

# Ch. 1: biology: exploring life

Literature, Russian Literature



Ch. 1: Biology: Exploring Life 1) Slides 1 and 2: What is the main difference between physiological adaptation (as in sense, respond and adapt to the environment) and evolutionary adaptation? Evolutionary adaptation occurs over generations. Evolutionary adaptation does involve genetic change but it's the change in traits as a result of genetic change that drives natural selection and evolutionary adaptation (just genetic change alone won't drive evolutionary change). Physiological adaptation is an adjustment to environmental stress. 2) Provide one example of physiological adaptation and one example of evolutionary adaptation (can be for any organism, including humans): Physiological adaptation: Examples of psychological adaptations in a human is : acclimated to adjust to environmental change in weather cold, hot and high altitudes without genetic change long-term acclamations when people lose excess body fat and are very slender for long periods of time a result of mild long-term undernourishment they will retain more body fat eventually becoming obese. They experience this when they initially lose body fat and again gain later when they retain it Tanning is a seasonal adaptation. Evolutionary adaptation: Eyes in front of head in humans instead of on side of head like other mammals. 3) Slide 3: Why is the nucleus of the cell in slide 3 so large? In other words, what is this cell doing that requires that its nucleus be so large? (Please be specific). In eukaryotic cell in slide #3 has organelles including a nucleus containing DNA and mitochondria energy organelles . Compared to the prokaryotic cell which has the DNA in the cytoplasm smaller and simpler and doesn't contain a nucleus or other organelles, it does have cell membrane. Bacteria and Archea are single celled prokaryotes. Slide #3 shows a white blood cell which produce

variation of antibodies to kill off pathogens, DNA is spread out in the white blood cell. Protein synthesis in the cell RNA to DNA has function. DNA is in the nucleus. The components in this type of cell has the nucleus, ribosomes , ER , cytoskeleton cell membrane. their function is to destroy pathogens (bacteria). 4) In comparison, why is the nucleus of our cheek cells so small? (please be specific). The nucleus controls the activity of the cell. The cell Membrane surrounds the nucleus of the cheek. cytoplasm in that nucleus bacteria smaller and compares you see them as small dark spots 5) From lab: What is the most obvious difference that you notice right away between our cheek cells (eukaryotic cells) and bacteria (prokaryotic cells) when viewed under the microscope? Obvious difference is the color and size 6) Slide 9: Name and briefly describe one emergent property, characteristic or function that emerges as we build structure from heart muscle cell to heart muscle tissue: strength structure size function property. Electronic charge it is alive, signal. 7) Name and briefly describe one emergent property, characteristic or function that emerges as we build structure from heart muscle tissue to heart: heart muscle has grown to pump 8) Name and briefly describe one emergent property, characteristic or function that emerges as we build structure from the heart to the cardiovascular system: pump blood through cardiovascular system 9) Regarding the process of evolution, which of the following is in the correct order (arrow means “ leads to”) a) genetic variation → biological variation → natural selection b) natural selection → biological variation → genetic variation c) biological variation → genetic variation → natural selection d) all of the above Answer D) all the above 10) Slide 11: Which color will the beetle population be in a year? Why? Dark

increasing frequency of traits within population that enhances survival and reproductive success in natural selection passes on successful traits to offspring. Chs. 2/3 (biochemistry/water) 11) From the perspective of our cells, what is the purpose of the digestive system? (please be specific). Digestion is the process in which food is broken down to its smaller components molecules(eg) carbohydrates are broken down into sugar molecules so that the cells can use them as raw materials for an energy and biosynthesis. 12) Which electrons in an atom or molecule contain the most energy? Electrons on the outer shell of the Atoms have more potential energy than the electrons on the inner shell 13) What would happen to an electron on the inner shell of a magnesium atom that absorbed solar energy? They move to higher outer shell. 14) What would happen to that same electron if it transferred its energy to another atom or molecule? It would go back to lower inner shell and energy level Will go back down. 15) Why does morphine stop pain? (please be specific): Morphine and Opiates resemble naturally occurring compounds in our brain tissue called endorphins and so can bond to endorphin receptors on surface of neurons. Structure in Shape is important. 16) What happens to enzymes if the pH of blood or body fluid becomes too acidic or too basic? What are the potential consequences? (please be specific): Enzymes lose shape , at high or low pH it is life threatening low blood pH means your blood contains too much acid, liver not working properly lower pH constricts Heart from oxygen intake.. Chs. 4/5: (Carbon/biological macromolecules) (beginning from slide 14) 17) What makes an amino acid " essential" ? There are 12 in the amino acid produced by the body. Eight our body does not produce and you get from

consumption. They perform critical biological roles including neurotransmitters transport and in synthesis, formation of body tissue and organs. 18) What do polypeptides/proteins look like when they first emerge from the ribosome? chain 19) Where in the cell are proteins synthesized? Initially in Ribosome. 20) Where in the cell do proteins fold and take on a three-dimensional shape? ER(Endoplasmic Reticulum) 21) Why is the 3-dimensional shape of proteins so important? It enables it to carry out particular function. 22) Describe what is happening in slide 17. What would happen to us if the antibody protein lost its shape? What physiological conditions might cause the antibody protein to lose its shape? (8 pts.) We would get sick if antibody lost its shape. If temperature were to go up or down, or if pH were to change (acidity were to change) it would cause antibody to lose its shape and we would get sick. 23) Slide 18: Trace sickle cell anemia from gene to protein to sickle cells to symptoms (8 pts.). The cell membrane delineates the cell, helps the cell sense its outside environment, identifies the cell to other cells, and “ talks” to other cells. Cell membrane proteins can be integral (within the membrane), or peripheral (adjacent to membrane). Some integral membrane proteins span the entire membrane; these are called transmembrane proteins. An example, receptor proteins help the cell sense and receive information from its outside environment. Signal transduction proteins transmit signals across its membrane and communicate with other cells. These proteins can also function transport of substances across membranes, cell-to-cell communication, and cell identification. The membrane proteins and cholesterol, which contribute to cell membrane structure and function. Transport proteins (e. g., channel

proteins) help substances (e. g., glucose & salts) to cross the cell membrane. Glycoproteins (protein-sugar molecules) on the cell surface identify the cell. Peripheral proteins usually have an enzymatic function (carry out signaling, biosynthesis or breakdown reactions). Sickle cell anemia is a genetic disease with severe symptoms, including pain and anemia. The disease is caused by a mutated version of the gene that helps make hemoglobin - a protein that carries oxygen in red blood cells. The mutations that cause sickle cell anemia can be traced from the DNA level up to the level of the whole organism. Someone carrying only one copy of the gene. She does not have the disease, but the gene that she carries still affects her, her cells, and her proteins: The mutation in the DNA slightly changes the shape of the hemoglobin molecule, allowing it to clump together. There are effects at Cellular level: When red blood cells carrying mutant hemoglobin are deprived of oxygen, they become " sickle-shaped" instead of the usual round shape . This shape can sometimes interrupt blood flow. There are negative effects at the whole organism level: Under conditions such as high elevation and intense exercise, a carrier of the sickle cell allele may occasionally show symptoms such as pain and fatigue.