1. Hibernation?

Animals can go into a state of reduced metabolism that may last several months. If this state occurs mainly in winter, it is called hibernation

2. Symbiosis example?

There are three different types of **symbiotic** relationships: mutualism, commensalism, and parasitism. Mutualism: both partners benefit.
An **example** of mutualism is the relationship between the Egyptian plover and the crocodile. ... Commensalism: only one species benefits while the other is neither helped nor harmed. **(Internet)**

3. Example of foundation species?

Foundation species are sometimes referred to as 'Ecosystem Engineers'.
Examples of Foundation Species are; Corals, Earthworms, Beavers and many more!

4. Nutrition and nutrition cycle?

A **nutrient cycle** refers to the movement and exchange of organic and inorganic matter back into the production of living matter. The process is regulated by the food web pathways previously presented, which decompose organic matter into inorganic **nutrients**. **Nutrient cycles** occur within ecosystems.

5. Factor of environment?

Environmental factor. An **environmental factor**, ecological **factor** or eco **factor** is any **factor**, abiotic or biotic, that influences living organisms. Abiotic **factors** include ambient temperature, amount of sunlight, and pH of the water soil in which an organism lives.

6. Reproduction of amoeba?

Asexual reproduction - • Binary fission (ppt)
Amoeba reproduces by the common asexual reproduction method called binary fission. After replicating its genetic material through mitotic division, the cell divides into two equal sized daughter cells. (Internet)

7. Mistake in natural selection?

A major driving force of evolution comes from **mistakes** made by cells and how organisms cope with the consequences, UA biologists have found ..... Charles Darwin based his groundbreaking theory of **natural selection** on the realization that genetic variation among organisms is the key to evolution.

8. Characteristic of protozoa?

• No cell wall • Free-living or parasitic • Consumers • Habitat – aquatic (ponds,lakes, oceans) • Examples: amoeba, paramecium, dinoflagellates

9. Landscape element?

The ecosystems making up a landscape generally form a mosaic of visually distinctive patches. These patches are called landscape elements.

10. Nutrient influence by human and terrestrial ecosystem?

Human activities are significantly and rapidly altering the form and function of **terrestrial ecosystems**. For example, we are changing the chemical composition of the atmosphere, converting natural landscapes to urban areas, and transporting floral and faunal species far beyond their natural boundaries. **(Internet)**

11. What is hibernation and example?

Hibernation is a state or condition of inactivity of a plant or animal spending the winter in a long snooze especially for the purpose of rest. **Examples:** Reptiles and amphibians, bees etc.

12. Population growth?

Population growth is the **increase** in the number of individuals in a **population**. Global human **population growth** amounts to around 83 million annually, or 1.1% per year.

13. What is genetic drift?

Many changes in genotype are neutral or benign to phenotype and survival; these —cryptic‖ changes over time may result in genetic drift,

14. Landscape ecology?

—Landscape ecology is concerned with spatial patterns in the landscape and how they develop, with an emphasis on the role of disturbance, including human impacts‖ (Smith and Smith). It is a relatively new branch of ecology, that employs Global Information Systems. The goal is to predict the responses of different organisms to changes in landscape, to ultimately facilitate ecosystem management

15. Nutrient enrichment human?

Nutrient enrichment by humans is altering aquatic and terrestrial ecosystems.
Nitrate concentration and export by the earth's major rivers correlate directly with human population density.
Human disturbance also increases export of ***phosphorus*** from aquatic catchments.
Nutrient enrichment appears to be reducing the diversity of plants and fungi in terrestrial ecosystems

16. Protein synthesis of Organelles?

That is, some of the organelles • within eukaryotic cells are capable of protein synthesis. • These organelles • with their own genetic material • and protein-synthesizing capabilities • are thought to have been free-living bacteria • that entered into a symbiotic relationship, • eventually giving rise to eukaryotic cells

17. Optimal Foraging theory?

Evolutionary ecologists predict that if organisms have limited access to energy, natural selection is likely to favor individuals that are more effective at acquiring energy and nutrients. Many animals select food in a way that appears to maximize the rate at which they capture energy.

18. Factor affecting decomposition of environment?

The rate of **decomposition** is governed by three sets of **factors**—the physical **environment** (temperature, moisture and soil properties), the quantity and quality of the dead material available to decomposers, and the nature of the microbial community itself.

19. Troper?

A state of low metabolic rate and lowered body temperature, when food is scarce and night temperatures cold. Other animals can go into a state of reduced metabolism that may last several months.

20. Landscape Elements

A landscape is a heterogeneous area composed of several ecosystems.

•The ecosystems making up a landscape generally form a mosaic of visually distinctive patches.

•These patches are called landscape elements.

•Landscape ecology is the study of landscape structure and processes.

21. Work of Clausen, Keck, and Hiesey

Clausen, Keck, and Hiesey explored the extent and sources of morphological variation in plant populations, including both the influences of environment and genetics.

Long 5 Marks

22. Nutrient loss from ecosystem?

Major pathways in which these **nutrients** are **lost** include: soil erosion, leaching and gaseous **losses**. Leaching is a physical process where **nutrients** exit terrestrial **ecosystems** in the downward flow of water through the soil. ... Another **loss** of **nutrients** from **ecosystems** is due to denitrification.

23. Lamark contribution?

Lamarck is best known for his **contributions** to evolution, or Lamarckism, which suggests organisms acquire or lose traits based on how much they use them in their lives.

24. Key stone speices?

A **keystone species** is often a dominant predator whose removal allows a prey population to explode and often decreases overall diversity. Other kinds of **keystone species** are those, such as coral or beavers, that significantly alter the habitat around them and thus affect large numbers of other organisms.

25. Importance of bacteria?

The ecosystem, both on land and in the water, depends heavily upon the activity of **bacteria**. The cycling of nutrients such as carbon, nitrogen, and sulfur is completed by their ceaseless labor.

26. Food Web?

A food web is the natural interconnection of food chains and a graphical representation of what-eats-what in an ecological community. Another name for food web is consumer-resource system.

27. Role of bacteria in environment?

The cycling of nutrients such as carbon, nitrogen, and sulfur is completed by their ceaseless labor..... Decomposition is the breakdown of these organisms, and the release of nutrients back into the **environment**, and is one of the most important **roles** of the **bacteria**.

28. Foundation species?

Foundation species is used to refer to a **species** that has a strong role in structuring a community. A **foundation species** can occupy any trophic level in a food web (i.e., they can be primary producers, herbivores or predators).

29. Importance of protists?

The slime molds are important to ecosystems because they are decomposers, which release vital nutrients back into the environment. You could say life on Earth depends on the protists because they supply us with **oxygen**, are critical organisms in food chains, and recycle important nutrients for other life forms to use.

30. Sigmoidal population growth / movement

•Sigmoidal population growth can be modeled by the logistic growth equation, a modification of the exponential growth equation that includes a term for environmental resistance. In the logistic model, the rate of population growth decreases as population density increases. Research on laboratory populations indicates that zero population growth at carrying capacity may be attained by many combinations of reduced birthrates and increased death rates.

31. How Birds and mammals / Animals regulate body temperature

Birds and mammals rely heavily on metabolic energy to regulate body temperature. The physical nature of the aquatic environment reduces the possibilities for temperature regulation by aquatic organisms.

Most endothermic aquatic species are air breathers. Some organisms, mainly flying insects and some large marine fish, improve performance by selectively heating parts of their anatomy. The energetic requirements of thermoregulation may influence the geographic distribution of species.

32. Mode of Feeding of Amoeba

Feeding structures- •food vacuole •digestive enzymes •diffusion **(ppt)**

Amoeba feeds on microscopic organisms such as single-celled algae and bacteria. When the amoeba encounters a suitable organism, the cytoplasm flows round the prey and engulfs it, with a drop of water, in a food vacuole. The cytoplasm secretes enzymes into the food vacuole. **(Internet)**

33. Logistic population growth

•**As resources are depleted, population growth rate slows and eventually stops; this is known as logistic population growth**.

34. Torpor

A state of low metabolic rate and lowered body temperature, when food is scarce and night temperatures cold. Other animals can go into a state of reduced metabolism that may last several months.

35. How nutrient enrichment says the human is altering the aquatic and terrestrial ecosystem?

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Nitrate concentration and export by the earth's major rivers correlate directly with human population density. Human disturbance also increases export of ***phosphorus*** from aquatic catchments.

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36. Keystone species

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significantly alter the habitat around them and thus affect large numbers of other organisms

37. Role of foundation species

A **foundation species** is a **species** that has a strong **role** in structuring a community. The activities of **foundation species** physically modify the environment and produce and maintain habitats that benefit other organisms using that benefit.

Elements of landscape

A **landscape** includes the physical **elements** of geophysically defined landforms such as (ice-capped) mountains, hills, water bodies such as rivers, lakes, ponds and the sea, living **elements** of land cover including indigenous vegetation, human **elements** including different forms of land use, buildings, and structures

38. Factor affects the decomposition

Decomposition rate is influenced by temperature, moisture, and chemical composition of litter and the environment.

•The rate of decomposition affects the rate at which nutrients, such as nitrogen and phosphorus, are made available to primary producers. Rates of decomposition in terrestrial ecosystems are higher underarm, moist conditions.

Organelles Capable of Protein Synthesis

That is, some of the organelles within eukaryotic cells are capable of protein synthesis. These organelles with their own genetic material and protein-synthesizing capabilities are thought to have been free-living bacteria that entered into a symbiotic relationship, eventually giving rise to eukaryotic cells

39. Reproduction of Amoeba

Asexual reproduction

•Binary fission

Amoeba reproduces by the common asexual **reproduction** method called binary fission. ... **Amoeba** is a shapeless tiny unicellular organism that has a porous cell membrane which encloses the cell organelles and cytoplasm. **Amoeba** reproduces by the common asexual **reproduction** method called binary fission.

40. Importance of bacteria in environment

In summary, **bacteria** are single-celled **microbes** without a nucleus. **Bacteria** play many roles in our ecosystem. **Bacteria** are decomposers which break down dead material and recycle it. They also can be producers, making food from sunlight, such as photosynthetic **bacteria**, or chemicals, such as chemosynthetic **bacteria**.

41. Food web and structure of communities

The feeding activities of a few keystone species may control the structure of communities
Robert Paine (1966) proposed that the feeding activities of a few species have inordinate influences on community structure. He predicted that some predators may increase species diversity by reducing the probability of competitive exclusion. Manipulative studies of predaceous species have identified many keystone species, including starfish and snails in the marine intertidal zone and fish in rivers. On land, birds exert substantial influences on communities of their arthropod prey .

42. Importance of protistis

Plant-like **protists** produce almost one-half of the oxygen on the planet through photosynthesis. Other **protists** decompose and recycle nutrients that **humans** need to live. ... For example, medicines made from **protists** are used in treatment of high blood pressure, digestion problems, ulcers, and arthritis.

Examples of Symbiosis:

1. **Toxoplasma**

It is a parasitic protist that may infect a range of animals including mice, rats, and people. To reproduce sexually, the protist must infect a cat. The cat is not directly affected, but when a mouse is infected it brings harm. Mice infected with toxoplasma lose their fear of cats, which of course may bring them in close contact with a predator.

2. **Microbes**

Microbes are important for human health. For example, human breast milk contains oligosaccharides, which are short chains of sugar molecules. There is no nutritional value to babies, but the microbes are important for developing a baby's immune system.

3. **Cattle and Egrets**

Cattle do not benefit but are unaffected as egrets eat the insects that have been disturbed as the cattle forage for food.

43. Gene and Characteristics of Genes

Genes are functional units of heredity as they are made of DNA. The chromosome is made of DNA containing many genes. Every gene comprises of the particular set of instructions for a particular function or protein coding. Speaking in usual terms, genes are responsible for heredity

The human cell contains 23 pairs of chromosomes. The trait is one of the characteristics determined by one or more genes. Abnormal genes and genes that are formed due to new mutations also result in certain traits. Genes vary in size depending on the code or the protein they produce. All cells in the human body contain the same DNA. The difference between the cells occurs due to the different type of genes that are turned on and therefore produce a variety of proteins.

44. Define Codon, nonsense codon and describe the relationship between genotype and phenotype? 10

CODON-A codon is a sequence of three DNA or RNA nucleotides that corresponds with a specific amino acid or stop signal during protein synthesis. DNA and RNA molecules are written in a language of four nucleotides; meanwhile, the language of proteins includes 20 amino acids. Codons provide the key that allows these two languages to be translated into each other. Each codon corresponds to a single amino acid (or stop signal), and the full set of codons is called the genetic code.

NONSENSE CODON

-There are 3 codons out of 64 in genetic code which do not encode for any Amino Acid. These are called termination codons or stop codons or nonsense codons. The stop codons are UAA, UAG, and UGA. They encode no amino acid. The ribosome pauses and falls off the mRNA. They signal release of the nascent polypeptide from the ribosome because no cognate tRNA has anticodons complementary to these stop signals, allowing a release factor to bind to the ribosome instead

Difference Between Genotype and Phenotypes

The genotype is the set of genes in our DNA which is responsible for a particular trait. Genotype is the genetic makeup of an organism and it results in some of the physical characteristics of that organism.The entire genetic information about an organism is contained in a genotype.. Genotype is determined by the makeup of something called "alleles

The phenotype is the physical expression, or characteristics, of that trait. For example, two organisms that have even the minutest difference in their genes are said to have different genotypes. These two mice may have different genotypes and both can still be white if they share the particular phenotype for white fur.

The phenotype is the physical appearance of an organism, while the Genotype is the genetic composition of an organism. Phenotype is observable and is the expression of the genes of an individual. So even the organism with the same species may differ, with a minute difference in their genotype. This is the main difference between the two.

We can notice one's hair colour, eye colour, height, weight, skin colour, etc. but cannot look at genes responsible for these characters, so the observable physical look is the phenotype while the unnoticed genes responsible for such characters present in the DNA of cell of the individual is genotype. (From ppts)

Populations include genetic and phenotypic variation among individuals, which are significant aspects of population structure. The first biologists to conduct thorough studies of phenotypic and genotypic variation and to incorporate experiments in their studies, focused on plants. By using plants cloned from the same parent, Bonnier was able to control for the effects of genotype on plant form and observe the effects of climate.

45. What are the processes of the ecosystem influenced by landscape structure? 2

Landscape structure influences processes such as the flow of energy, materials, and species between the ecosystems within a landscape.

46. Define Hardy-Weinberg principle. 2

One of the most fundamental concepts in population genetics, the Hardy-Weinberg principle, states that "in a population mating at random in the absence of evolutionary forces, allele frequencies will remain constant."

47. How nutrient enrichment says the human is altering the aquatic and terrestrial ecosystem? 3

Nutrient loss by stream ecosystems is highly pulsed and associated with disturbance by flooding. Nutrient enrichment by humans is altering aquatic and terrestrial ecosystems. ***Nitrate*** concentration and export by the earth's major rivers correlate directly with human population density. Human disturbance also increases export of ***phosphorus*** from aquatic catchments.

Nutrient enrichment appears to be reducing the diversity of plants and fungi in terrestrial ecosystems.

48. Define and explain optical foraging theory 3

Optimal foraging theory attempts to model how organisms feed as an optimizing process. Evolutionary ecologists predict that if organisms have limited access to energy, natural selection is

likely to favour individuals that are more effective at acquiring energy and nutrients. Many animals select food in a way that appears to maximize the rate at which they capture energy. Plants appear to allocate energy to roots versus shoots in a way that increases their rate of intake of the resources that limit their growth. Plants in environments with abundant nutrients but little light tend to invest more energy in the growth of stems and leaves and less in roots. In environments rich in light but poor in nutrients, plants tend to invest more energy in the growth of roots.

49. Lyell's Mistake on natural selection. 3

As a part of his general resistance to direction/ substantial change in geology, Lyell maintained there was no real direction of change in the fossil record either. This was greeted with pretty general astonishment, but Lyell claimed the apparent changes were just due to our having bad (misleading) samples…more mammals would soon appear in older formations, etc., as we extend our fossil collections. Within ten years (1840) it was clear that this was completely untenable.

50. Explain with example how exotic predators disturb the structure of food web. 5

Exotic predators can collapse and simplify the structure of food webs. Introduced fishes have devastated the native fishes of Lake Atitlan and Gatun Lake in Central America.

Example:

The influence of the Nile perch on the fish community of Lake Victoria is enmeshed with massive changes in the lake's ecosystem.

Introduction of the Nile perch is rapidly reducing the species-rich fish fauna of Lake Victoria to a community dominated by a handful of species.

51. How evolution of mutualism took place, how humans developed relationship with other species. 10

Evolution of Mutualism

- Theory predicts that mutualism will evolve where the benefits of mutualism exceed the costs. **Keeler** built a cost-benefit model for the evolution and persistence of facultative plantant protection mutualisms in which the benefits of the mutualism to the plant are represented in terms of the proportion of the plant's energy budget that ants protect from damage by herbivores.
- The model assesses the costs of the mutualism to the plant in terms of the proportion of the plant's energy budget invested in extrafloral nectaries and the water, carbohydrates, and amino acids contained in the nectar. The model predicts that the mutualism will be favored where there are high densities of ants and potential herbivores and where the effectiveness of alternative defenses are low.

Humans in Mutualism

- Humans have developed a variety of mutualistic relationships with other species, but one of the most spectacular is that between the greater honeyguide and the traditional honey gatherers of Africa. In this apparently ancient mutualism, humans and honeyguides engage in elaborate communication and cooperation with clear benefit to both partners.
- The mutualism offers the human side a higher rate of discovery of bees' nests, while the honeyguide gains access to nests that it could not raid without human help. Careful observations

have documented that the honeyguide informs the honey gatherers of the direction and distance to bees' nests as well as of their arrival at the nest.

52. Cuvieraaa's advantage ?2

Cuvier's anatomical and classificational work was impeccable.

He identified four basic body plans for animals– vertebrates, mollusks, arthropods, and radiate (jellyfish & others).

With these groups clearly distinguished, the chain of being was no longer part of biology.

53. endosymbionts and evolution of eukaryotes?5

Formed from several prokaryotic cells . In a symbiotic relationship Symbiosis involving a prolonged association of two or more dissimilar organisms, is quite common today. In many cases both symbionts benefit from the association as occurs in lichens, once thought to be plants but actually symbiotic fungi and algae

Evidence for Endosymbiosis

Supporting evidence for endosymbiosis comes from studies of living eukaryotic cells containing internal structures called organelles, such as mitochondria and plastids which contain their own genetic material. In addition, prokaryotic cells synthesize proteins as a single system, whereas eukaryotic cells are a combination of protein-synthesizing systems.

Organelles Capable of Protein Synthesis

That is, some of the organelles within eukaryotic cells are capable of protein synthesis. These organelles with their own genetic material and protein-synthesizing capabilities are thought to have been free-living bacteria that entered into a symbiotic relationship, eventually giving rise to eukaryotic cells

54. Proterozoic Animal Fossils 3

Although scarce, a few animal fossils older than those of the Ediacaran fauna are known.

A jellyfish-like impression is present in rocks 2000 m below the Ediacara Hills Pound Quartzite.

Burrows in many areas presumably made by worms, occur in rocks at least 700 million years old.

Wormlike and algae fossils come from 700 to 900 million-year-old rocks in China but the identity and age of these "fossils" has been questioned

55. Cuvier's advantage On natural selection?

Cuvier's anatomical and classificational work was impeccable.

- ❖ He identified four basic body plans for animals– vertebrates, molluscs, arthropods, and radiata (jellyfish & others).
- ❖ With these groups clearly distinguished, the chain of being was no longer part of biology.
- ❖ But links between distinct groups were still striking– Lamarck cited teeth in fetal baleen whales, for instance, which St. Hilaire took as an instance of 'unity of plan'. A broader sort of unity could restore the chain to some respectability…

56. Protozoan characters?

- All are unicellular eukaryotes
- Many species are both heterotrophic and autotrophic simultaneously or at different stages of the lifecycle

- Protozoans are ecologically important primary producers, consumers and as vital links in the food chain
- Humans are greatly effected by parasitic protozoans either directly or indirectly
- Effects range from irritating - fatal
- Malaria (*Plasmodium spp.*) worldwide epidemic

57. Incomplete fossil record of soft bodies?

The fossil record is relatively incomplete for several reasons:

1. Soft tissues are rarely preserved
2. Movement of the earth crust has obliterated or erased and or covered many fossils.
3. Fossilization takes place only in certain types of habitats and favorable environments
4. Paleontologists have not dug up every place

58. What are the processes of the ecosystem influenced by landscape structure?

Landscape structure influences processes such as the flow of energy, materials, and species between the ecosystems within a landscape.

Examples

Studies of the movements of small mammalsin a prairie landscape show that a smaller proportion of individuals moves in more fragmented landscape but that theindividuals that do move will move farther.

59. Hardy weinberg principal?

One of the most fundamental concepts in population genetics, the Hardy-Weinberg principle, states that
“in a population mating at random in the absence of evolutionary forces, allele frequencies will remain constant.”

60. Proterozoic fossils?

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61. Advantage of being multicellular?

For something on the order of 1.5 billion years

all organisms were single-celled and life seems to have thrived .In fact, single-celled organisms are quite good at what they do but what they do is very limited .Single celled organisms can not grow very large, because as size increases proportionately less of a cell is exposed to the external environment in relation to its volume and the proportion of surface area decreases Transferring materials from the exterior to the interior becomes less efficient .

while multicelled organisms have cells specialized to perform specific functions such as respiration, food gathering, and reproduction multicelled organisms live longer, since cells can be replaced and more offspring can be produced Cells have increased functional efficiency when they are specialized into organs with specific capabilities

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64. How to documented genetic history in genome ?

Comparing nucleic acids or other molecules to infer relatedness is a valuable tool for tracing organisms' evolutionary history

DNA that codes for rRNA changes relatively slowly and is useful for investigating branching points hundreds of millions of years ago

mtDNA evolves rapidly and can be used to explore recent evolutionary events

65. EUsocialistic characteristics?

- The more complex level of social behavior, which is considered to be the pinnacle of social evolution, is called eusociality.
- Eusociality is generally thought to include three major characteristics:

(1) individuals of more than one generation living together,
(2) cooperative care of young, and
(3) division of individuals into sterile, or nonreproductive, and reproductive castes.

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67. Food web?

A food web summarizes the feeding relations in a community.

- The earliest work on food webs concentrated on simplified communities in areas such as the Arctic islands. However, researchers such as Charles Elton (1927) soon found that even these so-called simple communities included very complex feeding relations.
- The level of food web complexity increased substantially, however, as researchers began to study complex communities. Studies of the food webs of tropical freshwater fish communities revealed highly complex networks of trophic interaction that persisted even in the face of various simplifications.
- A focus on strong interactions can simplify food web structure and identify those interactions responsible for most of the energy flow in communities.

Food web and structure of communities

➢ **The feeding activities of a few keystone species may control the structure of communities.**

Robert Paine (1966) proposed that the feeding activities of a few species have inordinate influences on community structure. He predicted that some predators may increase species diversity by reducing the probability of competitive exclusion.
Manipulative studies of predaceous species have identified many keystone species, including starfish and snails in the marine intertidal zone and fish in rivers. On land, birds exert substantial influences on communities of their arthropod prey.

68. Endosymbiotic theory and origin of eukaryotic evolution?

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Humans

Humans have acted as keystone species in communities. People have long manipulated food webs both as a consequence of their own feeding activities and by introducing or deleting species from existing food webs. In addition, many of these manipulations have been focused on keystone species. Hunters in tropical rain forests have been responsible for removing keystone animal species from large areas of the rain forests of Central and South America. Chinese farmers have used ants as keystone predators to control pests in citrus orchards for over 1,700 years.