How do we sequence Antibiotics?

The Discovery of Antibiotics

Alexander Fleming discovered the pencillium mold which killed the Staphylococcus bacteria How do we sequence anit-biotics?

How do bacteria make antibiotics

Tyrocidine B1 is 10 amino-acid long sequence.
UGGCCAUGGCGCCCAGAACUGAGAUCAAUAGUACCCGUAUUAACGGGUGA DNA makes RNA makes Protein

DNA replicates with help of DNA polymerase. DNA is transcripted into RNA with help of RNA polymerase. RNA is translated into protiens by ribosomes

Transcription is simply replacament of T with U RNA is translated into amino acid sequence via genetic code. Each 3-mer in RNA, called codon is converted into onr of 20 amino acids

3 stopon codons -> UGA , UAA, UAG

Assignment => Translate RNA string to amino acid string

Dodging the Central Dogma

Lipmann demonstrated that tyrocidines and gramicidins are non-robosomal peptides (NRPs), which are synthesised not by ribosomes but instead by a protein called NRP synthetase.

Sequencing antibiotics by shattering them into pieces

Many NRPs are cyclic making then difficult to sequence.

Mass spectrometer helps in sequencing of peptides. Assume integer masses

A mass spectrometer can break tyrocidine B1 into two different linear fragments Experimental setup

Generating a theoretical spectrum from a known peptide is easy, but we want to solve the reverse. We want to construct an unknown peptide form its experimental spectrum. This is the cyclopeptide sequencing problem In general case, the problem could habe multiple solutions

A Brute force algorithm for