coreBio II - genetics: Mon. 31 Jan. 2018

vertical inheritance: one cell to its offspring; cellular reproduction dependent

mutational innovations restricted to a lineage

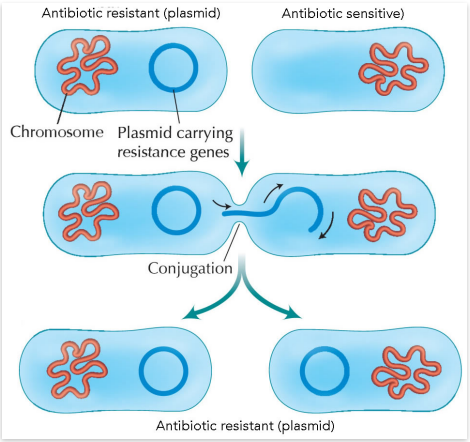
horizontal gene transfer: one cell to another existing cell - reproduction independent

mutational innovations can move between lineages / organisms

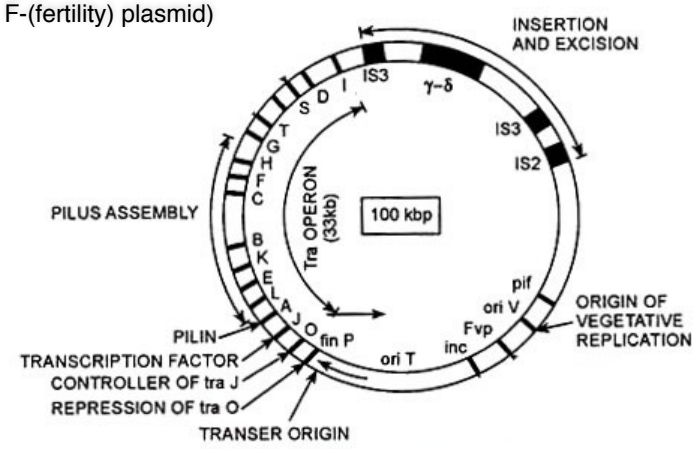
sexual inheritance: cellular fusion

mutational innovations shared among offspring

selfish / useful genetic elements (F-plasmid)

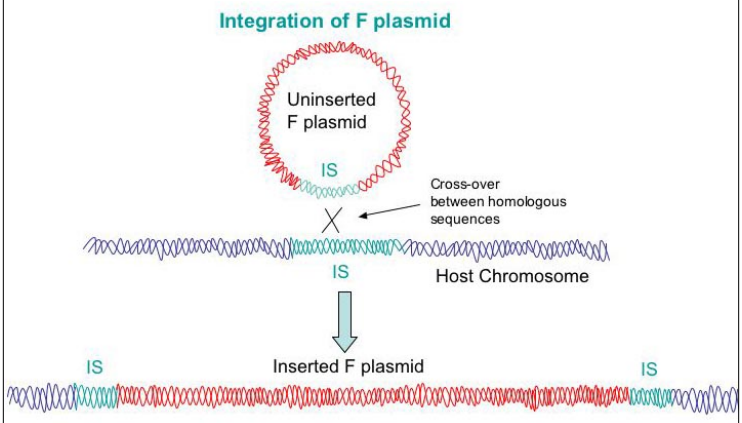


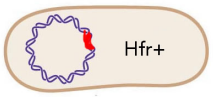
F-(fertility) plasmid)

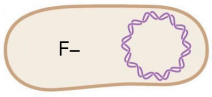


A map of *F* plasmid. The transfer operon (*tra* operon) has genes *A* to *T*.

F-(fertility) plasmid integration







Thr^{+}, Leu^{+}, ari^{R}, Lac^{+}, Gal^{+}, str^{R} Thr$^{–}$, Leu$^{–}$, ari^{S}, Lac$^{–}$, Gal$^{–}$, str^{S}

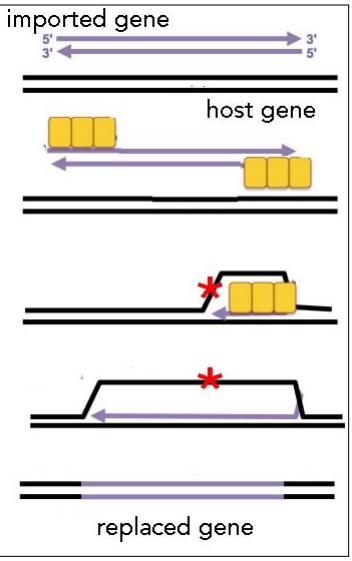
what does this mean? (in haploid prokaryotes)

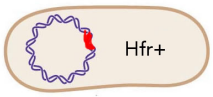
dominant (wild type) / recessive (loss of function)

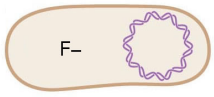
Questions to answer and ponder:

- Describe (diagram) what happens to the DNA molecule that is introduced to a cell via conjugation?

homologous recombination



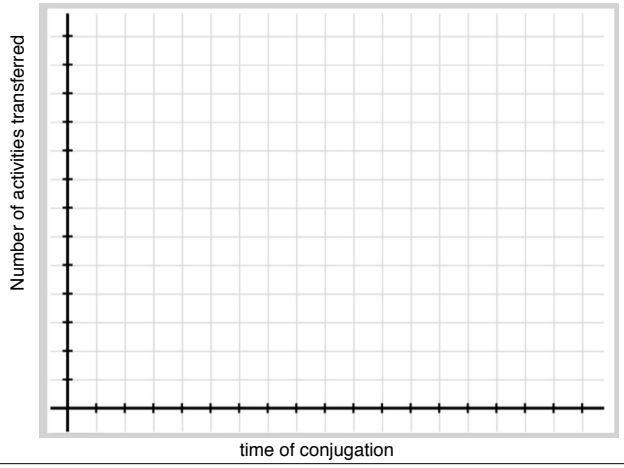




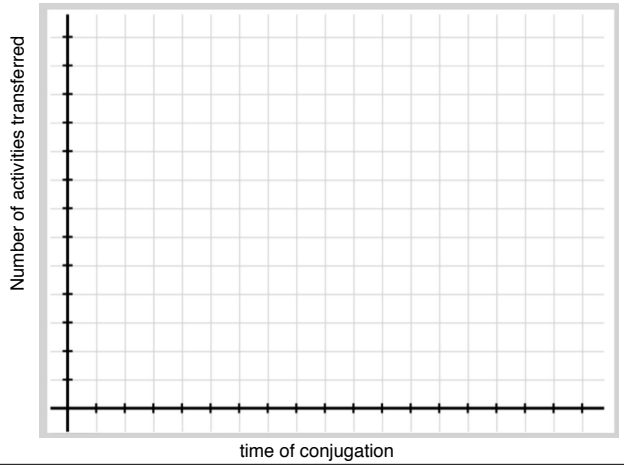
Thr^{+}, Leu^{+}, ari^{R}, Lac^{+}, Gal^{+}, str^{R}

Thr^{-}, Leu^{-}, ari^{S}, Lac^{-}, Gal^{-}, str^{S}

assume that the Thr+, Leu+, ariR, Lac+, Gal+, strR genes are close together on the chromosome, how could you tell their orientation with respect to a single Hfr site.



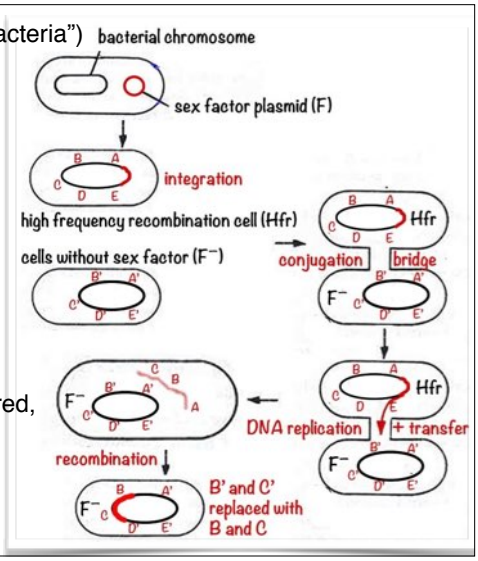
assume that Thr+, Leu+, ariR, Lac+, Gal+, strR genes are scattered evenly around the chromosome, how would their transfer change as a function of time of conjugation (single Hfr site)?



conjugation ("sex in bacteria")

F (fertility) plasmid dependent conjugation

integration
(if Her domain transferred, F– cell becomes F+)



Questions to answer and ponder:

- How might the regulation of plasmid ORI regions be different in low and high copy number plasmids?

Questions to answer and ponder:

- What is an asexual clone? How would you recognize it.
- What is the effect of a amorphic allele / mutation on the behavior of a prokaryotic clone.
- What are some possible (evolutionary) advantages to the ability to take up and integrate, as opposed to simply eat foreign DNA?
- Why might the “source” of foreign DNA matter?
- Present a plausible model that would identify host from foreign DNA

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Aidan considers your questions…

next:

Chapter 13: Asexual and sexual reproduction in eukaryotes

In which we consider the processes of asexual and sexual reproduction in eukaryotes. We note the molecular processes, mitosis & cytokinesis, involved in somatic cell reproduction and how they are modified in meiosis and gamete formation within the germ line. We consider the implications of chromosome pairing, recombination & independent segregation as well as dimorphism of gametes leading to maternal and paternal effects, including mitochondria inheritance and sex determination.