

# D and L Amino Acids

By Frank Deis

In the Fischer Projection, molecules are compared to a "canonical" form with the most oxidized carbon on top (as "carbon one"), and the longest carbon chain shown vertically. When presented that way groups to the right and left of carbons in the chain are D or L respectively, and are imagined as pointing forward, out of the page. The simplest way to determine if a drawing is D or L is by:

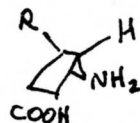
## SWAPPING GROUPS

Start with a "messed up" amino acid.

- 1) Swap the carboxyl group to the top of the drawing.
- 2) Swap the R group to the bottom.
- 3) If necessary, swap the NH<sub>2</sub> group to the left.
- 4) Count the number of swaps. If it's an even number, you started with "L". If it's an odd number, you started with "D".

There are "instant" methods for determining if an amino acid is D or L, but they require 3 Dimensional visualization, and only about 10% of people can do that easily enough to make it worth bothering with. Try it and see if you are in that 10%.

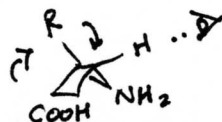
## ONWARD



Imagine a small footbridge over a stream. At the beginning of the bridge is the COOH carboxyl group ("O"). The top of the bridge is the alpha-carbon. On the far side of the bridge is the NH<sub>2</sub> group ("N") and we are crossing the bridge in the ON-ward direction. The remaining two groups are R and H. If you touch the R group with your left hand as you cross the bridge, the amino acid is "L". If it's your right hand, it's "D".

Another instant visualization resembles the Chiral system most of you learned (or tried to learn) in Organic Chemistry class. This system is known as

## CORN



Look down the C-H of the alpha carbon. The H should be toward you and the C away from you. The other three groups will be behind the alpha Carbon. You are looking for the sequence CO - R - N, meaning the carboxyl, then the R group, then the amino. If these make a clockwise circle, the amino acid is "L".

All amino acids used in protein synthesis are "L", and are on the list of 20 amino acids which you were asked to memorize. Some "D" amino acids exist in nature, in bacterial cell walls and in some peptide antibiotics.