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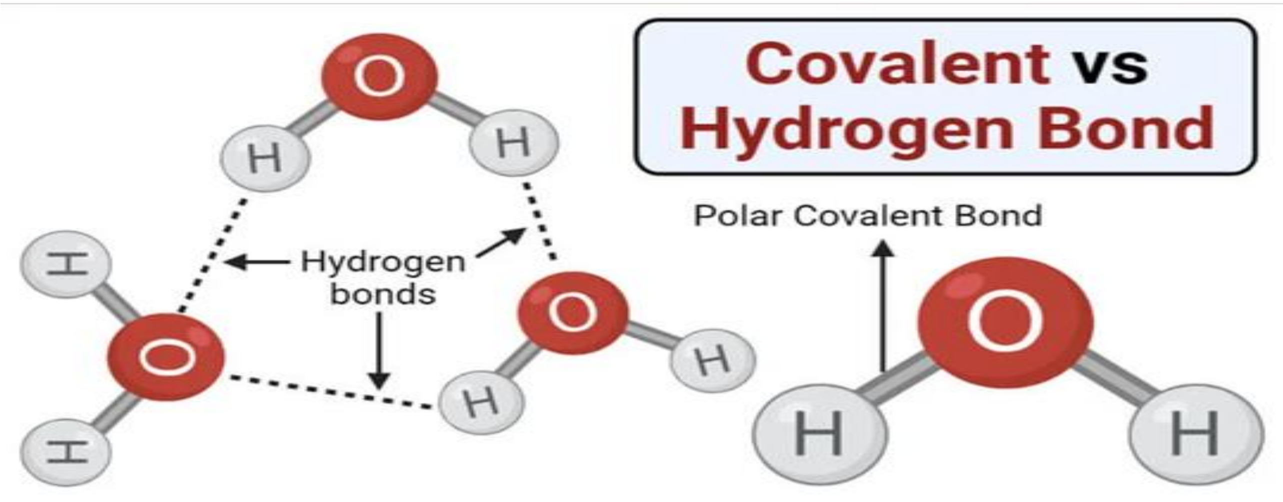
1 number question

Covalent bonds are strong chemical bonds, as we all know. The sharing of two atoms gives them their structure. They are most likely present in every biomolecule. Proteins, carbohydrates, lipids, and nucleic acids are a few examples. The stability of biomolecules' three-dimensional form is due to covalent bonding. due to their unique chemical characteristics. However, compared to covalent connections, hydrogen bonds are weaker. They play a significant part in the chemical bonds that hold together biomolecules. Though it is known to all that hydrogen bond is weaker than covalent connections yet hydrogen bonds are a crucial kind of chemical binding in biomolecules. Together with other electronegative atoms, oxygen or nitrogen can form hydrogen bonds. We know that the hydrogen atom has a partial positive charge then the electronegative atom has a partial negative charge. The electrostatic pull between the two atoms, which forms the hydrogen bond, structures it. I'll now go into detail on how two bonds help proteins, carbohydrates, lipids, and nucleic acids form biomolecules.



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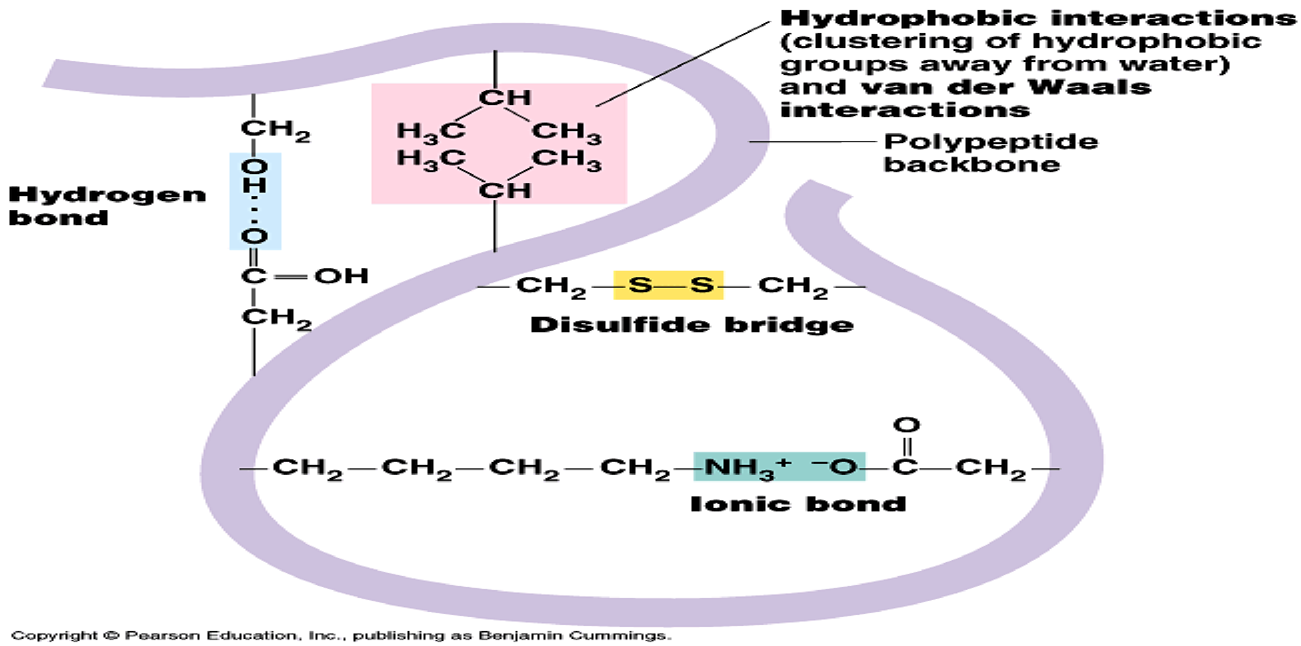
<u>Proteins:</u> Proteins are constructed from amino acids. Peptide covalent bonds hold them together. We know that the condensation process between the carboxyl group(-COOH) of one amino acid and the amino group(-NH2) of another amino acid results in the release in the release of a water molecule. For instance, the peptide bonds between amino acids in a protein like insulin keep the protein chain together and enable it to take on its distinct three-dimensional shape. The protein's ability to attach to particular receptors and control the metabolism of glucose depends on its structure. Elaine (2007), mentioned his protein structure model in the journal.



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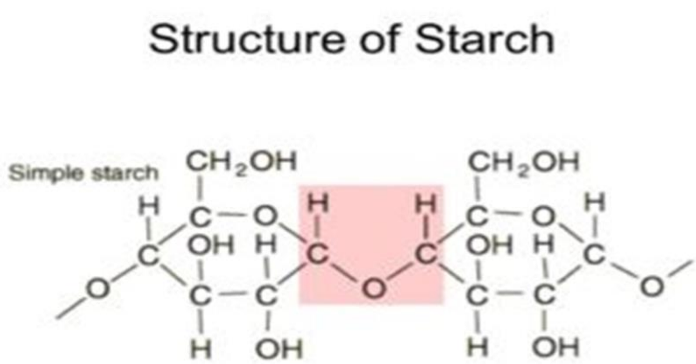
Carbohydrates: Glycosidic bonds, a type of covalent link, are found in carbohydrates like glucose. These bonds are created when the hydroxyl groups (-OH) of two different sugar molecules interact, releasing a water molecule. Carbohydrates' glycosidic linkages provide them with structural stability and support their function. One such polysaccharide is starch, which is made up of glucose units connected by -glycosidic linkages. Starch can function as an energy storage molecule in plants to the covalent connections that enable it to take the form of a compact, branching structure. Kobe (1997), mentioned his carbohydrate theory in the journal



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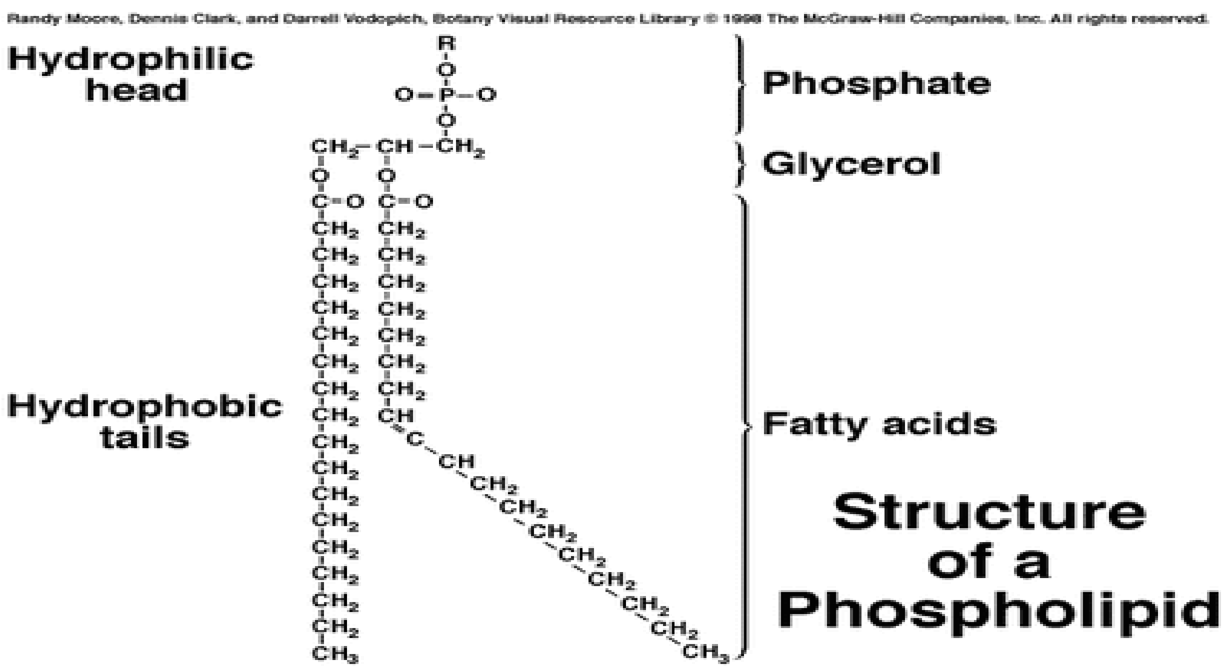
Lipids: Ester bonds, like those seen in triglycerides, are covalent connections between a molecule of glycerol and a fatty acid. To create the triglyceride molecule, the fatty acids are frequently joined to the glycerol backbone by ester bonds. Because of the covalent structure of ester bonds lipids are stable. It makes them effective energy storage molecules. As we know that phospholipids contain both polar and non-polar areas. They have a hydrophobic tail and a hydrophilic head in biological membranes. The hydrophobic interactions between the non-polar tails and the hydrogen bonds between the polar heads enable the development of stable lipid bilayers, which usually make up the structure of cell membranes. Schultz (1999), mentioned his lipid theory in the journal.



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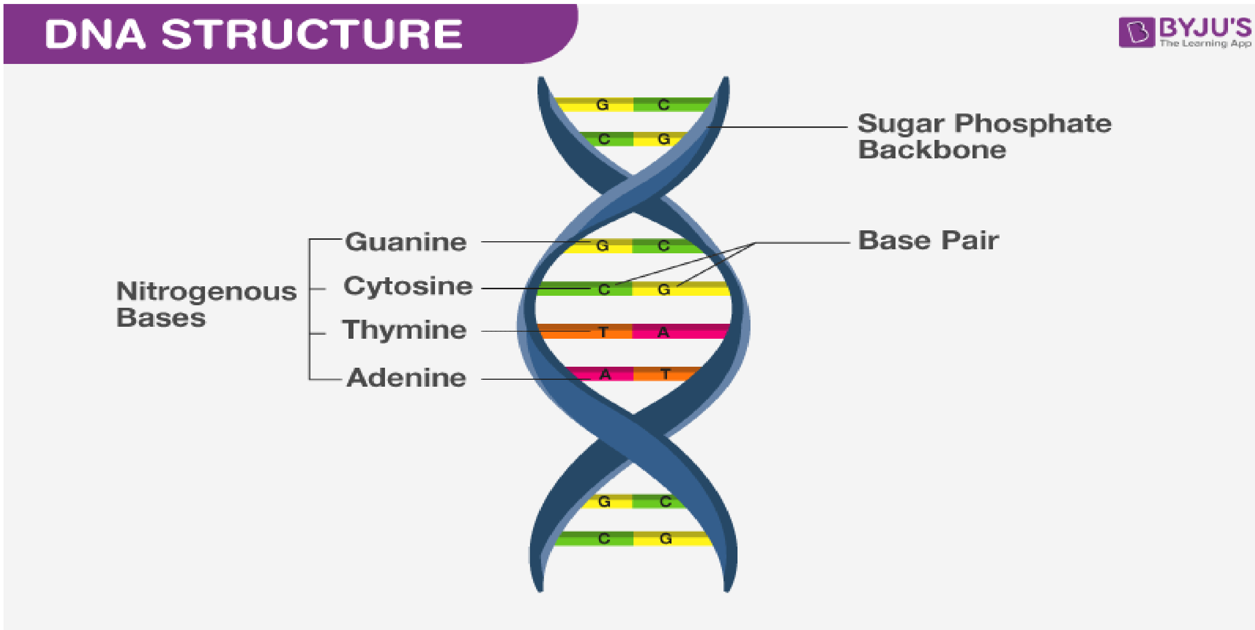
Nucleic acid: As we know that the covalent phosphodiester bonds usually join the sugar-phosphate backbones of the nucleotide units. For example, DNA, and RNA. These bonds are produced by the reaction between the 3'hydroxyl group of one nucleotide and the 5'phosphate group of another nucleotide. That releases a water molecule. Covalent phosphodiesters provide the nucleic acid structure, integrity, and stability allowing it to maintain its transmitted genetic information. For example, DNA's double helix structure is secured by the covalent phosphodiester bonds between its nucleotides. It enables accurate genetic information replication and storage. Eschenmoser (1999), mentioned his nucleic acid theory in the journal.



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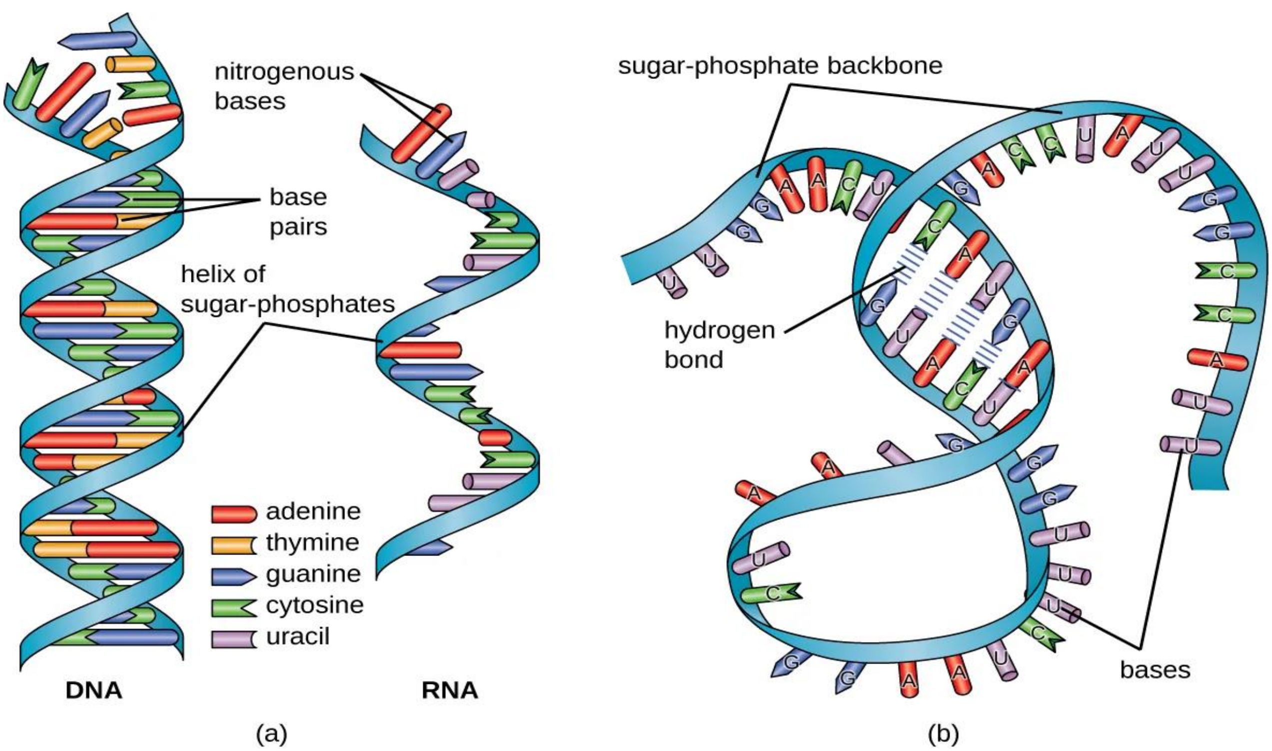


https://www.google.com

References:

- Elaine, G. A. (2007). Protein Structure. *The American Biology Teacher*, *69*(1), 38-40. https://doi.org/10.2307/4452080
- Kobe, R. K. (1997). Carbohydrate Allocation to Storage as a Basis of Interspecific Variation in Sapling Survivorship and Growth. *Oikos*, *80*(2), 226-233. https://doi.org/10.2307/3546590
- Schultz, D. L. (1999). Population Structure, Reproduction, and Lipid Cycling in the Dusky Shiner (Notropis cummingsae) in Contrasting Sreams. *Copeia 1993*(3), 669-683. https://doi.org/10.2307/1447599
- Eschenmoser, A. (1999). Chemical Etiology of Nucleic Acid Structure. *Science*, *284*(5423), 2118-2124. http://www.jstor.org/stable/2898416

Artificial intelligence, known as selective breeding where humans select certain organisms with desirable traits and pass them on to those traits to future generations. It is basically known as a "guided evolution". Over time, it causes alterations in the genetic makeup of a population. Natural and artificial selection differ greatly from one another. Because of this, artificial selection used by humans has a big impact on how populations' genetic features are shaped.

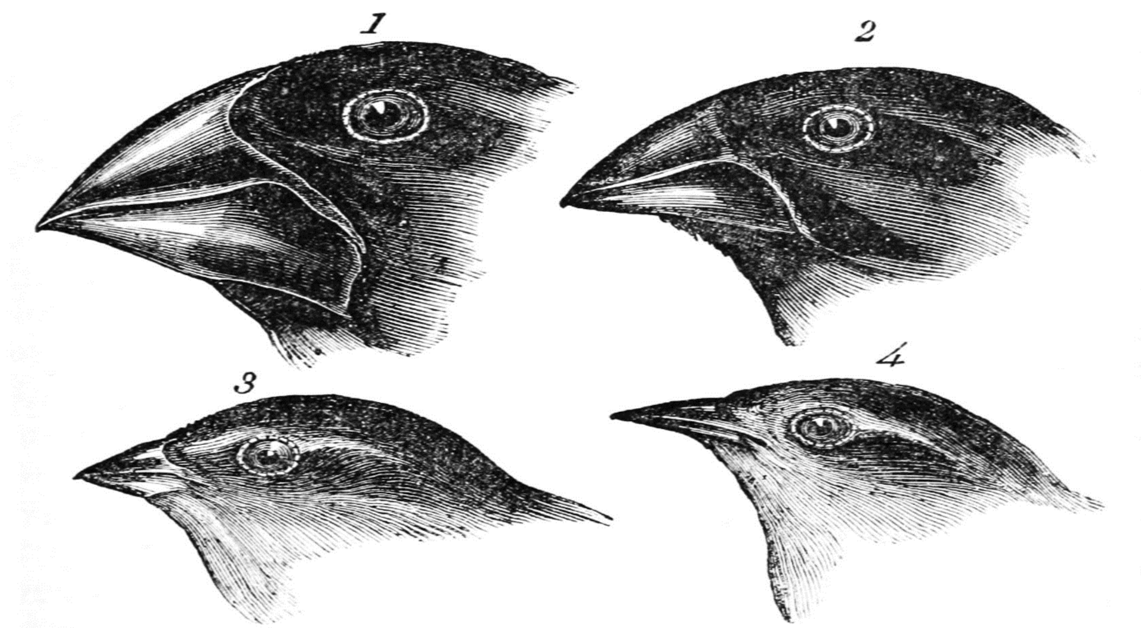
Selection criteria: Natural selection uses the environment as the selective pressure to determine which individuals have a higher chance of surviving and procreating based on their attributes. As a result, adaptations emerge that raise the likelihood of both survival and reproductive success. In contrast, humans choose the selection criteria in an artificial selection based on their tastes or predetermined objectives. Regardless of the natural environment, traits that are thought to be desirable or advantageous are purposefully chosen, such as improved agricultural yield, certain physical characteristics, or particular behaviors.

Selective Pressure: The selective pressures in natural selection are frequently erratic and change over time. Predation, resource competition, sickness, climate change, and other factors all affect an individual's ability to reproduce and survive. In artificial selection, human intervention—typically through managed breeding programs—imposes selective pressure. Humans choose people who possess the desirable traits, ensuring that the desired genetic features are passed down to succeeding generations.

Time Scale: Natural selection causes progressive changes in a population's genetic makeup over a lengthy time scale, frequently thousands or millions of years. Artificial selection, on the other hand, can result in large changes quickly. By selectively breeding individuals with desired features over several generations, humans can increase the rate at which a trait fixes.

Genetic Diversity: Natural selection favors individuals with features that offer them a survival or reproduction advantage in a certain environment by acting on the genetic variety that already exists within a population. In contrast, artificial selection frequently begins with a small group of people who have the desired features. Inadequate management of the breeding population could result in a decrease in genetic diversity. Humans can also introduce new individuals or deliberately procreate a varied group of individuals to maintain or increase genetic diversity.

Reproductive isolation: Within a population, natural selection is at work, and gene flow between populations is possible. As a result, favorable features can spread and genetic material can be exchanged. Artificial selection, on the other hand, frequently concentrates on particular populations or breeds, resulting in reproductive isolation from other populations. This may limit the possibility of genetic variation through gene flow but may lead to the fixation of specific features within a breed.The deliberate sculpting of genetic features in populations is made possible by human involvement in artificial selection. Humans can speed up the process of trait fixation, produce new breeds or varieties, and alter organisms to suit particular needs or preferences by selectively breeding individuals with desirable qualities. Agriculture, animal breeding, and domestication have all made substantial use of artificial selection to improve desired features, boost output, and accomplish certain objectives. Ruse (1975), mentioned his artificial selection in the journal.



1. Geospiza magnirostris.
2. Geospiza fortis.
3. Geospiza parvula.
4. Certhidea olivasea.

www.wikipedia.com

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Reference:

- Ruse, M. (1975). Charles Darwin and Artificial Selection. *Journal of the History of Ideas*, *36*(2), 339-350. https://doi.org/10.2307/2708932