

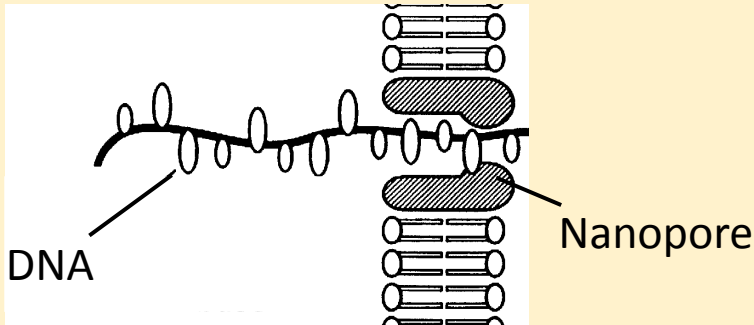
Watch out Pac Bio? Sequencing by Xpansion (SBX)

What is SBX?

- 3rd Generation Technology (Single molecule Sequencing) by Stratos
- Nanopore sequencing

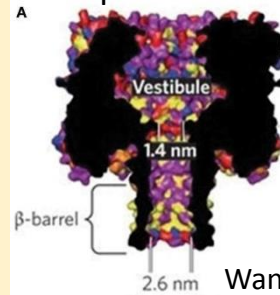
What is Nanopore sequencing?

- Using a small opening (nanopore) to pass either ssDNA or dsDNA through a membrane with a form of detection to determine the DNA sequence



Church et al. 1998

α -hemolysin (α -HL) protein nanopore used in SBX

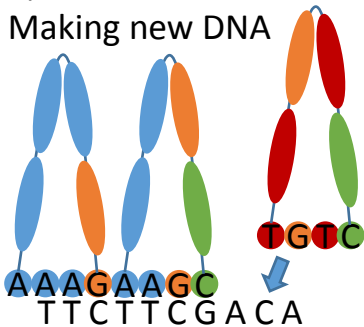


Wang et al. 2014

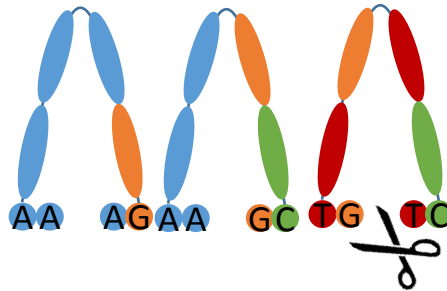
How SBX works:

Probes are attached to small oligos. These probes have large molecules corresponding to the bases in the small oligos. Those small oligos anneal to target ssDNA to make new DNA. The new DNA is denatured and is then broken, but the chain of probes is not. The chain, composed of the large molecules, is read through a nanopore

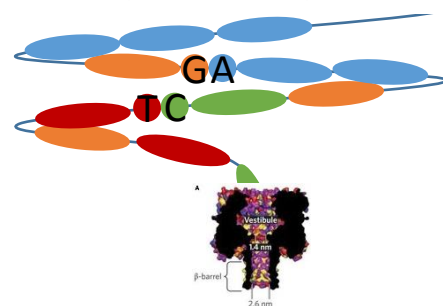
1) Probes bind to DNA
Making new DNA



2) Denatured DNA is cleaved
between the ends of the probe



3) The new molecule goes
through the nanopore



Problems in Nanopore sequencing (Wang et al. 2014)

1. Base recognition because bases are close together (poor signal to noise ratio)
2. Nanopore stability
3. Speed of DNA (too fast for base recognition)
4. Multiplexing (knowing what base is moving through which hole)

SBX solutions

- By coding the DNA with larger signaling molecules it increases the signal (Problem 1) and reduces the number of signals per unit time (Problem 3)

SBX issues

- No published read longer than 216bp yet
- Does not solve all the Nanopore technology problems
- Not released to scientists for testing yet

References:

Church G, Deamer D, Branton D, Baldarelli R, Kasianowicz J (1998) Characterization of Individual Polymer Molecules Based on Monomer-Interface Interactions. US Patent No. 5795782, Brookline, Santa Cruz; Lexington, Natick, Darnestown.

Wang Y, Yang Q, Wang Z (2014) The evolution of nanopore sequencing. Frontiers in Genetics. 5:449. doi:10.3389/fgene.2014.00449.