LIDETA SUB CITY ADMINISTRATION EDUCATION OFFICE
GRADE 12 BIOLOGY MODEL EXAMINATIONS
2016E.C/ 2024G.C

NUMBER OF QUESTIONS: 100 **TIME ALLOWED: - 2 HOURS**

GENERAL DIRECTIONS

THIS BOOKLET CONTAINS EXAMINATION BIOLOGY. IN THIS EXAMINATION, THERE ARE A TOTAL OF 100 MULTIPLE CHOICE QUESTIONS. CAREFULLY SELECT THE BEST ANSWER AND BLACKEN ONLY THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED. FOLLOW THE INSTRUCTIONS ON THE ANSWER SHEET AND THE EXAMINATION PAPER CAREFULLY. USE ONLY PENCIL TO MARK YOUR ANSWERS. YOUR ANSWER MARK SHOULD BE HEAVY AND DARK, COVERING THE ANSWER SPACE COMPLETELY. PLEASE ERASE ALL UNNECESSARY MARKS COMPLETELY FROM YOUR ANSWER SHEET.

YOU ARE ALLOWED TO WORK ON THE EXAM FOR 2 HOURS. WHEN TIME IS CALLED, YOU MUST IMMEDIATELY STOP WORKING, PUT YOUR PENCIL DOWN, AND WAIT FOR FURTHER INSTRUCTIONS.

ANY FORM OF CHEATING OR AN ATTEMPT TO CHEAT IN THE EXAMINATION WILL RESULT IN AN AUTOMATIC DISMISSAL FROM THE EXAMINATION HALL AND CANCELLATION OF YOUR SCORE (S).

PLEASE MAKE SURE THAT YOU HAVE WRITTEN ALL THE REQUIRED INFORMATION ON THE ANSWER SHEET BEFORE YOU START TO WORK ON THE EXAMINATION.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

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CHOOSE THE BEST ANSWER FROM THE SUGGESTED OPTIONS AND BLACKEN THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED.

1. The Ethiopian biological research institute which is conducting research on leprosy and other diseases is
   A. Armauer Hansen Research Institute C. The Institute of Biodiversity Conservation
   B. Aklilu Lemma Institute of Pathobiology D. Ethiopian Institute of Agricultural Research
2. This item is based on the following lists of structures of cells
   1. Chloroplast 2. Ribosome 3. endoplasmic reticulum
   4. cell wall 5. Mitochondria 6. vacuole
   Which of the following structures listed above are found in both plant and animal cells?
   A. 2, 3. 5 B. 1, 3, 6 C. 3, 4, 5 D. 2, 4, 6
3. Turgor pressure and plasmolysis happen in plants when
   A. the cell and the environment are isotonic, and environment is hypotonic respectively.
   B. excess water enters into the cells, and excess water is loss and shrinks the cells, respectively.
   C. excess water is lost from the cells and excess water enters into the cells, respectively.
   D. the cell is hypotonic, and the environment is hypertonic, respectively.
4. A grade 12 student wants to study onion epidermal cells using light microscope which of the following activities is correct during his observation? He
   A. stain the cells using iodine that reacts with the starch of the cells and turns blue black
   B. start to set up the microscope with the highest power lens in place
   C. stain the cells using Methylene blue that reacts and turns the nucleus blue
   D. focus the lenses to see ribosomes and mitochondria within the cell

   Item number 5 is based on the following structures involved in double circulation.
   1. Right atrium 5. Lungs
   2. Pulmonary vein 6. Left atrium
   3. Left ventricle 7. Right ventricle
   4. Pulmonary artery
5. The order of blood flow is:
   A. 1,6,4,5,7,3.2 B. 6, 3.4.5, 2, 1, 7 C.1,7,2.5,4,6,3 D.1.7.4, 5.2.6, 3
6. Which of the following end products of digestion pass into lacteals during absorption of food?
   A. Amino acids B. Glucose C. Fatty acids D. Vitamins
7. Which of the following is correct about the effect of altitude on breathing rate? At higher altitude breathing rate
   A. decreases because of the atmospheric pressure
   B. increases because of the low level of oxygen in the air
   C. decrease because of the high level of oxygen in the air
   D. increases because of the high level of carbon dioxide in the air
8. A student conducted an experiment on an unknown food item, He put a drop of specimen from the unknown food item on a clean sheet of filter paper using dropper. Then, he left the paper for few minutes; He found a spot where sample was placed while holding the paper against light coming in through window. What was the unknown food item?
   A. Lipid B. Vitamin C. Protein D. Carbohydrate

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9. The path followed by air as it enters the human body is:
   A. nose, trachea, bronchioles, bronchus, alveolus
   B. nose, bronchus, trachea, bronchioles, alveolus
   C. nose, bronchus, bronchioles, trachea, alveolus
   D. nose, trachea, bronchus, bronchioles, alveolus
10. Which of the following digestive processes is affected if the gall bladder is surgically removed?
   A. Digestion of proteins C. Digestion of carbohydrates
   B. Digestion of vitamins D. Digestion of lipids
11. Which of the following enzymes changes peptides into amino acids in the small intestine?
   A. Pepsin B. Trypsin C. Rennin D. Erepsin
12. Assume you wanted to demonstrate compatibility of blood groups. You took four test tubes labeled O, A, B, and AB based on the blood group that each test tube contains. Then you added unknown blood sample into each test tube and no agglutination was observed in each test tube. From this, you can conclude that the unknown blood sample was
   A. blood group B. B. blood group 0 C. blood group A. D. blood group AB
13. Which of the following diseases is different from others?
   A. Tuberculosis B. Measles C. Influenza D. Rabies
14. The technique of controlling microorganisms which involves heating followed by rapid cooling is called
   A. Pasteurization B. dry heat sterilization C. disinfection D. autoclave sterilization
15. Which of the following groups of plant lacks vascular tissue?
   A. Pteridophytes B. Gymnosperms C. Angiosperms D. Bryophytes
16. Suppose you are asked to classify a vertebrate whose skin is covered by hair. The animal should be grouped in class:
   A. Aves B. Mammalia C. Reptilia D. Amphibia
17. Biology student went to field to collect animals and grouped them into vertebrates and invertebrates. He collected the following organisms.
   1. Squid 4. Butterfly
   2. Earthworm 5. Shark
   3. Frog 6. Shrimp
   Which of the above organisms did he group as vertebrates?
   A. 3 and 5 B. 4 and 6 C. 2 and 3 D. l and 5
18. In a simple food chain secondary consumers occupy:
   A. 2^{nd} trophic level B. 3^{rd} trophic level C. 1^{st} trophic level D. 4^{th} trophic level
19. Which one of the following organisms converts nitrogen in the soil into ammonia?
   A. Nitrifying bacteria C. Putrefying bacteria
   B. Nitrogen fixing bacteria D. Denitrifying bacteria
20. Which of the following food chains can result in an inverted pyramid of numbers
   A. Grass → rabbit → foxes C. Tree → birds →parasites of birds
   B. Tree →monkeys → leopards D. Grass → Insect →birds
21. When a mother wants to make injera, first she prepares dough from teff powder and water. She leaves the dough for two or three day for
   A. Yeasts to produce ethanol C. Bacteria to produce water

B. Yeasts to produce carbon dioxide D. Bacteria to produce lactic acid

22. Before starting his actual experiment, Mendel let the pea plants to self-pollinate for a number of generations. This is in order to:
A. Observe how the plants germinate C. Study the conditions needed for their growth
B. Check if they fertile D. Test the purity of each variety for a chosen trait

23. In betta fish, alleles for color are incompletely dominant. Green fish have genotype AA, dark blue fish have genotype aa, and royal blue fish have genotype Aa. Two royal blue betta fish are crossed. What percentage of the offspring is expected to be green?
A. 0% B. 50% C. 25% D. 75%

24. Which type of cell division produces cells that are genetically identical to the parent cell?
A. Mitosis B. Meiosis C. Both mitosis and meiosis D. Neither mitosis nor meiosis

25. Which of the following is a correct pair of a neuron structure (nerve cell) and its functions?
A. Axon – contain nucleus C. Dendrites --- receives signals from the other nerve cells
B .Myelin sheath---- transfers impulse D. Cell body--- transmit impulse to dendrites

26. Short sight is a condition where a person has difficulty focusing on distant objects. What is the most common cause?
A. detached retina B. An elongated eyeball C. Damaged cornea
D. Cataracts

27. Which of the following hormone responsible for reducing high blood glucose level?
A. Glucagon B. Insulin C. Adrenaline D. thyroxine

28. Which of the following hormones has its deficiency results stunted growth and mental retardation.
A. Insulin B. Thyroxin C. Adrenaline D. Glucagon

29. What makes endocrine glands differ from exocrine glands? Endocrine glands:
A. do not have ducts whereas exocrine glands do have ducts
B. have ducts while exocrine glands do not have ducts
C. release their secretions through ducts to site of destination
D. are less in number in our body than exocrine glands

30. Female genital mutilation (FGM) is a harmful practice that can lead to serious health complications. Why is it important to raise awareness against FGM?
A. It has no health consequences. C. It violates human rights
B. It is not a cultural tradition. D. It is only practiced in certain countries.

31. Sweating is a physiological method of temperature regulation in homoiotherms. When sweat evaporates from the skin, it has a:
A. Warming effect C. Cooling effect
B. No effect on body temperature D. Increases blood pressure

32. Kidneys play a crucial role in maintaining water and ionic (salt) balance in the body by:
A. Reabsorbing needed water and electrolytes while excreting waste
B. Producing large amounts of urine regardless of hydration levels
C. Only regulating water balance but not ionic balance
D. Primarily excreting water and not reabsorbing anything

33. Which internal structures of leaves are responsible for gas exchange?
A. Cuticle B. Epidermis C. Stomata D. Palisade mesophyll

34. Auxin (IAA) is a plant hormone which involved in apical dominance. What will happen if it is removed from the tip of the plant? The plant

A. stops growth B. will die C. increase in height D. grows from the side or branch

35. How do plants uptake mineral salts through roots?

A. By active transport B. By passive diffusion C. By osmosis D. By translocation

36. How can the processes of germination in dicots and monocots be demonstrated?

A. By measuring seed weight C. By conducting a water absorption experiment

B. By observing changes in leaf shape D. By planting seeds and observing seedling growth

37. How are natural resources classified as renewable or non-renewable?

A. Based on their economic value C. Based on their biological origin

B. Based on their abundance in the environment D. Based on their ability to replenish over time

38. How was Ethiopian vegetation affected in history?

A. It remained unchanged throughout history

B. It experienced significant deforestation and land degradation

C. It expanded due to successful conservation efforts

D. It was unaffected by human activity

39. Which air pollutant can lead to acid rain?

A. Carbon dioxide and methane C. Sulphur dioxide and nitrogen oxide

B. Carbon dioxide and carbon mono oxide D. Methane and Sulphur oxide

40. When the pituitary gland release ADH into the kidney tubule?

A. The water level of the body is too low

B. The water level of the body is too high

C. The water level of the body is constant

D. The ion balance of the body is constant

41. Louis Pasteur, a famous scientist, used the scientific method to develop the process of pasteurization. Pasteurization involves heating liquids to kill harmful bacteria. Which step of the scientific method did Pasteur use when he observed that spoiled milk was teeming with microorganisms?

A. Testing the hypothesis C. Making an observation

B. Forming a hypothesis D. Drawing conclusions

42. Under what circumstances would a biologist use a petri dish?

A. To observe microorganisms under a microscope

B. To measure the acidity or alkalinity of a solution

C. To store and grow bacteria or fungi cultures

D. To conduct experiments involving electricity

43. One of a field tool in biology is a quadrat, which description is that the task of a quadrat in biology?

A. Show how the number of a particular species changes across an area

B. Judge the abundance of organisms under water

C. A small frame used for moving population estimation

D. Estimate the abundance of organisms on land

44. Afield biologist can measure the slope of an area by using

A. data logger B. Flow meter C. scalpels D. Theodolite

45. How is biological science relevant to food production?

A. It helps in developing new cooking recipes

B. It studies the nutritional value of different foods

C. It explores methods to increase crop yield and improve livestock production

D. It determines the best restaurants in town

46. Which of the properties of water allows mosquito larvae to protect themselves from sinking down into the water from the water surface?

A. Its high surface heat capacity C. Its low density in solid state

B. Its high latent heat of vaporization D. Its high surface tension

47. The four most abundant elements in biochemical molecules are:

A. Hydrogen, oxygen, carbon, and nitrogen C. Iron, calcium, sodium, and potassium

B. Sulfur, phosphorus, magnesium, and chlorine D. Helium, neon, argon, and krypton

48. Proteins are made up of chains of amino acids and have various functions such as:

A. Building and repairing tissues, enzymes, and hormones

B. Storing energy, insulation, and protection

C. Transporting oxygen, fighting disease, and clotting blood

D. Transporting oxygen and Storing energy

49. If α glucose reacts with galactose molecule in a condensation reaction, what will be the chemical formula of the disaccharide formed in this reaction?

A. $C_{12}H_{22}0_{11}$ B. $C_{12}H_{24}O_{12}$ C. $C_{10}H_{20}O_{10}$ D. $C_6H_{12}O_6$

50. Which of the following properties of enzymes make it possible that single enzyme molecule can act on many substrate molecules?

A. enzyme lower the activation energy C. enzymes are protein

B. enzyme reused over and over again D. enzymes are substrates specific

51. Enzymes can lower the activation energy required for a reaction to occur. This means the reaction:

A. Releases less energy C. Produces fewer products

B. Requires less heat to start D. Takes longer to complete

52. Allosteric enzymes have multiple binding sites. Allosteric regulation refers to the control of enzyme activity by the binding of regulatory molecules at sites other than the active site. What is the benefit of allosteric regulation?

A. It allows for fine-tuning of metabolic pathways

B. It makes enzymes less specific for their substrates.

C. It increases the activation energy of reactions

D. It has no significant effect on enzyme activity.

53. Enzymes are essential in many industries. For example, amylase is used in the:

A. starch conversion and dishwater detergents C. process of fruit juice

B. dissolving clots of heart attack patient D. Processing of nuclear waste

54. The Cell Theory states that all living things are composed of cells and the cell is the basic unit of life. Which statement is NOT part of the Cell Theory?

A. Cells contain hereditary information.

B. Living organisms can arise spontaneously from non-living matter.

C. Cells are the smallest units that can carry on all the activities of life.

D. New cells arise from pre-existing cells.

55. There are two main types of cells: prokaryotic and eukaryotic. Which of the following is a characteristic of all cells?

A. Circular DNA molecule C. Simple cell wall made of cellulose

B. Complex membrane-bound organelles D. Presence of cytoplasm

56. A cell organelle that serve as a cellular post office that labels and dispatches molecules is
A. Mitochondria B. Endoplasmic reticulum C. Golgi apparatus D. Ribosomes

57. The organelles of the cell which is concerned with the synthesis of lipid in addition to being association with carbohydrate metabolism and detoxification is
A. Golgi body C. Rough endoplasmic reticulum
B. thylakoid membrane D. smooth endoplasmic reticulum

58. Which of the following is used to begin the process of glycolysis?
A. Pyruvate B. NADH C. solar energy D. ATP

59. Which of the following is not a product of anaerobic respiration?
A. Carbon dioxide B. Water C. Alcohol D. Lactic acid

60. Photosystems are protein complexes within the thylakoids that contain chlorophyll pigments. What is the main function of a photosystem?
A. Capture light energy and convert it into usable forms
B. Fix carbon dioxide into organic molecules
C. Transport electrons in the electron transport chain
D. Break down glucose to release energy

61. Photorespiration is a process that occurs in some plants at high temperatures. It reduces the efficiency of photosynthesis. What molecule is taken up by plants during photorespiration?
A. Oxygen B. Carbon dioxide C. Water D. Glucose

62. Biotechnology is the use of living organisms or their products to create new products or processes. What is the ultimate goal of using biotechnology responsibly?
A. To create the most profit possible
B. To develop weapons and harmful products.
C. To improve human health and well-being while conserving natural resources.
D. To replace natural processes entirely.

63. Conservation of natural resources is crucial for a sustainable future. All are the contributions of biotechnology to resource conservation, except?
A. Developing crops that require less water
B. Creating biofuels from renewable sources
C. Using microorganisms for bioremediation of polluted environments
D. Encouraging excessive use of pesticides and herbicides

64. Biotechnology encompasses both traditional and modern methods. Which of the following is an example of a traditional use of biotechnology?
A. Genetically modified organisms (GMOs) C. Production of bread using yeast
B. Chemical synthesis of new drugs D. Nuclear power generation

65. Modern biotechnology offers a range of applications in agriculture. All are using genetic engineering to improve crops, except?
A. Increase resistance to pests and diseases
B. Improve tolerance to drought or other environmental stresses
C. Enhance nutritional value
D. Create crops that require excessive use of fertilizers

66. There are potential benefits and concerns associated with creating transgenic crops. Which of the following is a benefit of using transgenic crops?
   A. They may be more susceptible to pests and diseases.
   B. They may introduce allergens into the food supply.
   C. They can potentially reduce reliance on herbicides and pesticides
   D. They are not suitable for organic farming.
67. Bio pesticides are an alternative to traditional chemical pesticides. How do bio pesticides differ from chemical pesticides?
   A. They are typically less harmful to the environment.
   B. They are non-living things.
   C. They are more broad-spectrum and can kill a wider range of pests.
   D. They are always cheaper to produce.
68. In which of the following groups of organisms are all the members unicellular?
   A. Viruses B. Fungi C. Algae D. Bacteria
69. Which of the following is the correct sequence of the steps in the lysogenic cycle of viral replication?
   A. Adsorption → penetration → integration → Replication → maturation →release
   B. Adsorption → penetration → Replication → integration → maturation →release
   C. Adsorption → penetration → Replication →maturation → release
   D. Adsorption → penetration → Replication → maturation → integration →release
70. Suppose the half-life of carbon-14 is 6000 years and the age of the fossil was found to be18,000 years.What would be the amount of the carbon-14 left in the fossil?
   A. ¾ B. ½ C. ¼ D. 1/8
71. The fossil Ardipithecus ramidus was significant because it proves that
   A. The common ancestor of human and chimpanzees could not have resembled a chimpanzee
   B. The common ancestor of human and chimpanzees was like a gorilla
   C. The common ancestor of human and chimpanzees was intelligent
   D. There was not common ancestor of modern human and chimpanzees
72. Swiss starling lay four to five eggs, more young survive than when the female lays more or less than this number. The kind of natural selection operating is:
   A. directional selection C. disruptive selection
   B. stabilizing selection D. divergent selection
73. In the Miller and Urey's simulation experiment to study organic molecule formation in primitive atmosphere of the Earth, all the following gases are used except?
   A. Ammonia B. Oxygen C. Hydrogen D. Methane
74. Which of the following genetic disease is believed to be determined by a defect involving chromosome 21 in humans?
   A. cystic fibrosis C. Down's syndrome
   B. Turner syndrome D. Klinefelter syndrome
75. Lucy belongs to the species:
   A. ardipithecus B. afarensis C. ramidus D. africanus
76. Among the following fossil hominid species, which one has the largest cranial capacity?

A. Australopithecus C. Homo erectus
B. Homo habilis D. Homo sapiens

77. Which of the following is **not** a part of Darwin's theory of evolution?
A. Over reproduction C. Existence of natural variations
B. Use- and –disuse of body parts D. Competition for scarce resources

78. HIV treatment focuses on antiretroviral therapy (ART) which:
A. Reduces the risk of transmission C. Boosts the immune system to fight off HIV
B. Manages the virus by suppressing its replication D. Cures HIV completely

79. Which of the following is not a step of light- dependent reaction?
A. High-energy electrons move through electron transport chain
B. Pigments in photosystem II absorbs light
C. ATP synthase allows H^+ ions to pass through the thylakoid membrane
D. ATP and NADPH are used to produce sugars

80. To reduce six molecules of carbon dioxide to glucose via photosynthesis, how many molecules of NADPH and ATP is required in Calvin cycle?
A. 6 NADPH and 6 ATP C. 12 NADPH and 12 ATP
B. 12 NADPH and 18 ATP D. 24 NADPH and 18 ATP

81. During which stage of photosynthesis O_2 is produced?
A. Cyclic photophosphorylation C. Calvin cycle
B. The light dependent reaction involving photosystem II D. carbon fixation

82. Among the following reaction in C3,C4 and CAM Pathway, one similarly takes place in mesophyll cell:
A. Fixation of carbon dioxide C. Generation of ATP and NADP
B. Calvin cycle D. Sugar production

83. In which of the following pair's cellular respiration does substrate level phosphorylation occur?
A. Glycolysis and link reaction C. Krebs cycle and Glycolysis
B. Electron transport chain and Chemiosmosis D. Krebs cycle and link reaction

84. The products of anaerobic respiration in animal cells are
A. Ethanol, CO_2 and 2 ATP C. Lactic acid and 36 ATP
B. Ethanol, CO_2 and 36 ATP D. Lactic acid and 2 ATP

85. Plants that follow CAM photosynthetic pathway carry out the two stages of photosynthesis at different times. Which of the following products are formed during the night?
A. CO_2 and sugar C. Oxaloacetate and malate
B. ATP and NADPH D. Malate and sugar

86. Which of the following options represents the correct catabolic pathway of the given respiratory substrate?
A. Proteins→ammonia →amino acid →pyruvate →TCA
B. Lipids→glycerol→ acetyl-COA →pyruvate →TCA

C. Polysaccharides→glucose→acetyl-COA→pyruvate→TCA

D. Lipids→ fatty acids→ acetyl-COA→TCA

87. The rate of photorespiration is lower in C4 plants compared to C3 plants due to:

A. Higher temperature tolerance C. Enhanced CO_2 concentration near Rubisco
B. Increased water availability D. Greater chlorophyll content

88. Energy transformations in cells contribute to maintaining the CO_2 and O_2 balance in the atmosphere by:

A. Releasing CO_2 through photosynthesis C. Releasing O_2 through photosynthesis
B. Absorbing CO_2 through cellular respiration D. Absorbing O_2 through fermentation

89. The primary function of fermentation is to:

A. Convert glucose into pyruvate
B. Generate ATP through oxidative phosphorylation
C. Regenerate NAD+ for glycolysis to continue
D. Produce carbon dioxide and water as waste products

90. An absorption spectrum shows that chlorophyll a absorbs more blue and red light. What does this information suggest?

A. Chlorophyll a reflects blue and red light.
B. Chlorophyll a transmits blue and red light.
C. Chlorophyll a is most efficient at using blue and red light for photosynthesis.
D. Chlorophyll a cannot use blue and red light for photosynthesis.

91. How many molecules of PGA are produced for every three molecules of CO_2 fixed in the Calvin cycle?

A. 1 B. 2 C. 6 D. 3

92. Which molecule is regenerated at the end of the Calvin cycle to begin another cycle?

A. RuBP B. PGA C. G3P D. Glucose

93. C4 plants are more efficient than C3 plants under conditions of:

A. High light intensity C. Low CO_2 concentration
B. Low temperature D. High humidity

94. On which of the following points do Lamarck's and Darwin's theories of evolution agree?

A. Evolution occurs by natural selection C. All living things tend to over reproduce
B. Evolution produces new species D. New structures arise by use-and-disuse

95. What is the reproductive isolating mechanism called if two species of frogs do not interbreed because they cannot understand the mating calls of one another?

A. Habitat isolation C. Temporal isolation
B. Behavioral isolation D. hybrid sterility

96. Which of the following species isolating processes could lead to the evolution of a new species by the mechanism known as sympatric speciation?

A. A river that changed its course for many years
B. A new mountain range that was created many years ago
C. Populations of a species having different breeding time
D. A land mass that separated two water bodies for many years

97. Some archaea play a beneficial role in the environment. What is an example of this benefit?

A. They can cause food spoilage. C. They can break down pollutants.
B. They compete with beneficial bacteria. D. They disrupt the balance of ecosystems.

98. Fungi play a vital role in many ecosystems. Which of the following is NOT an economic benefit of fungi?
A. They decompose organic matter, returning nutrients to the soil.
B. Some fungi are used in food production
C. Certain fungi are used in medicine to produce antibiotics.
D. Fungi can be a source of fuel

99. Which mode of reproduction involves the exchange of genetic material between two paramecia?
A. Binary fission B. Budding C. Conjugation D. Spore formation

100. Which **of the following** pairs of diseases is most likely to be transmitted through the air?
A. Botulism and Salmonella C. Measles and Chicken pox
C. Athlete's foot and Ringworm D. Malaria and Leishmaniasis