Importance of Chirality in daily life

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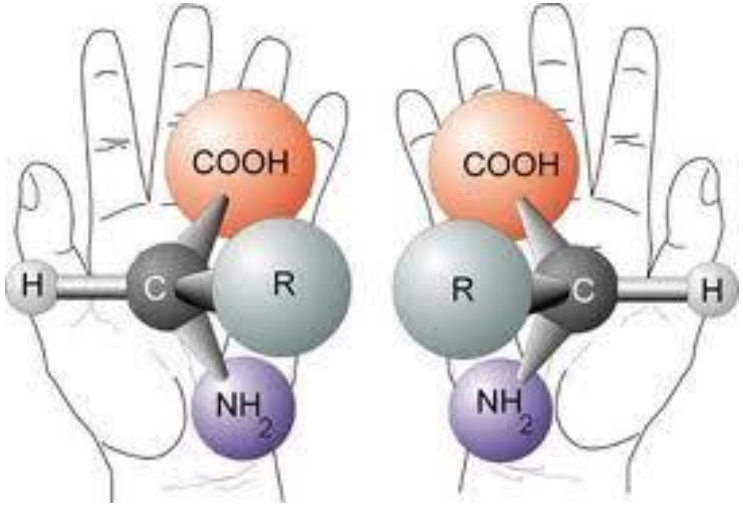
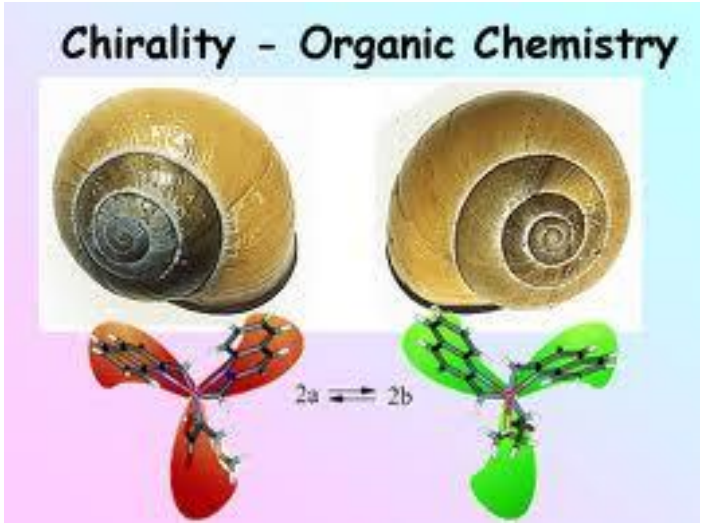
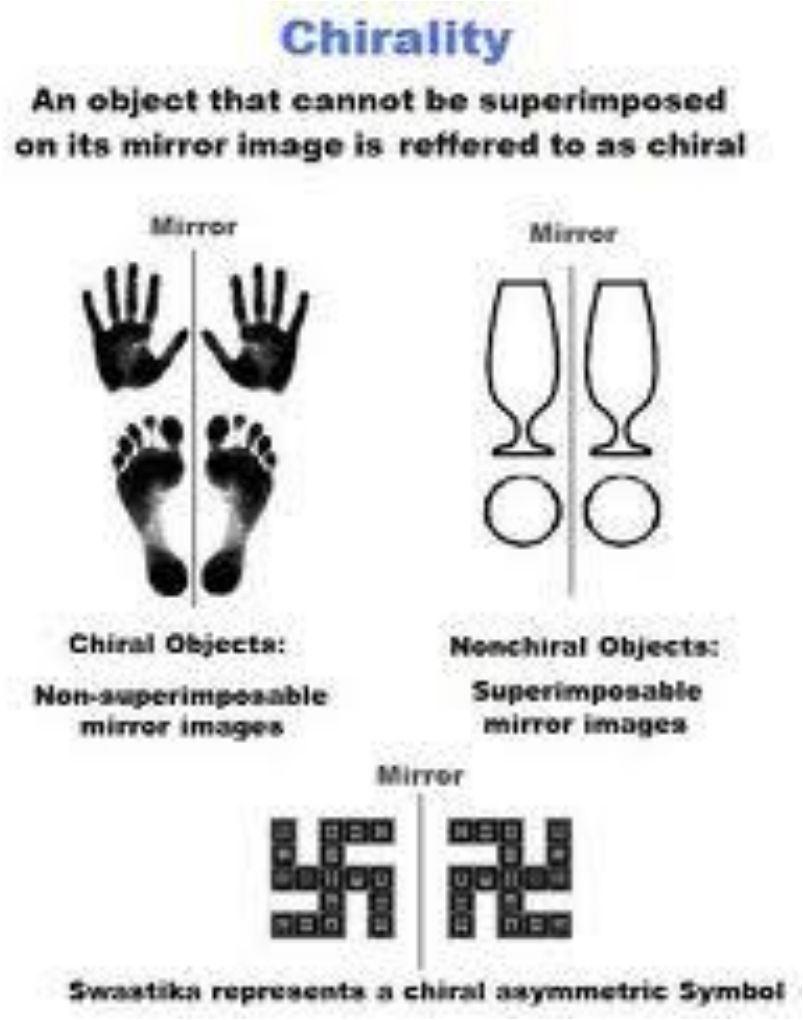
Chirality : a concept in STEREOCHEMISTRY!

A chiral object is non superimposable on its mirror image

Chirality: Non-superimposibility on mirror image







Understand Chirality through Specificity

Some facts about Glucose:

- D-glucose and L-glucose are mirror images of one another

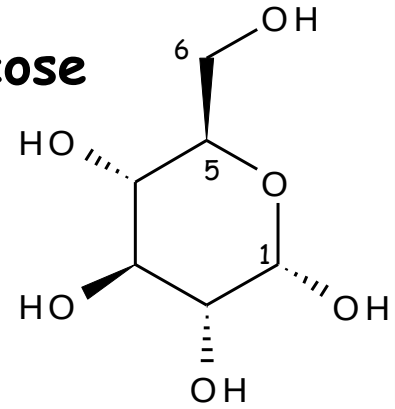
- D-glucose is the instant source of energy while L-glucose is NOT

- Our cells -- and those of almost all other living organisms -- can't burn L-glucose for energy, but they can burn D-glucose

Origin of biological properties relating to chirality : analogous to specificity of hand (chiral molecule) to respective gloves (chiral rceptor)

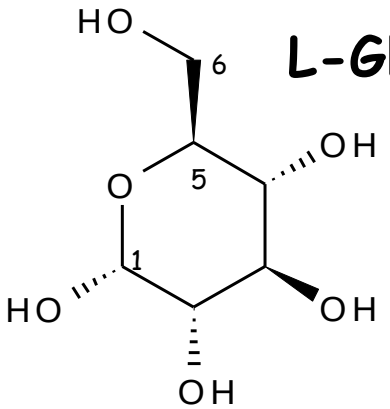
Understand Chirality through Specificity

D-Glucose

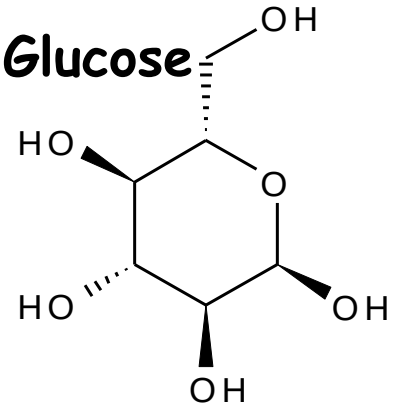


Mirror

L-Glucose



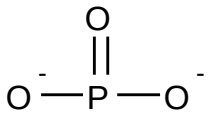
L-Glucose

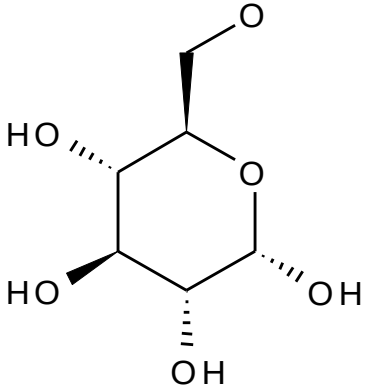


ATP

ADP

Hexokinase





D-Glucose-6-phosphate

ATP

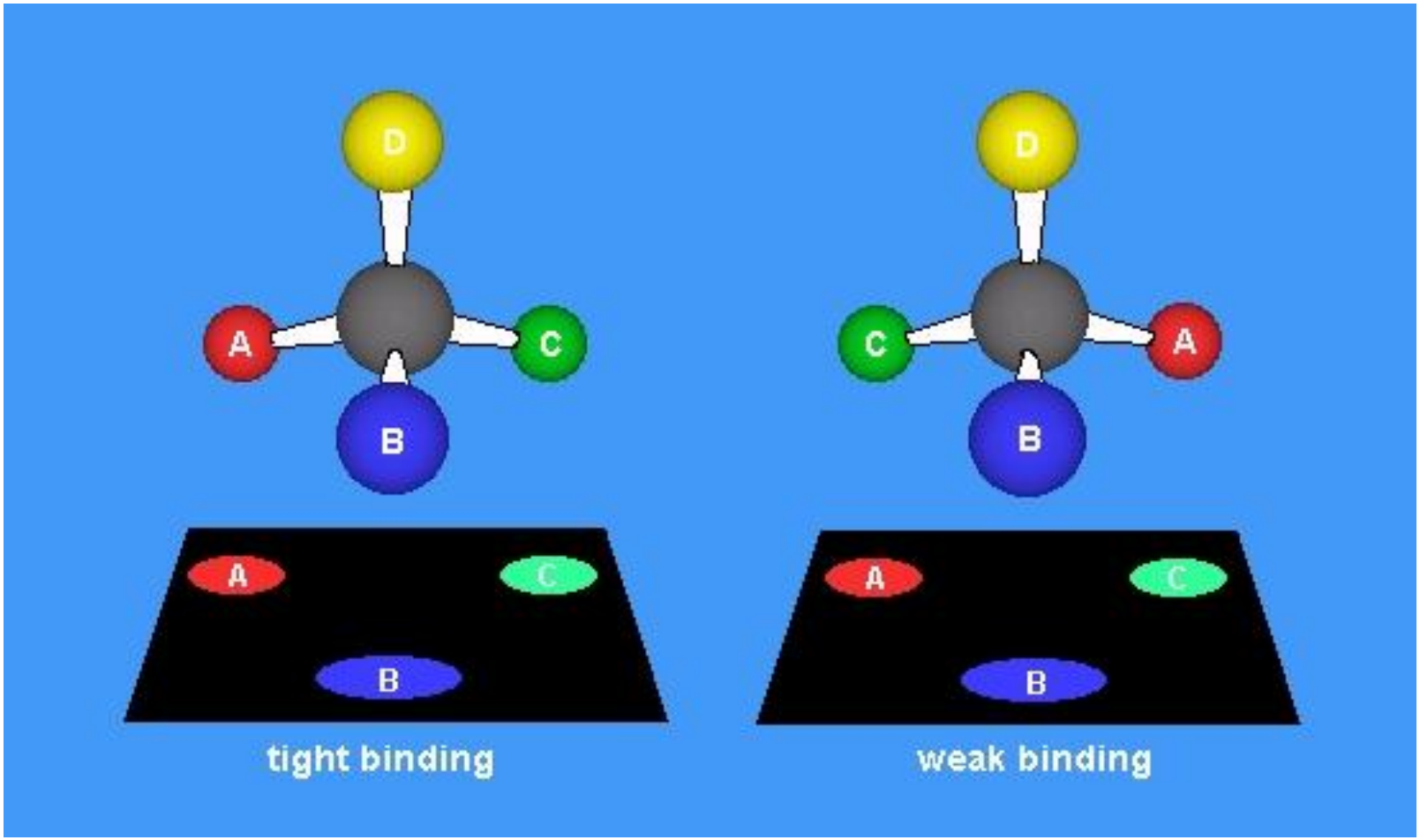
ADP

No Phosphorylation

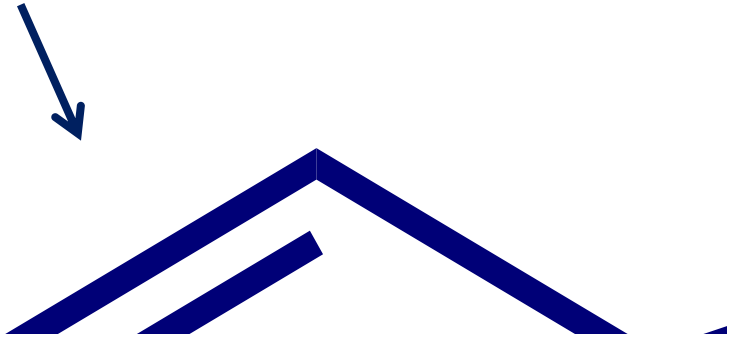
Glycolysis and The Citric Acid Cycle (TCAC)

CO_2, H_2O, energy sources mostly ATP

Chiral recognition by receptors (enzyme active site) and the substrate: due to at least three-point interaction



Understand Chirality through Specificity



Thalidomide was prescribed to pregnant women for morning sickness during 1957-1962. But, it turned out to be a teratogen (creating malformation in Embryos) and caused serious birth defects to more than 10,000 babies.

Thalidomide tragedy: Push towards enantiopure drugs

Some Top Drugs in the Market Synthesis

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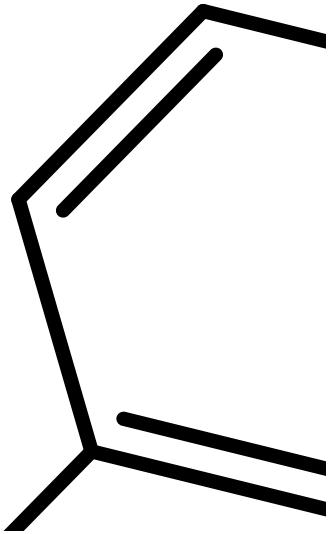

The Biological Importance of Chirality

- Human body is structurally chiral, with heart lying to the left of the centre, and liver to the right.
- Most people are right handed.
- Helical seashells are chiral, and most spiral like a right-handed screw.
- Many plants display chirality while winding around supports.
- All but one of the 20 amino acids are classified as left handed while molecules of natural sugars right handed, including the sugar that occur in DNA.
- DNA, itself, has a helical structure and all naturally occurring DNA turns to the right.