coreBio II - genetics: Monday 19 Feb 2018

hand in questions!

Top questions from last time

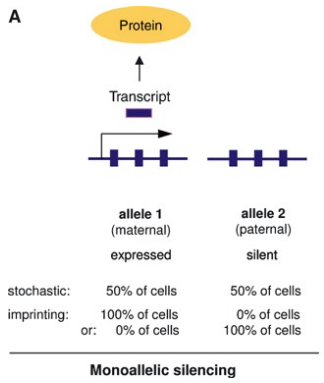
Things to remember

imprinting of genes effects embryo, reflects different interests of parents

paternally effect genes- zygote over mom

maternal effect genes- protect mom over zygote

effects occur early in process leading to meiosis (all gametes effected).



Sex Determination: Why So Many Ways of Doing It?

Abstract: Sexual reproduction is an ancient feature of life on earth, and the familiar X and Y chromosomes in humans and other model species have led to the impression that sex determination mechanisms are old and conserved. In fact, **males and females are determined by diverse mechanisms** that **evolve rapidly** in many taxa. Yet this diversity in primary sex-determining signals is coupled with **conserved molecular pathways** that trigger male or female development. Conflicting selection on different parts of the genome and on the two sexes may drive many of these transitions, but few systems with rapid turnover of sex determination mechanisms have been rigorously studied. Here we survey our current understanding of how and why sex determination evolves in animals and plants and identify important gaps in our knowledge that present exciting research opportunities to characterize the evolutionary forces and molecular pathways underlying the evolution of sex determination.

http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001899

RESEARCH UPDATE

Sry and sex determination: how lazy can it be?

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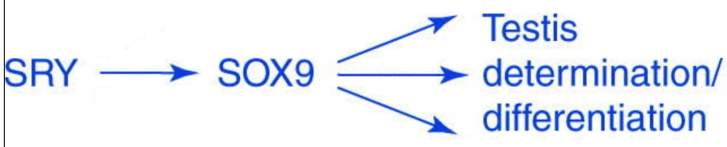


What would be the effect of
null (amorphic) mutation in SRY?

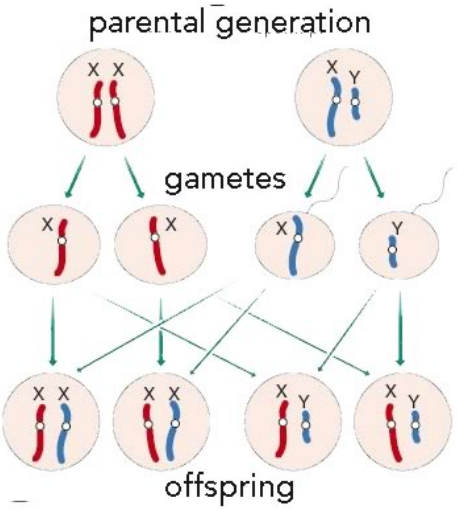
Where is the paternal Y from?

Which X in female is from mom and which from dad?

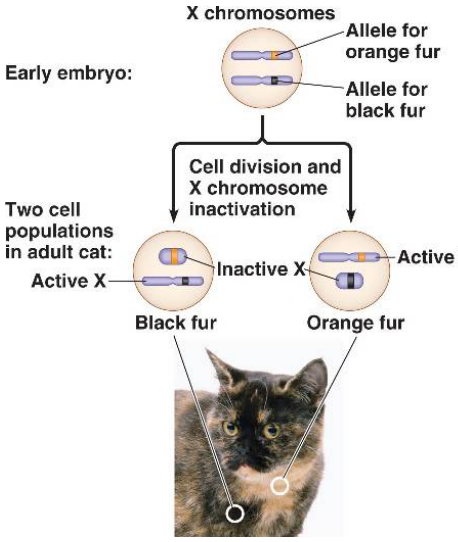
Where can crossing over occur?

Can parthenogenesis in mammals occur (theoretically)?
In which sex?

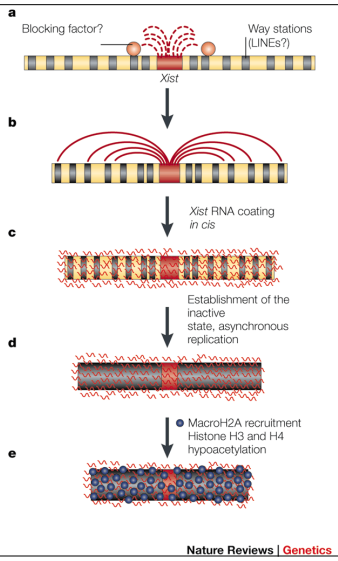
What type of off-spring be produced.



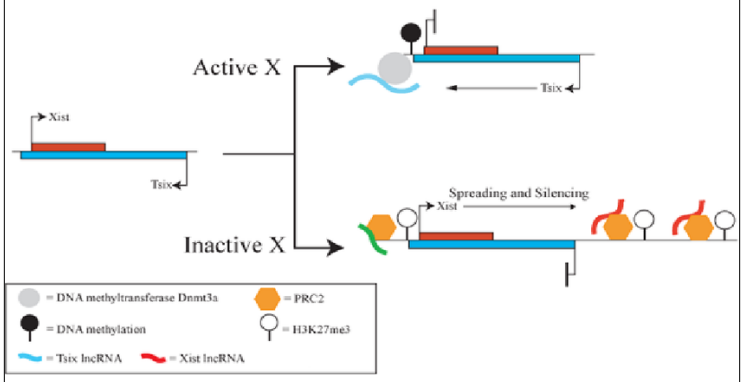
X-inactivation - balancing gene



X-inactivation - balancing gene expression



X-inactivation - balancing gene expression



If a gene is on the X, it will be expressed from only one allele

female is mosaic

alleles can influence rate of somatic cell division

in males, recessive alleles on X are always visible

same process for mono-allelically expressed genes (mosiac)

Questions to answer:

216. What does it mean to be mosaic for an allele?

217. Why do males and females differ in the traits they display?

218. Why do males and females differ in the display of phenotypes associated with genes on the X chromosome?

219. Can you provide a plausible mechanism to explain why (autosomal) random monoallelic expression occurs?

220. How can monoallelic expression impact an organism?

- Under what conditions might mono-allelic (autosomal) gene expression be beneficial?