

Bio393: Genetic Analysis

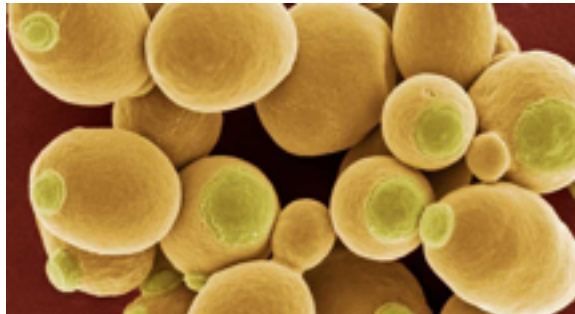
Complementation



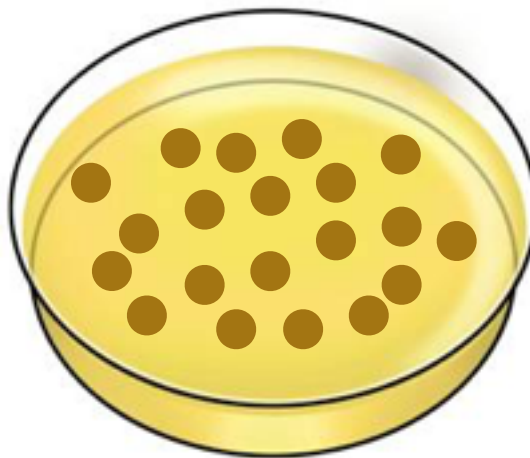
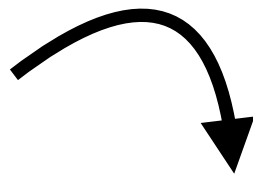
Screen for mutants that require adenine to grow

Screen:

EMS



S. cerevisiae

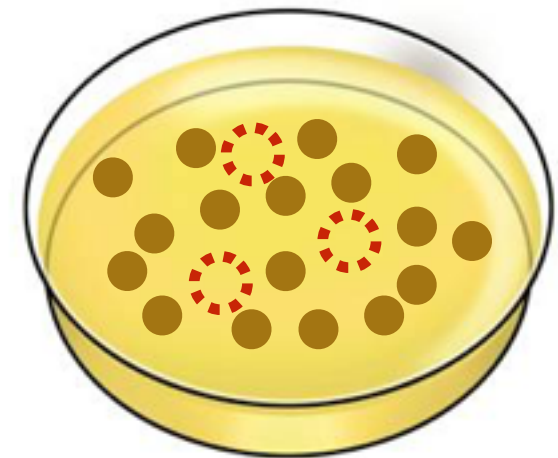


Complete
media

Replica
plate



~24 hrs

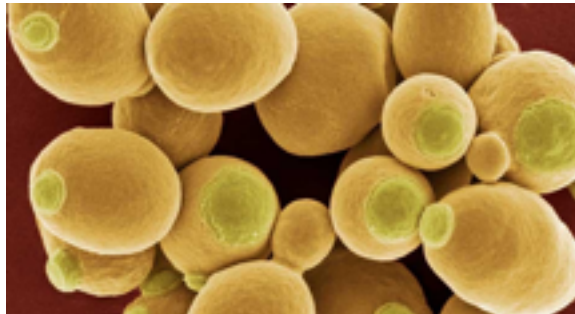


Media
-adenine

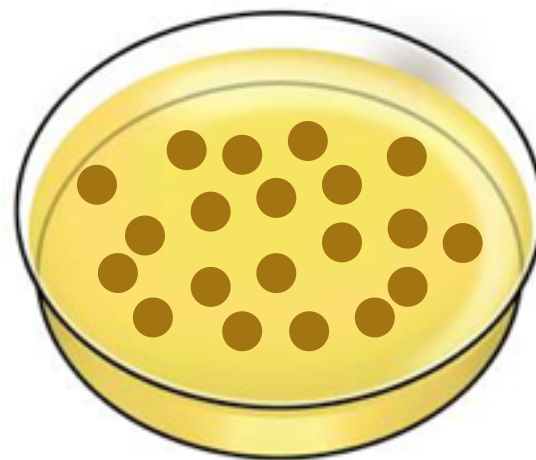
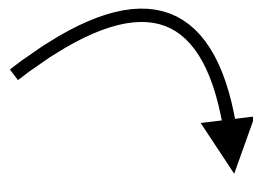
Screen for mutants that require adenine to grow

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EMS



S. cerevisiae

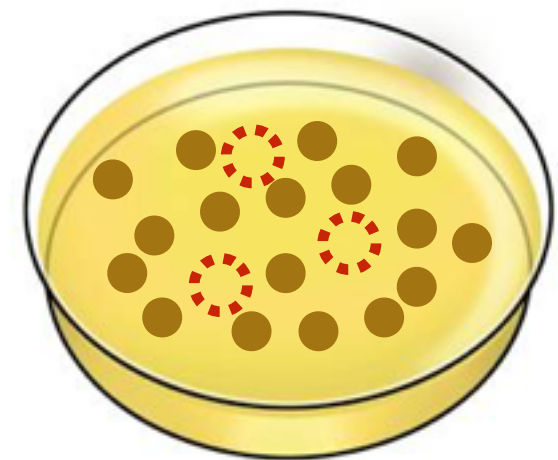


Complete
media

Replica
plate



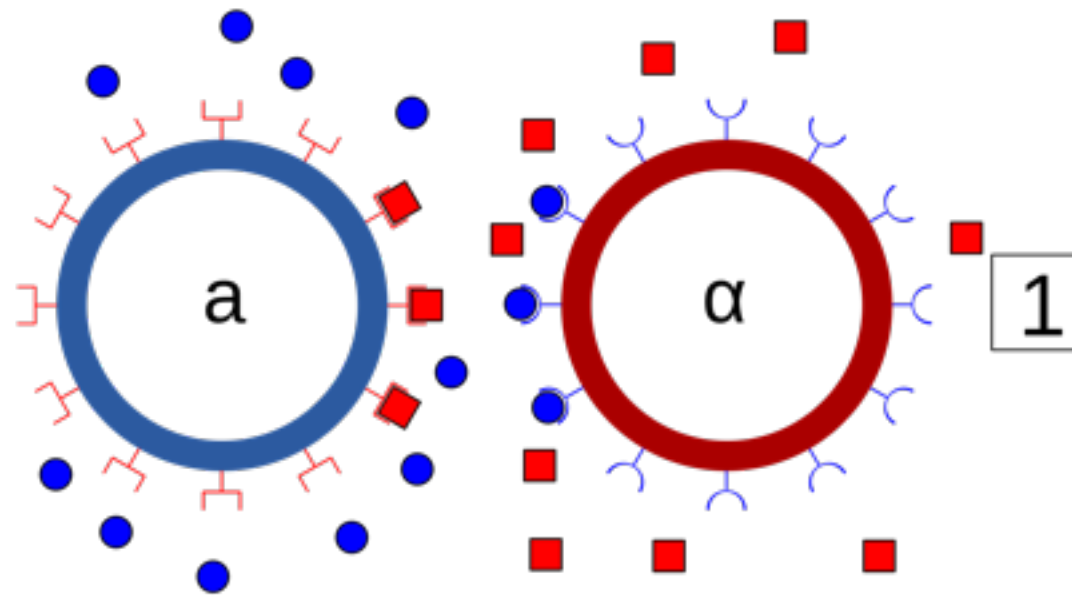
~24 hrs



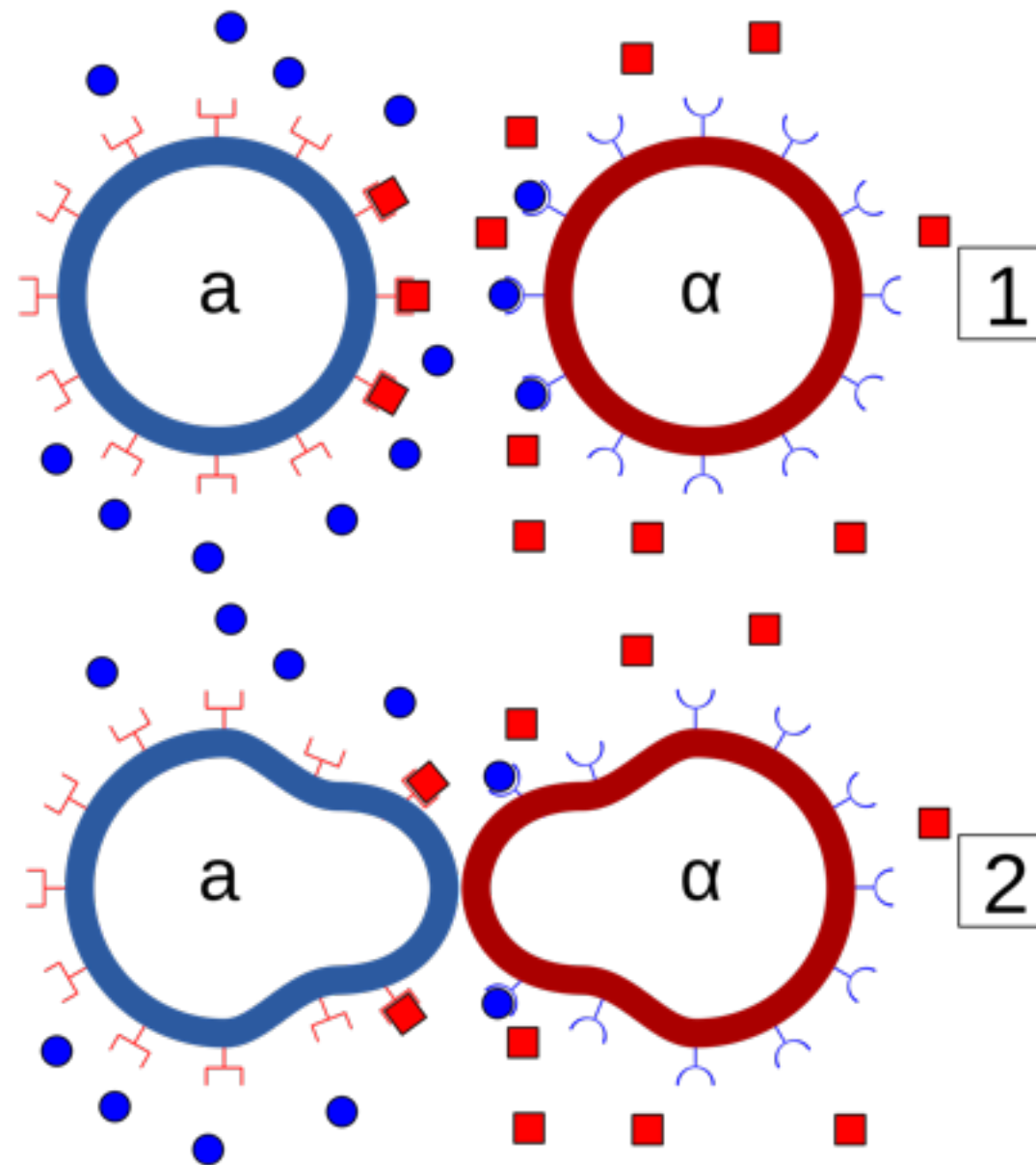
Media
-adenine

Three *ade*- mutants

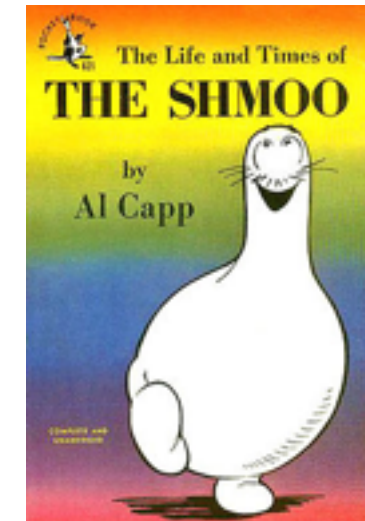
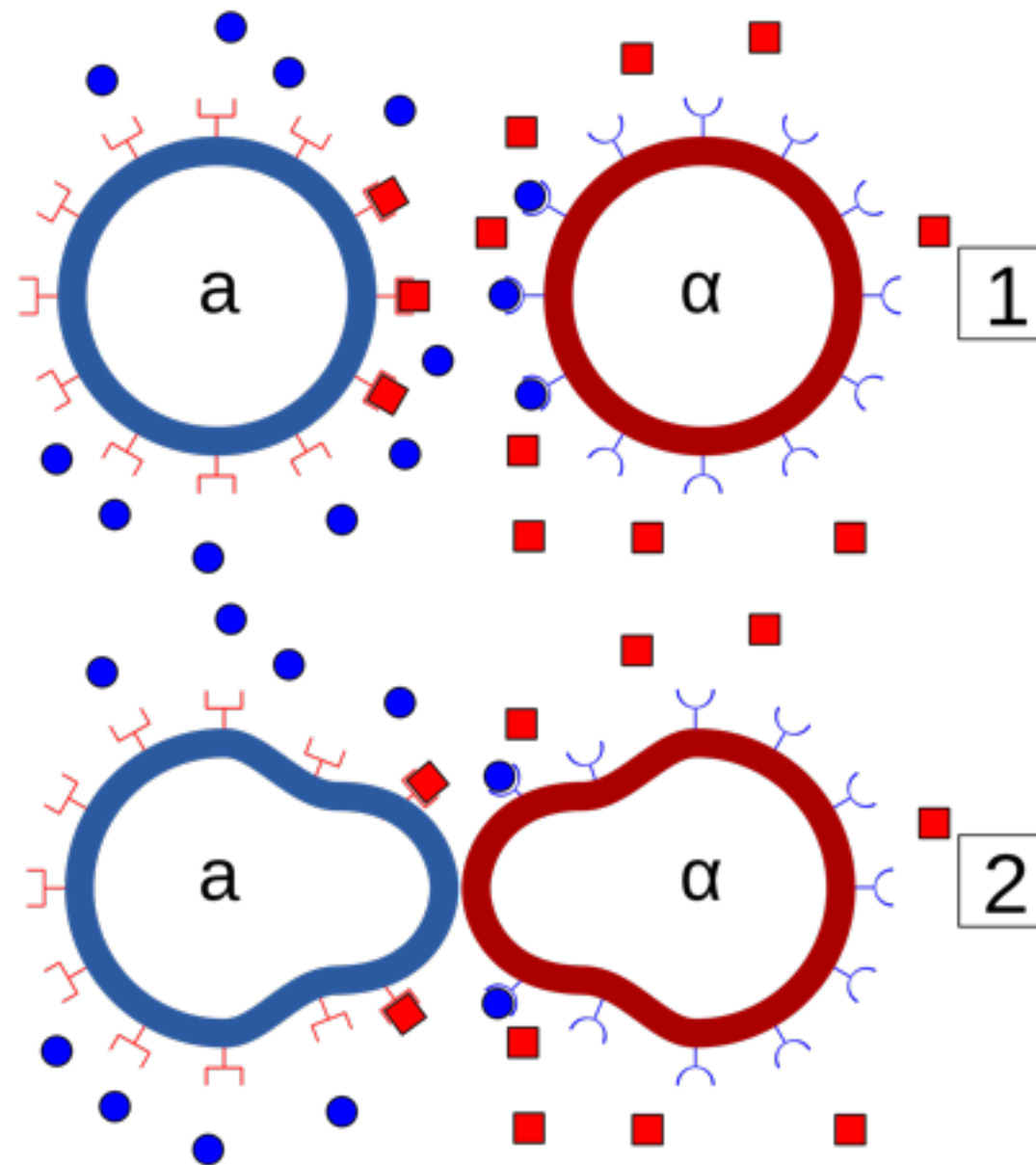
Yeast mating



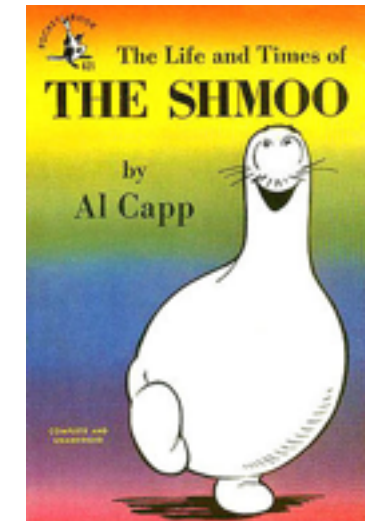
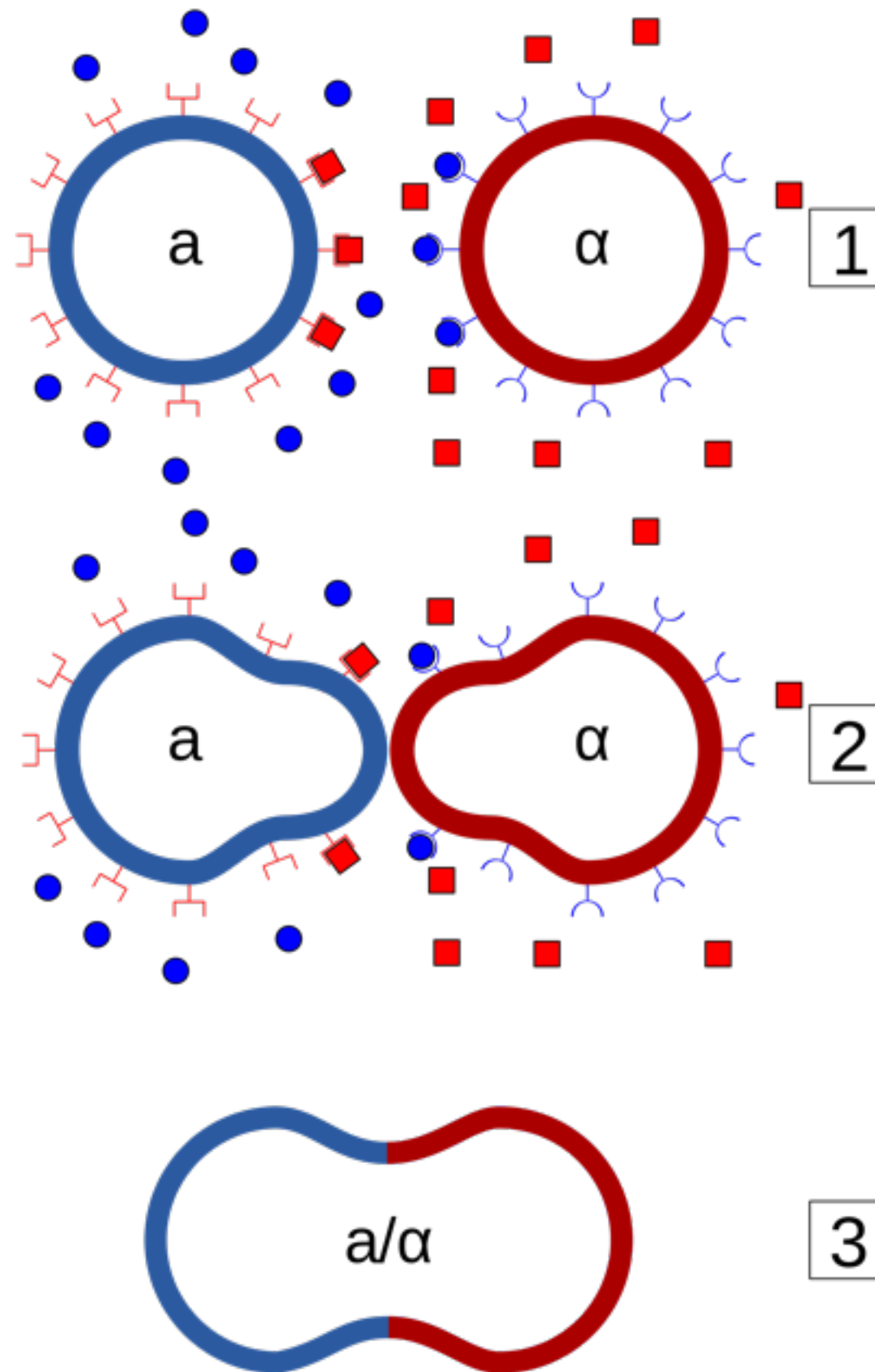
Yeast mating



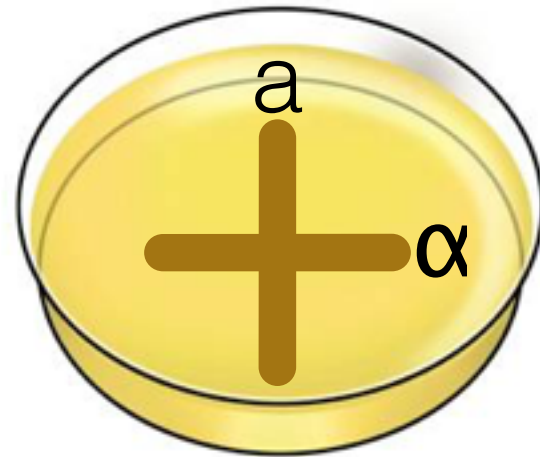
Yeast mating



Yeast mating



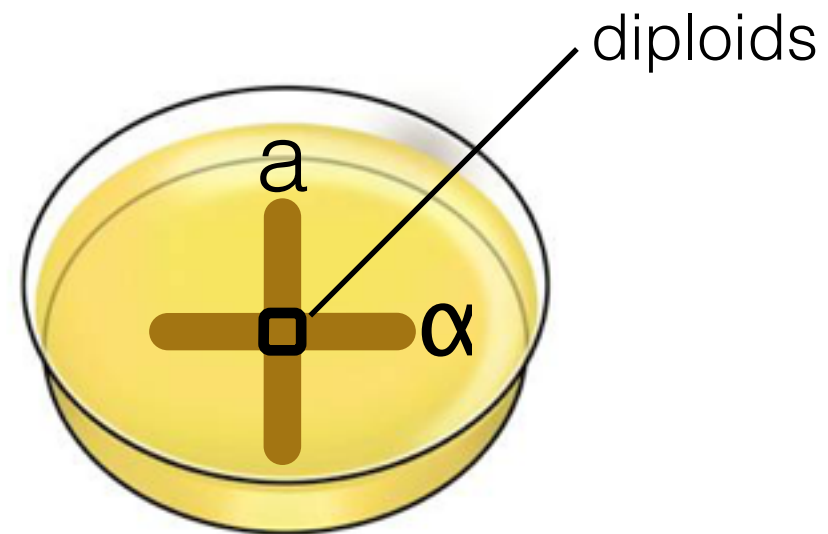
Yeast mating tests



**Complete
media**

ade1 mutant

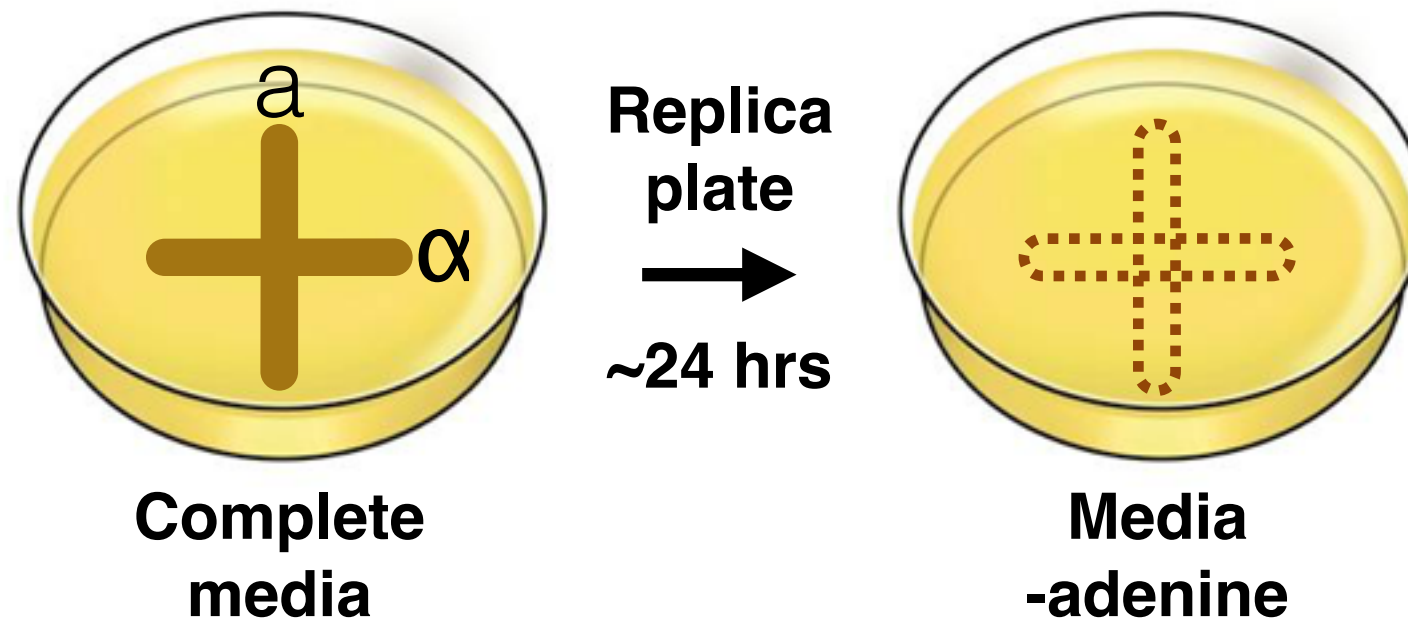
Yeast mating tests



**Complete
media**

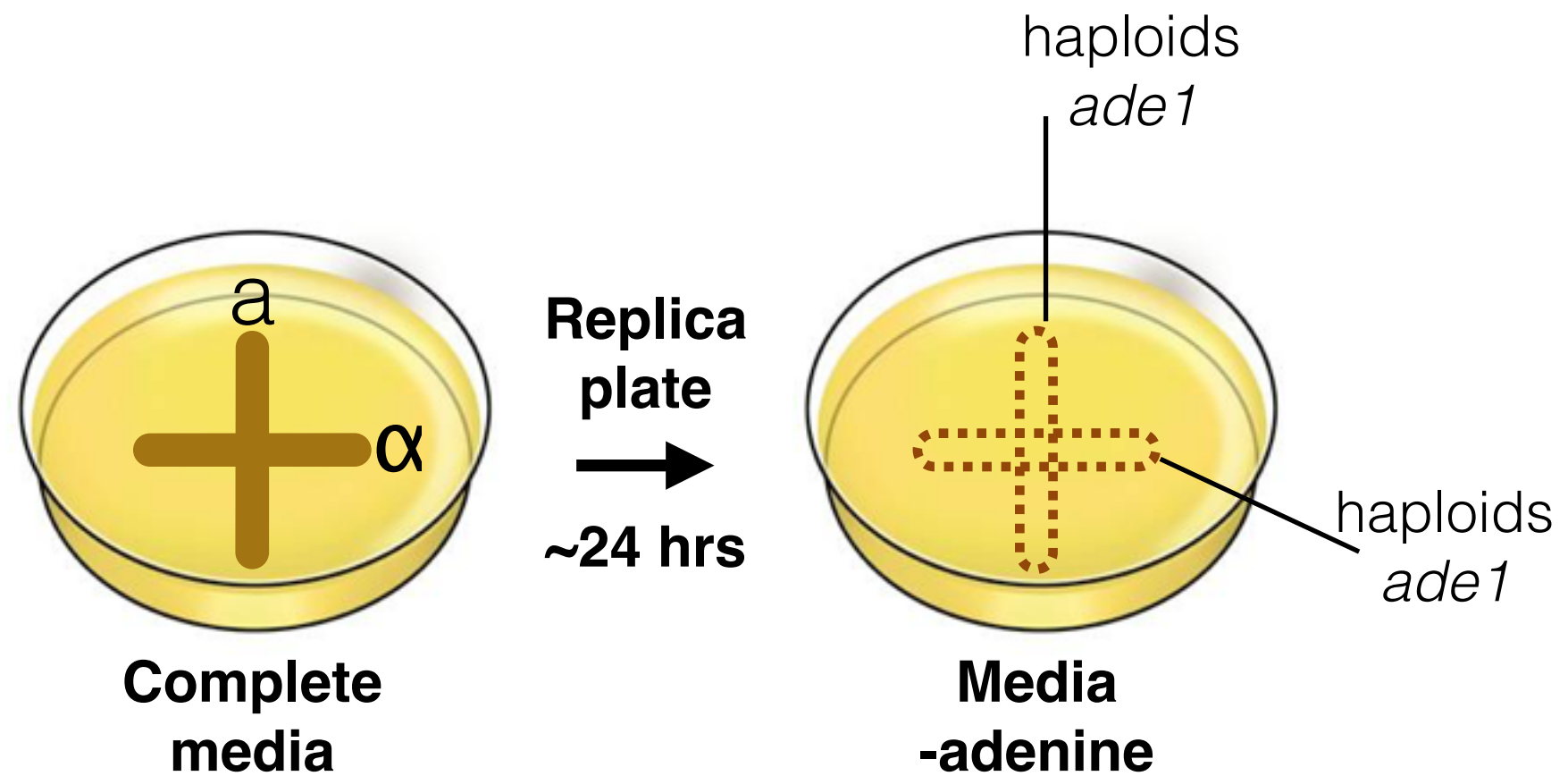
ade1 mutant

Yeast mating tests



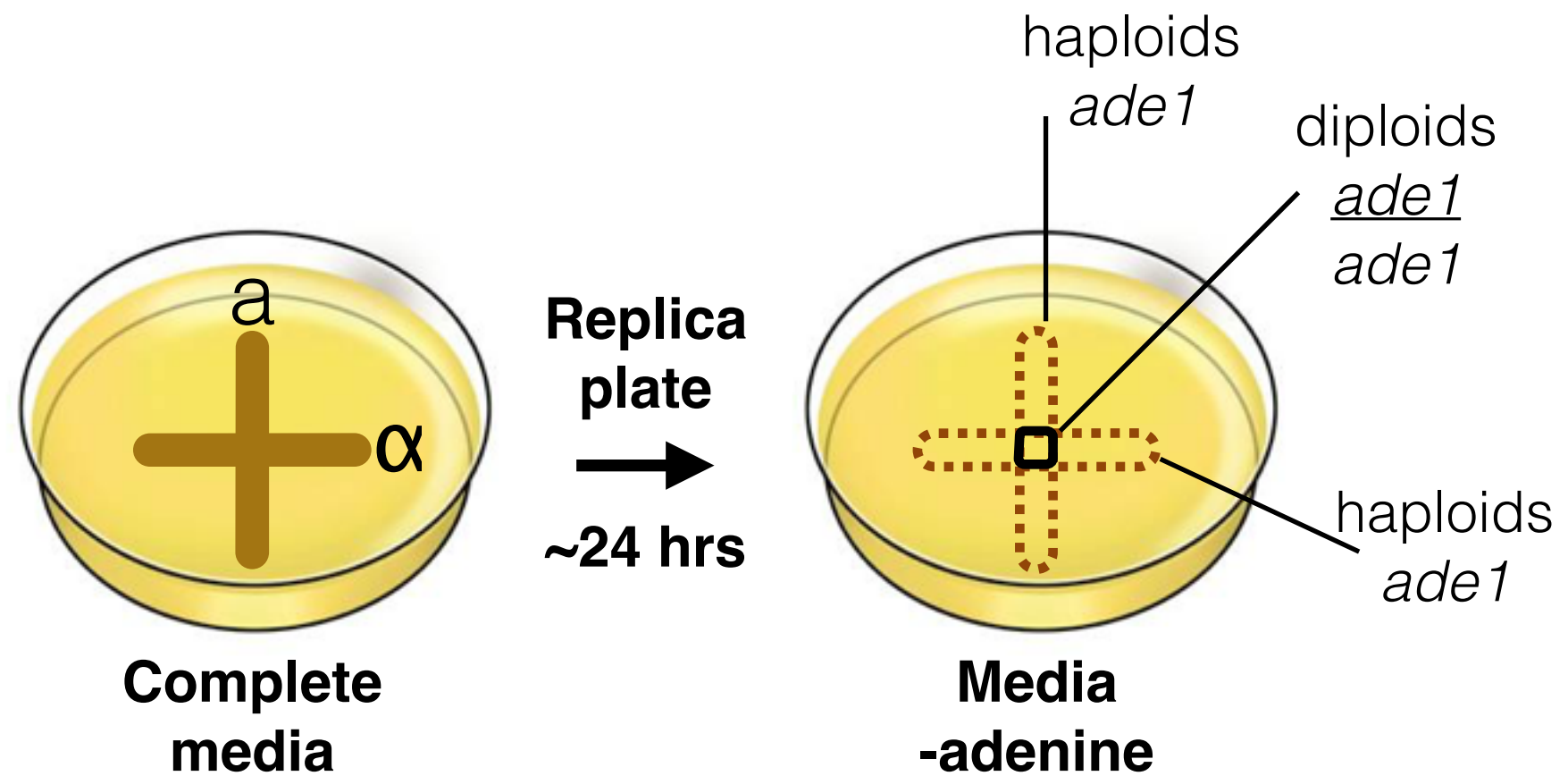
a cells are *ade1* mutant
α cells are *ade1* mutant

Yeast mating tests



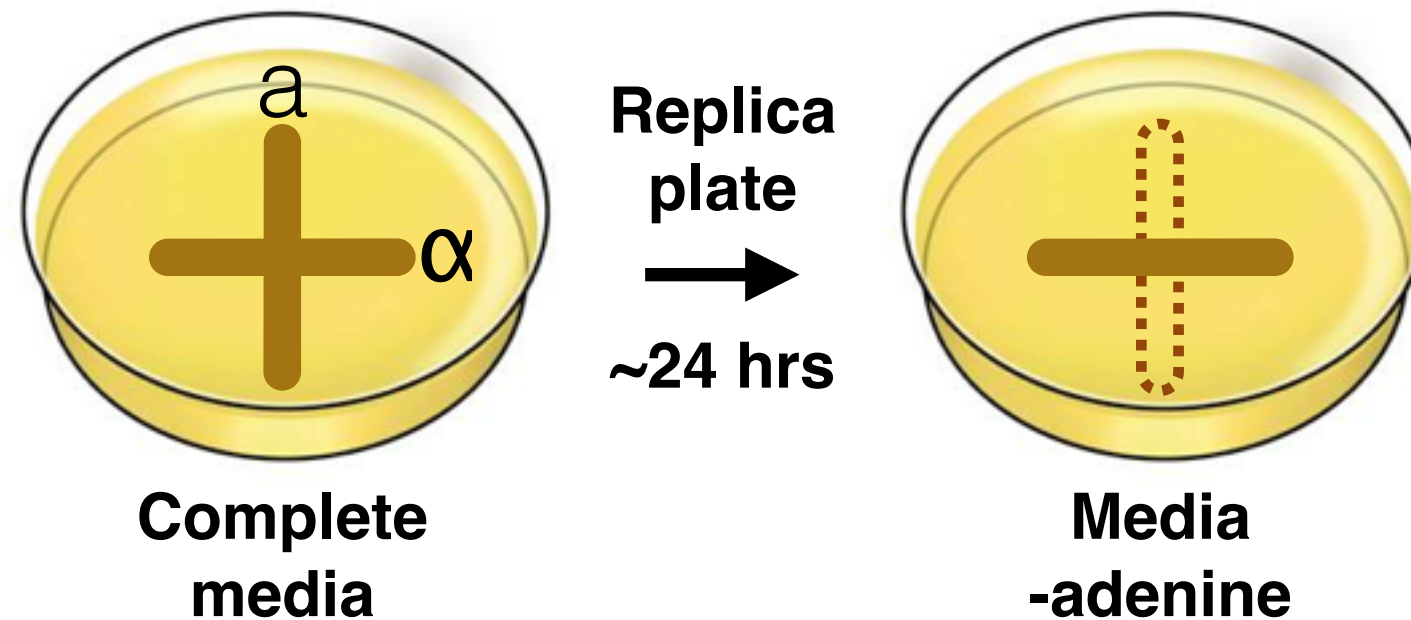
a cells are *ade1* mutant
 α cells are *ade1* mutant

Yeast mating tests



a cells are *ade1* mutant
 α cells are *ade1* mutant

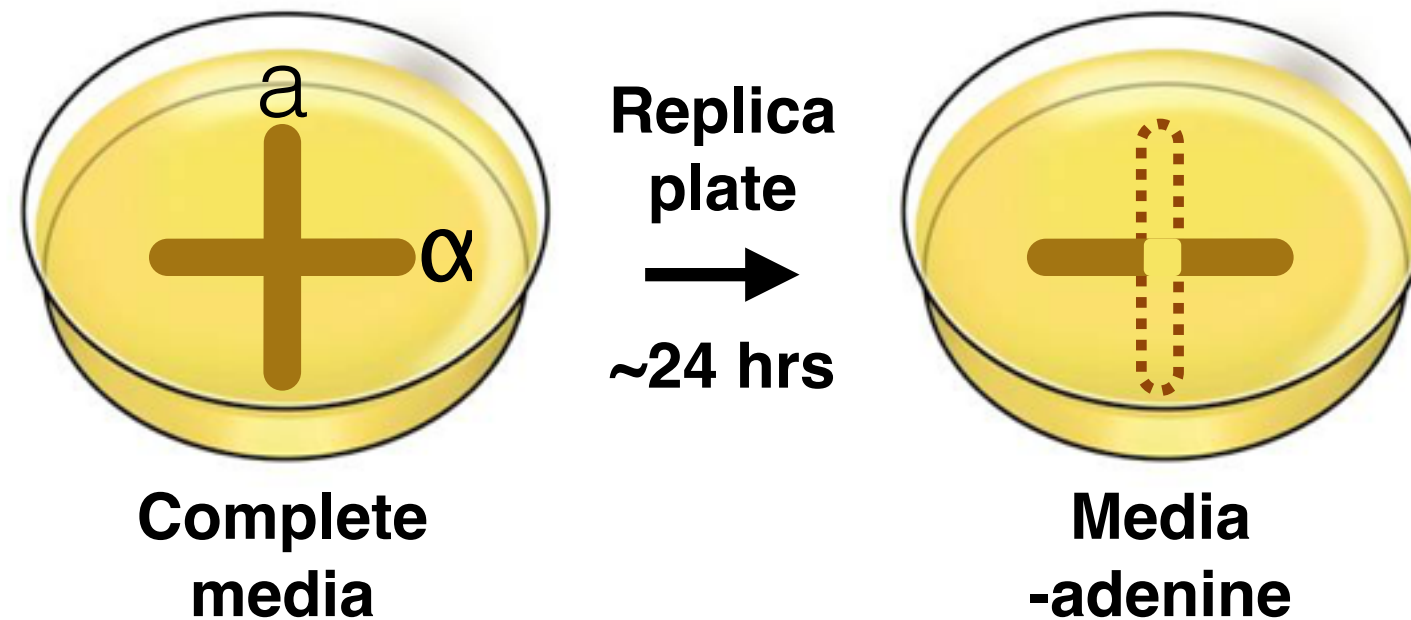
Dominance testing comes before complementation testing



a cells are *ade1* mutant
α cells are wild type

Is the mutant phenotype dominant?

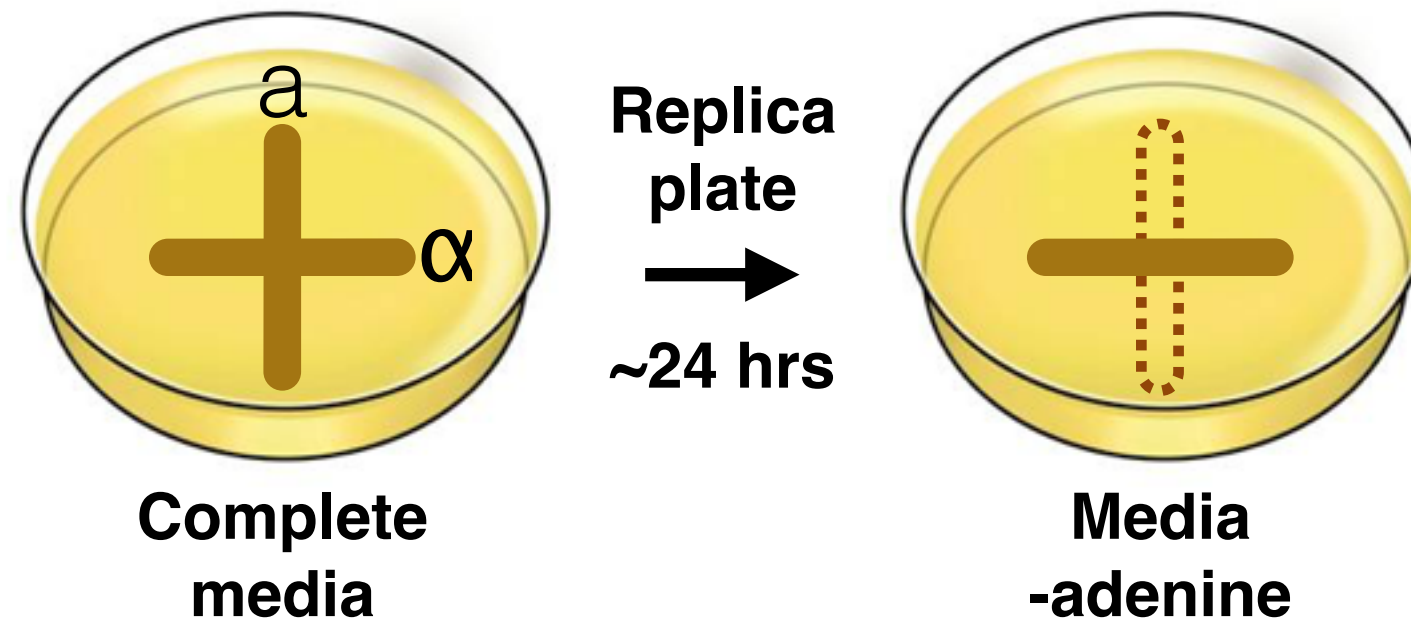
Dominance testing comes before complementation testing



a cells are *ade2* mutant
α cells are wild type

Is the mutant phenotype dominant?

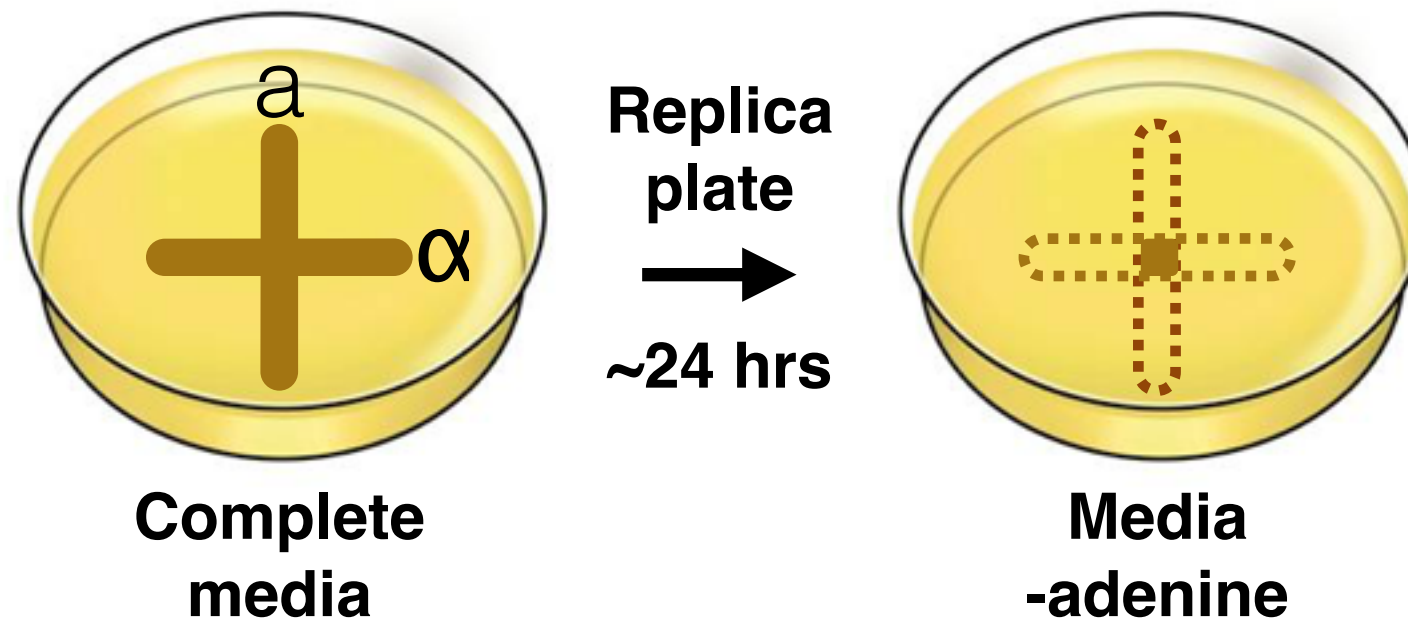
Dominance testing comes before complementation testing



a cells are *ade3* mutant
α cells are wild type

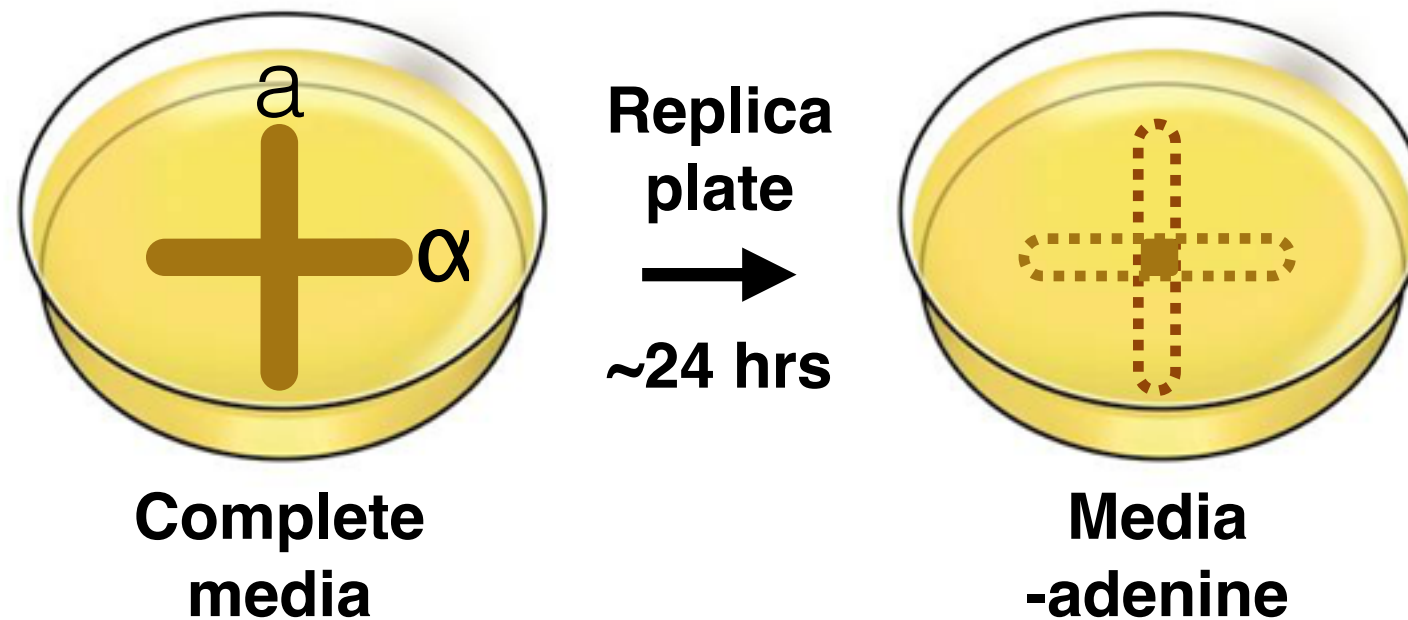
Is the mutant phenotype dominant?

The complementation test



a cells are *ade1* mutant
α cells are *ade3* mutant

The complementation test

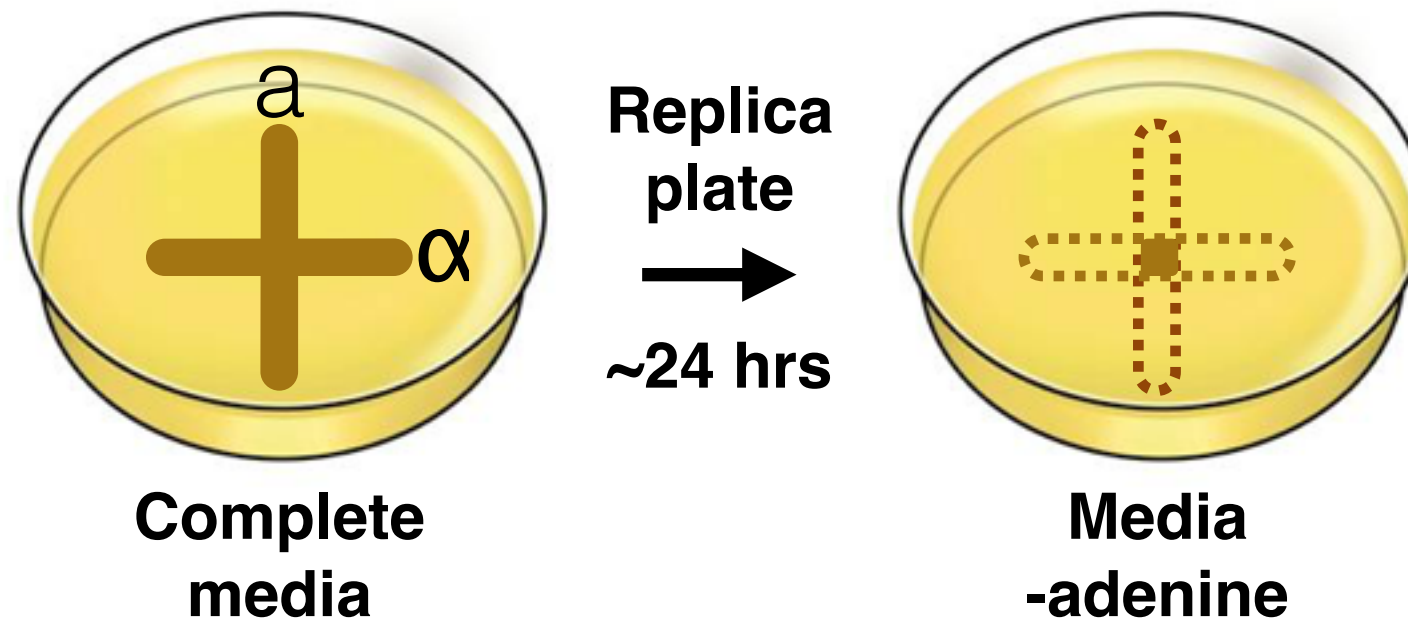


a cells are *ade1* mutant

α cells are *ade3* mutant

***ade1* and *ade3* mutations are in different genes**

The complementation test

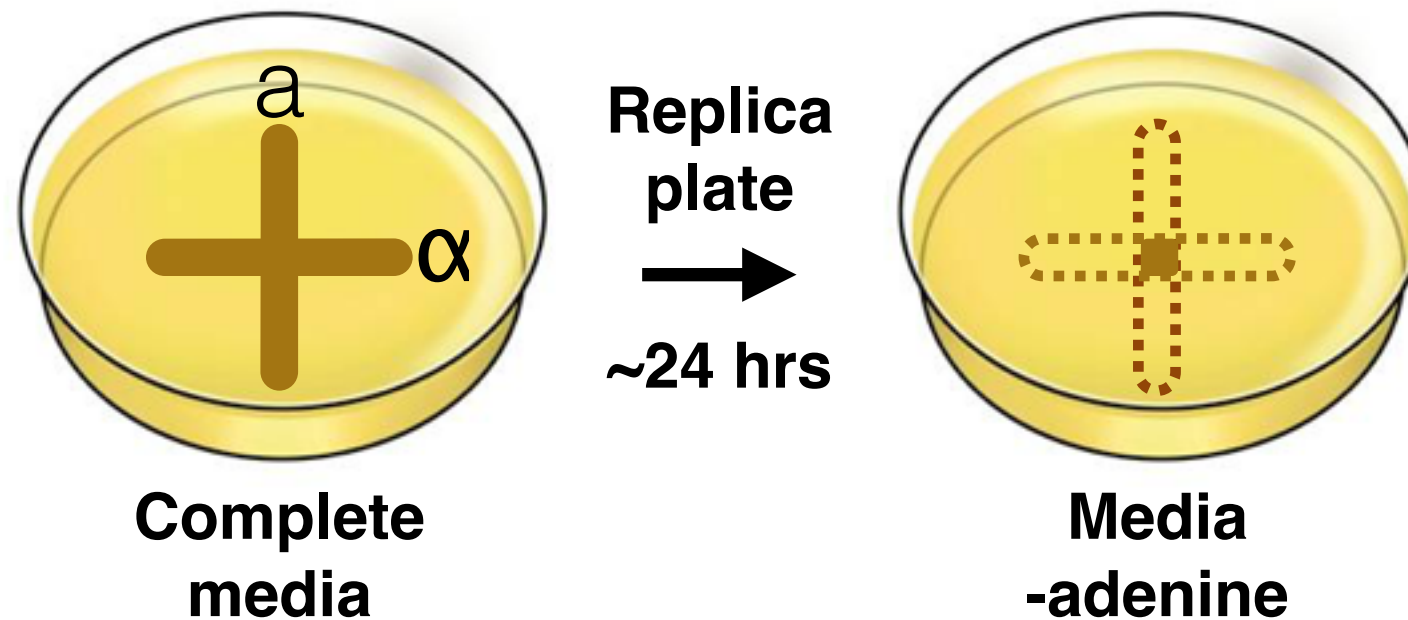


a cells are *ade1* mutant

α cells are *ade3* mutant

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The complementation test

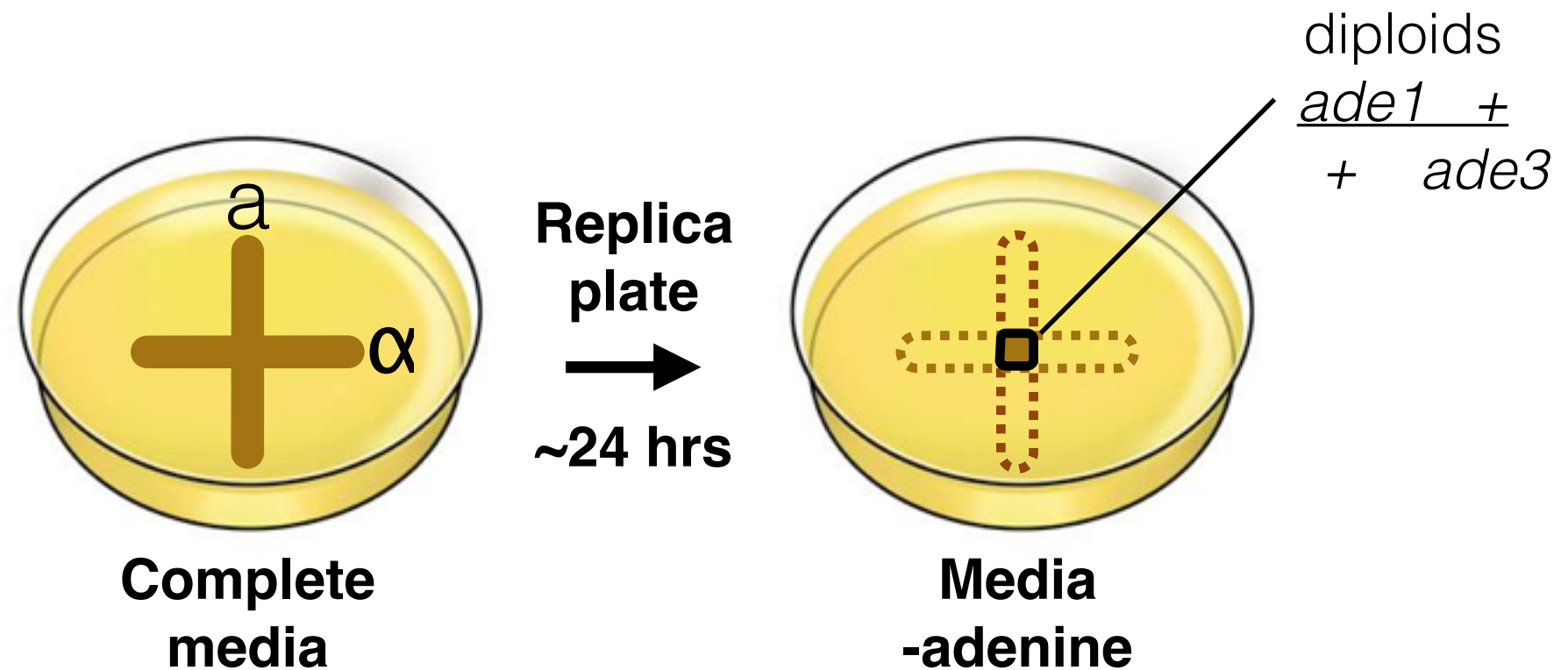


a cells are *ade1* mutant
α cells are *ade3* mutant

***ade1* and *ade3* mutations are in different genes**

They are deficient in different functions!

The complementation test

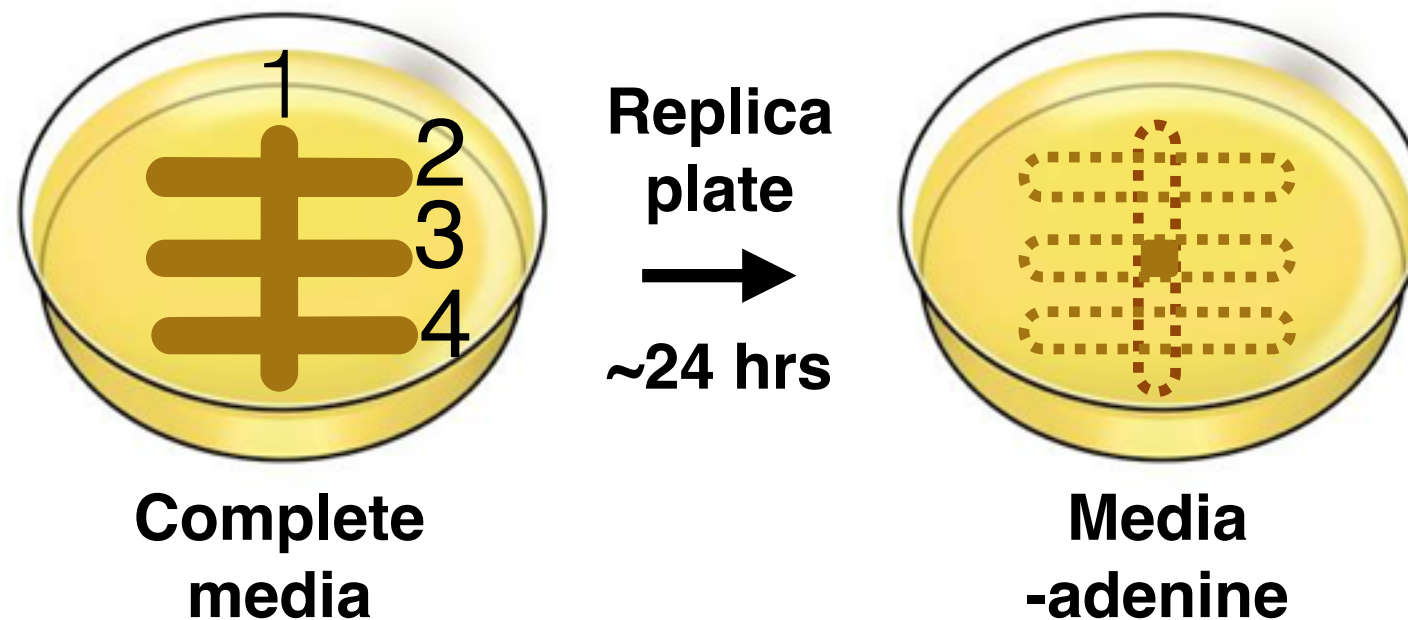


a cells are *ade1* mutant
α cells are *ade3* mutant

***ade1* and *ade3* mutations are in different genes**

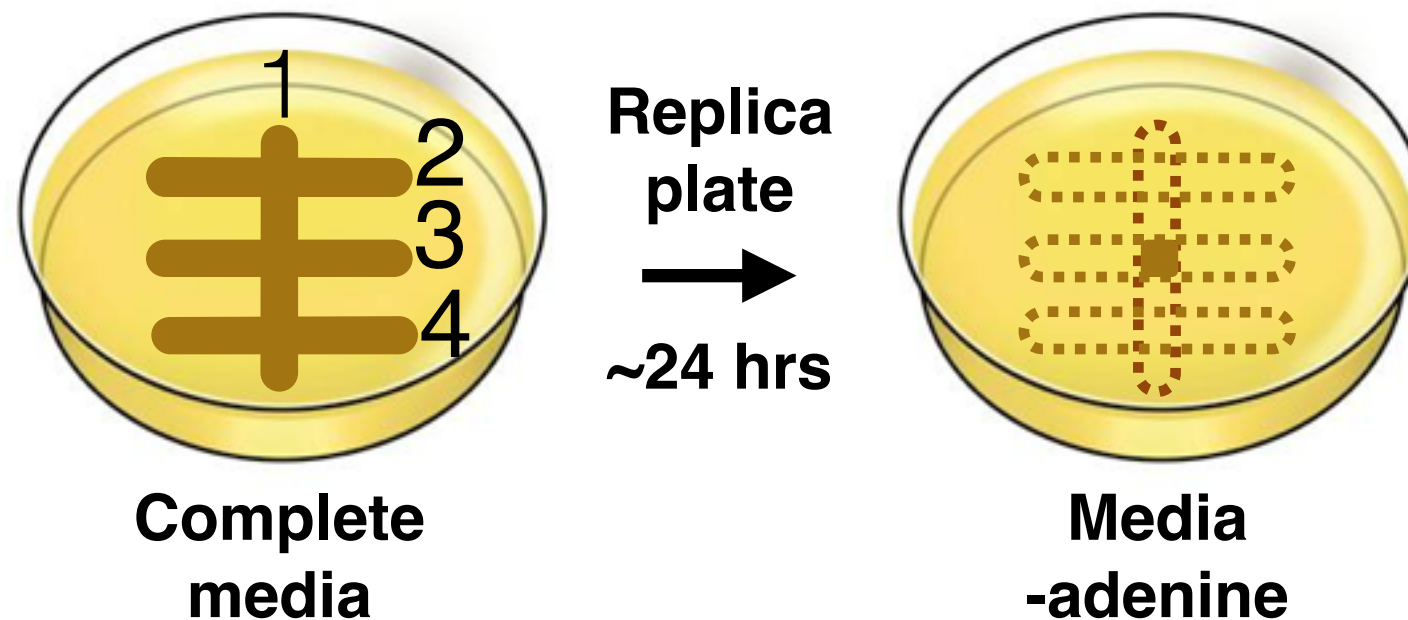
They are deficient in different functions!

The complementation test



a cells are *ade1* mutant
α cells are *ade2* mutant
α cells are *ade3* mutant
α cells are *ade4* mutant

The complementation test



α cells are *ade1* mutant

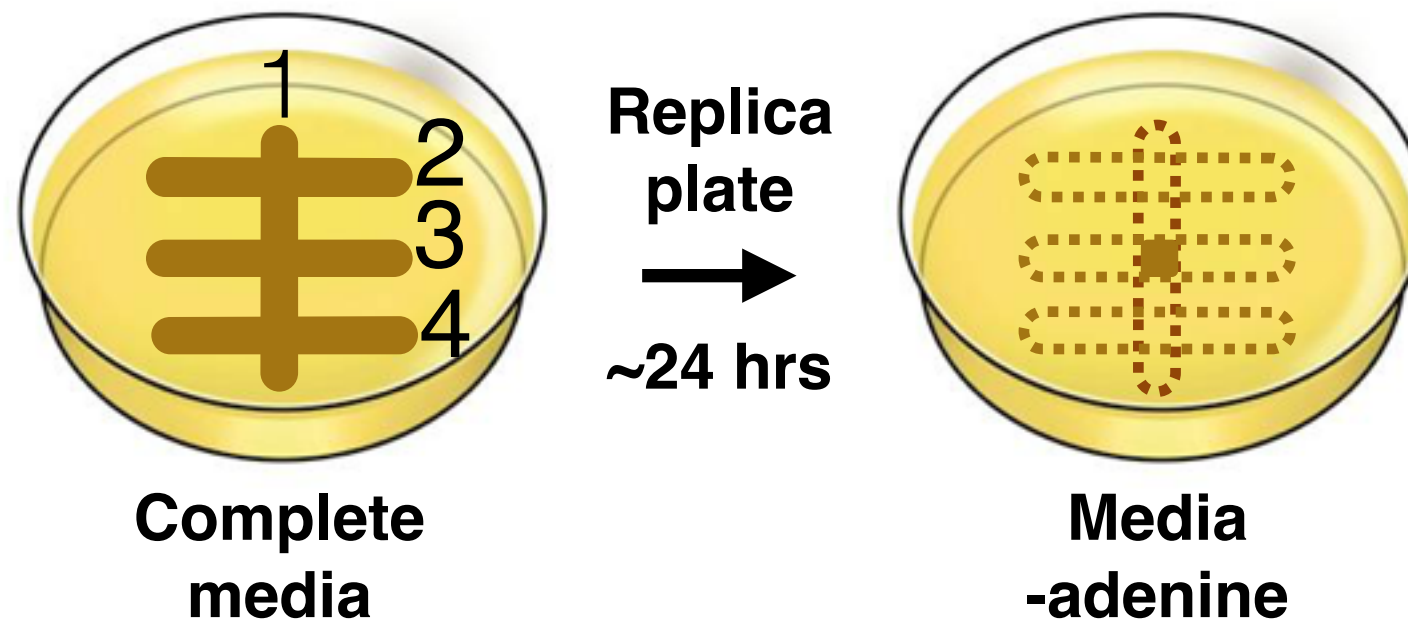
α cells are *ade2* mutant

α cells are *ade3* mutant

α cells are *ade4* mutant

***ade1* and *ade4* mutations are in the same gene**

The complementation test



α cells are *ade1* mutant

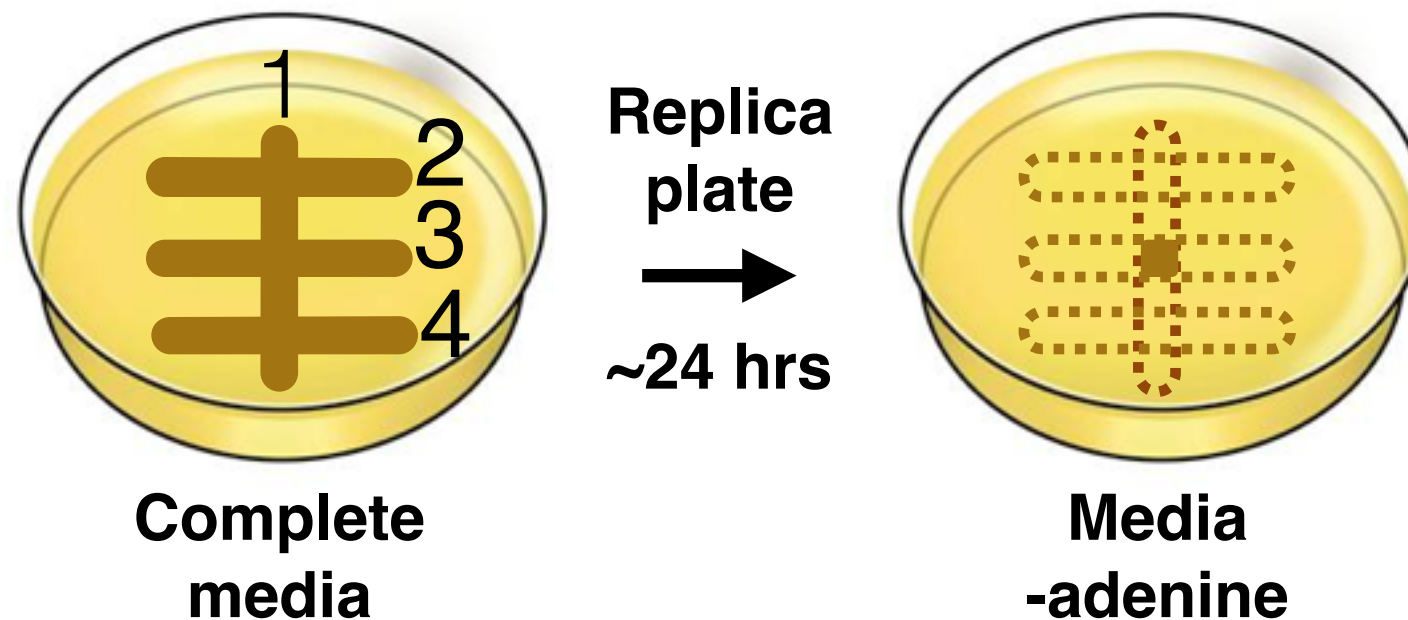
α cells are *ade2* mutant

α cells are *ade3* mutant

α cells are *ade4* mutant

***ade1* and *ade4* mutations are in the same gene**

The complementation test



- α cells are *ade1* mutant
- α cells are *ade2* mutant
- α cells are *ade3* mutant
- α cells are *ade4* mutant

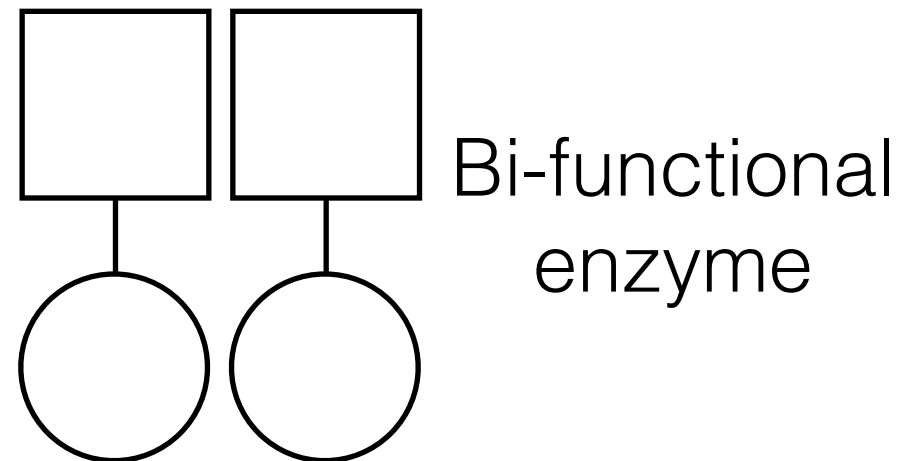
***ade1* and *ade4* mutations are in the same gene**

They are deficient in the same function

Exceptions to complementation of function

Intragenic complementation

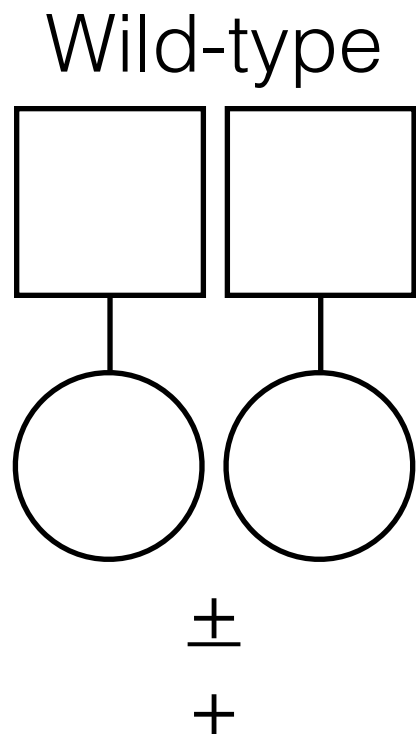
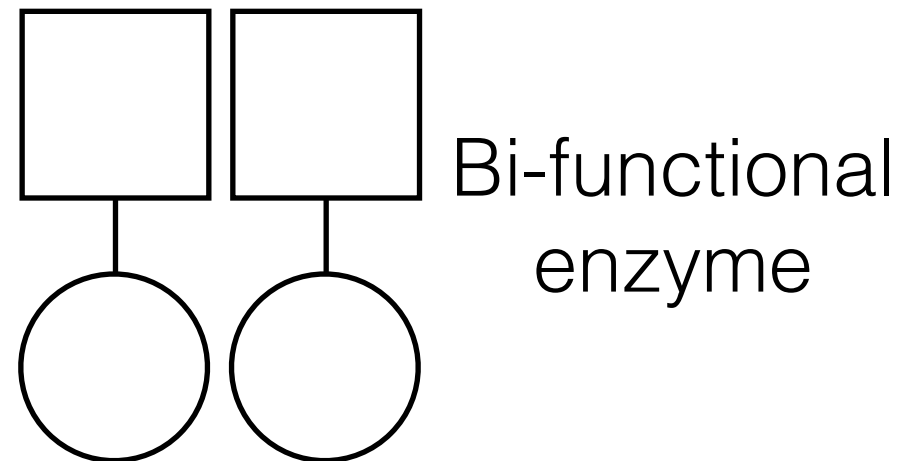
same gene but different functions



Exceptions to complementation of function

Intragenic complementation

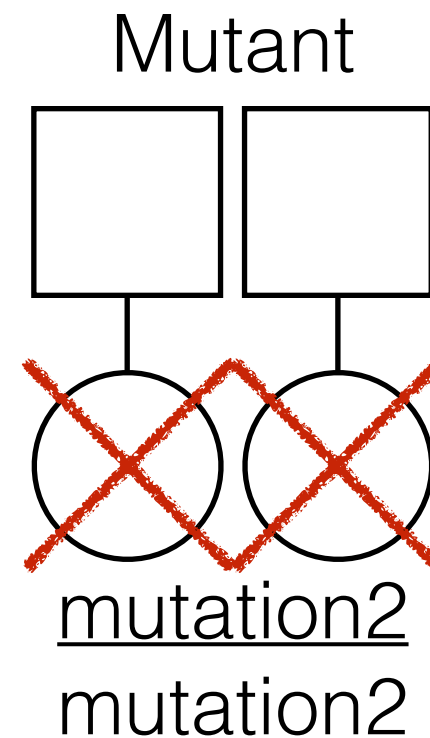
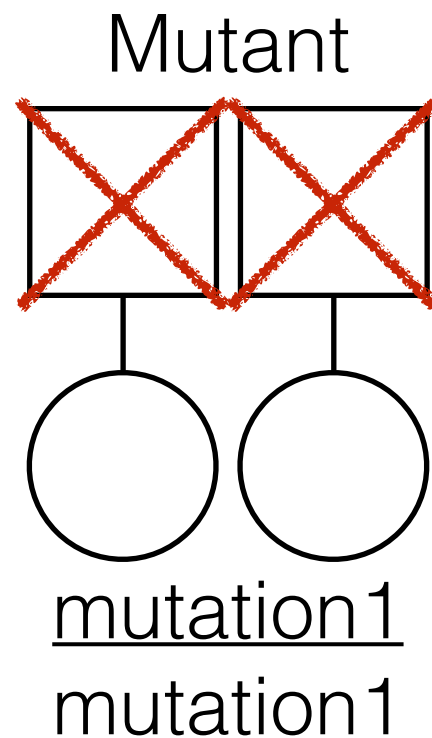
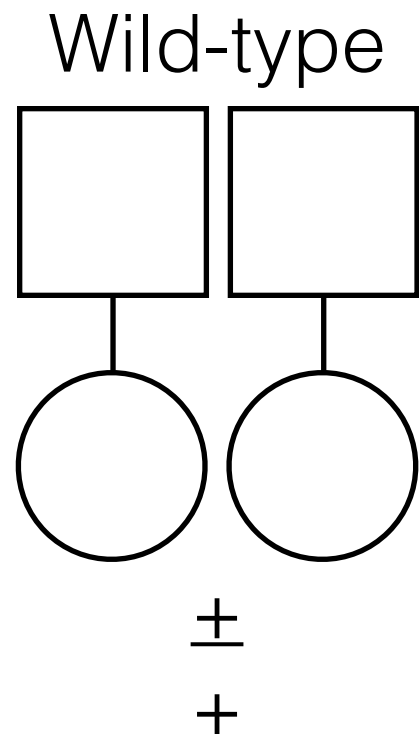
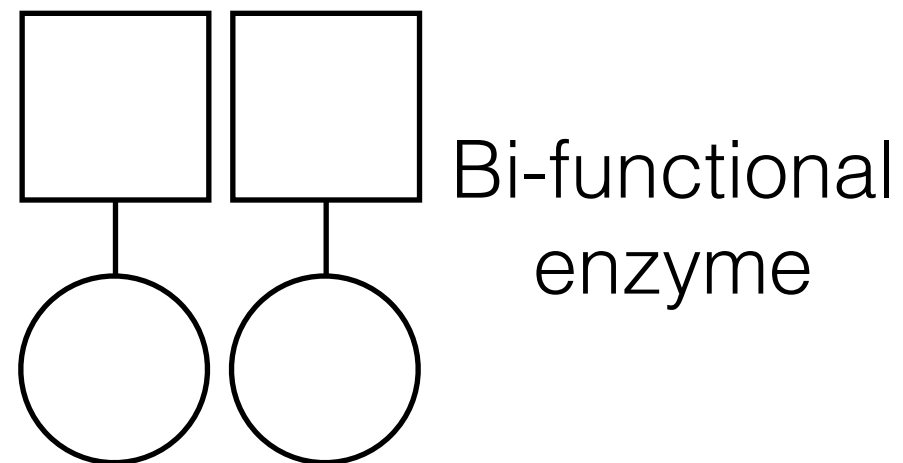
same gene but different functions



Exceptions to complementation of function

Intragenic complementation

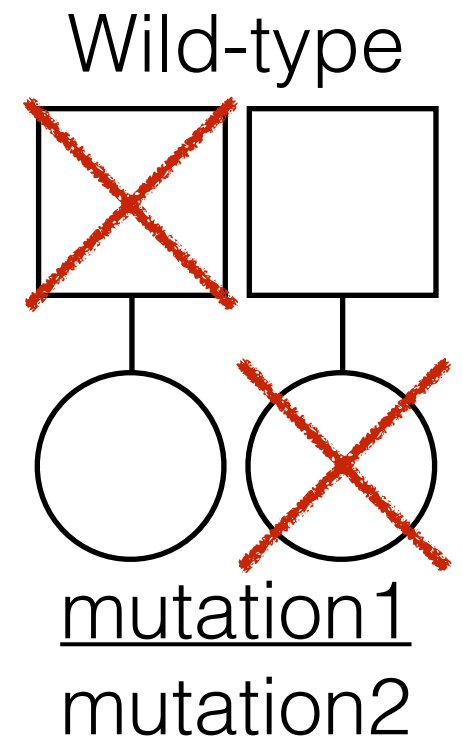
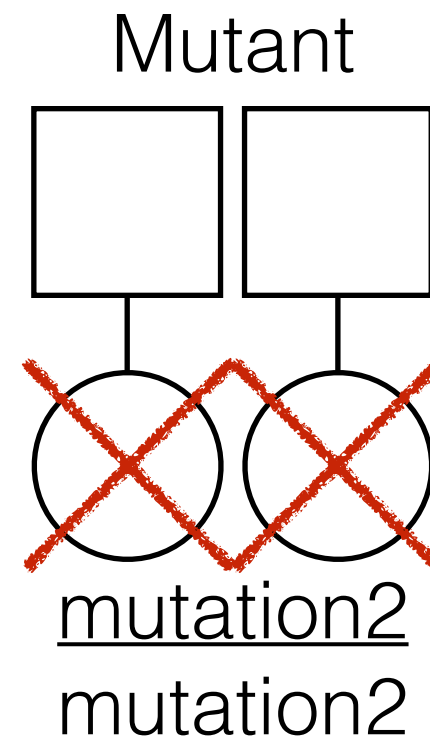
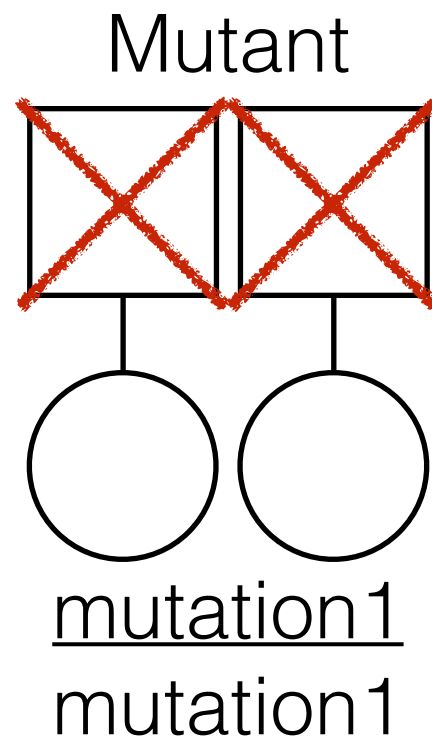
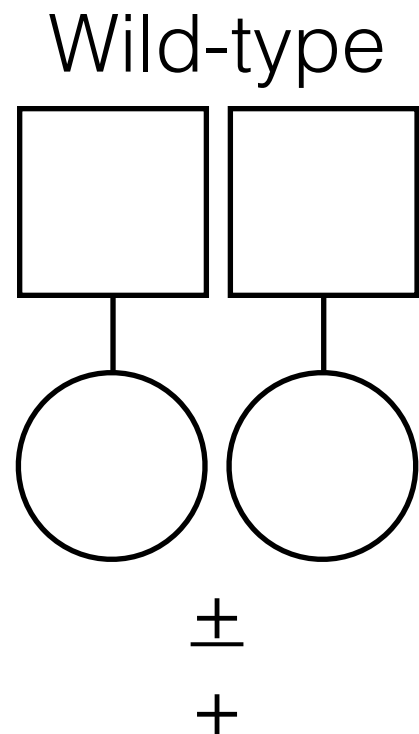
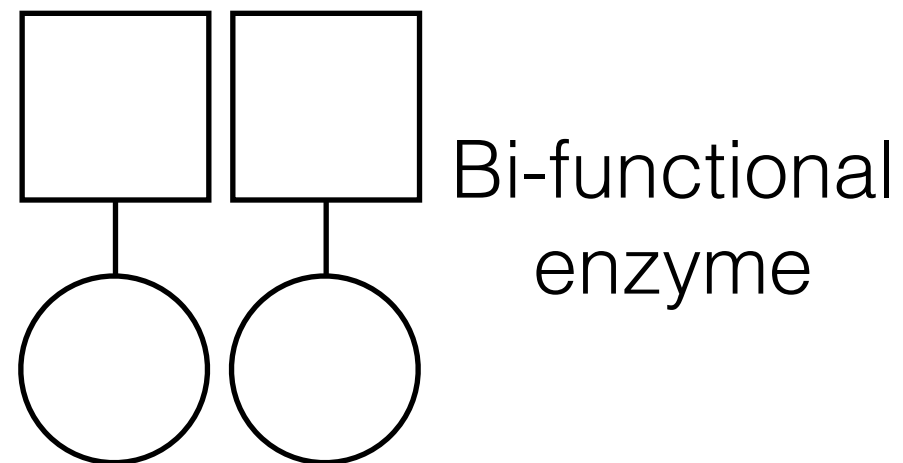
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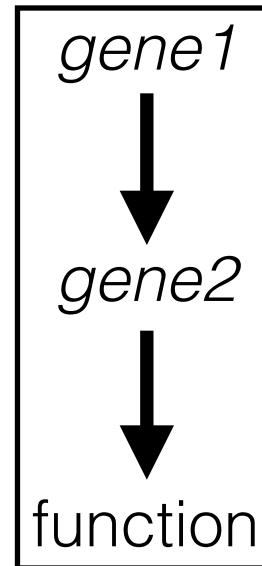
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Exceptions to complementation of function

Intergenic noncomplementation

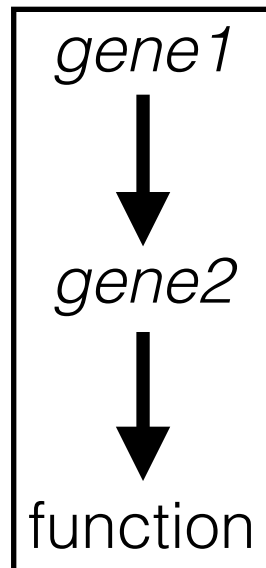
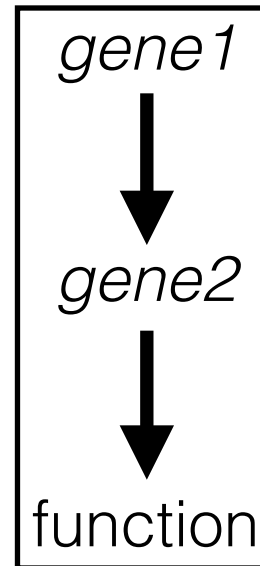
different gene but same function



Exceptions to complementation of function

Intergenic noncomplementation

different gene but same function

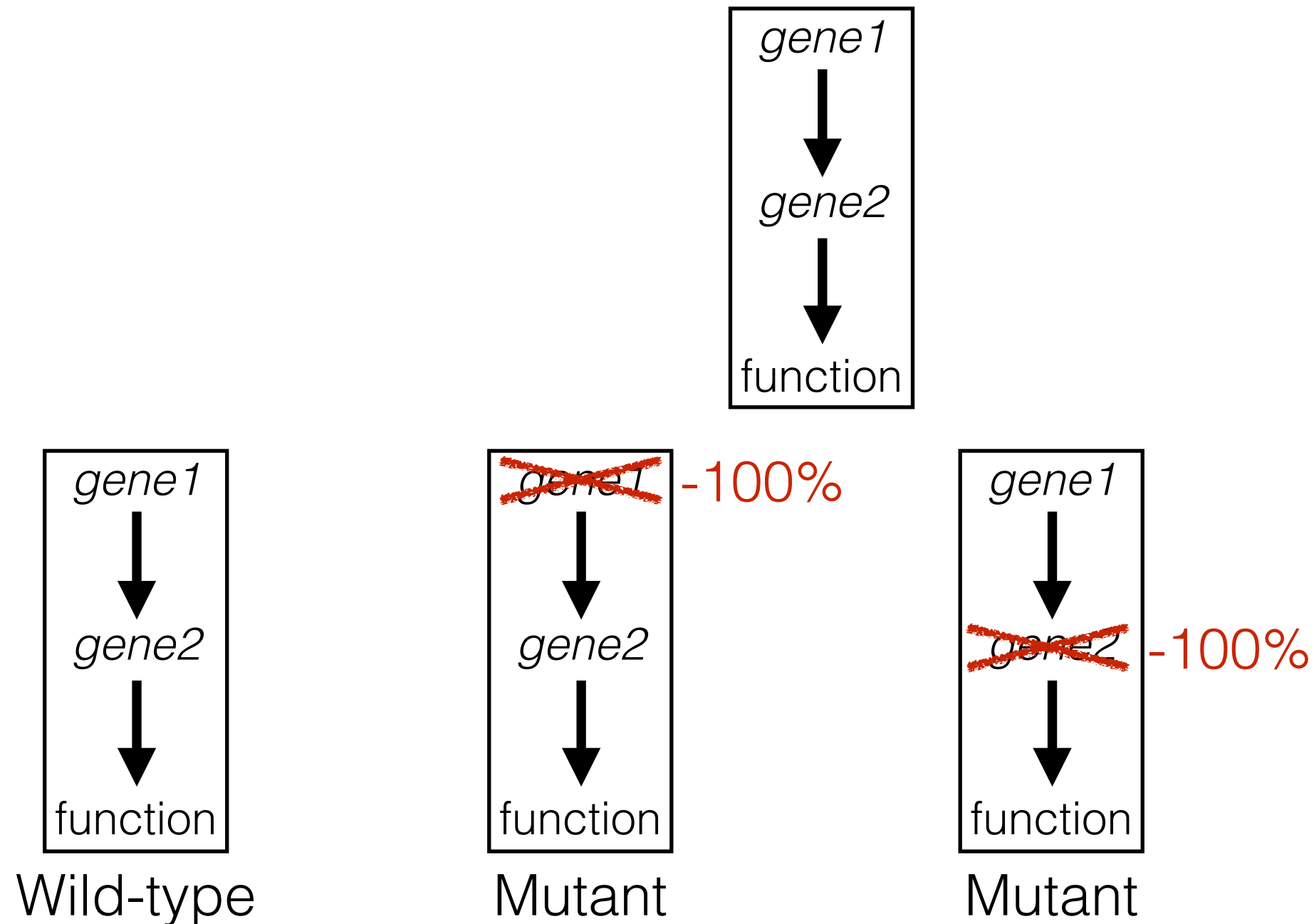


Wild-type

Exceptions to complementation of function

Intergenic noncomplementation

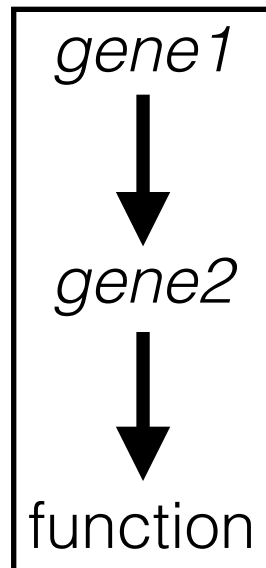
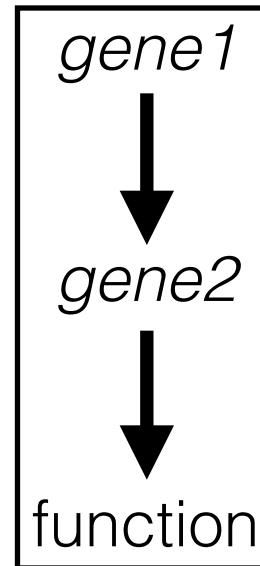
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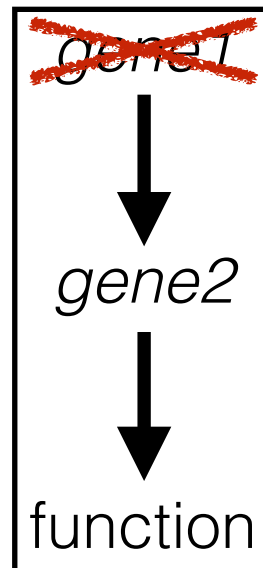
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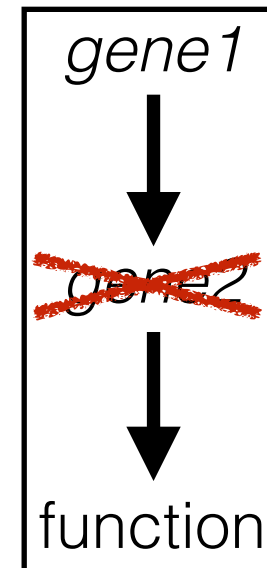


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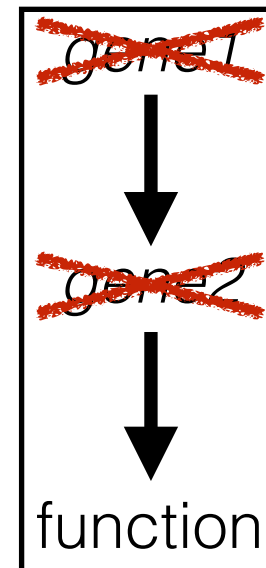
Mutant

-100%



Mutant

-100%



Mutant

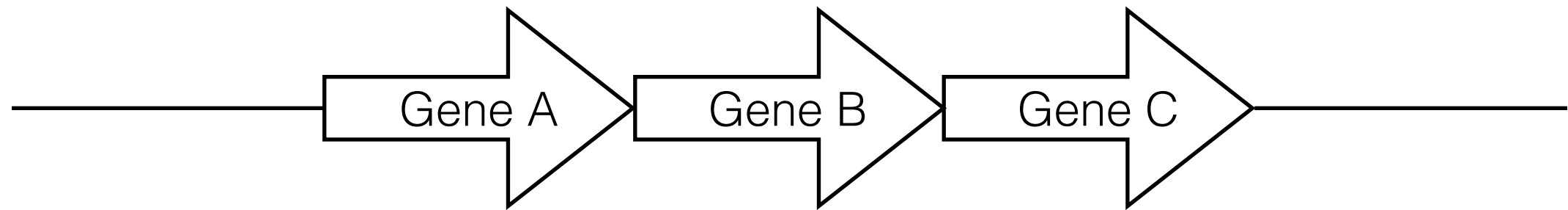
-50%

-50%

Exceptions to complementation of function

Polar effects

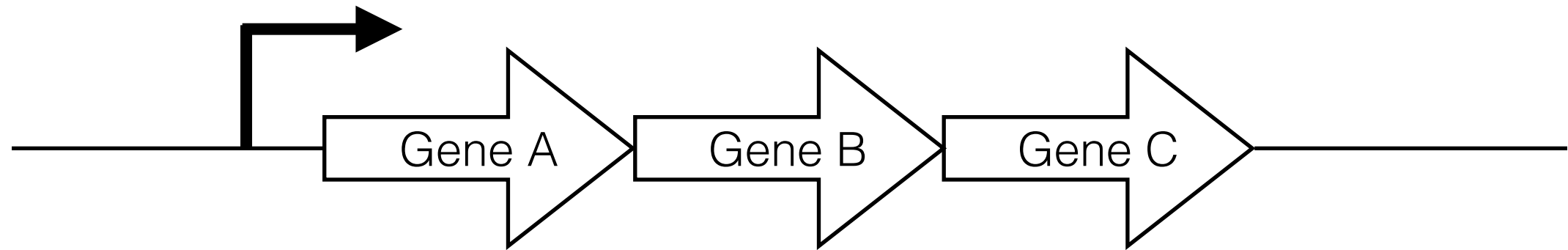
one mutation affects multiple genes/functions



Exceptions to complementation of function

Polar effects

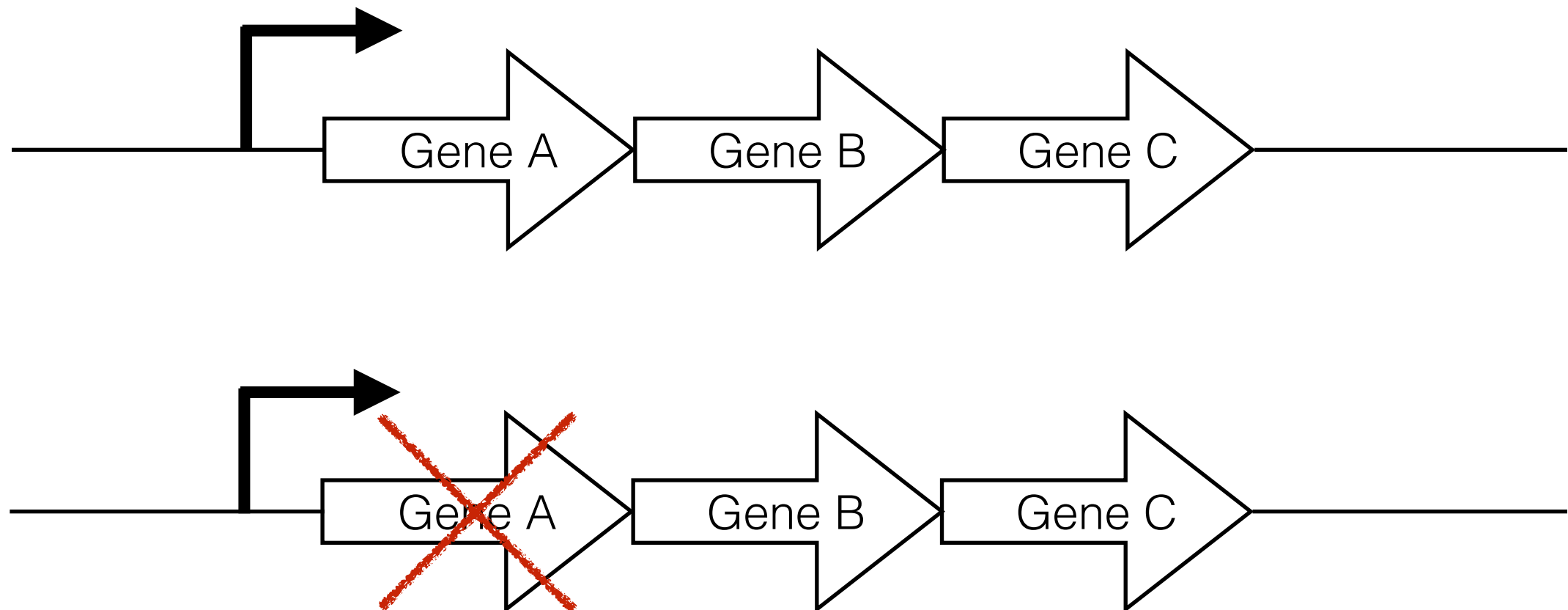
one mutation affects multiple genes/functions



Exceptions to complementation of function

Polar effects

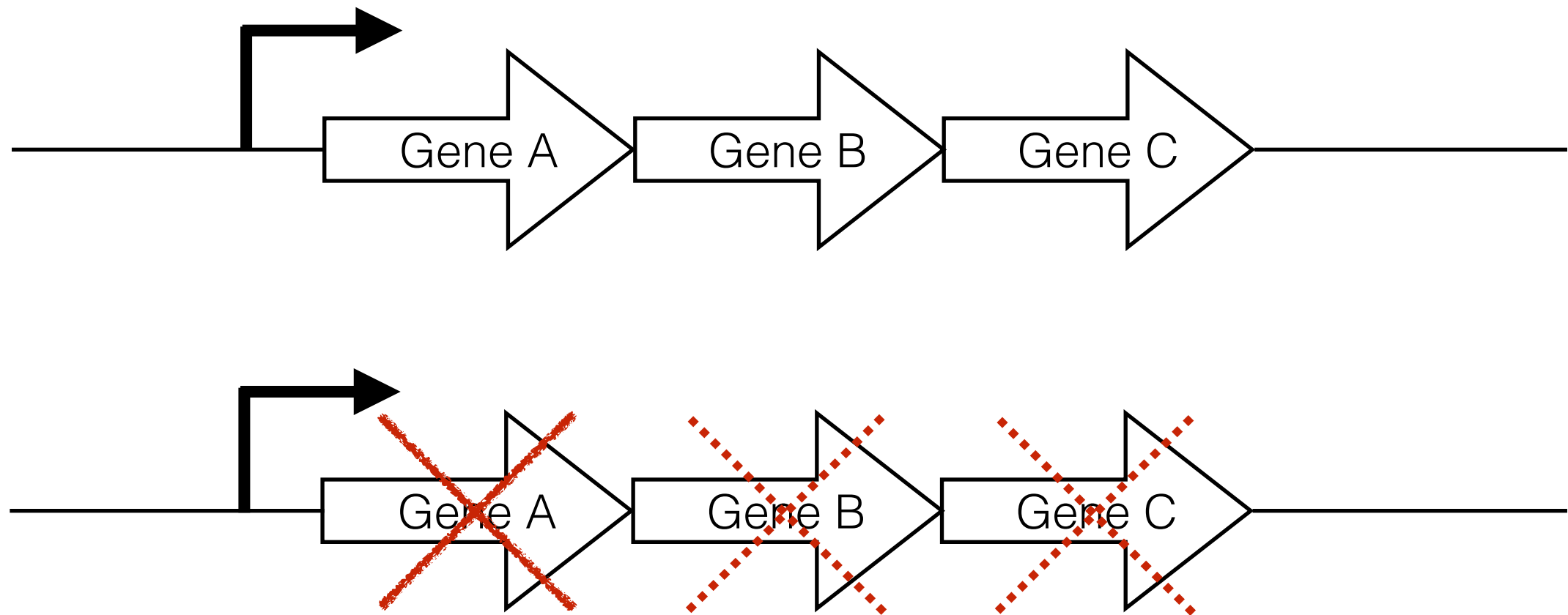
one mutation affects multiple genes/functions

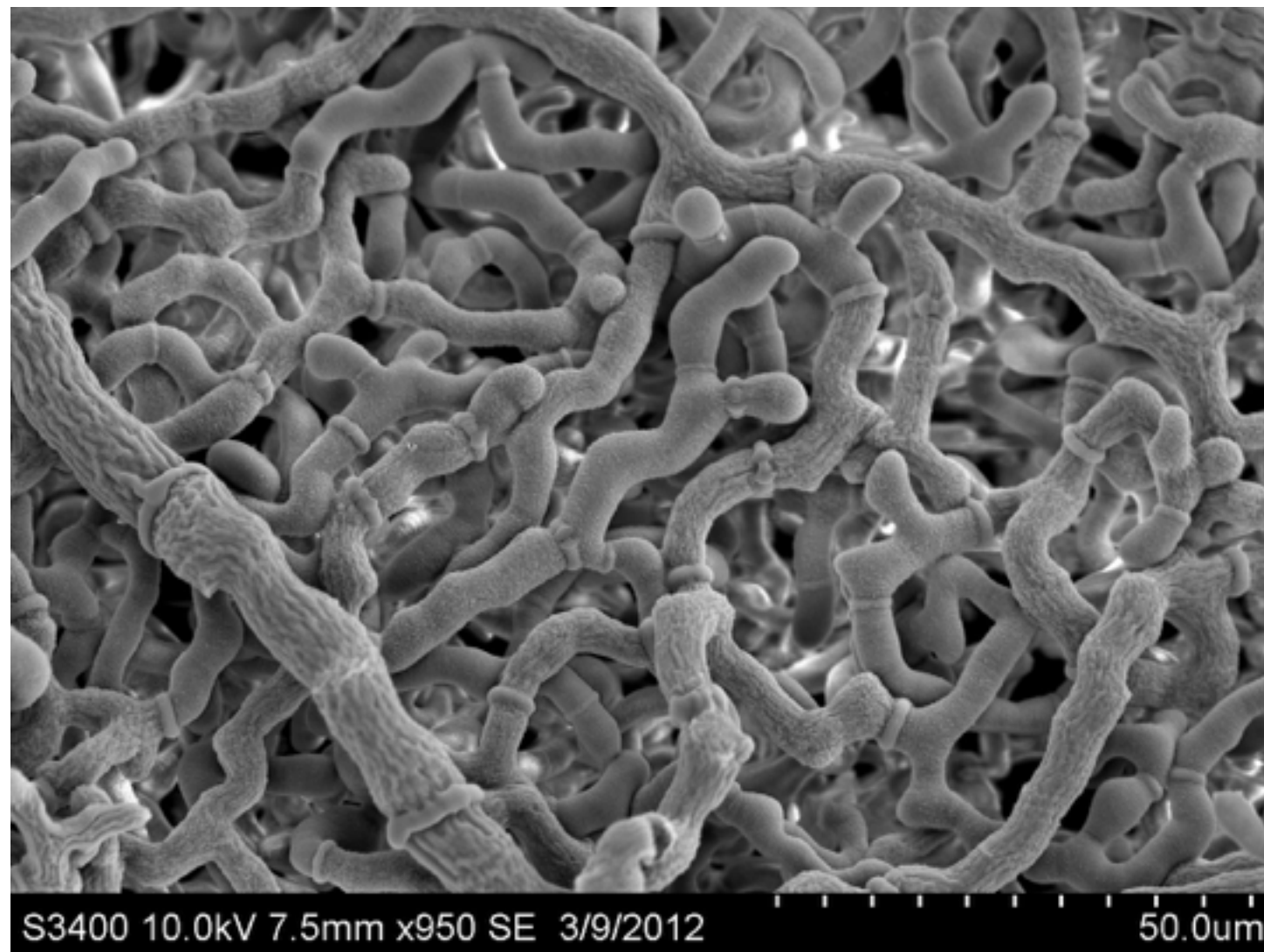


Exceptions to complementation of function

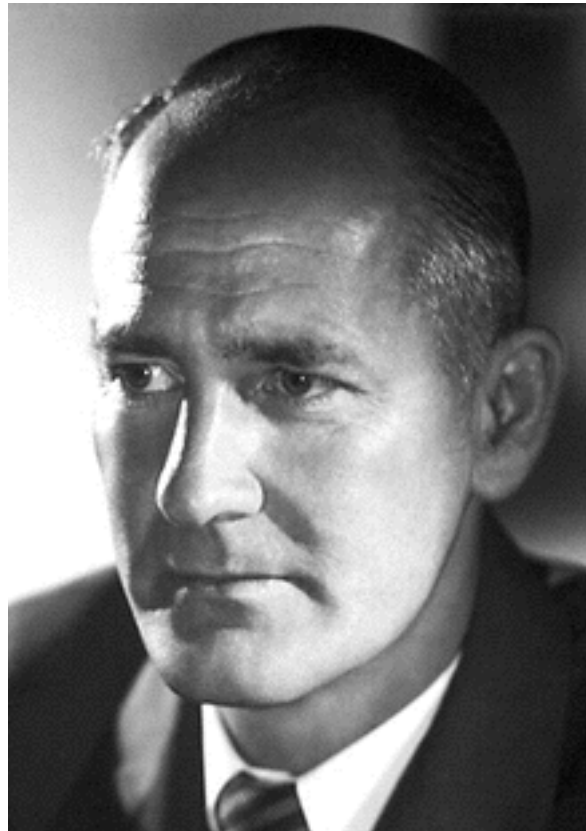
Polar effects

one mutation affects multiple genes/functions





N. crassa

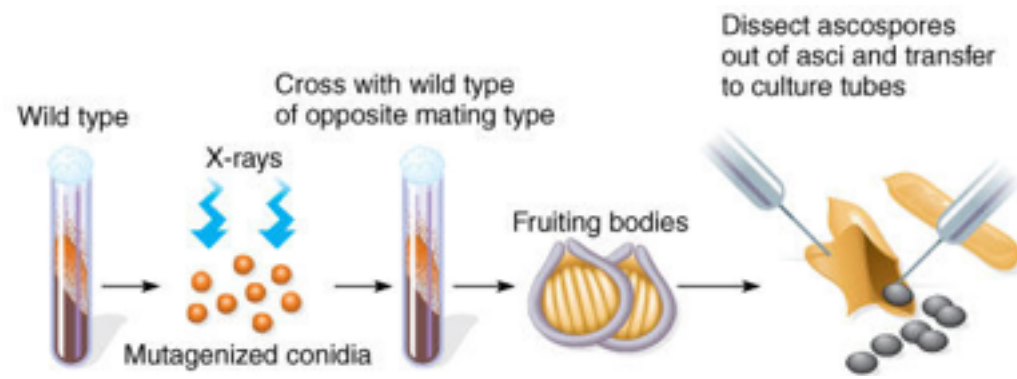


George Beadle

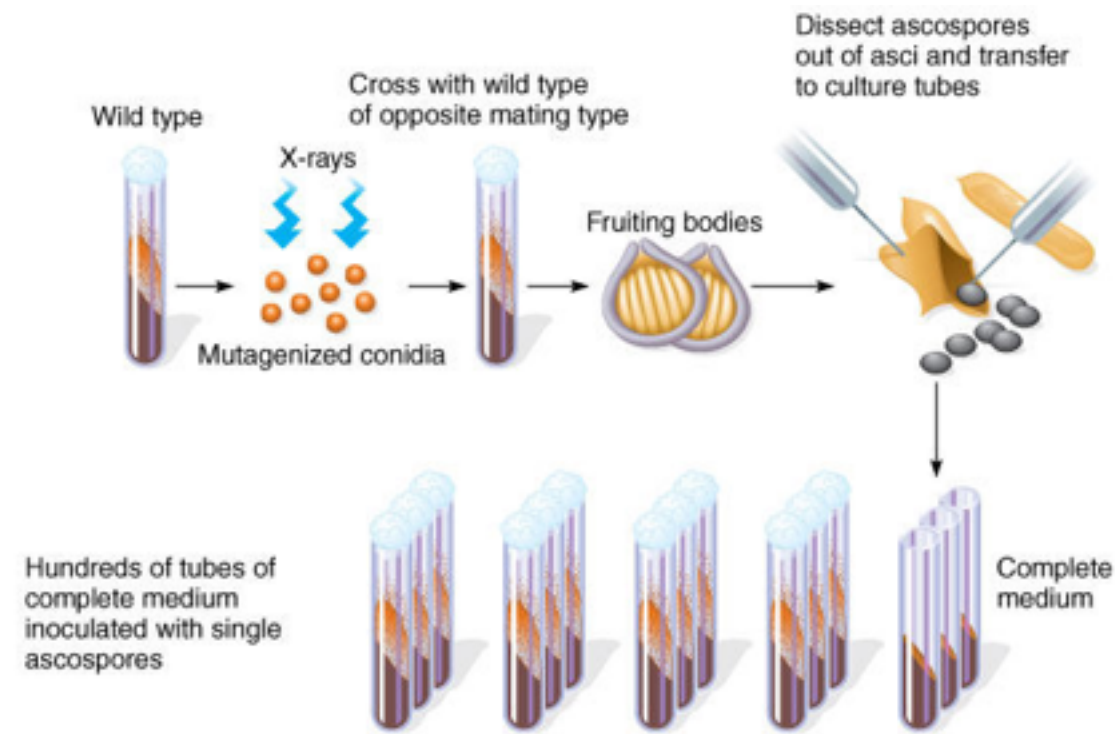


Ed Tatum

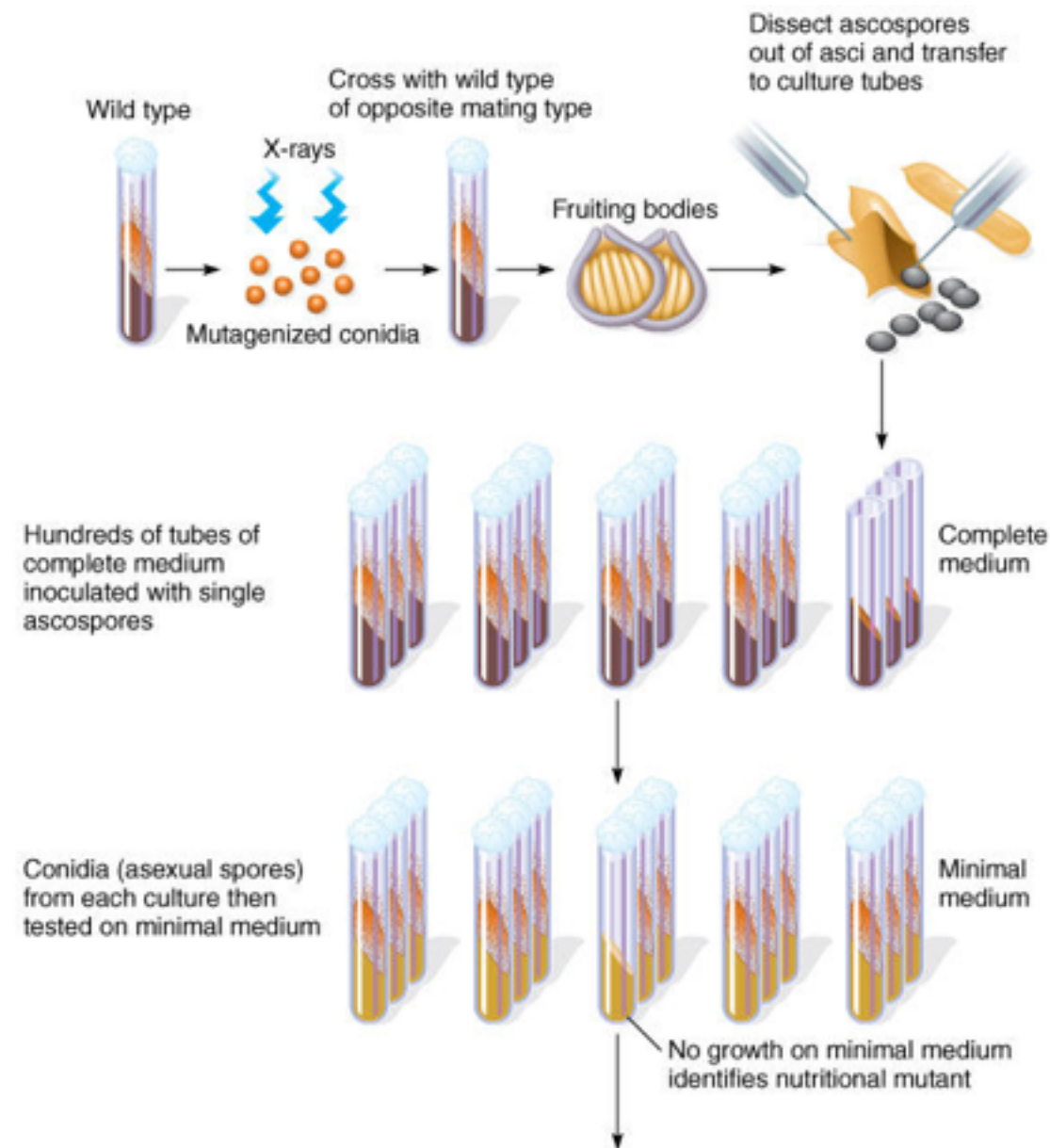
The Beadle-Tatum Experiment



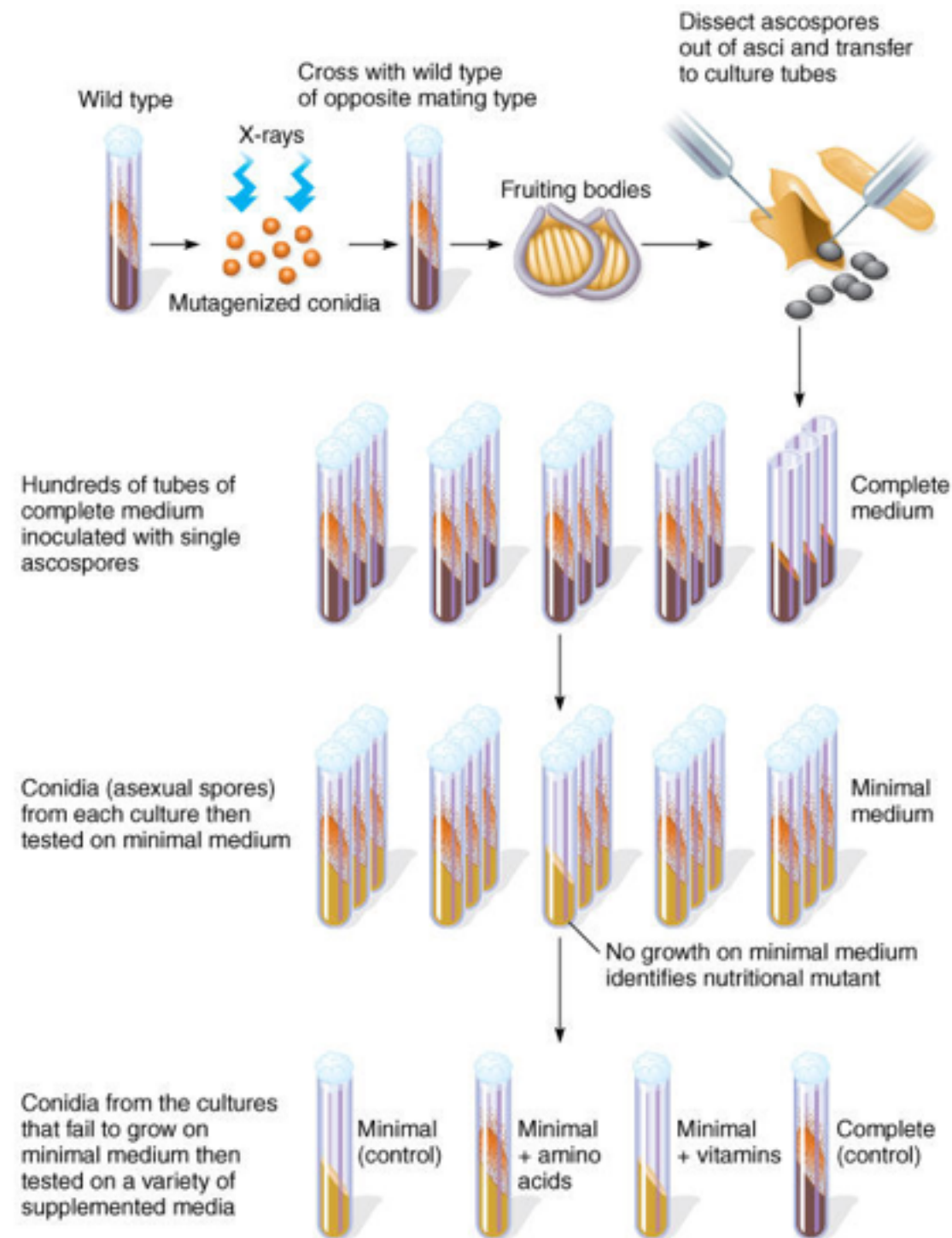
The Beadle-Tatum Experiment



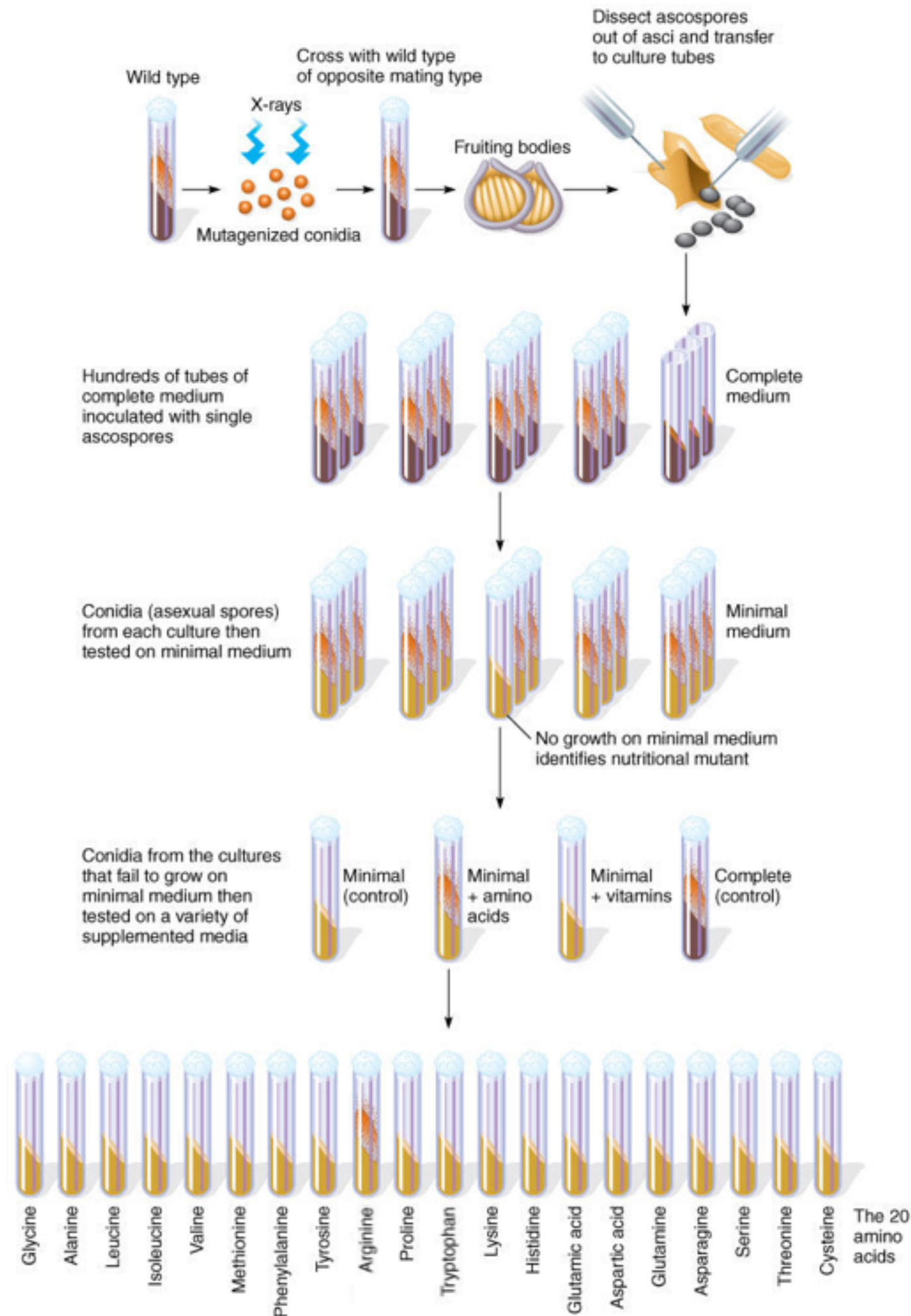
The Beadle-Tatum Experiment



The Beadle-Tatum Experiment



The Beadle-Tatum Experiment



Arginine mutant complementation experiment

	<i>arg-a</i>	<i>arg-b</i>	<i>arg-c</i>	<i>arg-d</i>	<i>arg-e</i>	<i>arg-f</i>	<i>arg-g</i>	<i>arg-h</i>	<i>arg-i</i>
<i>arg-a</i>									
<i>arg-b</i>									
<i>arg-c</i>									
<i>arg-d</i>									
<i>arg-e</i>									
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