The X chromosome has the largest effect on hybrid sterility in all organisms studied.

Possible explanations?

- observational bias
- artifact of hemizygosity among backcross males
- improper dosage comp.
- X-linked evolve faster (Charlesworth)

① Observational bias?

- can only analyzes cases where 1 sex sterile
- autosomal cases of reproductive isolation would involve both sexes which would be unobservable

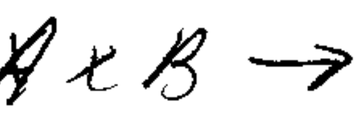
Test: can use 3rd species to pass chromo

A x B → dead
B x C → OK
A x C → OK

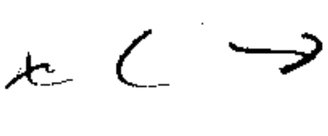
Conclusion: X is involved

② Hemizygous

- all recessive alleles expressed



F1 ♂ = sterile



F1 ♀

∴ hemizygous problem may be simple related to hemizygousity.

ⓐ but ♀ w/ same imbalance are fertile

ⓑ and in hybrid females that are sterile the X chromosome always has an effect

Do the same genes cause ♂ and ♀ sterility?
- diff genes/chromos. are responsible

③ Dosage compensation?
- hypertranscription in Drosophila

ⓐ but in birds/butterflies apparently don't dosage compensate

ⓑ and mutants in dosage comp. in Drosophila are usually lethal ∴ if dosage comp changed might expect to be dead.

ⓒ no rescue of fertility by mutant alleles

④ Rapid evolution of X chromo

Why could this occur?

ⓐ recessive mutations show up better on X chromos and can increase in frequency

ⓑ underdominant mutations can be fixed on X easily

How test?

① effect of autosomes should incr. with age of taxa

- this holds up

② should be an X effect on ♀ too

- this holds up

③ female-limited favorable mutations should accumulate slower ∴ female sterility should arise later.

- this holds up

But

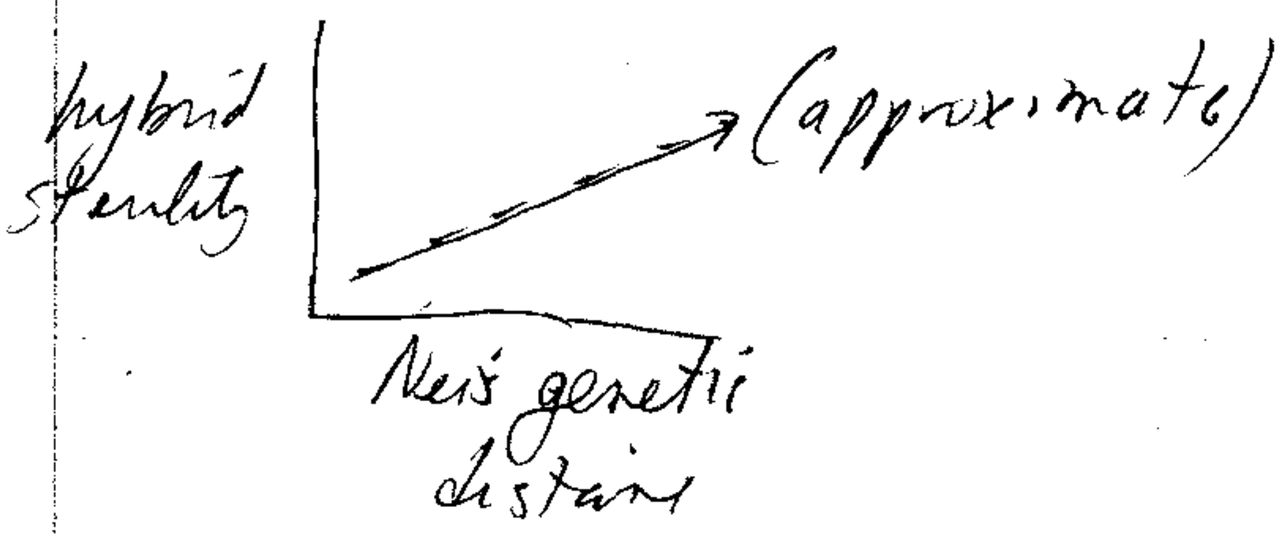
Assumes that those alleles causing infertility are recessive or underdominant and on X chromosome and these are different from those genes which cause morphological differences.

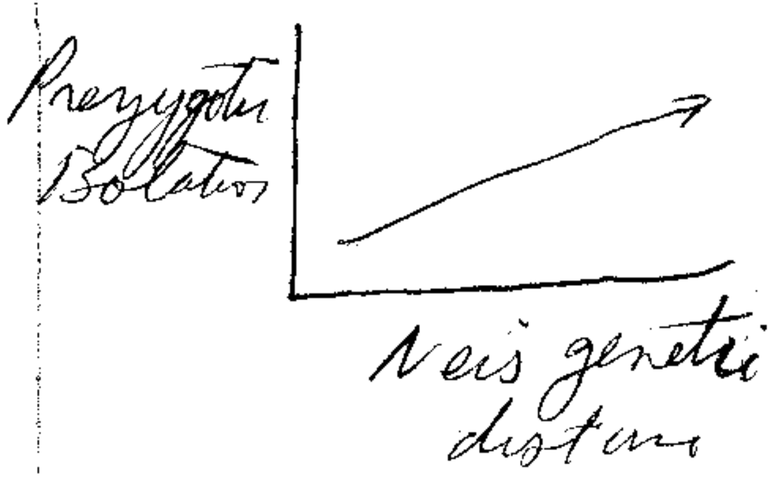
11/04/91

Allan Orr: Speciation in Drosophila

Dobzhansky:

Speciation
Animals
- gradual
- post & pre-zygotic isolation about as fast





Haldanes rule: if one sex is always sterile then it is heterogametic (most of the time).

This rule holds up in organisms w/ ♂ XY and ♀ XY.