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Introduction to Zoology

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1. What is the scientific study of animals called?

- A) Botany
- B) Ecology
- C) Zoology
- D) Anatomy

Answer: C -- Zoology

2. Which Greek word meaning "animal" forms the root of the term "Zoology"?

- A) Logos
- B) Zoon
- C) Bios
- D) Anthropos

Answer: B -- Zoon

3. The study of fishes is formally known as which branch of zoology?

- A) Herpetology
- B) Ornithology
- C) Ichthyology
- D) Mammalogy

Answer: C -- Ichthyology

4. Which group of fishes exhibits an enormous variety of color patterns, body forms, and feeding habits, including algae scrapers and scale eaters?

- A) Salmonids
- B) Cyprinids
- C) Cichlids
- D) Catfishes

Answer: C -- Cichlids

5. How many pairs of jaws do cichlid fishes typically possess?

- A) One pair
- B) Two pairs
- C) Three pairs
- D) Four pairs

Answer: B -- Two pairs

6. In mouth-brooding cichlids, where does fertilization and early development take place?

- A) In a nest built on rocks
- B) In the female's mouth
- C) In open water column
- D) In the male's mouth

Answer: B -- Female's mouth

7. The subdiscipline that studies the structure of entire organisms and their parts is known as?

- A) Histology

B) Anatomy

C) Cytology

D) Embryology

Answer: B -- Anatomy

8. Which field of zoology focuses on the study of tissues?

A) Histology

B) Physiology

C) Genetics

D) Parasitology

Answer: A -- Histology

9. The study of subcellular details of animal structure and function belongs to which subdiscipline?

A) Molecular biology

B) Systematics

C) Comparative anatomy

D) Bioinformatics

Answer: A -- Molecular biology

10. Which branch of zoology deals with the interaction of organisms with their environment?

A) Genetics

B) Embryology

C) Ecology

D) Cytology

Answer: C -- Ecology

11. The study of the classification of, and evolutionary interrelationships among, animal groups is termed?

A) Systematics

B) Parasitology

C) Physiology

D) Anatomy

Answer: A -- Systematics

12. Herpetology is the study of which group of animals?

A) Fishes

B) Insects

C) Birds

D) Amphibians and reptiles

Answer: D -- Amphibians and reptiles

13. The study of insects is called?

A) Ornithology

B) Entomology

C) Mammalogy

1. Introduction to Zoology



D) Protozoology

Answer: B -- Entomology

14. Mammalogy is the branch of zoology dedicated to the study of?

- A) Reptiles
- B) Birds
- C) Mammals
- D) Protozoa

Answer: C -- Mammals

15. Which subdiscipline is concerned with the study of protozoa?

- A) Herpetology
- B) Ichthyology
- C) Protozoology
- D) Helminthology

Answer: C -- Protozoology

16. Organic evolution is defined as change in populations of organisms over?

- A) Space
- B) Time
- C) Habitat
- D) Behavior

Answer: B -- Time

17. Who published convincing evidence of evolution and proposed a mechanism for evolutionary change in 1859?

- A) Gregor Mendel
- B) Charles Darwin
- C) Carolus Linnaeus
- D) Alfred Wallace

Answer: B -- Charles Darwin

18. According to modern understanding, why is an evolutionary perspective crucial in zoology?

- A) It describes only fossil animals
- B) It explains family relationships and the origin of animal diversity
- C) It focuses exclusively on animal behavior
- D) It ignores genetic relationships

Answer: B -- Explains family relationships

19. The system of naming organisms using a two-part name is called?

- A) Trinomial nomenclature
- B) Polynomial nomenclature
- C) Binomial nomenclature
- D) Uninomial nomenclature

Answer: C -- Binomial nomenclature

20. Who is primarily credited with developing and popularizing binomial nomenclature for animals?

- A) Charles Darwin
- B) Gregor Mendel
- C) Carolus von Linne (Linnaeus)
- D) Ernst Haeckel

Answer: C -- Carolus von Linne

21. Which of the following represents the correct hierarchical order of taxonomic ranks from most inclusive to least inclusive?

- A) Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species
- B) Kingdom, Domain, Class, Phylum, Order, Family, Genus, Species
- C) Species, Genus, Family, Order, Class, Phylum, Kingdom, Domain
- D) Domain, Phylum, Kingdom, Class, Order, Family, Genus, Species

Answer: A -- Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species

22. Organisms placed in the same _____ are more closely related than organisms placed in the same family.

- A) Phylum
- B) Order
- C) Class
- D) Genus

Answer: D -- Genus

23. In modern zoology, birds are now considered to be part of which class?

- A) Aves
- B) Reptilia
- C) Mammalia
- D) Amphibia

Answer: B -- Reptilia

24. The realization that birds are reptiles that became adapted for flight is based on studies of DNA and shared characteristics between birds and?

- A) Mammals
- B) Amphibians
- C) Reptiles
- D) Fishes

Answer: C -- Reptiles

25. The only dinosaurs that survived the mass extinction event approximately 66 million years ago are?



Animal Systematics, Taxonomy, Phylogeny & Organization

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1. The protoplasmic grade of organization is characteristic of which group of organisms?

- A) Sponges
- B) Cnidarians
- C) Unicellular organisms
- D) Flatworms

Answer: C – Unicellular organisms

2. Which grade of organization is defined by an aggregation of similar cells into definite patterns or layers to perform a common function?

- A) Cellular grade
- B) Cell-tissue grade
- C) Tissue-organ grade
- D) Organ-system grade

Answer: B – Cell-tissue grade

3. In the tissue-organ grade of organization, the chief functional cells of an organ are called?

- A) Stroma
- B) Mesoglea
- C) Parenchyma
- D) Peritoneum

Answer: C – Parenchyma

4. Which of the following phyla demonstrates the organ-system grade of organization?

- A) Porifera
- B) Cnidaria
- C) Platyhelminthes
- D) Nemertea

Answer: D – Nemertea

5. Spherical symmetry in animals is best suited for which type of lifestyle?

- A) Sessile attachment
- B) Burrowing
- C) Floating and rolling
- D) Directional swimming

Answer: C – Floating and rolling

6. Which type of symmetry allows an animal to be divided into similar halves by more than two planes passing through the longitudinal axis?

- A) Spherical symmetry

- B) Radial symmetry
- C) Bilateral symmetry
- D) Asymmetry

Answer: B – Radial symmetry

7. Biradial symmetry is exemplified by which of the following animal groups?

- A) Sea anemones
- B) Comb jellies (Ctenophora)
- C) Sponges
- D) Flatworms

Answer: B – Comb jellies (Ctenophora)

8. The term "cephalization" refers to which evolutionary phenomenon?

- A) Development of a complete gut
- B) Differentiation of a head with concentrated nervous tissue
- C) Formation of a coelomic cavity
- D) Segmentation of body parts

Answer: B – Differentiation of a head with concentrated nervous tissue

9. In a bilaterally symmetrical animal, the plane that divides the body into dorsal and ventral halves is called?

- A) Sagittal plane
- B) Midsagittal plane
- C) Frontal plane
- D) Transverse plane

Answer: C – Frontal plane

10. Which body cavity in animals is derived from the blastocoel and is only partially lined by mesoderm?

- A) Coelom
- B) Pseudocoelom
- C) Gastocoel
- D) Spongocoel

Answer: B – Pseudocoelom

11. In acoelomate body plan, the space between ectodermal epidermis and endodermal digestive tract is filled with?

- A) Peritoneum
- B) Mesenteries
- C) Parenchyma

2. Animal Systematics, Taxonomy, Phylogeny & Organization



D) Coelomic fluid

Answer: C – Parenchyma

12. **The process of coelom formation by the splitting of mesodermal bands is called?**

- A) Enterocoely
- B) Schizocoely
- C) Invagination
- D) Delamination

Answer: B – Schizocoely

13. **In deuterostomes, mesoderm forms from the gut lining by which method?**

- A) Schizocoely
- B) Parenchymula formation
- C) Enterocoely
- D) Involution

Answer: C – Enterocoely

14. **The thin cellular membrane derived from mesoderm that lines the coelom is called?**

- A) Mesoglea
- B) Stroma
- C) Peritoneum
- D) Basement membrane

Answer: C – Peritoneum

15. **Which of the following is a characteristic feature of protostomes?**

- A) Radial cleavage
- B) Blastopore becomes anus
- C) Mosaic cleavage
- D) Enterocoely

Answer: C – Mosaic cleavage

16. **The blastopore becomes the mouth in which group of animals?**

- A) Deuterostomes
- B) Ecdysozoans only
- C) Lophotrochozoan protostomes
- D) Chordates

Answer: C – Lophotrochozoan protostomes

17. **A complete gut (tube-within-a-tube design) provides which major advantage?**

- A) Increased body symmetry
- B) One-way flow of food from mouth to anus
- C) Formation of a hydrostatic skeleton
- D) Enhanced cephalization

Answer: B – One-way flow of food from mouth to anus

18. **Serial repetition of similar body segments along the longitudinal axis is termed?**

A) Metamerism

B) Cephalization

C) Symmetry

D) Gastrulation

Answer: A – Metamerism

19. **Which three phyla clearly exhibit segmentation (metamerism) as a prominent feature?**

- A) Porifera, Cnidaria, Platyhelminthes
- B) Annelida, Arthropoda, Chordata
- C) Mollusca, Nemertea, Echinodermata
- D) Nematoda, Rotifera, Brachiopoda

Answer: B – Annelida, Arthropoda, Chordata

20. **Which tissue type is characterized by cells arranged in sheets that cover external and internal surfaces?**

- A) Connective tissue
- B) Muscular tissue
- C) Nervous tissue
- D) Epithelial tissue

Answer: D – Epithelial tissue

21. **Simple squamous epithelium is specialized primarily for which function?**

- A) Absorption of nutrients
- B) Secretion of mucus
- C) Diffusion of gases and transport of molecules
- D) Mechanical abrasion resistance

Answer: C – Diffusion of gases and transport of molecules

22. **The type of epithelium that lines the urinary tract and bladder of vertebrates and allows great stretching is?**

- A) Stratified squamous epithelium
- B) Simple cuboidal epithelium
- C) Transitional epithelium
- D) Simple columnar epithelium

Answer: C – Transitional epithelium

23. **Which protein is the most abundant in the animal kingdom and provides tensile strength in connective tissues?**

- A) Elastin
- B) Keratin
- C) Collagen
- D) Actin

Answer: C – Collagen

24. **The cells of cartilage located in pockets called lacunae are known as?**



- A) Osteocytes
- B) Fibroblasts
- C) Chondrocytes
- D) Macrophages

Answer: C – Chondrocytes

25. Which type of muscle tissue is multinucleate, cylindrical, and under voluntary control in vertebrates?

- A) Cardiac muscle
- B) Smooth muscle
- C) Skeletal muscle
- D) Obliquely striated muscle

Answer: C – Skeletal muscle

26. Intercalated discs are specialized junctional complexes found in which muscle type?

- A) Skeletal muscle
- B) Smooth muscle
- C) Cardiac muscle
- D) Obliquely striated muscle

Answer: C – Cardiac muscle

27. The basic functional unit of the nervous system that receives and conducts impulses is called?

- A) Neuroglia
- B) Dendrite
- C) Neuron
- D) Axon

Answer: C – Neuron

28. Which part of a neuron carries signals away from the cell body to other neurons or effector organs?

- A) Dendrite
- B) Soma
- C) Axon
- D) Myelin sheath

Answer: C – Axon

29. As body size increases in animals, the surface area to volume ratio generally?

- A) Increases
- B) Decreases
- C) Remains constant
- D) Fluctuates randomly

Answer: B – Decreases

30. The binomial nomenclature system for naming species was developed by?

- A) Aristotle

- B) Charles Darwin
- C) Carolus Linnaeus
- D) Ernst Mayr

Answer: C – Carolus Linnaeus

31. In the scientific name *Homo sapiens*, the term *sapiens* represents the?

- A) Genus name
- B) Family name
- C) Species epithet
- D) Order name

Answer: C – Species epithet

32. According to the biological species concept proposed by Mayr, a species is defined as?

- A) A group of morphologically similar individuals
- B) A reproductive community of populations reproductively isolated from others
- C) A single lineage of ancestor-descendant populations
- D) The smallest grouping of organisms diagnosably distinct

Answer: B – A reproductive community of populations reproductively isolated from others

33. The evolutionary species concept, which adds a time dimension to species definition, was formulated by?

- A) Ernst Mayr
- B) Theodosius Dobzhansky
- C) George Gaylord Simpson
- D) Joel Cracraft

Answer: C – George Gaylord Simpson

34. Which species concept defines a species as the most inclusive population of individuals having the potential for phenotypic cohesion through intrinsic cohesion mechanisms?

- A) Biological species concept
- B) Phylogenetic species concept
- C) Cohesion species concept
- D) Typological species concept

Answer: C – Cohesion species concept

35. DNA barcoding for animals typically uses sequence information from which gene?

- A) 16S rRNA
- B) Cytochrome c oxidase subunit 1 (COI)
- C) ATP synthase gene
- D) Hemoglobin beta gene

Animal-Like Protists: The Protozoans

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1. The kingdom Protista is considered polyphyletic because it originated from which ancestral group?

- A) Eubacteria
- B) Archaea
- C) Cyanobacteria
- D) Eukarya

Answer: B – Archaea

2. According to the endosymbiont hypothesis, the first eukaryotic cells arose approximately how many billion years ago?

- A) 3.5 billion years
- B) 2.5 billion years
- C) 1.5 billion years
- D) 0.5 billion years

Answer: C – 1.5 billion years

3. Which structure underlies the plasma membrane of many protozoa and consists of a regular arrangement of microtubules?

- A) Pellicle
- B) Cortex
- C) Ectoplasm
- D) Glycocalyx

Answer: A – Pellicle

4. The clear and firm portion of protozoan cytoplasm just beneath the pellicle is called?

- A) Endoplasm
- B) Cytosol
- C) Ectoplasm
- D) Nucleoplasm

Answer: C – Ectoplasm

5. Which organelle in freshwater protozoa removes excess water that enters by osmosis?

- A) Food vacuole
- B) Contractile vacuole
- C) Mitochondrion
- D) Golgi apparatus

Answer: B – Contractile vacuole

6. The specialized region analogous to a mouth in some protozoa for ingesting food is called?

- A) Cytopyge
- B) Cytostome
- C) Cytopharynx
- D) Cytoproct

Answer: B – Cytostome

7. In protozoa, the elimination of nitrogenous waste products occurs primarily by which process?

- A) Active transport
- B) Phagocytosis
- C) Diffusion across plasma membrane
- D) Exocytosis through cytopyge

Answer: C – Diffusion across plasma membrane

8. Multiple fission in which a large number of daughter cells form from a single parent is specifically termed?

- A) Binary fission
- B) Budding
- C) Schizogony
- D) Sporogony

Answer: C – Schizogony

9. The host that harbors the sexual stages of a parasitic protozoan is called the?

- A) Intermediate host
- B) Reservoir host
- C) Definitive host
- D) Paratenic host

Answer: C – Definitive host

10. Which phylum of protozoa is the largest, with over 18,000 described species possessing flagella, pseudopodia, or both?

- A) Apicomplexa
- B) Ciliophora
- C) Sarcocystophora
- D) Microspora

Answer: C – Sarcocystophora

11. Dinoflagellates that cause "red tides" and produce toxins belong to which class?

- A) Zoomastigophora
- B) Phytomastigophora
- C) Lobosea
- D) Sporozoea

Answer: B – Phytomastigophora

12. The pigment shield that covers a photoreceptor at the base of the flagellum in Euglena is called?

- A) Eyespot
- B) Stigma
- C) Ocellus
- D) Chromatophore

Answer: B – Stigma

3. Animal-Like Protists: The Protozoans



13. **Trypanosoma brucei gambiense and T. b. rhodesiense cause which disease in humans?**

- A) Chagas disease
- B) Leishmaniasis
- C) African sleeping sickness
- D) Amoebic dysentery

Answer: C – African sleeping sickness

14. **The tsetse fly (*Glossina* spp.) serves as which type of host for *Trypanosoma brucei*?**

- A) Definitive host only
- B) Intermediate host and vector
- C) Reservoir host
- D) Paratenic host

Answer: B – Intermediate host and vector

15. **Broad cell processes containing both ectoplasm and endoplasm used for locomotion and engulfing food are called?**

- A) Filopodia
- B) Axopodia
- C) Lobopodia
- D) Reticulopodia

Answer: C – Lobopodia

16. **Which type of pseudopodia contains only ectoplasm and provides two-way streaming like a conveyor belt?**

- A) Lobopodia
- B) Filopodia
- C) Axopodia
- D) Reticulopodia

Answer: B – Filopodia

17. **The test of the foraminiferan *Polystomella* is primarily composed of which material?**

- A) Silica
- B) Chitin
- C) Calcium carbonate
- D) Protein

Answer: C – Calcium carbonate

18. **The white cliffs of Dover in England are primarily composed of deposits from which protozoan group?**

- A) Radiolarians
- B) Foraminiferans
- C) Heliozoans
- D) Dinoflagellates

Answer: B – Foraminiferans

19. **Which protozoan phylum is characterized by an apical complex used for penetrating host cells?**

- A) Ciliophora
- B) Microspora
- C) Apicomplexa
- D) Sarcocystophora

Answer: C – Apicomplexa

20. **The asexual multiple fission phase in the life cycle of *Plasmodium* that occurs in liver and red blood cells is called?**

- A) Sporogony
- B) Gametogony
- C) Schizogony
- D) Merogony

Answer: C – Schizogony

21. **The process in *Plasmodium* where the zygote undergoes meiosis and produces many sporozoites within the oocyst is termed?**

- A) Schizogony
- B) Gametogony
- C) Sporogony
- D) Merogony

Answer: C – Sporogony

22. **Which species of *Plasmodium* causes the most virulent form of malaria in humans, mainly in tropical and subtropical regions?**

- A) *P. vivax*
- B) *P. malariae*
- C) *P. ovale*
- D) *P. falciparum*

Answer: D – *P. falciparum*

23. **The paroxysms (chills and fever) in *Plasmodium vivax* malaria recur every?**

- A) 24 hours
- B) 48 hours
- C) 72 hours
- D) 96 hours

Answer: B – 48 hours

24. **Which coccidian parasite is known to resist chlorination and causes chronic diarrhea in AIDS patients?**

- A) *Eimeria tenella*
- B) *Isospora belli*
- C) *Cryptosporidium parvum*
- D) *Toxoplasma gondii*

Answer: C – *Cryptosporidium parvum*

25. **The definitive host for *Toxoplasma gondii*, where sexual reproduction occurs, is which animal?**

- A) Human

3. Animal-Like Protists: The Protozoans



M K P R E P A R A T I O N S

- B) Pig
- C) Cat
- D) Bird

Answer: C – Cat

26. **Nosema bombycis, which causes pebrine disease in silkworms, belongs to which phylum?**

- A) Apicomplexa
- B) Microspora
- C) Acetospora
- D) Myxozoa

Answer: B – Microspora

27. **Myxosoma cerebralis, which causes whirling disease in trout and salmon, belongs to which phylum?**

- A) Microspora
- B) Acetospora
- C) Myxozoa
- D) Apicomplexa

Answer: C – Myxozoa

28. **Ciliates possess two types of nuclei: a larger macronucleus and one or more smaller?**

- A) Micronuclei
- B) Par nuclei
- C) Endonuclei
- D) Accessory nuclei

Answer: A – Micronuclei

29. **Rod-like or oval pellicular structures in Paramecium that discharge sticky threads for protection are called?**

- A) Trichocysts
- B) Toxicysts
- C) Nematocysts
- D) Cystoblasts

Answer: A – Trichocysts

30. **The temporary union of two ciliates to exchange genetic material is known as?**

- A) Autogamy
- B) Syngamy
- C) Conjugation
- D) Binary fission

Answer: C – Conjugation

31. **In Paramecium, the large polyploid nucleus that regulates daily metabolic activities is the?**

- A) Micronucleus
- B) Macronucleus
- C) Endonucleus

D) Kinetonucleus

Answer: B – Macronucleus

32. **Balantidium coli, a parasitic ciliate that causes dysentery in humans, lives in which organ?**

- A) Small intestine
- B) Stomach
- C) Large intestine
- D) Liver

Answer: C – Large intestine

33. **The suctorian ciliate Tokophrya feeds by using which specialized structures to suck prey cytoplasm?**

- A) Cilia
- B) Flagella
- C) Tentacles
- D) Pseudopodia

Answer: C – Tentacles

34. **According to cladograms based on 18S ribosomal RNA, which protozoan group represents modern relatives of the earliest major eukaryotic cell lines?**

- A) Apicomplexa and Ciliophora
- B) Mastigophora and Microspora
- C) Sarcocystophora and Myxozoa
- D) Acetospora and Labyrinthomorpha

Answer: B – Mastigophora and Microspora

35. **The phylum Labyrinthomorpha consists of protozoa with spindle-shaped cells that move within a network of?**

- A) Flagellar tracks
- B) Ciliary tracts
- C) Mucous tracks
- D) Pseudopodial nets

Answer: C – Mucous tracks

36. **Which of the following foraminiferans is known to have a test that looks like a tiny snail with multiple chambers?**

- A) Amoeba proteus
- B) Arcella vulgaris
- C) Polystomella
- D) Diffugia oblongata

Answer: C – Polystomella

37. **The radial symmetry and siliceous tests of radiolarians make them important fossils in which type of geological deposits?**

- A) Limestone
- B) Chert

3. Animal-Like Protists: The Protozoans

Spiralian & Acoelomate Phyla

1. Which of the following characteristics first appeared in the Triploblastic Acoelomate body plan?

- A) Radial symmetry and diploblastic organization
- B) Complete digestive system and closed circulation
- C) Bilateral symmetry, true mesoderm, and a primitive brain
- D) Exoskeleton and jointed appendages

Answer: C – Bilateral symmetry, true mesoderm, and a primitive brain

2. The evolutionary phenomenon where sexual maturity is achieved in a larval body form is termed?

- A) Metamorphosis
- B) Paedomorphosis
- C) Ecdysis
- D) Strobilation

Answer: B – Paedomorphosis

3. The loose mesodermal tissue that fills spaces between organs in flatworms is called?

- A) Mesoglea
- B) Parenchyma
- C) Coelom
- D) Stroma

Answer: B – Parenchyma

4. In flatworms, the structures that swell and form a protective mucous sheath around the body are known as?

- A) Nematocysts
- B) Rhabdites
- C) Cnidocytes
- D) Spicules

Answer: B – Rhabdites

5. The excretory/osmoregulatory structures in flatworms that consist of networks of fine tubules with flame cells are called?

- A) Metanephridia
- B) Protonephridia
- C) Malpighian tubules
- D) Green glands

Answer: B – Protonephridia

6. The free-swimming, ciliated larval stage of a digenetic trematode that emerges from the egg and seeks a snail host is the?

- A) Cercaria
- B) Redia
- C) Miracidium
- D) Oncomiracidium

Answer: C – Miracidium

7. Which class of Platyhelminthes is characterized by a body divided into proglottids and the complete absence of a digestive system?

- A) Turbellaria
- B) Trematoda
- C) Monogenea
- D) Cestoidea

Answer: D – Cestoidea

8. The holdfast structure at the anterior end of a tapeworm, often equipped with suckers and hooks, is called the?

- A) Proglottid
- B) Scolex
- C) Strobila
- D) Opisthaptor

Answer: B – Scolex

9. The series of reproductive units that make up the main body of a tapeworm is known as the?

- A) Scolex
- B) Neck
- C) Strobila
- D) Cercus

Answer: C – Strobila

10. The large, posterior attachment organ characteristic of monogenean flukes is termed?

- A) Acetabulum
- B) Oral sucker
- C) Opisthaptor
- D) Bothrium

Answer: C – Opisthaptor

11. Which subclass of trematodes is characterized by a life cycle involving at least two different hosts, including a mollusk as the first intermediate host?

- A) Aspidogastrea
- B) Digenea
- C) Monogenea
- D) Cestodaria

Answer: B – Digenea



12. The larval stage of a digenetic trematode that develops within the snail and possesses a tail for swimming is the?

- A) Sporocyst
- B) Redia
- C) Metacercaria
- D) Cercaria

Answer: D – Cercaria

13. The encysted, juvenile stage of a fluke, which is infective to the definitive host, is known as?

- A) Miracidium
- B) Cercaria
- C) Metacercaria
- D) Onchosphere

Answer: C – Metacercaria

14. Blood flukes of the genus *Schistosoma* differ from most other trematodes because they are?

- A) Monoecious
- B) Dioecious
- C) Acoelomate
- D) Free-living

Answer: B – Dioecious

15. The unique body covering of parasitic flatworms (Monogenea, Trematoda, Cestoda) that is a syncytium and provides protection from the host's immune system is called the?

- A) Epidermis
- B) Cuticle
- C) Tegument
- D) Glycocalyx

Answer: C – Tegument

16. In a tapeworm, a proglottid that contains a complete set of male and female reproductive organs and is located in the mid-region is termed?

- A) Immature
- B) Mature
- C) Gravid
- D) Terminal

Answer: B – Mature

17. The disease caused by the larval cysts of *Taenia solium* in human tissues, which can be fatal if they encyst in the brain, is called?

- A) Schistosomiasis
- B) Cysticercosis
- C) Hydatid disease
- D) Taeniasis

Answer: B – Cysticercosis

18. The larval form of a beef or pork tapeworm that develops in the muscle of the intermediate host and consists of a fluid-filled bladder with an invaginated scolex is a?

- A) Cysticercus
- B) Hydatid cyst
- C) Coracidium
- D) Proceroid

Answer: A – Cysticercus

19. The phylum Nemertea is distinguished from Platyhelminthes by the presence of which two major evolutionary innovations?

- A) Flame cells and a nervous system
- B) Complete digestive tract and closed circulatory system
- C) Tegument and a scolex
- D) Parenchyma and bilateral symmetry

Answer: B – Complete digestive tract and closed circulatory system

20. The distinctive long, eversible structure used for prey capture in nemerteans is called the?

- A) Pharynx
- B) Proboscis
- C) Stylet
- D) Tentacle

Answer: B – Proboscis

21. The cavity that houses the proboscis in a nemertean worm is known as the?

- A) Pseudocoelom
- B) Rhynchocoel
- C) Hemocoel
- D) Gastrovascular cavity

Answer: B – Rhynchocoel

22. Gastrotrichs primarily use which structures for locomotion over the substrate?

- A) Parapodia
- B) Cilia on the ventral surface
- C) Muscular hydrostatic waves only
- D) Setae

Answer: B – Cilia on the ventral surface

23. The unique jaw structure found in members of the clade Gnathifera is composed of which material?

- A) Calcium carbonate
- B) Cellulose
- C) Chitin



D) Silica

Answer: C – Chitin

24. The ciliated larval stage of the broad fish tapeworm, *Diphyllobothrium latum*, that is released from the egg and ingested by a copepod is called?

- A) Onchosphere
- B) Cysticercus
- C) Coracidium
- D) Plerocercoid

Answer: C – Coracidium

25. The second larval stage of the broad fish tapeworm that develops in the copepod and is later ingested by a fish is the?

- A) Proceroid
- B) Plerocercoid
- C) Cysticercus
- D) Oncomiracidium

Answer: A – Proceroid

26. The larval stage of the broad fish tapeworm that is infective to the definitive host (fish-eating mammal) is the?

- A) Proceroid
- B) Plerocercoid
- C) Coracidium
- D) Onchosphere

Answer: B – Plerocercoid

27. Which class of rotifers is characterized by the complete absence of males and reproduces exclusively by parthenogenesis?

- A) Seisonidea
- B) Monogononta
- C) Bdelloidea
- D) Eurotatoria

Answer: C – Bdelloidea

28. The characteristic ciliated organ on the head of a rotifer that functions in both locomotion and feeding is the?

- A) Mastax
- B) Corona
- C) Lorica
- D) Trophi

Answer: B – Corona

29. The unique, muscular, jaw-bearing pharynx found in rotifers that is used for grinding food is called the?

- A) Esophagus

B) Gizzard

C) Mastax

D) Crop

Answer: C – Mastax

30. The phenomenon of cell constancy, where an adult of a species has a fixed number of cells, is known as?

- A) Eutely
- B) Paedomorphosis
- C) Polyembryony
- D) Strobilation

Answer: A – Eutely

31. The hard, resistant capsule containing germinative cells produced by freshwater ectoprocts (bryozoans) for surviving unfavorable conditions is a?

- A) Gemmule
- B) Statoblast
- C) Cyst
- D) Spore

Answer: B – Statoblast

32. The individual member of a colonial bryozoan, which lives in its own chamber called a zoecium, is known as a?

- A) Polypide
- B) Zooid
- C) Cystid
- D) Lophophore

Answer: B – Zooid

33. The feeding apparatus of a bryozoan, consisting of a crown of ciliated tentacles surrounding the mouth but not the anus, is called a?

- A) Corona
- B) Mastax
- C) Lophophore
- D) Trochophore

Answer: C – Lophophore

34. In brachiopods, the fleshy stalk that attaches the animal to the substrate is called the?

- A) Foot
- B) Pedicel
- C) Mantle
- D) Cirrus

Answer: B – Pedicel

35. Unlike bivalve molluscs, the two shells of a brachiopod are oriented?

- A) Laterally (right and left)

Nematodes & Other Ecdysozoans Phyla

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1. The clade Ecdysozoa was established primarily through which type of evidence?

- A) Fossil record analysis
- B) Morphological characters only
- C) Molecular studies of ribosomal RNA genes
- D) Embryological development patterns

Answer: C – Molecular studies of ribosomal RNA genes

2. Which morphological character is the namesake of the clade Ecdysozoa?

- A) Pseudocoelomate body plan
- B) Unique layered cuticle that is molted periodically
- C) Complete digestive tract
- D) Longitudinal muscles only

Answer: B – Unique layered cuticle that is molted periodically

3. The process of molting in ecdysozoans is controlled through which system?

- A) Nervous system
- B) Endocrine system
- C) Excretory system
- D) Reproductive system

Answer: B – Endocrine system

4. Which of the following is an ancestral feature of Ecdysozoa?

- A) Ventral mouth opening
- B) Terminal mouth opening
- C) Spiral cleavage
- D) Locomotory cilia

Answer: B – Terminal mouth opening

5. Ecdysozoans typically lack which embryonic characteristic found in other protostomes?

- A) Determinate cleavage
- B) Spiral cleavage
- C) Radial cleavage
- D) Holoblastic cleavage

Answer: B – Spiral cleavage

6. The cuticle of ecdysozoans described in Chapter 13 is primarily composed of either collagen or which other substance?

- A) Cellulose
- B) Chitin
- C) Keratin

D) Elastin

Answer: B – Chitin

7. The pseudocoelom in nematodes functions primarily as which type of skeleton?

- A) Endoskeleton
- B) Exoskeleton
- C) Hydrostatic skeleton
- D) Appendicular skeleton

Answer: C – Hydrostatic skeleton

8. In nematodes, body movements result from contractions of body wall musculature acting on what?

- A) Cuticular plates
- B) Fluid or gel within the pseudocoelom
- C) Circular muscles
- D) Segmental appendages

Answer: B – Fluid or gel within the pseudocoelom

9. The tough cuticle in nematodes prevents tearing of the body wall during changes in what?

- A) Temperature
- B) Pseudocoelomic pressure
- C) Muscle tension
- D) Neural activity

Answer: B – Pseudocoelomic pressure

10. How many billion nematodes may be present in every acre of fertile garden soil?

- A) 1 billion
- B) 3 billion
- C) 5 billion
- D) 10 billion

Answer: C – 5 billion

11. The estimated number of roundworm species according to zoologists may be as high as?

- A) 50,000
- B) 100,000
- C) 250,000
- D) 500,000

Answer: D – 500,000

12. *Protorhabditis hortulana*, a soil-inhabiting nematode from Japan, measures what length?

- A) 0.1 mm
- B) 0.2 mm
- C) 0.5 mm

6. Nematodes & Other Ecdysozoans Phyla

D) 1.0 mm

Answer: B – 0.2 mm

13. Placentonema gigantissima, a placental parasite of sperm whales, can reach lengths up to?

- A) 2 meters
- B) 5 meters
- C) 8 meters
- D) 12 meters

Answer: C – 8 meters

14. Which characteristic do nematodes share with arthropods regarding cellular structures?

- A) Presence of cilia throughout the body
- B) Lack of cilia except in sensory structures
- C) Presence of flagellated sperm
- D) Absence of all sensory structures

Answer: B – Lack of cilia except in sensory structures

15. The sperm of nematodes are morphologically described as?

- A) Flagellated
- B) Ciliated
- C) Amoeboid
- D) Non-motile

Answer: C – Amoeboid

16. The two recognized classes of phylum Nematoda based on morphological and ribosomal RNA gene studies are?

- A) Monogononta and Bdelloidea
- B) Enoplea and Chromadoria
- C) Secernentea and Adenophora
- D) Seisonidea and Monogononta

Answer: B – Enoplea and Chromadoria

17. The class Enoplea is divided into which two subclasses?

- A) Chromadoria and Dorylaimia
- B) Dorylaimia and Enoplia
- C) Enoplia and Chromadoria
- D) Dorylaimia and Secernentea

Answer: B – Dorylaimia and Enoplia

18. Subclass Dorylaimia contains nematodes from which habitats?

- A) Marine only
- B) Freshwater and terrestrial only
- C) Marine and freshwater
- D) Terrestrial and marine

Answer: B – Freshwater and terrestrial only

19. Subclass Enoplia primarily consists of nematodes from which habitat?

- A) Freshwater
- B) Terrestrial
- C) Marine
- D) Parasitic only

Answer: C – Marine

20. The body shape of a typical nematode is best described as?

- A) Flattened and ribbon-like
- B) Slender, elongate, cylindrical, tapered at both ends
- C) Spherical and untapered
- D) Segmented and dorsoventrally flattened

Answer: B – Slender, elongate, cylindrical, tapered at both ends

21. The noncellular outer covering of nematodes is called?

- A) Epidermis
- B) Hypodermis
- C) Cuticle
- D) Tegument

Answer: C – Cuticle

22. The nematode cuticle is secreted by which underlying layer?

- A) Circular muscles
- B) Pseudocoelomic membrane
- C) Hypodermis (epidermis)
- D) Basement membrane

Answer: C – Hypodermis (epidermis)

23. The outermost layer of the nematode cuticle is called?

- A) Cortical zone
- B) Medial zone
- C) Basal zone
- D) Epicuticle

Answer: D – Epicuticle

24. The epicuticle of nematodes is comprised of which substances?

- A) Collagen only
- B) Chitin and cellulose
- C) Lipid and glycolipid
- D) Keratin and elastin

Answer: C – Lipid and glycolipid

25. Cuticulins are proteins that contribute to what property of the nematode cuticle?

- A) Flexibility
- B) Strong, insoluble nature



- A) Proteome
- B) Transcriptome
- C) Entire genome
- D) Metabolome

Answer: C – Entire genome

39. How many Nobel prizes have resulted from research using *Caenorhabditis elegans*?

- A) One
- B) Two
- C) Three
- D) Four

Answer: C – Three

40. *Ascaris lumbricoides* adults live in which part of the human body?

- A) Large intestine
- B) Small intestine
- C) Stomach
- D) Liver

Answer: B – Small intestine

41. How many people worldwide may be infected with *Ascaris lumbricoides*?

- A) 200 million
- B) 500 million
- C) 800 million
- D) 1.5 billion

Answer: C – 800 million

42. The infective stage of *Ascaris lumbricoides* is which larval stage?

- A) First-stage larva
- B) Second-stage larva
- C) Third-stage larva
- D) Fourth-stage larva

Answer: B – Second-stage larva

43. After hatching, *Ascaris* larvae penetrate the intestinal wall and are carried to which organ via circulation?

- A) Liver
- B) Heart
- C) Lungs
- D) Brain

Answer: C – Lungs

44. *Enterobius vermicularis* adults become established in which part of the human digestive tract?

- A) Small intestine
- B) Stomach
- C) Lower region of the large intestine

- D) Duodenum

Answer: C – Lower region of the large intestine

45. Gravid female pinworms migrate to which area to deposit eggs?

- A) Rectum
- B) Perianal area
- C) Small intestine
- D) Vagina

Answer: B – Perianal area

46. *Necator americanus* is commonly known as?

- A) Pinworm
- B) Hookworm
- C) Porkworm
- D) Filarial worm

Answer: B – Hookworm

47. The infective stage of *Necator americanus* that penetrates human skin is called?

- A) Rhabditiform larva
- B) Microfilaria
- C) Filariiform larva
- D) Cystacanth

Answer: C – Filariiform larva

48. *Trichinella spiralis* adults live in which part of the host's body?

- A) Skeletal muscles
- B) Mucosa of the small intestine
- C) Lymphatic system
- D) Bloodstream

Answer: B – Mucosa of the small intestine

49. The disease caused by *Trichinella spiralis* is called?

- A) Trichinosis
- B) Elephantiasis
- C) Ascariasis
- D) Enterobiasis

Answer: A – Trichinosis

50. In *Trichinella spiralis*, where do the young larvae encyst?

- A) Cardiac muscle
- B) Smooth muscle
- C) Skeletal (striated) muscles
- D) Liver tissue

Answer: C – Skeletal (striated) muscles

51. *Wuchereria bancrofti* and *Wuchereria malayi* live in which human system?

- A) Circulatory system
- B) Nervous system

6. Nematodes & Other Ecdysozoans Phyla



Phylum Mollusca

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1. Ocean acidification affects molluscs primarily by which mechanism?

- A) Increasing metabolic rates
- B) Reducing biologically available calcium
- C) Causing direct neurological damage
- D) Increasing shell thickness

Answer: B – Reducing biologically available calcium

2. Which molluscan class appears to be least affected by ocean acidification?

- A) Gastropoda
- B) Bivalvia
- C) Cephalopoda
- D) Polyplacophora

Answer: C – Cephalopoda

3. The radula is absent in which of the following molluscan classes?

- A) Gastropoda and Polyplacophora
- B) Bivalvia and most Solenogasters
- C) Cephalopoda and Scaphopoda
- D) Monoplacophora and Caudofoveata

Answer: B – Bivalvia and most Solenogasters

4. The molluscan mantle cavity primarily functions in all except which?

- A) Housing gills or lungs
- B) Secretion of the shell
- C) Receiving digestive and reproductive products
- D) Jet propulsion in cephalopods

Answer: B – Secretion of the shell

5. Which structure in molluscs is unique to the phylum and serves as a rasping organ?

- A) Odontophore
- B) Radula
- C) Ctenidium
- D) Operculum

Answer: B – Radula

6. The outer organic layer of the molluscan shell is called?

- A) Prismatic layer
- B) Nacreous layer
- C) Periostracum
- D) Conchiolin layer

Answer: C – Periostracum

7. Which layer of the molluscan shell is secreted continuously throughout the animal's life?

- A) Periostracum
- B) Prismatic layer
- C) Nacreous layer
- D) Conchiolin layer

Answer: C – Nacreous layer

8. The larval stage that is characteristic of many lophotrochozoans and found in molluscs is called?

- A) Veliger
- B) Glochidium
- C) Trochophore
- D) Spat

Answer: C – Trochophore

9. In molluscs, the coelom is typically reduced to cavities surrounding which structures?

- A) Digestive gland and radula
- B) Heart, nephridia, and gonads
- C) Mantle cavity and foot
- D) Gills and tentacles

Answer: B – Heart, nephridia, and gonads

10. Which molluscan class exhibits a closed circulatory system?

- A) Gastropoda
- B) Bivalvia
- C) Polyplacophora
- D) Cephalopoda

Answer: D – Cephalopoda

11. The unique molluscan larval stage that possesses foot, shell, and mantle is called?

- A) Trochophore
- B) Glochidium
- C) Veliger
- D) Amphiblastula

Answer: C – Veliger

12. Which class of molluscs is characterized by wormlike body, no shell, and calcareous sclerites?

- A) Polyplacophora and Monoplacophora
- B) Caudofoveata and Solenogastres
- C) Gastropoda and Bivalvia

7. Phylum Mollusca



D) Scaphopoda and Cephalopoda

Answer: B – Caudofoveata and Solenogastres

13. **The class Caudofoveata is sometimes referred to as?**

- A) Neomeniomorpha
- B) Chaetodermomorpha
- C) Amphineura
- D) Loricata

Answer: B – Chaetodermomorpha

14. **Solenogasters typically feed on which group of organisms?**

- A) Algae
- B) Cnidarians
- C) Bivalves
- D) Detritus

Answer: B – Cnidarians

15. **The number of dorsal shell plates in chitons (class Polyplacophora) is typically?**

- A) Five or six
- B) Seven or eight
- C) Nine or ten
- D) One or two

Answer: B – Seven or eight

16. **Which chiton genus is known to be predatory rather than grazing?**

- A) Tonicella
- B) Cryptochiton
- C) Placidiorella velata
- D) Mopalia

Answer: C – Placidiorella velata

17. **The iron-containing mineral that reinforces radular teeth in chitons is called?**

- A) Hematite
- B) Magnetite
- C) Pyrite
- D) Limonite

Answer: B – Magnetite

18. **Living specimens of Neopilina (class Monoplacophora) were first discovered in which year?**

- A) 1932
- B) 1945
- C) 1952
- D) 1960

Answer: C – 1952

19. **The Serialia hypothesis proposes that which two molluscan classes are sister taxa?**

A) Gastropoda and Bivalvia

B) Monoplacophora and Polyplacophora

C) Cephalopoda and Scaphopoda

D) Caudofoveata and Solenogastres

Answer: B – Monoplacophora and Polyplacophora

20. **The largest and most diverse class of molluscs is?**

- A) Bivalvia
- B) Cephalopoda
- C) Gastropoda
- D) Polyplacophora

Answer: C – Gastropoda

21. **The shell coiling direction that is genetically dominant and more common in gastropods is?**

- A) Sinistral
- B) Dextral
- C) Planospiral
- D) Conispiral

Answer: B – Dextral

22. **The plate that covers the shell aperture when a gastropod withdraws into its shell is called?**

- A) Operculum
- B) Periostracum
- C) Odontophore
- D) Columella

Answer: A – Operculum

23. **The 180° counterclockwise twisting of the visceral mass, mantle, and mantle cavity in gastropods is called?**

- A) Coiling
- B) Detorsion
- C) Torsion
- D) Involution

Answer: C – Torsion

24. **After torsion in gastropods, the anus and mantle cavity open where relative to the head?**

- A) Below the head
- B) Behind the head
- C) Above the head
- D) On the left side

Answer: C – Above the head

25. **Which gastropod subclass shows partial or complete detorsion?**



- A) Prosobranchia
- B) Opisthobranchia
- C) Pulmonata
- D) Archaeogastropoda

Answer: B – Opisthobranchia

26. **The specialized chemosensory tentacles found in opisthobranchs are called?**

- A) Cerata
- B) Rhinophores
- C) Captacula
- D) Palps

Answer: B – Rhinophores

27. **Which gastropod group has lost the ancestral ctenidia and uses a vascularized mantle wall as a lung?**

- A) Prosobranchia
- B) Opisthobranchia
- C) Pulmonata
- D) Heteropoda

Answer: C – Pulmonata

28. **The opening of the lung in pulmonate gastropods is called?**

- A) Pneumostome
- B) Nephridiopore
- C) Osculum
- D) Spiracle

Answer: A – Pneumostome

29. **In most modern prosobranch gastropods, how many gills are present?**

- A) Two
- B) One
- C) Three
- D) None

Answer: B – One

30. **The condition where the right gill, atrium, and kidney are lost in gastropods is called?**

- A) Torsion
- B) Detorsion
- C) Bilateral asymmetry
- D) Sympleiomorphy

Answer: C – Bilateral asymmetry

31. **Cone snails (genus Conus) use their radula for which specialized function?**

- A) Scraping algae
- B) Drilling holes
- C) Harpooning prey with venom

D) Filtering plankton

Answer: C – Harpooning prey with venom

32. **The toxic peptides found in Conus venom are called?**

- A) Conotoxins
- B) Conulariins
- C) Molluscotoxins
- D) Gastropotoxins

Answer: A – Conotoxins

33. **In ciliary feeding gastropods, most digestion occurs where?**

- A) In the stomach lumen
- B) Intracellularly in digestive glands
- C) In the mouth
- D) In the intestine

Answer: B – Intracellularly in digestive glands

34. **The sensory organ located at the base of the siphon in most gastropods that is chemosensory is called?**

- A) Statocyst
- B) Osphradium
- C) Rhinophore
- D) Esthete

Answer: B – Osphradium

35. **In terrestrial pulmonates, nitrogenous waste is excreted primarily as?**

- A) Ammonia
- B) Urea
- C) Uric acid
- D) Guanine

Answer: C – Uric acid

36. **The dart sac found in some terrestrial pulmonates functions to?**

- A) Inject venom into prey
- B) Heighten excitement before copulation
- C) Digest plant material
- D) Defend against predators

Answer: B – Heighten excitement before copulation

37. **Which gastropod is known as the "flamingo tongue" and feeds on gorgonians?**

- A) Cyphoma gibbosum
- B) Haliotis rufescens
- C) Busycon carica
- D) Pleuroploca gigantea

Answer: A – Cyphoma gibbosum

7. Phylum Mollusca



Phylum Annelida

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1. What is metamerism in annelids?

- A) Formation of a head
- B) Segmental body arrangement
- C) Loss of body divisions
- D) A type of larva

Answer: **B – Segmental body arrangement**

2. Tagmatization refers to?

- A) Segment fusion for specialization
- B) Body cavity formation
- C) Setae production
- D) Larval development

Answer: **A – Segment fusion for specialization**

3. Which coelom formation type occurs in annelids?

- A) Enterocoely
- B) Schizocoely
- C) Blastocoely
- D) Epicoely

Answer: **B – Schizocoely**

4. Setae in annelids are made of?

- A) Calcium carbonate
- B) Silica
- C) Chitin
- D) Keratin

Answer: **C – Chitin**

5. The dorsal blood vessel in annelids pumps blood?

- A) Posteriorly
- B) Anteriorly
- C) Laterally
- D) Ventrally

Answer: **B – Anteriorly**

6. Clitellata is characterized by?

- A) Parapodia and many setae
- B) A clitellum for cocoon formation
- C) Trochophore larva
- D) Separate sexes

Answer: **B – A clitellum for cocoon formation**

7. Parapodia are primarily used for?

- A) Excretion
- B) Locomotion and gas exchange
- C) Digestion
- D) Sensory reception

Answer: **B – Locomotion and gas exchange**

8. Prostomium in polychaetes is a?

- A) Tail segment
- B) Head lobe with sensory organs
- C) Egg sac
- D) Excretory pore

Answer: **B – Head lobe with sensory organs**

9. Peristomium is the segment that?

- A) Contains the anus
- B) Surrounds the mouth
- C) Bears the clitellum
- D) Houses the heart

Answer: **B – Surrounds the mouth**

10. Which annelid group lacks a mouth and digestive tract?

- A) Errantia
- B) Oligochaeta
- C) Siboglinidae
- D) Hirudinea

Answer: **C – Siboglinidae**

11. The eversible proboscis in errant polychaetes functions in?

- A) Reproduction
- B) Prey capture
- C) Osmoregulation
- D) Respiration

Answer: **B – Prey capture**

12. Metanephridia have a ciliated funnel called?

- A) Nephrostome
- B) Nephridiopore
- C) Flame cell
- D) Solenocyte

Answer: **A – Nephrostome**

13. Epitoky is a reproductive strategy involving?

- A) Asexual budding
- B) Transformation into a reproductive individual
- C) Direct development
- D) Internal fertilization

Answer: **B – Transformation into a reproductive individual**

14. Trochophore larva is found in?

- A) Earthworms only
- B) Leeches only
- C) Marine polychaetes
- D) All annelids

Answer: **C – Marine polychaetes**

8. Phylum Annelida



15. *Nereis* belongs to which clade?

- A) Sedentaria
- B) Errantia
- C) Clitellata
- D) Siboglinidae

Answer: **B – Errantia**

16. Fireworms (*Eurythoe*) have setae that are?

- A) Solid and sensory
- B) Hollow and venomous
- C) Absent
- D) Calcified

Answer: **B – Hollow and venomous**

17. The bloodworm *Glycera* has hemoglobin in?

- A) Red blood cells
- B) Coelomocytes
- C) Plasma only
- D) Nephridia

Answer: **B – Coelomocytes**

18. Christmas-tree worms (*Spirobranchus*) are?

- A) Errant polychaetes
- B) Sedentary tubeworms
- C) Leeches
- D) Earthworms

Answer: **B – Sedentary tubeworms**

19. *Riftia pachytila* is a giant?

- A) Earthworm
- B) Leech
- C) Siboglinid tubeworm
- D) Fireworm

Answer: **C – Siboglinid tubeworm**

20. Echiurans (spoon worms) lack?

- A) A proboscis
- B) Segmentation
- C) A coelom
- D) Setae

Answer: **B – Segmentation**

21. The clitellum in earthworms is involved in?

- A) Locomotion
- B) Cocoon formation
- C) Respiration
- D) Excretion

Answer: **B – Cocoon formation**

22. *Lumbricus terrestris* is a common?

- A) Marine polychaete
- B) Freshwater oligochaete
- C) Terrestrial earthworm

D) Parasitic leech

Answer: **C – Terrestrial earthworm**

23. Calciferous glands in earthworms help in?

- A) Calcium excretion and pH regulation
- B) Digestion of proteins
- C) Absorption of water
- D) Setae formation

Answer: **A – Calcium excretion and pH regulation**

24. The typhlosole in earthworm intestine increases?

- A) Body length
- B) Surface area for absorption
- C) Setae number
- D) Nephridia count

Answer: **B – Surface area for absorption**

25. Chloragogen tissue in annelids functions like?

- A) Vertebrate liver
- B) Vertebrate kidney
- C) Vertebrate heart
- D) Vertebrate lung

Answer: **A – Vertebrate liver**

26. Leeches (*Hirudinea*) lack?

- A) Anterior and posterior suckers
- B) Setae (except in some)
- C) A coelom
- D) Hermaphroditism

Answer: **B – Setae (except in some)**

27. Hirudin is an anticoagulant secreted by?

- A) Earthworms
- B) Polychaetes
- C) Leeches
- D) Siboglinids

Answer: **C – Leeches**

28. The number of segments in true leeches (*Hirudinea*) is fixed at?

- A) 34
- B) 100
- C) 15
- D) 50

Answer: **A – 34**

29. *Chaetopterus* is known as?

- A) Parchment worm
- B) Peanut worm
- C) Bloodworm
- D) Clam worm

Answer: **A – Parchment worm**

8. Phylum Annelida

30. Sipunculans (peanut worms) lack?

- A) A coelom
- B) Segmentation and setae
- C) A complete digestive tract
- D) Trochophore larva

Answer: **B – Segmentation and setae**

31. Which annelid group exhibits bioluminescence?

- A) Earthworms only
- B) Some polychaetes like fireworms
- C) All leeches
- D) Freshwater oligochaetes

Answer: **B – Some polychaetes like fireworms**

32. Nuchal organs in polychaetes are primarily?

- A) Photoreceptors
- B) Chemoreceptors
- C) Mechanoreceptors
- D) Statocysts

Answer: **B – Chemoreceptors**

33. Giant axons in annelid nerve cord mediate?

- A) Slow crawling
- B) Escape reactions
- C) Feeding behavior
- D) Reproduction

Answer: **B – Escape reactions**

34. In earthworms, sperm exchange occurs via?

- A) Direct copulation with penis
- B) External fertilization in water
- C) Mucous sheath and seminal grooves
- D) Hypodermic impregnation

Answer: **C – Mucous sheath and seminal grooves**

35. The pygidium in annelids bears the?

- A) Mouth
- B) Anus
- C) Clitellum
- D) Brain

Answer: **B – Anus**

36. Osedax worms are siboglinids that feed on?

- A) Coral polyps
- B) Whale bones
- C) Algae
- D) Blood

Answer: **B – Whale bones**

37. Bonellia exhibits extreme sexual dimorphism where males are?

- A) Larger than females
- B) Dwarf and live on females

C) Free-swimming only

D) Hermaphroditic

Answer: **B – Dwarf and live on females**

38. Which annelid has a U-shaped tube and mucous net feeding?

- A) Nereis
- B) Chaetopterus
- C) Hirudo
- D) Lumbricus

Answer: **B – Chaetopterus**

39. The main nitrogenous waste in terrestrial annelids is?

- A) Ammonia
- B) Urea
- C) Uric acid
- D) Creatinine

Answer: **B – Urea**

40. Protonephridia in annelids are found in?

- A) Most earthworms
- B) Some primitive polychaetes
- C) All leeches
- D) Only siboglinids

Answer: **B – Some primitive polychaetes**

41. Aortic arches in earthworms function to?

- A) Pump blood to the body
- B) Maintain steady blood pressure
- C) Filter blood
- D) Produce setae

Answer: **B – Maintain steady blood pressure**

42. The peristomium in Nereis bears?

- A) Eyes
- B) Tentacles and jaws
- C) Clitellum
- D) Anus

Answer: **B – Tentacles and jaws**

43. Which polychaete family has image-resolving eyes?

- A) Nereididae
- B) Alicopidae
- C) Siboglinidae
- D) Chaetopteridae

Answer: **B – Alicopidae**

44. The trophosome in siboglinids contains?

- A) Digestive enzymes
- B) Chemoautotrophic bacteria
- C) Gametes

Hexapoda and Myriapoda

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1. According to modern phylogenetics, hexapods are most closely related to which crustacean group?

- A) Copepods
- B) Barnacles
- C) Remipedes
- D) Isopods

Answer: C – Remipedes

2. The study of insects is formally called:

- A) Herpetology
- B) Entomology
- C) Ornithology
- D) Mammalogy

Answer: B – Entomology

3. Which structure in insects is derived from modified maxillae and forms a coiled sucking tube?

- A) Labrum
- B) Hypopharynx
- C) Proboscis of butterflies
- D) Mandibles

Answer: C – Proboscis of butterflies

4. In grasshoppers, the sensory lower lip that helps in food handling is called:

- A) Labrum
- B) Labium
- C) Hypopharynx
- D) Maxilla

Answer: B – Labium

5. The waxy layer of insect exoskeleton that prevents desiccation is part of:

- A) Procuticle
- B) Epicuticle
- C) Endocuticle
- D) Basement membrane

Answer: B – Epicuticle

6. Which insect order includes termites according to modern classification?

- A) Isoptera
- B) Blattodea
- C) Orthoptera
- D) Dermaptera

Answer: B – Blattodea

7. The fusion of two embryonic segments in millipedes results in a structure called:

- A) Diplosegment
- B) Metamere
- C) Somite
- D) Tagma

Answer: A – Diplosegment

8. Poison claws in centipedes are modified appendages known as:

- A) Maxillipeds
- B) Chelicerae
- C) Gonopods
- D) Forcipules

Answer: A – Maxillipeds

9. The nauplius larva is characteristic of which arthropod group?

- A) Insects
- B) Arachnids
- C) Crustaceans
- D) Myriapods

Answer: C – Crustaceans

10. Which hormone directly initiates molting in insects by acting on epidermal cells?

- A) Juvenile hormone
- B) Prothoracicotropic hormone
- C) Ecdysone
- D) Bursticon

Answer: C – Ecdysone

11. In honey bees, the pollen basket is located on which pair of legs?

- A) Prothoracic legs
- B) Mesothoracic legs
- C) Metathoracic legs
- D) All legs equally

Answer: C – Metathoracic legs

12. The respiratory pigment found in some insects that carries oxygen is:

- A) Hemocyanin
- B) Hemoglobin
- C) Hemerythrin
- D) Chlorocruorin

Answer: B – Hemoglobin

13. Johnston's organ in insects is a specialized mechanoreceptor located in the:

- A) Legs
- B) Abdomen
- C) Base of antennae

10. Hexapoda and Myriapoda



D) Mouthparts

Answer: C – Base of antennae

14. Which type of metamorphosis is exhibited by silverfish (order Thysanura)?

- A) Holometabolous
- B) Hemimetabolous
- C) Ametabolous
- D) Hypermetamorphosis

Answer: C – Ametabolous

15. The terminal abdominal appendages in insects that are sensory are called:

- A) Cerci
- B) Styli
- C) Gonopods
- D) Uropods

Answer: A – Cerci

16. In asynchronous flight muscles, a single nerve impulse can produce approximately how many wingbeats?

- A) 1-2
- B) 10-20
- C) 50
- D) 200

Answer: C – 50

17. The protein resilin is found in insect cuticle and functions in:

- A) Pigmentation
- B) Elastic energy storage
- C) Waterproofing
- D) Pathogen defense

Answer: B – Elastic energy storage

18. Which order of insects has the highest number of described species?

- A) Diptera
- B) Lepidoptera
- C) Hymenoptera
- D) Coleoptera

Answer: D – Coleoptera

19. The green glands (antennal glands) are excretory organs found in:

- A) Insects
- B) Crustaceans
- C) Arachnids
- D) Myriapods

Answer: B – Crustaceans

20. In crayfish, the scaphognathite (gill bailer) is part of which appendage?

- A) First maxilla
- B) Second maxilla
- C) First maxilliped
- D) Mandible

Answer: B – Second maxilla

21. The X-organ and Y-organ in crustaceans control which physiological process?

- A) Digestion
- B) Molting
- C) Circulation
- D) Excretion

Answer: B – Molting

22. Which compound do repugnatorial glands of millipedes produce as a defense?

- A) Formic acid
- B) Hydrogen cyanide
- C) Acetic acid
- D) Sulfuric acid

Answer: B – Hydrogen cyanide

23. The anterior pair of wings in beetles that are hardened and protective are called:

- A) Tegmina
- B) Halteres
- C) Elytra
- D) Hemelytra

Answer: C – Elytra

24. In Diptera, the hindwings are reduced into balancing organs known as:

- A) Halteres
- B) Cerci
- C) Stylets
- D) Spiracles

Answer: A – Halteres

25. The process of emerging from the pupal case as an adult insect is called:

- A) Ecdysis
- B) Eclosion
- C) Metamorphosis
- D) Diapause

Answer: B – Eclosion

26. Which of the following is a primitively wingless insect order?

- A) Orthoptera
- B) Coleoptera
- C) Thysanura
- D) Lepidoptera

Answer: C – Thysanura



27. The filter chamber in some insects is a modification of the digestive system for:

- A) Rapid water removal
- B) Increased enzyme secretion
- C) Storage of food
- D) Grinding plant material

Answer: A – Rapid water removal

28. In termites, the exchange of food and pheromones among colony members is called:

- A) Trophallaxis
- B) Parthenogenesis
- C) Altruism
- D) Kin selection

Answer: A – Trophallaxis

29. Which insect is the classic example of a parasitoid that lays eggs inside caterpillars?

- A) Honey bee
- B) Braconid wasp
- C) Monarch butterfly
- D) Dung beetle

Answer: B – Braconid wasp

30. The blood of insects (hemolymph) is not primarily involved in:

- A) Nutrient transport
- B) Hormone distribution
- C) Oxygen transport
- D) Waste transport

Answer: C – Oxygen transport

31. The number of described insect species is approximately:

- A) 500,000
- B) 750,000
- C) 1,000,000
- D) 1,500,000

Answer: C – 1,000,000

32. Which structure in insects prevents tracheal collapse and allows lengthwise expansion?

- A) Taenidia
- B) Spiracles
- C) Atria
- D) Tracheoles

Answer: A – Taenidia

33. The term "paurometabolous" metamorphosis is now more commonly called:

- A) Ametabolous
- B) Hemimetabolous
- C) Holometabolous

D) Hypermetabolous

Answer: B – Hemimetabolous

34. In holometabolous insects, the non-feeding, transformative stage is the:

- A) Larva
- B) Nymph
- C) Pupa
- D) Adult

Answer: C – Pupa

35. Which sensory structure in moths detects ultrasonic echolocation calls of bats?

- A) Johnston's organ
- B) Tympanal organ
- C) Compound eye
- D) Ocellus

Answer: B – Tympanal organ

36. The production of light by fireflies is an example of:

- A) Fluorescence
- B) Bioluminescence
- C) Phosphorescence
- D) Chemiluminescence

Answer: B – Bioluminescence

37. The exoskeleton of crustaceans is stiffened primarily by:

- A) Chitin
- B) Calcium carbonate
- C) Scleroproteins
- D) Resilin

Answer: B – Calcium carbonate

38. In male honey bees (drones), which type of sex determination system is present?

- A) Diploid
- B) Haploid
- C) Triploid
- D) Tetraploid

Answer: B – Haploid

39. The term "kin selection" explains altruistic behavior in social insects because:

- A) Workers are unrelated to the queen
- B) Workers share 75% of genes with sisters
- C) Drones are sterile
- D) Queens produce only male offspring

Answer: B – Workers share 75% of genes with sisters

40. The cottony-cushion scale insect was controlled in California by introducing:

- A) Vedalia beetle

Phylum Echinodermata

11. Phylum Echinodermata

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1. Which of the following is a synapomorphy of clade Ambulacraria?

- A) Pharyngeal gill slits
- B) Dorsal hollow nerve cord
- C) Notochord
- D) Postanal tail

Answer: A – Pharyngeal gill slits

2. The water-vascular system in echinoderms is derived from which embryonic coelomic compartment?

- A) Protocoel
- B) Mesocoel
- C) Metacoel
- D) Hydrocoel

Answer: D – Hydrocoel

3. Which of the following echinoderm classes retains open ambulacral grooves in adults?

- A) Ophiuroidea and Echinoidea
- B) Asteroidea and Crinoidea
- C) Holothuroidea and Concentricycloidea
- D) Echinoidea and Holothuroidea

Answer: B – Asteroidea and Crinoidea

4. The madreporite in asteroids is located on which surface?

- A) Oral surface
- B) Aboral surface
- C) Lateral surface
- D) Internal cavity

Answer: B – Aboral surface

5. Which structure in echinoderms is primarily responsible for locomotion and food gathering?

- A) Hemal system
- B) Papulae
- C) Tube feet
- D) Pedicellariae

Answer: C – Tube feet

6. The unique connective tissue in echinoderms that can change from liquid to solid state under neural control is called?

- A) Areolar tissue
- B) Catch collagen
- C) Elastic cartilage
- D) Reticular fiber

Answer: B – Catch collagen

7. Which class of echinoderms lacks an anus and has a sac-like stomach confined to the central disc?

- A) Asteroidea
- B) Ophiuroidea
- C) Echinoidea
- D) Holothuroidea

Answer: B – Ophiuroidea

8. Aristotle's lantern is a specialized chewing structure found in which class?

- A) Asteroidea
- B) Ophiuroidea
- C) Echinoidea
- D) Crinoidea

Answer: C – Echinoidea

9. The respiratory tree, used for gas exchange and excretion, is a unique feature of which class?

- A) Asteroidea
- B) Ophiuroidea
- C) Echinoidea
- D) Holothuroidea

Answer: D – Holothuroidea

10. Which of the following is the free-swimming larval stage of asteroids?

- A) Ophiopluteus
- B) Echinopluteus
- C) Bipinnaria
- D) Auricularia

Answer: C – Bipinnaria

11. The calcareous endoskeleton of echinoderms is characterized by a meshwork structure known as?

- A) Stroma
- B) Stereom
- C) Spongin
- D) Sclereid

Answer: B – Stereom

12. Which echinoderm class is characterized by arms sharply marked off from the central disc and tube feet without suckers?

- A) Asteroidea
- B) Ophiuroidea
- C) Echinoidea



D) Crinoidea

Answer: **B – Ophiuroidea**

13. The madreporite in ophiuroids is located on which surface?

- A) Aboral surface
- B) Oral surface
- C) Lateral surface
- D) Internal coelom

Answer: **B – Oral surface**

14. Cuvierian tubules, used for defense, are modified parts of which structure in sea cucumbers?

- A) Digestive tract
- B) Respiratory tree
- C) Hemal system
- D) Water-vascular system

Answer: **B – Respiratory tree**

15. Which of the following statements about crinoids is correct?

- A) They have a madreporite on the oral surface
- B) They lack pedicellariae and spines
- C) They have closed ambulacral grooves
- D) They reproduce only asexually

Answer: **B – They lack pedicellariae and spines**

16. The dorsal nerve cord in some hemichordates is considered to have evolved independently from that in chordates. This is an example of?

- A) Homology
- B) Convergent evolution
- C) Divergent evolution
- D) Coevolution

Answer: **B – Convergent evolution**

17. Which fossil echinoderm was bilaterally symmetrical with two feeding appendages and a muscular non-plated stalk?

- A) Ctenoimbricata
- B) Helicoplacus
- C) Yanjiahella biscarpa
- D) Dendrocystites

Answer: **C – Yanjiahella biscarpa**

18. In sea stars, the cardiac stomach can be everted through the mouth during feeding. This is primarily used for?

- A) Defense against predators
- B) Extracellular digestion outside the body

C) Gas exchange

D) Excretion of nitrogenous waste

Answer: **B – Extracellular digestion outside the body**

19. The hemal system in echinoderms is surrounded by extensions of the coelom called?

- A) Perihemal sinuses
- B) Ampullae
- C) Polian vesicles
- D) Tiedemann's bodies

Answer: **A – Perihemal sinuses**

20. Which cells in echinoderm coelomic fluid are involved in engulfing waste products?

- A) Lymphocytes
- B) Coelomocytes
- C) Osteocytes
- D) Choanocytes

Answer: **B – Coelomocytes**

21. The condition in which an echinoderm casts off an injured arm near its base is known as?

- A) Evisceration
- B) Autotomy
- C) Fission
- D) Paedomorphosis

Answer: **B – Autotomy**

22. Which of the following is the correct sequence of development in sea stars?

- A) Zygote → Brachiolaria → Bipinnaria → Adult
- B) Zygote → Bipinnaria → Brachiolaria → Adult
- C) Zygote → Ophiopluteus → Brachiolaria → Adult
- D) Zygote → Auricularia → Doliolaria → Adult

Answer: **B – Zygote → Bipinnaria → Brachiolaria → Adult**

23. In sea urchins, the periproct is the region that contains?

- A) Mouth and teeth
- B) Anus and genital pores
- C) Madreporite only
- D) Tube feet only

Answer: **B – Anus and genital pores**

24. Which echinoderm class exhibits the greatest elongation along the oral-aboral axis?

- A) Asterozoa
- B) Ophiurozoa
- C) Echinozoa
- D) Holothurozoa

Answer: **D – Holothurozoa**

25. **The stone canal in asteroids connects the madreporite to which structure?**

- A) Polian vesicles
- B) Ring canal
- C) Radial canal
- D) Tiedemann's bodies

Answer: **B – Ring canal**

26. **Which of the following functions is NOT associated with pedicellariae in echinoderms?**

- A) Keeping the body surface free of debris
- B) Capturing small prey
- C) Locomotion on soft substrates
- D) Protection with venom glands

Answer: **C – Locomotion on soft substrates**

27. **The auricularia larva is characteristic of which echinoderm class?**

- A) Asterozoa
- B) Ophiurozoa
- C) Echinozoa
- D) Holothurozoa

Answer: **D – Holothurozoa**

28. **In crinoids, the calyx and arms together form the?**

- A) Stalk
- B) Crown
- C) Test
- D) Disc

Answer: **B – Crown**

29. **Which extinct echinoderm group was triradial with three spirally arranged ambulacra?**

- A) Homalozoa
- B) Cystoidea
- C) Helicoplacoidea
- D) Blastoidea

Answer: **C – Helicoplacoidea**

30. **The water-vascular system in crinoids functions without a madreporite. How is fluid exchanged?**

- A) Through the anus
- B) Using existing coelomic fluid
- C) Through tube feet only

D) Via the respiratory tree

Answer: **B – Using existing coelomic fluid**

31. **Which of the following is a key characteristic of class Concentricycloidea (sea daisies)?**

- A) Five long arms with open grooves
- B) Two concentric ring canals and no arms
- C) Presence of Aristotle's lantern
- D) Respiratory tree for gas exchange

Answer: **B – Two concentric ring canals and no arms**

32. **The process of evisceration in sea cucumbers involves expulsion of?**

- A) Tube feet only
- B) Respiratory tree and digestive tract
- C) Madreporite and stone canal
- D) Pedicellariae and spines

Answer: **B – Respiratory tree and digestive tract**

33. **In regular sea urchins, the primary mode of locomotion is by?**

- A) Arm movements
- B) Tube feet with assistance from spines
- C) Contractions of body wall muscles
- D) Ciliary gliding

Answer: **B – Tube feet with assistance from spines**

34. **The pyloric ceca in sea stars are primarily involved in?**

- A) Gas exchange
- B) Digestion and absorption
- C) Excretion of ammonia
- D) Production of gametes

Answer: **B – Digestion and absorption**

35. **Which of the following is true about the nervous system of echinoderms?**

- A) It possesses a distinct brain and ganglia
- B) It consists of three neural units with a nerve ring and radial nerves
- C) It is absent in holothuroids
- D) It is entirely centralized in the aboral surface

Answer: **B – It consists of three neural units with a nerve ring and radial nerves**

36. **The adhesive papillae in brachiolaria larvae of asteroids are used for?**

- A) Swimming
- B) Attachment to substratum

Phylum Hemichordata & Chordata

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1. Which of the following is a characteristic feature of the phylum Hemichordata?

- A) Notochord throughout life
- B) Pharyngeal slits
- C) Postanal tail
- D) Dorsal hollow nerve cord

Answer: B – Pharyngeal slits

2. The proboscis in acorn worms is primarily used for?

- A) Respiration
- B) Locomotion and feeding
- C) Reproduction
- D) Defense only

Answer: B – Locomotion and feeding

3. In hemichordates, the buccal diverticulum was once mistaken for?

- A) Endostyle
- B) Notochord
- C) Dorsal nerve cord
- D) Postanal tail

Answer: B – Notochord

4. The class Pterobranchia is characterized by?

- A) Free-swimming lifestyle
- B) Presence of a stalk and tentacles
- C) Large body size
- D) Absence of pharyngeal slits in all species

Answer: B – Presence of a stalk and tentacles

5. Cephalodiscus and Rhabdopleura belong to which hemichordate class?

- A) Enteropneusta
- B) Pterobranchia
- C) Ascidiacea
- D) Thaliacea

Answer: B – Pterobranchia

6. The tornaria larva of hemichordates closely resembles the larva of?

- A) Annelids
- B) Arthropods
- C) Echinoderms
- D) Molluscs

Answer: C – Echinoderms

7. In enteropneusts, the glomerulus is associated with which function?

- A) Digestion
- B) Excretion

C) Circulation

D) Reproduction

Answer: B – Excretion

8. The dorsal nerve cord in some hemichordates is described as?

- A) Solid and ventral
- B) Hollow and dorsal
- C) Double and lateral
- D) Absent in all species

Answer: B – Hollow and dorsal

9. Which of the following is NOT a characteristic of phylum Chordata?

- A) Notochord
- B) Pharyngeal slits
- C) Jointed appendages
- D) Postanal tail

Answer: C – Jointed appendages

10. The subphylum Urochordata is also known as?

- A) Lancelets
- B) Tunicates
- C) Acorn worms
- D) Vertebrates

Answer: B – Tunicates

11. In ascidians, the incurrent siphon is also called?

- A) Atrial siphon
- B) Oral siphon
- C) Excurrent siphon
- D) Branchial siphon

Answer: B – Oral siphon

12. The only animals that produce cellulose are members of?

- A) Cephalochordata
- B) Vertebrata
- C) Urochordata
- D) Hemichordata

Answer: C – Urochordata

13. The heart of tunicates exhibits which unusual feature?

- A) Four-chambered structure
- B) Absence of blood vessels
- C) Reversal of blood flow direction
- D) Hemoglobin as respiratory pigment

Answer: C – Reversal of blood flow direction

12. Phylum Hemichordata & Chordata



14. **The appendicularians (Larvacea) are unique among tunicates because?**

- A) They are sessile as adults
- B) They retain the tadpole form and notochord as adults
- C) They lack pharyngeal slits
- D) They have a cellulose tunic

Answer: B – **They retain the tadpole form and notochord as adults**

15. **Thaliaceans (salps) use which method for locomotion?**

- A) Ciliary action
- B) Muscular contractions and jet propulsion
- C) Undulation of notochord
- D) Walking on tube feet

Answer: B – **Muscular contractions and jet propulsion**

16. **The larval tunicate attaches to substrate using?**

- A) Suckers on the tail
- B) Adhesive papillae
- C) Oral tentacles
- D) Atrial siphon

Answer: B – **Adhesive papillae**

17. **During metamorphosis of a tunicate, the internal structures rotate by?**

- A) 90 degrees
- B) 180 degrees
- C) 270 degrees
- D) 360 degrees

Answer: B – **180 degrees**

18. **Cephalochordates are commonly called?**

- A) Sea squirts
- B) Lancelets or amphioxus
- C) Acorn worms
- D) Salps

Answer: B – **Lancelets or amphioxus**

19. **The notochord in amphioxus is unique because?**

- A) It is replaced by bone
- B) It contains muscle cells and is contractile
- C) It is absent in adults
- D) It is located ventrally

Answer: B – **It contains muscle cells and is contractile**

20. **In amphioxus, the oral hood bears ciliated fingerlike projections called?**

- A) Cirri
- B) Tentacles
- C) Palps
- D) Setae

Answer: A – **Cirri**

21. **The chamber surrounding the pharynx in cephalochordates is called?**

- A) Atrium
- B) Coelom
- C) Pericardium
- D) Hemocoel

Answer: A – **Atrium**

22. **Amphioxus lacks a true heart; blood is propelled by?**

- A) Somatic muscles
- B) Contractile waves in vessel walls
- C) Ciliary action
- D) External pressure

Answer: B – **Contractile waves in vessel walls**

23. **The midgut cecum in amphioxus functions similarly to which vertebrate organs?**

- A) Liver and pancreas
- B) Kidney and spleen
- C) Heart and lungs
- D) Brain and spinal cord

Answer: A – **Liver and pancreas**

24. **Which fossil chordate from the Burgess Shale shows myomeres and a notochord?**

- A) Haikouella
- B) Pikaia
- C) Myllokunmingia
- D) Conodont

Answer: B – **Pikaia**

25. **Haikouella lanceolata is considered significant because it possesses?**

- A) A complete cranium
- B) Paired eyes and an enlarged brain
- C) Jaws and paired fins
- D) Amniotic egg

Answer: B – **Paired eyes and an enlarged brain**

26. **The ammocoete larva belongs to which vertebrate group?**

- A) Hagfishes
- B) Lampreys
- C) Bony fishes
- D) Amphibians

Answer: B – **Lampreys**

27. **The ammocoete larva resembles amphioxus in body form but also has?**

- A) A chambered heart and tripartite brain
- B) Jaws and paired fins
- C) A cellulose tunic
- D) A notochord only

Answer: A – **A chambered heart and tripartite brain**

28. **According to Garstang's hypothesis, vertebrates evolved from?**

- A) Sessile adult tunicates
- B) Paedomorphic tunicate larvae
- C) Free-swimming cephalochordates
- D) Hemichordate worms

Answer: B – **Paedomorphic tunicate larvae**

29. **Paedomorphosis refers to?**

- A) Loss of larval stage
- B) Retention of juvenile traits in adult body
- C) Premature death of larvae
- D) Transformation of larva into adult

Answer: B – **Retention of juvenile traits in adult body**

30. **Current molecular evidence suggests that the sister group of vertebrates is?**

- A) Cephalochordata
- B) Hemichordata
- C) Urochordata (Tunicates)
- D) Echinodermata

Answer: C – **Urochordata (Tunicates)**

31. **The earliest known vertebrate fossils from the early Cambrian include?**

- A) Ostracoderms
- B) Myllokunmingia and Haikouichthys
- C) Placoderms
- D) Acanthodians

Answer: B – **Myllokunmingia and Haikouichthys**

32. **Conodonts are extinct vertebrates known primarily from?**

- A) Bony armor
- B) Phosphatized toothlike elements
- C) Complete soft body preservation
- D) Shell impressions

Answer: B – **Phosphatized toothlike elements**

33. **Ostracoderms were jawless fishes characterized by?**

- A) Cartilaginous skeleton only
- B) Bony dermal armor

C) Absence of any skeleton

D) Paired fins in all species

Answer: B – **Bony dermal armor**

34. **Heterostracans, a group of ostracoderms, lacked?**

- A) A caudal fin
- B) Paired fins
- C) A bony head shield
- D) Pharyngeal slits

Answer: B – **Paired fins**

35. **The evolution of jaws in gnathostomes is believed to have arisen from?**

- A) The first pharyngeal (mandibular) arch
- B) The notochord
- C) Paired fins
- D) The neural crest

Answer: A – **The first pharyngeal (mandibular) arch**

36. **Placoderms and acanthodians are significant because they were?**

- A) The first jawless fishes
- B) The first jawed vertebrates
- C) The first terrestrial vertebrates
- D) The first filter feeders

Answer: B – **The first jawed vertebrates**

37. **The fin-fold hypothesis explains the origin of?**

- A) Jaws
- B) Paired pectoral and pelvic fins
- C) The notochord
- D) Pharyngeal slits

Answer: B – **Paired pectoral and pelvic fins**

38. **The hyponeural and ectoneural systems are part of the nervous system in?**

- A) Hemichordates
- B) Cephalochordates
- C) Echinoderms (but we skip, so not included)

Answer: (skip – I will avoid echinoderms. Let me correct: I will not include any echinoderm-specific MCQs. I will focus on chordates and hemichordates only.)

I will continue with pure hemichordate and chordate MCQs.

39. **Which of the following is a synapomorphy of the clade Ambulacraria?**

- A) Notochord
- B) Postanal tail
- C) Tripartite coelom

Fishes: Vertebrate Success in Water

1. The oldest known craniate fossils, dating back 530-520 million years, are collectively referred to as which of the following?

- A) Conodonts
- B) Ostracoderms
- C) Myllokunmingiids
- D) Placoderms

Answer: C – Myllokunmingiids

2. The toothlike structures found in conodonts, made of hydroxyapatite, are called what?

- A) Placoid scales
- B) Denticles
- C) Ampullae
- D) Lamellae

Answer: B – Denticles

3. Which extinct group of fishes was jawless, covered by protective bony plates, and lacked paired fins?

- A) Placoderms
- B) Acanthodians
- C) Ostracoderms
- D) Cyclostomes

Answer: C – Ostracoderms

4. The evolution of which two structures enabled the subsequent adaptive radiation and diversification of fishes?

- A) Lungs and swim bladder
- B) Jaws and paired appendages
- C) Scales and operculum
- D) Notochord and gill slits

Answer: B – Jaws and paired appendages

5. According to cladistic analysis, which extant group is considered the most primitive craniate?

- A) Lampreys
- B) Hagfishes
- C) Lancelets
- D) Tunicates

Answer: B – Hagfishes

6. Hagfishes defend themselves by producing copious amounts of slime from which structures?

- A) Oral tentacles
- B) Epidermal teeth
- C) Ventrolateral slime glands

D) Pharyngeal pouches

Answer: C – Ventrolateral slime glands

7. The rasping tongue of hagfishes, used to remove flesh from carcasses, is aided by specialized body contortions called what?

- A) Ammocoete twists
- B) Spiral valves
- C) Knots
- D) Ram ventilations

Answer: C – Knots

8. The adhesive mouth of a sea lamprey is lined with numerous epidermal teeth and surrounds which movable structure?

- A) Radula
- B) Rasping tongue
- C) Tentacle
- D) Gill raker

Answer: B – Rasping tongue

9. The filter-feeding larval stage of a lamprey is known as which of the following?

- A) Trochophore
- B) Ammocoete
- C) Leptocephalus
- D) Nauplius

Answer: B – Ammocoete

10. Which of the following best describes the reproductive habit of sea lampreys (*Petromyzon marinus*)?

- A) Iteroparous with multiple spawning events
- B) Semelparous, dying after a single spawning event
- C) Viviparous with internal gestation
- D) Parthenogenetic without fertilization

Answer: B – Semelparous, dying after a single spawning event

11. Jaws of vertebrates evolved from which embryonic structure?

- A) The most anterior pair of pharyngeal arches
- B) The neural crest cells
- C) The notochordal sheath
- D) The ectodermal placodes

Answer: A – The most anterior pair of pharyngeal arches

12. Which extinct group of fishes is considered to be the last common ancestor of modern



gnathostomes?

- A) Ostracoderms
- B) Placoderms
- C) Acanthodians
- D) Conodonts

Answer: C – Acanthodians

13. The skin of sharks is covered by dermal denticles known as which type of scales?

- A) Cycloid scales
- B) Ctenoid scales
- C) Ganoid scales
- D) Placoid scales

Answer: D – Placoid scales

14. The largest living sharks, such as the whale shark, are primarily which type of feeders?

- A) Predatory carnivores
- B) Filter feeders
- C) Detritivores
- D) Parasitic feeders

Answer: B – Filter feeders

15. The lateral expansion of pectoral fins into winglike appendages is a characteristic modification seen in which group?

- A) Sharks
- B) Ratfishes
- C) Skates and rays
- D) Chimaeras

Answer: C – Skates and rays

16. The gill cover, called an operculum, and teeth modified into large crushing plates are specializations of which chondrichthyan subclass?

- A) Elasmobranchii
- B) Holocephali
- C) Myxini
- D) Petromyzontida

Answer: B – Holocephali

17. Which group of sarcopterygians can survive seasonal droughts by burrowing into mud and aestivating?

- A) Coelacanths
- B) Tetrapodomorphs
- C) Lungfishes (Protopterus and Lepidosiren)
- D) Ray-finned fishes

Answer: C – Lungfishes (Protopterus and Lepidosiren)

18. The discovery of a live coelacanth

(Latimeria chalumnae) in 1938 was a milestone because it was found where?

- A) Off the coast of Indonesia
- B) In the Mississippi River basin
- C) Off the coast of South Africa
- D) In the Amazon River

Answer: C – Off the coast of South Africa

19. The large, paddlelike rostrum of paddlefishes is densely innervated with sensory organs for detecting what?

- A) Chemical odors
- B) Weak electrical fields
- C) Water pressure changes
- D) Low-frequency sounds

Answer: B – Weak electrical fields

20. The Chinese paddlefish (Psephurus gladius) was declared extinct in which year?

- A) 2010
- B) 2015
- C) 2019
- D) 2022

Answer: C – 2019

21. The specialized muscle bundles in most fishes, arranged in a zigzag pattern, are called what?

- A) Myofibrils
- B) Myomeres
- C) Sarcomeres
- D) Myotomes (as functional units)

Answer: B – Myomeres

22. The condition where teeth are uniform along the length of the jaw and seated in shallow depressions is known as?

- A) Heterodont and thecodont
- B) Homodont and acrodont
- C) Homodont and pleurodont
- D) Heterodont and acrodont

Answer: B – Homodont and acrodont

23. The outpocketings of the intestine that increase absorptive surface in bony fishes are called what?

- A) Spiral valves
- B) Typhlosoles
- C) Pyloric ceca
- D) Villi

Answer: C – Pyloric ceca

13. Fishes: Vertebrate Success in Water

24. In teleosts, the conus arteriosus is replaced by an expansion of the ventral aorta called the?

- A) Sinus venosus
- B) Bulbus arteriosus
- C) Atrioventricular node
- D) Spiral valve

Answer: B – Bulbus arteriosus

25. The vessel that carries blood to the lungs in lungfishes, developed as a branch off aortic arch VI, is called the?

- A) Pulmonary vein
- B) Dorsal aorta
- C) Pulmonary artery
- D) Branchial artery

Answer: C – Pulmonary artery

26. The highly efficient gas exchange mechanism in fish gills, where blood and water flow in opposite directions, is called?

- A) Concurrent exchange
- B) Countercurrent exchange
- C) Crosscurrent exchange
- D) Parallel exchange

Answer: B – Countercurrent exchange

27. The modified first pharyngeal slits of elasmobranchs, used as an alternate route for water entering the pharynx, are called?

- A) Opercula
- B) Spiracles
- C) Nares
- D) Cloacae

Answer: B – Spiracles

28. The vascular network that secretes gases into the swim bladder of physoclistous fishes is known as the?

- A) Ovale
- B) Gas gland
- C) Rete mirabile
- D) Choroid plexus

Answer: C – Rete mirabile

29. Fishes that gulp air at the surface to force air into their swim bladders, which are connected to the digestive tract, are termed?

- A) Physoclistous
- B) Physostomous
- C) Homocercal
- D) Heterocercal

Answer: B – Physostomous

30. The lateral-line system of fishes consists of sensory pits called neuromasts that are primarily stimulated by?

- A) Light intensity
- B) Chemical gradients
- C) Water movements
- D) Electrical fields

Answer: C – Water movements

31. Electroreceptors located on the heads of sharks, used to detect bioelectric fields of prey, are called?

- A) Neuromasts
- B) Ampullae of Lorenzini
- C) Rods and cones
- D) Olfactory rosettes

Answer: B – Ampullae of Lorenzini

32. The electric eel (*Electrophorus electricus*) uses electrical currents called "doublets" to cause what effect in prey?

- A) Immediate death
- B) Involuntary muscle contractions
- C) Loss of orientation
- D) Cardiac arrest

Answer: B – Involuntary muscle contractions

33. Freshwater fishes combat excess water buildup by producing large quantities of which type of urine?

- A) Concentrated urine
- B) Isotonic urine
- C) Dilute urine
- D) Uric acid paste

Answer: C – Dilute urine

34. Elasmobranchs maintain osmotic balance by retaining high concentrations of urea and which other compound in their blood?

- A) Ammonia
- B) Trimethylamine oxide (TMAO)
- C) Uric acid
- D) Creatinine

Answer: B – Trimethylamine oxide (TMAO)

35. The functional unit of the fish kidney, which filters bloodborne wastes, is called the?

- A) Nephron
- B) Alveolus
- C) Glomerulus
- D) Tubule

Answer: A – Nephron

Amphibians

14. Amphibians

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1. The transition from water to land in both ontogeny and phylogeny is uniquely exhibited by which vertebrate group?

- A) Reptiles
- B) Mammals
- C) Amphibians
- D) Birds

Answer: C – Amphibians

2. The superclass that includes amphibians and amniotes as the two major extant branches is called?

- A) Gnathostomata
- B) Tetrapoda
- C) Osteichthyes
- D) Chordata

Answer: B – Tetrapoda

3. Which Devonian lobe-finned fish possessed an upper arm bone (humerus) and two forearm bones (radius and ulna) homologous to tetrapod limbs?

- A) Tiktaalik
- B) Acanthostega
- C) Eusthenopteron
- D) Ichthyostega

Answer: C – Eusthenopteron

4. The fossil genus considered morphologically intermediate between lobe-finned fishes and tetrapods, living approximately 375 million years ago, is?

- A) Eusthenopteron
- B) Panderichthys
- C) Tiktaalik
- D) Acanthostega

Answer: C – Tiktaalik

5. Which early Devonian tetrapod had well-formed limbs with digits but limbs were too weak for walking on land?

- A) Ichthyostega
- B) Acanthostega
- C) Tiktaalik
- D) Pederpes

Answer: B – Acanthostega

6. The earliest tetrapods like Acanthostega and Ichthyostega had how many digits per limb?

- A) Five

- B) Four

- C) More than five

- D) Three

Answer: C – More than five

7. Which early tetrapod possessed stronger vertebrae, elevated head muscles, strengthened girdles, protective rib cage, and ears modified for airborne sounds?

- A) Acanthostega
- B) Tiktaalik
- C) Ichthyostega
- D) Eusthenopteron

Answer: C – Ichthyostega

8. The air-filled cavity that evolved originally as a swim bladder but later coopted for air breathing illustrates which evolutionary principle?

- A) Adaptation
- B) Exaptation
- C) Convergent evolution
- D) Parallel evolution

Answer: B – Exaptation

9. The group that contains modern amphibians plus many extinct lineages first appearing in the early Carboniferous is called?

- A) Lepospondyls
- B) Anthracosaurs
- C) Temnospondyls
- D) Reptiliomorphs

Answer: C – Temnospondyls

10. Which group generally has only four digits on the forelimb rather than the five typical of most tetrapods?

- A) Amniotes
- B) Lepospondyls
- C) Anthracosaurs
- D) Temnospondyls

Answer: D – Temnospondyls

11. The subclass that contains modern amphibians is known as?

- A) Labyrinthodontia
- B) Lepospondyli
- C) Lissamphibia
- D) Temnospondyli

Answer: C – Lissamphibia

12. The earliest fossils attributable to modern amphibians appear in which geological period?

- A) Carboniferous
- B) Devonian
- C) Permian
- D) Triassic

Answer: C – Permian

13. Which two groups of Carboniferous and Permian tetrapods are judged from skull structure to be closer to amniotes than to temnospondyls?

- A) Temnospondyls and Lissamphibians
- B) Lepospondyls and Anthracosaurs
- C) Microsaur and Nectrideans
- D) Ichthyostegids and Acanthostegids

Answer: B – Lepospondyls and Anthracosaurs

14. Approximately how many species of living amphibians are currently recognized?

- A) 5,000
- B) 6,500
- C) 8,456
- D) 10,000

Answer: C – 8,456

15. In the ancestral amphibian life history, the larval form uses which structure for respiration?

- A) Lungs
- B) Skin
- C) Gills
- D) Buccal cavity

Answer: C – Gills

16. Many lungless salamanders respire primarily by gas exchange across which surfaces?

- A) Lungs only
- B) Gills only
- C) Skin and mucous membranes of mouth and throat
- D) Buccal cavity and lungs

Answer: C – Skin and mucous membranes of mouth and throat

17. The condition in which salamanders retain a permanently aquatic, larval morphology throughout life is called?

- A) Neoteny
- B) Paedomorphosis
- C) Metamorphosis
- D) Direct development

Answer: B – Paedomorphosis

18. The order Gymnophiona contains approximately how many species of caecilians?

- A) 150
- B) 214
- C) 350
- D) 771

Answer: B – 214

19. Caecilians are characterized by the presence of which sensory structure on the snout?

- A) Lateral line
- B) Nictitating membrane
- C) Sensory tentacles
- D) Tympanic membrane

Answer: C – Sensory tentacles

20. In caecilians, fertilization is internal and males have a protrusible copulatory organ called?

- A) Cloaca
- B) Phallodeum
- C) Spermatophore
- D) Hemipenis

Answer: B – Phallodeum

21. The order Urodela comprises approximately how many species of salamanders?

- A) 214
- B) 350
- C) 771
- D) 7,471

Answer: C – 771

22. In most salamanders, fertilization occurs via transfer of a packet of sperm called?

- A) Spermatheca
- B) Spermatophore
- C) Sperm plug
- D) Amplexus

Answer: B – Spermatophore

23. The female salamander stores sperm in a special pouch called?

- A) Cloaca
- B) Spermatheca
- C) Oviduct
- D) Nuptial pad

Answer: B – Spermatheca

24. The largest family of salamanders, containing more than 490 species, many of which are lungless, is?

- A) Salamandridae



- B) Ambystomatidae
- C) Plethodontidae
- D) Proteidae

Answer: C – Plethodontidae

25. Which salamander family is entirely lungless and represents the only vertebrates with neither lungs nor gills at any life stage?

- A) Cryptobranchidae
- B) Plethodontidae
- C) Amphiumidae
- D) Sirenidae

Answer: B – Plethodontidae

26. The mud puppy (Necturus) is an example of which type of pedomorphosis?

- A) Facultative
- B) Obligate perennibranchiate
- C) Direct development
- D) Terrestrial pedomorphosis

Answer: B – Obligate perennibranchiate

27. The axolotl (Ambystoma mexicanum) fails to metamorphose due to deficiency of which hormone?

- A) Prolactin
- B) Thyroxine (T4)
- C) Growth hormone
- D) Cortisol

Answer: B – Thyroxine (T4)

28. The order Anura contains approximately how many species of frogs and toads?

- A) 771
- B) 2,000
- C) 7,471
- D) 10,000

Answer: C – 7,471

29. The name "Anura" literally means?

- A) Tailed one
- B) Without tail
- C) Naked snake
- D) Double life

Answer: B – Without tail

30. The rodlike structure in frogs that represents fused caudal vertebrae is called?

- A) Urostyle
- B) Coccyx
- C) Sacrum
- D) Ilium

Answer: A – Urostyle

31. The largest anuran in the world, Conraua goliath, is found in?

- A) South America
- B) Southeast Asia
- C) West Africa
- D) Australia

Answer: C – West Africa

32. The smallest known tetrapods are frogs of the genus Eleutherodactylus and Psyllophryne measuring less than?

- A) 5 mm
- B) 1 cm
- C) 2 cm
- D) 5 cm

Answer: B – 1 cm

33. The largest American frog is the bullfrog, Lithobates catesbeianus, which reaches a head and body length of?

- A) 10 cm
- B) 15 cm
- C) 20 cm
- D) 30 cm

Answer: C – 20 cm

34. The family Ranidae is commonly known as?

- A) True frogs
- B) True toads
- C) Tree frogs
- D) Poison dart frogs

Answer: A – True frogs

35. The family Bufonidae is commonly known as?

- A) True frogs
- B) True toads
- C) Tree frogs
- D) Burrowing frogs

Answer: B – True toads

36. The family Hylidae is commonly known as?

- A) True frogs
- B) True toads
- C) Tree frogs
- D) Spadefoot toads

Answer: C – Tree frogs

37. The skin of amphibians is attached loosely to the body and contains which two layers?

- A) Epidermis and hypodermis
- B) Stratum corneum and stratum basale
- C) Epidermis and dermis

Reptiles

15. Reptiles

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1. The semipermeable skin and developmental stages of most amphibians keep them tied to which type of habitats?

- A) Arid deserts
- B) Aquatic systems and moist terrestrial habitats
- C) High-altitude alpine zones
- D) Deep oceanic trenches

Answer: B – Aquatic systems and moist terrestrial habitats

2. The monophyletic lineage Amniota includes which of the following groups?

- A) Only nonavian reptiles
- B) Only mammals and birds
- C) Nonavian reptiles, avian reptiles (birds), and mammals
- D) Only amphibians and reptiles

Answer: C – Nonavian reptiles, avian reptiles (birds), and mammals

3. The major synapomorphy that distinguishes reptiles and mammals from other vertebrates is which of the following?

- A) Four-chambered heart
- B) Amniotic egg
- C) Keratinized skin
- D) Metanephric kidneys

Answer: B – Amniotic egg

4. In nonavian reptiles, the lateral line system found in fishes and amphibians is which of the following?

- A) Highly developed
- B) Present but modified
- C) Lost
- D) Replaced by electroreception

Answer: C – Lost

5. The extraembryonic membrane that encloses the embryo in a fluid-filled sac and protects against shock and desiccation is called which of the following?

- A) Chorion
- B) Allantois
- C) Amnion
- D) Yolk sac

Answer: C – Amnion

6. Which extraembryonic membrane becomes highly vascular and aids in gas exchange, lying

near the shell?

- A) Amnion
- B) Allantois
- C) Chorion
- D) Yolk sac

Answer: C – Chorion

7. The allantois in the amniotic egg serves which primary function?

- A) Cushioning the embryo
- B) Gas exchange only
- C) Storing nitrogenous wastes
- D) Producing yolk

Answer: C – Storing nitrogenous wastes

8. According to the traditional classification presented, which order contains turtles?

- A) Crocodylia
- B) Squamata
- C) Sphenodontia
- D) Testudines

Answer: D – Testudines

9. The order Crocodylia is characterized by which of the following features?

- A) Complete absence of a ventricular septum
- B) Elongate, muscular, laterally compressed body and complete ventricular septum
- C) Teeth absent in adults
- D) Movable quadrate bones only

Answer: B – Elongate, muscular, laterally compressed body and complete ventricular septum

10. The tuataras belong to which order of nonavian reptiles?

- A) Squamata
- B) Testudines
- C) Crocodylia
- D) Sphenodontia

Answer: D – Sphenodontia

11. The order Squamata includes which of the following groups?

- A) Turtles only
- B) Crocodiles and alligators
- C) Snakes, lizards, and worm lizards
- D) Tuataras only

Answer: C – Snakes, lizards, and worm lizards



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12. The class Reptilia as shown in the traditional classification is considered which type of grouping?

- A) Monophyletic
- B) Paraphyletic
- C) Polyphyletic
- D) Holophyletic

Answer: B – Paraphyletic

13. The term "synapsid" refers to an amniote skull condition characterized by which feature?

- A) No temporal fenestrae
- B) Two pairs of temporal fenestrae
- C) A single opening (fenestra) in the temporal region
- D) Multiple openings in the nasal region

Answer: C – A single opening (fenestra) in the temporal region

14. The term "diapsid" refers to an amniote skull condition characterized by which feature?

- A) No temporal fenestrae
- B) Upper and lower temporal fenestrae
- C) A single temporal fenestra
- D) Fenestrae only in the nasal region

Answer: B – Upper and lower temporal fenestrae

15. The term "anapsid" refers to a skull that has which characteristic?

- A) Two pairs of temporal fenestrae
- B) A single temporal fenestra
- C) Lacks temporal fenestrae
- D) Fenestrae fused into one opening

Answer: C – Lacks temporal fenestrae

16. Although turtles possess an anapsid skull, they are currently grouped within which larger clade?

- A) Synapsida
- B) Anapsida
- C) Diapsida
- D) Parareptilia

Answer: C – Diapsida

17. The anapsid skull in Testudines is thought to have resulted from which evolutionary process?

- A) Retention of primitive condition
- B) Evolutionary loss of temporal fenestrae
- C) Fusion of synapsid openings
- D) Independent origin of fenestrae

Answer: B – Evolutionary loss of temporal fenestrae

18. Nonavian reptiles have dry skin with epidermal scales composed primarily of which

protein?

- A) Collagen
- B) Elastin
- C) Keratin
- D) Melanin

Answer: C – Keratin

19. Keratin, when chemically bonded to phospholipids, provides which function in nonavian reptiles?

- A) Increases metabolic rate
- B) Prevents water loss across body surfaces
- C) Enhances color vision
- D) Aids in calcium absorption

Answer: B – Prevents water loss across body surfaces

20. The dorsal portion of a turtle's shell is called which of the following?

- A) Plastron
- B) Carapace
- C) Scute
- D) Bridge

Answer: B – Carapace

21. The carapace of a turtle forms from a fusion of which structures?

- A) Only dermal bones
- B) Vertebrae, expanded ribs, and dermal bone
- C) Only expanded ribs
- D) Pectoral girdle and sternum

Answer: B – Vertebrae, expanded ribs, and dermal bone

22. The ventral portion of a turtle's shell is called which of the following?

- A) Carapace
- B) Bridge
- C) Plastron
- D) Neural plate

Answer: C – Plastron

23. The plastron of a turtle forms from bones of the pectoral girdle and which other structure?

- A) Skull bones
- B) Dermal bone
- C) Vertebral spines
- D) Limb bones

Answer: B – Dermal bone

24. Turtles that bend their long necks in a horizontal plane to withdraw their head belong to which clade?

- A) Cryptodira
- B) Pleurodira
- C) Anapsida
- D) Synapsida

Answer: B – Pleurodira

25. Turtles that fully withdraw the head and neck in a vertical plane between the forelimbs belong to which clade?

- A) Pleurodira
- B) Cryptodira
- C) Parareptilia
- D) Eureptilia

Answer: B – Cryptodira

26. All turtles are which of the following reproductive types?

- A) Viviparous
- B) Ovoviviparous
- C) Oviparous
- D) Parthenogenetic

Answer: C – Oviparous

27. Archosaurs are characterized by which of the following dental conditions?

- A) Acrodont teeth
- B) Pleurodont teeth
- C) Thecodont teeth
- D) Absence of teeth

Answer: C – Thecodont teeth

28. The first archosaurs appeared during which geological period?

- A) Carboniferous
- B) Devonian
- C) Permian
- D) Jurassic

Answer: C – Permian

29. Archosaurs became dominant terrestrial vertebrates during which period?

- A) Permian
- B) Carboniferous
- C) Triassic
- D) Cretaceous

Answer: C – Triassic

30. Crocodilians can be distinguished from other reptiles by which of the following features?

- A) Circular eye orbits
- B) Triangular eye orbits
- C) Absence of teeth

- D) Protrusible tongue

Answer: B – Triangular eye orbits

31. The largest extant crocodilian is which species?

- A) Nile crocodile
- B) American alligator
- C) Saltwater crocodile
- D) Gharial

Answer: C – Saltwater crocodile

32. The secondary palate in archosaurs separates which two passageways?

- A) Oral and esophageal
- B) Nasal and mouth passageways
- C) Tracheal and esophageal
- D) Pharyngeal and laryngeal

Answer: B – Nasal and mouth passageways

33. Lepidosauria is a monophyletic diapsid lineage that first appeared in which period?

- A) Jurassic
- B) Cretaceous
- C) Early Triassic
- D) Permian

Answer: C – Early Triassic

34. Lepidosaurs are characterized by which of the following features?

- A) Absence of scales
- B) Overlapping keratinized epidermal scales and regular shedding cycles
- C) Single male reproductive organ
- D) Longitudinal cloacal slit

Answer: B – Overlapping keratinized epidermal scales and regular shedding cycles

35. The two surviving species of tuataras are found in which country?

- A) Australia
- B) South Africa
- C) New Zealand
- D) Madagascar

Answer: C – New Zealand

36. Tuataras have which type of skull structure?

- A) Kinetic skull
- B) Akinetic skull
- C) Synapsid skull
- D) Anapsid skull only

Answer: B – Akinetic skull

37. In tuataras, the unique chewing mechanism involves which tooth arrangement?

Birds: Class Aves

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1. According to T.H. Huxley, birds are described as which of the following?

- A) Modern reptiles
- B) Glorified reptiles
- C) Flying mammals
- D) Advanced amphibians

Answer: B – Glorified reptiles

2. The single point of articulation between the skull and the first cervical vertebra in birds is called?

- A) Double condyle
- B) Occipital condyle
- C) Atlantal condyle
- D) Cervical condyle

Answer: B – Occipital condyle

3. Which ancient theropod had a feather-covered body and membranous wings similar to bats?

- A) Microraptor
- B) Caudipteryx
- C) Yi qi
- D) Sinosauropteryx

Answer: C – Yi qi

4. Asymmetrical feathers are required for which type of flight?

- A) Gliding
- B) Powered flight
- C) Soaring
- D) Hovering

Answer: B – Powered flight

5. The furcula in birds is commonly known as?

- A) Wishbone
- B) Keel
- C) Pygostyle
- D) Synsacrum

Answer: A – Wishbone

6. Which theropod possessed asymmetrical feathers on both fore and hind appendages?

- A) Yi qi
- B) Sinosauropteryx
- C) Caudipteryx
- D) Microraptor

Answer: D – Microraptor

7. The fossil Archaeopteryx was discovered in which country?

- A) China

B) Germany

C) France

D) Spain

Answer: B – Germany

8. Sinornis is approximately how many million years younger than Archaeopteryx?

- A) 5 million years
- B) 10 million years
- C) 15 million years
- D) 20 million years

Answer: C – 15 million years

9. The presence of alula in Eoalulavis indicates evolution of which flight mechanism?

- A) Gliding
- B) Highly maneuverable flight
- C) Soaring
- D) Hovering

Answer: B – Highly maneuverable flight

10. The superorder composed of large, flightless birds is called?

- A) Neognathae
- B) Palaeognathae
- C) Archosauria
- D) Theropoda

Answer: B – Palaeognathae

11. Which order includes ostriches and rheas?

- A) Anseriformes
- B) Struthioniformes
- C) Galliformes
- D) Columbiformes

Answer: B – Struthioniformes

12. The neognathous lineage includes which type of birds?

- A) Only flightless birds
- B) Modern flying bird species
- C) Only ancient birds
- D) Only aquatic birds

Answer: B – Modern flying bird species

13. The asteroid impact that led to dinosaur extinctions occurred approximately?

- A) 150 mya
- B) 135 mya
- C) 125 mya
- D) 66 mya

Answer: D – 66 mya

16. Birds: Class Aves



14. Pennaceous feathers are characterized by which feature?

- A) Rudimentary shaft only
- B) Prominent shaft with interlocking barbules
- C) No barbules
- D) Only downy structure

Answer: B – Prominent shaft with interlocking barbules

15. The tiny hooks that interlock barbules in pennaceous feathers are called?

- A) Barbicels
- B) Hamuli
- C) Rachis
- D) Calamus

Answer: B – Hamuli

16. Plumulaceous feathers include which type of feathers?

- A) Flight feathers
- B) Contour feathers
- C) Down feathers
- D) Primary feathers

Answer: C – Down feathers

17. The oil gland at the base of the tail in birds is called?

- A) Preen gland
- B) Uropygial gland
- C) Scent gland
- D) Sebaceous gland

Answer: B – Uropygial gland

18. Anting behavior in birds involves rubbing ants over feathers to obtain which acid?

- A) Acetic acid
- B) Citric acid
- C) Formic acid
- D) Lactic acid

Answer: C – Formic acid

19. Blue feathers appear blue due to which phenomenon?

- A) Blue pigment
- B) Structural color
- C) Melanin deposition
- D) Carotenoid pigments

Answer: B – Structural color

20. The process of shedding and replacing feathers is called?

- A) Ecdysis
- B) Molting

- C) Desquamation
- D) Sloughing

Answer: B – Molting

21. The cervical vertebrae in birds have which type of articular surface?

- A) Flat
- B) Ball-and-socket
- C) Saddle-shaped
- D) Hinge-like

Answer: C – Saddle-shaped

22. The synsacrum in birds is formed by fusion of which vertebrae?

- A) Only cervical vertebrae
- B) Only caudal vertebrae
- C) Posterior thoracic, lumbar, sacral, and anterior caudal
- D) Only thoracic vertebrae

Answer: C – Posterior thoracic, lumbar, sacral, and anterior caudal

23. The posterior caudal vertebrae in birds are fused into a structure called?

- A) Synsacrum
- B) Pygostyle
- C) Furcula
- D) Carina

Answer: B – Pygostyle

24. The keel on the sternum of birds is also known as?

- A) Furcula
- B) Pygostyle
- C) Carina
- D) Synsacrum

Answer: C – Carina

25. The perching tendon mechanism in birds causes the foot to grip when which joint is flexed?

- A) Knee joint
- B) Hip joint
- C) Ankle joint
- D) Shoulder joint

Answer: C – Ankle joint

26. The largest and strongest muscles in most birds are the?

- A) Leg muscles
- B) Neck muscles
- C) Flight muscles
- D) Tail muscles

Answer: C – Flight muscles

16. Birds: Class Aves



27. The alula in birds is supported by bones of which digit?

- A) First digit
- B) Medial digit
- C) Lateral digit
- D) Fourth digit

Answer: B – Medial digit

28. During hovering flight, hummingbirds beat their wings at which rate?

- A) 10-20 beats per second
- B) 30-40 beats per second
- C) 50-80 beats per second
- D) 100-120 beats per second

Answer: C – 50-80 beats per second

29. The crop in birds is a diverticulum of which organ?

- A) Stomach
- B) Esophagus
- C) Intestine
- D) Cloaca

Answer: B – Esophagus

30. Pigeon's milk is produced by which structure?

- A) Proventriculus
- B) Gizzard
- C) Crop
- D) Liver

Answer: C – Crop

31. The glandular part of the bird's stomach that secretes gastric juices is called?

- A) Gizzard
- B) Proventriculus
- C) Crop
- D) Ceca

Answer: B – Proventriculus

32. The muscular part of the bird's stomach that grinds food is called?

- A) Proventriculus
- B) Gizzard
- C) Crop
- D) Cloaca

Answer: B – Gizzard

33. Birds that swallow sand and abrasives to aid digestion are similar to which reptile group?

- A) Snakes
- B) Lizards
- C) Crocodylians

D) Turtles

Answer: C – Crocodylians

34. The heart rate of a hummingbird under stress can exceed?

- A) 500 beats per minute
- B) 800 beats per minute
- C) 1000 beats per minute
- D) 1200 beats per minute

Answer: C – 1000 beats per minute

35. The bird heart is relatively large, up to what percentage of total body weight?

- A) 1.2%
- B) 1.8%
- C) 2.4%
- D) 3.0%

Answer: C – 2.4%

36. The voice box in birds is called?

- A) Larynx
- B) Syrinx
- C) Pharynx
- D) Trachea

Answer: B – Syrinx

37. The fine air tubes in bird lungs about 400 µm in diameter are called?

- A) Alveoli
- B) Bronchioles
- C) Parabronchi
- D) Air capillaries

Answer: C – Parabronchi

38. How many ventilatory cycles are required to move a given volume of air through the avian respiratory system?

- A) One
- B) Two
- C) Three
- D) Four

Answer: B – Two

39. The enlargement of cerebral hemispheres in birds is due to which structure?

- A) Corpus callosum
- B) Corpus striatum
- C) Hippocampus
- D) Amygdala

Answer: B – Corpus striatum

40. The pineal body in birds is located on the roof of which brain region?

- A) Hindbrain

Ecology & Ecosystems

1. What term describes a group of populations of different species living close enough to interact?

- A) Ecosystem
- B) Community
- C) Population
- D) Biosphere

Answer: Community

2. Which of the following is a +/- interaction?

- A) Mutualism
- B) Commensalism
- C) Predation
- D) Competition

Answer: Predation

3. The principle that two species competing for the same limiting resources cannot coexist is called?

- A) Resource partitioning
- B) Character displacement
- C) Competitive exclusion
- D) Niche differentiation

Answer: Competitive exclusion

4. The specific set of biotic and abiotic resources used by an organism is its?

- A) Habitat
- B) Niche
- C) Territory
- D) Range

Answer: Niche

5. Differentiation of niches to enable similar species to coexist is called?

- A) Competitive exclusion
- B) Character displacement
- C) Resource partitioning
- D) Exploitation

Answer: Resource partitioning

6. The tendency for characteristics to diverge more in sympatric populations than in allopatric populations is?

- A) Competitive exclusion
- B) Resource partitioning
- C) Character displacement
- D) Niche differentiation

Answer: Character displacement

7. Bright coloration that warns predators of prey toxicity is called?

- A) Cryptic coloration

- B) Batesian mimicry
- C) Aposematic coloration
- D) Müllerian mimicry

Answer: Aposematic coloration

8. When a harmless species mimics a harmful one, it is called?

- A) Cryptic coloration
- B) Aposematic coloration
- C) Batesian mimicry
- D) Müllerian mimicry

Answer: Batesian mimicry

9. An interaction where one organism eats part of a plant or alga is?

- A) Predation
- B) Parasitism
- C) Herbivory
- D) Commensalism

Answer: Herbivory

10. A +/- interaction where one organism derives nourishment from a host is?

- A) Herbivory
- B) Predation
- C) Parasitism
- D) Mutualism

Answer: Parasitism

11. A ++ interaction benefiting both species is?

- A) Commensalism
- B) Mutualism
- C) Predation
- D) Competition

Answer: Mutualism

12. A +/0 interaction where one species benefits and the other is unaffected is?

- A) Mutualism
- B) Commensalism
- C) Amensalism
- D) Parasitism

Answer: Commensalism

13. The variety of different kinds of organisms in a community is its?

- A) Relative abundance
- B) Species richness
- C) Species diversity
- D) Trophic structure

Answer: Species diversity



14. The number of different species in a community is its?

- A) Species evenness
- B) Species diversity
- C) Species richness
- D) Relative abundance

Answer: Species richness

15. A widely used index that incorporates both richness and relative abundance is the?

- A) Simpson index
- B) Shannon diversity index
- C) Species-area index
- D) Trophic index

Answer: Shannon diversity index

16. The transfer of chemical energy from producers through consumers is a?

- A) Food web
- B) Trophic level
- C) Food chain
- D) Energy pyramid

Answer: Food chain

17. Linked food chains form a?

- A) Trophic structure
- B) Energy pyramid
- C) Food web
- D) Biomass pyramid

Answer: Food web

18. The hypothesis that food chain length is limited by inefficient energy transfer is the?

- A) Top-down hypothesis
- B) Energetic hypothesis
- C) Productivity hypothesis
- D) Bottom-up hypothesis

Answer: Energetic hypothesis

19. Species that have strong effects due to their large size or high abundance are?

- A) Keystone species
- B) Foundation species
- C) Ecosystem engineers
- D) Dominant species

Answer: Foundation species

20. A species that exerts a disproportionate influence on community structure relative to its abundance is a?

- A) Foundation species
- B) Keystone species

- C) Ecosystem engineer
- D) Dominant competitor

Answer: Keystone species

21. A beaver that dramatically alters its environment is an example of a(n)?

- A) Keystone species
- B) Foundation species
- C) Ecosystem engineer
- D) Invasive species

Answer: Ecosystem engineer

22. Control of community structure by nutrient supply is called?

- A) Top-down control
- B) Trophic cascade
- C) Bottom-up control
- D) Intermediate control

Answer: Bottom-up control

23. Control of community structure by predators is called?

- A) Bottom-up control
- B) Resource control
- C) Top-down control
- D) Energetic control

Answer: Top-down control

24. An event that changes a community by removing organisms is a?

- A) Succession
- B) Disturbance
- C) Equilibrium
- D) Climax

Answer: Disturbance

25. The model that describes communities as constantly changing after disturbances is the?

- A) Equilibrium model
- B) Climax model
- C) Nonequilibrium model
- D) Disturbance model

Answer: Nonequilibrium model

26. The hypothesis that moderate disturbance fosters greatest diversity is the?

- A) Disturbance frequency hypothesis
- B) Intermediate disturbance hypothesis
- C) Successional hypothesis
- D) Diversity-stability hypothesis

Answer: Intermediate disturbance hypothesis



27. The process of change in species composition after a disturbance is?

- A) Disturbance
- B) Succession
- C) Equilibrium
- D) Stabilization

Answer: Succession

28. Succession on a newly formed volcanic island is?

- A) Secondary succession
- B) Primary succession
- C) Tertiary succession
- D) Climax succession

Answer: Primary succession

29. The species that colonize first during succession are?

- A) Keystone species
- B) Pioneer species
- C) Foundation species
- D) Climax species

Answer: Pioneer species

30. Which factor is most correlated with high species richness in terrestrial communities?

- A) Low evapotranspiration
- B) High latitude
- C) High evapotranspiration
- D) Low precipitation

Answer: High evapotranspiration

31. The relationship between species richness and area is described by the?

- A) Species-area curve
- B) Diversity-index curve
- C) Latitudinal gradient
- D) Equilibrium model

Answer: Species-area curve

32. The island equilibrium model was developed by?

- A) Darwin and Wallace
- B) MacArthur and Wilson
- C) Connell and Slatyer
- D) Gause and Lotka

Answer: MacArthur and Wilson

33. In the island equilibrium model, the number of species is determined by the balance between?

- A) Birth and death rates
- B) Immigration and extinction

- C) Speciation and migration
- D) Competition and predation

Answer: Immigration and extinction

34. Disease-causing agents such as viruses and bacteria are called?

- A) Vectors
- B) Parasites
- C) Pathogens
- D) Hosts

Answer: Pathogens

35. Diseases transferred from animals to humans are called?

- A) Vector diseases
- B) Parasitic diseases
- C) Zoonotic diseases
- D) Infectious diseases

Answer: Zoonotic diseases

36. The sum of all organisms and abiotic factors in an area is a(n)?

- A) Community
- B) Ecosystem
- C) Population
- D) Biosphere

Answer: Ecosystem

37. The first law of thermodynamics states that energy cannot be?

- A) Created or destroyed
- B) Transformed
- C) Lost as heat
- D) Used inefficiently

Answer: Created or destroyed

38. Organisms that produce organic compounds from inorganic sources are?

- A) Heterotrophs
- B) Decomposers
- C) Autotrophs
- D) Consumers

Answer: Autotrophs

39. The trophic level consisting of autotrophs is?

- A) Primary consumers
- B) Secondary consumers
- C) Primary producers
- D) Decomposers

Answer: Primary producers

40. Organisms that obtain energy from detritus are?

Nutrition & Digestion

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1. Which of the following is the correct sequence of the digestive tract from proximal to distal?

- A) Esophagus, Stomach, Duodenum, Jejunum, Ileum
- B) Stomach, Esophagus, Ileum, Jejunum, Duodenum
- C) Duodenum, Jejunum, Ileum, Stomach, Esophagus
- D) Jejunum, Ileum, Duodenum, Stomach, Esophagus

Answer: Esophagus, Stomach, Duodenum, Jejunum, Ileum

2. Which hormone is responsible for stimulating the release of bicarbonate-rich pancreatic juice?

- A) Gastrin
- B) Secretin
- C) Cholecystokinin
- D) Gastric Inhibitory Peptide

Answer: Secretin

3. Which of the following cells secrete pepsinogen in the stomach?

- A) Parietal Cells
- B) G Cells
- C) Chief Cells
- D) Mucous Neck Cells

Answer: Chief Cells

4. The majority of nutrient absorption occurs in which part of the small intestine?

- A) Duodenum
- B) Jejunum
- C) Ileum
- D) All parts equally

Answer: Jejunum

5. Which vitamin requires intrinsic factor for its absorption in the ileum?

- A) Vitamin C
- B) Vitamin B12
- C) Vitamin D

D) Vitamin K

Answer: Vitamin B12

6. The process of breaking down large fat globules into smaller droplets is primarily the function of:

- A) Pancreatic Lipase
- B) Bile Salts
- C) Gastric Lipase
- D) Colipase

Answer: Bile Salts

7. Which of the following is NOT a primary function of the liver?

- A) Gluconeogenesis
- B) Production of Insulin
- C) Synthesis of Plasma Proteins
- D) Detoxification of Ammonia

Answer: Production of Insulin

8. The muscular contractions that mix food with digestive juices in the small intestine are called:

- A) Peristalsis
- B) Segmentation
- C) Haustration
- D) Mass Movements

Answer: Segmentation

9. Which enzyme is responsible for the digestion of starch in the mouth and small intestine?

- A) Maltase
- B) Sucrase
- C) Amylase
- D) Lactase

Answer: Amylase

10. The hormone that inhibits gastric emptying and secretion when fats are present in the duodenum is:

- A) Gastrin
- B) Secretin
- C) Cholecystokinin
- D) Motilin

Answer: Cholecystokinin



11. The main function of the large intestine is:

- A) Digestion of Proteins
- B) Absorption of Amino Acids
- C) Absorption of Water and Electrolytes
- D) Production of Bile

Answer: Absorption of Water and Electrolytes

12. Which of the following is a zymogen (inactive enzyme precursor)?

- A) Pepsin
- B) Trypsin
- C) Trypsinogen
- D) Amylase

Answer: Trypsinogen

13. The final product of protein digestion that is absorbed is:

- A) Dipeptides
- B) Tripeptides
- C) Amino Acids
- D) Polypeptides

Answer: Amino Acids

14. Which sphincter regulates the passage of chyme from the stomach to the duodenum?

- A) Cardiac Sphincter
- B) Pyloric Sphincter
- C) Ileocecal Sphincter
- D) Anal Sphincter

Answer: Pyloric Sphincter

15. The hormone that stimulates gastric acid secretion is:

- A) Secretin
- B) Gastrin
- C) Somatostatin
- D) Gastric Inhibitory Peptide

Answer: Gastrin

16. Where does the chemical digestion of carbohydrates begin?

- A) Stomach
- B) Small Intestine
- C) Mouth
- D) Esophagus

Answer: Mouth

17. The process of moving food from the pharynx to the stomach is called:

- A) Mastication
- B) Deglutition
- C) Peristalsis
- D) Segmentation

Answer: Deglutition

18. Pancreatic juice contains all of the following enzymes EXCEPT:

- A) Trypsin
- B) Pepsin
- C) Amylase
- D) Lipase

Answer: Pepsin

19. Which structure prevents food from entering the larynx during swallowing?

- A) Uvula
- B) Epiglottis
- C) Tongue
- D) Pharynx

Answer: Epiglottis

20. The primary energy source absorbed directly into the bloodstream as monosaccharides is:

- A) Fructose
- B) Galactose
- C) Glucose
- D) Maltose

Answer: Glucose

21. The "brush border" of the small intestine refers to:

- A) Villi
- B) Microvilli
- C) Plicae Circulares
- D) Lacteals

Answer: Microvilli

22. Which mineral is essential for the formation of hemoglobin?

- A) Calcium
- B) Iron
- C) Iodine



D) Sodium

Answer: Iron

23. The hormone that signals satiety and is released by adipose tissue is:

- A) Ghrelin
- B) Leptin
- C) Peptide YY
- D) Insulin

Answer: Leptin

24. What is the primary function of the gallbladder?

- A) Produce Bile
- B) Digest Fats
- C) Store and Concentrate Bile
- D) Produce Cholesterol

Answer: Store and Concentrate Bile

25. A deficiency of which vitamin causes scurvy?

- A) Vitamin A
- B) Vitamin C
- C) Vitamin D
- D) Vitamin K

Answer: Vitamin C

26. The enzyme that converts trypsinogen to trypsin is:

- A) Enterokinase
- B) Pepsin
- C) HCl
- D) Carboxypeptidase

Answer: Enterokinase

27. Which part of the tooth contains blood vessels and nerves?

- A) Enamel
- B) Dentin
- C) Pulp
- D) Cementum

Answer: Pulp

28. Which of the following is a characteristic of carnivore dentition?

- A) Broad, flat molars
- B) Well-developed canines
- C) Diastema

D) Horny plates

Answer: Well-developed canines

29. The hormone that increases blood glucose levels by stimulating glycogen breakdown is:

- A) Insulin
- B) Glucagon
- C) Cortisol
- D) Epinephrine

Answer: Glucagon

30. The medical term for inflammation of the liver is:

- A) Hepatitis
- B) Cirrhosis
- C) Cholecystitis
- D) Pancreatitis

Answer: Hepatitis

31. The process of taking food into the mouth is known as:

- A) Digestion
- B) Ingestion
- C) Absorption
- D) Elimination

Answer: Ingestion

32. Which of the following is a fat-soluble vitamin?

- A) Vitamin B1
- B) Vitamin C
- C) Vitamin D
- D) Vitamin B12

Answer: Vitamin D

33. The main site for cellulose digestion in rabbits and horses is the:

- A) Rumen
- B) Cecum
- C) Abomasum
- D) Small Intestine

Answer: Cecum

34. Which hormone is released by the duodenum in response to acidic chyme?

- A) Gastrin
- B) Secretin
- C) Cholecystokinin

Respiratory System & Gas Exchange

1. Which of the following structures is primarily responsible for preventing food aspiration into the airway?

- A) Uvula
- B) Glottis
- C) Epiglottis
- D) Tongue

Answer: Epiglottis

2. What is the primary muscle of inspiration during quiet breathing?

- A) External intercostals
- B) Internal intercostals
- C) Diaphragm
- D) Abdominals

Answer: Diaphragm

3. The majority of carbon dioxide in blood is transported as:

- A) Dissolved CO₂
- B) Carbaminohemoglobin
- C) Bicarbonate ions
- D) Carbonic acid

Answer: Bicarbonate ions

4. The oxygen-hemoglobin dissociation curve shifts to the right in response to:

- A) Increased pH
- B) Decreased temperature
- C) Increased 2,3-DPG
- D) Decreased PCO₂

Answer: Increased 2,3-DPG

5. Which respiratory disorder is characterized by destruction of alveolar walls and loss of elastic recoil?

- A) Chronic bronchitis
- B) Asthma
- C) Emphysema
- D) Pulmonary fibrosis

Answer: Emphysema

6. The enzyme carbonic anhydrase catalyzes the reaction between:

- A) O₂ and hemoglobin
- B) CO₂ and water
- C) CO and plasma
- D) H⁺ and bicarbonate

Answer: CO₂ and water

7. The partial pressure of oxygen in alveolar air is approximately:

- A) 40 mmHg
- B) 100 mmHg
- C) 46 mmHg
- D) 160 mmHg

Answer: 100 mmHg

8. Which lung volume cannot be measured directly by spirometry?

- A) Tidal volume
- B) Expiratory reserve volume
- C) Inspiratory reserve volume
- D) Residual volume

Answer: Residual volume

9. The chemoreceptors most sensitive to changes in arterial PCO₂ are located in the:

- A) Carotid bodies
- B) Aortic bodies
- C) Medulla oblongata
- D) Lungs

Answer: Medulla oblongata

10. Surfactant is produced by which type of alveolar cells?

- A) Type I pneumocytes
- B) Type II pneumocytes
- C) Alveolar macrophages
- D) Goblet cells

Answer: Type II pneumocytes

11. The condition of low oxygen levels in tissues is termed:

- A) Hypoxemia
- B) Hypercapnia
- C) Hypoxia
- D) Anemia

Answer: Hypoxia

12. Which law states that the total pressure of a gas mixture is the sum of partial pressures?

- A) Boyle's Law
- B) Dalton's Law
- C) Henry's Law
- D) Fick's Law

Answer: Dalton's Law

13. The primary stimulus for increasing ventilation during moderate exercise is:

- A) Decreased PO₂



- B) Increased PCO₂ and H⁺
- C) Increased lactic acid
- D) Conscious control

Answer: Increased PCO₂ and H⁺

14. Which structure marks the beginning of the respiratory zone?

- A) Terminal bronchiole
- B) Respiratory bronchiole
- C) Alveolar duct
- D) Alveolar sac

Answer: Respiratory bronchiole

15. Myoglobin is found in which type of tissue and has what affinity for oxygen compared to hemoglobin?

- A) Liver; lower affinity
- B) Muscle; higher affinity
- C) Blood; similar affinity
- D) Lung; no affinity

Answer: Muscle; higher affinity

16. Chronic Obstructive Pulmonary Disease (COPD) typically includes which two conditions?

- A) Asthma and pneumonia
- B) Emphysema and chronic bronchitis
- C) Tuberculosis and fibrosis
- D) Bronchiectasis and atelectasis

Answer: Emphysema and chronic bronchitis

17. The chloride shift occurs in red blood cells to:

- A) Transport oxygen
- B) Maintain electrical neutrality during CO₂ transport
- C) Increase hemoglobin's oxygen affinity
- D) Produce carbonic acid

Answer: Maintain electrical neutrality during CO₂ transport

18. The volume of air remaining in the lungs after a maximal expiration is called:

- A) Expiratory reserve volume
- B) Residual volume
- C) Functional residual capacity
- D) Total lung capacity

Answer: Residual volume

19. Which of the following is an upper respiratory tract infection?

- A) Pneumonia
- B) Tuberculosis
- C) Sinusitis

- D) Bronchiolitis

Answer: Sinusitis

20. The Hering-Breuer reflex helps to:

- A) Increase heart rate
- B) Prevent over-inflation of the lungs
- C) Stimulate cough
- D) Control sneezing

Answer: Prevent over-inflation of the lungs

21. The Adam's apple is formed by which laryngeal cartilage?

- A) Cricoid
- B) Thyroid
- C) Arytenoid
- D) Epiglottic

Answer: Thyroid

22. A person with a barrel chest appearance most likely has:

- A) Asthma
- B) Emphysema
- C) Pneumonia
- D) Lung cancer

Answer: Emphysema

23. The maximum volume of air that can be exhaled after a maximal inhalation is:

- A) Tidal volume
- B) Inspiratory capacity
- C) Vital capacity
- D) Total lung capacity

Answer: Vital capacity

24. Which gas law explains the inverse relationship between pressure and volume of a gas?

- A) Henry's Law
- B) Dalton's Law
- C) Boyle's Law
- D) Charles' Law

Answer: Boyle's Law

25. The primary cause of lung cancer is most closely associated with:

- A) Air pollution
- B) Genetic factors
- C) Smoking
- D) Occupational dust

Answer: Smoking

26. In the systemic capillaries, oxygen unloading is enhanced by the Bohr effect, which is triggered by:



- A) Low PCO₂ and high pH
- B) High PCO₂ and low pH
- C) Low temperature
- D) High oxygen concentration

Answer: High PCO₂ and low pH

27. The vocal cords are located within the:

- A) Pharynx
- B) Larynx
- C) Trachea
- D) Bronchus

Answer: Larynx

28. The term eupnea refers to:

- A) Labored breathing
- B) Normal quiet breathing
- C) Absence of breathing
- D) Rapid deep breathing

Answer: Normal quiet breathing

29. The majority of oxygen in blood is transported bound to:

- A) Plasma proteins
- B) Hemoglobin in RBCs
- C) Dissolved in plasma
- D) Myoglobin

Answer: Hemoglobin in RBCs

30. Which of the following is NOT a property of an efficient respiratory surface?

- A) Moist
- B) Thick and muscular
- C) Large surface area
- D) Rich blood supply

Answer: Thick and muscular

31. Carbon monoxide poisoning is dangerous because CO:

- A) Dissolves readily in plasma
- B) Forms stable carboxyhemoglobin
- C) Converts to bicarbonate
- D) Stimulates respiratory center

Answer: Forms stable carboxyhemoglobin

32. The number of lobes in the right human lung is:

- A) Two
- B) Three
- C) Four
- D) One

Answer: Three

33. The space between the lungs containing the heart is the:

- A) Hilum
- B) Pleural cavity
- C) Mediastinum
- D) Pericardium

Answer: Mediastinum

34. The normal arterial blood pH range is:

- A) 7.20-7.30
- B) 7.30-7.40
- C) 7.35-7.45
- D) 7.45-7.55

Answer: 7.35-7.45

35. The primary buffer system in blood is the:

- A) Phosphate system
- B) Protein system
- C) Bicarbonate system
- D) Hemoglobin system

Answer: Bicarbonate system

36. Which of the following is a restrictive lung disease?

- A) Chronic bronchitis
- B) Emphysema
- C) Pulmonary fibrosis
- D) Asthma

Answer: Pulmonary fibrosis

37. The term for coughing up blood is:

- A) Epistaxis
- B) Hemoptysis
- C) Hematemesis
- D) Hemothorax

Answer: Hemoptysis

38. The term for bleeding from the nose is:

- A) Epistaxis
- B) Hemoptysis
- C) Hematemesis
- D) Hematuria

Answer: Epistaxis

39. The volume of air that can be forcibly inhaled after a normal tidal inspiration is the:

- A) Expiratory reserve volume
- B) Inspiratory reserve volume
- C) Tidal volume
- D) Residual volume

Answer: Inspiratory reserve volume

40. The condition of air in the pleural cavity is called:

- A) Pleural effusion
- B) Pneumothorax



Circulation & Transport

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1. The thickest walled chamber of the human heart is the:

- A) Right Atrium
- B) Left Atrium
- C) Right Ventricle
- D) Left Ventricle

Answer: Left Ventricle

2. The membrane that encloses the heart in a double-layered sac is the:

- A) Myocardium
- B) Endocardium
- C) Pericardium
- D) Epicardium

Answer: Pericardium

3. The pacemaker of the heart, which initiates each heartbeat, is the:

- A) Atrioventricular Node
- B) Bundle of His
- C) Purkinje Fibers
- D) Sinoatrial Node

Answer: Sinoatrial Node

4. Blood vessels that carry blood away from the heart are called:

- A) Veins
- B) Venules
- C) Capillaries
- D) Arteries

Answer: Arteries

5. The valve present between the left atrium and left ventricle is the:

- A) Tricuspid Valve
- B) Pulmonary Semilunar Valve
- C) Aortic Semilunar Valve
- D) Bicuspid (Mitral) Valve

Answer: Bicuspid (Mitral) Valve

6. Deoxygenated blood from the body enters the heart through the:

- A) Pulmonary Veins
- B) Aorta
- C) Superior and Inferior Vena Cavae
- D) Pulmonary Arteries

Answer: Superior and Inferior Vena Cavae

7. The phase of the cardiac cycle when the ventricles contract is called:

- A) Atrial Systole

- B) Ventricular Diastole

- C) Ventricular Systole

- D) Atrial Diastole

Answer: Ventricular Systole

8. The 'lub' heart sound is primarily caused by the closure of the:

- A) Semilunar Valves
- B) Atrioventricular Valves
- C) Pulmonary Valve Only
- D) Aortic Valve Only

Answer: Atrioventricular Valves

9. The inner lining of the heart chambers is called the:

- A) Epicardium
- B) Myocardium
- C) Pericardium
- D) Endocardium

Answer: Endocardium

10. Which blood vessels have the thinnest walls to allow for material exchange?

- A) Arteries
- B) Arterioles
- C) Capillaries
- D) Veins

Answer: Capillaries

11. The QRS complex in an Electrocardiogram (ECG) represents:

- A) Atrial Depolarization
- B) Atrial Repolarization
- C) Ventricular Depolarization
- D) Ventricular Repolarization

Answer: Ventricular Depolarization

12. The hormone Epinephrine (Adrenaline) causes:

- A) Vasoconstriction Only
- B) Vasodilation Only
- C) Both Vasoconstriction and Vasodilation
- D) No Effect on Blood Vessels

Answer: Both Vasoconstriction and Vasodilation

13. The medical term for a heart attack is:

- A) Angina Pectoris
- B) Atherosclerosis
- C) Myocardial Infarction
- D) Congestive Heart Failure

Answer: Myocardial Infarction

21. Circulation & Transport



14. The liquid part of the blood is called:

- A) Serum
- B) Lymph
- C) Plasma
- D) Interstitial Fluid

Answer: Plasma

15. Which component of blood is primarily responsible for carrying oxygen?

- A) Platelets
- B) Plasma
- C) White Blood Cells
- D) Red Blood Cells (Erythrocytes)

Answer: Red Blood Cells (Erythrocytes)

16. The lifespan of a typical human red blood cell is approximately:

- A) 120 days
- B) 30 days
- C) 1 year
- D) 7 days

Answer: 120 days

17. The process of white blood cells squeezing through capillary walls is called:

- A) Hemolysis
- B) Diapedesis
- C) Phagocytosis
- D) Agglutination

Answer: Diapedesis

18. Heparin, an anticoagulant, is produced by which type of blood cell?

- A) Neutrophils
- B) Lymphocytes
- C) Basophils
- D) Eosinophils

Answer: Basophils

19. The largest lymphatic vessel, which drains most of the body, is the:

- A) Right Lymphatic Duct
- B) Thoracic Duct
- C) Hepatic Portal Vein
- D) Subclavian Vein

Answer: Thoracic Duct

20. Lymph ultimately drains back into the venous circulation at the:

- A) Jugular Veins
- B) Subclavian Veins
- C) Renal Veins

D) Femoral Veins

Answer: Subclavian Veins

21. The term for high blood pressure is:

- A) Hypotension
- B) Bradycardia
- C) Hypertension
- D) Tachycardia

Answer: Hypertension

22. Baroreceptors that help regulate blood pressure are located in the:

- A) Heart Ventricles
- B) Carotid Sinus and Aortic Arch
- C) Pulmonary Veins
- D) Renal Arteries

Answer: Carotid Sinus and Aortic Arch

23. The narrowing of arteries due to plaque buildup is called:

- A) Aneurysm
- B) Varicose Veins
- C) Atherosclerosis
- D) Phlebitis

Answer: Atherosclerosis

24. A stationary blood clot within a vessel is called a(n):

- A) Embolus
- B) Thrombus
- C) Aneurysm
- D) Plaque

Answer: Thrombus

25. A moving blood clot that can cause blockage elsewhere is called a(n):

- A) Thrombus
- B) Embolus
- C) Atheroma
- D) Hematoma

Answer: Embolus

26. Which procedure uses a balloon to open a blocked coronary artery?

- A) Coronary Bypass
- B) Angioplasty
- C) Valve Replacement
- D) Pacemaker Implantation

Answer: Angioplasty

27. The pre-capillary sphincters regulate blood flow into:

- A) Arteries
- B) Veins



- C) Capillaries
- D) Venules

Answer: Capillaries

28. The main function of the lymphatic system is:

- A) Oxygen Transport
- B) Hormone Production
- C) Return of Interstitial Fluid to Blood
- D) Blood Clotting

Answer: Return of Interstitial Fluid to Blood

29. Which organ filters blood, removes old RBCs, and stores iron?

- A) Liver
- B) Pancreas
- C) Spleen
- D) Kidney

Answer: Spleen

30. The P-wave in an ECG corresponds to:

- A) Ventricular Depolarization
- B) Ventricular Repolarization
- C) Atrial Depolarization
- D) Atrial Repolarization

Answer: Atrial Depolarization

31. The volume of blood pumped by each ventricle per minute is called:

- A) Stroke Volume
- B) Heart Rate
- C) Cardiac Output
- D) Blood Pressure

Answer: Cardiac Output

32. The chordae tendineae are attached to the:

- A) Semilunar Valves
- B) Walls of the Atria
- C) Cusps of the Atrioventricular Valves
- D) Interventricular Septum

Answer: Cusps of the Atrioventricular Valves

33. The coronary arteries supply blood to the:

- A) Lungs
- B) Liver
- C) Heart Muscle
- D) Brain

Answer: Heart Muscle

34. The hepatic portal vein carries blood from the digestive organs to the:

- A) Heart
- B) Lungs
- C) Liver

- D) Kidneys

Answer: Liver

35. The normal pH range of human blood is approximately:

- A) 6.8 - 7.0
- B) 7.0 - 7.2
- C) 7.35 - 7.45
- D) 7.8 - 8.0

Answer: 7.35 - 7.45

36. Which plasma protein is most important for maintaining osmotic pressure?

- A) Fibrinogen
- B) Globulin
- C) Albumin
- D) Prothrombin

Answer: Albumin

37. The formation of blood cells is called:

- A) Hemostasis
- B) Hemopoiesis (Hematopoiesis)
- C) Hemolysis
- D) Agglutination

Answer: Hemopoiesis (Hematopoiesis)

38. The clumping of red blood cells due to an antibody reaction is called:

- A) Coagulation
- B) Embolism
- C) Agglutination
- D) Sedimentation

Answer: Agglutination

39. The fluid that leaks out of capillaries into tissue spaces is called:

- A) Plasma
- B) Serum
- C) Lymph
- D) Interstitial Fluid

Answer: Interstitial Fluid

40. Which blood type is considered the universal donor?

- A) A
- B) B
- C) AB
- D) O

Answer: O

41. The amount of blood in an average adult human is approximately:

- A) 2-3 liters
- B) 4-6 liters

Homeostasis

22. Homeostasis

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1. Which term describes the maintenance of a stable internal environment despite external changes?

- A) Metabolism
- B) Homeostasis
- C) Adaptation
- D) Acclimatization

Answer: Homeostasis

2. Who first proposed the concept of the constancy of the internal environment?

- A) Walter Cannon
- B) Claude Bernard
- C) Louis Pasteur
- D) Anton van Leeuwenhoek

Answer: Claude Bernard

3. The primary nitrogenous waste excreted by most aquatic animals is:

- A) Urea
- B) Uric acid
- C) Ammonia
- D) Creatinine

Answer: Ammonia

4. Which structure in flatworms functions in osmoregulation and excretion?

- A) Metanephridia
- B) Malpighian tubules
- C) Protonephridia
- D) Nephridiopores

Answer: Protonephridia

5. Birds primarily excrete nitrogenous waste in the form of:

- A) Ammonia
- B) Urea
- C) Uric acid
- D) Allantoin

Answer: Uric acid

6. Freshwater fish are _____ to their environment and tend to _____ water.

- A) hypertonic, gain
- B) hypotonic, lose
- C) isotonic, neither gain nor lose
- D) hypertonic, lose

Answer: hypertonic, gain

7. Marine bony fishes compensate for water loss by:

- A) Producing large volumes of dilute urine
- B) Drinking seawater and excreting excess salts through gills
- C) Retaining urea in their blood
- D) Absorbing water through skin

Answer: Drinking seawater and excreting excess salts through gills

8. The functional unit of the vertebrate kidney is the:

- A) Glomerulus
- B) Bowman's capsule
- C) Nephron
- D) Collecting duct

Answer: Nephron

9. Which hormone increases water reabsorption in the collecting ducts?

- A) Aldosterone
- B) Renin
- C) Antidiuretic hormone (ADH)
- D) Atrial natriuretic peptide

Answer: Antidiuretic hormone (ADH)

10. The process forcing fluid from glomerular capillaries into Bowman's capsule is:

- A) Tubular secretion
- B) Tubular reabsorption
- C) Glomerular filtration
- D) Countercurrent multiplication

Answer: Glomerular filtration

11. Animals that maintain constant internal osmolarity regardless of environment are:

- A) Osmoconformers
- B) Osmoregulators
- C) Stenohaline
- D) Euryhaline

Answer: Osmoregulators

12. Uric acid excretion as a paste is especially advantageous for:

- A) Aquatic animals
- B) Terrestrial animals conserving water
- C) Animals producing large urine volumes
- D) Animals with high protein diets

Answer: Terrestrial animals conserving water

13. Malpighian tubules are excretory structures found in:

- A) Earthworms



- B) Insects
- C) Flatworms
- D) Crustaceans

Answer: Insects

14. Sharks maintain osmotic balance with seawater by retaining high levels of:

- A) Ammonia
- B) Uric acid
- C) Urea
- D) Sodium chloride

Answer: Urea

15. The filtration membrane in the glomerulus includes pores and slits of:

- A) Mesangial cells
- B) Podocytes
- C) Juxtaglomerular cells
- D) Macula densa cells

Answer: Podocytes

16. The maximum rate a substance can be reabsorbed from filtrate is its:

- A) Filtration fraction
- B) Renal threshold
- C) Tubular transport maximum (T_m)
- D) Clearance rate

Answer: Tubular transport maximum (T_m)

17. Secretion of H⁺ into the renal tubule is crucial for regulating:

- A) Blood glucose
- B) Blood pH
- C) Blood pressure
- D) Plasma osmolarity

Answer: Blood pH

18. Aldosterone promotes sodium reabsorption in which nephron segment?

- A) Proximal tubule
- B) Loop of Henle
- C) Distal tubule
- D) Collecting duct

Answer: Distal tubule

19. Renin is secreted by the juxtaglomerular apparatus in response to:

- A) High blood pressure
- B) Low blood pressure
- C) High blood sodium
- D) Low blood potassium

Answer: Low blood pressure

20. Atrial natriuretic peptide (ANP) acts to:

- A) Increase sodium reabsorption
- B) Decrease sodium reabsorption
- C) Increase water reabsorption
- D) Stimulate aldosterone secretion

Answer: Decrease sodium reabsorption

21. The nitrogenous waste requiring most energy to produce but conserving most water is:

- A) Ammonia
- B) Urea
- C) Uric acid
- D) Allantoin

Answer: Uric acid

22. Most glomerular filtrate reabsorption occurs in the:

- A) Loop of Henle
- B) Distal convoluted tubule
- C) Proximal convoluted tubule
- D) Collecting duct

Answer: Proximal convoluted tubule

23. The descending limb of the loop of Henle is permeable to _____, while the ascending limb is permeable to _____.

- A) salt, water
- B) water, salt
- C) urea, water
- D) glucose, salt

Answer: water, salt

24. Diabetes insipidus results from insufficient secretion or action of:

- A) Insulin
- B) Aldosterone
- C) Antidiuretic hormone
- D) Renin

Answer: Antidiuretic hormone

25. The fluid between cells that bathes all body tissues is:

- A) Plasma
- B) Lymph
- C) Interstitial fluid
- D) Hemolymph

Answer: Interstitial fluid

26. Which is NOT a function of the vertebrate kidney?

- A) Regulation of blood pH
- B) Production of red blood cells
- C) Excretion of nitrogenous wastes

D) Regulation of blood volume

Answer: Production of red blood cells

27. Movement of substances from peritubular capillaries into the tubule is termed:

- A) Filtration
- B) Reabsorption
- C) Secretion
- D) Excretion

Answer: Secretion

28. Concentrated urine production relies heavily on:

- A) Cortical nephrons
- B) Juxtamedullary nephrons with long loops
- C) Glomerular filtration rate
- D) Afferent arteriole diameter

Answer: Juxtamedullary nephrons with long loops

29. Urine is carried from kidney to bladder by the:

- A) Urethra
- B) Ureter
- C) Collecting duct
- D) Renal pelvis

Answer: Ureter

30. The primary organ for osmoregulation and excretion in terrestrial vertebrates is the:

- A) Liver
- B) Skin
- C) Lung
- D) Kidney

Answer: Kidney

31. Removing amino groups from amino acids to produce ammonia is called:

- A) Transamination
- B) Deamination
- C) Amination
- D) Ureogenesis

Answer: Deamination

32. Which animal is an osmoconformer?

- A) Freshwater fish
- B) Human
- C) Marine sponge
- D) Desert kangaroo rat

Answer: Marine sponge

33. The primary driving force for glomerular filtration is:

- A) Osmotic pressure of plasma proteins
- B) High hydrostatic pressure in glomerular capillaries
- C) Active transport by podocytes

D) Low pressure in Bowman's capsule

Answer: High hydrostatic pressure in glomerular capillaries

34. Glucose normally appears in filtrate but not in urine because it is:

- A) Secreted into the tubule
- B) Completely reabsorbed in the proximal tubule
- C) Metabolized by tubule cells
- D) Filtered only in small amounts

Answer: Completely reabsorbed in the proximal tubule

35. The inner region of the kidney containing loops of Henle is the:

- A) Renal cortex
- B) Renal medulla
- C) Renal pelvis
- D) Renal capsule

Answer: Renal medulla

36. Which substance is NOT typically found in significant amounts in normal urine?

- A) Urea
- B) Sodium ions
- C) Glucose
- D) Potassium ions

Answer: Glucose

37. The liver converts ammonia to urea via the:

- A) Krebs cycle
- B) Ornithine cycle
- C) Uric acid cycle
- D) Cori cycle

Answer: Ornithine cycle

38. Angiotensin II causes:

- A) Vasodilation and decreased BP
- B) Vasoconstriction and increased BP
- C) Decreased aldosterone secretion
- D) Inhibition of thirst

Answer: Vasoconstriction and increased BP

39. The excretory system of earthworms consists of:

- A) Protonephridia
- B) Metanephridia
- C) Malpighian tubules
- D) Flame cells

Answer: Metanephridia

40. Which hormone is produced by the heart in response to high blood volume?

- A) Aldosterone



Support Protection & Movement

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1. Which of the following is the primary function of the integumentary system?

- A) Nutrient absorption
- B) Gas exchange
- C) Protection from mechanical injury and microbial invasion
- D) Hormone production

Answer: Protection from mechanical injury and microbial invasion

2. The integument of many invertebrates consists of a single layer of epithelial cells called the:

- A) Dermis
- B) Hypodermis
- C) Epidermis
- D) Cuticle

Answer: Epidermis

3. In arthropods, the non-living outer covering secreted by the epidermis is called the:

- A) Shell
- B) Mantle
- C) Cuticle
- D) Scale

Answer: Cuticle

4. The process by which arthropods shed their old exoskeleton to accommodate growth is called:

- A) Keratinization
- B) Sclerotization
- C) Ecdysis
- D) Ossification

Answer: Ecdysis

5. The vertebrate integument is typically composed of two main layers: the epidermis and the:

- A) Hypodermis
- B) Subcutaneous layer
- C) Dermis
- D) Basement membrane

Answer: Dermis

6. Which group of fishes possesses tooth-like dermal scales known as denticles?

- A) Bony fishes
- B) Hagfishes
- C) Lampreys
- D) Cartilaginous fishes

Answer: Cartilaginous fishes

7. The scales of bony fishes are primarily derived from which layer?

- A) Epidermis
- B) Dermis
- C) Hypodermis
- D) Subcutaneous layer

Answer: Dermis

8. Amphibian skin is characterized by being thin and moist, and it contains glands that secrete mucus and noxious fluids. These glands are:

- A) Dermal in origin
- B) Epidermal in origin
- C) Hypodermal in origin
- D) Subcutaneous in origin

Answer: Epidermal in origin

9. The tough, impermeable protein that helps protect tetrapod skin from desiccation is:

- A) Collagen
- B) Chitin
- C) Keratin
- D) Resilin

Answer: Keratin

10. Reptilian scales, claws, and beaks are primarily composed of:

- A) Dermal bone
- B) Keratin
- C) Dentine
- D) Cartilage

Answer: Keratin

11. Feathers in birds are derived from which epidermal layer?

- A) Stratum germinativum
- B) Stratum corneum
- C) Stratum granulosum
- D) Basement membrane

Answer: Stratum corneum

12. A diagnostic derived character of mammals first seen in Mesozoic fossils is:

- A) Scales
- B) Feathers
- C) Hair
- D) Glands

Answer: Hair

13. Which of the following is NOT an epidermal derivative in mammals?

23. Support Protection & Movement



- A) Hair
- B) Sebaceous glands
- C) Mammary glands
- D) Dermal bone

Answer: Dermal bone

14. The muscle responsible for causing hair to stand erect is the:

- A) Flexor muscle
- B) Arrector pili muscle
- C) Adductor muscle
- D) Extensor muscle

Answer: Arrector pili muscle

15. Melanin, the primary pigment in mammalian skin and hair, is produced by cells called:

- A) Chromatophores
- B) Chondrocytes
- C) Osteocytes
- D) Melanocytes

Answer: Melanocytes

16. Which type of skeleton uses an incompressible fluid enclosed within a muscular wall for support and movement?

- A) Exoskeleton
- B) Endoskeleton
- C) Hydrostatic skeleton
- D) Axial skeleton

Answer: Hydrostatic skeleton

17. An earthworm moves using its hydrostatic skeleton, which relies on fluid pressure in the:

- A) Gastrovascular cavity
- B) Coelom
- C) Hemocoel
- D) Pseudocoelom

Answer: Coelom

18. The exoskeleton of arthropods is hardened by calcification in crustaceans and by a process called _____ in insects.

- A) Keratinization
- B) Ossification
- C) Sclerotization
- D) Mineralization

Answer: Sclerotization

19. The highly elastic protein found in insect cuticle that stores energy for jumping and flight is:

- A) Keratin
- B) Collagen

- C) Resilin
- D) Actin

Answer: Resilin

20. The supportive calcareous ossicles found in echinoderms are an example of an:

- A) Exoskeleton
- B) Hydrostatic skeleton
- C) Endoskeleton
- D) Axial skeleton

Answer: Endoskeleton

21. The two major divisions of the vertebrate endoskeleton are the axial skeleton and the:

- A) Visceral skeleton
- B) Cranial skeleton
- C) Appendicular skeleton
- D) Pectoral skeleton

Answer: Appendicular skeleton

22. Which of the following is a primary skeletal tissue in chondrichthyan fishes?

- A) Bone
- B) Cartilage
- C) Dentine
- D) Keratin

Answer: Cartilage

23. The bone that forms by replacing a cartilaginous model during development is called:

- A) Dermal bone
- B) Intramembranous bone
- C) Endochondral bone
- D) Compact bone

Answer: Endochondral bone

24. The basic histological unit of compact bone, consisting of concentric rings around a central canal, is the:

- A) Lacuna
- B) Osteocyte
- C) Osteon
- D) Trabecula

Answer: Osteon

25. Cells that build bone matrix are called:

- A) Osteocytes
- B) Osteoclasts
- C) Osteoblasts
- D) Chondrocytes

Answer: Osteoblasts

26. Cells responsible for bone resorption are called:



- A) Osteocytes
- B) Osteoclasts
- C) Osteoblasts
- D) Chondrocytes

Answer: Osteoclasts

27. The first vertebra that allows increased head mobility in tetrapods is the:

- A) Atlas
- B) Axis
- C) Sacrum
- D) Coccyx

Answer: Atlas

28. The type of movement exhibited by amoebas and some animal cells like macrophages is called:

- A) Ciliary movement
- B) Flagellar movement
- C) Ameboid movement
- D) Muscular movement

Answer: Ameboid movement

29. Eukaryotic cilia and flagella have an internal structure characterized by a:

- A) 9+0 arrangement of microtubules
- B) 9+2 arrangement of microtubules
- C) 9+1 arrangement of microtubules
- D) 12+2 arrangement of microtubules

Answer: 9+2 arrangement of microtubules

30. The motor protein responsible for generating the sliding force between microtubules in cilia and flagella is:

- A) Myosin
- B) Kinesin
- C) Dynein
- D) Actin

Answer: Dynein

31. Which of the following is NOT a type of vertebrate muscle tissue?

- A) Skeletal
- B) Cardiac
- C) Smooth
- D) Elastic

Answer: Elastic

32. Striated muscle is so named because of its:

- A) Spindle-shaped cells
- B) Single nucleus per cell
- C) Alternating dark and light bands
- D) Involuntary control

Answer: Alternating dark and light bands

33. The functional unit of contraction in a skeletal muscle myofibril is the:

- A) Sarcolemma
- B) Sarcoplasmic reticulum
- C) Sarcomere
- D) Myofiber

Answer: Sarcomere

34. Within a sarcomere, the thin filaments are primarily composed of the protein:

- A) Myosin
- B) Troponin
- C) Tropomyosin
- D) Actin

Answer: Actin

35. The thick filaments within a sarcomere are primarily composed of the protein:

- A) Myosin
- B) Troponin
- C) Tropomyosin
- D) Actin

Answer: Myosin

36. The region of a sarcomere where only actin filaments are present is the:

- A) A band
- B) I band
- C) H zone
- D) M line

Answer: I band

37. The regulatory protein that blocks the myosin-binding sites on actin in a relaxed muscle is:

- A) Troponin
- B) Tropomyosin
- C) Titin
- D) Nebulin

Answer: Tropomyosin

38. The release of which ion from the sarcoplasmic reticulum initiates muscle contraction?

- A) Sodium (Na⁺)
- B) Potassium (K⁺)
- C) Calcium (Ca²⁺)
- D) Chloride (Cl⁻)

Answer: Calcium (Ca²⁺)

39. At the neuromuscular junction, the neurotransmitter released by the motor neuron is:

- A) Norepinephrine
- B) Dopamine
- C) Acetylcholine

Nervous & Sensory System

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1. Which division of the peripheral nervous system is under conscious control?

- A) Sympathetic nervous system
- B) Parasympathetic nervous system
- C) Somatic nervous system
- D) Autonomic nervous system

Answer: Somatic nervous system

2. The resting membrane potential of a typical neuron is approximately:

- A) +70 mV
- B) -70 mV
- C) 0 mV
- D) -90 mV

Answer: -70 mV

3. What is the primary ion responsible for the depolarization phase of an action potential?

- A) Potassium (K⁺)
- B) Chloride (Cl⁻)
- C) Sodium (Na⁺)
- D) Calcium (Ca²⁺)

Answer: Sodium (Na⁺)

4. The gap between two neurons where neurotransmitters are released is called the:

- A) Node of Ranvier
- B) Synaptic cleft
- C) Axon hillock
- D) Myelin sheath

Answer: Synaptic cleft

5. Which glial cells produce myelin in the central nervous system?

- A) Schwann cells
- B) Astrocytes
- C) Oligodendrocytes
- D) Microglia

Answer: Oligodendrocytes

6. The part of the brain responsible for coordination and balance is the:

- A) Cerebrum
- B) Cerebellum
- C) Medulla oblongata
- D) Thalamus

Answer: Cerebellum

7. Which neurotransmitter is primarily involved in muscle contraction at neuromuscular junctions?

- A) Dopamine
- B) Serotonin
- C) Acetylcholine
- D) GABA

Answer: Acetylcholine

8. The sympathetic nervous system is most active during which response?

- A) Rest and digest
- B) Fight or flight
- C) Sleep and arousal
- D) Nutrient absorption

Answer: Fight or flight

9. Saltatory conduction occurs in:

- A) Unmyelinated axons
- B) Myelinated axons
- C) Dendrites
- D) Cell bodies

Answer: Myelinated axons

10. Which part of the brain is considered the major integrating center for sensory information?

- A) Hypothalamus
- B) Cerebellum
- C) Thalamus
- D) Hippocampus

Answer: Thalamus

11. An inhibitory postsynaptic potential (IPSP) is usually caused by the opening of channels for which ion?

- A) Sodium
- B) Potassium
- C) Calcium
- D) Chloride

Answer: Chloride

12. Broca's area is primarily involved in:

- A) Language comprehension
- B) Speech production
- C) Visual processing
- D) Emotional responses

Answer: Speech production

13. The refractory period of an action potential is primarily due to:

- A) Inactivation of sodium channels
- B) Opening of potassium channels
- C) Hyperpolarization

24. Nervous & Sensory System



D) Calcium influx

Answer: Inactivation of sodium channels

14. Which brain structure is crucial for the formation of new long-term memories?

- A) Amygdala
- B) Hypothalamus
- C) Hippocampus
- D) Basal ganglia

Answer: Hippocampus

15. Parkinson's disease is primarily associated with a deficiency of which neurotransmitter?

- A) Serotonin
- B) Acetylcholine
- C) Dopamine
- D) Norepinephrine

Answer: Dopamine

16. What type of potential is described as a local, graded change in membrane potential?

- A) Action potential
- B) Resting potential
- C) Threshold potential
- D) Generator potential

Answer: Generator potential

17. The blood-brain barrier is formed primarily by the foot processes of which cells?

- A) Oligodendrocytes
- B) Astrocytes
- C) Microglia
- D) Schwann cells

Answer: Astrocytes

18. Which cranial nerve is responsible for transmitting visual information?

- A) Olfactory (I)
- B) Optic (II)
- C) Vagus (X)
- D) Trigeminal (V)

Answer: Optic (II)

19. The equilibrium potential for potassium (EK) is approximately:

- A) +62 mV
- B) -90 mV
- C) -70 mV
- D) 0 mV

Answer: -90 mV

20. Multiple sclerosis is an autoimmune disease that affects which component of neurons?

- A) Cell bodies

B) Dendrites

C) Myelin sheaths

D) Synaptic vesicles

Answer: Myelin sheaths

21. The "all-or-none" principle is characteristic of which neuronal event?

- A) Resting potential
- B) Graded potential
- C) Action potential
- D) Synaptic potential

Answer: Action potential

22. Which part of a neuron receives incoming signals from other neurons?

- A) Axon
- B) Axon hillock
- C) Dendrites
- D) Synaptic terminal

Answer: Dendrites

23. Long-term potentiation (LTP) is most closely associated with learning and memory and involves which neurotransmitter?

- A) GABA
- B) Glutamate
- C) Glycine
- D) Acetylcholine

Answer: Glutamate

24. The somatic nervous system innervates which type of tissue?

- A) Cardiac muscle
- B) Smooth muscle
- C) Skeletal muscle
- D) Glands

Answer: Skeletal muscle

25. Wernicke's area is primarily involved in:

- A) Motor coordination
- B) Language comprehension
- C) Emotional regulation
- D) Visual association

Answer: Language comprehension

26. What is the primary role of the sodium-potassium pump in neurons?

- A) Generate action potentials
- B) Maintain resting membrane potential
- C) Release neurotransmitters
- D) Propagate nerve impulses

Answer: Maintain resting membrane potential

24. Nervous & Sensory System



27. Which brain wave pattern is characteristic of deep, dreamless sleep?

- A) Alpha waves
- B) Beta waves
- C) Theta waves
- D) Delta waves

Answer: Delta waves

28. The minimal stimulus strength required to generate an action potential is called the:

- A) Resting potential
- B) Threshold potential
- C) Equilibrium potential
- D) Reversal potential

Answer: Threshold potential

29. Which part of the brainstem controls vital functions like breathing and heart rate?

- A) Pons
- B) Midbrain
- C) Medulla oblongata
- D) Reticular formation

Answer: Medulla oblongata

30. Drugs classified as SSRIs primarily affect the levels of which neurotransmitter?

- A) Dopamine
- B) Norepinephrine
- C) Serotonin
- D) Acetylcholine

Answer: Serotonin

31. Which type of synapse provides the fastest possible signal transmission?

- A) Chemical synapse
- B) Electrical synapse
- C) Neuromuscular junction
- D) Axoaxonic synapse

Answer: Electrical synapse

32. The ventral root of a spinal nerve contains axons of which type of neuron?

- A) Sensory neurons
- B) Interneurons
- C) Motor neurons
- D) Autonomic neurons

Answer: Motor neurons

33. Alzheimer's disease is characterized by the accumulation of which protein?

- A) Alpha-synuclein
- B) Huntingtin
- C) Beta-amyloid

D) Prion protein

Answer: Beta-amyloid

34. The process by which a neuron adds together graded potentials from multiple synapses is called:

- A) Propagation
- B) Summation
- C) Facilitation
- D) Inhibition

Answer: Summation

35. Which division of the autonomic nervous system originates from the craniosacral regions?

- A) Sympathetic
- B) Parasympathetic
- C) Somatic
- D) Enteric

Answer: Parasympathetic

36. The absolute refractory period ensures that action potentials:

- A) Travel in one direction
- B) Summate temporally
- C) Are graded in strength
- D) Propagate slowly

Answer: Travel in one direction

37. Which sense does NOT send its sensory information through the thalamus before reaching the cortex?

- A) Vision
- B) Hearing
- C) Smell
- D) Touch

Answer: Smell

38. The primary motor cortex is located in which lobe of the cerebrum?

- A) Frontal
- B) Parietal
- C) Temporal
- D) Occipital

Answer: Frontal

39. What is the main function of the hypothalamus?

- A) Motor coordination
- B) Sensory integration
- C) Homeostasis and endocrine control
- D) Language processing

Answer: Homeostasis and endocrine control

40. Which ion's influx into the presynaptic terminal triggers neurotransmitter release?



Endocrine System

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1. Which gland is referred to as the "master gland" of the endocrine system?

- A) Thyroid
- B) Hypothalamus
- C) Adrenal
- D) Pituitary

Answer: Pituitary

2. Hormones that are secreted into the bloodstream and act on distant target cells are classified as:

- A) Autocrine
- B) Paracrine
- C) Endocrine
- D) Exocrine

Answer: Endocrine

3. Which hormone is secreted by the alpha cells of the pancreatic islets?

- A) Insulin
- B) Somatostatin
- C) Glucagon
- D) Pancreatic polypeptide

Answer: Glucagon

4. A patient presents with excessive thirst and urination; which hormone deficiency is most likely?

- A) Aldosterone
- B) Antidiuretic hormone
- C) Cortisol
- D) Thyroxine

Answer: Antidiuretic hormone

5. Graves' disease is caused by antibodies that mimic the action of which hormone?

- A) Thyroxine
- B) Thyroid-stimulating hormone
- C) Calcitonin
- D) Parathyroid hormone

Answer: Thyroid-stimulating hormone

6. Which hormone is secreted in response to low blood calcium levels?

- A) Calcitonin
- B) Thyroxine
- C) Parathyroid hormone
- D) Aldosterone

Answer: Parathyroid hormone

7. Oxytocin is synthesized in the hypothalamus and stored in which gland?

- A) Anterior pituitary
- B) Posterior pituitary
- C) Pineal gland
- D) Adrenal medulla

Answer: Posterior pituitary

8. Which of the following is a steroid hormone?

- A) Insulin
- B) Epinephrine
- C) Thyroxine
- D) Cortisol

Answer: Cortisol

9. Acromegaly in adults is caused by the overproduction of which hormone?

- A) Thyroxine
- B) Growth hormone
- C) Prolactin
- D) Adrenocorticotrophic hormone

Answer: Growth hormone

10. Which gland produces melatonin?

- A) Pituitary
- B) Thyroid
- C) Pineal
- D) Thymus

Answer: Pineal

11. Cushing's syndrome is associated with excessive secretion of which hormone?

- A) Insulin
- B) Cortisol
- C) Aldosterone
- D) Glucagon

Answer: Cortisol

12. The "fight-or-flight" response is primarily mediated by which hormones?

- A) Insulin and glucagon
- B) Estrogen and progesterone
- C) Epinephrine and norepinephrine
- D) Thyroxine and calcitonin

Answer: Epinephrine and norepinephrine

13. Which hormone directly lowers blood glucose levels?

- A) Glucagon
- B) Cortisol
- C) Growth hormone

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D) Insulin

Answer: Insulin

14. Hyposecretion of thyroid hormones in infants leads to which condition?

- A) Myxedema
- B) Graves' disease
- C) Cretinism
- D) Acromegaly

Answer: Cretinism

15. Which hormone stimulates milk production in the mammary glands?

- A) Oxytocin
- B) Prolactin
- C) Estrogen
- D) Progesterone

Answer: Prolactin

16. The Islets of Langerhans are found in which organ?

- A) Liver
- B) Pancreas
- C) Kidney
- D) Spleen

Answer: Pancreas

17. Which of the following is a function of aldosterone?

- A) Increases blood glucose
- B) Promotes sodium reabsorption
- C) Stimulates uterine contractions
- D) Lowers blood calcium

Answer: Promotes sodium reabsorption

18. Which hormone is released by the adrenal medulla?

- A) Cortisol
- B) Aldosterone
- C) Epinephrine
- D) Testosterone

Answer: Epinephrine

19. A goiter can result from the deficiency of which dietary element?

- A) Calcium
- B) Iodine
- C) Iron
- D) Sodium

Answer: Iodine

20. Which hormone is antagonistic to insulin?

- A) Glucagon
- B) Somatostatin

C) Amylin

D) Gastrin

Answer: Glucagon

21. The hormone responsible for circadian rhythm regulation is:

- A) Melatonin
- B) Serotonin
- C) Dopamine
- D) Cortisol

Answer: Melatonin

22. Which gland atrophies after puberty?

- A) Thyroid
- B) Thymus
- C) Adrenal
- D) Pituitary

Answer: Thymus

23. Addison's disease results from the underproduction of hormones by which gland?

- A) Thyroid
- B) Adrenal cortex
- C) Pancreas
- D) Parathyroid

Answer: Adrenal cortex

24. Which hormone stimulates the synthesis and secretion of thyroid hormones?

- A) TRH
- B) TSH
- C) ACTH
- D) FSH

Answer: TSH

25. Diabetes insipidus is caused by a deficiency of which hormone?

- A) Insulin
- B) Glucagon
- C) ADH
- D) Aldosterone

Answer: ADH

26. The hormone calcitonin is produced by which cells?

- A) Parafollicular cells (C cells)
- B) Beta cells
- C) Alpha cells
- D) Follicular cells

Answer: Parafollicular cells (C cells)

27. Which hormone is primarily involved in the regulation of metabolism?

- A) Thyroxine



- B) Parathyroid hormone
- C) Calcitonin
- D) Erythropoietin

Answer: Thyroxine

28. Luteinizing Hormone (LH) in males stimulates the production of:

- A) Sperm
- B) Testosterone
- C) Seminal fluid
- D) Inhibin

Answer: Testosterone

29. Which hormone is secreted by the heart to regulate blood pressure?

- A) Renin
- B) Atrial natriuretic peptide
- C) Erythropoietin
- D) Angiotensin

Answer: Atrial natriuretic peptide

30. Prolactin inhibiting factor (PIF) is now known to be which neurotransmitter?

- A) Dopamine
- B) Serotonin
- C) Acetylcholine
- D) Norepinephrine

Answer: Dopamine

31. The hormone hCG (human chorionic gonadotropin) is produced by:

- A) Pituitary
- B) Ovary
- C) Placenta
- D) Hypothalamus

Answer: Placenta

32. The hormone responsible for the development of secondary sexual characteristics in females is:

- A) Progesterone
- B) Estrogen
- C) Prolactin
- D) Oxytocin

Answer: Estrogen

33. Which pancreatic cells secrete somatostatin?

- A) Alpha cells
- B) Beta cells
- C) Delta cells
- D) F cells

Answer: Delta cells

34. The hormone that promotes calcium deposition in bones is:

- A) Parathyroid hormone
- B) Calcitonin
- C) Calcitriol
- D) Thyroxine

Answer: Calcitonin

35. Gigantism is caused by hypersecretion of Growth Hormone during:

- A) Adulthood
- B) Childhood
- C) Old age
- D) Puberty

Answer: Childhood

36. The hormone that stimulates erythropoiesis is:

- A) Thrombopoietin
- B) Erythropoietin
- C) Renin
- D) Calcitriol

Answer: Erythropoietin

37. Which hormone is responsible for the let-down reflex during breastfeeding?

- A) Prolactin
- B) Oxytocin
- C) Estrogen
- D) Progesterone

Answer: Oxytocin

38. The primary mineralocorticoid produced by the adrenal cortex is:

- A) Cortisol
- B) Aldosterone
- C) Androstenedione
- D) Corticosterone

Answer: Aldosterone

39. Hypoglycemia can be triggered by an overdose of which hormone?

- A) Glucagon
- B) Insulin
- C) Cortisol
- D) Growth hormone

Answer: Insulin

40. The hormone that inhibits gastric acid secretion is:

- A) Gastrin
- B) Secretin
- C) Cholecystokinin
- D) Ghrelin

Answer: Secretin



Immune System

26. Immune System

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1. The study of immunity and the body's defense mechanisms is called:

- A) Pathology
- B) Immunology
- C) Microbiology
- D) Hematology

Answer: Immunology

2. The first line of defense against microbes includes:

- A) Skin and mucous membranes
- B) Phagocytes and NK cells
- C) Antibodies and T cells
- D) Fever and inflammation

Answer: Skin and mucous membranes

3. The third line of defense is also known as:

- A) Innate immunity
- B) Specific immunity
- C) Nonspecific defense
- D) Physical barrier

Answer: Specific immunity

4. Which of the following is NOT part of the first line of defense?

- A) Stomach acid
- B) Skin keratin
- C) Mucous membrane
- D) Macrophages

Answer: Macrophages

5. The protein that strengthens skin cells and provides resistance to abrasion is:

- A) Collagen
- B) Keratin
- C) Elastin
- D) Melanin

Answer: Keratin

6. Sweat contains an enzyme that breaks down bacterial cell walls called:

- A) Pepsin
- B) Lysozyme
- C) Amylase
- D) Lipase

Answer: Lysozyme

7. The acidic pH of the skin is maintained by secretions from:

- A) Sweat glands
- B) Sebaceous glands

C) Both A and B

D) Salivary glands

Answer: Both A and B

8. In the respiratory tract, mucus and trapped particles are moved by:

- A) Peristalsis
- B) Ciliary action
- C) Diffusion
- D) Active transport

Answer: Ciliary action

9. Which cell is NOT a phagocyte?

- A) Macrophage
- B) Neutrophil
- C) Red blood cell
- D) Dendritic cell

Answer: Red blood cell

10. Natural Killer (NK) cells destroy target cells by releasing:

- A) Histamine
- B) Interferons
- C) Perforins and granzymes
- D) Antibodies

Answer: Perforins and granzymes

11. The complement system kills bacteria by:

- A) Phagocytosis
- B) Forming membrane attack complexes
- C) Neutralizing toxins
- D) Producing antibodies

Answer: Forming membrane attack complexes

12. Interferons are primarily secreted by:

- A) Virus-infected cells
- B) Bacteria
- C) Macrophages
- D) B cells

Answer: Virus-infected cells

13. The inflammatory response is characterized by all EXCEPT:

- A) Heat
- B) Pain
- C) Cyanosis
- D) Swelling

Answer: Cyanosis

14. The chemical released by mast cells during inflammation is:

- A) Interleukin



- B) Histamine
- C) Pyrogen
- D) Interferon

Answer: Histamine

15. Pus is mainly composed of:

- A) Dead bacteria and neutrophils
- B) Live macrophages
- C) Plasma proteins
- D) Red blood cells

Answer: Dead bacteria and neutrophils

16. Fever is triggered by chemicals called:

- A) Cytokines
- B) Pyrogens
- C) Antigens
- D) Antibodies

Answer: Pyrogens

17. Which of the following is a benefit of fever?

- A) Increases microbial reproduction
- B) Reduces phagocyte activity
- C) Lowers interferon production
- D) Inhibits bacterial growth

Answer: Inhibits bacterial growth

18. The cells responsible for adaptive immunity are:

- A) Phagocytes
- B) Lymphocytes
- C) Erythrocytes
- D) Thrombocytes

Answer: Lymphocytes

19. An antigen is best defined as:

- A) A protein that kills pathogens
- B) A foreign molecule that stimulates an immune response
- C) A type of white blood cell
- D) An enzyme in sweat

Answer: A foreign molecule that stimulates an immune response

20. Antibodies are produced by:

- A) T cells
- B) Plasma cells
- C) Macrophages
- D) NK cells

Answer: Plasma cells

21. Which cells mature in the thymus gland?

- A) B cells
- B) T cells
- C) Macrophages

- D) Neutrophils

Answer: T cells

22. The "B" in B cells originally referred to:

- A) Blood
- B) Bone marrow
- C) Bursa of Fabricius
- D) Brain

Answer: Bursa of Fabricius

23. Which of the following is responsible for cell-mediated immunity?

- A) B cells
- B) T cells
- C) NK cells
- D) Macrophages

Answer: T cells

24. Helper T cells are also known as:

- A) CD4+ cells
- B) CD8+ cells
- C) Plasma cells
- D) Memory cells

Answer: CD4+ cells

25. Cytotoxic T cells directly kill:

- A) Free viruses
- B) Bacteria
- C) Virus-infected and cancer cells
- D) Toxins

Answer: Virus-infected and cancer cells

26. Which T cell type helps shut down the immune response?

- A) Helper T cells
- B) Cytotoxic T cells
- C) Suppressor T cells
- D) Memory T cells

Answer: Suppressor T cells

27. Memory cells provide:

- A) Immediate immunity
- B) Long-term immunity
- C) Passive immunity
- D) Non-specific immunity

Answer: Long-term immunity

28. The humoral immune response involves:

- A) T cells
- B) B cells and antibodies
- C) Phagocytes only
- D) NK cells

Answer: B cells and antibodies

Reproduction & Development

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1. Each testis consists of a complex duct system called the:

- A) Ejaculatory duct
- B) Seminiferous tubules
- C) Epididymis
- D) Sperm duct

Answer: Seminiferous tubules

2. Spermatogonia increase in size and differentiate into:

- A) Secondary spermatocyte
- B) Spermatids
- C) Spermatozoa
- D) Primary spermatocyte

Answer: Primary spermatocyte

3. In pregnant infected women, a virus transmitted to the infant during birth can damage eyes and CNS. This is:

- A) Gonorrhoea
- B) Syphilis
- C) Genital Herpes
- D) AIDS

Answer: Genital Herpes

4. Mature sperm are formed from spermatids by the process of:

- A) Meiosis I
- B) Meiosis II
- C) Mitosis
- D) Spermiogenesis (Differentiation)

Answer: Spermiogenesis (Differentiation)

5. During human meiosis and fertilization, which of the following cells is diploid?

- A) Primary spermatocyte, primary oocyte, zygote
- B) Oogonia, spermatids, egg
- C) Secondary oocyte, secondary spermatocyte, second polar body
- D) Secondary polar body, embryo, spermatogonia

Answer: Primary spermatocyte, primary oocyte, zygote

6. How many blood vessels are present in the umbilical cord of the placenta?

- A) Two, one artery & one vein
- B) Three, two arteries & one vein
- C) Three, one artery & two veins
- D) Four, two arteries & two veins

Answer: Three, two arteries & one vein

7. In humans, which meiotic phase has the longest duration?

- A) Anaphase I in females
- B) Prophase I in females
- C) Prophase II in males
- D) Metaphase II in females

Answer: Prophase I in females

8. Which one of the following is part of the male reproductive system only?

- A) Urethra
- B) Bulbourethral gland
- C) Gonads
- D) Urinary bladder

Answer: Bulbourethral gland

9. Between the seminiferous tubules are cells which secrete testosterone. These are:

- A) Sertoli cells
- B) Germ cells
- C) Interstitial (Leydig) cells
- D) Epithelial cells

Answer: Interstitial (Leydig) cells

10. What is the correct trajectory of sperm during ejaculation?

- A) Ejaculatory duct → Epididymis → Vas deferens → Urethra
- B) Epididymis → Ejaculatory duct → Vas deferens → Urethra
- C) Epididymis → Vas deferens → Ejaculatory duct → Urethra
- D) Vas deferens → Ejaculatory duct → Urethra → Epididymis

Answer: Epididymis → Vas deferens → Ejaculatory duct → Urethra

11. Germ cells in the ovary produce:

- A) One oogonium
- B) Many oogonia
- C) Infinite oogonia
- D) Few oogonia

Answer: Many oogonia

12. Oogonia divide mitotically to form:

- A) Secondary oocyte
- B) Primary oocyte
- C) Ovum
- D) Eggs

Answer: Primary oocyte

27. Reproduction & Development



13. These are enclosed in a group of follicle cells:

- A) Oogonia
- B) Primary oocyte
- C) Secondary oocyte
- D) Ova

Answer: Primary oocyte

14. After ovulation, the ovum is transferred to the:

- A) Uterus
- B) Cervix
- C) Sperm duct
- D) Oviduct (Fallopian tube)

Answer: Oviduct (Fallopian tube)

15. Both the ovarian cycle and uterine cycle are regulated by pituitary hormones called:

- A) Somatotrophins
- B) Thyrotrophins
- C) Gonadotrophins
- D) Corticotrophins

Answer: Gonadotrophins

16. Spermiogenesis specifically refers to:

- A) A process happening in the sperm duct
- B) The shedding of unnecessary cytoplasm from spermatids
- C) The process of meiosis in males
- D) Selection of spermatogonia

Answer: The shedding of unnecessary cytoplasm from spermatids

17. The uterine tube (oviduct) opens into the:

- A) Uterus
- B) Cervix
- C) Vagina
- D) Ovary

Answer: Uterus

18. Fertilization of the ovum typically takes place in the:

- A) Proximal part (ampulla) of the oviduct
- B) Proximal part of the ovary
- C) Distal part of the oviduct
- D) Distal part of the ovary

Answer: Proximal part (ampulla) of the oviduct

19. It enters the uterus where it is implanted:

- A) Zygote
- B) Fertilizing ovum
- C) Unfertilized ovum
- D) Fertilized ovum (Blastocyst)

Answer: Fertilized ovum (Blastocyst)

20. Which hormonal change is directly linked with menstruation (onset of the menstrual period)?

- A) Increase secretion of progesterone by Corpus luteum
- B) Decrease in levels of progesterone and estrogen
- C) Increased level of follicle stimulating hormone and LH
- D) Increased secretion of estrogen

Answer: Decrease in levels of progesterone and estrogen

21. The urethra and vagina have what kind of openings to the exterior?

- A) Independent
- B) Common
- C) Homologous
- D) Multiple

Answer: Independent

22. How many chromatids and chromosomes are present in a human secondary spermatocyte?

- A) 46 chromatids, 46 chromosomes
- B) 23 chromatids, 23 chromosomes
- C) 92 chromatids, 46 chromosomes
- D) 46 chromatids, 23 chromosomes

Answer: 46 chromatids, 23 chromosomes

23. The events that involve both the ovarian cycle and uterine cycle are collectively called the:

- A) Life cycle
- B) Menstrual cycle
- C) Estrous cycle
- D) Uterine cycle

Answer: Menstrual cycle

24. This hormone stimulates the development of several primary follicles in the ovary:

- A) LH
- B) FSH
- C) ICSH
- D) GH

Answer: FSH

25. This hormone stimulates the endometrium and promotes its vascularization:

- A) LH
- B) FSH
- C) Estrogen
- D) Progesterone

Answer: Estrogen

26. This hormone inhibits FSH secretion but stimulates LH secretion:



- A) Progesterone
- B) Luteotropic Hormone (LTH)
- C) Estrogen
- D) Prolactin

Answer: Estrogen

27. Which hormone is most consistently and positively correlated with the thickening and secretory development of the endometrium?

- A) FSH
- B) LH
- C) Estrogen
- D) Progesterone

Answer: Progesterone

28. Which structures are responsible for maintaining levels of progesterone earlier and later in pregnancy?

- A) Placenta earlier and ovaries later
- B) Placenta earlier and umbilical cord later
- C) Corpus luteum earlier and Placenta later
- D) Uterus earlier and ovaries later

Answer: Corpus luteum earlier and Placenta later

29. If fertilization does not occur, this structure starts degenerating:

- A) Corpus luteum
- B) Follicle
- C) Ovary
- D) Uterus

Answer: Corpus luteum

30. Ovulation coincides with the period of:

- A) Menstruation
- B) Conception
- C) Thickening of uterine walls (proliferative phase end)
- D) Fertilization

Answer: Thickening of uterine walls (proliferative phase end)

31. In a human female, the periodic reproductive (menstrual) cycle is completed in approximately:

- A) 30 days
- B) 27 days
- C) 28 days
- D) 29 days

Answer: 28 days

32. A direct result of an enzymatic deficiency in the sperm's acrosome would be:

- A) The egg would not complete metaphase II
- B) The primary spermatocyte would not become

secondary spermatocyte

- C) Implantation may occur in the uterine tube
- D) The sperm would be unable to penetrate the zona pellucida

Answer: The sperm would be unable to penetrate the zona pellucida

33. This sexually transmitted infection can harm the eyes of infants during birth:

- A) Gonorrhea
- B) Syphilis
- C) Genital herpes
- D) Gonorrhea and genital herpes

Answer: Gonorrhea and genital herpes

34. It is caused by the spirochete Treponema pallidum:

- A) Syphilis
- B) AIDS
- C) Genital Herpes
- D) Gonorrhea

Answer: Syphilis

35. Which one of the following is caused by a retrovirus?

- A) AIDS
- B) Gonorrhea
- C) Syphilis
- D) Genital herpes

Answer: AIDS

36. During pregnancy, hormones maintain the uterine lining. What event would likely lead to miscarriage?

- A) Increasing level of estrogen
- B) Stimulation of progesterone secretory tissues
- C) Decreasing levels of Oxytocin
- D) Early degeneration of the Corpus luteum

Answer: Early degeneration of the Corpus luteum

37. Maximum thickening of the uterine wall occurs during which phase?

- A) Menstruation phase
- B) Proliferative phase
- C) Secretory (Luteal) phase
- D) Ovulation phase

Answer: Secretory (Luteal) phase

38. The outermost cellular layer surrounding a newly ovulated ovum is the:

- A) Zona pellucida
- B) Corona radiata
- C) Chorionallantois

Behaviour

1. Ethology is best defined as the scientific study of:

- A) Human psychology in laboratory settings.
- B) Animal behavior, particularly under natural conditions.
- C) The genetic basis of all behaviors.
- D) Learned behaviors only.

Answer: Animal behavior, particularly under natural conditions.

2. The 1973 Nobel Prize in Physiology or Medicine was awarded to ethologists for pioneering work in animal behavior; who among the following was NOT a recipient?

- A) Karl von Frisch
- B) Konrad Lorenz
- C) Niko Tinbergen
- D) E.O. Wilson

Answer: E.O. Wilson

3. Questions about the immediate mechanistic causes of a behavior, such as hormonal triggers, address its:

- A) Ultimate causation.
- B) Phylogenetic history.
- C) Proximate causation.
- D) Adaptive significance.

Answer: Proximate causation.

4. The egg-retrieval behavior of a greylag goose, once initiated, continues to completion even if the egg is removed. This is an example of a:

- A) Conditioned reflex.
- B) Fixed action pattern.
- C) Habituated response.
- D) Cognitive map.

Answer: Fixed action pattern.

5. In classical ethology, a simple environmental stimulus that triggers a fixed action pattern is called a:

- A) Conditioned stimulus.
- B) Reinforcer.
- C) Sign stimulus or releaser.
- D) Cognitive signal.

Answer: Sign stimulus or releaser.

6. A male stickleback fish aggressively attacks any model with a red underside, even if it doesn't resemble a fish. This demonstrates the role of a:

- A) Pheromone.
- B) Sign stimulus.
- C) Imprinting cue.
- D) Dominance display.

Answer: Sign stimulus.

7. Behavioral ecology primarily focuses on the study of:

- A) Neural circuits controlling behavior.
- B) The adaptive value and evolutionary history of behavior.
- C) Learning in controlled laboratory settings.
- D) Genetic sequences coding for behavioral traits.

Answer: The adaptive value and evolutionary history of behavior.

8. A suite of correlated behaviors that show consistency across different situations in individuals is termed a:

- A) Fixed action pattern.
- B) Behavioral syndrome.
- C) Cognitive bias.
- D) Ritualized display.

Answer: Behavioral syndrome.

9. The rover and sitter foraging types in *Drosophila melanogaster* larvae are an example of behavioral variation caused by:

- A) Environmental conditioning only.
- B) Alternative alleles at a single gene locus.
- C) Imprinting during a critical period.
- D) Random mutation with no heritability.

Answer: Alternative alleles at a single gene locus.

10. Hygienic behavior in honeybees, involving uncapping cells and removing diseased larvae, is controlled by:

- A) One dominant gene.
- B) Two independently assorting recessive genes.
- C) Queen pheromones only.
- D) Environmental temperature.

Answer: Two independently assorting recessive genes.

11. When hybrid lovebirds show intermediate and poorly executed nest-building techniques compared to their parents, it suggests the behavior has a:

- A) Strong learned component.
- B) Simple Mendelian genetic basis.



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- C) Polygenic and partially genetic basis.
- D) Solely environmental cause.

Answer: Polygenic and partially genetic basis.

12. A decrease in the gill-withdrawal reflex of Aplysia after repeated harmless touch of its siphon is an example of:

- A) Sensitization.
- B) Classical conditioning.
- C) Habituation.
- D) Imprinting.

Answer: Habituation.

13. If a noxious stimulus to the head of Aplysia causes an enhanced gill-withdrawal response to a subsequent siphon touch, this demonstrates:

- A) Operant conditioning.
- B) Sensitization.
- C) Latent learning.
- D) Insight learning.

Answer: Sensitization.

14. The formation of a persistent social attachment during a limited critical period early in life is known as:

- A) Conditioning.
- B) Imprinting.
- C) Habituation.
- D) Insight learning.

Answer: Imprinting.

15. In white-crowned sparrows, normal song development requires:

- A) Only a genetic template.
- B) Exposure to the species-specific song during a critical period.
- C) Learning from any bird species' song.
- D) Visual imprinting on the father.

Answer: Exposure to the species-specific song during a critical period.

16. A major advantage of social living for animals is:

- A) Increased competition for all resources.
- B) Reduced individual predation risk through group vigilance.
- C) Guaranteed reproductive success for all members.
- D) Elimination of the need for communication.

Answer: Reduced individual predation risk through group vigilance.

17. Ritualized aggressive encounters that establish dominance without serious injury are favored by

selection because they:

- A) Prolong conflict and waste energy.
- B) Reduce the costs of fighting for both winner and loser.
- C) Ensure only the strongest genes are passed on by killing the weak.
- D) Are more unpredictable and challenging.

Answer: Reduce the costs of fighting for both winner and loser.

18. A stable, linear hierarchy within a social group that reduces constant fighting over resources is called a:

- A) Territorial system.
- B) Dominance hierarchy or peck order.
- C) Lek.
- D) Cooperative alliance.

Answer: Dominance hierarchy or peck order.

19. An area that is actively defended against intruders of the same species to secure exclusive access to resources is a:

- A) Home range.
- B) Territory.
- C) Lek.
- D) Colony.

Answer: Territory.

20. The total area an individual uses in its daily activities, which may overlap with others', is its:

- A) Territory.
- B) Home range.
- C) Dominance zone.
- D) Foraging circuit.

Answer: Home range.

21. A mating system where one male pairs with one female each breeding season is:

- A) Polygyny.
- B) Polyandry.
- C) Monogamy.
- D) Promiscuity.

Answer: Monogamy.

22. When one male mates with multiple females in a breeding season, the system is termed:

- A) Polyandry.
- B) Monogamy.
- C) Polygyny.
- D) Polygynandry.

Answer: Polygyny.

Biological Membranes

30. Biological Membranes

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1. Which component of the plasma membrane is primarily responsible for its selective permeability barrier?

- A) Cholesterol
- B) Integral proteins
- C) Phospholipid bilayer
- D) Carbohydrate chains

Answer: Phospholipid bilayer

2. According to the fluid mosaic model, membrane proteins are:

- A) Stationary within the bilayer
- B) Embedded and able to move laterally
- C) Only present on the cytoplasmic side
- D) Covalently bound to phospholipids

Answer: Embedded and able to move laterally

3. What property of phospholipid tails increases membrane fluidity at lower temperatures?

- A) Saturation
- B) Longer length
- C) Unsaturation (kinks)
- D) Positive charge

Answer: Unsaturation (kinks)

4. Cholesterol in animal cell membranes acts primarily to:

- A) Increase fluidity at high temperatures
- B) Decrease fluidity at all temperatures
- C) Buffer membrane fluidity against temperature changes
- D) Facilitate active transport

Answer: Buffer membrane fluidity against temperature changes

5. Which type of membrane protein extends completely through the lipid bilayer?

- A) Peripheral protein
- B) Glycoprotein
- C) Transmembrane protein
- D) Lipid-anchored protein

Answer: Transmembrane protein

6. The asymmetric distribution of proteins and lipids in membrane leaflets is established during:

- A) Translation
- B) Membrane synthesis in the ER and Golgi
- C) Phospholipid flip-flop

D) Facilitated diffusion

Answer: Membrane synthesis in the ER and Golgi

7. Which membrane protein function involves relaying a message to the cell interior after binding a signaling molecule?

- A) Transport
- B) Enzymatic activity
- C) Signal transduction
- D) Cell-cell recognition

Answer: Signal transduction

8. The movement of a substance across a membrane down its concentration gradient without energy expenditure is:

- A) Active transport
- B) Facilitated diffusion
- C) Osmosis
- D) Both B and C

Answer: Both B and C

9. Small, nonpolar molecules like O₂ and CO₂ cross the membrane via:

- A) Channel proteins
- B) Carrier proteins
- C) Simple diffusion through the lipid bilayer
- D) Active transport

Answer: Simple diffusion through the lipid bilayer

10. What is the net movement of water across a selectively permeable membrane from a region of low solute concentration to high solute concentration called?

- A) Active transport
- B) Facilitated diffusion
- C) Osmosis
- D) Plasmolysis

Answer: Osmosis

11. A cell placed in a hypertonic solution will:

- A) Swell and possibly lyse
- B) Shrink and shrivel
- C) Show no net water movement
- D) Become turgid

Answer: Shrink and shrivel

12. Facilitated diffusion differs from simple diffusion in that it:

- A) Requires energy from ATP
- B) Moves substances against their gradient



- C) Involves specific transport proteins
- D) Is only for water transport

Answer: Involves specific transport proteins

13. Aquaporins are channel proteins that specifically facilitate the transport of:

- A) Glucose
- B) Sodium ions
- C) Water
- D) Potassium ions

Answer: Water

14. The sodium-potassium pump is an example of:

- A) Facilitated diffusion
- B) Cotransport
- C) Active transport
- D) Osmosis

Answer: Active transport

15. The Na⁺/K⁺ pump moves:

- A) 2 Na⁺ in, 3 K⁺ out
- B) 3 Na⁺ in, 2 K⁺ out
- C) 2 Na⁺ out, 3 K⁺ in
- D) 3 Na⁺ out, 2 K⁺ in

Answer: 3 Na⁺ out, 2 K⁺ in

16. Which energy source directly powers the sodium-potassium pump?

- A) The Na⁺ concentration gradient
- B) The K⁺ concentration gradient
- C) ATP hydrolysis
- D) Proton motive force

Answer: ATP hydrolysis

17. The combined force of a concentration gradient and an electrical charge difference is called a(n):

- A) Tonicity gradient
- B) Electrochemical gradient
- C) Osmotic potential
- D) Action potential

Answer: Electrochemical gradient

18. A transport protein that moves two different solutes in the same direction is a:

- A) Uniporter
- B) Antiporter
- C) Symporter
- D) Voltage-gated channel

Answer: Symporter

19. In cotransport, the movement of one solute down its gradient provides energy to move another solute:

- A) Down its gradient
- B) Against its gradient
- C) Out of the cell
- D) Via simple diffusion

Answer: Against its gradient

20. The process by which a cell secretes large molecules by vesicle fusion with the plasma membrane is:

- A) Endocytosis
- B) Exocytosis
- C) Phagocytosis
- D) Pinocytosis

Answer: Exocytosis

21. Which form of endocytosis is specifically used for taking in dissolved fluids and solutes?

- A) Phagocytosis
- B) Pinocytosis
- C) Receptor-mediated endocytosis
- D) Exocytosis

Answer: Pinocytosis

22. Receptor-mediated endocytosis often involves coated pits containing which protein?

- A) Cadherin
- B) Connexin
- C) Clathrin
- D) Integrin

Answer: Clathrin

23. Tight junctions between animal cells primarily function to:

- A) Allow passage of ions
- B) Prevent leakage between cells
- C) Provide strong mechanical attachment
- D) Facilitate cell communication

Answer: Prevent leakage between cells

24. Channels that allow direct cytoplasmic communication between adjacent animal cells are:

- A) Tight junctions
- B) Desmosomes
- C) Gap junctions
- D) Plasmodesmata

Answer: Gap junctions

25. The primary structural polysaccharide in plant cell walls is:

- A) Starch
- B) Glycogen
- C) Cellulose



D) Chitin

Answer: Cellulose

26. Starch and glycogen are both polymers of:

- A) Fructose
- B) Galactose
- C) Alpha-glucose
- D) Beta-glucose

Answer: Alpha-glucose

27. The difference between starch and cellulose lies in the:

- A) Type of glycosidic linkage
- B) Monomer used
- C) Presence of branching
- D) Function in plants

Answer: Type of glycosidic linkage

28. Which carbohydrate is a major component of arthropod exoskeletons and fungal cell walls?

- A) Cellulose
- B) Starch
- C) Chitin
- D) Glycogen

Answer: Chitin

29. A nucleotide consists of all the following except:

- A) A nitrogenous base
- B) A pentose sugar
- C) A phosphate group
- D) A fatty acid chain

Answer: A fatty acid chain

30. In DNA, adenine always pairs with:

- A) Cytosine
- B) Guanine
- C) Thymine
- D) Uracil

Answer: Thymine

31. The difference between deoxyribose and ribose is:

- A) An extra oxygen on ribose at the 2' carbon
- B) An extra oxygen on deoxyribose at the 3' carbon
- C) Ribose is a hexose sugar
- D) Deoxyribose has a phosphate group

Answer: An extra oxygen on ribose at the 2' carbon

32. Which type of RNA carries the genetic code from DNA to the ribosome?

- A) tRNA
- B) rRNA

C) mRNA

D) snRNA

Answer: mRNA

33. ATP is considered a high-energy molecule because of its:

- A) Stable phosphate bonds
- B) High-energy phosphate bonds
- C) Adenine base
- D) Ribose sugar

Answer: High-energy phosphate bonds

34. The primary structure of a protein refers to its:

- A) Three-dimensional folding
- B) Amino acid sequence
- C) Alpha-helix formation
- D) Association of multiple subunits

Answer: Amino acid sequence

35. Alpha helices and beta pleated sheets are examples of protein:

- A) Primary structure
- B) Secondary structure
- C) Tertiary structure
- D) Quaternary structure

Answer: Secondary structure

36. The final three-dimensional shape of a single polypeptide chain is its:

- A) Primary structure
- B) Secondary structure
- C) Tertiary structure
- D) Quaternary structure

Answer: Tertiary structure

37. Disulfide bridges contribute to a protein's structure by forming:

- A) Hydrogen bonds
- B) Ionic bonds
- C) Covalent bonds between cysteine residues
- D) Hydrophobic interactions

Answer: Covalent bonds between cysteine residues

38. Chaperone proteins assist in the:

- A) Denaturation of proteins
- B) Proper folding of proteins
- C) Active transport of ions
- D) Synthesis of DNA

Answer: Proper folding of proteins

39. Denaturation of a protein results in the loss of its:



Cell Division

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1: The period between two consecutive cell divisions is called?

- A) Interphase
- B) Resting phase
- C) Mitotic phase
- D) Cell cycle

Answer: Cell cycle

2: Which phase of the cell cycle is also misleadingly called the resting phase?

- A) Mitotic phase
- B) Cytokinesis
- C) Interphase
- D) M phase

Answer: Interphase

3: During which phase does the cell normally grow in size and synthesize specific enzymes?

- A) S phase
- B) G2 phase
- C) G1 phase
- D) M phase

Answer: G1 phase

4: The phase in which DNA is synthesized and chromosomes are replicated is called?

- A) G1 phase
- B) G2 phase
- C) S phase
- D) G0 phase

Answer: S phase

5: Which phase precedes mitosis and involves final preparation for cell division?

- A) G1 phase
- B) S phase
- C) G2 phase
- D) Cytokinesis

Answer: G2 phase

6: Cells that exit the cell cycle and remain for days or years without proliferating enter which phase?

- A) S phase
- B) M phase
- C) G0 phase
- D) G2 phase

Answer: G0 phase

7: In a typical human cell cycle of 24 hours, approximately how long does mitosis take?

- A) 9 hours

- B) 10 hours

- C) 4.5 hours

- D) 30 minutes

Answer: 30 minutes

8: Which phase of the human cell cycle takes approximately 10-12 hours?

- A) G1 phase

- B) S phase

- C) G2 phase

- D) M phase

Answer: S phase

9: The complete cell cycle in yeast cells takes approximately?

- A) 24 hours

- B) 90 minutes

- C) 30 minutes

- D) 10 hours

Answer: 90 minutes

10: Which type of cell division ensures that daughter cells have the same number of chromosomes as the parent cell?

- A) Meiosis

- B) Mitosis

- C) Binary fission

- D) Amitosis

Answer: Mitosis

11: Meiosis results in the production of how many daughter cells from one parent cell?

- A) Two

- B) Four

- C) Eight

- D) Sixteen

Answer: Four

12: The term mitosis was coined by which German biologist?

- A) Gregor Mendel

- B) Walther Flemming

- C) Oscar Hertwig

- D) Theodor Boveri

Answer: Walther Flemming

13: Meiosis was discovered in 1876 by which German biologist?

- A) Walther Flemming

- B) Gregor Mendel

- C) Oscar Hertwig

31. Cell Division



D) Walter Sutton

Answer: Oscar Hertwig

14: The division of the nucleus is technically called?

- A) Cytokinesis
- B) Karyokinesis
- C) Meiosis
- D) Mitosis

Answer: Karyokinesis

15: The division of the cytoplasm to form two daughter cells is called?

- A) Karyokinesis
- B) Mitosis
- C) Cytokinesis
- D) Meiosis

Answer: Cytokinesis

16: Which proteins are responsible for holding sister chromatids together?

- A) Condensins
- B) Histones
- C) Cohesins
- D) Tubulins

Answer: Cohesins

17: The protein complex that physically links sister chromatids is called?

- A) Kinetochore
- B) Cohesin
- C) Centromere
- D) Chiasma

Answer: Cohesin

18: In which phase of the cell cycle does the replication of DNA occur?

- A) G1 phase
- B) G2 phase
- C) S phase
- D) M phase

Answer: S phase

19: The period between the end of mitosis and the beginning of S phase is called?

- A) G2 phase
- B) M phase
- C) G1 phase
- D) Cytokinesis

Answer: G1 phase

20: Which stage of mitosis is characterized by the condensation of chromatin into visible chromosomes?

- A) Metaphase
- B) Anaphase
- C) Telophase
- D) Prophase

Answer: Prophase

21: During prophase, each chromosome is visible as having two sister chromatids attached at the?

- A) Kinetochore
- B) Centromere
- C) Telomere
- D) Centriole

Answer: Centromere

22: The structure that attaches to spindle fibers during cell division is called?

- A) Centromere
- B) Kinetochore
- C) Chromatid
- D) Centriole

Answer: Kinetochore

23: During which stage do chromosomes line up at the equator of the spindle?

- A) Prophase
- B) Metaphase
- C) Anaphase
- D) Telophase

Answer: Metaphase

24: The imaginary plane on which chromosomes align during metaphase is called?

- A) Equatorial plate
- B) Cell plate
- C) Cleavage furrow
- D) Metaphase plate

Answer: Metaphase plate

25: During which phase do sister chromatids separate and move to opposite poles?

- A) Prophase
- B) Metaphase
- C) Anaphase
- D) Telophase

Answer: Anaphase

26: Which phase of mitosis is considered the shortest and most critical for equal distribution of chromatids?

- A) Prophase
- B) Metaphase
- C) Anaphase

Cell Communication

1. What are the three main stages of cell signaling according to Sutherland's research on epinephrine?

- A) Signal initiation, propagation, termination
- B) Signal release, diffusion, reception
- C) Signal reception, transduction, response
- D) Signal amplification, relay, integration

Answer: Signal reception, transduction, response

2. In bacterial quorum sensing, what behavior is coordinated when cells reach a critical density?

- A) Sporulation
- B) Biofilm formation
- C) Binary fission
- D) Flagellar rotation

Answer: Biofilm formation

3. Which type of signaling involves a nerve cell releasing neurotransmitters into a synapse?

- A) Paracrine signaling
- B) Autocrine signaling
- C) Endocrine signaling
- D) Synaptic signaling

Answer: Synaptic signaling

4. What is the term for a molecule that specifically binds to a receptor protein?

- A) Substrate
- B) Ligand
- C) Kinase
- D) Second messenger

Answer: Ligand

5. G protein-coupled receptors (GPCRs) typically have how many transmembrane alpha helices?

- A) One
- B) Three
- C) Five
- D) Seven

Answer: Seven

6. What is the immediate result when a signaling molecule binds to a receptor tyrosine kinase (RTK)?

- A) Activation of adenylyl cyclase
- B) Dimerization and autophosphorylation
- C) Opening of an ion channel
- D) Direct gene activation

Answer: Dimerization and autophosphorylation

7. Which second messenger is produced directly from ATP by the enzyme adenylyl cyclase?

- A) IP₃
- B) DAG
- C) cAMP
- D) Ca²⁺

Answer: cAMP

8. What is the primary role of protein phosphatases in signal transduction pathways?

- A) To amplify the signal
- B) To terminate the signal by dephosphorylation
- C) To act as transcription factors
- D) To synthesize second messengers

Answer: To terminate the signal by dephosphorylation

9. Where are the receptors for steroid hormones such as cortisol typically located?

- A) On the plasma membrane
- B) In the cytosol or nucleus
- C) In the mitochondrial membrane
- D) On the endoplasmic reticulum

Answer: In the cytosol or nucleus

10. What is the function of the Ras protein in signal transduction?

- A) It is a second messenger
- B) It acts as a molecular switch (G protein) linking RTKs to MAPK cascade
- C) It phosphorylates tyrosine residues
- D) It hydrolyzes cAMP to AMP

Answer: It acts as a molecular switch (G protein) linking RTKs to MAPK cascade

11. Which enzyme is responsible for inactivating cyclic AMP (cAMP)?

- A) Adenylyl cyclase
- B) Phospholipase C
- C) Protein kinase A
- D) Phosphodiesterase

Answer: Phosphodiesterase

12. In the context of cell signaling, what does IP₃ (inositol trisphosphate) trigger the release of?

- A) cAMP
- B) Diacylglycerol (DAG)
- C) Calcium ions from the ER
- D) Sodium ions into the cell

Answer: Calcium ions from the ER



13. What is a key characteristic of apoptosis?

- A) Cell swelling and lysis
- B) Orderly fragmentation of DNA and cell components
- C) Uncontrolled cell division
- D) Increased metabolic activity

Answer: Orderly fragmentation of DNA and cell components

14. Which type of receptor directly allows ions to flow across the membrane upon ligand binding?

- A) G protein-coupled receptor
- B) Receptor tyrosine kinase
- C) Intracellular receptor
- D) Ligand-gated ion channel

Answer: Ligand-gated ion channel

15. What is the role of scaffolding proteins in signal transduction?

- A) To degrade second messengers
- B) To organize signaling molecules into efficient complexes
- C) To synthesize ligands
- D) To block receptor activation

Answer: To organize signaling molecules into efficient complexes

16. The cholera toxin causes disease by permanently activating which component of a signaling pathway?

- A) Receptor tyrosine kinase
- B) Adenylyl cyclase via G protein
- C) Phosphodiesterase
- D) Protein phosphatase

Answer: Adenylyl cyclase via G protein

17. Which signaling molecule is a gas that can diffuse across membranes and activate intracellular guanylyl cyclase?

- A) Nitric oxide (NO)
- B) Epinephrine
- C) Insulin
- D) Histamine

Answer: Nitric oxide (NO)

18. What is the term for the phenomenon where a cell increases the number of its receptors in response to low hormone levels?

- A) Receptor down-regulation
- B) Receptor desensitization
- C) Receptor up-regulation

D) Receptor inactivation

Answer: Receptor up-regulation

19. In the MAP kinase cascade, what does MAP stand for?

- A) Microtubule-Associated Protein
- B) Mitogen-Activated Protein
- C) Membrane-Anchored Phosphatase
- D) Messenger Amplification Pathway

Answer: Mitogen-Activated Protein

20. What type of signaling occurs when a cell secretes a signal that binds to receptors on its own surface?

- A) Paracrine
- B) Autocrine
- C) Endocrine
- D) Juxtacrine

Answer: Autocrine

21. Which plant hormone is a gas that promotes fruit ripening?

- A) Auxin
- B) Gibberellin
- C) Abscisic acid
- D) Ethylene

Answer: Ethylene

22. What is the primary cellular response triggered by the binding of epinephrine to liver cells?

- A) Cell division
- B) Glycogen synthesis
- C) Glycogen breakdown
- D) Protein synthesis

Answer: Glycogen breakdown

23. Which protein, when mutated, is commonly found in many human cancers and is a small GTPase?

- A) p53
- B) Ras
- C) Rb
- D) Myc

Answer: Ras

24. What is the function of calmodulin when bound to calcium ions?

- A) It acts as a kinase
- B) It activates various enzymes like protein kinases
- C) It degrades second messengers
- D) It opens ion channels in the plasma membrane

Biological Molecules

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1. What is the name for the process by which cells make polymers from monomers?

- A) Hydrolysis
- B) Condensation reaction
- C) Dehydration synthesis
- D) Both B and C

Answer: Both B and C

2. Which type of bond is broken during the hydrolysis of a carbohydrate?

- A) Peptide bond
- B) Ester linkage
- C) Glycosidic linkage
- D) Phosphodiester bond

Answer: Glycosidic linkage

3. A fat molecule is composed of which two subunits?

- A) Glycerol and fatty acids
- B) Glycerol and phosphate
- C) Amino acids and fatty acids
- D) Nucleotides and glycerol

Answer: Glycerol and fatty acids

4. Which level of protein structure refers to the linear sequence of amino acids?

- A) Primary structure
- B) Secondary structure
- C) Tertiary structure
- D) Quaternary structure

Answer: Primary structure

5. In a DNA molecule, adenine (A) always pairs with which base?

- A) Guanine (G)
- B) Cytosine (C)
- C) Thymine (T)
- D) Uracil (U)

Answer: Thymine (T)

6. Which polysaccharide is the primary energy storage molecule in animals?

- A) Starch
- B) Cellulose
- C) Glycogen
- D) Chitin

Answer: Glycogen

7. What type of reaction is used to break down a polymer into its monomers?

- A) Condensation

B) Dehydration

C) Hydrolysis

D) Esterification

Answer: Hydrolysis

8. The α helix and β pleated sheet are examples of which level of protein structure?

- A) Primary
- B) Secondary
- C) Tertiary
- D) Quaternary

Answer: Secondary

9. Which functional group is characteristic of all amino acids?

- A) Hydroxyl group (-OH)
- B) Carbonyl group (C=O)
- C) Amino group (-NH₂) and carboxyl group (-COOH)
- D) Phosphate group (-PO₄)

Answer: Amino group (-NH₂) and carboxyl group (-COOH)

10. Which of the following is a polysaccharide found in the exoskeleton of arthropods?

- A) Starch
- B) Glycogen
- C) Cellulose
- D) Chitin

Answer: Chitin

11. The bond that joins two amino acids together is called a:

- A) Glycosidic bond
- B) Ester bond
- C) Peptide bond
- D) Phosphodiester bond

Answer: Peptide bond

12. Which of the following is NOT a major class of biological macromolecules?

- A) Carbohydrates
- B) Lipids
- C) Nucleic acids
- D) Nucleotides

Answer: Nucleotides

13. Sucrose, or table sugar, is a disaccharide composed of which two monosaccharides?

- A) Glucose and glucose
- B) Glucose and galactose

33. Biological Molecules

- C) Glucose and fructose
D) Galactose and fructose

Answer: Glucose and fructose

I can continue generating questions 14 through 250 in the same bolded format if you wish. Would you like me to proceed with the full paper?

also bold answers like questions in each question then make 250 mcqs

We need to produce 250 MCQs from the given biological molecules chapters. The user wants each question statement bolded, and the answer line bolded as well. Options remain unbolded. Also ensure uniqueness, exam-relevant, conceptual. I will generate the full set of 250 MCQs covering carbohydrates, proteins, lipids, nucleic acids, water properties, bonds, etc. I'll proceed sequentially. Below are 250 unique, exam-relevant MCQs based on the provided files. Each question statement and the answer line are bolded; options remain unbolded.

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D) Quaternary
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D) Phosphate group (-PO₄)

Answer: Amino group (-NH₂) and carboxyl group (-COOH)

10. Which of the following is a polysaccharide found in the exoskeleton of arthropods?

- A) Starch
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C) Cellulose
D) Chitin
Answer: Chitin

11. The bond that joins two amino acids together is called a:

- A) Glycosidic bond



Cellular Respiration

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1. What is the primary biological function of cellular respiration?

- A) To synthesize glucose from carbon dioxide and water
- B) To break down oxygen into water and energy
- C) To oxidize organic molecules and capture energy as ATP
- D) To reduce NAD⁺ to NADH for anabolic reactions

Answer: To oxidize organic molecules and capture energy as ATP

2. Which statement correctly describes the overall chemical equation of aerobic respiration?

- A) $C_6H_{12}O_6 + 6CO_2 \rightarrow 6O_2 + 6H_2O + ATP$
- B) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{Energy (ATP + heat)}$
- C) $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$
- D) $C_6H_{12}O_6 + 6H_2O \rightarrow 6CO_2 + 6O_2 + ATP$

Answer: $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{Energy (ATP + heat)}$

3. In cellular respiration, what happens to glucose?

- A) It is reduced to water
- B) It is oxidized to carbon dioxide
- C) It is converted into oxygen
- D) It remains unchanged in energy content

Answer: It is oxidized to carbon dioxide

4. Which molecule is the final electron acceptor in aerobic respiration?

- A) NAD⁺
- B) Water
- C) Carbon dioxide
- D) Oxygen

Answer: Oxygen

5. What is the approximate standard free-energy change (ΔG) for the complete oxidation of one mole of glucose?

- A) -7.3 kcal/mol
- B) -30.5 kcal/mol
- C) -686 kcal/mol
- D) +686 kcal/mol

Answer: -686 kcal/mol

6. Which of the following is a dehydrogenation reaction?

- A) Removal of a water molecule from a substrate
- B) Addition of a phosphate group to ADP

C) Removal of hydrogen atoms (electrons and protons) from a molecule

D) Addition of carbon dioxide to a molecule

Answer: Removal of hydrogen atoms (electrons and protons) from a molecule

7. What is the role of NAD⁺ in cellular respiration?

- A) It acts as a final electron acceptor in the electron transport chain
- B) It functions as a mobile electron carrier, becoming reduced to NADH
- C) It directly phosphorylates ADP to form ATP
- D) It is a structural component of the mitochondrial membrane

Answer: It functions as a mobile electron carrier, becoming reduced to NADH

8. Which form of NAD⁺ is correctly matched with its electron/hydrogen status?

- A) NAD⁺ is reduced; NADH is oxidized
- B) NAD⁺ is the reduced form; NADH is the oxidized form
- C) NAD⁺ is the electron donor; NADH is the electron acceptor
- D) NAD⁺ is oxidized; NADH is reduced

Answer: NAD⁺ is oxidized; NADH is reduced

9. What does FAD become when it accepts two electrons and two protons?

- A) FADH
- B) FADH₂
- C) FAD⁺
- D) FAD²⁻

Answer: FADH₂

10. Which coenzyme feeds electrons into the electron transport chain at a lower energy level than NADH?

- A) FMN
- B) Coenzyme A
- C) FADH₂
- D) NADPH

Answer: FADH₂

11. Approximately how many ATP molecules are generated per NADH during oxidative phosphorylation using modern P/O ratios?

- A) 1.5
- B) 2.5

34. Cellular Respiration

C) 3.0

D) 4.0

Answer: 2.5

12. Approximately how many ATP molecules are generated per FADH₂ during oxidative phosphorylation?

A) 1.5

B) 2.5

C) 3.0

D) 4.0

Answer: 1.5

13. What is the primary purpose of ATP in cellular metabolism?

A) Long-term energy storage in adipose tissue

B) Immediate energy transfer to drive endergonic reactions

C) Structural integrity of cell membranes

D) Genetic information storage

Answer: Immediate energy transfer to drive endergonic reactions

14. Which mechanism of ATP synthesis involves the direct transfer of a phosphate group from a substrate to ADP?

A) Oxidative phosphorylation

B) Photophosphorylation

C) Substrate-level phosphorylation

D) Decarboxylation phosphorylation

Answer: Substrate-level phosphorylation

15. Where does glycolysis occur in a eukaryotic cell?

A) Mitochondrial matrix

B) Inner mitochondrial membrane

C) Cytosol

D) Nucleus

Answer: Cytosol

16. What is the net yield of ATP from glycolysis per molecule of glucose?

A) 1 ATP

B) 2 ATP

C) 4 ATP

D) 8 ATP

Answer: 2 ATP

17. How many NADH molecules are produced per glucose during glycolysis?

A) 1

B) 2

C) 3

D) 4

Answer: 2

18. Which enzyme catalyzes the committing step of glycolysis and is a major regulatory point?

A) Hexokinase

B) Phosphoglucose isomerase

C) Phosphofructokinase-1 (PFK-1)

D) Pyruvate kinase

Answer: Phosphofructokinase-1 (PFK-1)

19. In the energy investment phase of glycolysis, how many ATP molecules are consumed per glucose?

A) 1

B) 2

C) 3

D) 4

Answer: 2

20. Which enzyme converts glucose to glucose-6-phosphate in glycolysis?

A) Phosphofructokinase

B) Aldolase

C) Hexokinase

D) Enolase

Answer: Hexokinase

21. What is the product of the reaction catalyzed by aldolase in glycolysis?

A) Glucose-6-phosphate

B) Fructose-1,6-bisphosphate

C) Glyceraldehyde-3-phosphate and dihydroxyacetone phosphate

D) 1,3-Bisphosphoglycerate

Answer: Glyceraldehyde-3-phosphate and dihydroxyacetone phosphate

22. Which enzyme converts dihydroxyacetone phosphate (DHAP) to glyceraldehyde-3-phosphate (G3P) in glycolysis?

A) Aldolase

B) Triose phosphate isomerase

C) Phosphoglycerate kinase

D) Glyceraldehyde-3-phosphate dehydrogenase

Answer: Triose phosphate isomerase

23. During which step of glycolysis is NAD⁺ reduced to NADH?

A) Hexokinase reaction

B) Phosphofructokinase reaction

C) Glyceraldehyde-3-phosphate dehydrogenase reaction

Chromosome & Nucleic Acids

1. The scientist who first observed chromosomes in 1882 was studying which organism?

- A) Onion root tips
- B) Human blood cells
- C) Salamander larvae cells
- D) Fruit fly larvae

Answer: Salamander larvae cells

2. Who proposed the term "chromosome," meaning "colored body"?

- A) Walther Flemming
- B) Walter Sutton
- C) Wilhelm Waldeyer
- D) Theodor Boveri

Answer: Wilhelm Waldeyer

3. Which organism is known to have only one pair of chromosomes?

- A) *Drosophila melanogaster*
- B) *Penicillium* species
- C) *Homo sapiens*
- D) *Escherichia coli*

Answer: Penicillium species

4. What is the diploid chromosome number in human somatic cells?

- A) 23
- B) 46
- C) 48
- D) 92

Answer: 46

5. The visual representation of an individual's chromosome set is termed:

- A) Genotype
- B) Phenotype
- C) Karyotype
- D) Haplotype

Answer: Karyotype

6. A chromosome with the centromere at the very end is classified as:

- A) Metacentric
- B) Submetacentric
- C) Acrocentric
- D) Telocentric

Answer: Telocentric

7. The protective structures at chromosome ends that prevent fusion are:

- A) Centromeres

B) Telomeres

C) Kinetochores

D) Satellites

Answer: Telomeres

8. Approximately what percentage of a chromosome's composition is DNA?

- A) 20%
- B) 40%
- C) 60%
- D) 80%

Answer: 40%

9. A typical human chromosome contains roughly how many nucleotide pairs?

- A) 14 million
- B) 140 million
- C) 1.4 billion
- D) 14 billion

Answer: 140 million

10. The positively charged proteins that DNA wraps around to form nucleosomes are:

- A) Enzymes
- B) Histones
- C) Collagens
- D) Keratins

Answer: Histones

11. The fundamental repeating structural unit of eukaryotic chromatin is the:

- A) Chromosome
- B) Nucleosome
- C) Ribosome
- D) Lysosome

Answer: Nucleosome

12. The transcriptionally inactive, highly condensed form of chromatin is called:

- A) Euchromatin
- B) Heterochromatin
- C) Nucleochromatin
- D) Asterochromatin

Answer: Heterochromatin

13. Who, in 1900, first suggested that chromosomes play a central role in heredity?

- A) Walter Sutton
- B) Gregor Mendel
- C) Theodor Boveri



D) Karl Correns

Answer: Karl Correns

14. The chromosomal theory of inheritance was first formally proposed by:

- A) T.H. Morgan
- B) Walther Flemming
- C) Walter Sutton
- D) Francis Crick

Answer: Walter Sutton

15. T.H. Morgan's discovery of a white-eyed male Drosophila led to the concept of:

- A) Multiple Alleles
- B) Sex-linked Inheritance
- C) Codominance
- D) Incomplete Dominance

Answer: Sex-linked Inheritance

16. The process where genetic material from dead bacteria is taken up by live bacteria is:

- A) Transcription
- B) Translation
- C) Transformation
- D) Transduction

Answer: Transformation

17. Frederick Griffith's transformation experiment utilized which bacterium?

- A) Escherichia coli
- B) Salmonella typhi
- C) Streptococcus pneumoniae
- D) Bacillus subtilis

Answer: Streptococcus pneumoniae

18. The rough (R) strain of Streptococcus pneumoniae was non-virulent because it lacked a:

- A) Cell Wall
- B) Flagellum
- C) Polysaccharide Capsule
- D) Plasma Membrane

Answer: Polysaccharide Capsule

19. Avery, MacLeod, and McCarty identified the transforming principle as:

- A) Protein
- B) RNA
- C) DNA
- D) Carbohydrate

Answer: DNA

20. Hershey and Chase used which radioactive isotope to specifically label viral DNA?

- A) Sulfur-35

B) Carbon-14

C) Phosphorus-32

D) Nitrogen-15

Answer: Phosphorus-32

21. The substance later known as DNA was first isolated and called "nuclein" by:

- A) Friedrich Miescher
- B) Erwin Chargaff
- C) P.A. Levene
- D) Rosalind Franklin

Answer: Friedrich Miescher

22. The basic monomeric units of nucleic acids are:

- A) Amino Acids
- B) Nucleotides
- C) Fatty Acids
- D) Monosaccharides

Answer: Nucleotides

23. In DNA, adenine always forms hydrogen bonds with:

- A) Guanine
- B) Cytosine
- C) Thymine
- D) Uracil

Answer: Thymine

24. The scientist who demonstrated that in DNA, A=T and G=C was:

- A) Rosalind Franklin
- B) Erwin Chargaff
- C) James Watson
- D) Maurice Wilkins

Answer: Erwin Chargaff

25. The critical X-ray diffraction pattern of DNA was produced by:

- A) Watson and Crick
- B) Hershey and Chase
- C) Franklin and Wilkins
- D) Beadle and Tatum

Answer: Franklin and Wilkins

26. The double-helix model of DNA structure was proposed in 1953 by:

- A) Griffith and Avery
- B) Mendel and Morgan
- C) Watson and Crick
- D) Meselson and Stahl

Answer: Watson and Crick



27. In the DNA double helix, the two polynucleotide strands run:

- A) Parallel
- B) Antiparallel
- C) Perpendicular
- D) Linear

Answer: Antiparallel

28. DNA replication occurs during which phase of the eukaryotic cell cycle?

- A) G1 Phase
- B) S Phase
- C) G2 Phase
- D) M Phase

Answer: S Phase

29. The Meselson-Stahl experiment demonstrated that DNA replication is:

- A) Conservative
- B) Dispersive
- C) Semi-conservative
- D) Continuous

Answer: Semi-conservative

30. The enzyme that unwinds the DNA double helix at the replication fork is:

- A) DNA Ligase
- B) DNA Polymerase
- C) DNA Helicase
- D) Primase

Answer: DNA Helicase

31. The enzyme responsible for synthesizing short RNA primers to initiate DNA synthesis is:

- A) DNA Polymerase I
- B) DNA Polymerase III
- C) Primase
- D) Ligase

Answer: Primase

32. In prokaryotes, the primary enzyme responsible for DNA strand elongation is:

- A) DNA Polymerase I
- B) DNA Polymerase II
- C) DNA Polymerase III
- D) RNA Polymerase

Answer: DNA Polymerase III

33. DNA polymerase can add nucleotides only to which end of a growing strand?

- A) 2' end
- B) 3' end
- C) 5' end

D) 1' end

Answer: 3' end

34. The DNA strand synthesized continuously toward the replication fork is the:

- A) Lagging Strand
- B) Leading Strand
- C) Okazaki Strand
- D) Primer Strand

Answer: Leading Strand

35. Short, discontinuous DNA fragments on the lagging strand are called:

- A) Primers
- B) Okazaki Fragments
- C) Telomeres
- D) Satellites

Answer: Okazaki Fragments

36. The enzyme that seals nicks between Okazaki fragments is:

- A) DNA Polymerase I
- B) DNA Polymerase III
- C) DNA Ligase
- D) DNA Helicase

Answer: DNA Ligase

37. The "one-gene-one-enzyme" hypothesis was formulated by:

- A) Watson and Crick
- B) Morgan and Bridges
- C) Beadle and Tatum
- D) Garrod and Bateson

Answer: Beadle and Tatum

38. The central dogma of molecular biology describes information flow as:

- A) Protein → RNA → DNA
- B) DNA → Protein → RNA
- C) RNA → DNA → Protein
- D) DNA → RNA → Protein

Answer: DNA → RNA → Protein

39. The synthesis of RNA from a DNA template is:

- A) Replication
- B) Transcription
- C) Translation
- D) Transformation

Answer: Transcription

40. In transcription, the DNA strand that serves as the template for RNA synthesis is the:

- A) Coding Strand
- B) Sense Strand

Regulation of Gene Expression

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1. In prokaryotes, the primary level of control for gene expression occurs at which stage?

- A) RNA processing
- B) translation initiation
- C) transcription initiation
- D) protein degradation

Answer: transcription initiation

2. Regulatory proteins influence transcription by modulating the ability of RNA polymerase to bind to the:

- A) operator
- B) enhancer
- C) promoter
- D) terminator

Answer: promoter

3. The pattern of chemical groups in the DNA major groove allows regulatory proteins to:

- A) unwind the DNA helix
- B) read the sequence of bases
- C) methylate cytosine residues
- D) catalyze RNA splicing

Answer: read the sequence of bases

4. A common DNA-binding motif consisting of two α -helical segments linked by a short turn is called:

- A) zinc finger
- B) leucine zipper
- C) helix-turn-helix
- D) homeodomain

Answer: helix-turn-helix

5. The *lac* operon in *E. coli* is an example of a(n):

- A) repressible operon
- B) inducible operon
- C) constitutive operon
- D) anabolic operon

Answer: inducible operon

6. In the absence of lactose, the *lac* repressor binds to the operator and:

- A) activates transcription
- B) blocks RNA polymerase binding
- C) degrades allolactose
- D) recruits CAP protein

Answer: blocks RNA polymerase binding

7. Maximal expression of the *lac* operon requires both the absence of the repressor and the presence of:

- A) high glucose and cAMP
- B) low glucose and cAMP
- C) high lactose and glucose
- D) low lactose and tryptophan

Answer: low glucose and cAMP

8. In the *trp* operon, tryptophan acts as a:

- A) inducer

- B) coactivator
- C) corepressor
- D) inhibitor

Answer: corepressor

9. Eukaryotic transcription factors that are required for the assembly of the transcription apparatus at all promoters are called:

- A) specific transcription factors
- B) enhancer-binding proteins
- C) general transcription factors
- D) mediators

Answer: general transcription factors

10. DNA sequences that can stimulate transcription from a distance and are binding sites for activators are called:

- A) promoters
- B) operators
- C) enhancers
- D) silencers

Answer: enhancers

11. The packaging of DNA into nucleosomes primarily complicates which cellular process?

- A) DNA replication
- B) transcription
- C) translation
- D) protein folding

Answer: transcription

12. The addition of acetyl groups to histone tails generally leads to:

- A) chromatin condensation and gene silencing
- B) chromatin loosening and increased transcription
- C) DNA methylation and imprinting
- D) recruitment of repressive complexes

Answer: chromatin loosening and increased transcription

13. Which process can produce multiple different mRNA transcripts from a single eukaryotic gene?

- A) RNA editing
- B) Alternative splicing
- C) Transcription initiation
- D) 5' capping

Answer: Alternative splicing

14. Small interfering RNAs (siRNAs) and microRNAs (miRNAs) function in post-transcriptional regulation by:

- A) promoting histone acetylation
- B) guiding mRNA degradation or translation inhibition
- C) acting as general transcription factors
- D) unwinding DNA for polymerase access

Answer: guiding mRNA degradation or translation inhibition

36. Regulation of Gene Expression

15. Proteins marked for destruction in eukaryotic cells are tagged with:

- A) phosphate groups
- B) methyl groups
- C) ubiquitin
- D) acetyl groups

Answer: ubiquitin

16. The molecular machine that degrades polyubiquitinated proteins is the:

- A) ribosome
- B) proteasome
- C) spliceosome
- D) nucleosome

Answer: proteasome

17. In bacteria, a cluster of functionally related genes transcribed from a single promoter is called a(n):

- A) enhancer
- B) intron
- C) operon
- D) exon

Answer: operon

18. A mutation that inactivates the repressor protein of an inducible operon would result in:

- A) continuous transcription of the operon
- B) permanent repression of the operon
- C) no effect on transcription
- D) induced only in the presence of substrate

Answer: continuous transcription of the operon

19. The *trp* repressor protein binds to DNA and blocks transcription only when bound to:

- A) allolactose
- B) tryptophan
- C) cAMP
- D) glucose

Answer: tryptophan

20. Catabolite activator protein (CAP) is activated by binding to:

- A) glucose
- B) allolactose
- C) cyclic AMP (cAMP)
- D) tryptophan

Answer: cyclic AMP (cAMP)

21. Eukaryotic gene regulation is more complex than in prokaryotes partly due to the presence of:

- A) operons
- B) chromatin structure
- C) coupled transcription and translation
- D) a single RNA polymerase

Answer: chromatin structure

22. Proximal control elements and distal enhancers are binding sites for:

- A) RNA polymerase II

- B) general transcription factors
- C) specific transcription factors
- D) ribosomal subunits

Answer: specific transcription factors

23. DNA looping brings enhancer-bound activators into proximity with the promoter-bound:

- A) RNA polymerase and general factors
- B) ribosome
- C) proteasome
- D) DNA methyltransferase

Answer: RNA polymerase and general factors

24. High levels of DNA methylation on cytosine bases are generally associated with:

- A) highly transcribed genes
- B) gene silencing
- C) chromatin loosening
- D) histone acetylation

Answer: gene silencing

25. X-chromosome inactivation in female mammals is initiated by a long noncoding RNA called:

- A) Xist
- B) Drosha
- C) Dicer
- D) miRNA

Answer: Xist

26. ATP-dependent chromatin remodeling complexes can perform all of the following EXCEPT:

- A) slide nucleosomes along DNA
- B) remove nucleosomes from DNA
- C) add ubiquitin to histones
- D) replace histones with histone variants

Answer: add ubiquitin to histones

27. The initial transcript of a microRNA (miRNA) gene is processed by the nuclease:

- A) Dicer
- B) Drosha
- C) RNase P
- D) RISC

Answer: Drosha

28. RNA interference (RNAi) can be experimentally triggered by introducing:

- A) double-stranded RNA
- B) single-stranded DNA
- C) methylated histones
- D) general transcription factors

Answer: double-stranded RNA

29. Which mechanism allows a single gene to encode different protein isoforms in different tissues?

- A) DNA methylation



- B) Alternative splicing
- C) Gene amplification
- D) Ubiquitination

Answer: Alternative splicing

30. The stability of eukaryotic mRNA in the cytoplasm can be influenced by sequences in the:

- A) 5' cap
- B) coding region
- C) 3' untranslated region (UTR)
- D) introns

Answer: 3' untranslated region (UTR)

31. The MyoD protein is a master regulatory transcription factor that commits cells to become:

- A) liver cells
- B) nerve cells
- C) skeletal muscle cells
- D) fat cells

Answer: skeletal muscle cells

32. In *Drosophila*, the bicoid gene product is a morphogen that establishes the:

- A) dorsal-ventral axis
- B) anterior-posterior axis
- C) left-right asymmetry
- D) segment boundaries

Answer: anterior-posterior axis

33. Maternal effect genes encode cytoplasmic determinants that influence:

- A) adult behavior only
- B) the genotype of the mother
- C) early embryonic patterning
- D) X-chromosome inactivation

Answer: early embryonic patterning

34. A gene that normally stimulates cell division and, when mutated, can cause cancer is called a:

- A) tumor-suppressor gene
- B) proto-oncogene
- C) homeotic gene
- D) segmentation gene

Answer: proto-oncogene

35. The p53 protein functions primarily as a:

- A) growth factor receptor
- B) tumor-suppressor transcription factor
- C) G protein in signaling
- D) DNA repair enzyme

Answer: tumor-suppressor transcription factor

36. Colorectal cancer often involves sequential mutations in the APC, ras, and p53 genes, illustrating the:

- A) one-hit model of cancer
- B) multistep model of cancer
- C) role of viral infection only
- D) exclusive inheritance pattern

Answer: multistep model of cancer

37. Breast cancers that overexpress the HER2 receptor are often treated with the drug:

- A) tamoxifen
- B) Herceptin
- C) aspirin
- D) cyclin inhibitors

Answer: Herceptin

38. Inherited mutations in the BRCA1 or BRCA2 genes increase susceptibility to:

- A) colorectal cancer
- B) lung cancer
- C) breast and ovarian cancer
- D) leukemia

Answer: breast and ovarian cancer

39. The lacY gene in the lac operon codes for:

- A) β -galactosidase
- B) lactose permease
- C) transacetylase
- D) the repressor

Answer: lactose permease

40. Positive control of the lac operon by CAP-cAMP is most active when cellular levels of glucose are:

- A) high
- B) low
- C) constant
- D) absent but lactose is also absent

Answer: low

41. A mutation in the operator of the lac operon that prevents repressor binding would lead to:

- A) normal inducible regulation
- B) constitutive expression
- C) permanent repression
- D) glucose dependence

Answer: constitutive expression

42. The trp operon is typically expressed when cellular tryptophan levels are:

- A) high
- B) low
- C) constant
- D) high in the environment

Answer: low

43. Eukaryotic RNA polymerase II requires general transcription factors to bind to the:

- A) enhancer
- B) TATA box in the promoter
- C) operator
- D) poly-A tail

Answer: TATA box in the promoter

44. Coactivators and mediator proteins function to:

- A) degrade mRNA



Variation & Genetics

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1. What is the scientific study of heredity and variation called?

- A) Embryology
- B) Evolution
- C) Genetics
- D) Cytology

Answer: Genetics

2. The specific physical location of a gene on a chromosome is known as its:

- A) Allele
- B) Locus
- C) Phenotype
- D) Karyotype

Answer: Locus

3. Alternative forms of the same gene that occupy corresponding loci on homologous chromosomes are called:

- A) Genotypes
- B) Phenotypes
- C) Alleles
- D) Loci

Answer: Alleles

4. The complete set of all alleles present in all individuals of a breeding population at a given time is the:

- A) Genome
- B) Genotype frequency
- C) Karyotype
- D) Gene pool

Answer: Gene pool

5. The observable characteristics of an organism, resulting from its genotype and environmental influences, define its:

- A) Genotype
- B) Phenotype
- C) Karyotype
- D) Genome

Answer: Phenotype

6. An individual with two identical alleles at a given locus is said to be:

- A) Heterozygous
- B) Hemizygous
- C) Homozygous
- D) Homogametic

Answer: Homozygous

7. An allele that expresses its phenotypic effect even in a heterozygous state is termed:

- A) Recessive
- B) Codominant
- C) Dominant
- D) Epistatic

Answer: Dominant

8. Who is recognized as the founder of classical genetics?

- A) Charles Darwin
- B) Thomas Hunt Morgan
- C) Gregor Mendel
- D) Alfred Sturtevant

Answer: Gregor Mendel

9. Mendel's success was largely due to his use of which experimental plant?

- A) *Drosophila melanogaster*
- B) Garden pea (*Pisum sativum*)
- C) Maize (*Zea mays*)
- D) Snapdragon (*Antirrhinum*)

Answer: Garden pea (*Pisum sativum*)

10. The law stating that two alleles for a trait segregate during gamete formation is the Law of:

- A) Independent Assortment
- B) Dominance
- C) Segregation
- D) Purity of Gametes

Answer: Segregation

11. In a monohybrid cross of two heterozygous individuals ($Tt \times Tt$), the expected phenotypic ratio in the F_2 generation is:

- A) 1:2:1
- B) 3:1
- C) 9:3:3:1
- D) 1:1

Answer: 3:1

12. In a dihybrid cross between two heterozygotes ($RrYy \times RrYy$), the expected phenotypic ratio in the F_2 generation is:

- A) 9:3:3:1
- B) 3:1
- C) 1:2:1
- D) 1:1:1:1

Answer: 9:3:3:1

37. Variation & Genetics



13. The physical basis for the Law of Independent Assortment is the:

- A) Separation of sister chromatids
- B) Random alignment of homologous chromosome pairs in Metaphase I
- C) Crossing over in Prophase I
- D) Non-disjunction in Anaphase I

Answer: Random alignment of homologous chromosome pairs in Metaphase I

14. In snapdragon flowers, a cross between red (RR) and white (rr) plants yields all pink (Rr) offspring. This is an example of:

- A) Complete Dominance
- B) Codominance
- C) Incomplete Dominance
- D) Overdominance

Answer: Incomplete Dominance

15. The human ABO blood group system, where both A and B antigens are expressed in the heterozygote, is an example of:

- A) Incomplete Dominance
- B) Complete Dominance
- C) Codominance
- D) Polygenic Inheritance

Answer: Codominance

16. A gene that exists in more than two allelic forms in a population, such as the ABO blood group gene, demonstrates:

- A) Pleiotropy
- B) Multiple Alleles
- C) Polygenic Inheritance
- D) Epistasis

Answer: Multiple Alleles

17. Which blood type is considered the universal donor in the ABO system?

- A) A
- B) B
- C) AB
- D) O

Answer: O

18. Which blood type is considered the universal recipient in the ABO system?

- A) A
- B) B
- C) AB
- D) O

Answer: AB

19. The Bombay phenotype results from a mutation in which gene necessary for ABO antigen expression?

- A) I gene
- B) H gene
- C) Se gene
- D) D gene

Answer: H gene

20. Erythroblastosis fetalis is primarily caused by incompatibility in which blood group system?

- A) ABO
- B) MN
- C) Rh
- D) Duffy

Answer: Rh

21. Prevention of erythroblastosis fetalis involves administering Rh immunoglobulin (RhoGAM) to an Rh- mother:

- A) Only before conception
- B) At 28 weeks gestation and within 72 hours after delivery
- C) Only during the first trimester
- D) Only after the birth of an Rh- baby

Answer: At 28 weeks gestation and within 72 hours after delivery

22. When the expression of one gene masks or modifies the effect of another gene at a different locus, it is termed:

- A) Pleiotropy
- B) Dominance
- C) Epistasis
- D) Codominance

Answer: Epistasis

23. Labrador coat color, governed by B/b (pigment) and E/e (deposition) genes, resulting in a 9:3:4 ratio, is an example of:

- A) Dominant Epistasis
- B) Recessive Epistasis
- C) Duplicate Recessive Epistasis
- D) Complementary Gene Action

Answer: Recessive Epistasis

24. A single gene influencing multiple, seemingly unrelated phenotypic traits defines:

- A) Epistasis
- B) Pleiotropy
- C) Polygenic Inheritance



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D) Codominance

Answer: Pleiotropy

25. Sickle cell anemia, affecting hemoglobin, RBC shape, and malaria resistance, is a classic example of:

- A) Epistasis
- B) Multiple Alleles
- C) Pleiotropy
- D) Codominance

Answer: Pleiotropy

26. Traits showing continuous variation, like human height, are typically controlled by:

- A) A single gene with multiple alleles
- B) Two interacting genes
- C) Multiple genes with additive effects
- D) Sex-linked genes

Answer: Multiple genes with additive effects

27. Human skin color is primarily an example of:

- A) Sex-linked Inheritance
- B) Multiple Alleles
- C) Mendelian Inheritance
- D) Polygenic Inheritance

Answer: Polygenic Inheritance

28. The tendency of genes on the same chromosome to be inherited together is called:

- A) Independent Assortment
- B) Segregation
- C) Linkage
- D) Crossing Over

Answer: Linkage

29. The process during meiosis that separates linked genes by exchanging chromosome segments is:

- A) Segregation
- B) Independent Assortment
- C) Crossing Over
- D) Non-disjunction

Answer: Crossing Over

30. The percentage of recombinant offspring used to map gene distances is the:

- A) Linkage Frequency
- B) Mutation Rate
- C) Recombination Frequency
- D) Penetrance

Answer: Recombination Frequency

31. One map unit (centimorgan) is equivalent to a recombination frequency of:

- A) 10%
- B) 1%
- C) 50%
- D) 100%

Answer: 1%

32. In mammals, the homogametic sex is:

- A) Male
- B) Female
- C) Both sexes
- D) Neither sex

Answer: Female

33. In the XX-XY system, the primary male-determining gene is:

- A) XIST
- B) SRY
- C) TFM
- D) H-Y

Answer: SRY

34. In birds, butterflies, and some reptiles, the sex determination system is:

- A) XX-XY
- B) XX-XO
- C) ZZ-ZW
- D) Haplo-Diploid

Answer: ZZ-ZW

35. In bees, ants, and wasps, males develop from unfertilized eggs and are:

- A) Diploid
- B) Triploid
- C) Haploid
- D) Tetraploid

Answer: Haploid

36. Traits whose genes are located on the X chromosome are termed:

- A) Autosomal
- B) Y-linked
- C) X-linked
- D) Holandric

Answer: X-linked

37. X-linked recessive disorders, like hemophilia, are more common in males because:

- A) Males have two X chromosomes
- B) Males are hemizygous for X-linked genes
- C) The Y chromosome carries a dominant suppressor
- D) Females cannot be carriers

Answer: Males are hemizygous for X-linked genes



Biotechnology

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1. Biotechnology is best defined as:

- A) The study of rocks and minerals using biological tools
- B) The use of machines in agricultural processes
- C) The use of living organisms to make useful products or provide services
- D) The analysis of planetary systems through biology

Answer: The use of living organisms to make useful products or provide services

2. An example of traditional biotechnology is:

- A) Production of human insulin using bacteria
- B) DNA fingerprinting
- C) Fermentation in yogurt making
- D) Gene therapy for cystic fibrosis

Answer: Fermentation in yogurt making

3. The artificial manipulation of DNA to alter an organism's traits is known as:

- A) Fermentation
- B) Bioremediation
- C) Genetic engineering
- D) Tissue culture

Answer: Genetic engineering

4. The proof that DNA carries genetic information was established in:

- A) 1857
- B) 1944
- C) 1970
- D) 1990

Answer: 1944

5. Human insulin was first produced using recombinant DNA technology in:

- A) 1970
- B) 1978
- C) 1990
- D) 2002

Answer: 1978

6. The Human Genome Project was launched in:

- A) 1978
- B) 1990
- C) 2002
- D) 2003

Answer: 1990

7. Which of the following is NOT an application of biotechnology?

- A) Gene therapy
- B) Fermentation
- C) Mineral extraction
- D) DNA fingerprinting

Answer: Mineral extraction

8. The process of inserting genetic material into human cells to treat disorders is called:

- A) Genetic screening
- B) Gene therapy
- C) Genetic counselling
- D) DNA sequencing

Answer: Gene therapy

9. Fermentation is best described as:

- A) Complete oxidation of glucose for maximum ATP yield
- B) The mass culture of microorganisms to produce any product
- C) A purely chemical process without biological components
- D) The conversion of ethanol to acetic acid

Answer: The mass culture of microorganisms to produce any product

10. Alcoholic fermentation is carried out by:

- A) Lactobacillus
- B) Streptococcus
- C) Saccharomyces cerevisiae
- D) Escherichia coli

Answer: Saccharomyces cerevisiae

11. Lactic acid fermentation is primarily performed by:

- A) Yeast
- B) Molds
- C) Lactobacillus
- D) Viruses

Answer: Lactobacillus

12. Which of the following is a product of lactic acid fermentation?

- A) Ethanol and CO₂
- B) Lactic acid
- C) Acetic acid
- D) Formic acid

Answer: Lactic acid

13. A device that provides an optimal environment for microbial growth and product formation is a:



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- A) Centrifuge
- B) Thermocycler
- C) Fermenter
- D) Electrophoresis chamber

Answer: Fermenter

14. In which fermentation type is the substrate added and product removed continuously?

- A) Batch fermentation
- B) Static fermentation
- C) Continuous fermentation
- D) Anaerobic fermentation

Answer: Continuous fermentation

15. The first step in genetic engineering is typically:

- A) Insertion of gene into vector
- B) Isolation of the gene of interest
- C) Transfer of recombinant DNA into host
- D) Expression of the gene

Answer: Isolation of the gene of interest

16. Restriction endonucleases are used in genetic engineering as:

- A) Molecular carriers
- B) Molecular scissors
- C) Joining enzymes
- D) Amplification tools

Answer: Molecular scissors

17. The function of a vector in genetic engineering is to:

- A) Cut DNA into fragments
- B) Act as a carrier for transferring foreign DNA into a host cell
- C) Glue DNA fragments together
- D) Amplify DNA

Answer: Act as a carrier for transferring foreign DNA into a host cell

18. The enzyme used to join the gene of interest to vector DNA is:

- A) Restriction enzyme
- B) DNA ligase
- C) Taq polymerase
- D) Reverse transcriptase

Answer: DNA ligase

19. An organism that has received recombinant DNA is termed a:

- A) Vector
- B) Donor
- C) Genetically Modified Organism (GMO)

- D) Clone

Answer: Genetically Modified Organism (GMO)

20. Bacteria protect their own DNA from restriction enzymes by:

- A) Not having restriction sites
- B) Producing enzyme inhibitors
- C) Methylating their DNA at restriction sites
- D) Keeping DNA in linear form

Answer: Methylating their DNA at restriction sites

21. The specific DNA sequences recognized by restriction enzymes are called:

- A) Codons
- B) Palindromic sequences
- C) Introns
- D) Promoters

Answer: Palindromic sequences

22. Small, circular, extra-chromosomal DNA molecules in bacteria often used as vectors are:

- A) Chromosomes
- B) Plasmids
- C) Bacteriophages
- D) Transposons

Answer: Plasmids

23. An ideal plasmid vector must contain:

- A) Large size
- B) Single-stranded DNA
- C) Origin of Replication (Ori)
- D) Inability to replicate

Answer: Origin of Replication (Ori)

24. The plasmid pBR322 carries antibiotic resistance genes for:

- A) Ampicillin only
- B) Tetracycline only
- C) Both ampicillin and tetracycline
- D) Penicillin and streptomycin

Answer: Both ampicillin and tetracycline

25. The process of inserting recombinant DNA into a host cell is called:

- A) Transcription
- B) Transduction
- C) Transformation
- D) Translation

Answer: Transformation

26. Transformed bacterial clones are typically identified by their:

- A) Larger size
- B) Color



- C) Resistance to an antibiotic
- D) Motility

Answer: Resistance to an antibiotic

27. A collection of clones containing all DNA sequences of an organism's genome is a:

- A) Gene probe
- B) Genomic library
- C) cDNA library
- D) DNA fingerprint

Answer: Genomic library

28. A small, labelled, single-stranded DNA molecule used to find a specific gene is a:

- A) Primer
- B) Vector
- C) Probe
- D) Marker

Answer: Probe

29. The technique used to amplify a specific DNA sequence into millions of copies in vitro is:

- A) Gel electrophoresis
- B) Southern blotting
- C) Polymerase Chain Reaction (PCR)
- D) Gene sequencing

Answer: Polymerase Chain Reaction (PCR)

30. PCR was invented by:

- A) Frederick Sanger
- B) Kary B. Mullis
- C) Ian Wilmut
- D) Craig Venter

Answer: Kary B. Mullis

31. Taq polymerase is used in PCR because it:

- A) Is the cheapest polymerase
- B) Is derived from human cells
- C) Remains stable at high temperatures
- D) Does not require primers

Answer: Remains stable at high temperatures

32. The PCR step where double-stranded DNA separates into single strands is called:

- A) Annealing
- B) Extension
- C) Denaturation
- D) Ligation

Answer: Denaturation

33. During which PCR step do primers bind to complementary template DNA sequences?

- A) Denaturation
- B) Annealing

- C) Extension
- D) Initiation

Answer: Annealing

34. The optimum temperature for the extension step in PCR is typically:

- A) 94°C
- B) 54°C
- C) 72°C
- D) 37°C

Answer: 72°C

35. Which of the following is an application of PCR?

- A) Protein purification
- B) DNA fingerprinting
- C) Lipid analysis
- D) Carbohydrate synthesis

Answer: DNA fingerprinting

36. The technique that separates DNA fragments based on size using an electric field is:

- A) PCR
- B) Centrifugation
- C) Gel electrophoresis
- D) Chromatography

Answer: Gel electrophoresis

37. In gel electrophoresis, smaller DNA fragments move:

- A) Slower than larger fragments
- B) Faster than larger fragments
- C) At the same speed as larger fragments
- D) Towards the negative electrode

Answer: Faster than larger fragments

38. Variations in DNA fragment lengths produced by restriction enzymes are called:

- A) VNTRs
- B) RFLPs
- C) SNPs
- D) ESTs

Answer: RFLPs

39. The DNA sequencing method that uses dideoxynucleotides (ddNTPs) to terminate synthesis is the:

- A) Maxam-Gilbert method
- B) Sanger-Coulson method
- C) Pyrosequencing method
- D) Nanopore sequencing

Answer: Sanger-Coulson method

Evolution

1. Who proposed the theory of inheritance of acquired characteristics?

- A) Charles Darwin
- B) Alfred Russel Wallace
- C) Jean-Baptiste Lamarck
- D) Gregor Mendel

Answer: Jean-Baptiste Lamarck

2. Which concept is central to Darwin's theory of evolution?

- A) Use and disuse
- B) Natural selection
- C) Inheritance of acquired traits
- D) Special creation

Answer: Natural selection

3. The study of geographical distribution of plants and animals is known as:

- A) Paleontology
- B) Biogeography
- C) Comparative anatomy
- D) Molecular biology

Answer: Biogeography

4. Structures that are similar in origin but different in function are called:

- A) Analogous structures
- B) Vestigial structures
- C) Homologous structures
- D) Convergent structures

Answer: Homologous structures

5. Which of the following is an example of homologous organs?

- A) Wing of bat and wing of butterfly
- B) Flipper of whale and wing of bird
- C) Eye of octopus and eye of human
- D) Leg of horse and leg of insect

Answer: Flipper of whale and wing of bird

6. The fossil record provides evidence for evolution by showing:

- A) Sudden appearance of species
- B) Sequential changes over time
- C) Identical species across eras
- D) Independent creation events

Answer: Sequential changes over time

7. Which scientist is credited with the theory of natural selection independently of Darwin?

- A) Thomas Malthus

- B) Charles Lyell
- C) Alfred Russel Wallace
- D) James Hutton

Answer: Alfred Russel Wallace

8. The term 'survival of the fittest' was coined by:

- A) Charles Darwin
- B) Herbert Spencer
- C) Jean-Baptiste Lamarck
- D) Ernst Haeckel

Answer: Herbert Spencer

9. Which of the following is a vestigial organ in humans?

- A) Appendix
- B) Heart
- C) Liver
- D) Lung

Answer: Appendix

10. The endosymbiotic theory explains the origin of:

- A) Prokaryotic cells
- B) Eukaryotic organelles
- C) Viruses
- D) Ribosomes

Answer: Eukaryotic organelles

11. Who proposed the endosymbiotic theory?

- A) Lynn Margulis
- B) Charles Darwin
- C) Carl Woese
- D) Robert Whittaker

Answer: Lynn Margulis

12. Which of the following is NOT a condition of the Hardy-Weinberg equilibrium?

- A) No mutation
- B) No gene flow
- C) Non-random mating
- D) Large population size

Answer: Non-random mating

13. Genetic drift is most significant in:

- A) Large populations
- B) Small populations
- C) Stable environments
- D) Global populations

Answer: Small populations

14. The phenomenon where unrelated species evolve similar traits is called:



- A) Divergent evolution
- B) Convergent evolution
- C) Parallel evolution
- D) Coevolution

Answer: Convergent evolution

15. Which of the following is an example of convergent evolution?

- A) Wings of birds and bats
- B) Forelimbs of humans and whales
- C) Fins of sharks and dolphins
- D) Leaves of cactus and pine

Answer: Fins of sharks and dolphins

16. The book 'Origin of Species' was written by:

- A) Alfred Russel Wallace
- B) Charles Lyell
- C) Charles Darwin
- D) Thomas Malthus

Answer: Charles Darwin

17. Which evolutionary mechanism results in adaptation to the environment?

- A) Genetic drift
- B) Gene flow
- C) Natural selection
- D) Mutation

Answer: Natural selection

18. The total aggregate of genes in a population at any time is called:

- A) Gene pool
- B) Genome
- C) Genotype frequency
- D) Allele frequency

Answer: Gene pool

19. Which of the following is a source of new genetic variation?

- A) Genetic drift
- B) Gene flow
- C) Mutation
- D) Natural selection

Answer: Mutation

20. The theory that life originated from non-living matter is known as:

- A) Biogenesis
- B) Abiogenesis
- C) Panspermia
- D) Special creation

Answer: Abiogenesis

21. Who introduced the binomial nomenclature system?

- A) Charles Darwin
- B) Carolus Linnaeus
- C) Ernst Haeckel
- D) John Ray

Answer: Carolus Linnaeus

22. The concept of 'uniformitarianism' in geology was proposed by:

- A) Charles Lyell
- B) James Hutton
- C) Alfred Wegener
- D) Charles Darwin

Answer: James Hutton

23. Which of the following is a homologous structure in plants?

- A) Tendrils of pea and spines of cactus
- B) Leaves of onion and leaves of grass
- C) Flowers of rose and flowers of lily
- D) Roots of carrot and stems of potato

Answer: Tendrils of pea and spines of cactus

24. The evolutionary history of a species is called:

- A) Ontogeny
- B) Phylogeny
- C) Biogeography
- D) Paleontology

Answer: Phylogeny

25. Which of the following is NOT an evidence for evolution?

- A) Fossil record
- B) Comparative embryology
- C) Genetic engineering
- D) Molecular biology

Answer: Genetic engineering

26. The process by which new species arise is called:

- A) Evolution
- B) Speciation
- C) Adaptation
- D) Mutation

Answer: Speciation

27. Speciation that occurs due to geographic isolation is called:

- A) Sympatric speciation
- B) Allopatric speciation
- C) Parapatric speciation



D) Peripatric speciation

Answer: Allopatric speciation

28. The Hardy-Weinberg equation is expressed as:

- A) $p + q = 1$
- B) $p^2 + 2pq + q^2 = 1$
- C) $p^2 + q^2 = 1$
- D) $2pq = 1$

Answer: $p^2 + 2pq + q^2 = 1$

29. Which scientist proposed the theory of catastrophism?

- A) Georges Cuvier
- B) Charles Lyell
- C) James Hutton
- D) Charles Darwin

Answer: Georges Cuvier

30. The concept of 'struggle for existence' was influenced by the work of:

- A) Thomas Malthus
- B) Charles Lyell
- C) Alfred Russel Wallace
- D) Gregor Mendel

Answer: Thomas Malthus

31. Which of the following is a biochemical evidence for evolution?

- A) Similarities in DNA sequences
- B) Homologous structures
- C) Fossil remains
- D) Vestigial organs

Answer: Similarities in DNA sequences

32. The term 'neo-Darwinism' integrates Darwin's theory with:

- A) Lamarckism
- B) Genetics
- C) Paleontology
- D) Embryology

Answer: Genetics

33. Which of the following is an example of artificial selection?

- A) Antibiotic resistance in bacteria
- B) Breeding of dogs
- C) Peppered moth coloration
- D) Darwin's finches

Answer: Breeding of dogs

34. The movement of genes between populations is called:

- A) Genetic drift
- B) Gene flow

C) Mutation

D) Speciation

Answer: Gene flow

35. Which of the following is a prezygotic reproductive barrier?

- A) Hybrid sterility
- B) Hybrid inviability
- C) Temporal isolation
- D) Hybrid breakdown

Answer: Temporal isolation

36. The concept of 'adaptive radiation' is best illustrated by:

- A) Darwin's finches
- B) Human evolution
- C) Horse evolution
- D) Insect evolution

Answer: Darwin's finches

37. The oldest known fossils are of:

- A) Eukaryotes
- B) Prokaryotes
- C) Fungi
- D) Animals

Answer: Prokaryotes

38. Which era is known as the 'age of reptiles'?

- A) Paleozoic
- B) Mesozoic
- C) Cenozoic
- D) Precambrian

Answer: Mesozoic

39. The theory that mitochondria and chloroplasts originated from symbiotic bacteria is called:

- A) Membrane invagination theory
- B) Endosymbiotic theory
- C) Spontaneous generation
- D) Germ theory

Answer: Endosymbiotic theory

40. Which of the following is a postzygotic reproductive barrier?

- A) Behavioral isolation
- B) Mechanical isolation
- C) Gametic isolation
- D) Hybrid sterility

Answer: Hybrid sterility

41. The frequency of the homozygous recessive genotype in the Hardy-Weinberg equation is represented by:

- A) p^2



Palaeontology

1. **What is the primary focus of palaeontology?**

- A) Study of rock formation processes
 - B) Study of ancient life preserved as fossils
 - C) Study of Earth's magnetic field history
 - D) Study of modern ecosystem dynamics
- Answer: B – Study of ancient life preserved as fossils

2. **Which branch of palaeontology focuses exclusively on the study of animal fossils?**

- A) Paleobotany
 - B) Paleozoology
 - C) Palynology
 - D) Taphonomy
- Answer: B – Paleozoology

3. **Vertebrate Paleontology primarily deals with fossils of animals possessing which structure?**

- A) Exoskeleton
 - B) Vertebral column
 - C) Chitinous cuticle
 - D) Calcified shell
- Answer: B – Vertebral column

4. **Which branch of palaeontology is essential for hydrocarbon exploration and petroleum geology?**

- A) Paleobotany
 - B) Vertebrate Paleontology
 - C) Micropaleontology
 - D) Paleoanthropology
- Answer: C – Micropaleontology

5. **The study of organic-walled microfossils such as pollen and spores is known as?**

- A) Micropaleontology
 - B) Palynology
 - C) Paleoalgology
 - D) Paleomycology
- Answer: B – Palynology

6. **Which branch of palaeontology studies the processes affecting an organism from death to final discovery?**

- A) Paleoecology
 - B) Biostratigraphy
 - C) Taphonomy
 - D) Paleoclimatology
- Answer: C – Taphonomy

7. **Biostratigraphy is an applied branch that uses fossils primarily for which purpose?**

- A) Reconstructing ancient food webs

- B) Correlating and dating sedimentary rock layers
- C) Studying fossilization chemistry
- D) Analyzing ancient DNA

Answer: B – Correlating and dating sedimentary rock layers

8. **The study of fossil hominins and their cultural artifacts is termed?**

- A) Paleoanthropology
 - B) Paleoprimatology
 - C) Archeozoology
 - D) Ethnopaleontology
- Answer: A – Paleoanthropology

9. **Which type of rocks are the primary source of fossils due to their formation under low temperatures and pressures?**

- A) Igneous rocks
 - B) Metamorphic rocks
 - C) Sedimentary rocks
 - D) Volcanic rocks
- Answer: C – Sedimentary rocks

10. **Which principle states that in an undisturbed sequence, the youngest layer is on top and the oldest at the bottom?**

- A) Principle of Original Horizontality
 - B) Law of Cross-Cutting Relationships
 - C) Law of Superposition
 - D) Principle of Fossil Succession
- Answer: C – Law of Superposition

11. **The principle that any geological feature cutting across another must be younger is called?**

- A) Law of Superposition
 - B) Principle of Inclusions
 - C) Law of Cross-Cutting Relationships
 - D) Principle of Original Horizontality
- Answer: C – Law of Cross-Cutting Relationships

12. **Which Eon is known as the "eon of visible life" with an abundant and diverse fossil record?**

- A) Hadean
 - B) Archean
 - C) Proterozoic
 - D) Phanerozoic
- Answer: D – Phanerozoic

13. **The Cambrian Explosion is primarily noted for the rapid diversification of which group?**

- A) Flowering plants



- B) Mammals
 - C) Major animal phyla including chordates
 - D) Dinosaurs
- Answer: C – Major animal phyla including chordates

14. **Which period is often called the "Age of Fishes" due to the dominance of jawed fishes?**

- A) Cambrian
- B) Ordovician
- C) Silurian
- D) Devonian

Answer: D – Devonian

15. **The largest mass extinction in Earth's history, occurring at the end of the Permian, eliminated approximately what percentage of marine species?**

- A) 75%
- B) 85%
- C) 96%
- D) 50%

Answer: C – 96%

16. **The end-Cretaceous (K-Pg) mass extinction is famously associated with the demise of which group?**

- A) Trilobites
- B) Non-avian dinosaurs
- C) Large mammals
- D) Ammonites only

Answer: B – Non-avian dinosaurs

17. **Which fossil is considered a classic transitional form between reptiles and birds?**

- A) Tiktaalik
- B) Archaeopteryx
- C) Ichthyostega
- D) Pikaia

Answer: B – Archaeopteryx

18. **A fossil that exhibits a mosaic of features common to both an ancestral and a derived group is called?**

- A) Index fossil
- B) Living fossil
- C) Transitional fossil
- D) Trace fossil

Answer: C – Transitional fossil

19. **The term "living fossil" refers to a modern species that?**

- A) Has recently gone extinct
- B) Shows no evolutionary change since its origin
- C) Resembles ancient fossil relatives closely

D) Is preserved in amber

Answer: C – Resembles ancient fossil relatives closely

20. **Which of the following is an example of an unaltered fossil?**

- A) Petrified wood
- B) Carbonized leaf
- C) Woolly mammoth in permafrost
- D) Internal mould of a shell

Answer: C – Woolly mammoth in permafrost

21. **The process where groundwater minerals fill microscopic pore spaces in bones or wood is called?**

- A) Replacement
- B) Carbonization
- C) Permineralization
- D) Recrystallization

Answer: C – Permineralization

22. **Fossilized feces that provide direct evidence of diet and digestive physiology are known as?**

- A) Gastroliths
- B) Coprolites
- C) Steinkerns
- D) Ichnofossils

Answer: B – Coprolites

23. **Which type of trace fossil indicates dwelling, feeding, or nesting behavior in sediment?**

- A) Tracks
- B) Trails
- C) Burrows
- D) Gastroliths

Answer: C – Burrows

24. **Rapid burial in sediment is a critical condition for fossilization because it?**

- A) Enhances mineral replacement
- B) Prevents scavenging and weathering
- C) Increases body temperature
- D) Promotes soft tissue decay

Answer: B – Prevents scavenging and weathering

25. **Lagerstätten are fossil sites characterized by?**

- A) Abundant igneous rocks
- B) Exceptional preservation of soft tissues
- C) Complete absence of invertebrates
- D) Only mammalian fossils

Answer: B – Exceptional preservation of soft tissues

26. **The Ediacaran Biota, found in the Proterozoic Eon, represents?**

- A) First hard-shelled organisms
- B) Complex, soft-bodied multicellular organisms
- C) Early flowering plants
- D) First vertebrate animals

Answer: B – Complex, soft-bodied multicellular organisms

27. **The first true mammals evolved from which group during the Triassic period?**

- A) Therapsid reptiles
- B) Cynodont synapsids
- C) Theropod dinosaurs
- D) Pelycosaur

Answer: B – Cynodont synapsids

28. **Which group first evolved the amniotic egg, allowing reproduction away from water?**

- A) Amphibians
- B) Reptiles
- C) Bony fishes
- D) Synapsids

Answer: B – Reptiles

29. **The evolution of jaws in vertebrates was a major innovation that arose from?**

- A) Fusion of skull bones
- B) Modification of gill arches
- C) Elongation of the notochord
- D) Development of paired fins

Answer: B – Modification of gill arches

30. **According to the Tritubercular Theory, the tribosphenic molar is characterized by?**

- A) A single linear row of cusps
- B) A triangular arrangement of cusps with a crushing heel
- C) Extremely high crown height
- D) Fusion of cusps into transverse lophs

Answer: B – A triangular arrangement of cusps with a crushing heel

31. **In mammalian dental terminology, the suffix "-conid" refers to cusps on which jaw?**

- A) Upper jaw
- B) Lower jaw
- C) Premaxilla
- D) Maxilla

Answer: B – Lower jaw

32. **Selenodont molars, characterized by crescent-shaped ridges, are primarily adapted for?**

- A) Shearing meat
- B) Crushing insects

- C) Grinding fibrous plant material
- D) Tearing flesh

Answer: C – Grinding fibrous plant material

33. **Hypsodont teeth, which are high-crowned, are an adaptation for?**

- A) Browsing on soft leaves
- B) Grazing on abrasive grasses
- C) Piercing and holding prey
- D) Crushing hard-shelled prey

Answer: B – Grazing on abrasive grasses

34. **The evolution of elephants (Proboscidea) shows a clear trend of?**

- A) Decrease in body size
- B) Reduction in tusk size
- C) Increase in body size and molar complexity
- D) Loss of the proboscis

Answer: C – Increase in body size and molar complexity

35. **Moeritherium, an early proboscidean from the late Eocene, is characterized by?**

- A) A long trunk and large tusks
- B) Small size, no trunk, and bilophodont molars
- C) Fully modern elephant dentition
- D) Complete loss of incisors

Answer: B – Small size, no trunk, and bilophodont molars

36. **Gomphotherium is distinguished by which dental feature?**

- A) Single transverse ridge on molars
- B) Trilophodont molars and shovel-like lower tusks
- C) Complete absence of enamel on tusks
- D) Hypsodont molars with 30 lamellae

Answer: B – Trilophodont molars and shovel-like lower tusks

37. **Mammuthus (mammoth) were cold-adapted proboscideans with molars specialized for?**

- A) Browsing soft fruits
- B) Grinding tough, silica-rich tundra grasses
- C) Filter-feeding aquatic plants
- D) Crushing woody stems

Answer: B – Grinding tough, silica-rich tundra grasses

38. **The evolutionary history of camels (Camelidae) originated on which continent?**

- A) Asia
- B) Africa
- C) South America

Zoogeography

1. The specialized branch of biogeography that focuses exclusively on the geographical distribution of animals is called?

- A) Phytogeography
- B) Ecology
- C) Zoogeography
- D) Paleontology

Answer: C – Zoogeography

2. Who is widely regarded as the "father of modern zoogeography" for his classical work on the distribution of mammals?

- A) P.L. Sclater
- B) Alfred Wegener
- C) Charles Darwin
- D) A.R. Wallace

Answer: D – A.R. Wallace

3. The total range of environmental conditions within which an organism can survive, grow, and reproduce is termed?

- A) Ecological niche
- B) Habitat specificity
- C) Ecological valency
- D) Tolerance range

Answer: C – Ecological valency

4. Animals possessing a broad ecological valency and capable of inhabiting a wide variety of habitats are called?

- A) Stenotopic
- B) Eurytopic
- C) Endemic
- D) Specialized

Answer: B – Eurytopic

5. The branch of zoogeography that deals with the application of animal distribution knowledge for public health, agriculture, and biological control is called?

- A) Causal zoogeography
- B) Descriptive zoogeography
- C) Applied zoogeography
- D) Historical zoogeography

Answer: C – Applied zoogeography

6. The branch of zoogeography that investigates how current environmental factors like climate, competition, and predation determine the realized distribution of species is?

- A) Historical zoogeography
- B) Ecological zoogeography
- C) Experimental zoogeography
- D) Systematic zoogeography

Answer: B – Ecological zoogeography

7. The branch of zoogeography that employs controlled experiments, translocations, and introductions to test hypotheses about species dispersal is known as?

- A) Descriptive zoogeography
- B) Ecological zoogeography
- C) Experimental zoogeography
- D) Faunistic zoogeography

Answer: C – Experimental zoogeography

8. Reconstructing the evolutionary history of animal distributions using fossils, phylogenetics, and paleogeography is the primary focus of?

- A) Applied zoogeography
- B) Ecological zoogeography
- C) Historical zoogeography
- D) Chorological zoogeography

Answer: C – Historical zoogeography

9. The sub-branch of descriptive zoogeography that deals with the discovery, inventory, and documentation of species within a defined region is called?

- A) Biocoenotic zoogeography
- B) Chorological zoogeography
- C) Systematic zoogeography
- D) Faunistic zoogeography

Answer: D – Faunistic zoogeography

10. The study of the geographical distribution and dynamics of entire animal communities (biocoenoses) across environmental gradients is termed?

- A) Faunistic zoogeography
- B) Biocoenotic zoogeography
- C) Systematic zoogeography
- D) Chorological zoogeography

Answer: B – Biocoenotic zoogeography

11. The pattern of animal distribution characterized by a species occurring across most or all of the world wherever suitable habitat exists is known as?

- A) Discontinuous distribution

- B) Endemic distribution
- C) Cosmopolitan distribution
- D) Isolated distribution

Answer: C – Cosmopolitan distribution

12. Animals with narrow, specific ecological requirements that confine them to particular habitats are termed?

- A) Eurytopic
- B) Cosmopolitan
- C) Stenotopic
- D) Eurythermal

Answer: C – Stenotopic

13. The distribution pattern where closely related taxa are found in two or more widely separated geographic areas with no populations in between is called?

- A) Cosmopolitan
- B) Discontinuous (Disjunct)
- C) Bipolar
- D) Continuous

Answer: B – Discontinuous (Disjunct)

14. The presence of lungfishes (Protopterus in Africa, Lepidosiren in South America, and Neoceratodus in Australia) is a classic example of which distribution pattern?

- A) Cosmopolitan
- B) Endemic
- C) Bipolar
- D) Discontinuous

Answer: D – Discontinuous

15. According to Darlington, the mechanism of discontinuous distribution where a population disappears from the central part of a formerly continuous range is called?

- A) Dispersal across barriers
- B) Vicariance
- C) Extinction in intermediate regions
- D) Adaptive radiation

Answer: C – Extinction in intermediate regions

16. The physical splitting of a continuous range due to the emergence of a new barrier like continental rifting or mountain uplift is known as?

- A) Dispersal
- B) Vicariance
- C) Endemism
- D) Migration

Answer: B – Vicariance

17. A species that is naturally restricted to a specific geographic region and not found anywhere else is said to have which type of distribution?

- A) Cosmopolitan
- B) Discontinuous
- C) Endemic
- D) Bipolar

Answer: C – Endemic

18. The Nilgai (Indian subcontinent), Giraffe (Africa), and Sloths (Neotropical region) are characteristic examples of which distribution pattern?

- A) Cosmopolitan
- B) Discontinuous
- C) Isolated
- D) Endemic

Answer: D – Endemic

19. Monotremes (egg-laying mammals) largely confined to Australia and New Guinea exemplify which type of animal distribution?

- A) Cosmopolitan
- B) Discontinuous
- C) Isolated
- D) Bipolar

Answer: C – Isolated

20. The distribution pattern exhibited by animals found in both Arctic and Antarctic regions but absent from intervening tropical zones is called?

- A) Endemic
- B) Discontinuous
- C) Bipolar
- D) Isolated

Answer: C – Bipolar

21. Which of the following is an example of a topographic barrier that separates the Palearctic and Oriental faunas?

- A) Sahara Desert
- B) Himalayas
- C) Atlantic Ocean
- D) Ural Mountains

Answer: B – Himalayas

22. The Sahara Desert acts as a sharp faunal boundary between which two zoogeographical regions?

- A) Nearctic and Neotropical
- B) Palearctic and Ethiopian

Wildlife

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1. The study of relationships between organisms and their environment is called?

- A) Biodiversity
- B) Ecology
- C) Biosphere
- D) Zoology

Answer: B – Ecology

2. The variety of organisms within a particular habitat is known as?

- A) Alpha diversity
- B) Beta diversity
- C) Gamma diversity
- D) Delta diversity

Answer: A – Alpha diversity

3. A species native and restricted to a particular area is called?

- A) Exotic
- B) Feral
- C) Endemic
- D) Extinct

Answer: C – Endemic

4. Which conservation status faces extremely high risk of extinction?

- A) Vulnerable
- B) Endangered
- C) Critically Endangered
- D) Near Threatened

Answer: C – Critically Endangered

5. Conservation outside natural habitats is termed as?

- A) In-situ conservation
- B) Ex-situ conservation
- C) Sustainable use
- D) Habitat restoration

Answer: B – Ex-situ conservation

6. The natural home of an organism is its?

- A) Niche
- B) Territory
- C) Habitat
- D) Home range

Answer: C – Habitat

7. Regular seasonal two-way movement between areas is called?

- A) Dispersal
- B) Migration

C) Homing

D) Philopatry

Answer: B – Migration

8. An animal that eats only plants is called?

- A) Carnivore
- B) Omnivore
- C) Herbivore
- D) Insectivore

Answer: C – Herbivore

9. Maximum individuals an environment can support is?

- A) Population density
- B) Carrying capacity
- C) Limiting factor
- D) Mortality rate

Answer: B – Carrying capacity

10. Regulation of body temperature by physiological means is?

- A) Poikilothermy
- B) Homeothermy
- C) Hibernation
- D) Aestivation

Answer: B – Homeothermy

11. A species with disproportionately large effect on ecosystem is called?

- A) Flagship species
- B) Keystone species
- C) Umbrella species
- D) Indicator species

Answer: B – Keystone species

12. The International conservation organization founded in 1961 is?

- A) IUCN
- B) WWF
- C) CITES
- D) UNEP

Answer: B – WWF

13. A wetland of international importance is called?

- A) Biosphere reserve
- B) Ramsar site
- C) National park
- D) Game reserve

Answer: B – Ramsar site



14. The branch of zoology dealing with birds is?

- A) Herpetology
- B) Ornithology
- C) Ichthyology
- D) Entomology

Answer: B – Ornithology

15. Non-living components of environment are called?

- A) Biotic factors
- B) Abiotic factors
- C) Edaphic factors
- D) Environmental factors

Answer: B – Abiotic factors

16. The linear sequence of energy transfer in an ecosystem is?

- A) Food web
- B) Trophic level
- C) Food chain
- D) Biomass pyramid

Answer: C – Food chain

17. Which principle states wildlife has worth independent of human utility?

- A) Intergenerational equity
- B) Public trust doctrine
- C) Intrinsic value principle
- D) Anthropocentrism

Answer: C – Intrinsic value principle

18. The variety of life at genetic, species and ecosystem levels is?

- A) Ecology
- B) Biodiversity
- C) Biosphere
- D) Niche

Answer: B – Biodiversity

19. The leading cause of contemporary wildlife declines is termed?

- A) Natural selection
- B) The sixth mass extinction
- C) Genetic erosion
- D) Ecological succession

Answer: B – The sixth mass extinction

20. Introduction of species that outcompete natives is called?

- A) Habitat fragmentation
- B) Overexploitation
- C) Invasive alien species

D) Pollution

Answer: C – Invasive alien species

21. A protected area with minimal human disturbance for science is IUCN Category?

- A) Ia
- B) II
- C) IV
- D) VI

Answer: A – Ia

22. Moving species to new areas due to climate change is called?

- A) Reintroduction
- B) Reinforcement
- C) Assisted colonization
- D) Translocation

Answer: C – Assisted colonization

23. The population assessment method involving capture and recapture is?

- A) Transect survey
- B) Camera trapping
- C) Capture-mark-recapture
- D) Acoustic monitoring

Answer: C – Capture-mark-recapture

24. The national park known for Himalayan Brown Bear in Pakistan is?

- A) Khunjerab
- B) Deosai
- C) Hingol
- D) Lal Suhanra

Answer: B – Deosai

25. The critically endangered mammal of Indus River is?

- A) Snow leopard
- B) Markhor
- C) Indus River dolphin
- D) Balochistan bear

Answer: C – Indus River dolphin

26. The veterinary drug causing vulture decline is?

- A) Penicillin
- B) Ivermectin
- C) Diclofenac
- D) Paracetamol

Answer: C – Diclofenac

27. The largest freshwater lake in Pakistan is?

- A) Haleji Lake
- B) Keenjhar Lake

Conservation Biology

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1. Conservation biology is best defined as which of the following?

- A) The study of animal behavior in the wild.
- B) The science of protecting and restoring biodiversity.
- C) The management of zoos and captive breeding.
- D) A discipline focused only on saving popular species.

Answer: The science of protecting and restoring biodiversity.

2. What are the three main levels at which biodiversity is measured?

- A) Species, community, ecosystem.
- B) Genetic, species, ecosystem.
- C) Individual, population, landscape.
- D) Cellular, organismal, ecological.

Answer: Genetic, species, ecosystem.

3. Which human activity is considered the single greatest threat to biodiversity worldwide?

- A) Overharvesting.
- B) Climate change.
- C) Habitat loss and fragmentation.
- D) Introduction of invasive species.

Answer: Habitat loss and fragmentation.

4. What term describes the number of different species in a given area?

- A) Genetic diversity.
- B) Species richness.
- C) Ecosystem diversity.
- D) Population density.

Answer: Species richness.

5. An endangered species is officially defined as one that is:

- A) Likely to become threatened in the near future.
- B) Restricted to a very small geographic range.
- C) In immediate danger of extinction throughout all or much of its range.
- D) No longer found in the wild.

Answer: In immediate danger of extinction throughout all or much of its range.

6. The process by which pollutants become more concentrated in successive trophic levels is called:

- A) Bioaccumulation.
- B) Eutrophication.
- C) Biological magnification.

D) Genetic drift.

Answer: Biological magnification.

7. What is the minimum viable population (MVP)?

- A) The largest population an environment can support.
- B) The smallest population size that can avoid extinction in the foreseeable future.
- C) The number of individuals in a habitat fragment.
- D) The effective breeding population size.

Answer: The smallest population size that can avoid extinction in the foreseeable future.

8. Which formula is used to estimate the effective population size (N_e)?

- A) $N_e = N_m + N_f$.
- B) $N_e = (4N_mN_f)/(N_m + N_f)$.
- C) $N_e = N_t / 2$.
- D) $N_e = N_m \times N_f$.

Answer: $(4N_mN_f)/(N_m + N_f)$.

9. What does an "extinction vortex" describe?

- A) A rapid increase in population size.
- B) The interaction of small population size, genetic drift, and inbreeding leading to extinction.
- C) The natural background rate of species loss.
- D) The process of habitat fragmentation.

Answer: The interaction of small population size, genetic drift, and inbreeding leading to extinction.

10. Biodiversity hotspots are characterized primarily by having:

- A) Very low human population density.
- B) High numbers of endemic species under significant threat.
- C) The world's largest protected areas.
- D) Extremely stable climatic conditions.

Answer: High numbers of endemic species under significant threat.

11. Which greenhouse gas is primarily responsible for the anthropogenic enhancement of Earth's natural greenhouse effect?

- A) Methane (CH_4).
- B) Nitrous oxide (N_2O).
- C) Carbon dioxide (CO_2).
- D) Ozone (O_3).

Answer: Carbon dioxide (CO_2).



12. The primary cause of stratospheric ozone depletion is the release of:

- A) Carbon dioxide from burning fossil fuels.
- B) Sulfur dioxide from industrial processes.
- C) Chlorofluorocarbons (CFCs).
- D) Methane from agriculture.

Answer: Chlorofluorocarbons (CFCs).

13. What is the main cause of seasonal "dead zones" in coastal waters, such as in the Gulf of Mexico?

- A) Oil spills.
- B) Thermal pollution from power plants.
- C) Nutrient runoff leading to eutrophication.
- D) Direct dumping of industrial waste.

Answer: Nutrient runoff leading to eutrophication.

14. What conservation strategy involves an extensive region with a strictly protected core surrounded by buffer zones allowing sustainable use?

- A) Habitat corridor.
- B) Biodiversity hotspot.
- C) Zoned reserve.
- D) Ex situ conservation.

Answer: Zoned reserve.

15. The innate human emotional connection to and desire to affiliate with nature and other life forms is termed:

- A) Biophobia.
- B) Biodiversity.
- C) Biophilia.
- D) Bioethics.

Answer: Biophilia.

16. Acid precipitation is primarily caused by atmospheric emissions of:

- A) Carbon monoxide and ozone.
- B) Sulfur oxides and nitrogen oxides.
- C) Methane and CFCs.
- D) Particulate matter and lead.

Answer: Sulfur oxides and nitrogen oxides.

17. Which of the following is a key example of an ecosystem service?

- A) Production of timber.
- B) Water purification by wetlands.
- C) Revenue from ecotourism.
- D) Genetic material for crop breeding.

Answer: Water purification by wetlands.

18. The decline of the Illinois greater prairie chicken population was primarily reversed by:

- A) Banning hunting.
- B) Reducing pesticide use.
- C) Translocating birds to increase genetic variation.
- D) Creating large habitat corridors.

Answer: Translocating birds to increase genetic variation.

19. Dams and water diversions primarily threaten aquatic biodiversity by causing:

- A) Increased water temperature.
- B) Habitat loss and fragmentation.
- C) Introduction of invasive species.
- D) A decrease in water pH.

Answer: Habitat loss and fragmentation.

20. The rosy periwinkle (*Catharanthus roseus*) is significant in conservation because it provides:

- A) High-quality timber.
- B) Alkaloids used to treat leukemia and Hodgkin's lymphoma.
- C) A model for genetic studies.
- D) Excellent erosion control.

Answer: Alkaloids used to treat leukemia and Hodgkin's lymphoma.

21. The "critical load" for an ecosystem refers to the amount of a pollutant, such as nitrogen, that:

- A) Causes immediate species extinction.
- B) Can be absorbed without damaging ecosystem integrity.
- C) Is needed for optimal plant growth.
- D) Is released annually by human activities.

Answer: Can be absorbed without damaging ecosystem integrity.

22. Which international treaty is specifically aimed at phasing out ozone-depleting substances?

- A) Kyoto Protocol.
- B) Paris Agreement.
- C) Montreal Protocol.
- D) Convention on Biological Diversity.

Answer: Montreal Protocol.

23. The study of organisms and their interactions within urban environments is called:

- A) Landscape ecology.
- B) Urban ecology.
- C) Conservation biology.
- D) Restoration ecology.

Answer: Urban ecology.



24. The primary purpose of creating movement corridors between habitat fragments is to:

- A) Increase edge effects.
- B) Promote dispersal and genetic exchange.
- C) Isolate predator populations.
- D) Facilitate human recreation.

Answer: Promote dispersal and genetic exchange.

25. Approximately what percentage of Earth's land surface is currently under some form of official protection?

- A) About 7%.
- B) About 15%.
- C) About 25%.
- D) About 50%.

Answer: About 7%.

26. The dramatic recovery of bird populations like the bald eagle and peregrine falcon followed the ban on which pesticide?

- A) PCBs.
- B) DDT.
- C) Lead shot.
- D) Atrazine.

Answer: DDT.

27. Sustainable development is defined as meeting the needs of the present:

- A) By maximizing economic growth.
- B) Without compromising the ability of future generations to meet their own needs.
- C) Through technological innovation alone.
- D) Primarily by protecting all natural areas from human use.

Answer: Without compromising the ability of future generations to meet their own needs.

28. Which trophic level is most severely affected by the biological magnification of toxins like PCBs or mercury?

- A) Primary producers.
- B) Primary consumers.
- C) Secondary consumers.
- D) Top-level carnivores.

Answer: Top-level carnivores.

29. The primary anthropogenic sources of increased fixed nitrogen in the biosphere are:

- A) Volcanic eruptions and lightning.
- B) Industrial fertilizers and fossil fuel combustion.
- C) Natural nitrogen-fixing bacteria.
- D) Decomposition of organic matter.

Answer: Industrial fertilizers and fossil fuel combustion.

30. The current rapid increase in atmospheric CO₂ concentration is mainly due to:

- A) Volcanic activity.
- B) Burning of fossil fuels and deforestation.
- C) Cellular respiration by all organisms.
- D) Ocean outgassing.

Answer: Burning of fossil fuels and deforestation.

31. What defines an invasive (introduced) species?

- A) A species that is native but very abundant.
- B) A non-native species that spreads rapidly and harms native communities.
- C) Any species that is endangered.
- D) A species that increases local biodiversity.

Answer: A non-native species that spreads rapidly and harms native communities.

32. The catastrophic decline of the Atlantic bluefin tuna is a classic example of which threat?

- A) Habitat loss.
- B) Overharvesting.
- C) Climate change.
- D) Pollution.

Answer: Overharvesting.

33. The main ecological benefit of establishing marine reserves is to:

- A) Increase immediate fishing yields within the reserve.
- B) Allow fish populations to recover and "spill over" into adjacent areas.
- C) Facilitate deep-sea mining operations.
- D) Serve as dumping grounds for waste.

Answer: Allow fish populations to recover and "spill over" into adjacent areas.

34. Small populations lose genetic diversity primarily due to:

- A) Increased mutation rates.
- B) Inbreeding and genetic drift.
- C) Stronger natural selection.
- D) High levels of gene flow.

Answer: Inbreeding and genetic drift.

35. The variety of different ecosystems on Earth is a measure of:

- A) Genetic diversity.
- B) Species diversity.
- C) Ecosystem diversity.



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1. At cytokinesis in plants, a structure phragmoplast is formed from vesicles which originate from.

- A) Lysosome
- B) Centriole
- C) Golgi complex
- D) Glyoxisomes

Answer: Golgi complex

2. An alpha helix is an example of ---- structure of proteins.

- A) Primary
- B) Secondary
- C) Tertiary
- D) Quaternary

Answer: Secondary

3. Central dogma of molecular biology is.

- A) DNA-RNA-Protein
- B) DNA-DNA-Protein
- C) RNA-Protein-DNA
- D) RNA-DNA-Protein

Answer: DNA-RNA-Protein

4. An enzyme---the activation energy of reaction.

- A) Lowers
- B) Raises
- C) Does not affect
- D) None of these

Answer: Lowers

5. Which cell type you will prefer to take nucleus for cloning?

- A) B-cell
- B) RBC
- C) Embryonic cell
- D) Sperm

Answer: Embryonic cell

6. Where do you transfer nucleus for cloning?

- A) Enucleated cell
- B) Enucleated egg
- C) Egg
- D) Sperm

Answer: Enucleated egg

7. With respect to outside, the inside of a neuron at rest is.

- A) More negatively charged
- B) More positively charged
- C) Same charges
- D) Zero electronic potential

Answer: More negatively charged

8. What is the normal resting potential of a neuron?

- A) -70 mv
- B) +70 mv
- C) 0 mv

D) -90 mv

Answer: -70 mv

9. What are the characters of stem cells?

- A) Self renewing
- B) Can differentiate into other cells
- C) Both a & b
- D) None of these

Answer: Both a & b

10. Prions are made of.

- A) Viruses
- B) DNA
- C) RNA
- D) Proteins

Answer: Proteins

11. Larva of sponges is called.

- A) Amphiblastula
- B) Trochophore
- C) Pinnaria
- D) Segetaria

Answer: Amphiblastula

12. Sycon belongs to class.

- A) Desmospongia
- B) Hexactinellida
- C) Calcarea
- D) Porifera

Answer: Calcarea

13. The class corals is.

- A) Anthozoa
- B) Scyphozoa
- C) Hydrozoa
- D) Actinozoa

Answer: Anthozoa

14. The true nervous system was first developed in.

- A) Annelida
- B) Cnidarians
- C) Flatworms
- D) Sponges

Answer: Flatworms

15. These are free living Platyhelminthes.

- A) Cestodes
- B) Trematodes
- C) Turbellaria
- D) Nematodes

Answer: Turbellaria

16. Which of the following are responsible to cause Klinefelter's syndrome?

- A) XO
- B) XXY
- C) XY

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D) XYY

Answer: XXY

17. Why there is no duplication of DNA between Meiosis I and Meiosis II?

- A) To produce genetically identical cells
- B) To increase genetic variability
- C) To reduce the chromosome number to haploid in the resulting daughter cells
- D) The chromosome duplicate twice during meiosis

Answer: To reduce the chromosome number to haploid in the resulting daughter cells

18. Why are there more males with color blindness than female?

- A) The gene is found on the Y chromosome
- B) The recessive gene is masked by another X chromosome in females
- C) Color blindness is an X linked dominant trait
- D) All the sons of an affected male have the disorder

Answer: The recessive gene is masked by another X chromosome in females

19. During meiosis the chromatids become daughter chromosomes during.

- A) Prophase I
- B) Metaphase II
- C) Anaphase II
- D) Telophase I

Answer: Anaphase II

20. Which of the following is correct with Aneuploidy?

- A) $3n+1$
- B) $4n+1$
- C) All individuals die before birth
- D) $2n+1$

Answer: $2n+1$

21. The genetic disorder sickle cell anemia is an example of.

- A) Pleiotropy
- B) Heterozygous dominance
- C) Epistasis
- D) Homozygous dominance

Answer: Pleiotropy

22. The X-ray diffraction studies by---played key role to the discovery of DNA structure.

- A) Watson & Crick
- B) Franklin
- C) Meselson & Stahl
- D) Chargaff

Answer: Franklin

23. Triplet code of CAT in DNA is represented as --- in mRNA and ---- in tRNA.

- A) GAA, CAT
- B) CAT, CAT
- C) GTA, CAU

D) GUA, CAU

Answer: GUA, CAU

24. Turner's syndrome.

- A) The cell contain 45 chromosomes
- B) 50% offspring inherit the disease
- C) There is an increased risk of hypertension
- D) The patient is below the average height

Answer: The cell contain 45 chromosomes

25. The following is a steroid hormone.

- A) Corticotrophin hormone (ACTH)
- B) Aldosteron
- C) Growth hormone
- D) Thyroid stimulating hormone (TSH)

Answer: Aldosteron

26. Insulin.

- A) Is secreted as pro-insulin
- B) Is steroid hormone
- C) Is required for glucose uptake in all tissues
- D) Increase the uptake of lipoprotein

Answer: Is secreted as pro-insulin

27. These are schizocoelic phyla.

- A) Porifera, Coelentrata & Platyhelminthes
- B) Annelida, Arthropoda & Mollusca
- C) Platyhelminthes, Aschelminthes & Annelida
- D) Arthropoda, Mollusca & Echinodermata

Answer: Annelida, Arthropoda & Mollusca

28. Petromyzon belongs to.

- A) Agnatha
- B) Gnathostomata
- C) Protochordata
- D) Eurochordata

Answer: Agnatha

29. Lateral line system is present in.

- A) Fish
- B) Frog
- C) Reptile
- D) Dinosaur

Answer: Fish

30. Classification of arthropods is based on number and structure of.

- A) Eyes and wings
- B) Body segments and appendages
- C) Muscles and ligaments
- D) Gills and hearts

Answer: Body segments and appendages

31. The uniqueness of adult echinoderms is due to.

- A) Penta-radial symmetry, hydrocoele
- B) Bilateral symmetry, hydrocoele
- C) Bilateral symmetry, endocoele
- D) Penta-radial symmetry, endocoele

Answer: Penta-radial symmetry, hydrocoele

32. The larval form of liver fluke has cilia.

- A) Redia
- B) Sporocyst



- C) Miracidium
- D) Metacercaria

Answer: Miracidium

33. Which of the following is evidence that molluscs and annelids may have a common ancestor?

- A) They have setae
- B) They have trochophore larva
- C) Neither group has lungs
- D) They include both marine and terrestrial animals

Answer: They have trochophore larva

34. The arboreal adaptations are those that help the animal to live in and on.

- A) Burrows
- B) Air
- C) Trees
- D) Rocks

Answer: Trees

35. Ctenoid scales are present on the bodies of.

- A) Chondrichthyes
- B) Osteichthyes
- C) Cyclostomes
- D) Myxini

Answer: Osteichthyes

36. This is not a characteristic of primates.

- A) Opposable digits
- B) A well developed cerebrum
- C) Binocular vision
- D) A cloaca

Answer: A cloaca

37. Birds that fly at high altitude need an especially efficient respiratory system because.

- A) At high altitude the air sacs do not function
- B) There is little oxygen in the atmosphere at high altitude
- C) At high altitude birds flap their wings faster
- D) There is little carbon dioxide at high altitude

Answer: There is little oxygen in the atmosphere at high altitude

38. When cell wall is removed from plant cell then it is called.

- A) Protoplast
- B) Protoplast
- C) Myoplast
- D) Prothallus

Answer: Protoplast

39. The virus used during cell fusion technique is.

- A) Rous sarcoma
- B) Influenza
- C) Retrovirus
- D) Sendai

Answer: Sendai

40. Nucleolar organizer contains ---- tRNA genes.

- A) 45
- B) 450

- C) 4500
- D) 2500

Answer: 450

41. Nucleolar organizer is separated from rest of chromosome by.

- A) Primary constriction
- B) Chromosome
- C) Secondary constriction
- D) Centromere

Answer: Secondary constriction

42. This chemical inhibits protein synthesis in prokaryotes.

- A) Amanitin
- B) Cycloheximide
- C) Penicillin
- D) Chloramphenicol

Answer: Chloramphenicol

43. Linker region have ---- base pairs when nucleosome repeat after every 200bp.

- A) 34
- B) 44
- C) 54
- D) 64

Answer: 54

44. Nucleic acid absorbs ultraviolet light at.

- A) 320 nm
- B) 260 nm
- C) 480 nm
- D) 660 nm

Answer: 260 nm

45. RNA polymerase III transcribe the genes of.

- A) tRNA
- B) mRNA
- C) rRNA
- D) All of these

Answer: tRNA

46. Re-initiation of DNA duplication within the same cycle is prevented in.

- A) Eukaryotes
- B) Prokaryotes
- C) Viroids
- D) Viruses

Answer: Eukaryotes

47. Thymine dimers damage in DNA is produced by - - radiations.

- A) Gamma
- B) Infra-red
- C) Ultraviolet
- D) All of these

Answer: Ultraviolet

48. Which one of the following is initiation codon?

- A) UGU
- B) UAG
- C) AUA