

ORGANIC COMPOUNDS

- **Always contain carbon**
 - **Carbohydrates**
 - **Lipids**
 - **Proteins**

CARBOHYDRATES

- **Store energy for a short time**
 - Simple (sugars)
 - Complex (starches)
 - Cellulose (fiber) is in plants only



SIMPLE CARBOHYDRATES

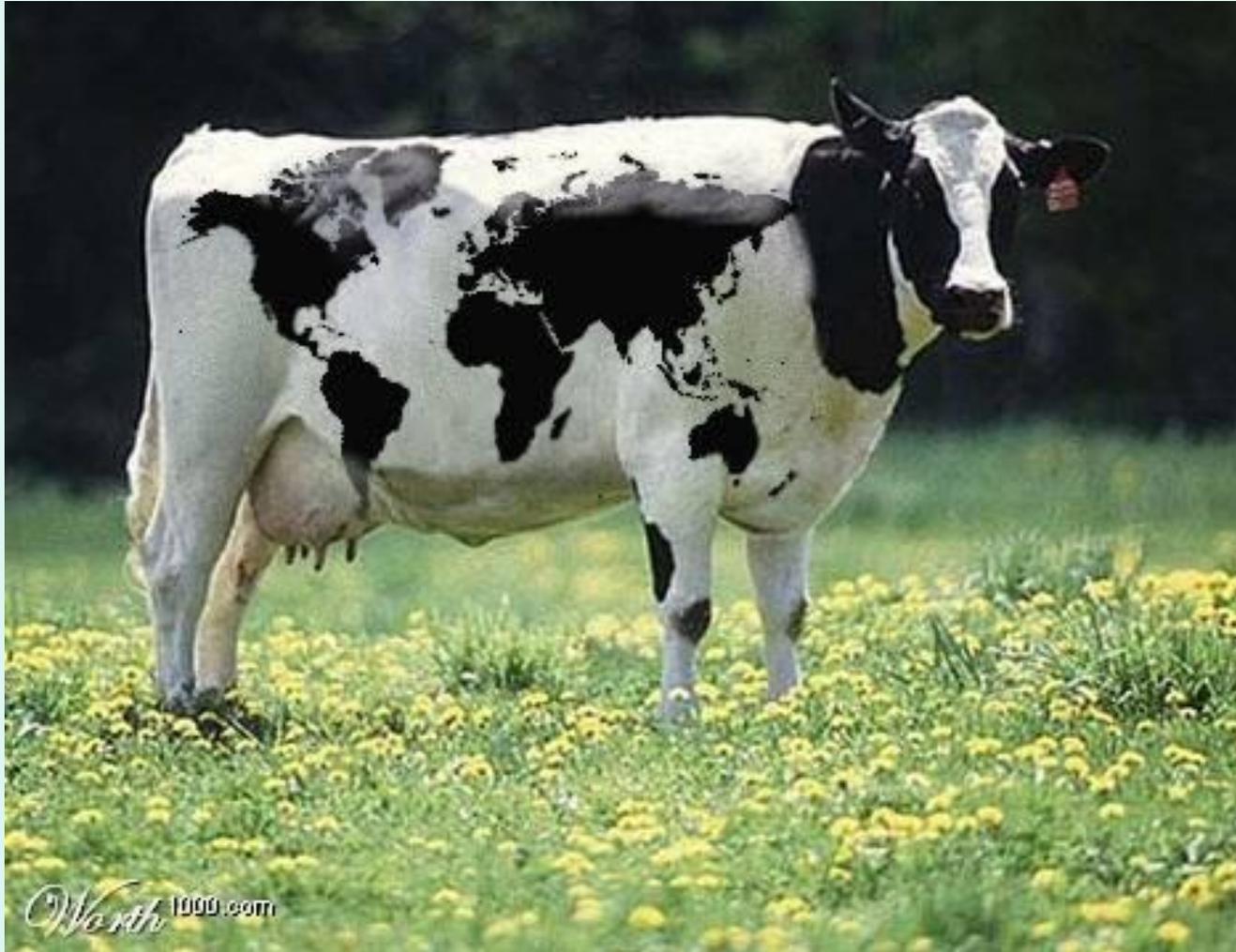
- **Known as sugars**
- **Quick source of energy**
- **Burned off fast**
 - **Glucose**
 - **Sucrose**
 - **Fructose**
 - **Lactose** (some people are lactose intolerant)



Lactose Intolerance

- The inability to properly break down lactose, the main sugar found in milk.
- They are missing the enzyme lactase
- Nausea, cramps, diarrhea, and gas
- **At birth, nearly everyone produces enough lactase**
- **People of European descent are the only group that does not suffer much from lactose intolerance.**

Lactose intolerance is common world-wide



Lactose

- Present in bottled salad dressings, lunchmeat, prescription drugs.

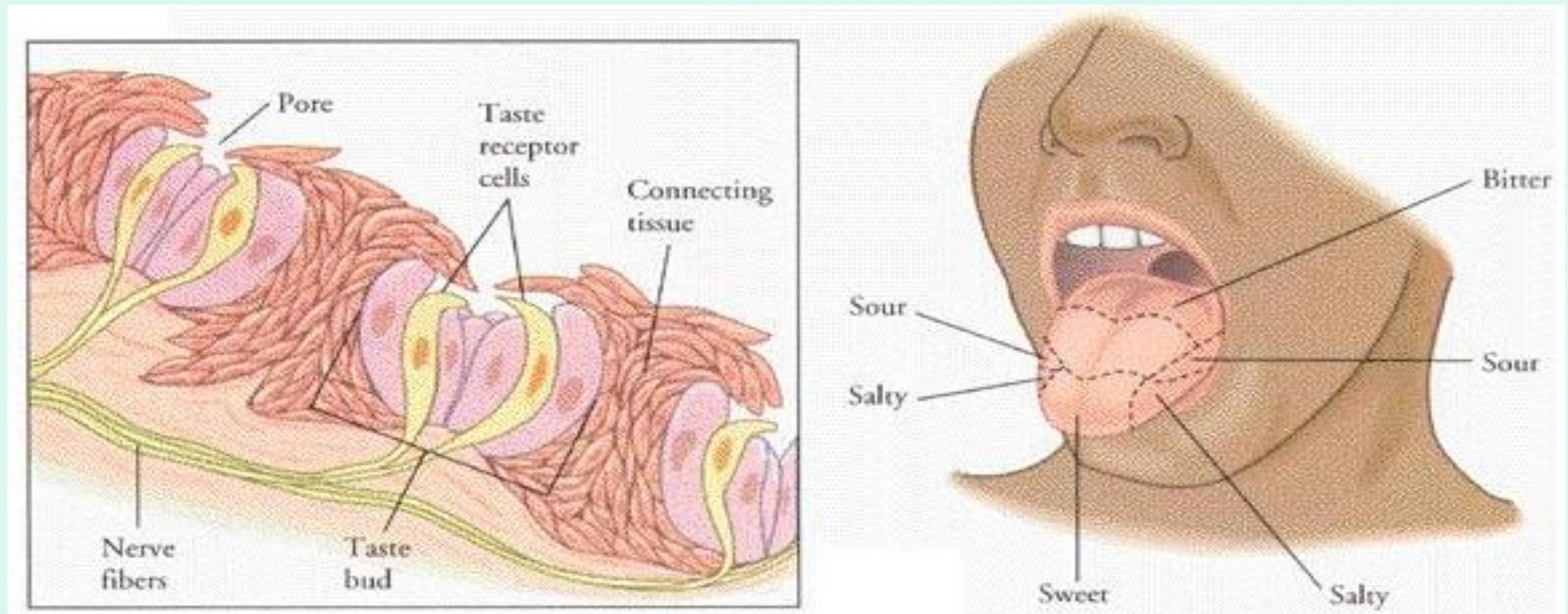


Lactose

- **Currently, lactose intolerance cannot be corrected by gene therapy to treat the underlying cause**
- The symptoms of lactose intolerance can be controlled through diet.
 - **Beverages made from soy or rice** instead of milk.
 - Milk-based foods pre-treated with lactase.
 - Lactase in pill form can be taken with food

“Sweet” Taste Receptors

- We perceive sweetness when molecules of a substance attach to the “sweet” taste receptors on our tongue.



“Sweet” Taste Receptors

- Aspartamine (Equal and NutraSweet)
- Compounds that bind more tightly to “sweet” taste receptors send stronger “sweet” messages to the brain.

Artificial Sweeteners

- Neotame is 8000 times sweeter than sucrose. Therefore, smaller quantities are needed.
- Some sugar substitutes also bind to “bitter” receptors.

STARCH

- **The storage form of glucose in plants**
- When we eat breads, corn, rice, potatoes, and cakes, we convert it to glucose.
- These don't break down to glucose as easily, so they tend to get stored and are only broken down when there is not enough glucose available.



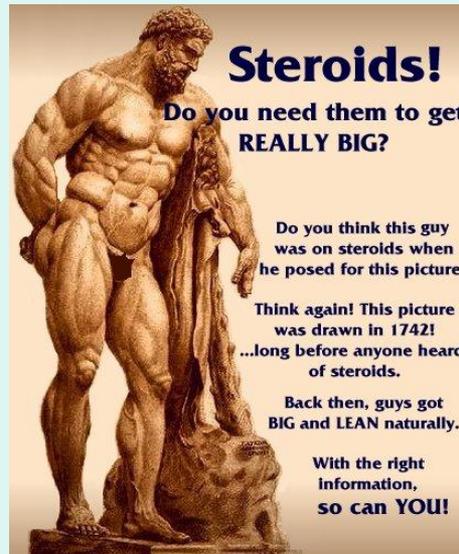
CELLULOSE

- **Only found in plant cell walls**
- Our body is unable to break it down, so it passes through our digestive tract.
- **That is what is referred to as eating fiber.**
- The fiber portion of is the wall of each cell.
- The contents of each cell contain the carbohydrates which can be digested.



LIPIDS

- They don't dissolve in water.
 - FATS AND OILS
 - Fats are animal lipids
 - Oils are plant lipids
 - STEROIDS

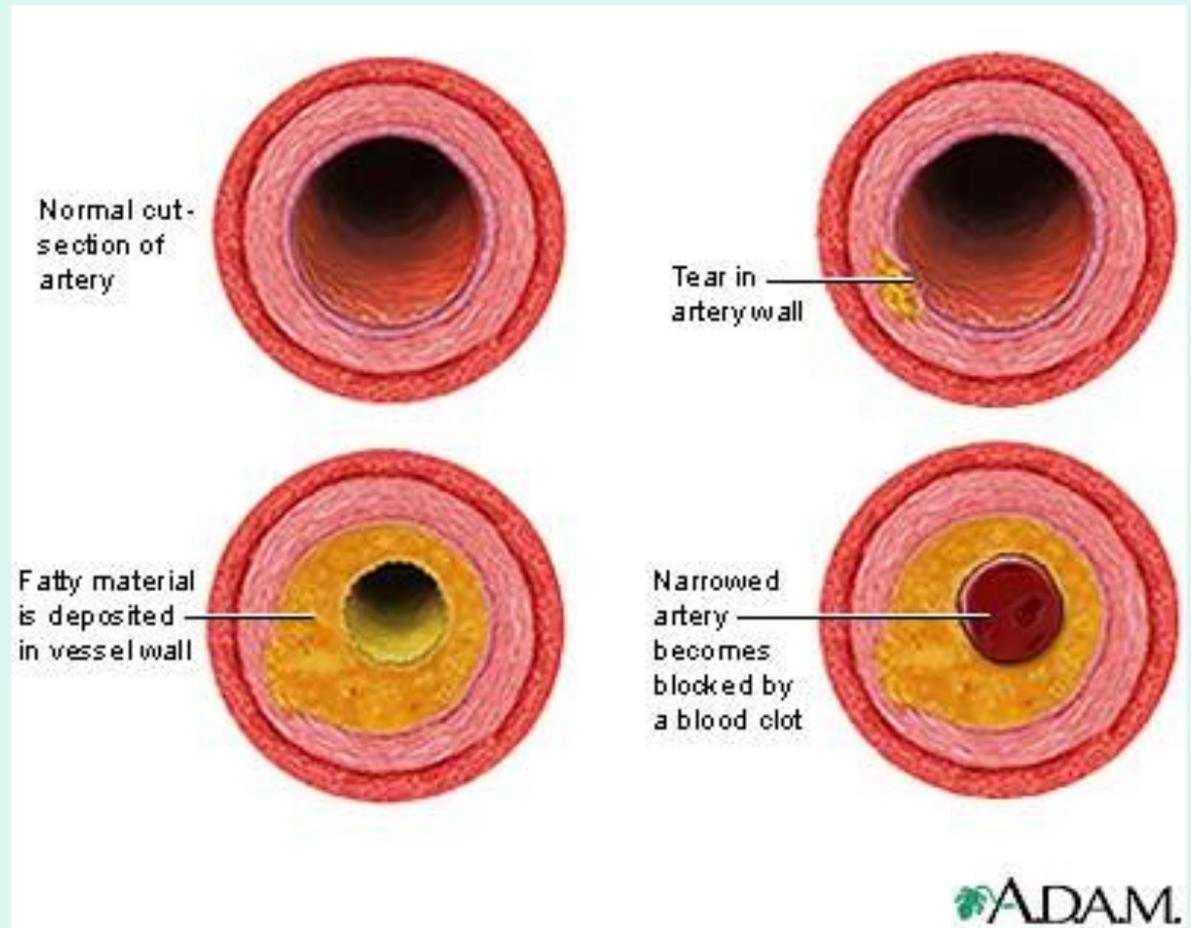


FATS

- **Long-term energy storage**
- **Insulate against heat loss**
- **Forms protective cushions around organs**
 - 1) **SATURATED FATTY ACIDS** are **solid at room temperature**, like butter and lard (animal fats).
 - 2) **UNSATURATED FATTY ACIDS** are **liquid at room temperature**, such as vegetable oils (plant fats)

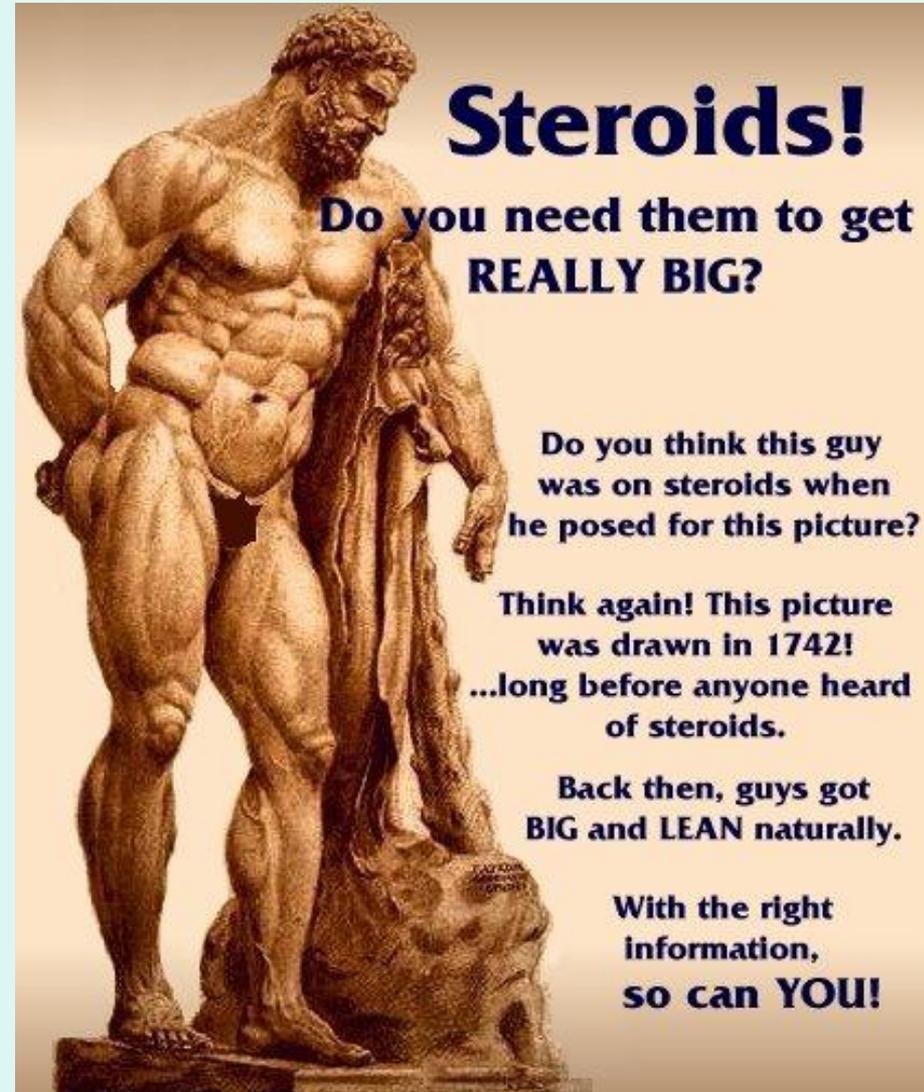
Atherosclerosis

- **Caused by diets rich in saturated fats**
- The lipids deposits (plaques) build up within the walls of blood vessels, reducing blood flow.



STEROIDS

- Formed from cholesterol
- Cholesterol is found in the cell membranes of our body.
- Examples of steroids that our body makes are **estrogen and testosterone**.



Anabolic Steroids

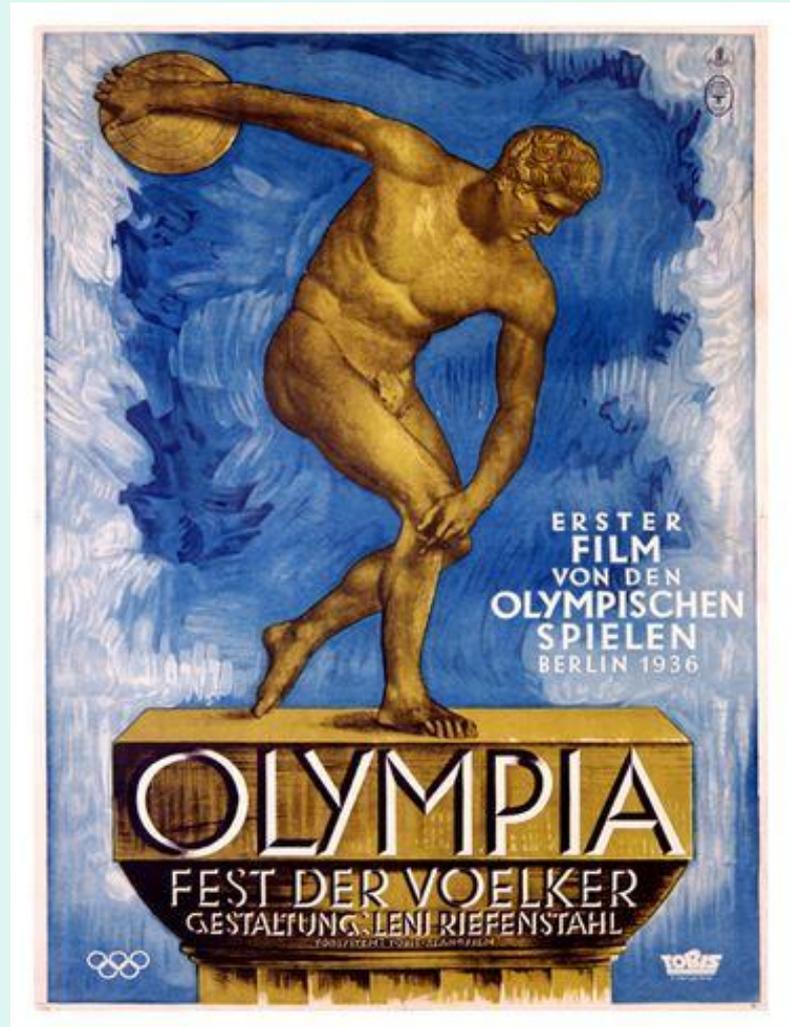
- Synthetic testosterone
- Testosterone causes a buildup (anabolism) in muscle and bone mass in males during puberty and maintains masculine traits throughout life.
- Because anabolic steroids structurally resemble testosterone, they also mimic some of its effects.

Anabolic Steroids

- Used to treat anemia and diseases that destroy body muscle.
- Overdosing may cause violent moods swings (“steroid rage”) and deep depression.
- The liver may be damaged, leading to cancer.
- High blood pressure
- The body reduces its output of natural male sex hormones
 - Men: shrunken testicles, reduced sex drive, infertility, and breast enlargement.
 - Women: menstrual cycle disruption and development of masculine characteristics, including facial hair.
 - Teenagers: bones may stop growing, stunting growth.

Olympic Drug Testing

- THG was a new steroid that was not detectable in ordinary drug testing before 2003.
- Performance-enhancing drugs bar an athlete from getting a medal.
- Blood doping: blood is removed from an athlete's body several weeks before a competition and then re-injected into the body right before the event.

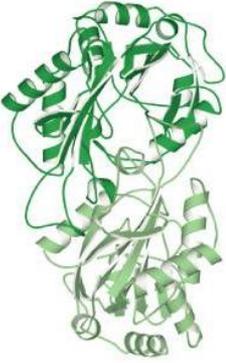


PROTEINS

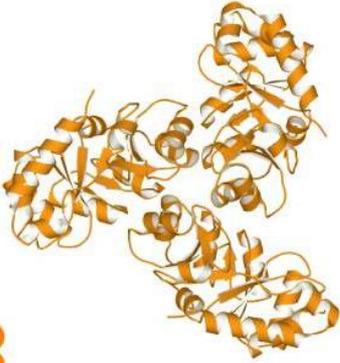
- **Our hair, nails, tissues, ligaments, cartilage, bone, tendons, muscles, and organs are made of proteins.**
- **Other proteins we have are enzymes, which function to speed up metabolic reactions and break down larger compounds into smaller ones.**
- A protein is made from a string of amino acids. Each of our many thousands of different kinds of proteins has a unique shape that corresponds to a specific function.

PROTEINS

(a) dimer



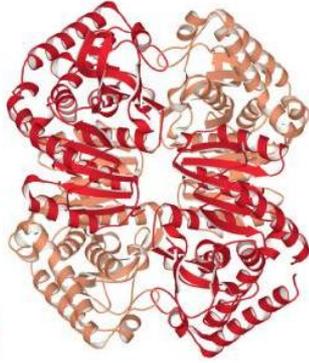
(b) trimer



(c) planar tetramer



(d) tetramer



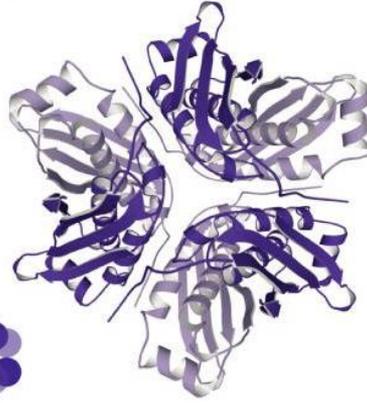
(e) pentamer



(f) planar hexamer



(g) hexamer (trimer of dimers)



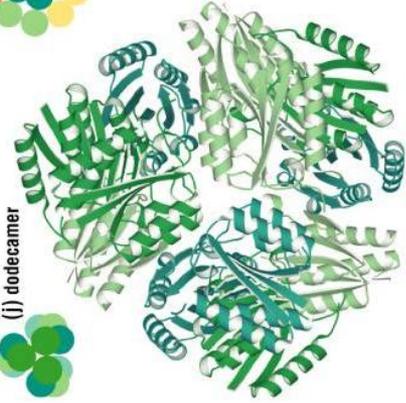
(h) heptamer



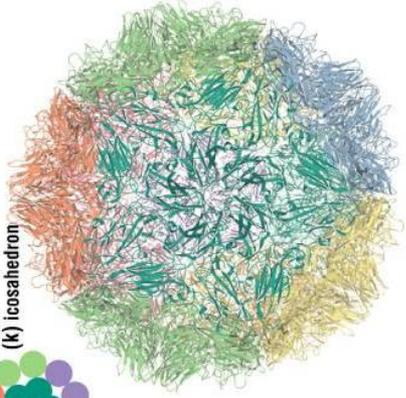
(i) octamer



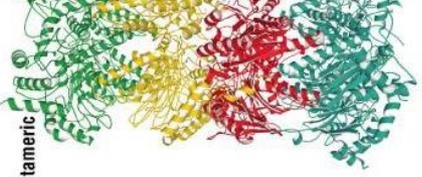
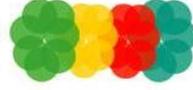
(j) dodecamer



(k) icosahedron



(l) pseudoheptameric structure



AMINO ACIDS

- **The building blocks of protein**
- **All proteins are all made up of a various combination of only 20 amino acids**
- **How they are arranged determines the type of protein**

Denatured Proteins

- Denatured proteins are those whose amino acid chains becomes unraveled, and results in loss of function.
- Proteins are denatured by
 - salt concentration
 - pH
 - excessive heat



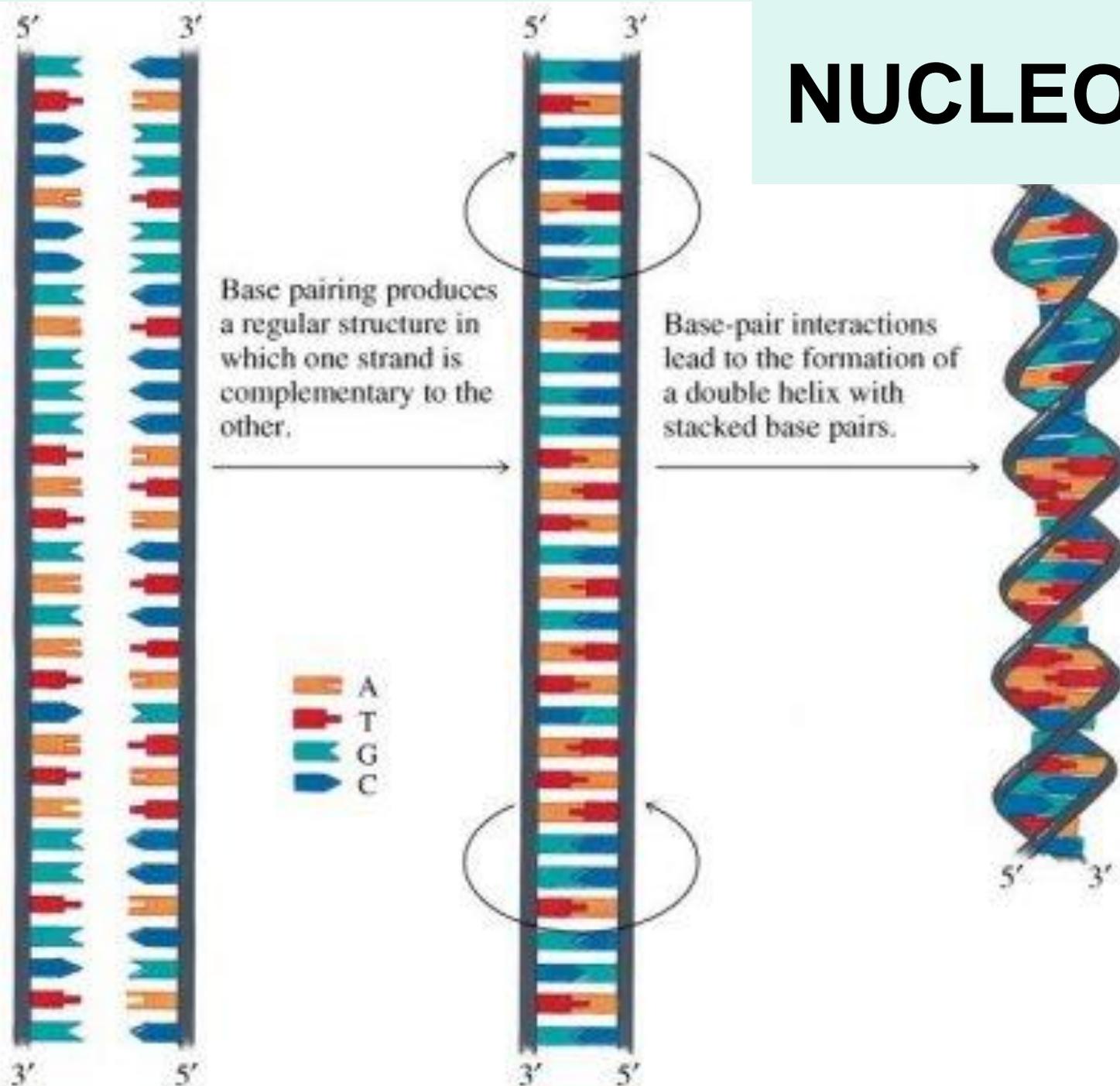
NUCLEIC ACIDS

- **Special type of amino acids that make up DNA and RNA**
- **DNA makes up our genes**
- **Genes**
 - **store information about how to replicate, including how to arrange the amino acids in the new cell to form the proper proteins for the body.**

TYPES OF NUCLEIC ACIDS

- DNA
 - The genetic material that organisms inherit from their parents consists of DNA.
 - **Genes** are the specific stretch of a DNA molecule that programs the amino acid sequences.
- RNA
 - Messenger molecules that take a copy of the DNA blueprint out of the nucleus and into the cell where it is used to make proteins

NUCLEOTIDES



Nucleic acids are made of nucleotides

NUCLEOTIDES

- Nucleic acids are made out of a string of nucleotides
- There are only four types:
 - adenine (A)
 - thymine (T)
 - cytosine (C)
 - guanine (G)

A sample protein sequence: AATCAGCÆ

DNA

- The two strands of this DNA are also twisted into a **double helix**



ATP

- The type of protein that provides all the energy to cells.
- When food is broken down to glucose for energy, ATP is what is released, which is the actual **energy molecule**.
- The more ATP that is produced, the more energy we have.
- When we inhale oxygen, it is used in a process called respiration, which produces ATP for energy. That is why we breathe.

