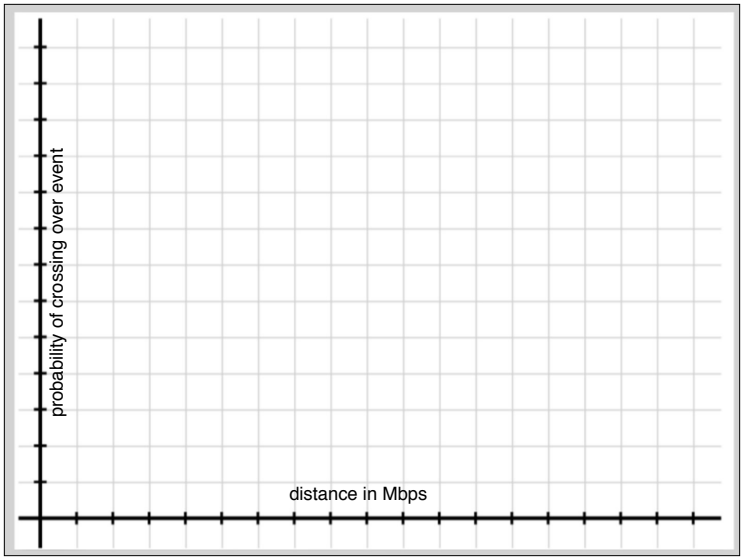
coreBio II - genetics: Friday 16 Feb 2018

hand in questions!

Aidan: top questions from last time

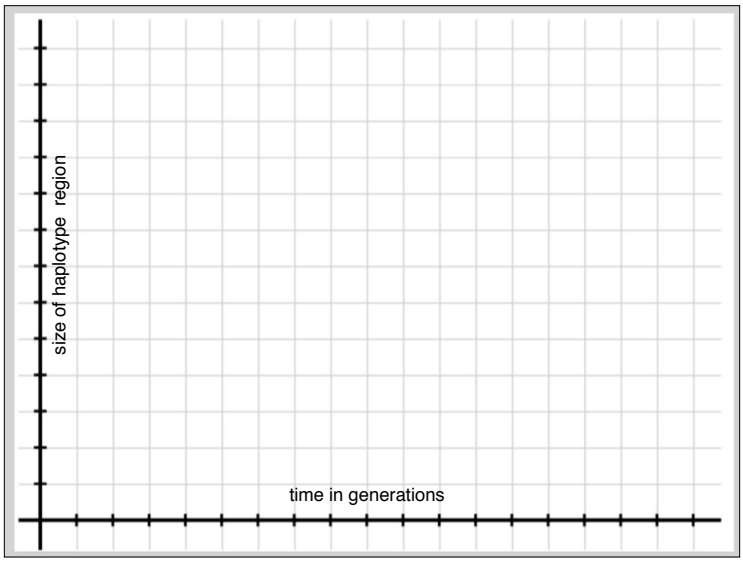
Questions (you should be able) to answer:

Graph, as a function of distance, the likelihood that recombination will disconnect a selected (whether positively of negatively) allele from alleles in surrounding genes.



Questions (you should be able) to answer:

Graph size of a conserved genomic region (haploid) as a function of time in a population.



imprinting

mother - fetus are not genetically identical - why not?

what is imprinting?

A gene is **only** expressed from the gene inherited from mother or father (even though father's or mother's version is present).

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B

BIOLOGICAL SCIENCES

The origin and evolution of genomic imprinting and viviparity in mammals

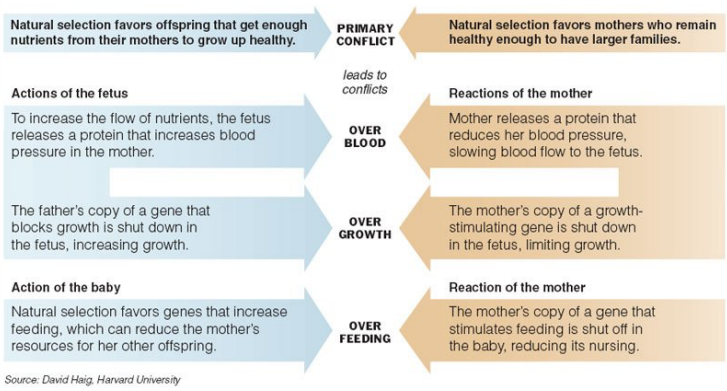
Marilyn B. Renfree, Shunsuke Suzuki, Tomoko Kaneko-Ishino

Published 19 November 2012. DOI: 10.1098/rstb.2012.0151

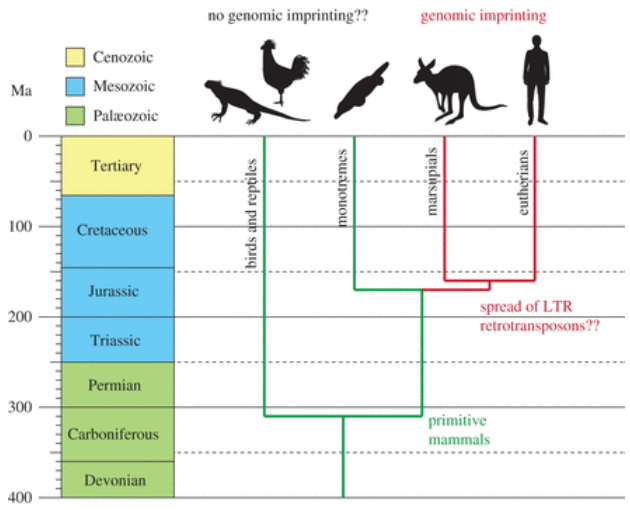
maternal - fetal conflicts

In Childbearing, a Battle on Many Fronts

Experiments with mice and studies of humans support the theory that evolutionary conflicts underlie a range of disorders in pregnancy and child development.



Source: David Haig, Harvard University

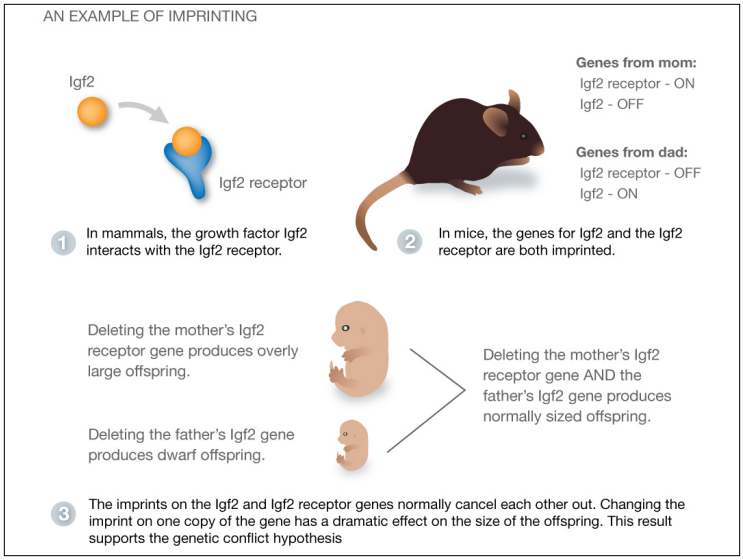


Origins of genomic imprinting

- "Conflict hypothesis"
- Imprinting arose early in mammalian evolution.
- It is to the male's benefit to silence genes that conserve maternal resources at the expense of the fetus.
- It is to the female's benefit to silence genes that allocate resources to the fetus at the expense of the mother.

the **Genetic Conflict hypothesis**, supposes that imprinting grew out of a competition between males for maternal resources.

http://learn.genetics.utah.edu/content/epigenetics/imprinting/



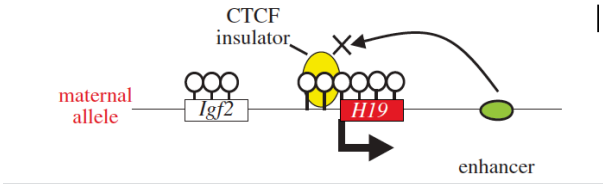


Figure 2. Regulation of the paternal and maternal expression in the *Igf2–H19* imprinted domain by a single gDMR. The open lollipops represent unmethylated CpG islands and the black lollipops represent methylated CpG islands. The boxes represent *Igf2* and *H19* genes and the arrows from the boxes indicate expression of the genes. The yellow and green circles represent the CTCF insulator protein and a downstream enhancer, respectively.

If the gene is only expressed from the maternal copy, only the maternal allele matters (and vice versa)