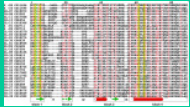


Next Generation Sequencing

Ho-Ryun Chung



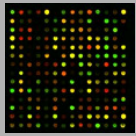
Sequence alignment



PCR



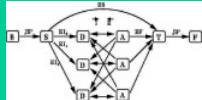
Sequencing



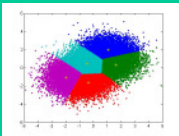
Microarray



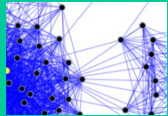
Pattern recognition



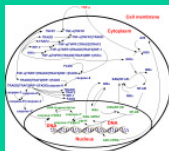
Gene prediction



Clustering



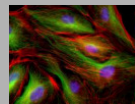
Network inference



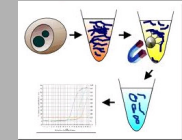
Modeling and simulation



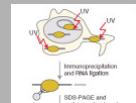
In situ hybridization



Immunofluorescence



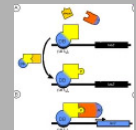
Chromatin immunoprecipitation



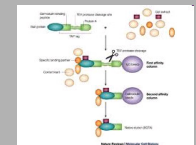
RNA immunoprecipitation



Mass spectrometry



Yeast two hybrid



Tandem affinity purification

... platforms



Illumina/Solexa



454



Helioscope



ABI - Solid



Pacific Biosciences

... principles - 454

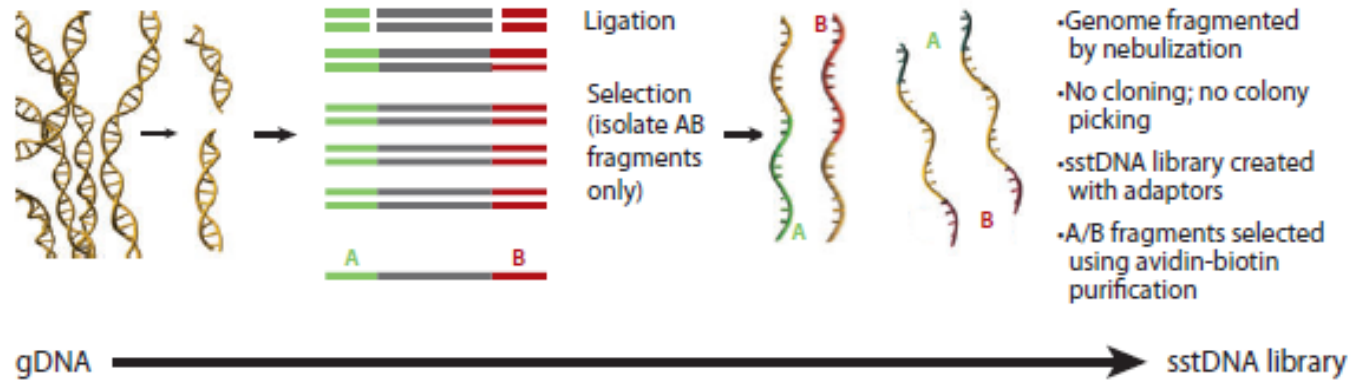


454

a

DNA library preparation

4.5 hours



... principles - 454

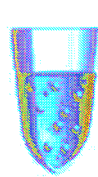


454

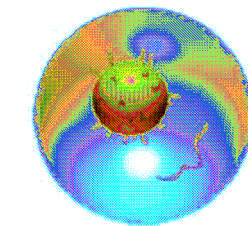
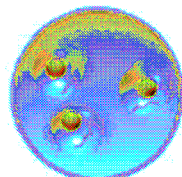
b

Emulsion PCR

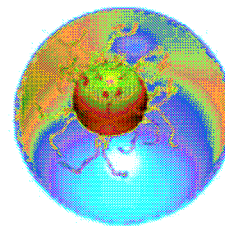
8 hours



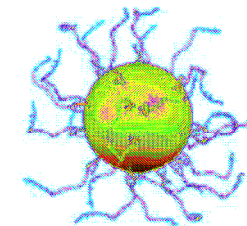
Anneal sstDNA to an excess of DNA capture beads



Emulsify beads and PCR reagents in water-in-oil microreactors



Clonal amplification occurs inside microreactors



Break microreactors and enrich for DNA-positive beads

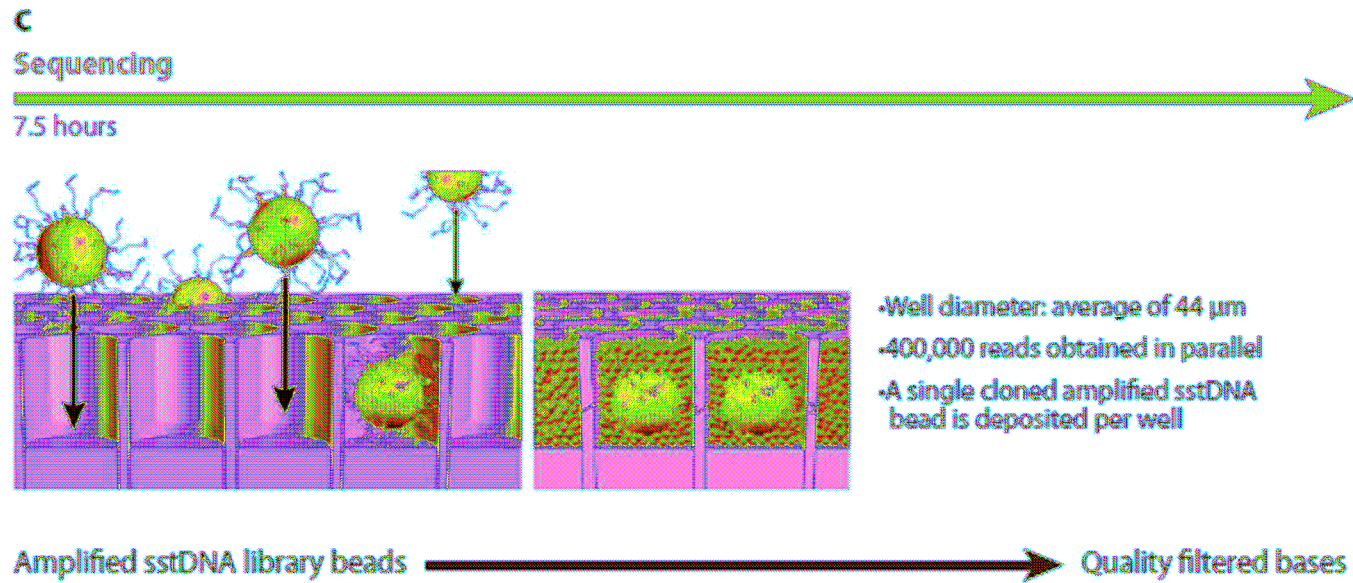
sstDNA library

Bead-amplified sstDNA library

... principles - 454



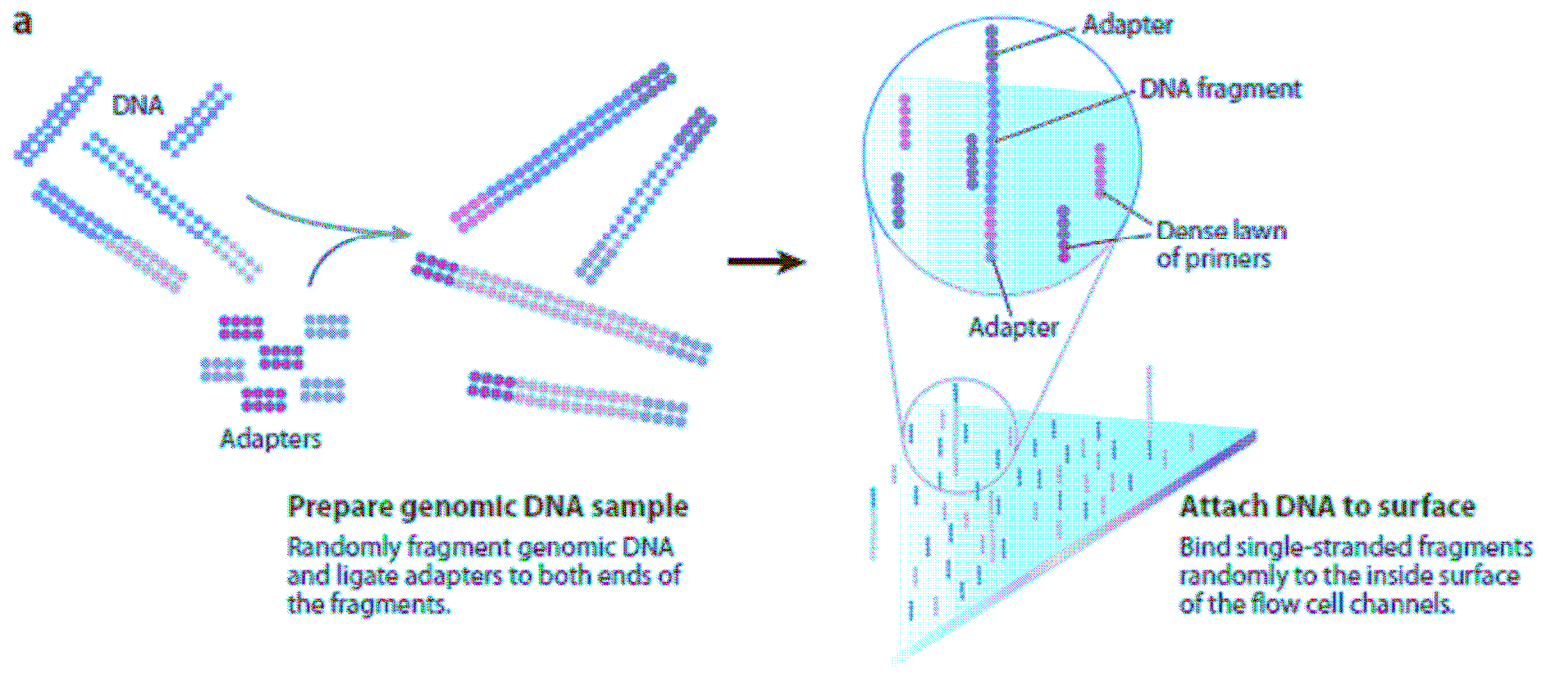
454



... principles - illumina



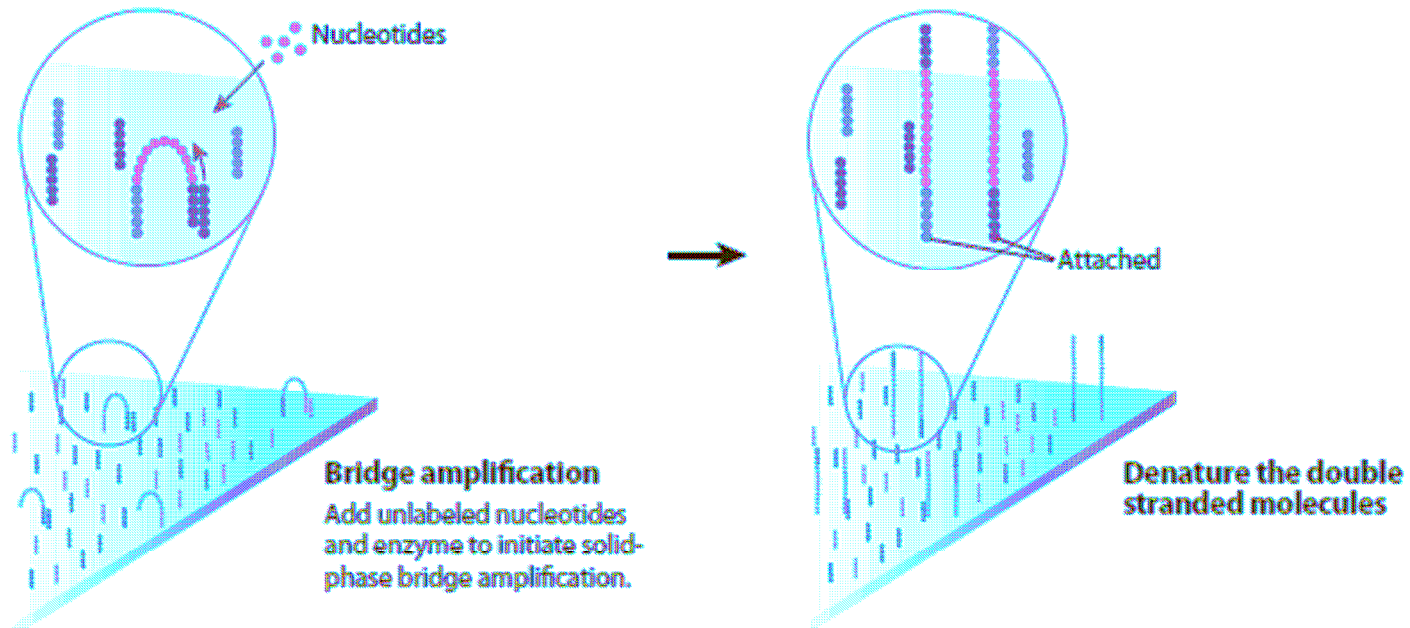
Illumina



... principles - illumina



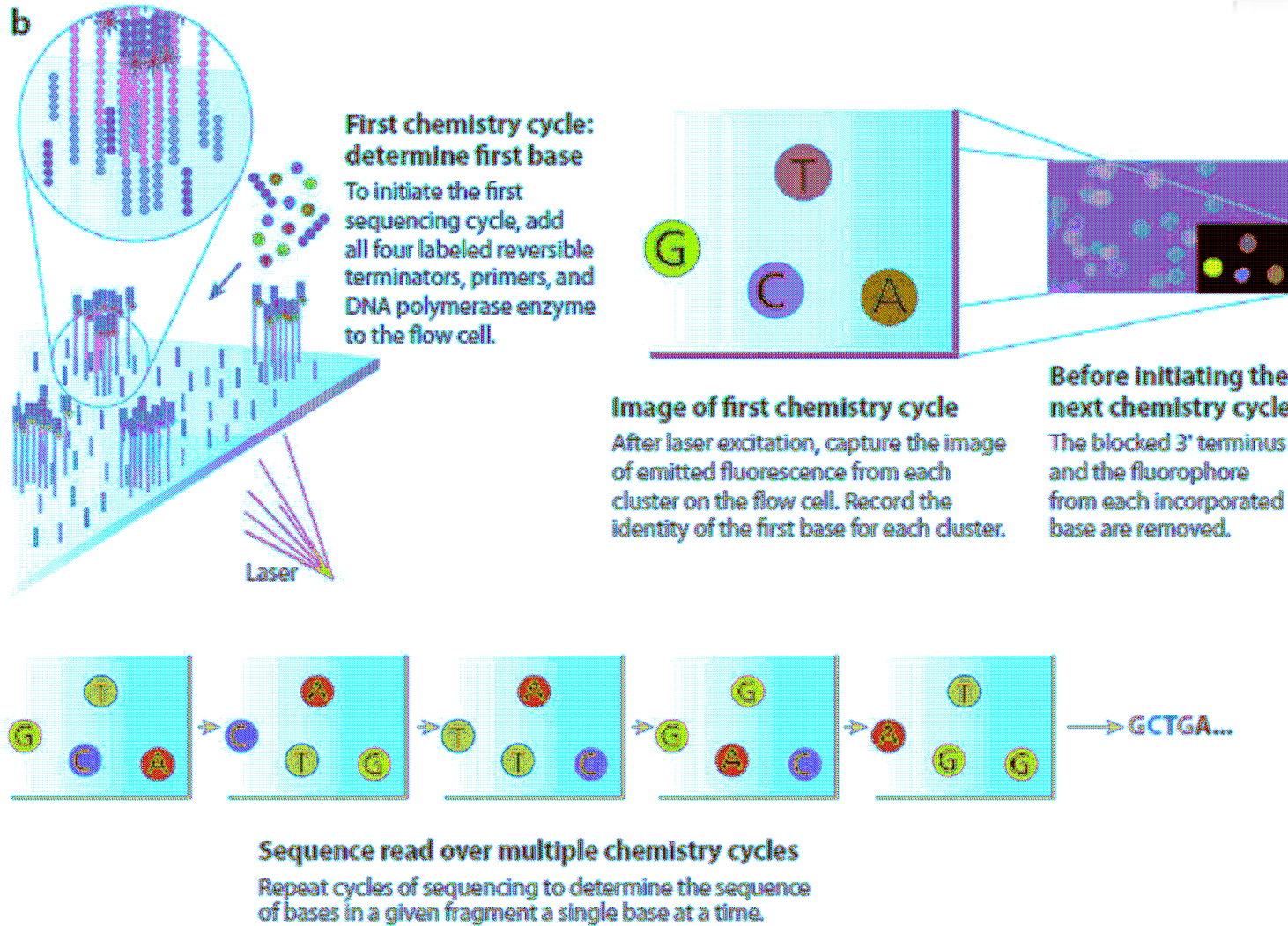
Illumina



... principles - illumina



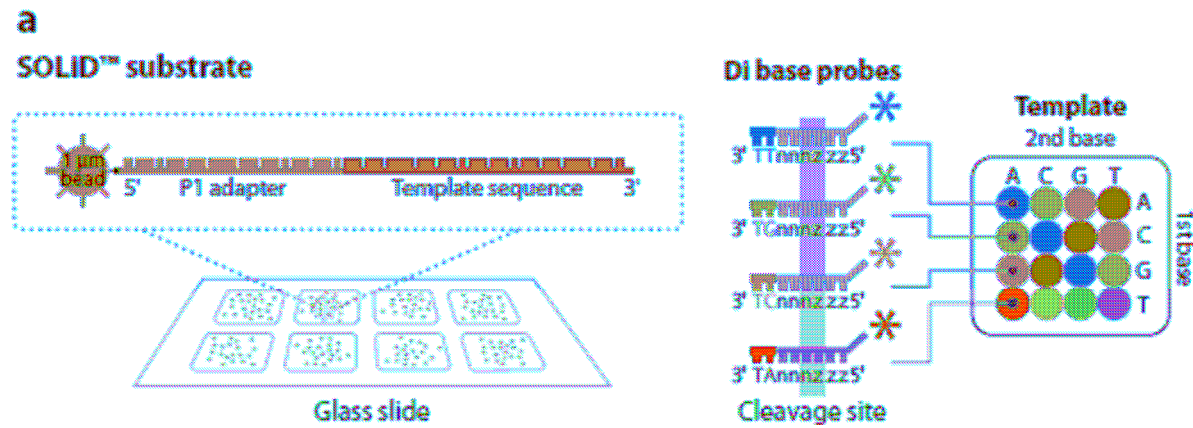
Illumina



... principles – ABI - Solid



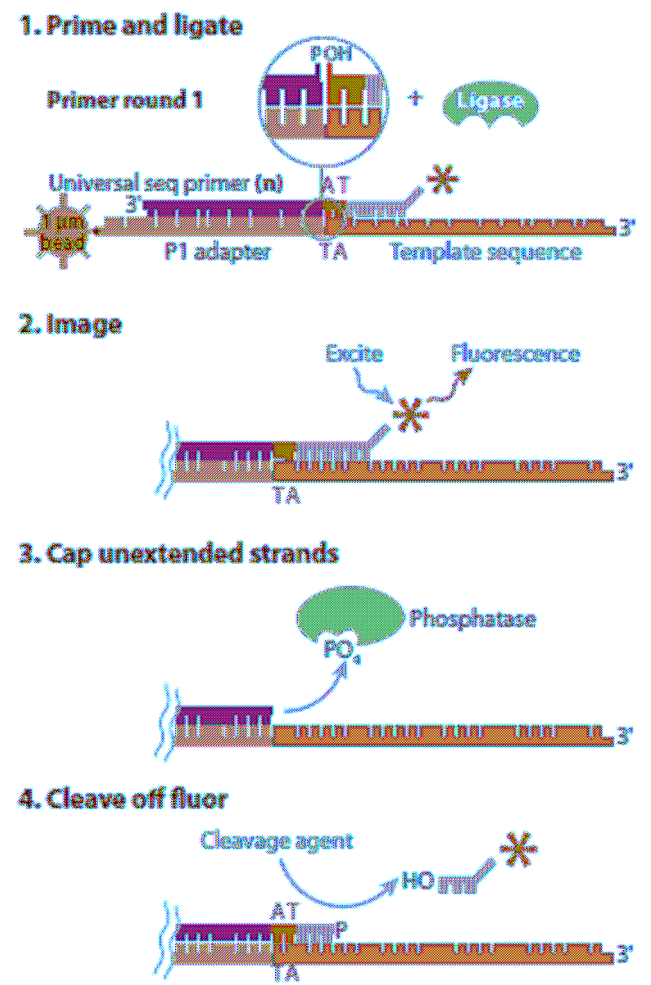
ABI - Solid



... principles – ABI - Solid



ABI - Solid

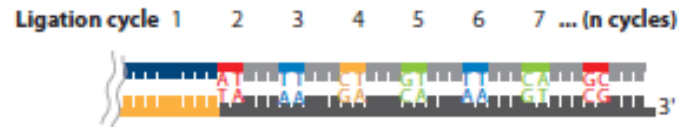


... principles – ABI - Solid

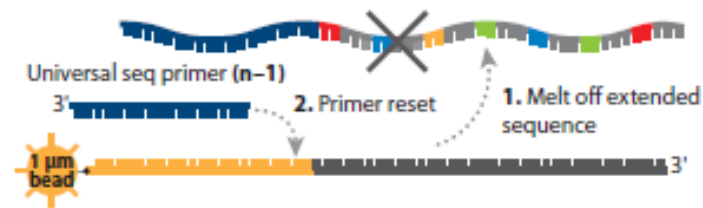


ABI - Solid

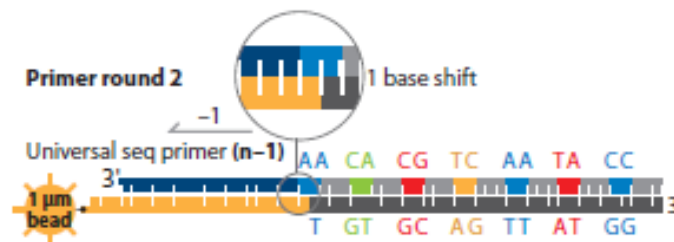
5. Repeat steps 1–4 to extend sequence



6. Primer reset



7. Repeat steps 1–5 with new primer

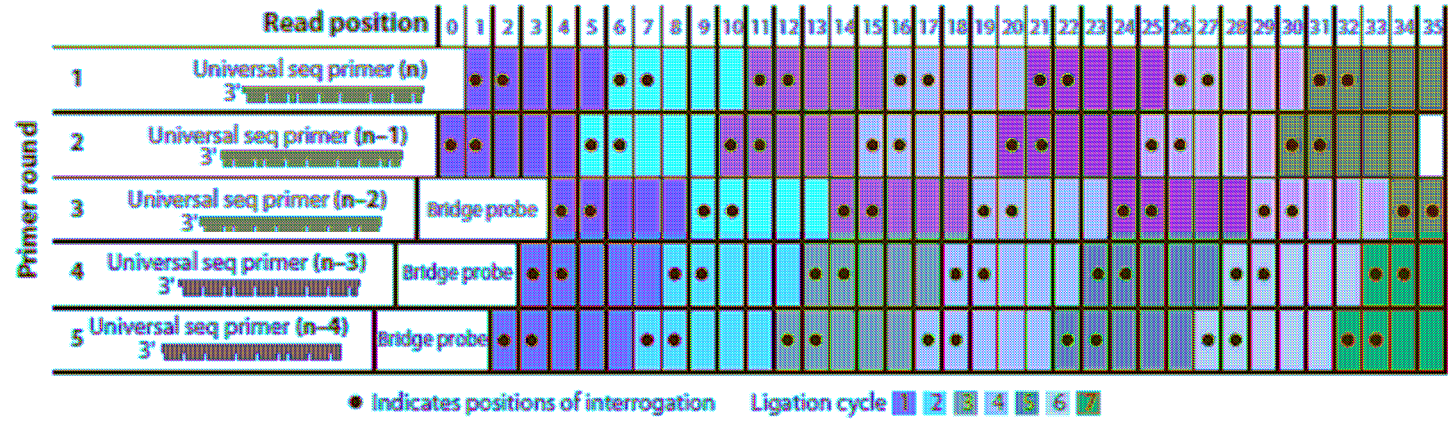


... principles – ABI - Solid



ABI - Solid

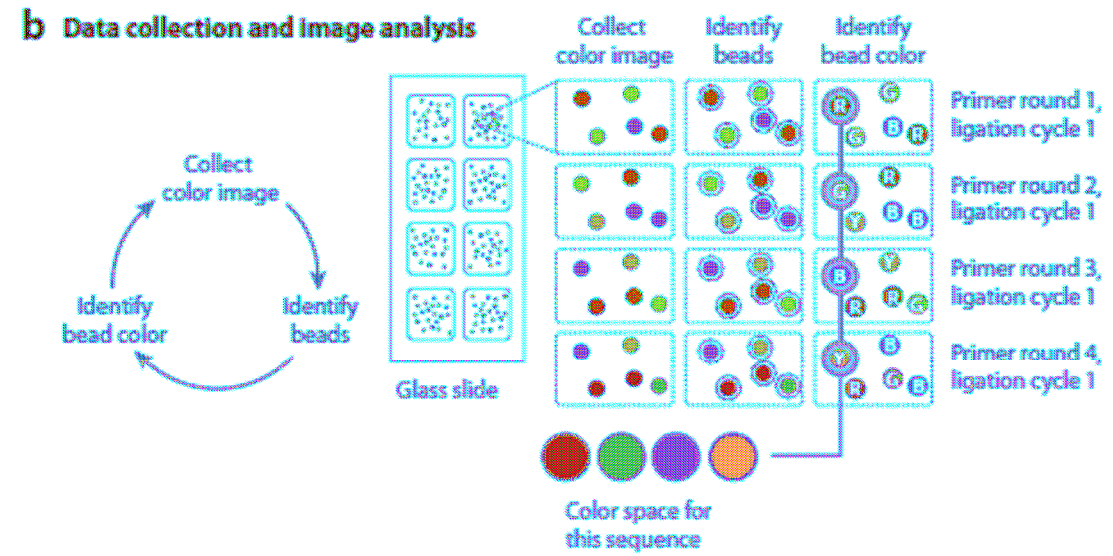
8. Repeat Reset with , n-2, n-3, n-4 primers



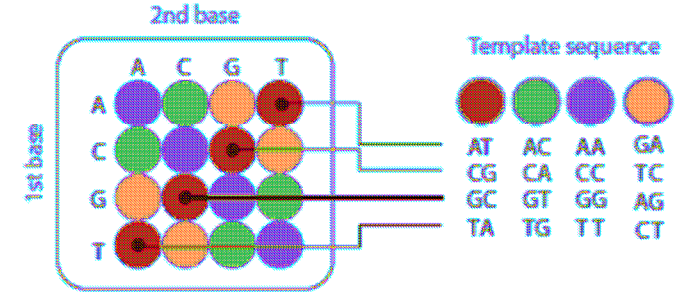
... principles – ABI - Solid



ABI - Solid



Possible dinucleotides encoded by each color



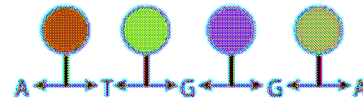
... principles – ABI - Solid



ABI - Solid

Double interrogation

With 2 base encoding each base is defined twice



Decoding

