CHAPTER 6 : EVOLUTION

Page No. : **110-125**
Total Pages : **16**
Questions Asked : **43**

2-3 QUESTION PER PAGE AT AN AVERAGE

BUT, LETS SEE WHICH PAGE HAS MAXIMUM WEIGHTAGE

- **Which page has the maximum**

115, 120 = 2 Page

35.1% QUESTIONS

2010-2024		Page No.
	0	110,122,123,125
12,13,20,21,22	1	113,114,117,118
10,13,15,16,19,20	2	111,112,124
10,11,12(2),15,21	3	116,119
14,16(2),19,21,22,24	4	121,123,124,125
10,11,12,(2),16	5	123
13,15,17,18,19(2)	6	120
12,13,14(2),15,18(2), 20(2),21,22	8	115

EVOLUTION

1. **Evolutionary Biology** is the study of **histroy of life forms on earth.**
2. **Stellar distances** measured in **light years.**
3. **Origin of universe -** almost **20 billion years old.**
4. Huge clusters of galaxies comprise the universe.
5. Galaxies contain **stars & clouds of gases & dust.**
6. **Big Bang theory** explain the **origin of universe.**
7. **Origin of earth** about **4.5 billion years back.**
8. **Origin of life** almost **4 billion years back.**
9. **Theory of panspermia -** unit of life called **spores** were transfered to different plantes including earth.
10. **Theory of spontaneous generation -** Life came out of decaying & rotting matter like straw & mud etc.
11. **Louis Pasteur** experiment : Life comes only from **pre-existing life.**
    - Uses Pre-sterilised flasks.
    - Dismissed spontaneous generation
    - This did not answer how the first life form came on earth.
12. **Oparin of Russia & Haldane of England** proposed that first form of life could have come from pre-existing, non-living organic molecules. and formation of life was preceded by **chemical evolution**.
13. **Conditions on earth -** High temperature, volcanic stroms, reducing atomosphere, containing CH_4, NH_3 and water vapour (H_2O)
14. **S.L. Miller (American scientist),**created similar conditions in laboratory.
15. He created **Electric discharge, close flask** containing CH_4,H_2, NH_3, & water vapour at **800°C.** He observed **formation of amino acids.**

[NEET 2020] [NCERT-111]

16. **Theory of Special creation :** Three annotations
    1. All living organisms that we see today were created as such
    2. Diversity was always the same since creation & will be same in future.
    3. Earth is about 4000 years old.
17. Darwin (Sail ship : H.M.S. Beagle) conduded that existing living form share similarties to varying degree not only among them selves but also the life forms that existed millions of years ago.

[NEET 2020][NCERT-112]

18. Any population has built in variation in characteristics.
19. Acc. of Darwin, ultimately & only to reproductive fitness. These who better fit in an enviroment, leave more progeny than others & hence survive & selected by nature. (Natural Selection)
20. Alfred Wallace, a naturalist, worked in Malay Archepelago
21. The geographical history of earth closely correlated with biological history of earth.
22. Earth is very old, not thousand of years old but billions of years old.
23. Fossils – Remained of hard parts of life-forms found in rocks.
24. Different aged rock sediments contain fossils of different life-forms who probably died during the formation of particular sediment.
25. Study of fossils - Palentology
26. Divergent & Convergent evolutions -

DIVERGENT EVOLUTION	CONVERGENT EVOLUTION
[NEET 2021] [NCERT-114]	[NEET 2016,2021] [NCERT-115]
• Same structure developed along different direction due to adaptation to different needs.	• They are not anatomically similar Structure but they performs similar functions.
• Structures are **Homologus.** Homology indicates **common ancestry** [NEET-2022]	• Structures are **Analogous** [NEET-2022]
• Same Anatomical structure but different function	• Different structures evolving for the same function & hence **having similarity**
Examples- 1. Pattern of bone of forelimbs of mammals 2. Vertebrates heart 3. Vertebrates Brain 4. Thorn of Bougainvillea & Tendril of cucurbita	**Examples** 1. Eye of octopus & Mammals 2. Flippers of penguins & Dolphins [2022,2024] 3. Sweet potato & potato [NEET 2020,2013,2012][NCERT-115]

[NEET 2022,2018,2016,2014,2012] [NCERT-130]

27. Evolution by **natural selection** comes from **England.**

[NEET 2015] [NCERT-116]

1. **Before industrialisation (1850s)-** more white wings moths on tree than dark-winged or melanic moths.
2. **After industrialisation (1920) -** more dark - winged moths in the same area than white winged moths.

28. During post industrialisation period, the tree tranks became dark due to industrial smoke & soots, in thin condition white winged moth does not survie due to predators.

29. Lichens known as **pollution indicators,** they will not grow in polluted area

30. Area where industrialisation did not occurs (Rural area) count of melanic moths was low.

31. In a mixed population, those that can better-adapt, survive & increase in population size.

32. **Excess use of herbicides,** pesticides etc has only resulted in selection of resistant varieties in much lesser time scale **(Evolution by Anthropogenic Action) Eg:** Antibiotics **OR** Drugs against Eukaryotic organims.

[NEET 2020,2021] [NCERT-117]

33. Evolution is not a direct process, it is a **stochastic process.**

34. **Adaptive Radiation**

[NEET 2021] [NCERT-117]

- Process of evolution of different species in a given geographical area starting from a point & literally radiating to other geographical area.

[RE-NEET-2024] [NEET 2012] [NCERT-117]

- **Examples -** Darwin finches & Australian marsupials.

35. **Darwin Finches :** Original seed-eating features change into insectivorous & vegetarian forms.

[NEET 2013] [NCERT-117]

36. When more than one adaptive radiation appeared to have occured in an isolated geopraphical area - **Convergent evolution**

37. Convergent evolution of Australian Marsupials & placental mammals.

[NEET-2023] [NCERT 118]

PLACENTAL MAMMALS	AUSTRALIAN MARSUPIALS
Mole	Marsupial mole
Anteater	Numbat (Anteater)
Mouse	Marsupial mosuse
Lemur	Spotted cuscus
Flying squirrel	Flying phalanger
Bobcat	Tasmanian tigercat
Wolf	Tasmanian wolf

38. Branching descent & natural selection are **two key concepts of Darwinian theory of evolution**

39. **French naturalist lamark -** use & disuse of organs.

eg: Neck of Giraffes

40. **Thomas Malthus** work on **populations** influenced Darwin.

41. Natural resources are limited, populations are stable in size **except :** For seasonal fluctuation.

42. **Hugo de Vries (Twentieeth century)** based on his work **evening primrose** gives idea of mutation

43. **According to Darwin,** Mutation are directional, small & Gradual but Acc. to **Hugo de vries,** Mutation are Random & directionless

[NEET 2018,2012] [NCERT-119]

44. De Vries believed that mutation caused Speciation & hence called **Saltation** (Single step & large mutation)

[NEET 2019] [NCERT-119]

Hardly-Weinberg principle

45. In a given population one can find out the frequency of occurance of alleles of a gene or a locus. This frequency is supposed to remain fixed & even remain the same through generations.

46. Allele frequencies in a population are stable & constant from generation to generation.

47. **Gene Pool :** Total genes & their alleles in a population.

48. **Genetic equilibrium :** Gene pool remains constant

49. Sum total of all the allelic frequency is one.

50. $p^2+2pq+q^2=1$, Binomial expansion of $(P+q)^2$

.[NEET 2019,2014] [NCERT-121]

Here, P^2 = Homozygous dominant

q^2 = Homozygous recessive

Pq= Heterozygous

[NEET 2016] [NCERT-121]

51. When frequency differs from expected values, indicates the extent of evolutionary change.

52. Disturbance in genetic equilibrium or Hardy-weinberg equilibrium could be interpreted as resulting in evolution.

53. **Five factors that affect Hardy-weinberg equilibrium**

    1. Gene migration or gene flow

    [RE-NEET-2024] [NEET 2021,2013] [NCERT-121]

    2. Genetic drift
    3. Genetic recombination
    4. Mutation
    5. Natural selection

54. **Gene flow :** If gene migration happens multiple times.

55. **Genetic drift :** If same change occurs by chance.

[NEET 2016,2013] [NCERT-121]

56. **Founder effect :** The change in allelic frequency is so different in the new sample of population that they become a different species. The original drifted population become founders.

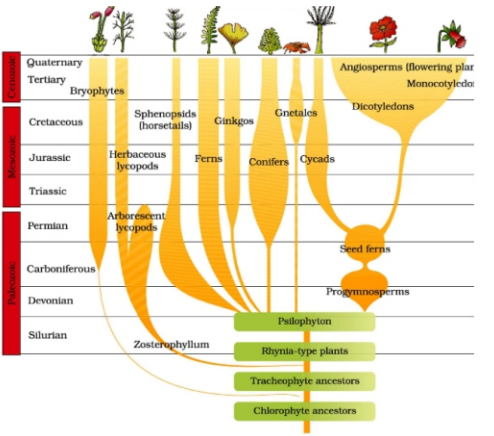
[NEET 2022, 2019,2017] [NCERT-121]

57. **Natural selection can lead to -**

    Stabilisation (In which more individuals acquires mean character value) **Directional** (more individual acquires **other than** mean character value) **Disruptive** (more individuals acquires **peripheral** character value) at both ends of the distribution curve)

58. About **2000 million year ago** (mya) the **first cellular form** of life appeared on earth.

59. A sketch of the evolution of plant forms through geological



[RE-NEET-2024] [NEET 2024]

60. **Invertebrates** formed & Active = 200 mya
61. **Jawless fishes** probably evolved = 350 mya
62. **Sea weeds & few plants** existed = 320 mya
63. Fish with **stout & strong fins** could move on land & go back in water = 350 mya
64. First organism invaded land are plants.
65. They (Coelacanth) were ancestors of modern day frogs & salamanders.
66. Amphibians evolved into reptiles (lay thick shelled eggs)
67. In **200 mya,** reptiles of different shapes & size dominated on earth.

68. Giant ferns (Pteridophytes) were present but they all fell to form coal deposits slowly.
69. Some of these land reptiles went back into water to evolve into fish like reptiles probably **200 mya** (Ichthyosaurs)
70. **Tyrannosaurus rex (Biggest reptiles)** was about **20 feet** in height & had huge fearsome dagger like teeth.
71. Dinosaurs suddenly disappeared from the earth = 65 mya
72. **First mammals - shrews** (small sized fossils)
73. Due to continental drift, when south america joined north America pouched mammals of Australia survived because of lack of competition from any other mammals.
74. Some mammals live wholly in water – whales, dolphins, seals , sea cows.
75. Most successful story is the evolution of man with language skills & self-consciousness.

[NEET 2012] [NCERT-124]

Origin & Evolution of man

76. Primates (Dryopithecus and Ramapithecus) existed about 15 mya.
77. Ramapithecus was more man-like & dryopithecus was more ape-like
78. Few fossils of man-like bones have been discovered in Ethiopia & Tanzania.
79. Man-like primates walked in eastern africa about 3-4 mya, not taller than 4 feet but walked up right.
80. **Australopithecus** probably lived in **East African grasslands** = 2 mya
81. Austrlopithecines **hunted with stone weapons & eat fruits.**
82. First human-like beings = **Homo habilis,** Brain capacities 650-800 cc they did **not eat meat**

[NEET 2019,2015] [NCERT-124]

83. **Homo erectus,** Fossils discovered in **Java in 1891** .about **1.5 mya** brain capacities around **900cc,** they **eat meat**

[NEET 2019] [NCERT-124]

84. **Neanderthal man** with a brain size of **1400cc** lived in near east & central Asia between 1,00,000-40,000 year back. They **used hides** to **protect their body & buried their dead.**

[NEET 2012,2019,2016] [NCERT-124]

85. Homo sapiens arose in **Africa,** ice age 75000-10,000 year ago, modern homo sapiens arose.
86. **Pre-historic cave art** developed around 18000 year ago.
87. **Agriculture came** around 10,000 year back & human seltlement started
88. One such cave paintings by pre-historic human can be seen at Bhimbetka rock shelter in Raisen district **Madhya Pradish.**