

bioinformatics @ school

Bioinformatics: a bit of life



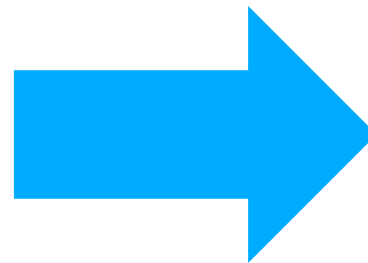
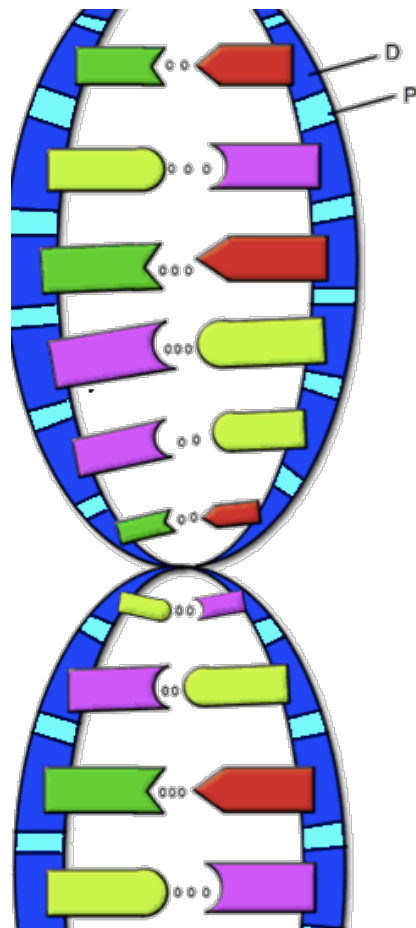
Bioinformatics: a bit of life

Two units:

1. Murder at the airport
(35 minutes)
2. Designing an antivenom
(65 minutes)



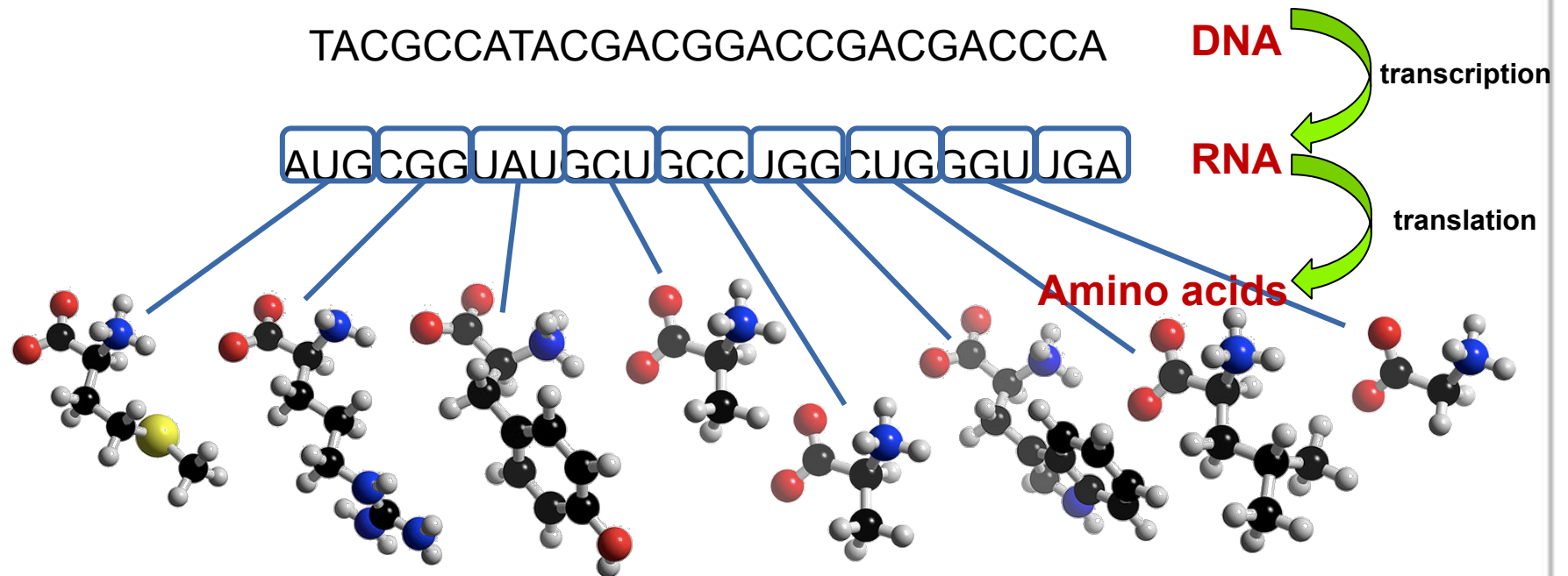
DNA is a code



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ATTATACGAAGCCAAAAAGTCTACCCGACTCAAAACTAAATCCTG
AGTATTTGCTATTCAGTCAAGACATACAGCTCTCGAAACAGGCAA
ACCTCAAAACCAAAGAGATTTACTATTGAGAGTGATTTGCAAAA
ITCATCATAACAATTATAACCCGGAAGAGTTTCCCGAAAGCACAT
ACTACGTCCCAGAGGCTCAAATGTTATGCATATTGTCCCCTTG
ATTTAGACCCCAATGTTTTGAAACGAAATGATTTAGATACTACAT
ECGATCAAGTTTTTTAAAGATAAAAAATGCTGTCAGCAAAAAGGTT
AATTTTTTAAAGAACACTTTAAGAATTGACTCAAATAAAACATTCG
AAAAC TGGAACATATCCATGTTTTACA ACTACTTTAAAACTACA
ACCCTAATGTTGGTAAATCAACTTTGATCAACTCTACTACAGA
AGTTAAAAATTGATTCTACTGGGAAAATTA ACTCCCCTCTGAAG
JTTTTACGAACCCGAAGAATTTTTTCAAGATTCAAGCTGCTGGTG
ATTTAACTAGATCCGTACAAGCCTACCAAGTTGGAGGTAAAATAC
ECTATTTCAACTTCCACCTCCAGATTACGCCTAGAAGA ACTAATCG
AAAGGCTGCGAAAAACCGATTTATTCAATCGGAAGCATATAAAAC
JTATGAAGGGCACATCACAGGGAGGCTGTTATACCGTGGGAGGGA
JTCGAAAGGATCCATAAATCAGATTGTGAAATACATACCAGGAC
AGAACATTGAAAAAGGTATTGATGTATTCAACTCGTGCAATTCAT
JGTTATCACGGTATTGTGGAATTTAAAGCGTTATATGCGAAAAAA
ACGCAATACCTCATTATTGGAAGTATAGAGATCGTTCTGAAAG
IATTAAGGACA ACTGGGAGGTATGAGTTCAAAGGACTACATGAGA
STATCCAAGTAGGTATAAGGGAAACCGCTAGAAA ACTTGATTGAGT
ACATTGAAACAAATGGTAAAGAGTCAAGCTGTCCAGAGATAGAC
PGTATGAGATGGCCCCGGATGAAGCTGATACTTTGAACGCAGTGA
AAAAACCGAGAAAGATTTATCTGCTAGAAGATTTGTGCGACGATG
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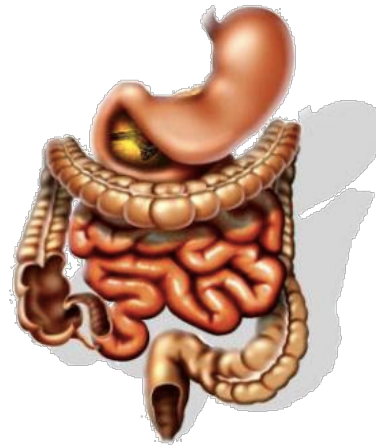
From DNA to protein



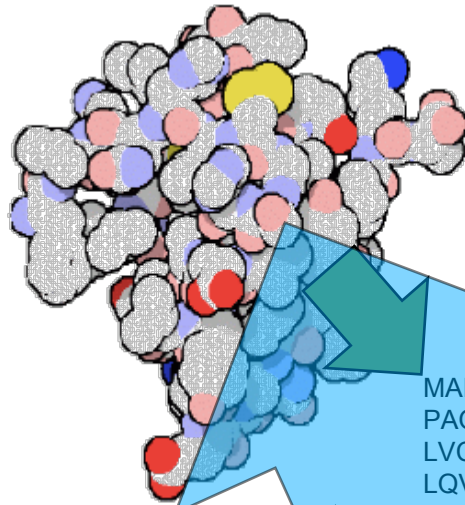
Methionine (start), arginine, tyrosine, alanine, alanine, tryptophan, leucine, glycine

One letter code: M R Y A A W L G

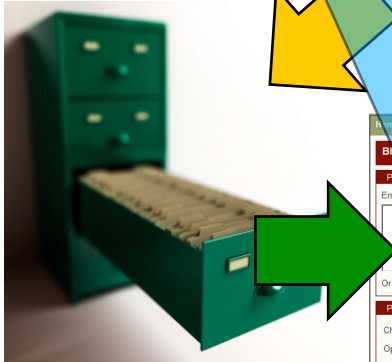
Proteins



BLAST: identifying proteins



MALWMRLLPL LALLALWGPD
PAQAFVNQHL CGSHLVEALY
LVCGERGFFY TPKTRREAED
LQVGQVELGG GPGAGSLQPL
ALEGSLQKRG IVEQCCTSIC
SLYQLENYCN



BLAST

Protein Query

Enter one or more protein sequences in FASTA format

Or enter filename:

Protein Databases

Choose the databank to search [Swiss-Prot]

Optionally enter an MRS query to limit the search space

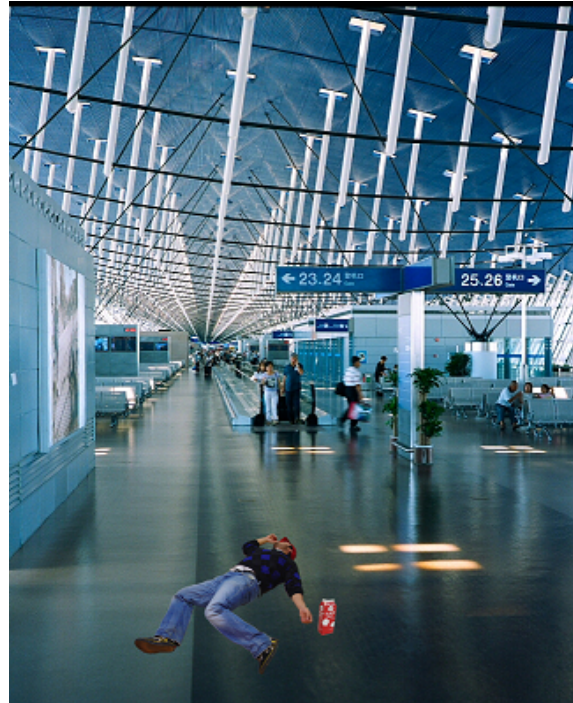
Blast Options Filter sequence (low complexity)

E-value cutoff [10.0]

1. Scientists **sequence proteins**
2. The amino acid sequence is **stored in databases**
3. **BLAST compares** amino acid sequences
4. When a 'match' occurs, the protein is **identified**



Murder at the airport



→ Identify the four proteins

→ <http://www.bioinformaticaindeklas.nl/en/education/murder-at-the-airport/>

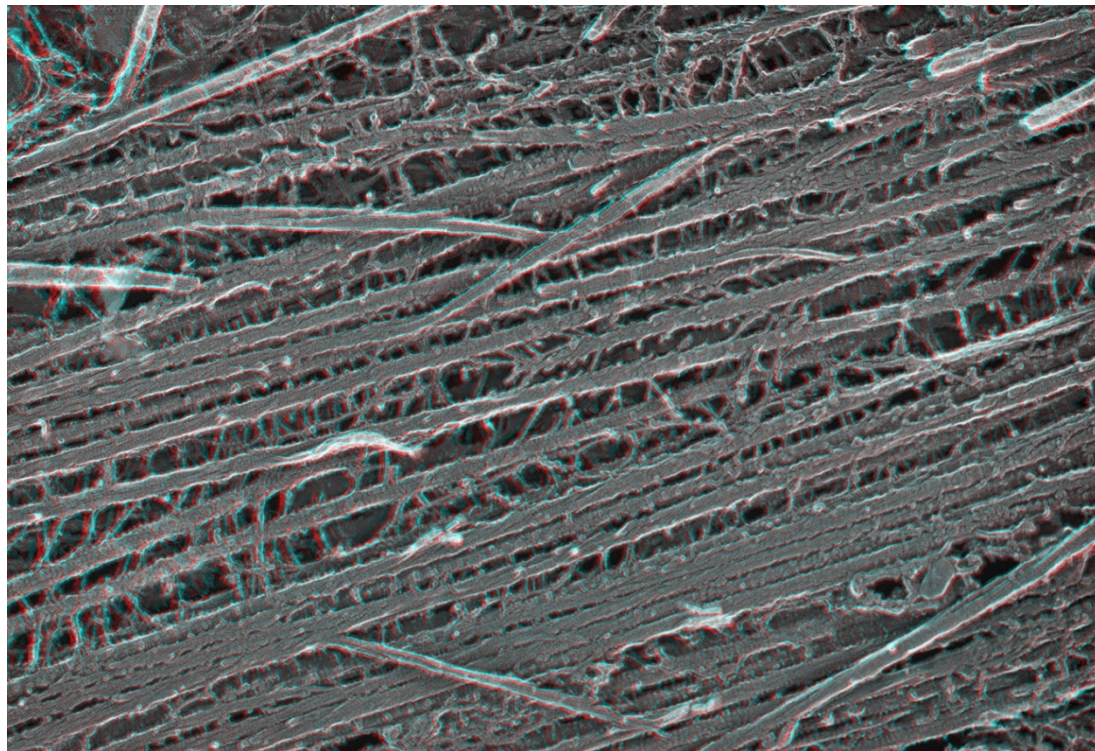


The killer!



3D Drug Design

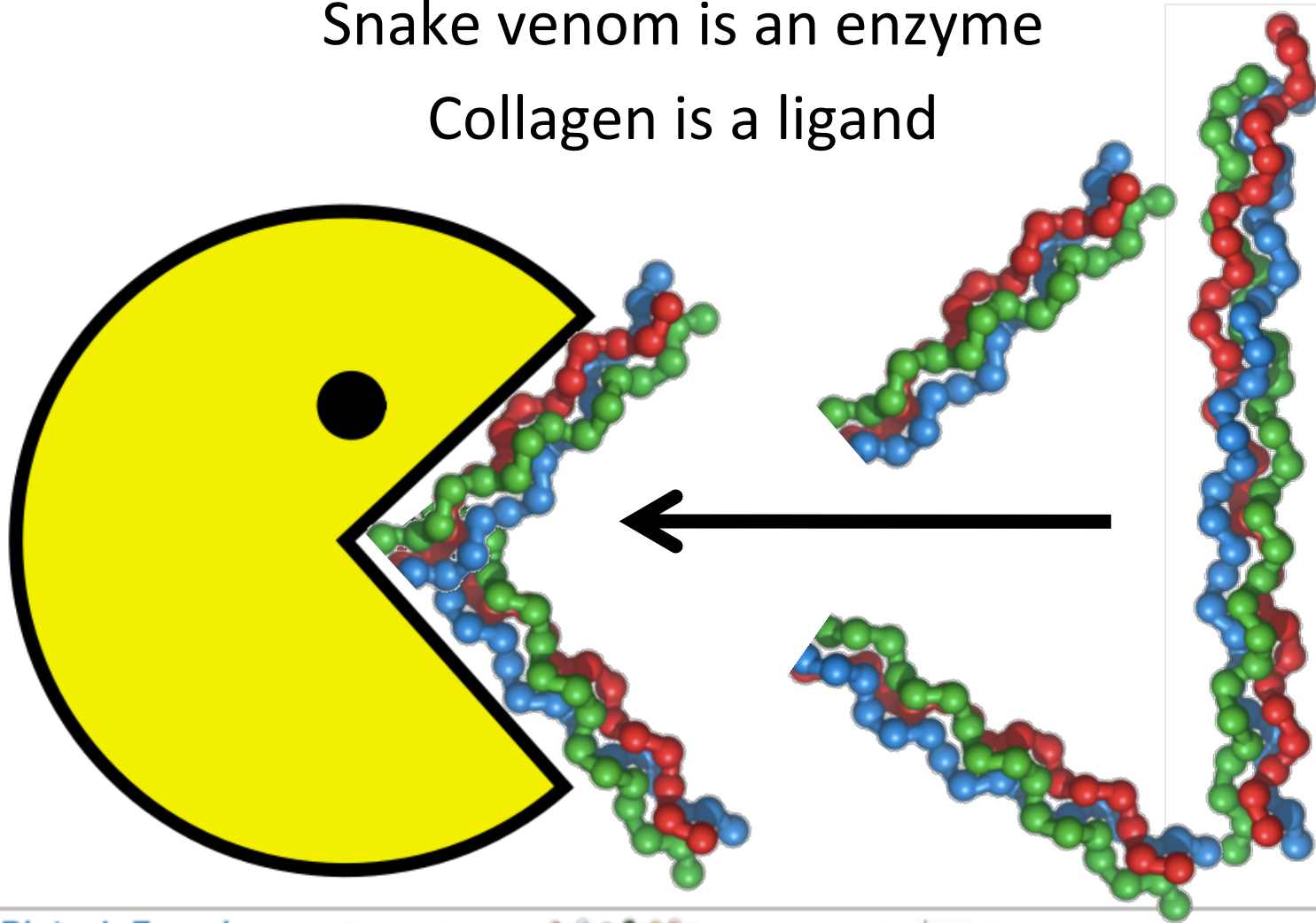
Collagen



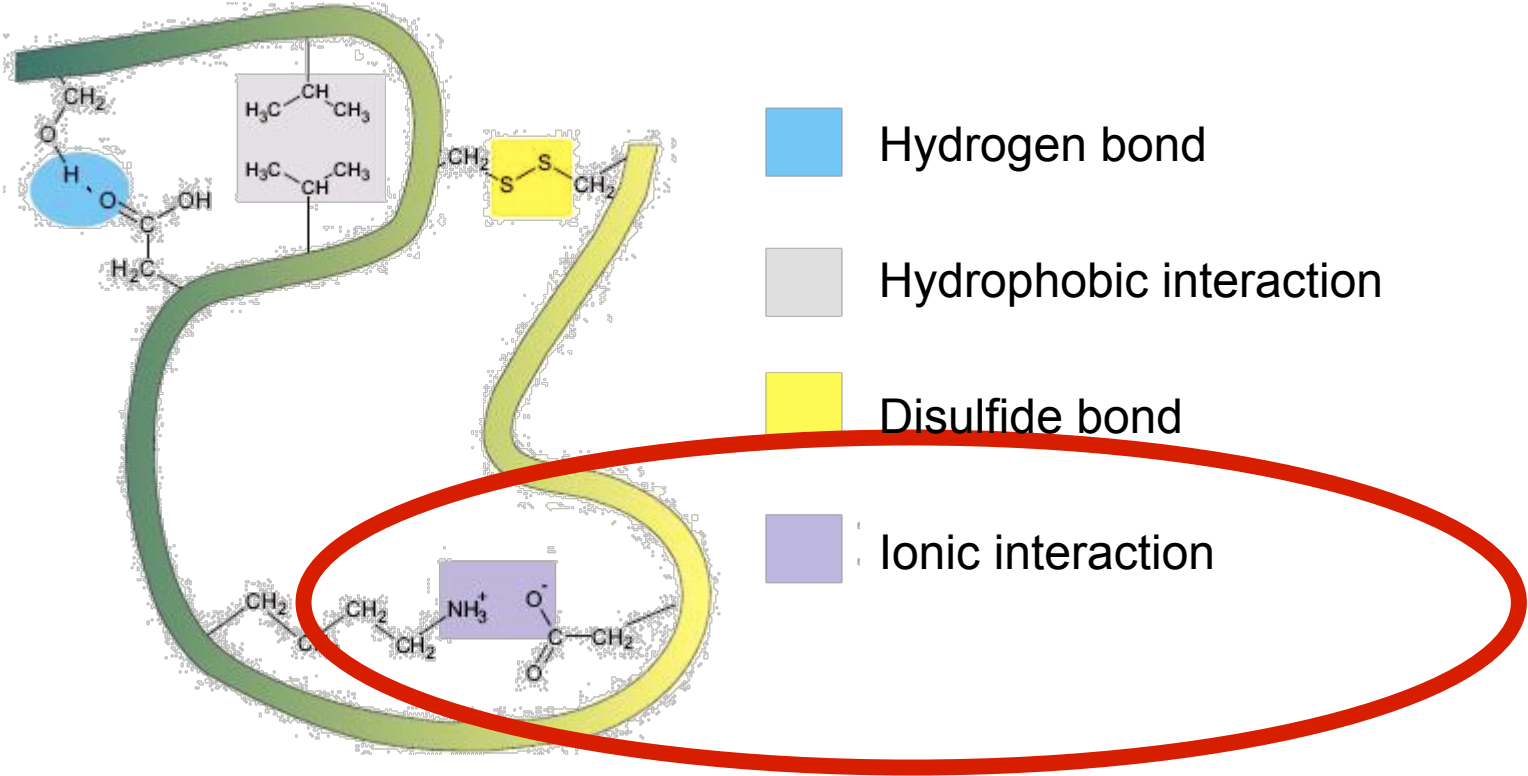
Snake venom

Snake venom is an enzyme

Collagen is a ligand



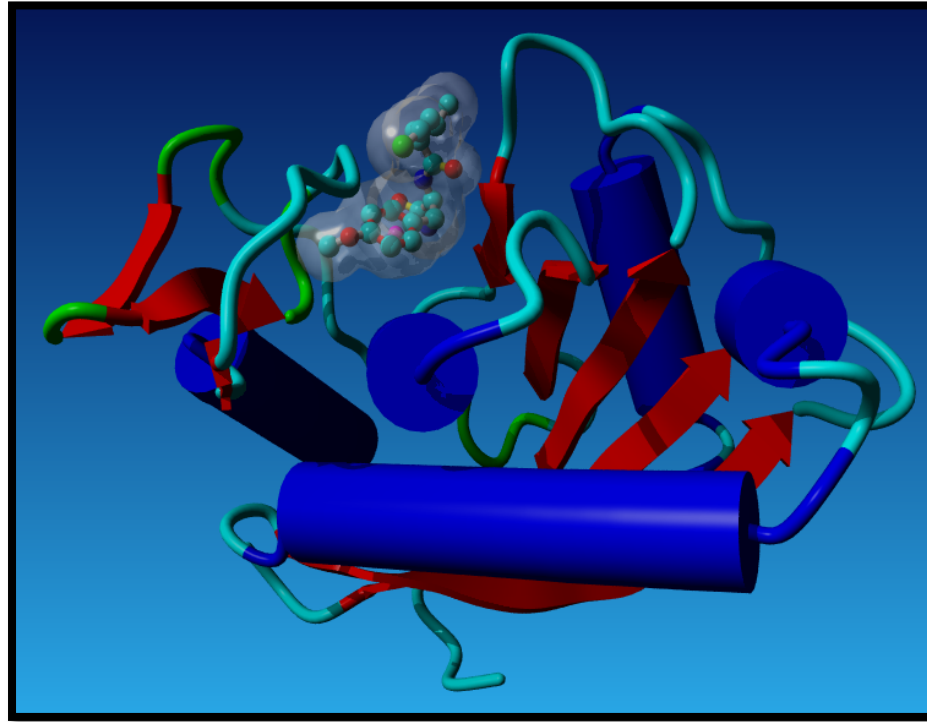
Interactions in proteins



The strongest interaction is the ionic interaction



3D Drug Design



→ <http://www.bioinformaticaindeklas.nl/en/education/designing-an-antivenom-in-3d/>

→ 3D Drug design



