

11/5/09

Exams back today

Regrades due next week

PS 8 due next week.

Irregular bagels? Email if want to set up different time

* NO MINUS GRADESChemical MutagensBase analogs: incorporated into DNA/RNA by mistake, ^{anti-}virals

Alkylating agents: plastic synthesis, mustard gas, EMS

↳ wide range of mutations

Intercalating agents: acridines, ethidium bromide

↳ insertions/deletions

↳ fits b/w stacks of bases

* cancer cells: chemo is type of base analog

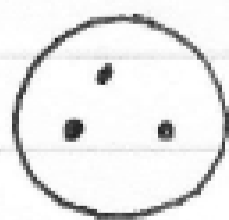
How do we measure mutagenicity?

* Ames Test

take bacteria that are His⁻, watch for frequency of His⁺ revertants

Finessing the Ames Test

- disable bacterial repair enzymes
- make more like a mammal: add liver enzymes to test breakdown products of original chemical simultaneously (metabolites could be mutagenic even if original is not)

H₂OH₂O + mutagen

Repair Systems?

1) Direct repair: ~~photolyase~~ photolyase, directly restores wild type

2) Base excision repair: DNA Glycosylase cleaves, AP endonuclease nicks DNA upstream of damaged bases, deoxyribophosphodiesterase removes damaged DNA

Then DNA Pol fills in using comp. strand as template, ligase fills nicks

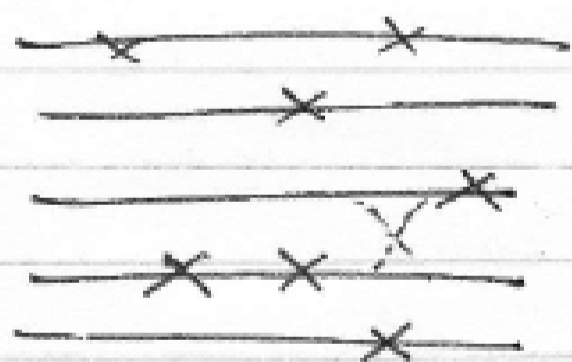
3) Nucleotide excision repair: recognize presence of mutation by distortion of double helix, assemble protein complex and cut up + downstream of mutation, removing @ 30 nucleotides. Again, DNA Pol fills in using template, then ligation follows

Recombination:

Like mutation, rec'n generates genetic variation

↳ new combos of existing variants

How did it evolve? solve Muller's Ratchet

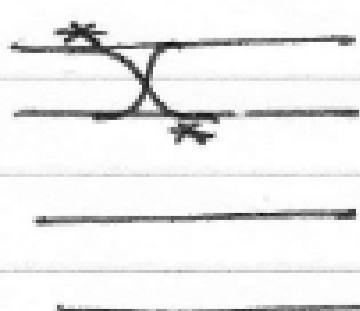


Mutations are random, constant, usually deleterious. Genomes get worse & worse, but rarely get better

Rec'n (crossing over) can recreate unmutated & some genome

↳ & one w/ lots of mutation

Rec'n can also combine good mutants



Get 2 good ~~mutants~~ mutations into genome w/o needing a rare, double mutation

③

~~11/5/09~~ 11/5/09

Sex + recomb are very similar
-sex also gets rid of the baddies + g combines goodies

Why only 2 sexes?

Problem: sex 1 can only repro. w/sex 2 =
only mate w/1/2 pop, given equal sex ratios

What if 1 never meets with 2?

w/3 or more sexes, it just gets worse

But... what about an infinite # of sexes?

(still only need 2 indiv. of diff sexes) - works great

• some fungi have >13 sexes

Why not have rec'n, no sex?

Extremes in gamete sizes are good = anisogamy

~~bigg~~ big(egg) + small(sperm), only one set
of cytoplasm, mitochondria, chloroplasts, ribosomes, etc.

↳ rarely mito from 2 parents rather than
one causes disease