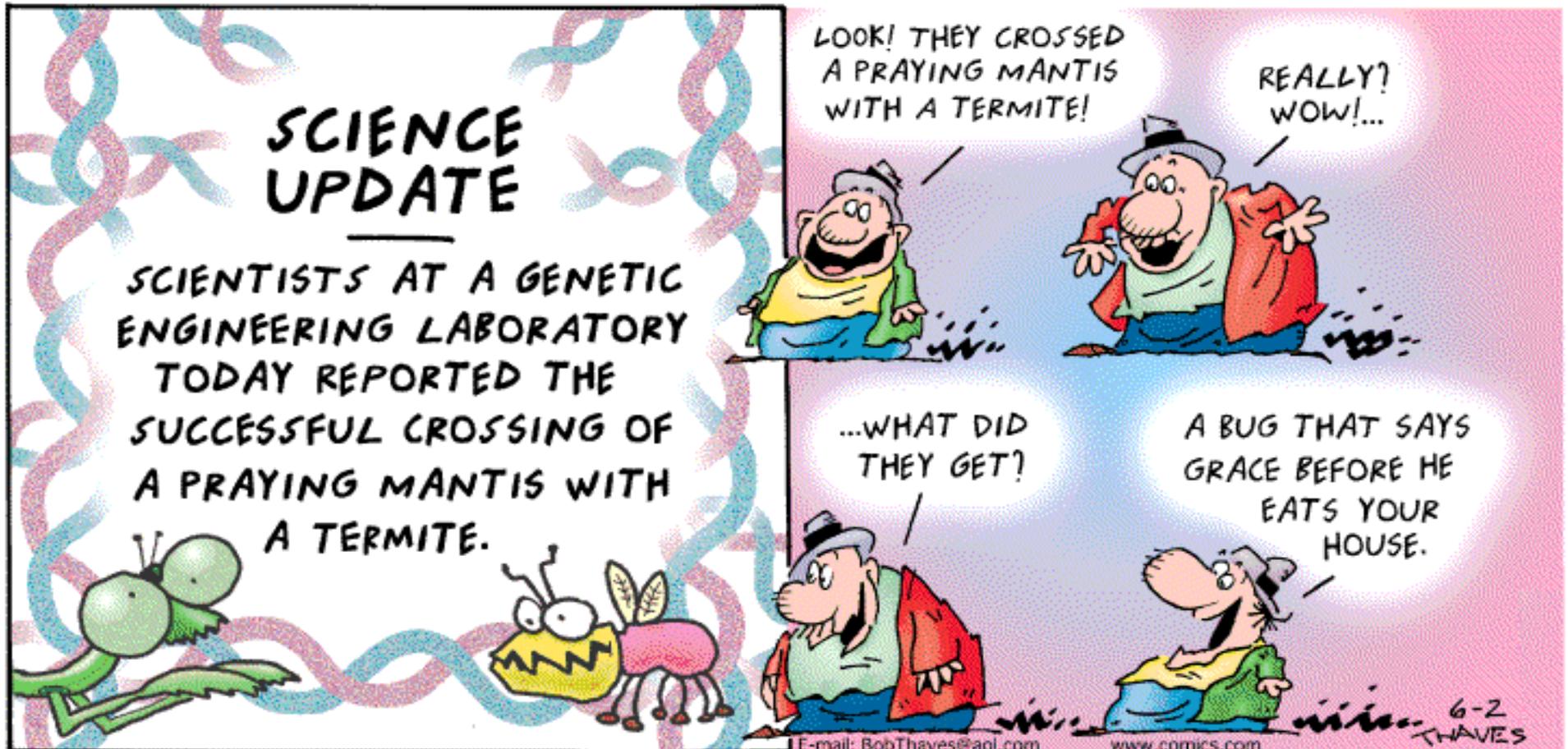


Chapter 11- Genetics

11-1 The Work of Gregor Mendel



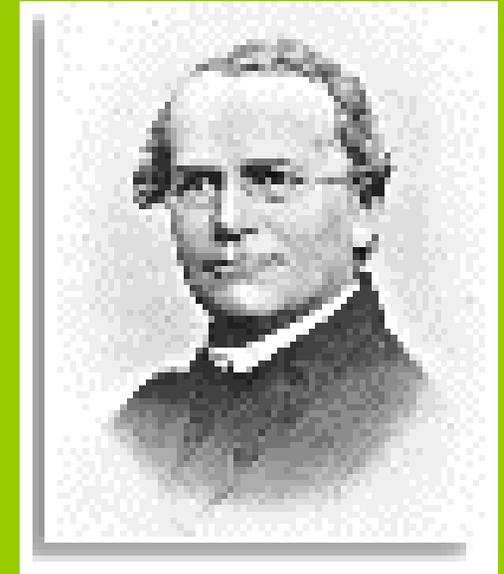
I. Gregor Mendel

A. Worked with pea plants

1. Reproduce sexually
2. Pea plants are Self-pollinating
have both Male & Female parts
3. True-breeding plants- produce offspring identical to parents.
Ex. True breeding Tall plants always produce tall offspring

B. Cross pollinated pea plants

- ## C. Studied their trait-specific characteristics of an organism.



D. Found that Pea plants have 7 contrasting traits

Mendel's Seven F ₁ Crosses on Pea Plants							
Traits →	Seed Shape	Seed Color	Seed Coat Color	Pod Shape	Pod Color	Flower Position	Plant Height
P	Round	Yellow	Gray	Smooth	Green	Axial	Tall
	 X 	 X 	 X 	 X 	 X 	 X 	 X 
F ₁							
	Round	Yellow	Gray	Smooth	Green	Axial	Tall

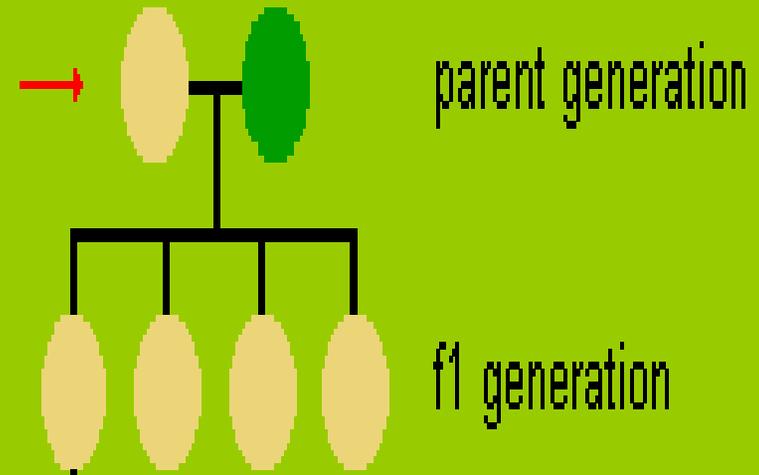
E. Crossed plants with contrasting traits:

Ex. Crossed a true breeding yellow seed pea plant with a true breeding green seed pea plant.

True breeding
P cross: Yellow x Green



F₁: Yellow



1. Found that the offspring (F₁) from these original parents (Pcross) always produced plants with yellow peas.

F. Made 3 conclusions from his many, many experiments

1. Biological inheritance is determined by factors (genes) that are passed from one generation to the next.

a. **Gene**- section on chromosome that determines traits

i. Each gene contains two alleles

b. **Alleles**- different forms of a gene
(All of the different possible characteristics of a trait)

Ex. Alleles for seed color are
yellow or green

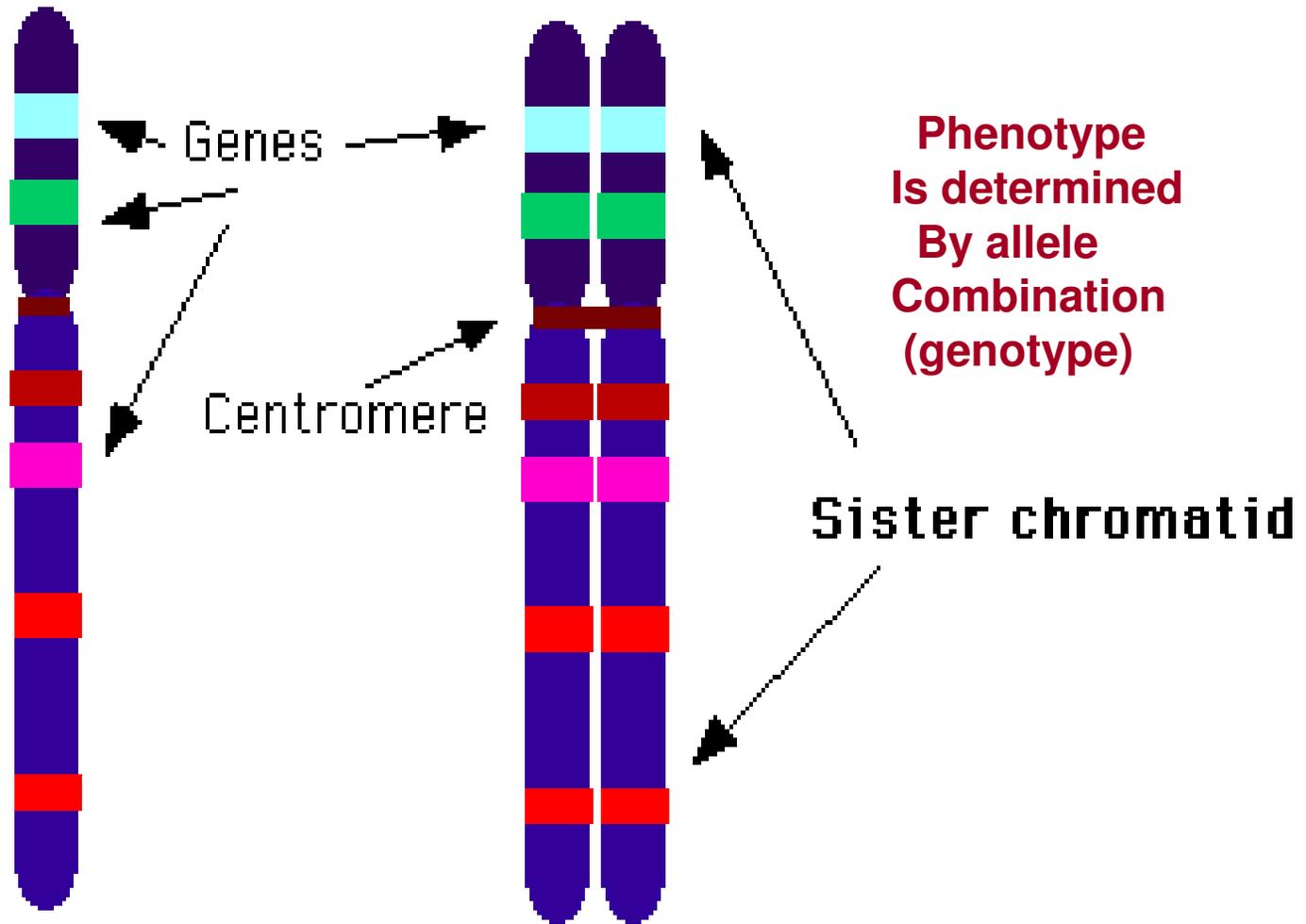
Ex. Alleles for Dimples

Dimples or no dimples

Ex. Alleles for Vision

Color blind or Normal

Chromosome Terminology



Unduplicated

Duplicated

2. Principle of dominance- states that some alleles are dominant and some are recessive

a. **Dominant**- trait that is expressed if present
(symbol- capital letter)

Ex. Yellow = Y

b. **Recessive**- hidden, unless both alleles are recessive (symbol - lower case letter)

Ex. Green = y

G. Mendel wondered what happened to recessive alleles (green, short, wrinkled...) in F_1 cross?

1. He crossed 2 plants from F_1 - (all yellow)
2. Discovered that the recessive allele (green, short, wrinkled...) reappeared.

Ex. F₁ cross

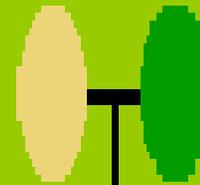
Yellow X Yellow



F₂

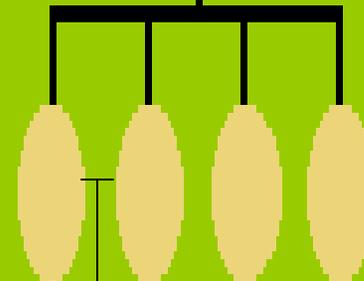
3 yellow to 1 green
(3:1 ratio)

cross-pollination →

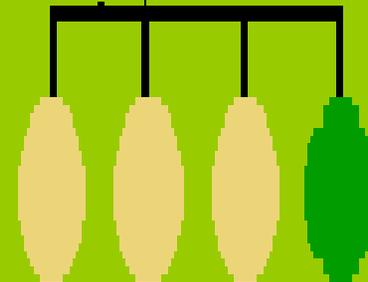


parent generation

self-pollination →



f1 generation



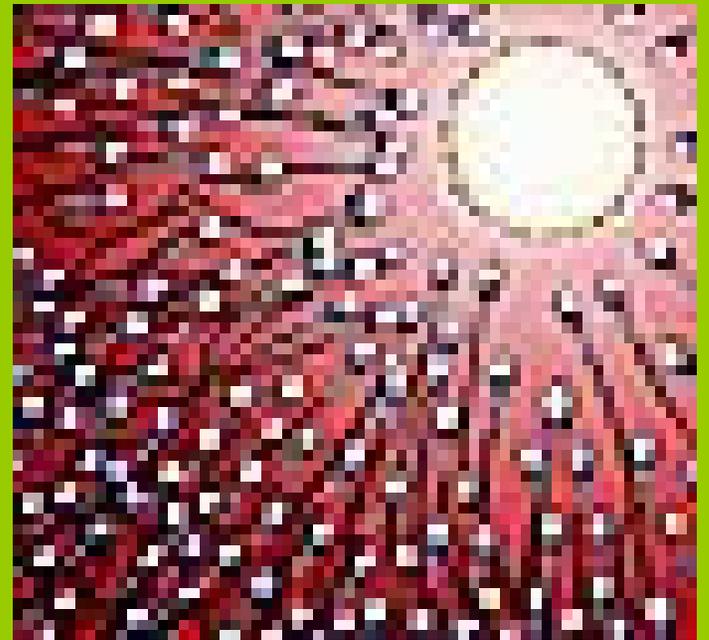
3:1 ratio

f2 generation

H. Segregation of alleles during gamete formation (how alleles separate when sperm/egg cells are made)

Gametes -sperm or egg cells.

1. Each **gamete** gets only **1 allele** for each gene
2. Remember each gene contains 2 alleles.
 - a. One from egg (mom)
 - b. One from sperm (dad)
 - c. So, when sperm fertilizes egg, the 2 alleles come together to form the gene.



3. The pea plants produced two kinds of alleles:

a. Some gametes carry the yellow allele(Y)

b. Some gametes carry the green allele (y)



Gregor Mendel in his garden

Ch 11-2
Probability
and
Punnett Squares

II. Genetics and Probability

A. **Probability**- the likelihood that a particular event will occur

1. flipping a coin- 50% tails or 1 out of 2 chances.

2. Getting three tails in a row- **MULTIPLY** the chances.

$$\text{Ex. } \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \underline{\hspace{2cm}}$$

3. The principles of probability can be used to predict the outcomes of genetic crosses

B. Punnett square- diagram used to predict possible offspring (babies) each time a cross occurs/offspring produced.

1. Example:

cross two F_1 plants

2. Place one allele combination from one parent over the columns

Place the other allele combination from the other parent next to the rows.

Fill in the boxes

	y	y
y	yy	Yy
y	Yy	yy

2. Terms

a. **Genotype**- genetic make-up. The 2 alleles that make up a specific gene

(Ex. YY or Yy or yy)

i. **Heterozygous**- organisms that have gametes with different alleles (Yy)

ii. **Homozygous**- organisms that have gametes with all the same alleles (YY or yy)

b. **Phenotype**- physical characteristics

Ex. yellow or green (how it looks)