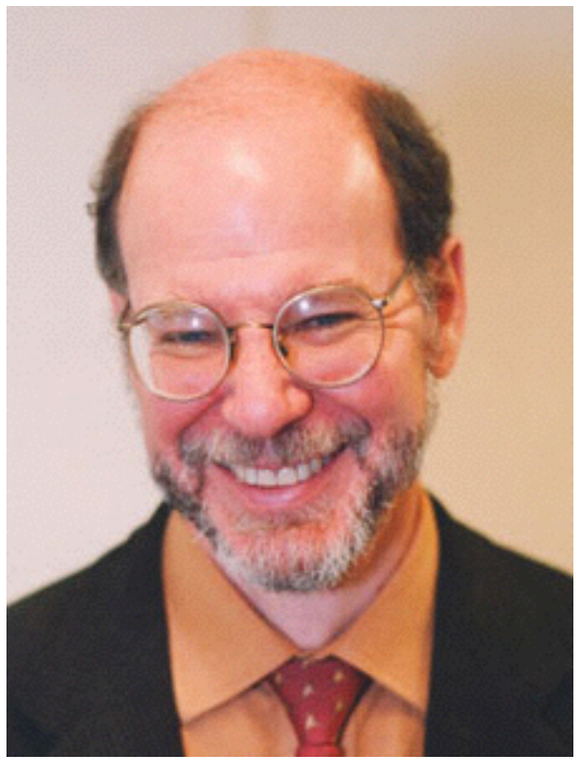
Bio393: Genetic Analysis

Step-wise genetic analysis



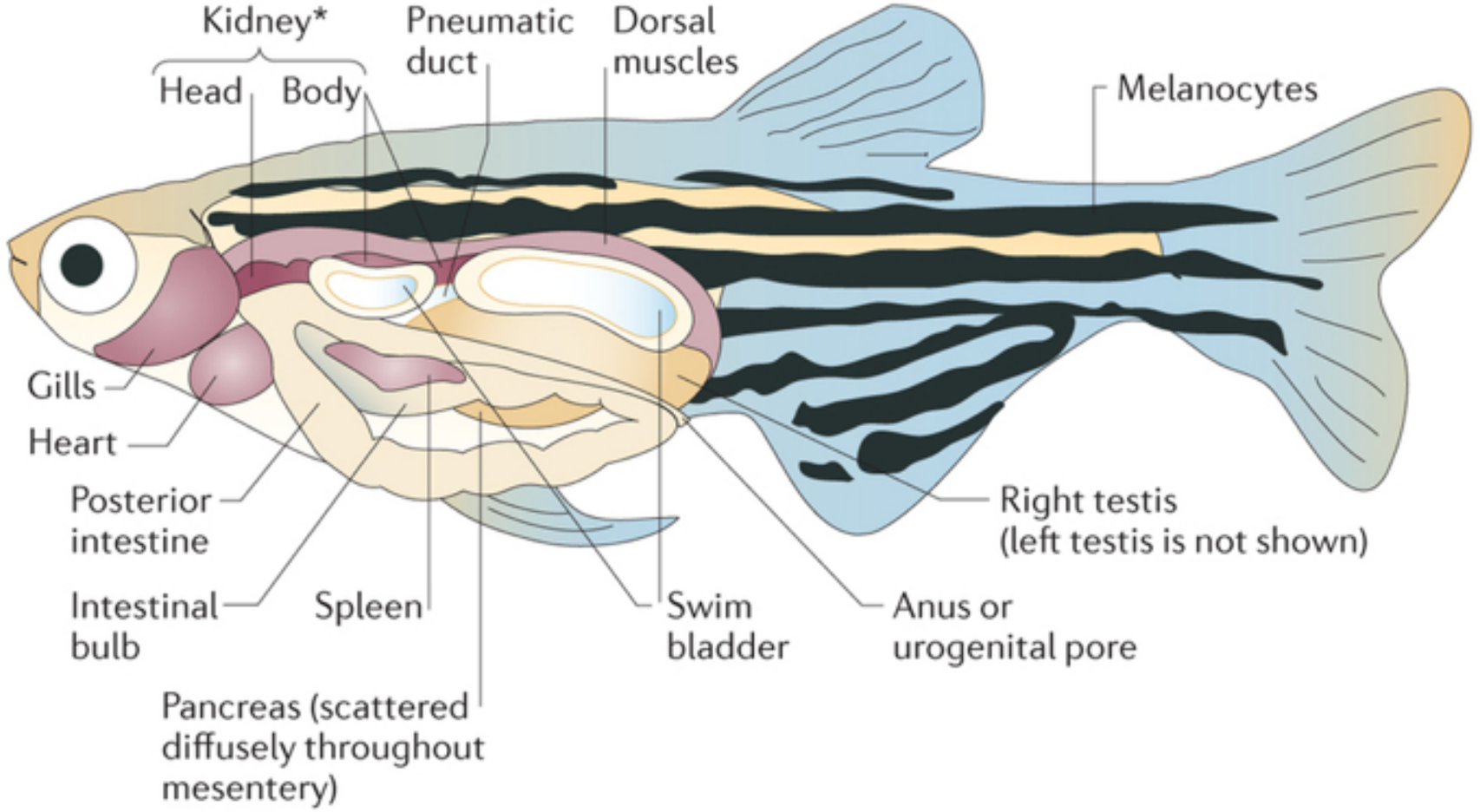
Bob Horvitz

Lecture 10

17. Determine site of gene action

What is the cell, organ, and/or tissue where the gene functions?

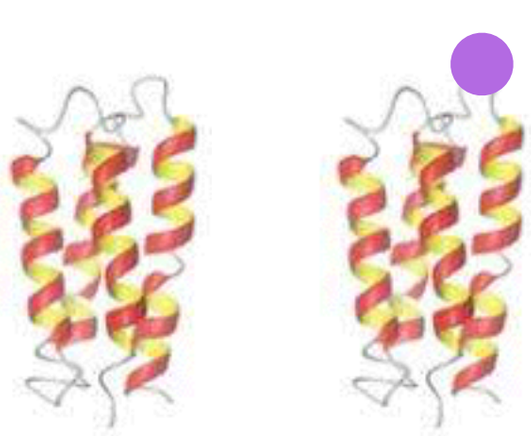
1. Rescue a mutant phenotype in a specific cell, organ, or tissue
2. Mosaic analysis (cell autonomy experiments)



18. Determine time of gene action

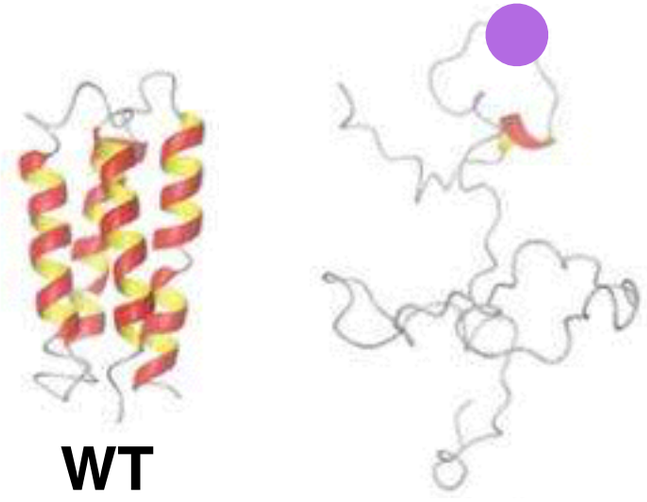
When does the gene function?

1. Induce expression to rescue a mutant phenotype at a specific time
2. Use temperature-labile mutants to define the temperature-sensitive period



WT **Mutant**

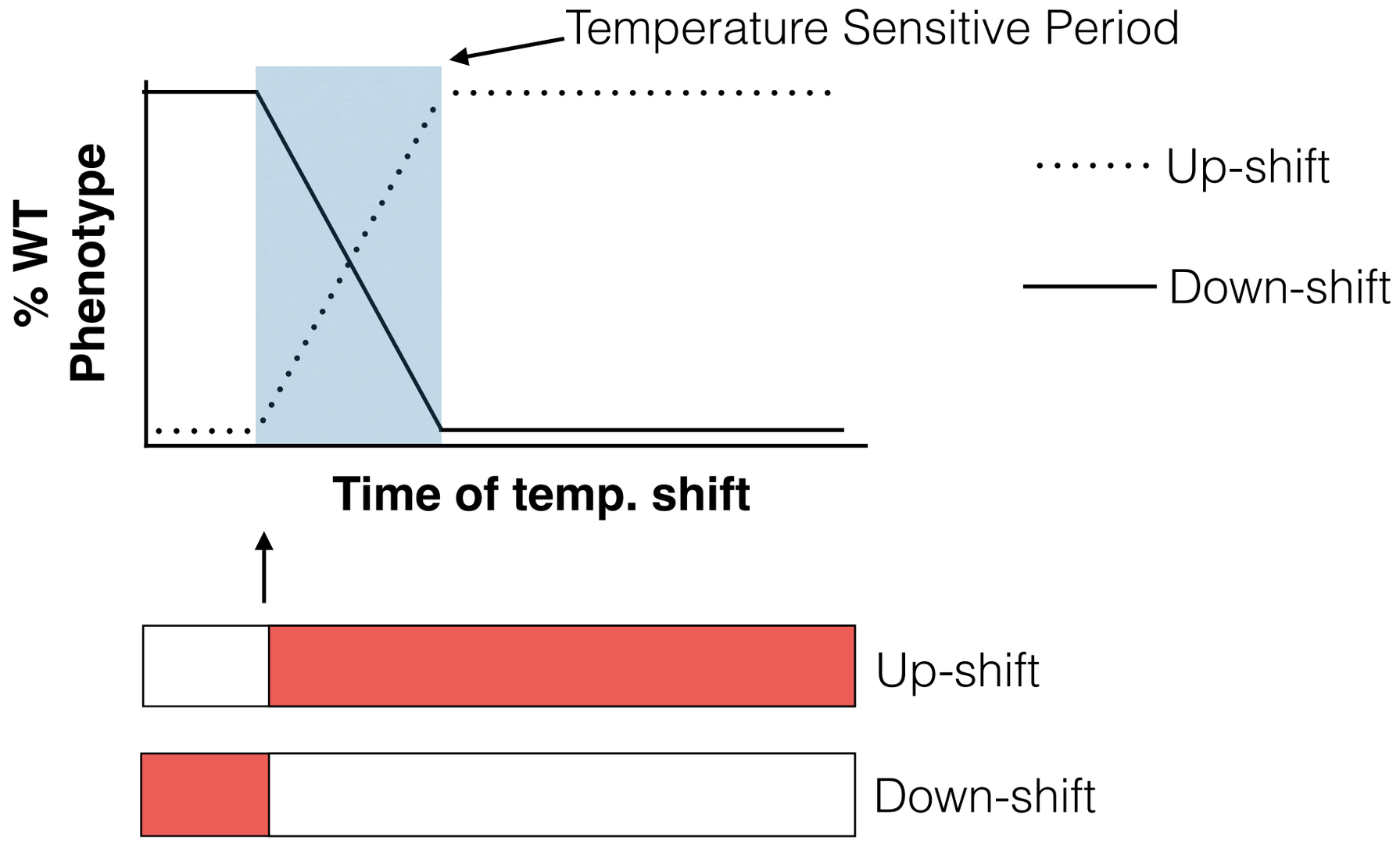
Permissive temperature



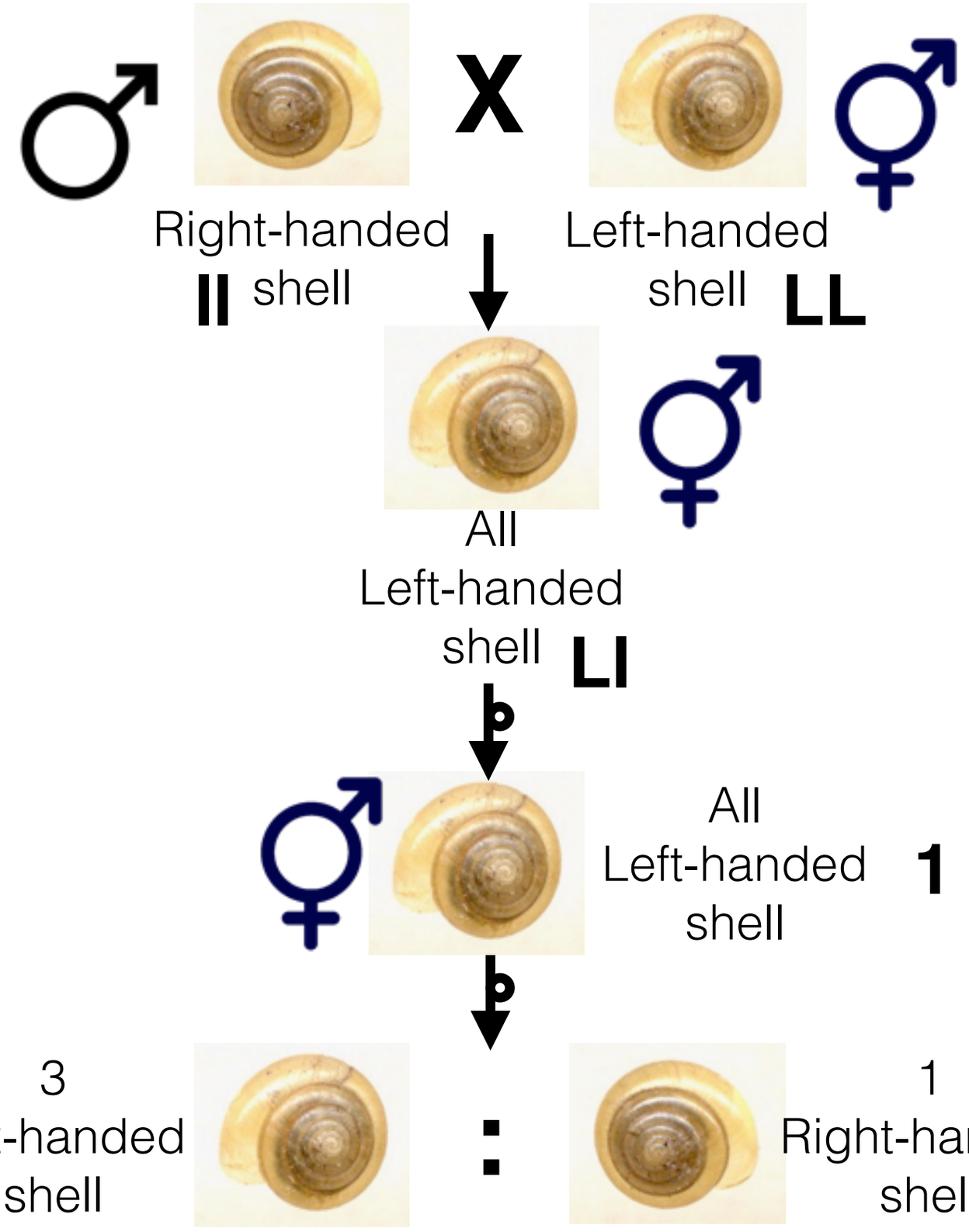
WT **Mutant**

Restrictive temperature

18. Determine time of gene action



19. Determine if there are maternal effects or cytoplasmic inheritance



19. Determine if there are maternal effects or cytoplasmic inheritance

Reciprocal cross

Left-handed shell

LL

X

Right-handed shell

ll

All Right-handed shell

Ll

All Left-handed shell

1 LL: 2 Ll: 1 ll

3 Left-handed shell

:

1 Right-handed shell

19. Determine if there are maternal effects or cytoplasmic inheritance

The egg and sperm have different compositions.

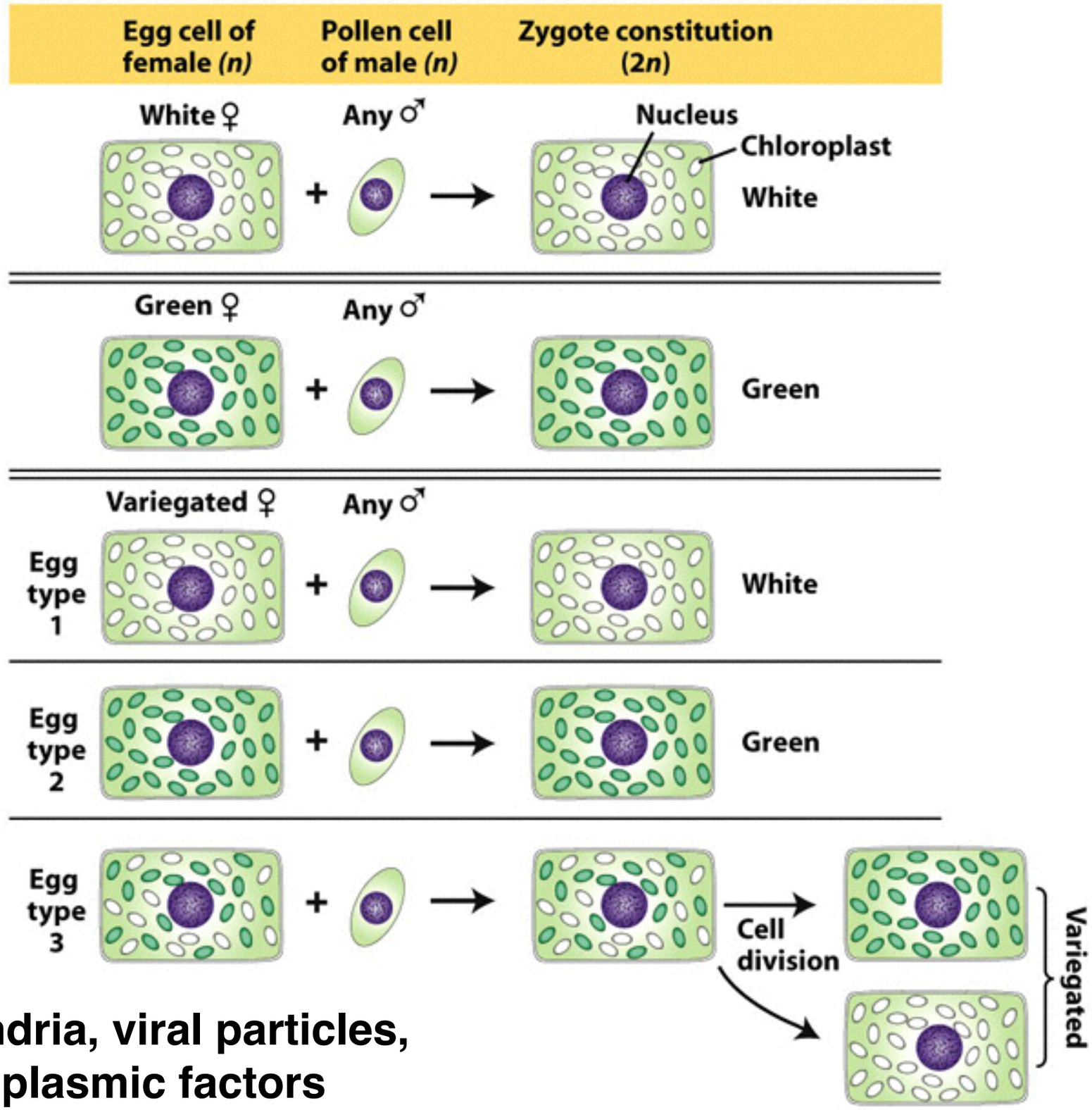
19. Determine if there are maternal effects or cytoplasmic inheritance

Plastid inheritance in *Mirabilis jalapa*

Only the color of the stem (mother) matters

White, green, or variegated

19. Determine if there are maternal effects or cytoplasmic inheritance



Plastids, mitochondria, viral particles, and other cytoplasmic factors

20. Determine the overexpression phenotype

What happens when the wild-type individual
has too much of gene X?

Overexpression *might* be useful
for investigating genetic interactions

21. Perform an overexpression screen for additional modifiers

1. Screen for dominant phenotypes similar to your mutant phenotype

2. Inducible overexpression of specific genes

3. Transposon-mediated overexpression screens

Find more genes by making hypermorphs

22. Isolate enhancers and suppressors of your mutant phenotype

23. Investigate pathways (measure genetic interactions or epistasis)