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MOOD MECHANIC(GOOD SHAHZAD ANJUM)

Bt101 Mcqs:

- Jean Baptiste LAMARCK .
  1744 – 1829
- Jean Baptiste LAMARCK He proposed a theory of evolution which is attractive.
- Small non-functional organs (vestigial organs)
- Rejection of Lamarckism, Weismann's theory of germ plasm (1896–1910)
- Charles Robert Darwin (1809–1882) in England
- Charles Robert Darwin He joined school of medicine, Scotland in 1825 but he was not interested in being physician.
- Most importantly, Darwin spent 5 weeks on the Galápagos Islands.
- A group of volcanic islands 900 km off the coast of Ecuador
- " Origin of Species" in 1859.BOOK NAME
- **Evidences of Theory of Natural Selection, Three major evidences:**
- Geology
- Fossil Evidences
- Galápagos islands

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- Darwin was impressed by Charles Lyell and James Hutton' s ideas of geology. Theory of uniformitarianism
- The earth could be much older than 6,000 years.
- Gradual changes over the time with changing environment was foundation of theory of natural selection.
- Extinct hippopotamus like animal, now called Toxodon
- Horselike animal, Thoantherium
- Horses, They were introduced in 1500
- Rhea in N. Argentina, Replaced in south of the Rio Negro by a smaller, browner Rhea
- Recent fossils are closely related to extant species
- Galápagos Islands, Which are named after the large tortoises that inhabit them (Sp. galápago, tortoise)
- 14 species of finches arose from this ancestral group, Galápagos Finches

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- Inheritance is carried out by transfer of genes.
- Traits that promote successful reproduction are said to be adaptive.
- Alfred Russel Wallace (1823-1913), Co-discoverer of theory of natural selection

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- Characteristics that increase the potential of an organism or species to successfully reproduce in a specified environment. Adaptations
- Adaptation is confused with fitness or adaptedness
- Genes of all traits are present in a population in form of alleles.
- Stock of different genes in an interbreeding population is called as gene pool.
- The process of genetic drift is analogous to flipping a coin
- Higher the number of trials, closer to ratio of 50:50.
- Smaller the number, disproportionate ratio like 70:30.
- Chances of incorporation of two adaptive alleles into gametes is equal.
- Types of Genetic Drift, 1)Founder Effect, 2)Bottleneck Effect

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- When phenotypically different individuals do not differ genetically, no evolutionary change will have occurred.
- It occurs when number of individuals in a population is drastically reduced. Bottleneck Effect
- Enzyme lactate dehydrogenase, Catalyzes the conversion of pyruvate to lactate

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- The widespread use of insecticides has led to the rapid evolution of resistance in more than 500 pest species.
- Two phenotypes of toads
- Green: Green leave average 4 offsprings
- Brown: Brown leave average 2.5 offsprings

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- fittness is quantified as reproductive success
- By custom, the most fit phenotype is assigned a fitness value of 1.0.
- Fitness of the green phenotype would be 4.0/4.0 = 1.000
- Fitness of the brown phenotype would be 2.5/4.0 = 0.625.
- The difference in fitness would therefore be
- 1.000 – 0.625 = 0.375
- Difference in fitness of 0.375 is quite large
- Natural selection in this case strongly favors the green phenotype
- In water strider (fish), larger females lay more eggs than smaller females.
- The amount of genetic variation in a population may be determined by the relative strength of different evolutionary processes

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- Both genetic drift and natural selection remove alleles from population.
- Natural selection is non random
- Genetic drift is random.
- Natural selection is removing inferior alleles while gene flow can bring them back.
- Fish predation on an insect, the water boatman, which occurs in three different colors.
- Both positive and negative frequency dependent selections play their role in evolutionary processes
- In some cases, selection favors one phenotype at one time and another phenotype at another time. Oscillating Selection
- Heterozygotes may exhibit greater fitness than homozygotes
- **Three kinds of Selection**
- Disruptive Selection
- Directional Selection
- Stabilizing Selection
- Polymorphism occurs in a population when two or more distinct forms exist

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- It occurs when different phenotypes are maintained at relatively stable frequencies in the population.

Balanced Polymorphism

- Sickle cell anemia is homozygous recessive trait.
- Most common in Africa where malaria is common as well
- Heterozygous alleles carriers are less more susceptible to malaria.
- Homozygous dominant alleles carriers are more susceptible to malaria
- Homozygous recessive alleles carriers have low survival due to anemia
- Frequency of homozygous phenotypes will be lower than heterozygous. This is Balanced polymorphism
- No variation means no evolutionary change
- gigantic cattle that yield twice as much meat as our leading breeds.
- **Species** is a group of populations in which genes are actually, or potentially, exchanged through interbreeding.
- Temporal Isolation – type of reproductive isolation due to reproducing at different times.

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- **Blackbird (*Turdus merula*), Population of the blackbird is a woodland species.**
- **Ring ouzel (*Turdus torquatus)nRing ouzel is a moorland breeding species.***
- **Parapatric Speciation, Occurs in small, local populations, called demes**
- **All of the frogs in a particular pond or all of the sea urchins in a particular tidepool make up a deme.**
- **Sympatric Speciation, This speciation, occurs within a single population**
- **Evolutionary changes are occurring gradually over millions of years. This concept, called phyletic gradualism**

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- ***Cytochrome c* is a protein present in the cellular respiration pathways in all eukaryotic organisms.**
- **Nondisjunction at a single chromosome results in an abnormal number of chromosomes, Aneuploidy**
- **Product of nondisjunction during meiosis which results in additional copies of the entire genome. Polyploidy**
- **Error in DNA replication that can produce duplications of short genetic sequences. . Replication Slippage**
- **Legs have been modified for:**

1. **Wading (stork, heron)**

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2. Swimming (penguin, duck)

3. Perching (sparrow, parrot)

- In 1736, Linnaeus published a system of binomial nomenclature, still in use today. Father of taxonomy
- Many one-celled organisms, such as Euglena, don't fit well in a 2 Kingdom system
- Robert Whittaker, working in the 1940s-70s, was dissatisfied with the old 2-kingdom systems.
- Names are written in italics, binomial nomenclature
- Common name: Indian frog, Genus name: Rana, Species name: tigrina , Scientific name: *Rana tigrina*
- . Polyphyletic groups,These have members that can be traced to separate ancestors.
- Paraphyletic groups also result when knowledge of the group is insufficient.
- Cladists differentiate between homologies and analogies.

• Types of domain archae

- Methanogens
- Thermoacidophiles
- Halophiles

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- They release methane (CH4) as a waste product, Methanogens
- Live in a chemical soup of hydrogen sulfide (H_2S) and other dissolved minerals.
- The ocean's concentration is roughly 4%.
- One habitat of halophils is Great Salt Lake.
- Great Salt Lake is actually three to five times saltier than the ocean.
- 2.5 million tons of sodium chloride is extracted from the lake.
- Cyanobacteria can fix atmospheric nitrogen in anaerobic conditions.
- Symbiotic relationship with leguminous plants roots.
- Gram-negative bacteria that include those causing syphilis and Lyme disease
- Chemoheterotrophic ; obtaining energy from oxidation
- Average bacteria 0.5 - 2.0 µm in diameter
- Surface Area ~12 µm^2 of(bacteria)
- Volume is ~4 µm of(bacteria)
- Surface Area to Volume is 3:1 of(bacteria)
- Involved in protein synthesis

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- Peptido-glycan Polymer (amino acids + sugars)
- Involved in protein synthesis(ribosomes)
- PoMonotrichous; one flagella
- Lophotrichous; tuft at one end
- Amphitrichous; both ends
- Peritrichous; all around bacteria.

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- lysaccharides firmly attached to the cell wall.
- Short protein appendages smaller than flagella(pilli)
- Length is 0.5 – 2 µm. (pilli)
- Number is 1 – 10 per cell. (pilli)
- Used in conjugation for exchange of genetic material. (pilli)
- Evolved 2.7 billion years ago
- Classification(Domain Eukaryota)
- Kingdom Protista (unicellular eukaryotes)
- Kingdom Plantae
- Kingdom Fungi
- Kingdom Animalia
- Chloroplasts and Mitochondria evolved from symbiotic bacteria that lived inside of a larger prokaryote. Also known as Symbiogenesis

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- Size- similar size to bacteria (1-10 microns) Eukaryota
- **Two types of cell functions**
- Swimming (somatic cells)
- Reproduction (gonidium
- The nucleus is an organelle found in eukaryotic cells.
- Two meters of human DNA fits into a nucleus that's 0.000005 meters across.

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- The nuclear envelope is a double-layered membrane
- Chromosomes contain double stranded DNA molecules in a condensed form attached to a histone protein
- Chromatin is comprised of DNA.
- First isolated from cell cytoplasm by Claude (1943)ribosome
- Term ribosomes was coined by Palade (1955). Also called 'palade particles
- Ribosomes are special because they are found in both prokaryotes and eukaryotes.
- ribosomes are of 2 types: (A) 70S Ribosomes: Found in prokaryotes.
- (B) 80S Ribosomes: Found in cytoplasm of eukaryotes
- 60-65% r-RNA(Ribosomes)

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- 70S ribosome: 35-40%(protein)
- 80S ribosome: 55%(protein)
- Discovered in 1945 by albert claude (ER)
- It was first noticed in the cytoplasm of chick embryo cells. (ER)
- **Types of Endoplasmic reticulum**
- 1. Rough ER (RER)
- 2. Smooth ER (SER)

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- SER is more tubular then RER
- Named after Camillo Golgi(GOLGI BODY)
- An Italian biologist who discovered the organelle with a light microscope in 1897. Camillo Golgi
- Has three different parts☹GOLGI APPARATUS)
- cis-Golgi
- medial-Golgi
- trans-Golgi
- *cis* is first cisternae.
- *trans* is final cisternae.
- One side of the Golgi body receives transport vesicles produced by the ER. This side is called cis face
- Opposite side releasing vesicle is trans face.

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- **Lysosomes were discovered by the Belgian cytologist de Duve in the 1950s.**
- **Internal environment is acidic (pH: 7)**
- **More than 60 different enzymes(Lysosomes)**
- **More than 50 membrane proteins(Lysosomes)**
- **First observed by Richard Altman (1894)MITOCHONDRIA**

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- **Term mitochondria was coined by Carl Benda (1898).**
- **Size: 0.05 – 1.0 µm (MITOCHONDRIA)**
- **Length: 1 – 10 µm long(MITOCHONDRIA)**
- **average liver cell contain around 1500 mitochondria.**
- **Intermembrane Space(Perimitochondrial space) mitochondria**
- **Contain large number of integral protein structures called porins(mitochondria)**
- **Folds of inner mitochondrial membrane(Cristae)**
- **Contains stalked particles on inner side called as F_1 particles.**
- **Contains 2/3 rd of total protein of mitochondria.MATRIX**
- **It codes 2 rRNAs , 22 tRNAs and 13 mitochondrial membrane proteins.(MITOCHONDRIA)**
- **First observed by electron microscopy in animal cells (195s), then in plant cells (1960)PEROXISOMES**

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- Isolated from liver cells by centrifugation, PEROXISOMES
- Called them peroxisomes because they generate and destroy H_2O_2
- Chloroplast was first isolated and named in 1817
- Only photosynthetic organisms have chloroplasts
- Chloroplasts are a type of plastids.

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- Presence of two pigments, chlorophyll a and chlorophyll b. (Chloroplasts)
- Photosystems convert light energy into chemical energy i.e. ATP and NADPH.
- ATP and NADPH are released into stroma.
- CO_2 and water are used as raw material for glucose synthesis.
- Cytoskeleton provides support and shape to cell
- Present in both eukaryotic and prokaryotic cell(CYTOSKELTON)
- It is a network of protein fibers(CYTOSKELTON)
- Cytoskeleton is made up of three kinds of protein filaments
- . Microtubules

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- (formed by tubulins)
- 2. Microfilaments
- (formed by actins)
- 3. Intermediate Filaments
- Hollow rods 25 nm in diameter(MICROTUBULE)
- In muscle cells, actin filaments interact with myosin filaments to create muscle contraction
- Intermediate in size 8-12 nm(Intermediate Filaments)
- Genomic DNA sequences of an archaean and a bacterium were first compared in 1996.
- Archaea are very different from bacteria.
- Protists are unicellular
- Autotrophic (self-nourishing), saprozoic (living in decaying organic matter), or heterotrophic (obtains energy from organic compounds)
- Phylum Mastigophora has two classes.
- Phytomastigophora
- Zoomastigophora
- Chloroplast has a pyrenoid(EUGLENA)
- Euglena flagella are haploid

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- **Asexual reproduction occurs in spring and summer.(VOLVOX)**
- **Sexual reproduction occurs in autumn.(VOLVOX)**
- **Zygote undergoes meiosis to retain haploidy(Phylum Mastigophora)**
- ***Trypanosoma brucei* It has three sub species.**
- ***Trypanosoma brucei***
- ***T. b. brucei(Parasite of non human)***
- ***T. b. gambiense (Causes sleeping sickness in humans)***
- ***T. b. rhodesiense(Causes sleeping sickness in humans.)***
- ***Members of the subphylum Sarcodina are the amoebae***
- **When feeding and moving, they form temporary cell extensions called pseudopodia.**
- **Types of pseudopodia**
- **Majorly amoeba has four types**
- **Lobopodia**
- **Filopodia**
- **Reticulopodia**
- **Axopodia**
- **Used for locomotion (Lobopodia)**
- **Similar to filopodia(Reticulopodia)**

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- Causes dysentery in humans(Entamoeba)
- Pass to other host in the form of cyst(Entamoeba)
- About 5, 500 species(Phylum Apicomplexa)
- Multiple fission of an asexual stage in host cells to form many more (usually asexual) individuals, Which are called merozoites

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- Causes malaria in humans (PLASMODIUM)
- Globally, an estimated 3.4 billion people in 92 countries are at risk of being infected with malaria
- Disease of poultry, sheep, cattle, and rabbits(Coccidiosis)
- Two genera, Isospora and Eimeria have important parasites
- Cryptosporidium (coccidian)
- Toxoplasmosis(Caused by Toxoplasma)
- Fetuses that survive frequently show signs of mental retardation and epileptic seizures
- About 9,000 species(Phylum Ciliphora)
- A few ciliates are symbiotic
- Trichocysts are pellicular structures primarily used for protection.
- Ciliate *Didinium* feeds principally on Paramecium

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- **Phylum Invertebrata (Classification OF Kingdom Animalia)**
- **Phylum Chordata(Classification OF Kingdom Animalia)**
- **Classification of Invertebrata**

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- **Porifera**
- **Cnidaria**
- **Echinodermata**
- **Platyhelminthes**
- **Nematoda**
- **Annelida**
- **Arthropoda**
- **Mollusca**
- **Classification of Chordata**
- **Subphylum Urochordata**
- **Subphylum Cephalochordata**
- **Subphylum Vertebrata**
- **Classification of Vertebrata, Classes:**
- **Pisces**

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- Amphibia
- Reptilia
- Aves
- Mammalia
- **Three cell types: OF PORIFERA**
- **Pinacocytes**
- **Mesenchyme cells**
- **Choanocytes**
- **Microscopic needlelike spikes called spicules**
- **Feed on particles that range in size from 0.1 to 50 µm.**
- **Classification OF Phylum Coelenterata**
- **Class Hydrozoa**
- **Class Scyphozoa**
- **Class Cubozoa**
- **Class Anthozoa**
- **embryological layers**
- **Epidermis**
- **Gastrodermis**
- **Mesoglea**

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- **Nematocysts**

- Fluid-filled, intracellular capsule enclosing a coiled, hollow tube , A lidlike operculum caps the capsule at one end
- The cnidocyte has a modified cilium called a cnidocil

- **Polyp**

- Asexual and sessile, Attaches to a substrate at the aboral end Cylindrical body called column

- **. Medusa**

- Dioecious and free swimming, Tentacles dangle from its margins
- Protonephridia as excretory structures
- A Few Turbellarians Have A Free-swimming Stage Called A Müller's Larva
- A Hard Capsule Called A Cocoon
- Ventral gland cells, called renette
- Posterior flap of tissue called bursa
- Segmented arrangement of body parts in an animal is called Metamerism.
- Organization of segments into functional units (e.g. head, thorax and abdomen(Tagmatization)

- **Parapodia:**

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Paired muscular bristle-bearing appendages used in locomotion, sensation and respiration

Setae:

.Bristle secreted from invaginations of the distal ends of Parapodia.

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- **Oligochaetes are scavengers.**
- **Mucoid mass, called the protostyle**

  shed off at the time of growth, called ecdysis.
- **Large tissue spaces are called hemocoel**
- **Blood bath the tissues and than return into the dorsal aorta, through an opening called ostia**

- **LONG QUESTION**
- **PHYLUM NEMATODA**
- **PHYLUM ARTHROPODA**
- **PHYLUM MULASCA**

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