'Terminator seeds i.e. can be used only once.

(f) Roots secrets chemicals that act as bioherbicide or

(i) In B.T. cotton and B.T. Brinjal, gene from soil bacteria Bacillus Thuringiensis is inserted. so it is genetically modified.

Bacillus



Cocci

Vibro.

(ii) The insects eat the leaf of this plants & sleep for long as it becomes toxic in their digestive system (high pH)

Eugenics :

(i) It is study of human genetics

(ii) Golton is father of Eugenics

Dysgenics :

(i) It is study of all unwanted characters found in a given human race.

Euphenics :

It is improvement of human race with the help of Gene therapy or techniques of genetic engineering

Euthenics :

It is improvement of human race by providing them better environment like education, nutrition & medical facility

Note :

(i) Gene + Environment = Phenotype or external appearance (morphology)

(ii) When individuals of oppasite sex can interbreed or reproduce and can form fertile offsprings, they are said to be from same species".

Atmosphere

Atmosphere :

(i) It is thin layer of colourless, odourless, tasteless gases which surrounds earth surface.

(ii) These gases are held by means of force of gravity, which is max. at Earth surface i.e. why with increase in height / altitude, density of atmosphere decreases and after height of 9660 km (approximately 10,000 km) it fades or merges into solar atmosphere.

Q. 1. Which of the following is most variable component of atmosphere [all are variables]

(a) Ozone ✓(b) Water vapour

(c) Dust particles (d) Oxides of sulphur & oxides of Nitrogen

Q. 2. State whether statement is True / False.

(i) Composition of atmosphere is never uniform. True

(ii) Composition of atmosphere is variable by change in Latitude, altitude, time & season. True

(iii) Atmosphere is responsible for high (low) di-urnal range of temperature. False (temp. diff. in day / night)

(iv) As Mercury is closest to sun, it is hottest. False. Venus is hottest (due to CO_2)

(v) Mercury and moon has no atmosphere. True

(vi) At the surface of moon, Twilight condition is observed. False.

(vii) All planets of solar family, in its side view rotate from West to East, except Uranus & Venus. True.

(viii) Venus in its side view rotates from East to West. True.

(ix)

Q. 3. Which of the following is not GHG ?

(a) Methane (Wetlands) (b) CO_2 CH_3Br, SF_6, SF_5

(c) Water vapour (Tropical region) (d) Toxic or bad ozone.

(e) CFC (f) Freon : (g) Hydrochlorofluoro Carbon.

Q 4 CO_2 is main GHG globally.

Q. 5 CH_4 is main GHG for tropical region.

Q 6 Water vapour is most important natural GHG in tropical region.

Q. 7. CF_4 has max. life span among GHG. (trifloromethyl sulphur penta-fluoride)

Q. 8 CH_3F_3 has max. Global Warming Potential (GWP)

Q. 9. CHC. has max. Ozone Depleting Potential (ODP)

Q. 10 CFC, HCFC, Freon, Oxides of (sulpher & Nitrogen) is both GHG & ODS

Q. 11 CH_4 has 20-30 times more GWP as compared to CO_2.

Q. 12 Destruction of wetland releases huge amount of CH_4 followed by CO_2 in atmosphere.

Q. 13. Swoms, marshes, bogs & other wetlands emit huge amount of CH_4 in atmosphere.

Q. 14. Kyoto protocol is about GHG's.

Q 15. Montreal protocol is about Ozone Depleting substances (ODS).

Q 16. Ramsar convention is on Wetlands.

Q 17 Stockholm convention is on Persistant Organic pollutants (POP's)

Q 18. Basel conventions is on trans-boundary movement of hazardous substances.

Q. 19. Arrange following in decreasing orde of GWP.

1 (a) Trifluoromethyl 1 (b) Tetrafluoromethan

(c) Sulphur Hexafluoride 1 (d) Chlorofluoro carbons 2

(e) Nitrous oxide 3 (f) Methane 4

CO_2 5

Q. 20. Arrange following in decreasing order of CH_4 emission

(a) Remurants (cud chewing harbivores) - 30%.

(b) Burning of biomass

(c) Waste treatment process

(d) Paddy fields.

Q. 21. Arrange the following increasing order of their contribution in global warming effect

(a) Nitrous oxide (b) CFC

(c) Methane (d) CO_2

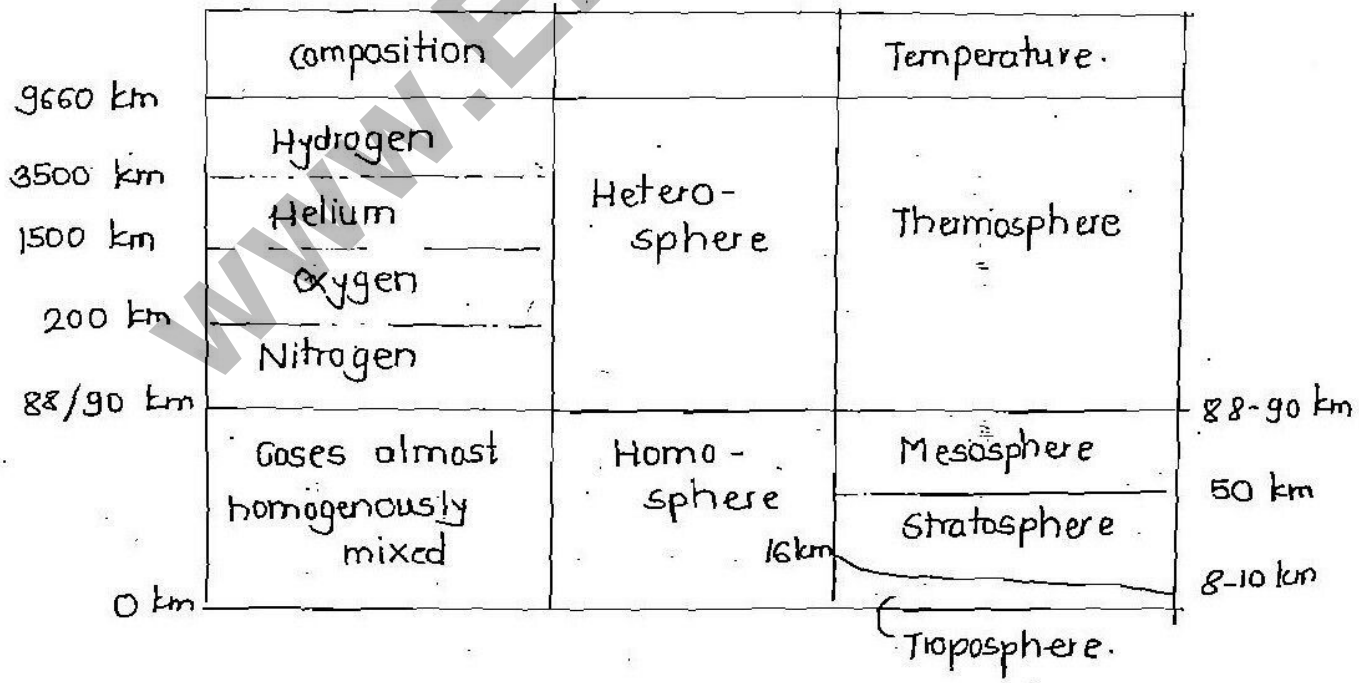
Q. 22. Arrange following in increasing order of lifetime

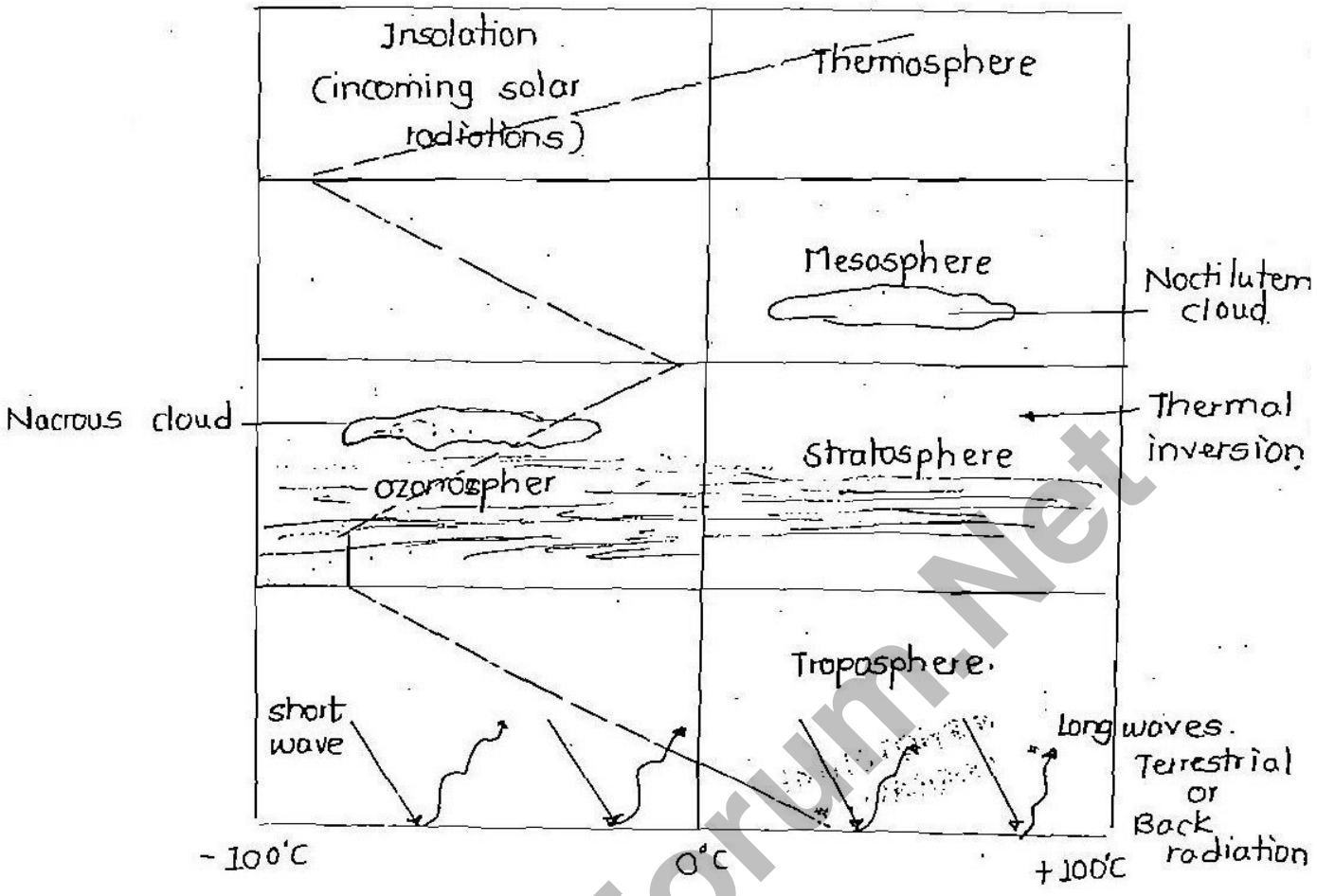
(a) CH_4 (b) nitrous oxide

(c) CFC (d) SF_6

(e) Tetrafluoromethane.

Classification of atmosphere:





(1) Troposphere :

(i) Greek word 'Tropos' means turnover i.e. in this layer maximum turnover, turbulance or uncontrolled motions are found, like cyclones and storms.

(ii) It is also called friction layer and friction is offerred by mountains, buildings, forests & other surfaces.

(iii) As it is lowest layer of atmosphere, closest to earth surface where force of gravity is maximum. Thus it becomes most dense layer of atmosphere and contains 70-90% mass of total atmosphere.

(iv) Around 70-90% of total moisture content i.e. water vapour is found in this layer, so all weather phenomenon like cloud formation, rainfall, occurence of fog, smog occurs in this layer.

(v) Height of troposphere is variable, max. over Equators & minimum over poles. 6-8 km over poles & 18 km over equators.

(vi) Within troposphere with increase in height temperature decreases and this Lapse in temperature is at fixed rate called as Normal Lapse rate or Environmental Lapse rate (6.5°C/km) or 1°C/165 m.

Note:

(i) All those gases/substances which are found in lower atmosphere and are transparent for shortwaves & absorb long-waves emitted by Earth surface are called GHG.

(ii) They have tendency to increase temperature of earth's surface and lower atmosphere.

(iii) Ozone is found in both Troposphere and stratosphere. Ozone found in Troposphere is called Negative ozone, toxic ozone, bad ozone, low ozone. It is secondary pollutant & component of photochemical smog. It is GHG.

(iv) Ozone found in Stratosphere is called Good ozone, positive ozone, Ozonosphere, protective ozone.

(v) Methyl bromide is recently recognised Ozone depleting substance (ODS)

(vi) Halon is bromine containing compound. Firstly developed by American army, widely used in defence - important ODS

(2) Stratosphere:

(i) In this layer temperature increases because of ozonosphere.

(ii) Ozonosphere absorbs more than 90% of Lethal/UV-C more than harmful/UV-B and fraction of yellow-green and infra-red.

(iii) This opposing trend of temperature as compared to previous layer is called Thermal inversion.

(iv) Thickness of ozonosphere is measured in terms of Dobson unit.

1 D.U = 1 ppb.

(v) Thermal inversion is responsible for frontogenesis between air masses of upper troposphere and lower stratosphere.

(vi) This front act as barrier and restricts vertical upward movement of ODS, GHG's & pollutants & thus they are bound to spread horizontally very fast causing global problem.

(vii) Special type of cloud - Nacreous is formed which is not responsible for any rainfall.

(3) Mesosphere :

(i) In Mesosphere temperature decreases with increase in height. (Nochilectum - rich in Meteoritic dust)

(ii) Lowest temperature is found.

(iii) ELR or NLR is not valid in Mesosphere.

(4) Thermosphere.

(i) On the basis of temperature, it is uppermost layer, thus it is least dense layer.

(ii) It occupies largest volume of the atmosphere.

(iii) As it is under direct effect of sun, temperature increases with increase in height.)

Green House Effect :

(A) Negative Aspect :

Q. Which of the following is NOT responsible for Greenhouse effect.

(a) Sun-spot cycle. (b) Nucleur-explosion test.
(c) Lightening & thunderstorm (d) Shifting or Jhoom cultivation
(e) Burning of agricultural waste (f) Forest fire
(g) Combustion of fossil fuel (h) Emmissions from traffic
(i) Emmissions from supersonic jet.

1. Global Worming

(i) It is gradual increase in temperature of earth surface & lower atmosphere due to absorbance of Longwaves emitted by Earth surface.

Impacts :

(i) Due to increase in temperature water vapours are formed (GHG) which again causes increase in temperature due to Green house effect of water vapours.

(ii) Due to this soil-moisture imbalance occurs which causes Drought, Desertification, Barren land & Relict land respectively.

(iii) Melting of ice due to global warming increases sea water level.

(iv) The intrusion of marine water into GWT in coastal area causes contamination of groundwater by salts which causes Salinisation.

(v) Due to increase in sea level (melting of ice), mangrooves are destructed in Littoral zone. Due to this Habitat loss and fragmentation occurs losing biodiversity and keystone species.

(i) Human is Omnivores.

(ii) In nature food web exists which is complex. More it is complex in nature more is stability of ecosystem.

(i) Rechel Carson in his famous book "The silent book" firstly mentioned. impact of DDT which is chlorinated hydrocarbon used as insecticide on aquatic organisms

(ii) Biomagnification is process in which conc of toxins, insecticides, pesticides and other chemicals increases with increase in trophic level because these chemicals are neither metabolised nor excreted by kidney.

(iii) These chemicals are stored in Adipose tissue also called fat depot of body.

(iv) Thus impact of biomagnification will be maximum at higher trophic level.

Impacts:

(i) In human, it causes brain abnoimality, kidney failure, hematuria i.e. release of blood through urine, Oligospermia (low sperm count), Azospermia - siemen without sperms, abnormal M.C. and endometriosis.- thinning of endometrium.

(ii) In birds, rapid decline in their population is due to raphwing of eggs before their hatch date, it was firstly observed in British sparrow hawk. (Accipites nisus) wt

(iii) In aquatic orgonisms, mortility of large fishes is due to accumulations of toxins in their body.

Q. List out whether the given statement is true / false regarding Eutrophication.

(a) It is natural process.

(b) It is anthropogenic process.

(c) Green scum or algal bloom, algal boom is repoited during mesotrophic phase.

(d) Eutrophic phase is Climax stage of succession.

(e) Most stable phase is mesotrophic.

(f) The final fate of lake is its tumination into forest through formation of wetlands.

(g) Eutrophic phase is having max. productivity, bio-diversity and stability.

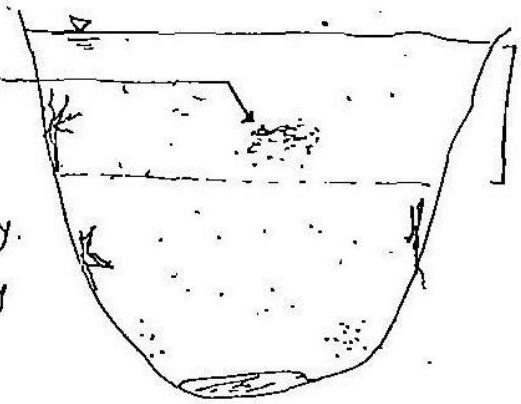
Q. Match the following:

List-I		List-II
Cd	→	Etai-Etai / Ouch Ouch
Hg	→	Minamata disease
As	→	Blackfoot disease
NO_3^- (nitrate)	→	Blue baby syndrome
F	→	skeletal fluorosis.

Eutrophication:

(i) It is example of ecological succession

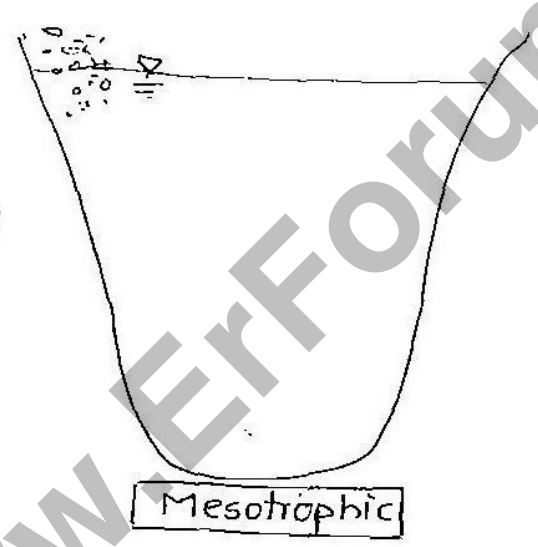
(ii) If it is natural process, it takes thousands of years and if its onthropogenic then its fast process takes few years.



Less nutrients
Less silt & sediment
Less productivity.
Less biodiversity

Photic zone high
(more DO)
(less BOD)

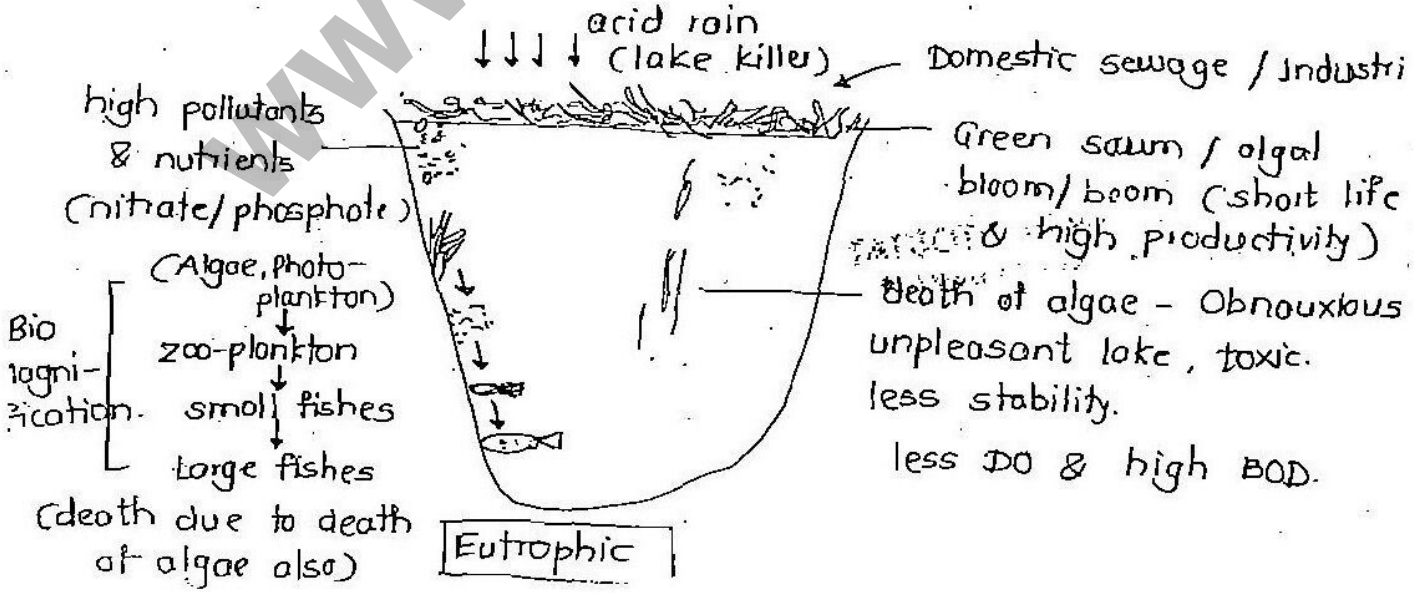
Oligotrophic / Geologically young / Pioneer



Max. biodiversity
Max. stability

Max. life span.
Max. species richness
Max. productivity

Mesotrophic



acid rain (lake killer)
Domestic sewage / Industri
high pollutants & nutrients (nitrate/phosphate)
Green scum / algal bloom/ boom (short life & high productivity)
(Algae, Photo-plankton)
Bio magni-fication
zoo-plankton
small fishes
large fishes
(death due to death of algae also)
Death of algae - Obnouxious unpleasant lake, toxic.
less stability.
less DO & high BOD.

Eutrophic

(i) Desvoeux gave the term Smog which is combination of smoke and fog.

Classical smog
(Londone type smog)

C.S. = SO_x + particulates
(cement dust.
metalic dust. carbon soot
Black carbon)

Found in Winters and early morning hours.
Coal is sulphur rich.

Photochemical smog
(LOS Angeles type smog)

P.C.S. = NO_x
+
Volatile organic carbons (VOC)
+
Peroxy acelynitrate (PAN)
+
Peroxy Benzyl nitrate
+
Toxic / Bad ozone ($-O_3$)
+
H_2O_2

Intense light is required for the photochemical reaction & formation of secondary pollutants.
Formed in summer & afternoon

Impacts:

(i) It couse Tokyo Yokohama Asthma., firstly reported in the American army living in Smogy atmosphere of Japan during II world war.
It causes various kinds of asthma & emphysema which is caused due to structural breakdown of alveolii of lungs
PAN causes imitation in eyes.
Negative ozone is kind of GHG., & it causes Green house effect.
Negative ozone causes photo-oxidation of chloropyhil which decreases photosynthtic activity.

Reproductive System

Primary sex organs :

(i) Those sex organs which produces both sex cells or gamets (sperm in male, ovum in female) and sex hormones, are called primary sex organs. (
e.g. Testies in Male & Ovary in female.

Male reproductive system :

(i) Spermatogenesis is process of sperm formation.
(ii) Pitutory gland plays important role in downward movement of testis from abdominal cavity into pouch like structure. called as Scrotal Sac.
(iii) In all mammles, Males have testis outside their main body excep Elephant, as Testis requires 1-2°c low temperature for proper spermatogensis.
(iv) Castaration is surgical removal of testis. It is done in animals e.g. Ox - in order to make them agile & strong
(Maintainance of body, Locomotion, Reproduction)
Temperature (cannot be altered) ← energy to
(v) Leydig cells of testis are responsible for secretion of male sex harmone Testosteron & Andasterone (supportive in function)

Q. In Gynaecomastia _____ becomes defective

(a) Liver
(b) Testis
(c) Kidney
(d) Ovary
(e) All.

(v) Testosteron is responsible for sexual behaviour of male & regulation of secondary sexual characters.
e.g. Mustach, Beards, Moleness voice, Body hairs, Pubic hairs, Functional testis.

(vi) Testosteron is responsible for inhibition of growth of Mammary gland so moles don't have functional Mammory gland.

(vii) Sometimes Leydic cells of testis becomes defective & their occurs hyposecretion of Testosteron & growth of memory gland is not inhibited & such moles have developed mammary glands like female. condition is called Gynaecomastia.

(viii) Seminiferous Tubules or crypt of Testis is responsible for secretion of countless sperms in normal moles.

Male (♂) (Normal) ⟶ Siemen ⟶ sperms + Ca^{++} + Fructose

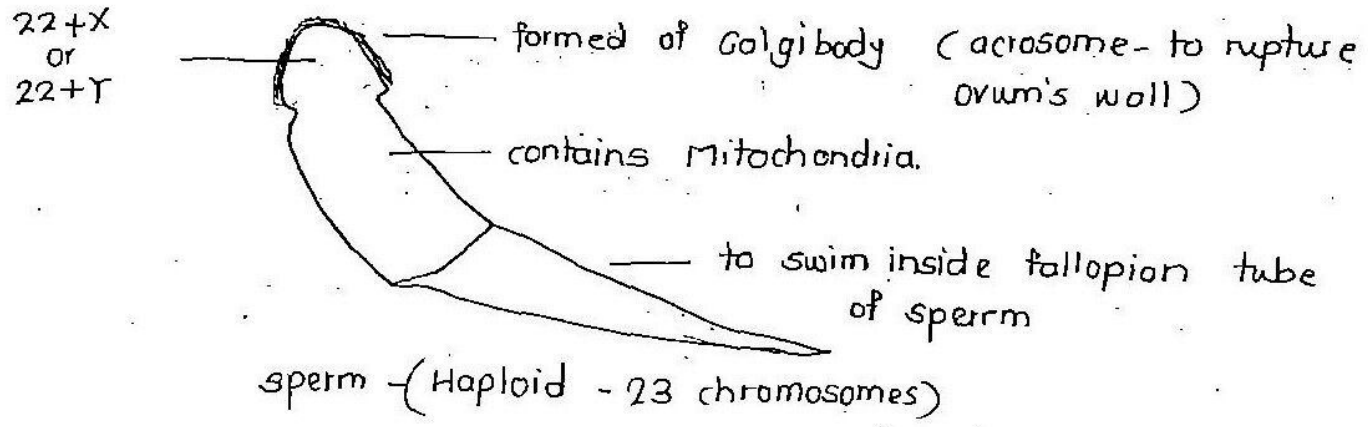
(ix) Co^{++} gives structural support to sperms while fructose provide nutrients to them.

Abnormalities :

(i) Oligospermia - Low sperm count

(ii) Azospermia - siemen without sperms

(iii) Abnormal sperm
- without tail
- Brached / polytail condition.
- reduced no. of mitochondria.
- reduced motility.

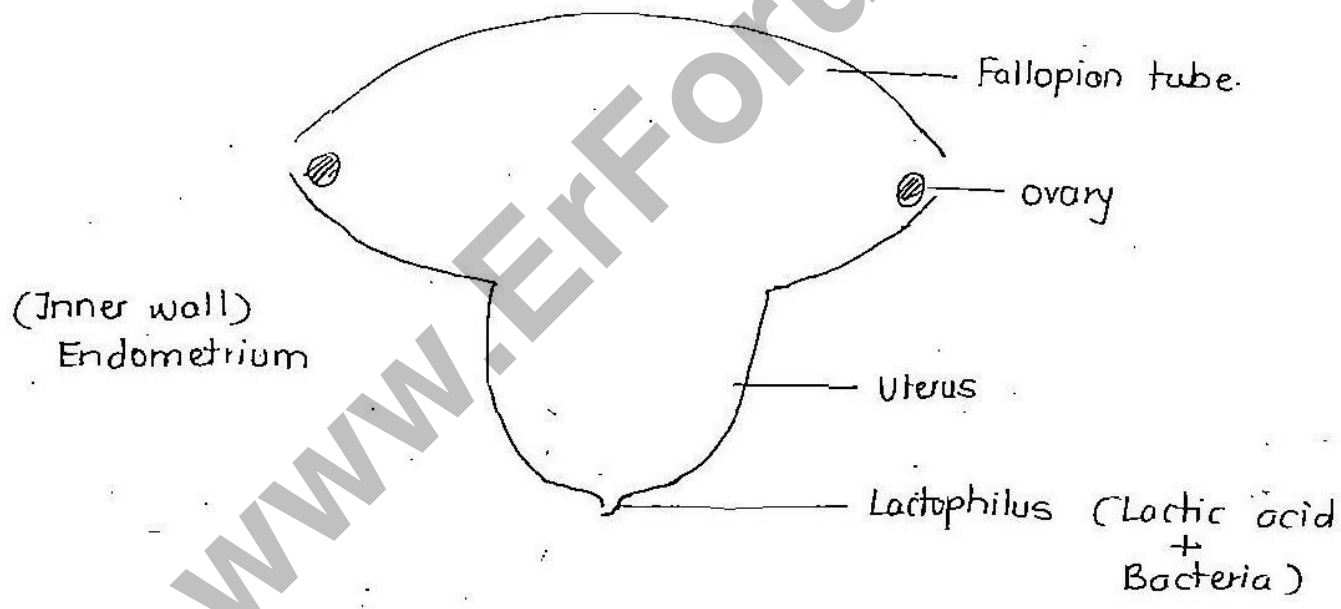


sperm (Haploid - 23 chromosomes)

Causes of biomagnification (increase in conc. of toxins in body)

(i) High stress level
(ii) Excessive physical exercise
(iii) physical damage to testis (seminiferous tubules becomes ruptured)
(iv) Ageing
(v) Excessive smoking & alcohole intake.
(vi) Mumps
(vii) Harmful radiations.

Female reproductive system:



(i) Oogenesis is process of ovum formation.
(ii) Pitutory gland plays important role in regulation of Menstruation cycle, development of ovum & growth of pregnant uterus.
(iii) Ovary secrets important female sex hormones Estrogen and Progestrone.
(iv) Estrogen is responsible for sexual behaviour of female and development of secondary sexual characters.
e.g. Growth of Mammary gland.

Note:

Mammary gland is modified sebaceous gland whose formation is promoted by Estrogen and inhibited by Testosteron.

(v) Progesteron is responsible for regulation of last few days of Menstruation cycles and helps in sustaining pregnancy.

(vi) Menarch is stage of life cycle of human female at which M.C. starts. It is indication of begining of fertile period i.e. now female can reproduce: (starts at $12 \pm 2\frac{1}{2}$ yrs)

(vii) Menopause is stage of life cycle of human female at around 45 ± 3-4 yrs, depending upon gene and diet at, which M.C. stops. (termination of fertile period)

(viii) M.C. is periodic removal of inner wall of uterus i.e. Endometrium after every $28 \pm 2/3$ days depending upon Harmonal balance.

(ix) Ovulation is the process of release of ovum.

(x) Maximum chances of ovulation is during mid-phase of M.C. As their occurs high concentration of LH surge or the Lutinising Harmone. It stimulates ovary, either left ovary or right ovary or in very rare case both ovary.

(xi) Normally one ovum is released in one M.C.

(xii) Fertilisation is fusion of sperm with ovum.

(xiii) After fertilisation Zygot is formed.

Ovum (Haploid) - $22 + X$

Sperm (Haploid) - $22 + X/Y$

Zygot (diploid) $44 + XY$ or $44 + XX$

(xiv) Zygot formed has 46 chromosomes. It undergoes mitotic division or equational divisionc to form group of cells, each having 46 chromosomes. & after 6-9 days, it is placed on

(xv) inner wall of uterus called as Implantation, after which M.C. starts

In Vivo and Vitro fertilisation

(i) Sometimes their occurs defect in Philopian tube & it starts producing antibodies against sperm of specific individual, in this case Invitro fertilisation is preferred. i.e. fertilisation is done outside body in testtube within Culture medium. Such babies are called Test tube baby.

(ii) Harsha is 1st test tube baby of India.

(iii) When fertilisation occurs inside body i.e. within Falopian tube (rarely in uterus). It is called Invivo fertilisation.

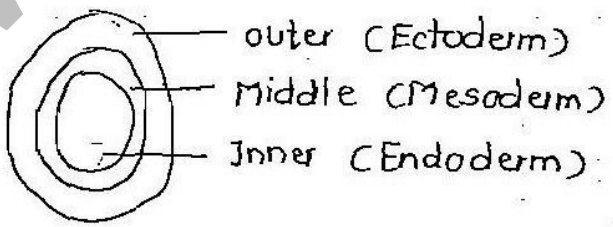
Stages of boby growth:

Week first:

(i) Fertilisation and implantation occurs.

Week Second:

Three layers of embryo are formed.



Note:

Stem cells have excellent power of growth & regeneration. They are of following type:

(a) Unipotent stemcells e.g. cells of bone marrow.

(b) Pleuripotent / Multypotent stem cells. e.g. cells of ectoderm, endoderm & mesoderm

(c) Totipotent stem cells. e.g. Zygot

- cells of placenta

(ii) Cryopreservation is method of storage of gene, DNA, seed, pollen, stem cells in liquid nitrogen at -171°C. It is one of ex-situ i.e. offsite conservation method of biodiversity.

Week third:

- Embryo about 2mm in size
- Formation of 1st organ - Brain + spinal cord starts.
- Backbone formation occurs.
- In females having thicker endometrium, formation of Umbilical cord occurs/starts.

Week fourth:

- Embryo is 5mm in size
- Formation of heart, blood, blood vessels, Arteries veins starts.

After 1 Month of Pregnancy, 1st sign of its growth i.e. Heart beat.

2nd Month:

Formation of eyes, ears, mouth, tongue, limb starts

3rd Month:

- Most organ systems are well developed.
- sex-organ is well developed. & foetus starts moving.

5th Month:

- Formation of fingerprint starts.
- growth of hair occurs.

7th Month:

- After completion of 7th Month, baby is well developed.
- Baby starts respond to touch, loud noise & swallows Amniotic fluid which has surrounded baby.

8^{th} & 9^{th} Month

- Only size and weight of baby increases.
- After completion of 9^{th} Month, delievery of baby occurs any time.

Twins :

(1) Monozygotic or identical twins :

As twins are derived from single complete clevage. in monozygotic derived embryo, they always have same gene and same sex.

(2) Dizygotic or non-identical twins :

(i) In this case, due to rore orulotion both ovary release one ovum each which is fertilised by two different sperms.
(ii) As a result, two different zygots are formed which undergo seperate mitotic division and are implanted seperately.
(iii) They always have different gene. But sex can be same or different depending upon fertilising sperm.

(3) Siamese / Conjoint twin :

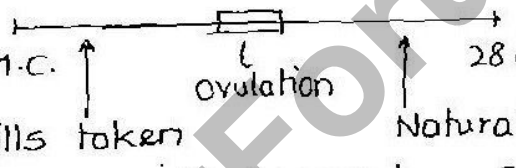
(i) It is very rare, one out of 500 twins.
(ii) They are formed either due to incomplete clevage in monozygotic derived embryo or close placement of dizygotic derived embryo.

(i) The process of baby birth is called as Paiturition.

(ii) Colostrum is the first milk secreted by mother after baby's birth. It is rich in nutrients and antibodies. and provides immunity to baby against disease or pathogens.

(iii) During pregnancy test concentration of HCG (Human Chorionic Gonadotropin) is detected in blood and urine.

(i) In oral contraceptive pills, synthetic ovarian harmone obtained from Yam plants, Astrogen and progesteron is found whose target is to supress ovulation & fertilisation.



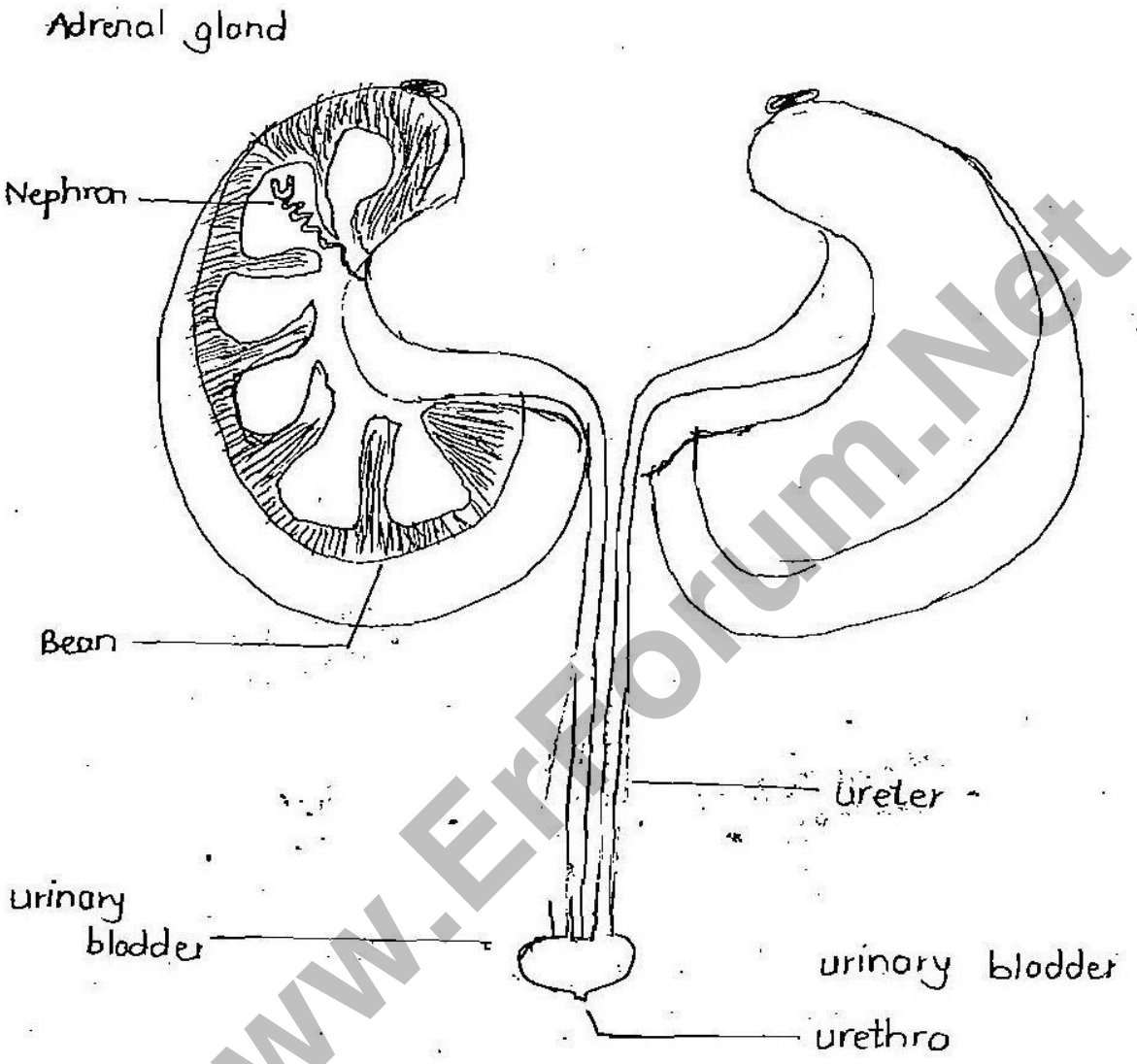
(ii) Vasectomy is done in Males in which Vardeferens is cut & tied to prevent fertilisation.

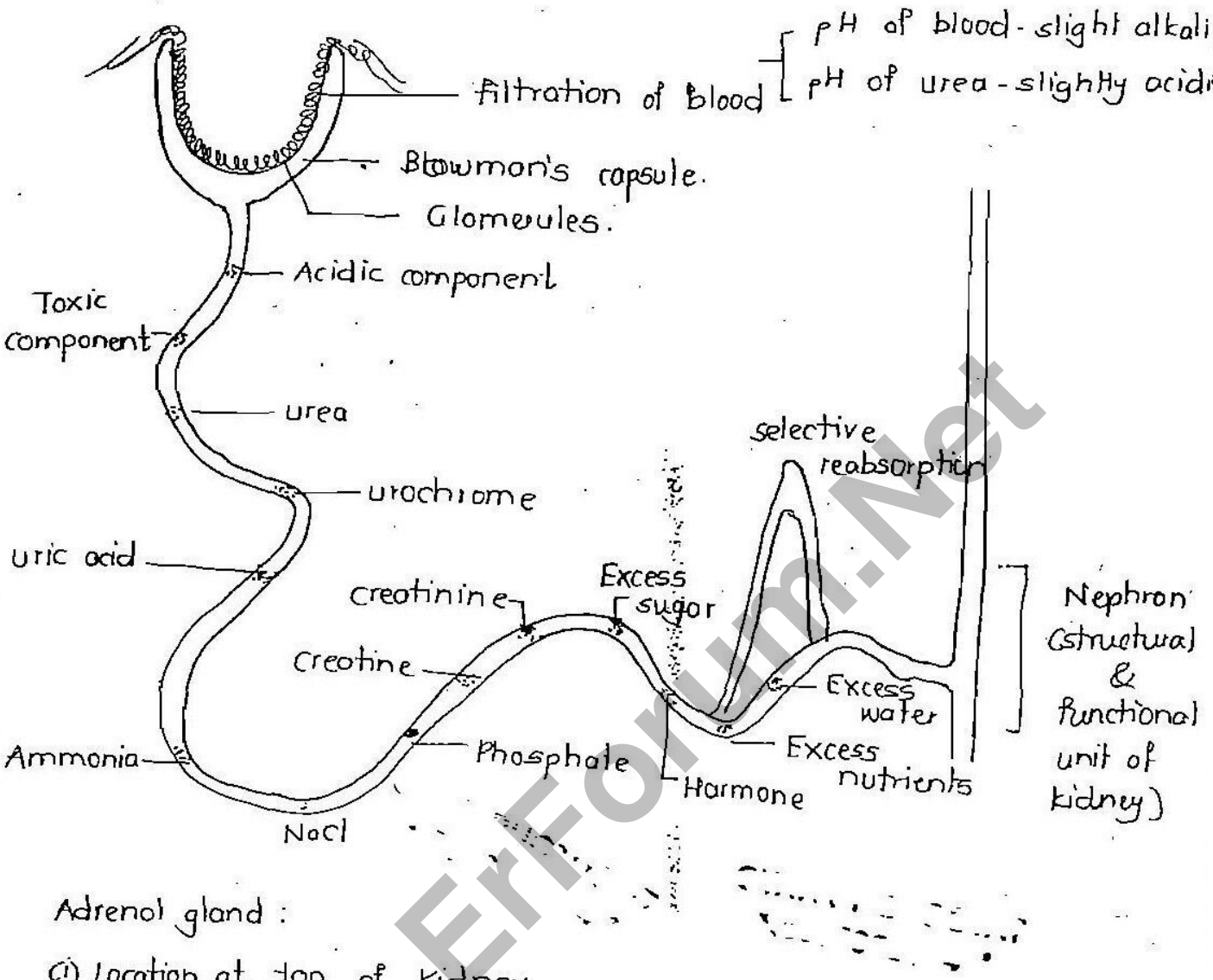
(iii) Tubectomy is done in Female in which, oviduct is cut & tied to prevent fertilisation

Excretory System

Kidney :

(Renal system or excretory system)





Adrenol gland :

(i) Location at top of kidney.

(ii) Also called Supra-renal gland or Emegency gland. or Stress gland.

(iii) Secrets Harmone - Adrenalin.

(iv) Adrenalin increases Blood pressure (3F Harmone i.e. fight, Flight, Fright)

Poncreas :

(i) It is heterocrine or mixed gland.

(ii) Location - curvature of deodnum.

(iii) 98-99 % cells of Poncreas are Exocine in nature. i.e. secrets enzymes

(iv) Pancreatic juice contains all digestive enzymes except Pepsin & Ptyalin.

(v) 1-2% cells are endocrine in nature → Islet of Langerhans.

(a) α-cells - Glucagen - (increase Blood glucose level)
(b) β-cells - Insulin - (decreases blood glucose level)
(c) δ-cells - Somatostatin - (regulating effect)

Case I:

(i) If excess glucose is present in the blood, Pituitary gland command Pancreas to reduce glucose level in blood.
(ii) In Liver Glycogenesis occurs with help of Insulin secreted by β cells and the excess glucose is stored in the form of glycogen (Reseve food) & thus Blood Glucose level is decreased.

Case II:

(i) If excess glucose is present in blood but, β cells have become defective then Glycogensis in Liver decreases & thus Hyposecretion of Insulin occurs. This causes remained level of High glucose in blood as it is.
(ii) This excess glucose in blood is filtered in Kidney by Nephron & thus increased level of glucose in Urine called Glycosuria or Diabetes mellitus.

Case III

(i) If person is hungry (starvation), the glucose level in blood is increased by Glycogenolysis in liver by breaking of Reserve food by α-cells in Pancreas.
(ii) In this case, Blood Glucose level is increased by Glycogenolysis of reserve food.

Glandular System

Glandular System :

Glands are Group of cells / tissue which becomes secretive in function.

It may secret Hormone, Enzyme or both.

1. Exocrine glands

(i) These are ducted glands

(ii) They secret enzymes in large amount.

(iii) They are proteinaceous in biochemical nature except Ribozyme (formed of RNA).

(iv) They act as bio-catalyst but are never used.

$$\text{starch} \xrightarrow[\text{Ptyalin}]{} \text{Maltose.}$$

2. Endocrine glands

(i) Harmones are secreted in low amount by them.

(ii) These are secreting harmones directly into blood.

(iii) Biochemical nature :

- Protein - Somatotropin - Main Growth Harmone. (By Pitutary gland)
  - Thyroxine - (Thyroid gland)
- Steroids
  - Testosterone (♂)
  - Estrogen (♀)

(iv) Mechanism of action :

Biocatalyst but is used in biochemical reactions.

3. Heterocrine / Mixed gland:

(i) They have Exocrine cells secreting enzymes & also endocrine cells screting harmones.

(ii) e.g. Pancreas
Testis (♂)
Ovary (♀)

Hepatic cells - liver
Hepatology - study in Liver

Q. Which of the following is not Endocrine gland?

(a) Liver
(b) Thymus
(c) Ceruminous gland
(d) Lacrinal gland. - tear gland
(e) Sweat gland
(f) Mammary gland.
(g) Adrinal gland.

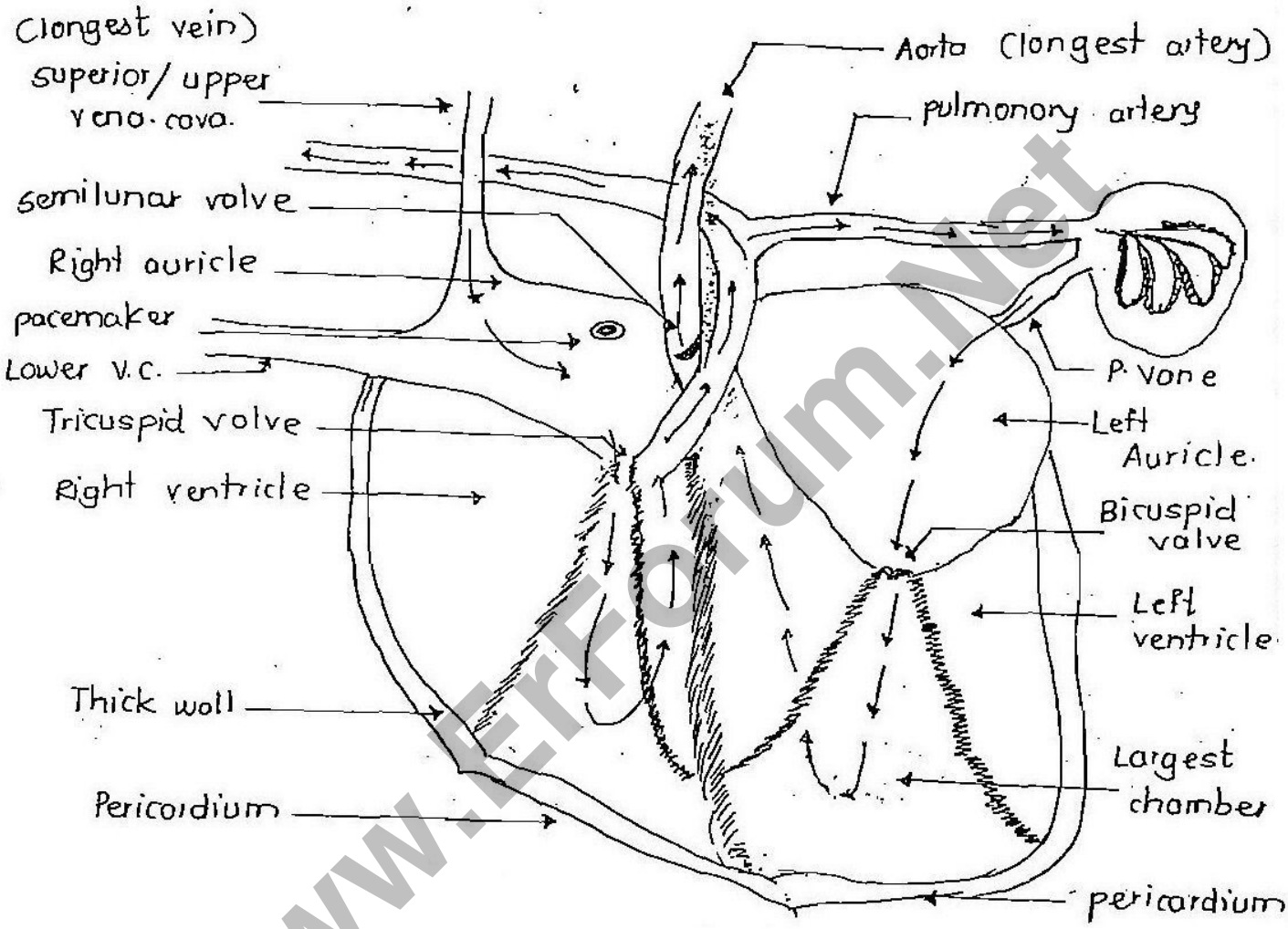
Ear-wax gland / Ceruminous gland
- To prevent pathogen entry in ear
- wax to entrap pathogen

Liver:

(i) Hepatology is study of liver.
(ii) Liver has max. no. of mitochondria per cell.
(iii) It has power of regeneration.
(iv) 30-40% of total absorption of small intenstine goes to Liver and it performs excretory function (i.e. removes toxic component)
(v) Ornithine cycle occurs in Liver responsible for Urea formation.
(vi) During Joundice & Hoepatitis Liver becomes affected and becomes unable to remove toxic components, bile components.

Circulatory System

Cardiovascular system / Circulatory system :



(i) Auricles receive blood in heart while Venticals pump it to the body & lungs again.

(ii) Arteries carry O_2 rich blood while veins carry CO_2 rich blood & case is exactly reversed in case of pulmonary artery & pulmonary veins.

(iii) Right auricle receives CO_2 from whole body. Superior or upper vena cava (Longest vein) brings bloods from upper part of body while Inferior or lower vena cava brings blood from lower part of body. The blood entering is CO_2 rich as the respiration in cells (mitochondria) produces CO_2.

(iv) The gaseous exchange take place on the surface of Alveoli in the Lungs. Thinner the wall higher is the rate of exchange. The blood recieved from cells is CO_2 rich. This blood becomes O_2 rich in Lungs & release CO_2 in it.

(v) In damaged alveoli (Emphysema) walls are thicker thus gaseous exchange is affected.

(vi) The process of double circulation in heart was explained by William Harvey. (blood enters heart twice)

(vii) The human heart is Mycogenic (Muscular) whiles in insects etc. it is Neurogenic.

(viii) In cold blooded animals or Ectotherms, or Poikilotherms body temperature fluctuates with environment and they cannot maintain constant body temperature, because their heart is NOT highly evolved.
e.g. Amphibians & Reptile.

(ix) In worm blooded or endotherm or Homeotherm, as they have well developed four chambered heart, they can maintain constant body temperature.
e.g. Birds & Mammles.

(x) Pacemaker in Right auricle regulates the rate of blood circulation in heart.

Q. 1. Cardiology is the study of Heart.

Q. 2. Muscles forming heart are called Cardiac muscles

Q. 3. Haematology is study of blood & blood cells.

Q. 4. For the normal functioning of Cardiac muscle Ca. Fe ion is required.

Q. 5. Our heart is Myogenic

Q. 6. Outer covering of Lungs is called APleural Sac.

Q. 7. Outer covering of heart is called. Pericardium.

Q. 8. William Harvey is called father of "Blood circulation".

Q. 9. The process through which formation of blood occurs is called. Haemopoisis

Q. 10. Formation of blood & blood cells occurs in Bone Marrow c.

Q. 11. Auricle is chamber of heart which receives blood.

Q. 12 Ventricle. is chamber of heart which sends blood.

Q. 13. Right auricle receives CO_2 rich blood from body cells.

Q. 14. Left auricle receives O_2 rich blood from Lungs.

Q. 15. Left ventricle sends O_2 rich blood to lung.

Q. 16. Inside lungs gaseous exchange or oxygenation of blood occurs at surface of Alvioli

Q 17. Left ventricle sends CO_2 rich blood through Aorta to body parts.

Q 18 Right has pacemaker.

Q 19. Left ventricle is largest chamber of heart

Q 20 Left ventricle has most thickest wall.

Q 21. All arteries carry O_2 rich blood except pulmonary artery

Q 22. Aorta. is longest artery.

Q 23. All veins carry CO_2 rich blood except pulmonary vein

Q. 24. Superior vena cava. is longest vein.

Q. 25. Pulmonary artery carries CO_2 rich blood from Right ventricle to Lungs

Q 26 Pulmonary vein carries O_2 rich blood from Lungs to L. auricle

Q 27. Tricuspid valve is found between Right auricle & Right ventri

Q 28 Bicuspid valve is found between.

Q 29. Blood passes through Semi-Lunar. valve from Left ventricle to Aorta.

Q. 30. Lup... is the first heart sound.

Blood:

(i) It is formed of Plasmo and blood cells.

(ii) There are three types of blood cells viz. RBC's, WB'c & Platlets.

(a) R.B.C's

- Also called as Erythrocytes
- Pigmented cells & are large in numbers.
- Life span is about 120 days.
- Spleen is called Graveyard of RBC's where dead RBC's are stored.
- It carries transportation of O_2 with the help of haemoglobin.

(b) WBC's

- White blood cells or Leucocytes.
- These are non-pigmented cells, larger in size.
- They are significant in
  - De-toxification in of drugs
  - against allergic reactions
  - for immunity & immunological reactions.

(c) Platlets:

- Called as Thrombocytes.
- avg. life is 14 days.
- maintain internal leakage (prevents internal bleeding)

Normal blood pressure in human body ranges from 80 mm (on relaxation - diastolic pressure) to 120 mm (on contraction - systolic pressure) of Hg.
Sphygmo-manometer is used to measure blood pressure.

Colour of Haemoglobin is purple to violet. But as it has tendency to exist in the form of oxyhamoglobin, it becomes Red and is responsible for red colour of blood.

(Haemo - Iron part. Globin - protein part)

Affinity of Haemoglobin to combine with Oxygen and form oxyhaemoglobin is 200 time less than its tendency to form Carboxyhaemoglobin & thus Passive smoking is more harmful than active.

Heart Sound:

(i) First heart sound is Lup which is longer & louder which is caused due to Auricol-Ventrical valve (AV-valve)

(ii) Second heart sound is Dup which is shorter & slower & caused due to movement of Semi-Lunar valve.

(iii) Sometimes valves of heart become defective & it causes sound. This condition is called "Heart Mur-mur".

Chambers of Heart

(i) In fishes, two chambered heart is found (1 Auricle + 1 ventricle)

(ii) In Amphibians, three chambered heart is found (2 Auricles + 1 ventricle)

(iii) In Reptiles, incomplete four chambered heart is found (2 Auricles + 2 partially divided ventricles) except Crocodile which has complete well developed four chambered heart.

(iv) In birds and mammles, well developed, four chambered heart is found.

(v) In cockrooch, 13 chambered heart is found.

Note:

(i) Cockrooch's blood is white due to presence of respiratory pigment Haemocyonin.

(ii) When blood flows through arteries, veins & capillaries, it is called closed circulation.

(iii) When blood flows through open sinuses (pipelike structure) it is called Open circulation. In cockroach open circulation is found.

Blood Group Genetics :

(i) Karl Landsteiner and Weiner firstly discovered A, B, O system of blood group.

(ii) Later on de-castello discovered fourth blood group AB.

(iii) Weiner firstly discovered Rh-factor in Rhesus Monkey.

(iv) Those persons having Rh-factor are called Rh^+ and those who don't have, called Rh^-.

Husband	Wife.	
Rh^+	Rh^+	Normal children
Rh^-	Rh^-	
Rh^-	Rh^+	
* Rh^+	Rh^-	

Case 1 :

(i) As the Husband's blood group is Rh^+, the fochus will have Rh factor (i.e. Rh^+) because Rh^+ dominates over Rh^-

(ii) But as Wife is having blood group Rh^-, it will treat the [illegible]

Any foreign substance (e.g. Bacteria, virus, protein) if entered in cell, is called Antigen.

To treat Antigen, cell produces Antibodies. (Immune system.

In above case, as Rh^- of foetus is Antigen for Wife it will produce antibodies, but it takes delayed expression & delievery is Normal.

But at this time Wife's body produces Rh- Memory cells against that antigen.

Case 2:

At the time of 2nd baby, immune system of Wife treats & destroy the Rh^+ of foetus.

Thus, baby is killed when its foetus itself. This disease is called Erythro-blasto-foetolisis or HDN (Haemolytic Death of Newborn)

Genotype / Type of gene	Phenotype (Blood)	Antigen (RBC)	Antibody (Plasma)
$I^A I^A$ or $I^A I^o$	A	A	b
Homozygous - Heterozygous			
$I^B I^B$ or $I^B I^o$	B	B	a
$I^A I^B$	AB	AB	-
$I^o I^o$	O	-	ab

Q. If blood group of father is AB & mother is O.

(a) Find possible blood groups of children.

(b) Impossible blood groups of children :

♀ \ ♂	A	B
O	AO	BO
O	AO	BO

Possible bloodgroups : AO & BO (Heterozygous A or B)

Impossible bloodgroups : AB, O, AA, BB (Homozygous A or B)

Q. If bloodgroup of Father is Homozygous A & Mother is O. Find out not possible bloodgroup of children.

♀ \ ♂	A	A
O	OA	OA
O	OA	OA

Not possible bloodgroups - O, AA, BB, AB, OA, OB.

Q. If Father is homozygous A & Mother is homozygous B. Then find out possible bloodgroup of children.

♀ \ ♂	B	B
A	AB	AB
A	AB	AB

Possible bloodgroup - AB only.

Sex-linked disease :

(i) On the basis of sex-chromosome, sex linked disease is of two type.

(I) Y-linked diseases :

(i) It is always transmitted from father to son.

(ii) Those genes which are restricted only on Y-chromosome, are called Holandric genes.

e.g.
Hypertrichosis (Hairy ears)
Gene for Baldness.

(II) X-linked diseases :

(i) It is possible in both males and females.

(ii) Though females have double amount of X-linked gene, disease is more common in males.

e.g.
Colour blindness.
Haemophilia. / Bleeders disease.

(a) Colour blindness :

(i) Horner firstly discovered colour blindness.

(ii) It is X-linked disease.

(iii) Genes for photo-perception of Red and Green colour are present on X-chromosome whereas Genes for photo-perception of various other colours are present on Autosome.

Male (♂)		Female		
XY	X^cY	XX	X^cX	X^cX^c
(Normal)	(Colour blind)	(Normal)	(Carrier) - has gene for Colour blind but can see Green & Red.	(Colour blind)

Q. If father is normal and mother is carrier of colour blindness then.

in total children = 50 % Normal

= 25 % Carrier

= 25 % Colour blind.

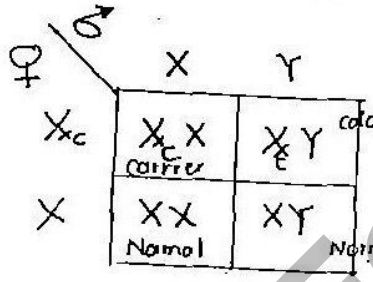
of sons = 50 % Normal

= 50 % colour blind

of doughters = 50 % Normal

= 50 % Carrier

= 0 % Colour blind.



(b) Hoemophilia / Bleeder's diseose :

(i) It wos discovered by John Cotto.

(ii) It is X-linked diseose, firstly reported in Queen Victoria.

(iii) It is caused due to absence of blood clot factors. factor VIII and factor IX.

(iv) Factor VIII & factor IX, through transcription & translation are responsible for formation of two proteins Prothrombin and Fibrinogene respectivly.

Male (♂)		Female (♀)		
XY	$_hXY$	XX	$_hXX$	$_hX_hX$
Normal	(Haemophilic)	Normal	Carrier	Haemophilic

Respiratory System

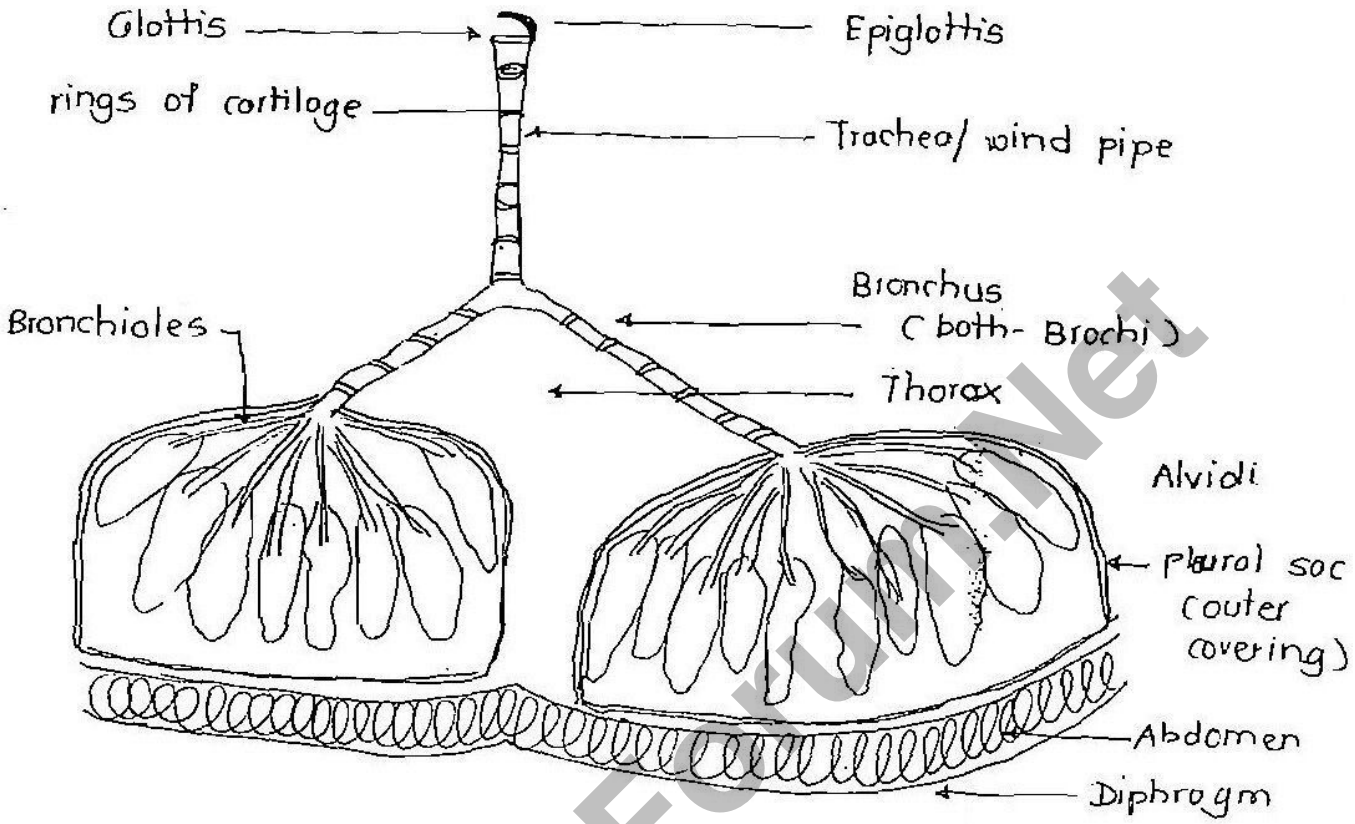


Fig. pulmonary system

(i) In Male, there is Arch type diaphragm while in female its Flat diophragm.

(ii) Breathing is involutary movement controlled by respiratory centre of brain - Medulla Oblongata.

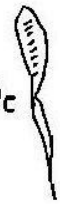
(iii) In aquatic organisms rate of breathing is faster as compared to land animals, because in waterbodies dissolved O_2 is less as compared to atmosphere.

(iv) Larger land animals have slower rate of breathing as they feed on poor quality of food which requires less oxygen for its complete oxidation.

(v) Smaller animals have high Metabolic activity as they feed on fine quality of food, which requires more oxygen for its complete oxidation.

Aquatic organisms
e.g Fishes, Prown, Tadpole

Respiratory centre



Todpole (Baby frog) — Gills (Branchiol respiration)

Todpole ⟶ Adult
∴ (Metamorphism)

Land animals
e.g. Rat, elephant, man
Frog (on land)

Lungs
(pulmonary respiration)

Earthworm, Leech.
Frog (in water)

Skin
(Cutaneous respiration)

Insects
e.g. Housefly, cockroaches

Trachea or Airtube
(Tracheal respiration)

Aerial organisms
e.g. Birds.

Airsacs, Lungs.

Spider, Scorpions

Book Lungs.

(vi) Larynx or soundbox or voice box has no role in breathing. It's function is to produce sound with the help of vocal chords whose length & thickness is governed by Gene.

(vii) Diaphragm is muscular septum which seperates Thorax from abdomen (below & Thorax above). Diophragm form "Floor of Thoracic cavity"

(viii) Intercostal muscles are present between ribs & they help in forward and backward movement of ribs.

(ix) Diaphragm & intercostal muscles are collectively called Inspiratory muscles.

(x) In males, Larynx is covered by Cartilage whose protruding part is called Adam's apple. In Females Adam's apple is absent.

Lung's volume :

1. Tidal air / Tidal volume (TV)
   (i) It is effortless breathing caused due to movement of diaphragm & intercastal muscles.
   (ii) In Male it is around 500 ml & in female due to flat diaphragm. it is 360-360 ml of air.

2. Inspiratory reserves volume (IRV)
   (i) It is maximum possible inspiration (inhaled air) after tidal volume or tidal air.
   (ii) It is around 2500 to 3000 ml of air.

3. Inspiratory capacity (IC) IC = TV + IRV.

4. Expiratory reserve volume (ERV) :
   (i) It is most forcefull expression (exhaled air).
   (ii) It is around 1000 - 1500 ml of air.

5. Residual volume :
   It is volume of air remained in Alviolii which is around 1200 ml even after most forceful expression.

6. Vital capacity (VC):

Air though nose → mucus enzyme (filtray fine part. → lysozome (anti bacterial) (stronger than lysozome in mouth.

VC = IC + ERV or
= T.V + I.RV + ERV.

7. Total lungs capacity (TLC): TLC = VC + RV

Digestive System

Human teeth:

(i) Cells forming teeth are called Odontoblast

(ii) Odontology is study of pattern of arrangement of teeth.

Features of human teeth:

(A) Heterodont : It is of 4 different type (I - Incisor, C - Canine, P Premolar & M - Molar)

(B) Diphyodont : It comes twice & thus human has two different set of teeth. (Milk teeth or baby teeth or deciduous teeth & Adult/ Pumanent teeth)

(C) Thicodont : it is coming from cavity or socket of Jawbone.

Dental formula :

$$\frac{2\ 1\ 2\ 3}{2\ 1\ 2\ 3} \quad \begin{matrix} \text{- upper jaw (half)} \\ \text{- lower jaw (half)} \end{matrix}$$

I C P M.

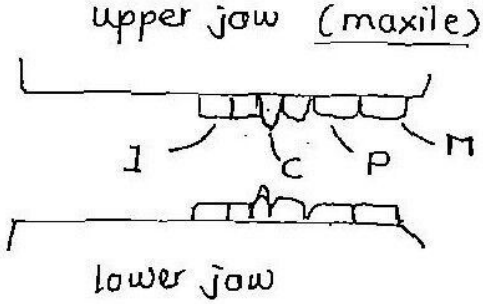
No. of teeth = I - $2 \times 4 = 8$

C - $1 \times 4 = 4$

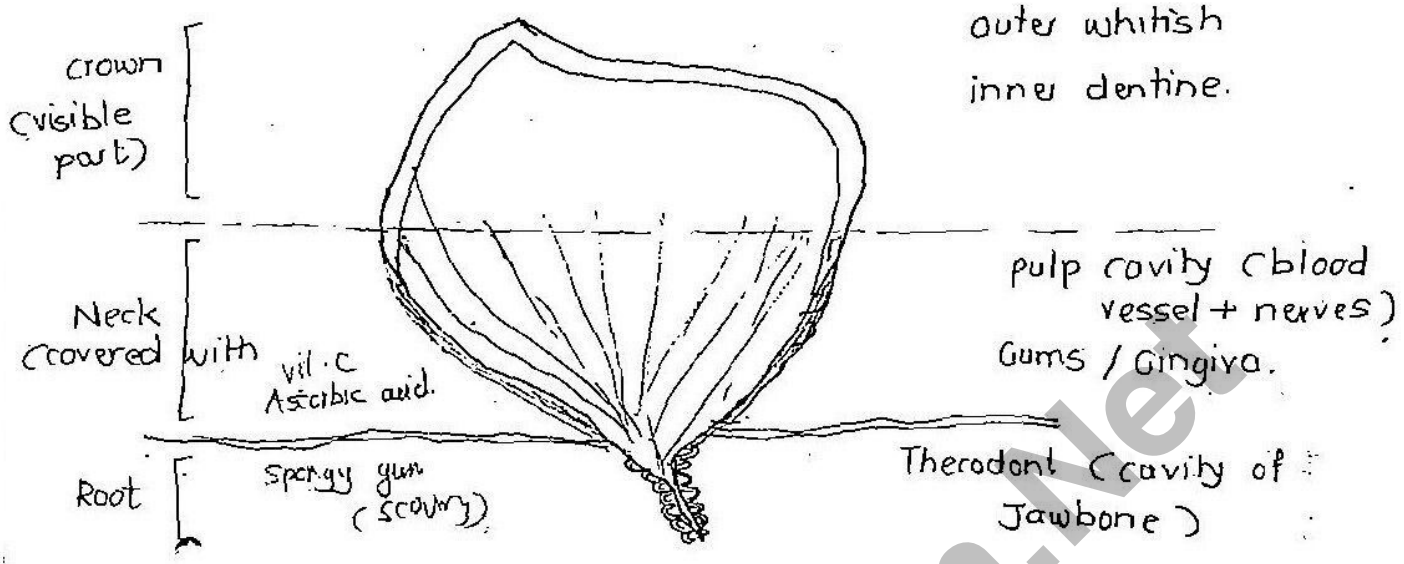
P - $2 \times 4 = 8$

M - $3 \times 4 = 12$

32



(movable - one of strongest bone of skull (mandible) only movable bone of skull)



(i) Calciferol or vitamin D or anti-rickets vitamine or sunshine vitamin is responsible for absorption of Calcium & phosphorous.

(ii) This vitamin is synthesized in skin with help of UV - B rd.

(iii) Tocoferol or vitamin E or beauty vitamin is also called as Anti-sterlity vitamin.

(iv) Calcium & phosphorous is required for strong bone & teeth.

(v) Tusk of elephant is modified incisor.

(vi) Rats are the only animal that can replace their enamal.

(vii) Among baby teeth, incisor comes first whereas among adult teeth 1st Molar comes 1st & 3rd Molar comes last. It is also called wisdom teeth.

(viii) Enamel is hardest substance of human body. It is more harder than bones

Mechanism of digestion :

Q. In DPT. 'D' stands for

(a) Diptheria (by Bacteria) (b) Dengue (by virus) (c) Dermatitis (deff of B or fungi) (d) Diarrhoea. (Bacteria or protozoa.)

Q. In DPT, 'P' stands for,

(a) Pertusis (Bacteria) (b) Polio (virus) (c) Pneumonia (Bacteria) (d) Pox (virus)

Q. In DPT 'T' stands for.

(a) Tetanus (Bacteria) (b) Tetany (c) Typhoid (Bacteria) (d) Tuberculosis. (Bacteria)

Q. Which of the following is STD

(a) AIDS (virus) (b) Syphilis (bacteria) (c) Gonorrhea (bacteria) (e) Trichomoniasis (protozoa.)

Q. Which of the following is caused by protozoa ?

(a) Malaria (b) Kala ozar (c) Black-sickness

(d) Sleeping sickness (e) Amoebic dysentry (f) Trichomoniarisis

(i) Tetany is caused by deficiency of parathormone Colli'se harmone - (Extreme restlessness)

(ii) Kala-ozar (Black sickness)

Kala-ozar (Black sickness)	Protozoa Leishmania	Transmitting agent Sand fly
Sleeping sickness	Trypanosoma	tse-tse fly.
Amoebic dysentry (Causes infection in 'Colon,' longest part of large intenstine)	Entamoeba Histolytica	

AIDS

(i) Causal agent : HIV + RNA virus
(Retrovirus- reverse transcription occurs)

(ii) origin : African ♀ + Greenish Monkey ♂

(iii) Test : ELISA (Enzyme Linked Immuno Soibant Assay)

(iii) No. of T cells decreases (decrease in no. CD_4 cells) due to Loss of immunity i.e. Capacity to fight against disease.

(iv) Drugs : Azytothymin, Ribivirine, Suromine.

Q. Enamel is hardest substance of our body

Q Carbo.. is first compound whose digestion starts.

Q Ptyalin is first enzyme that starts digestion.

Q. Maltose is first end product of digestion.

Q. When food is mixed with saliva, it is called as. Bolus

Q When Parotoid gland becomes affected by paramixo virus, disease is called as Mumps.

Q: Saliva contains Salivary amylose & Lysozome.

Q Digestion of carbohydrate & protein starts from mouth & stomach respectively.

Q. Mucous is responsible for smooth forwaid movement of food from mouth to stomach. (Peristaltic)

Q. pH of saliva is slightly ___

Q pH of Gastric juice is slightly acidic

Q pH of Bile is slightly ___

Q pH of pancreatic juice is slightly alkoline.

Q When food is mixed with Gastric juice it is called - Chyme.

Q Pepsinogene, Mucous & HCl are components of Gastric juice

Q Digestion of fats starts from Duodenum

(i) Starch / Polysaccharides / Carbohydrates is the first form of food which is digested.

(ii) Salivary gland is the first gland involved in process of digestion which includes Saliva.

(iii) Saliva contains Ptyalin / Salivary amylase (first enzyme in digestion) and Anti-Bacterial substance - Lysozome which kill the bacterias in food in mouth itself.

(iv) In mouth Glycogen starch is converted to Maltose (1st end product of digestion with two glucose molecules - Glycosidic bond)

(v) The food mixed with saliva in mouth is called Bolus. (soft food)

(vi) Parotide gland (near ears) is largest salivary gland which if affected by Virus - Paramyxo causes Mumps. The excess of or constant Mumps leads to infertility in both Male & Female

(vii) The food pipe - Oesophagus has lining of Mucous which helps in downward movement of food called Peristolsis.

(viii) The entry of food in stomach is regulated by sphincter muscles.

(ix) The food entered in stomach is soft food containing Pepsin (protein form in stomach) is called Chyme..

(x) The stomach has lining of modified form of Mucus which prevents action of acids on stomach itself.

(xi) Mid part of stomach called as Fundic region contains Gastric glands which produce Gastric juice.

(xii) Gastric juices include HCl acid, Mucous and Pepsinogene Pepsinogene is inactive form of enzyme

(xiii) HCl from Gastric Gland
- kills micro-organisms
- produces acidic condition (less pH)

- Activates Pepsin (i.e. Pepsinogene in acidic condition, converted to Pepsin)
- Inactivates Ptyalin
- Makes food soft for further process of digestion.

(xii) From stomach, food enters small intenstine (small diameter) but long in length which is constituted of 3 parts

(a) Duodenum - (shortest) & initial part
(b) Jejnum
(c) Ileum - (longest) & final part.

(xiii) All three parts of small intestine are covered with lining of Villi (fingerlike structures - to increase area for digestion)

(xiv) Deodenum receives enzymes from Pancreas & Liver. Liver forms the Bile (पित्त) from destruction of RBC's (life 120 days) and stores it in Gall bladder. The "bile salt" helps in the emulsification (breaking down in small components) of oils & fats. in food. (i.e. why Dr. advices person with malfunction liver to avoid oily food)

(xv) Pancreas secret pancreatic juice which is slightly alkaline & contains all the enzymes required for digestion except Ptyalin & Pepsin.

(xvi) Max. process of digestion occurs in Ileum.

(xvii) from small intenstine food enters in Large intenstine formed of

(a) Coecum - contains (Vermiform appendix)
(b) Colon - longest in Large intenstine
- conserves water
- part of Large intenstine.
(c) Rctum - ends with Anus.

(xviii) When food enters Caecum, it is called Chyle.

Q Duodnum receives both bile & pancreatic juice.

Q. Liver is largest gland of body

Q. Parotoid is largest Salivary gland.

Q Bile is formed by destruction of RBC's

Q. Bile is stored in Gall blodder.

Q. During emulsification, surface area of Fatty globulus increases

Q. Heterodont thicodont & Diphyodont are features of teeth.

Q Bile contains no enzymes & it is Bile salt which causes emulsification of oils / fats.

Q. Main function of Villi is to increase surface area & to promote absorption of food.

Q _____ & _____ vestigal organs.

Q In Herbivores, compound stomach is found having ____ chamber & _____ is largest.

Q. Harbivores while cudchewing releases CH_4 in atmosphere.

Q. Due to presence of Methano-tropous bacterio in their intestine, Herbivores relese CH_4.

Note

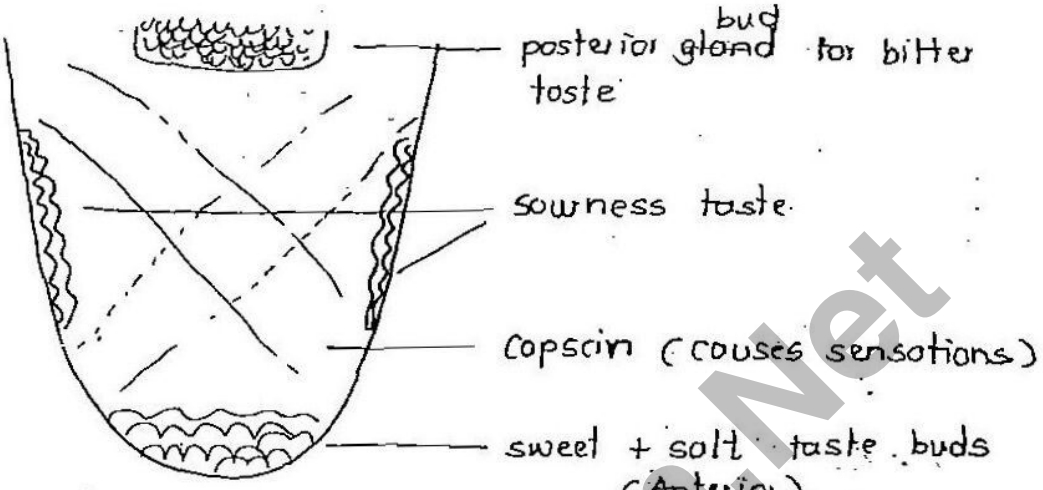
(i) Vestibule is space between lips & gums.

(ii) Frenulum is thin membranes structures which helps in attachment of tongue Posteriorly.

(iii) Lysozome is antibacterial substance in Soliva.

(iv) Frog has Anteriorly attached tongue.

(v) In coprophagus animals like pig, robbit, earthworm, either Villi is absent or it is poorly developed, so they have tendency to it their own excreta, in order to increase efficiency of nutrient absorption.



Colour of Humon excreta is due to addition of Bile pigments. (In joundice eyes, skin becomes yellowish due to accumulation of these pigments)

In human Caecum and Vermiform appendix is Vestigal - organ whereas in Harbivores, it contains bacteria which secrets enzyme cellulose that helps in digestion of cellulose thus Caecum & Vermiform appendix is their functional organ.
(

In humon Colon contains bacteria which secrets or which is responsible for synthesis of Vitamin K -called as Napthoquinon or Phylloquinone.

Cell Biology / Cytology

(i) Greek word - Kytos - cell + logous - study.

(ii) Cell is basic unit of life

(iii) Cell is basic unit of structural and function of life.

(iv) R. Virchor said "All living cells arise from pre-existing cells."

(v) Scleiden & Schwan - "Cell theory / Cell doctorine
"All living cells follow cell theory except virus

(vi) Robert Hook discovered 'Cell' and Robert Brown discovered 'Nucleus'.

Note:

(i) Smallest cell : P.P.L.O. (Pleuro Pneumonia Like Organism) - also called Mycoplosma or "Joker of cell bio / Microbio" - as it changes its shape, state becouse of absence of cell wall.

(ii) Largest cell : Ostrich's egg (Africon savana. origin)

(iii) Smallest humon cell : Speum

(iv) Largest humon cell : Ovum.

(v) Longest humon cell - Neuron
(Nephron. basic unit of Kidney)

(vi) Longest plant cell - Fibre of Ramie

(vii) Total no. of cells in human body = wt. in kg $\times 10^{15}$ cells

(viii) Arctic tern is very long migratory bird, migrates from N. to S pole & again from S to N pole.

plant 3
Leukoplast - white
Chromoplast - colourful
Chloroplast - green

	Plant cell	Animal Cell
1. cell wall	Present	Absent.

Note:

(i) In higher plants cell wos is mode of Cellulose
(ii) Cell woll in Bacteria - Murein
(iii) Cell woll in Fungi - Chitin

"Cellulose, Murein & Chitin" form structural polysacchride (Carbohydrates)

2. Reserve food	Storch	Glycogen - storage poly--saccharide (in Liver & muscles)
3. Plastid	Present	Absence

Younger plant - Lukoplast (white)
e.g. stem i.e. Potato below soil is colowles 1st.
Grown plant - Chloroplast (Green)
e.g. Potato becomes green when after growing, its some part is exposed to sunlight.
Matured plant - Chromoplost (colourful)
e.g. brownish potato.

4. Storage of starch in plant - Plastid

4. Food storage	starch - plastid	Glycogen - Liver & muscle.
5. Cell size	Larger	smaller.
8. Vacuoles	Well developed & large.	Absent or small in size
9. Lysosome (Suicide bags)	Absent.	Present (self eating of proto-plasm - Autophogy)

10.	Centrosome	Absent	Present (Helps in cell division)
11.	Spherosome, Glyoxysome, Lomosome (SGL)	Present	Absent.
12.	Cytokinesis (division of cytoplasm)	Cell-plate formation	Cell cleavage or cell furrow formation

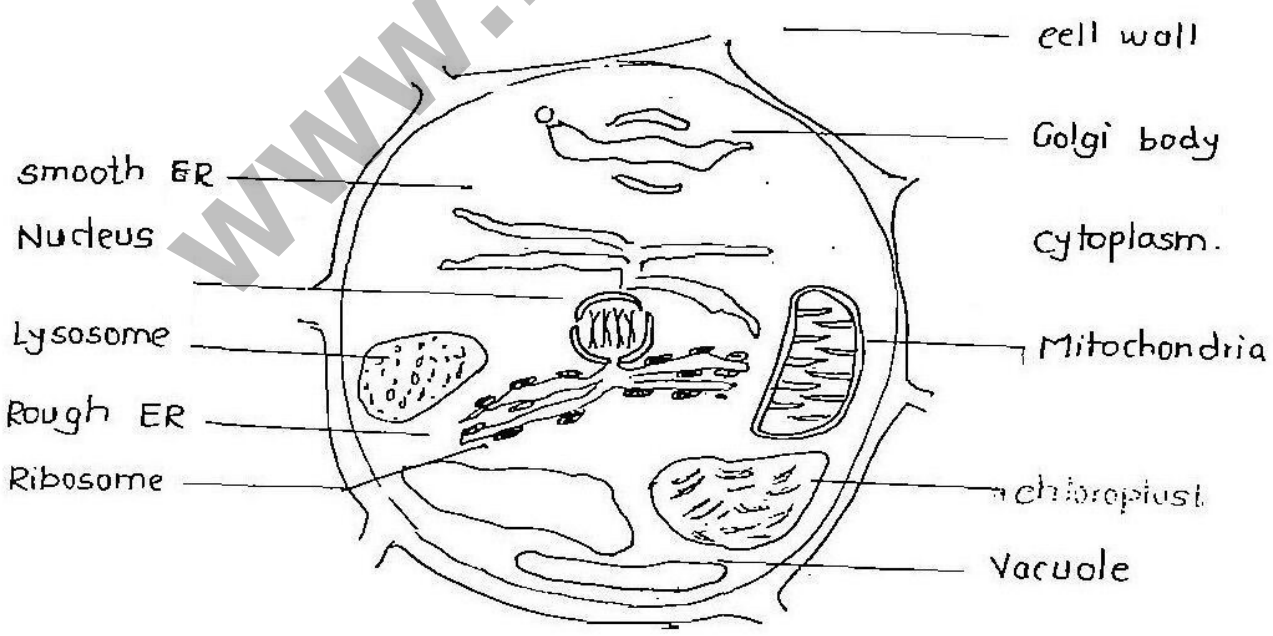
Note:

Karyokiness - division of Nucleus is same in both Animal and plant cells.

(i) Segment of DNA is called Gene which is responsible for characters.

(ii) Chromosome is formed due to combination of DNA wound on prolein.

(iii) Nucleus is called Control Tower of cell.



Endoplasmic reticulum :

(i) It gives mechanical support to the Nucleus.
(ii) Rough Endoplasmic Reticulum (RER) has Ribosomes attached over it.
(iii) They carry out intra-cellular transportation.
(iv) Protein synthesis in a cell takes place in Ribsomes on ER. (Lipid / fat synthesis takes place in smooth ER)
(v) Endoplasmic reticulum is also called 'Traffic police' of the cell.

Mitochondria

(i) They are called power house of cell.
(ii) It is found in both Animal & plant cell.
(iii) Energy is stored in it in form of ATP.

Lysosome :

(i) They are called Suicide bags of cell.
(ii) Autofagy - self eating of cell by Lysosome.
(iii) It is present only in Animal cell.

Vacuole :

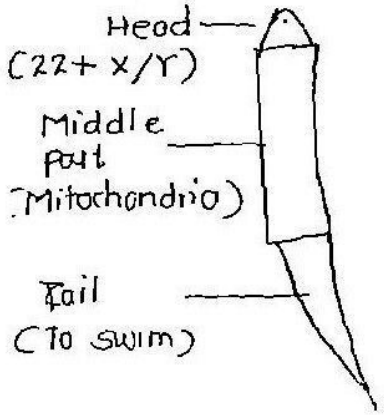
(i) It occupies max. space of cell in plant cell.
(ii) They are dustbins of the cell.

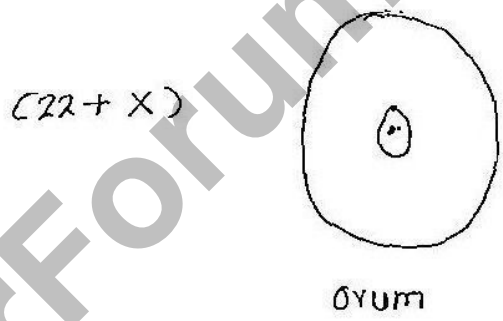
Golgi body :

(i) Dictosome - in plant cell.

Humon chromasomal diseases :

	Autosomes	Sex chromosome
♂ Normal Mole	1 5 13 18 21 22	XY Hateogomatic
♀ Normal Female		XX Homogomatic





(i) Mole can produce countless sperms at a time.
(ii) Female can produce 400 ovum in lifetime.
(iii) One set of chromosomes is called Haploid.
(iv) There are total 22 pairs of chromosome- Autosomes and one pair of sex-chromosome in humon.

Sex-chromosomal disorder:

(1) King Fetter's disease/syndrome:

$$44A + XXY = 47 \text{ chromosome}$$

(Male having Female charcters)

- Even though two X-chromosomes, it appears like male due to dominance of Y-chromosome.

(2) Multiplex syndrome:

$$44A + XXX/XXXX/XXXXX = 47 \text{ or } 48 \text{ or } 49$$

(Super-Female)

(3) Jacob's syndrome

$$44A + XYY = 47 \text{ chromosomes}$$

(Super Male)

(4) Turner's syndrome:

$$44A + X = 45 \text{ chromosome}$$

- deletion of entire chromosom in female.

Autosomal disorder:

(i) Deletion of small segment of 5th pair of chromosome is called Cat cry or Mew syndrome.

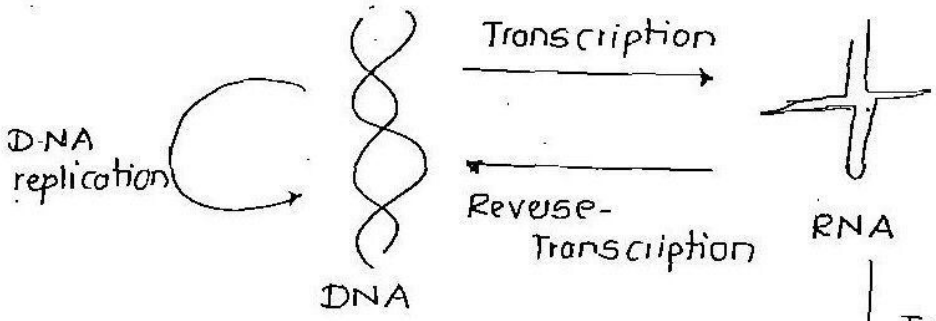
(ii) Presence of additional one Autosome in ....

13th pair	Patau's syndrome	45 A + sex chromo. (Trisomy)
18th pair	Edward's syndrome	
21st pair	Down's syndrome (Mongolism)	

Koryon - Nucleus

Karyology - study of Nucleus.

	Prokaryotic cell (Bacteria)	Eukaryotic cell (Plants / animals)
(i)	Nucleus absent	Nucleus present.
(ii)	DNA present O - double stranded circular (dS-cir DNA) - 'Naked' - histone protein is absent	DNA present  - double stranded helicular. (dS - heli. DNA) - histone protein is present.
(iii)	Chromosome is not developed Ribosomes (protein factory) of 70'S type is present	Chromosome is developed. Ribosome of 80'S type is present. (Stedberg -)
(iv)	Membrane bound structures viz. mitochondria, lysosomes. vacuole. chloroplast, golgibody are absent. Both translation & ~~reverse~~-transcription occurs simultane.	Membrane bound structures are present. Transcription occurs in nucleus while translation in cytoplasm.



(decides charactu as per info. of DNA)

The process of formation of RNA from DNA is called DNA transcription.

The reverse transcription i.e. formation of DNA from RNA is called in AIV virus. Thus it is called Retrovirus.

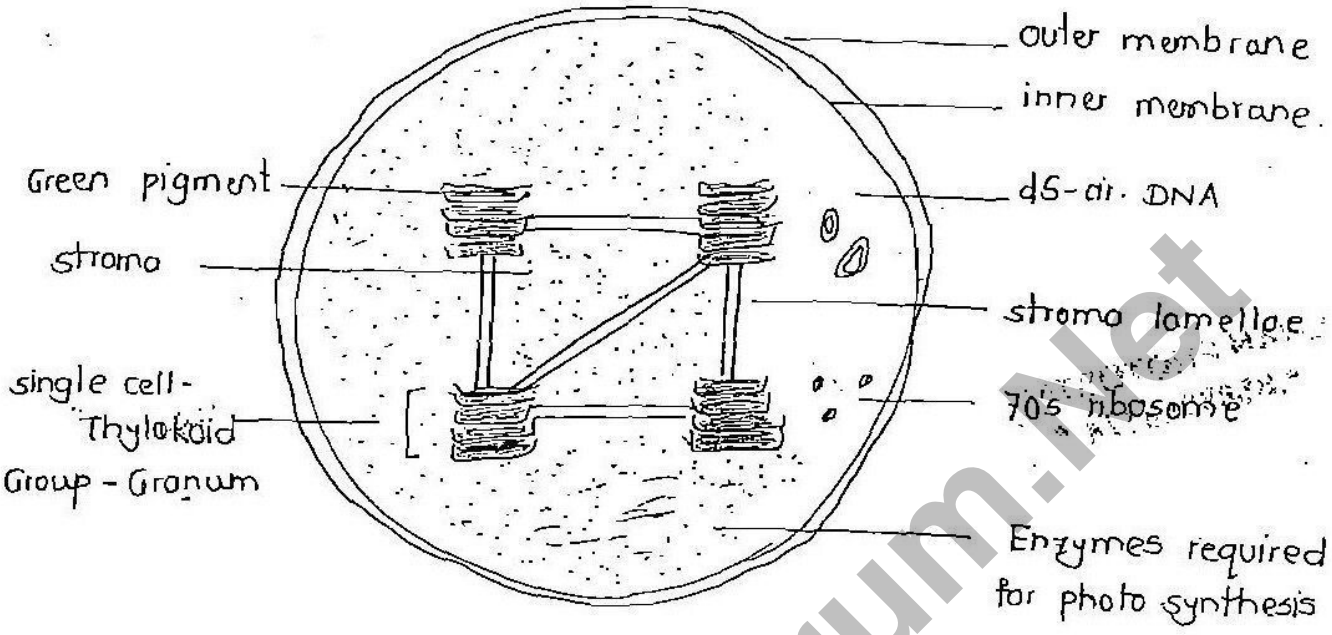
The DNA replicates once during cell division called as DNA replication.

The information on DNA is transfered to protein, called as Translation of decode information, which decides characters of body.

This process is called Central dogma of molecular body.

Transcription occurs inside nucleus while translation occurs in cytoplasm (RNA combines with ribosomes forming protein)

Chloroplost :
(green plostid)



(i) Soch. firstly discovered chloroplost.
(ii) Schimper gave the term "Chloroplost".
(iii) chloroplost is found in plant cell & it is absent in animal cells as Prokaryotes.
(iv) Chloroplast has procaryotic characte (d-S-cir-DNA and 70's ribosome). Because of its origin from Cynobacteria or Blue-Gree algae (BGA).
(v) Endosymbiotic theory explains origin of both mitochondria and chloroplost.
- during origin of cell, bacteria & BGA entered into cell
- bacteria formed- evolved into Mitochondria while BGA evolved into chloroplost.

Mitochondria - Energy supplier
Chloroplost - Food produce
(Have their own DNA)
] Evolved prokaryotes called as "Cells within cell".

(vi) Group of Granum is called Grana.

(vii) Chloroplast has gree pigment which shows maximum absorption of blue light followed by red and minimum absorbance of green.

(viii) Chlorophyll is present inside Thylokoid. cluster or group of Thylokoid is called Granum. & all Granum's are collectively called Grana.

(ix) All enzymes required for Dark reaction of photo-synthesis. are found in stroma of chloroplast.

(x) As chloroplast has its own DNA - it can form few enzymes required for photo-synthesis and for rest enzymes, it is dependant on nuclear DNA. and thus called as "Semi-autonomous structure of cell."

Inside chloroplast. within Granum, light dependant ATP formation occurs and process is called photophosorisation

$$\text{Adinosine di-phesphate (ADP)} + \text{inorganic phasphote} \xrightarrow[\text{chlorophyll}]{\text{sunlight}} \text{Adinosine tri-phospho (ATP)}$$

(xi) ATP is called "Energy currency" of the cell.

Photosynthesis :

Q. Less than ___ % of solar energy is used in photosynthesis.

(a) 20 (b) 10 (c) 5 ✓(d) 1

Q. Photosynthesis occurs in ___ light.

(a) Natural (b) Artificial ✓(c) both.

Q Photosynthesis occurs in ___ light.

✓(a) Visible (b) Ultra-violet (c) both. (d)

Q. The max. rate of photosynthesis is in ___ light

(a) Blue (b) Green (c) Yellow ✓(d) Red

Q. The min. rate of photosynthesis in ___ light

(a) Blue ✓(b) Green (c) Yellow

Q During photosynthesis O_2 is released from

(a) CO_2 ✓(b) H_2O (c) both.

Q. Max. productivity of photosynthesis is found in.

✓(a) Tropical rainforest. 1 (b) Temperate grassland. 2

(c) Tundra 4. (d) Taiga / coniferous forest. 3

Q. Maximum productivity is found in...

✓(a) Coral (b) Mangroove.

(c) Lichen. (d) Mycorrhiza.

Q. Max. productivity is found ..... & max. production is in

(a) Ocean (Max. production) (b) Forest. (Max productivity)

(i) Rotation of earth is responsible for
- Geoid shape of earth (oblate spheroid)
- occurance of day & night
- difference in local time.
- deflection of oceanic currents, waves, winds & tides.

(ii) Revolution along with its inclination on its axis of angle of 23 1/2° with respect to vertical axis is responsible for
- formation of season (due to inclination)
- variation in length of day and night.

(iii) Obliquity is change in angle of inclination from 22.1° to 24.5° in time span of 41,000 to 46,000 years.

(iv) Eccentricity is change in orbit, from more circular to more elliptical. It takes 96,000 years to 1 loc year.

(v) Wobbling of Earth on its axis is called as Precession.

(vi) Entire solar system revolves around its galactic centre in time span of 250 million years called as "Cosmic year".

(vii) Our solar system is present at distance of 30,000 light years from galactic centre in arm of spiral galaxy "Milky way".

Note:

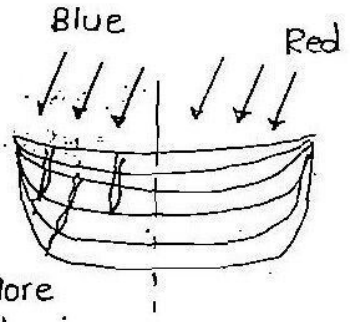
(i) Out of 100 units of sunrays that enter into outer atmosphere around 50 units strike earth's surface and it is called as Insolation. i.e. Incoming solar radiation.

(ii) Around 50 units is lost in way through reflection, refraction, scattering and absorption.

(iii) Less than 1% (0.02%) is totally used in photosynthesis.

(iv) Chlorophyll pigment has spectroscopic feature that, it can absorb light only in the range of 400-700 nm whether it is natural or artificial and this range is called Photosynthetically Active region (PAR).

Rate of photosynthesis in decreasing order is Red, Blue, Yellow green



More damage. (less rate of P.S.)

V I B G Y O R

wavelength increases →

Energy decreases →

(i) Force of gravity $\propto \frac{1}{\text{radius of earth}}$

∴ 'g' is more at poles & less at equator.

Insolation (vertical sunlight) → High Temperature → High moisture → Dust particles.

(Hygroscopic nuclei of condensation)

Clouds formation → High rainfall → High productivity of P.S.

High biodiversity → More stability.

(ii) Pressure (atmospheric) is more at poles due to inclined sunrays, less temperature while at equator atmospheric pressure is less.

Lichen:

Lichen = Algae + Fungi

(i) Algae and Fungi form symbiotic relationship.
(ii) Algae contains chlorophyll and performs photosynthesis which is used as food by Fungi. Thus Algae is called slave or servant.
(iii) Fungi provides protection to Algae from diseose (bacterial attack & thus serves as Master in Lichen.
(iv) Lichen is called pioneer of vegetation. during succession they are first to grow.
(v) Lichen grows ot bark of tree and rocky surface.
(vi) Some Lichens are used as Medicine
e.g. Peltigera (dog Lichen) used as medicine against the dog bite.
(vii) Lichens are used as indicator of air pollution moinly NO_x
(viii) They are highly sensitive to it.
(ix) Algae is called Phycobiant & Fungi is called Mycobiont.

Mycorrhiza:

(enzyme in plant to convert atm phosp into usable form

a) Mycorrhiza is symbiotic association between fungi and higher plant root, in which fungi increases absorption of phosphorous in the form of phosphates & in return it gets food prepared by plant.

Note:
Plant absorbs nitrogen from soil. mainly in the form of nitrate followed by nitrite, except Coniferous forests or Taiga forests in which plant absorb nitrogen in the form of Ammonium.

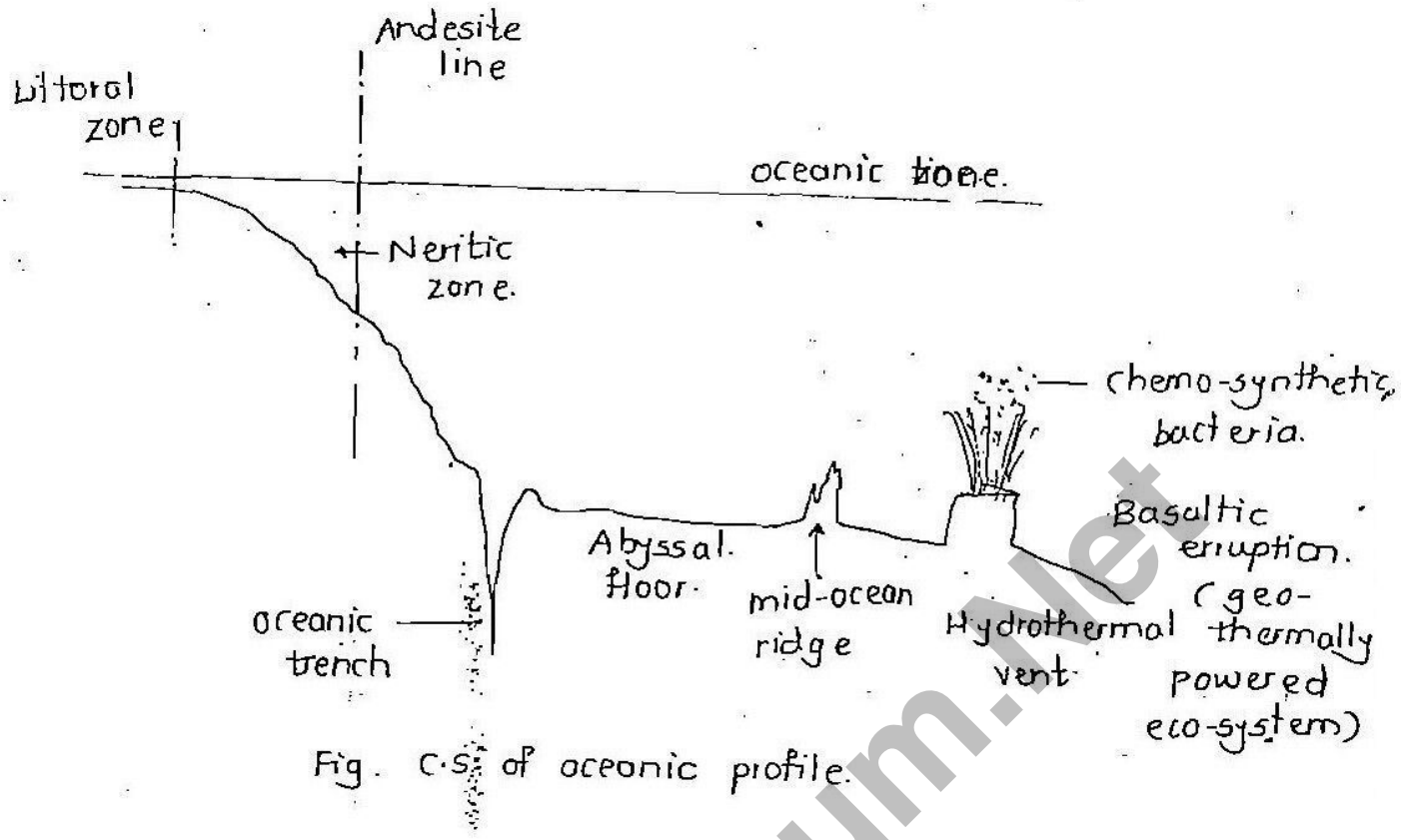


Fig. C.S. of oceanic profile.

Mangroove :

(i) Mangroove is NOT a single genetic group, it is collective term given to group of vegetation that can be herbs, shrubs, trees found in Littoral zone of tropical and sub-tropical region. i.e. 30°N to 30°S.

(ii) Mangrooves can survive under physically harsh condition like high temperature, high salinity, muddy condition, tidal extremes, anaerobic condition, intense oceanic currents as they have specialised, ecological adaptations.
e.g.

a) They have unique feature of "Vivipary" i.e. germination of seeds when fruits are attached to motherplant itself. to reduce period of germination.

b) They have respiratory roots which are positively phototropic and negatively geotropic. Such roots are called Pneumatophores & pores responsible for respiration are called Pneumatothodes.

(iii) Mangroves behaves as breeding ground for various marine species. Thus it is responsible for conservation of biodiversity.

(iv) In India, "Sundarban" is single largest continuous strech of Mangroove which is dominated by Rhizzphora trees locally called 'Sundry'.

(v) Sundarban is native place for endangered species for Royal bengal tigers, fishing cats, Gangatic dolphin, king crob

(vi) Some mangrooves are used as biofuels like Jatropa, Karonja, Pongomia, "non-mangroove Euphorbia" also called as Petrolium plant'

(vii) Two endemic species of mangrooves are Rhizophora Annyomalona (A.P.) or Pichavaram (Tamilnadu) and Heritiera kanikensis (Bhitarkania - Oriso)

Q. Which of the following has max. coral area ?

(a) Indonesia
(b) Philipines
(c) Australia
(d) India

Q. Which of the following is responsible for Coral-breaching ?

(a) Global warming
(b) destruction of mongrooves
(c) High siltation
(d) White band diseases or Block band disease
(e) Tsunami
(f) High rate of soil erroson in Littoral zone
(g) High solihity
(h) Intense oceanic current.
(i) High temperature.

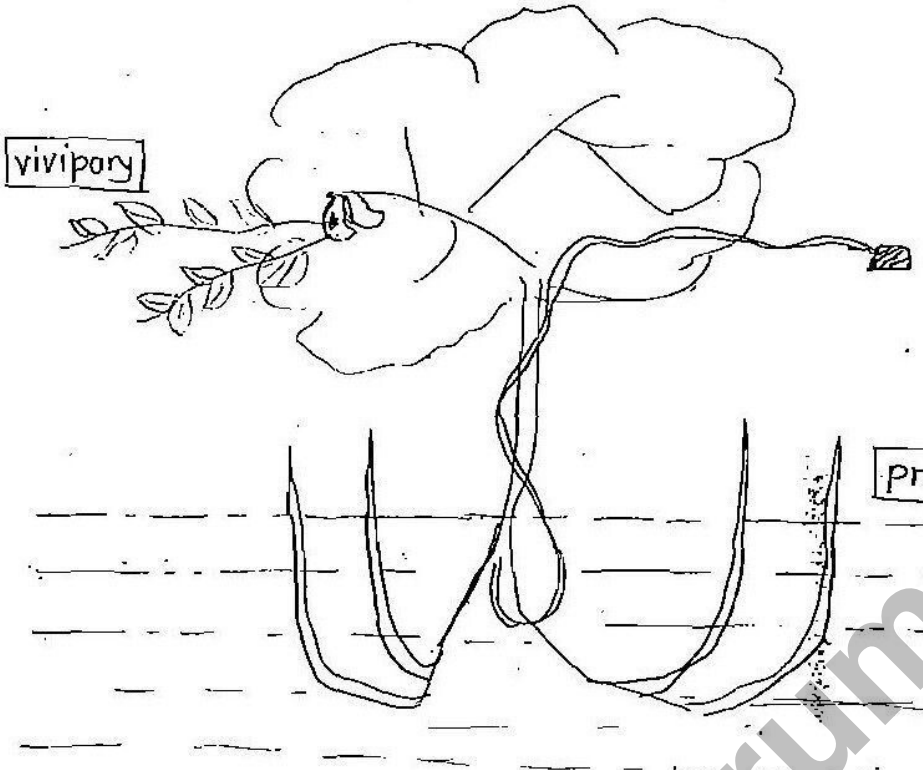
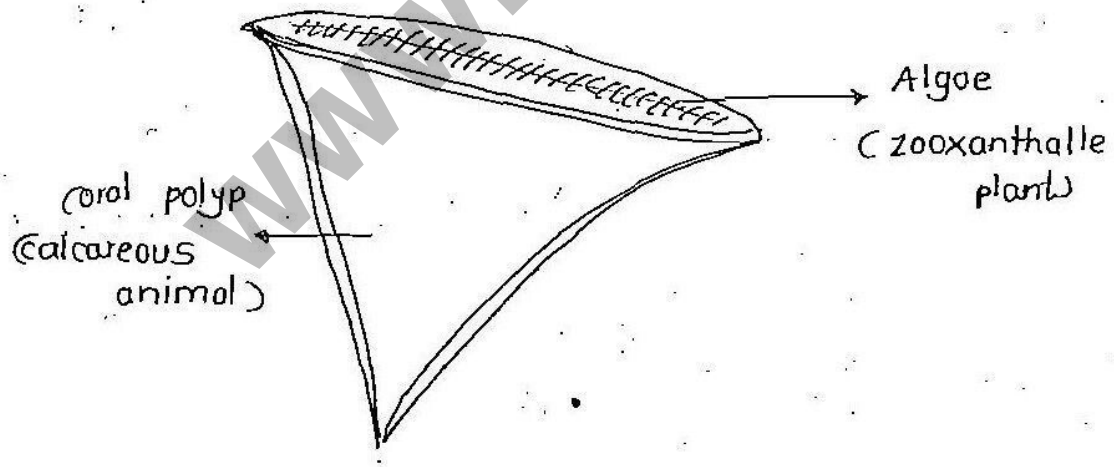


Fig. Mangroove features.

$$\text{soil hydration} \propto \frac{1}{\text{soil aeration}}$$

Coral



(i) Corals are plant + animal, superorganism found in neritic zone of tropical & sub-tropical region on submarine bench or platform which provides firm substratum.

(ii) Algae is responsible for providing food through photosynthesis and in return it gets return from animal component ie. Coral polyp.

(iii) When sometimes, death of algae occurs which is responsible for whitening or yellowing of coral (due to lack of food) it is termed as coral breaching.

(iv) After death of coral, when million of calcarious skeleton are cemented together, they will form coral reef.

(v) As corals are rich in biodiversity and productivity, they are called Rainforests of tropical ocean.

(vi) Corals are living structures & thus behaves as Carbon sink whereas Coral reefs are dead structures behaves as Carbon source.

Note:

(i) Australia has single largest Coral reef - The Great Barrier reef (1920 km long) present on its Eastern coast.

(ii) Indonesia has max. coral area followed by Philipines and Australia

(iii) India has only 2% of World Coral & 6% of world mangroove

(iv) Light is penetrated only upto 200 m depth in ocean (avg. depth 3750 m) thus less productivity than forests but as oceans cover max area of earth, they have max. production.

Q. Which of the following behaves as Carbon sink?

(a) Coral (b) Mongroove (c) Lichen

(d) Micorhiza (e) Temperate grassland (f) Ocean

(g) Forests (h) Savana (i) ALL

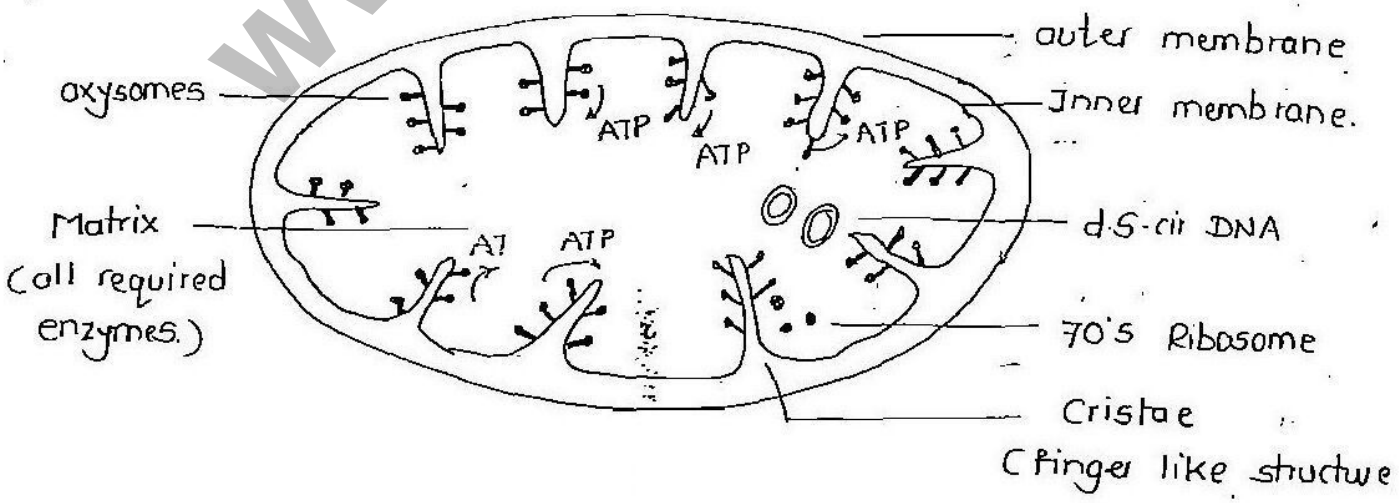
Types of reactions in Photosynthesis :

Light reaction (Robert Hill)	Dark reaction. (Blackman)
Occurs inside Granum. as it contains chlorophyll.	occurs in stroma, as it contains all enzymes.
Faster process	Slow reactions.
Oxidation process	Reduction process.
$2H_2O \longrightarrow O_2 \uparrow$ (photo-oxidation of water or photolysis of water)	$CO_2 \longrightarrow C_6H_{12}O_6$ Glucose. (Minor from mitochondria, Major from atmosphere. (Carbon fixation/Assimilation)
solar energy $\longrightarrow$ A.T.P. (1%) (photo-phosphorization)	
ATP produced.	ATP is used.

Photosynthesis is Redox reaction.

Moonlight is not effective for photosynthesis & no tree produces O_2 at night

Mitochondria
(powerhouse of cell)



(i) Kolliker firstly discovered mitochondria in animal cells. Later on Altman discovered it in plants.

(ii) Benda gave the term mitochondria

(iii) Mitochondria is found in both plants and animals, it is absent in mature RBC & prokaryotes.

(iv) Max. no. of mitochondria is found in Liver cell (around 1000 to 1200 mitochondria per cell as Glycogen - reserved food is stored in Liver i.e. high energy demand is served by Liver)

(v) Mitochondria has prokaryotic character like double stranded circular DNA and 70's ribosome. Due to its origin from Aerobic bacteria

(vi) Endo-simbiotic theory explains origin of mitochondria.

(vii) Like chloroplost, mitochondria is also semi-autonomous as it has its own DNA and it can form few enzymes required for Krebs cycle.

(viii) Mitochondria has finger like structures called as Cristae. which is formed due to folding & refolding of inner membrane of mitochondria.

(ix) At the surface of Cristae, oxysomes or F_0-F_1 particles are present.

(x) In Mitochondria large amount of ATP formation occurs through oxygen dependant process called "Oxidative phosphorylation".

(xi) As mitochondria supplies energy, it is called Power house of cell.

RESPIRATION

(i) Glucose is broken down into pyruvic acid in Cytoplasm as it contains all the enzymes required.

$C_6H_{12}O_6$ (Hexose - 1 mole) $\xrightarrow{\text{Glycolysis}}$ Pyruvic acid. (final product) (C-3, 2 moles)

(ii) Glycolysis is common in both plants & animals in both Aerobic and anaerobic respiration, called "Common pathway)

Aerobic respiration:

(i) The oxygen is used to carry out 10 reaction cycle called as Krob's cycle. (Pyuruvic acid enters mitochondria)

(ii) Electron transport chain is formed on inner membrane of mitochondria. The process is called oxidative phosphorylation in mitochondria.

(iii) About 36-38 ATP energy is produced along with $6\,CO_2\uparrow$.

(iv) It is same in both plants & animals.

Anaerobic respiration:

(i) In Wetlands, anaerobic reaction in plants take place 2 ATP and Ethyl alcohol is formed.

(ii) In animals, anaerobic respiration results in 2 ATP energy and formation of Lactic acid.

(iii) The smokers have process of anaerobic respiration due to which Lactic acid is formed which causes tiredness.

(iv) Smoking destroys mitochondrias in sperms & tail of sperm is lost.

Photosynthesis	Respiration.
Occurs in daytime	Occurs 24 hours.
Anabolic / constructive process	Catabolic / destructive process
release of O_2	release of CO_2
- It is redox reaction.	It is oxidative process.
It is endergonic process (solar energy is used)	Exergonic process (ATP + heat is released)

Note:

Plant releases oxygen during daytime and CO_2 during night because

(a) during daytime, CO_2 released by mitochondria through respiration is taken by chloroplast & it is involved in photosynthesis, during which photo-oxidation of water releases O_2 molecule.

(b) During light as there is no light, no photosynthesis, so mitochondrial CO_2 is directly released into atmosphere.