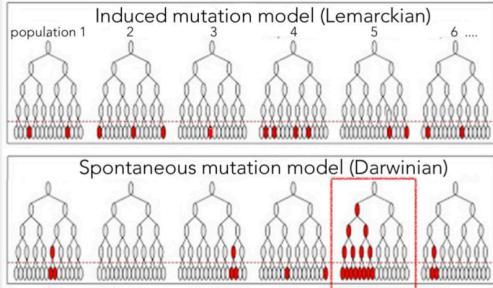




Hand in questions for today

Luria-Delbrück



How would increasing the mutation rate influence the outcome of the Luria-Delbrück experiment.

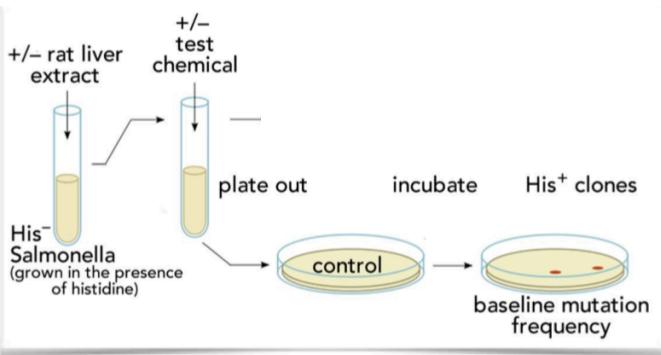
Questions to ponder:

Given the frequency at which phage resistance arises, can you provide a plausible reason for why resistance to bacteriophage is not already a universal trait in prokaryotes?

How would it change your perspective if mutations occurred because organisms need them, rather than randomly?

How does the apparent fact that evolution depends upon random mutations to generate new genes and new "types" of organisms, new species, influence your view of the meaning of existence?

Ames test for mutagenic chemicals



Ames test for mutagenic chemicals

Bacterial Strains: We will use two his⁻ *S. typhimurium* strains in our screen for mutagens. TA1535 contains a T to C missense mutation in the *hisG* gene, leading to a leucine to proline amino acid substitution. TA1538 has a deletion of 1 base pair (C) in the *hisD* gene, which causes a -1 frameshift mutation. This changes two amino acids and brings a stop codon into the reading frame 133 amino acids prematurely.

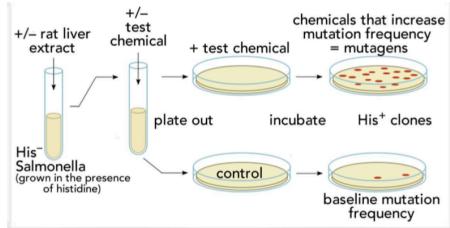
Ames test for mutagenic chemicals

Why choose reversion from his⁻ to his⁺?

Does this over- or under-estimate the mutation rate?

What factors control the number of mutant colonies?

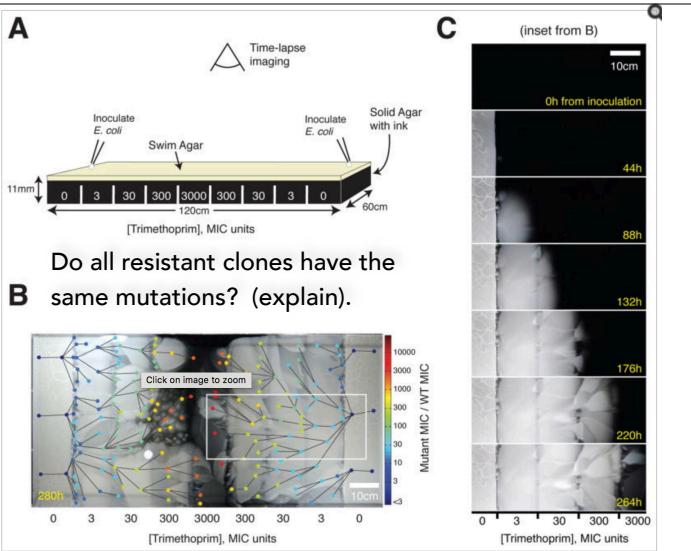
If you sequenced the mutagenized genome, where would you find mutations?



Questions to answer:

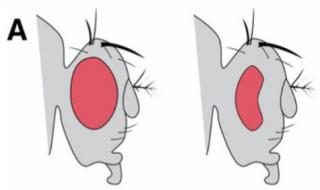
What is responsible for the baseline mutation frequency (in the Ames test)?

A compound produces mutations in the Ames test; what factors would influence your decision about whether to worry about exposure to that compound?



Where does evolutionary competition occur in the plate?

Do all mutant (antibiotic resistant) clones make it to the central region?
What factors influence bacterial growth?

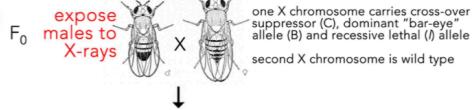


"isolated a version of the X-chromosome, known as CBl, that carries a dominant allele that produces bar eyes (\leftrightarrow), a recessive lethal mutation, and a large inversion (a flipped region) in the chromosome; the presence of this inversion generates embryonic lethal mutations if recombination occurs within the inverted region"

How to make mutations?

inducing mutation on the X-chromosome

how does this effect males?



Questions to answer:

What are the advantages (for a geneticist) for choosing an organism with hundreds of offspring per mating event?

What is the advantage of studying traits that alter non-essential structures?

Why is it not possible to identify every gene involved in the formation of a complex trait by a simple mutagenesis approach?

Rational mutagenesis

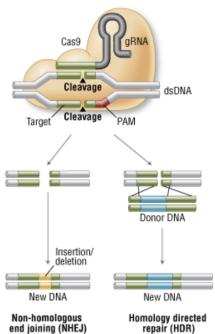
What is needed for rationale mutagenesis?







A. Genome Engineering With Cas9 Nuclease



Genome Engineering with CRISPR-Cas9:
Birth of a Breakthrough Technology

