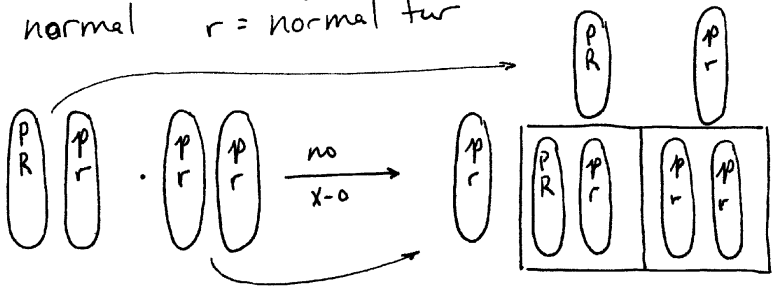
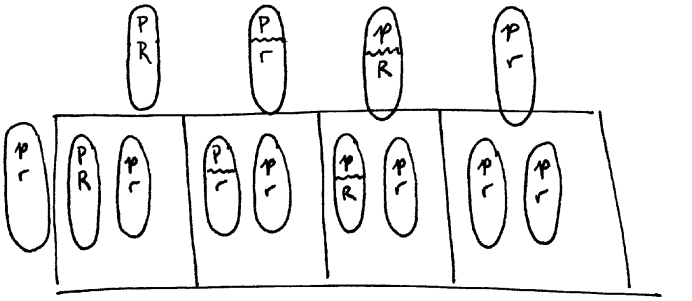
(19) P = pollex R = rough fur

p = normal r = normal fur

a) 

1 pollex + rough : 1 normal + normal

b) With crossing over



frequency of x-o = $\frac{\#\text{ x-o}}{\#\text{ population}} = \frac{64}{262} = .244 = 24.4\%$

c) 24.4% x-o = 24.4 map units apart

(20) B = wild-type body V = wild-type wings
b = black body v = vestigial wings

a) All of the F1 generation will be heterozygous for both traits.

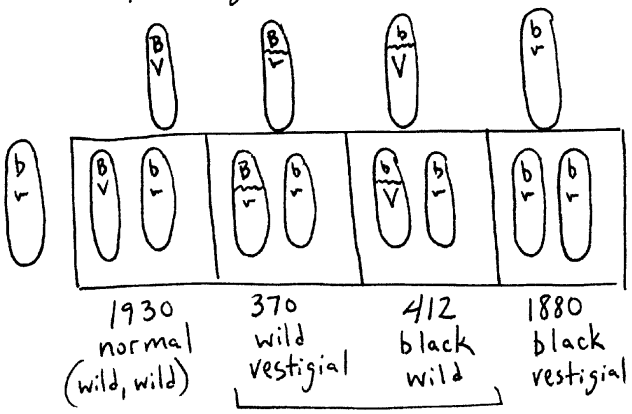
b) Yes, they are linked. If they weren't linked, we'd expect:

BbVv · bbvv

	BV	Bv	bV	bv
bv	BbVv	Bbvv	bbVv	bbvv

1 wild, wild : 1 wild, vestigial : 1 black, wild : 1 black, vestigial

however, we got



c) Freq. X-O = $\frac{\#\ X\text{-}O}{\#\ population} = \frac{370+412}{1930+370+412+1880} = \frac{782}{4592} = .170$

The genes are 17.0 map units apart.

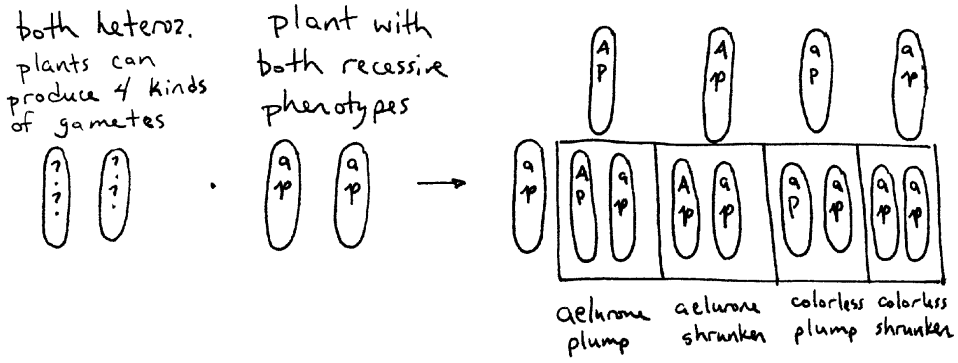
(21) A = aleurone P = plump
a = colorless p = shrunken

Linked gene rules of thumb:

1) Phenotypes with higher than expected frequency show the allele combination of the unaltered chromosomes.
2) Phenotypes with lower than expected frequency are the result of crossing over.

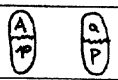
both heteroz. plants can produce 4 kinds of gametes

plant with both recessive phenotypes



plant A: 610 | 380 | 392 | 618 (380 and 392: crossing over)

plant B: 382 (x-o) | 612 | 616 | 390 (x-o)

	original	Crossed over
Plant A's chromosomes		
Plant B's chromosomes