

cpo science

# Life Science





Traits,  
Genes  
&  
Chromosomes

My  
Family

UNIT  
**4**

# Genetics

A blue-tinted background image of a science laboratory. It shows various pieces of equipment including a microscope, a computer monitor, a globe, and other lab instruments on a desk.

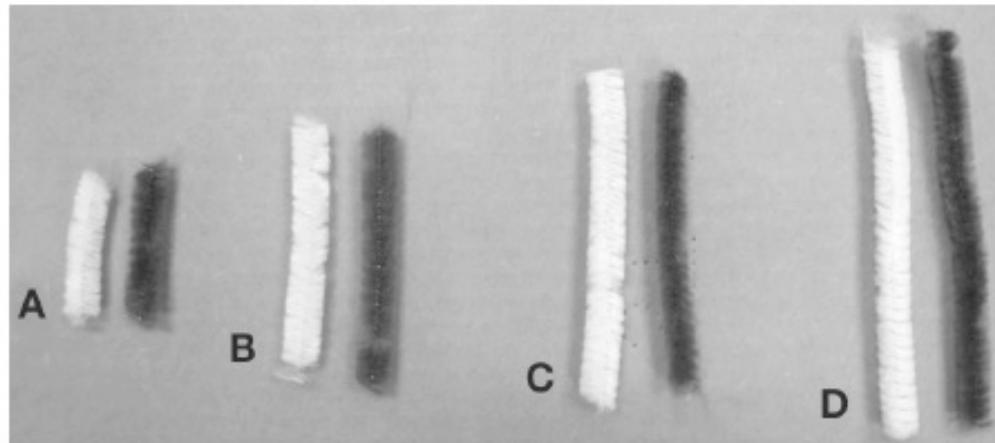
# Chapter Ten: Reproduction

- **10.1 Growth and Cell Reproduction**
- **10.2 Sexual Reproduction and Meiosis**

## Investigation 10B

### Modeling Mitosis and Meiosis

- *How do sex cells end up with a haploid set of chromosomes?*

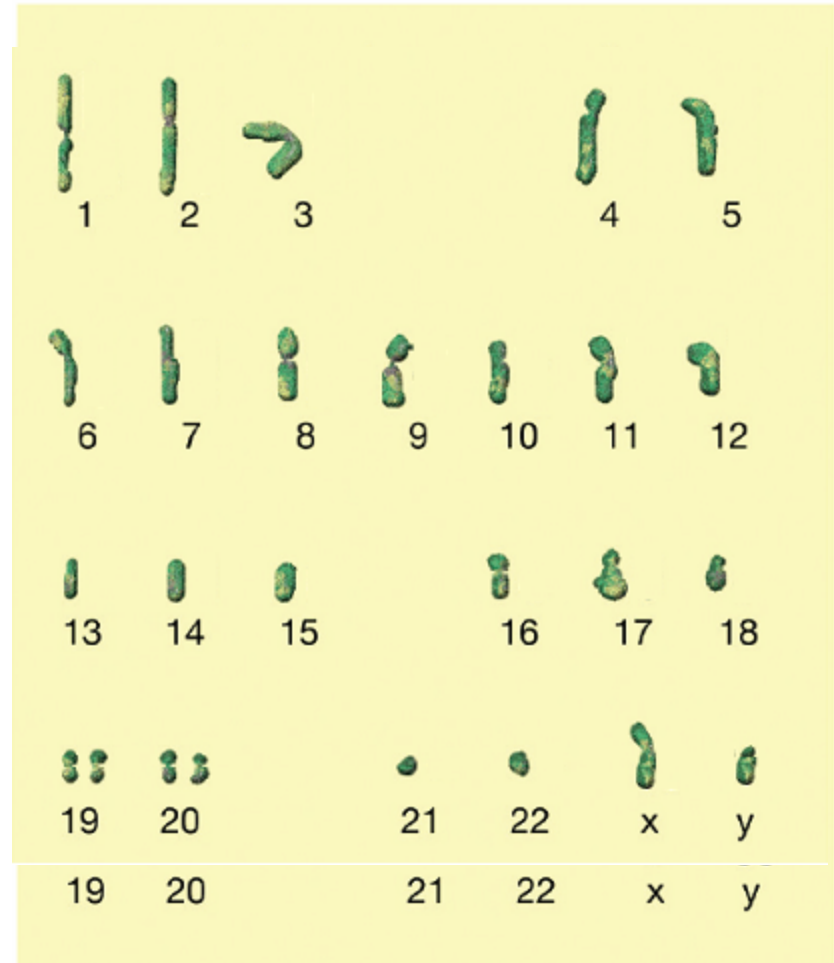


## 10.2 Two types of reproduction

- **Asexual reproduction** is reproduction that requires only one parent.
- Most single-celled organisms like bacteria and protozoans reproduce this way.
- **Sexual reproduction** is a type of reproduction that involves special types of cells called sex cells.

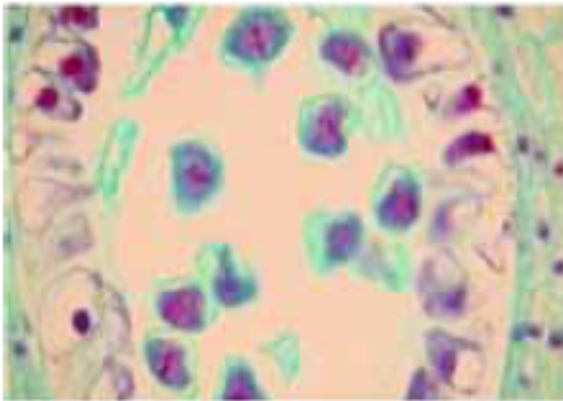
## 10.2 Chromosomes

- **Sex cells** contain half the number of chromosomes as *body cells* (all of the other cells in a multicellular organism).
- Human body cells have 46 chromosomes.
- Human sex cells have 23 chromosomes.



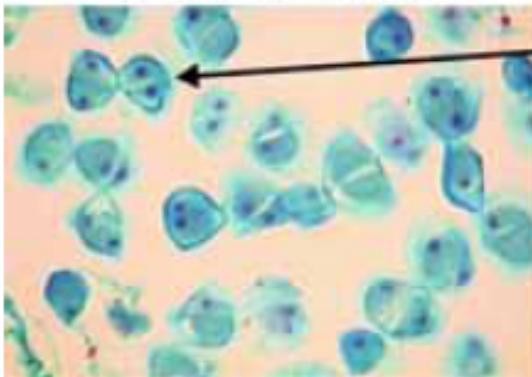
## 10.2 Chromosomes

**Start of meiosis**



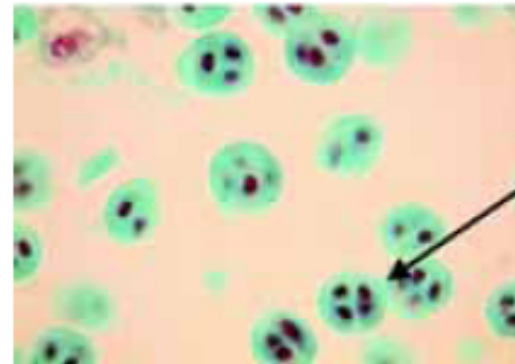
- **Meiosis** is cell division that produces sex cells with half the number of chromosomes.

**First cell division**



Two  
cells

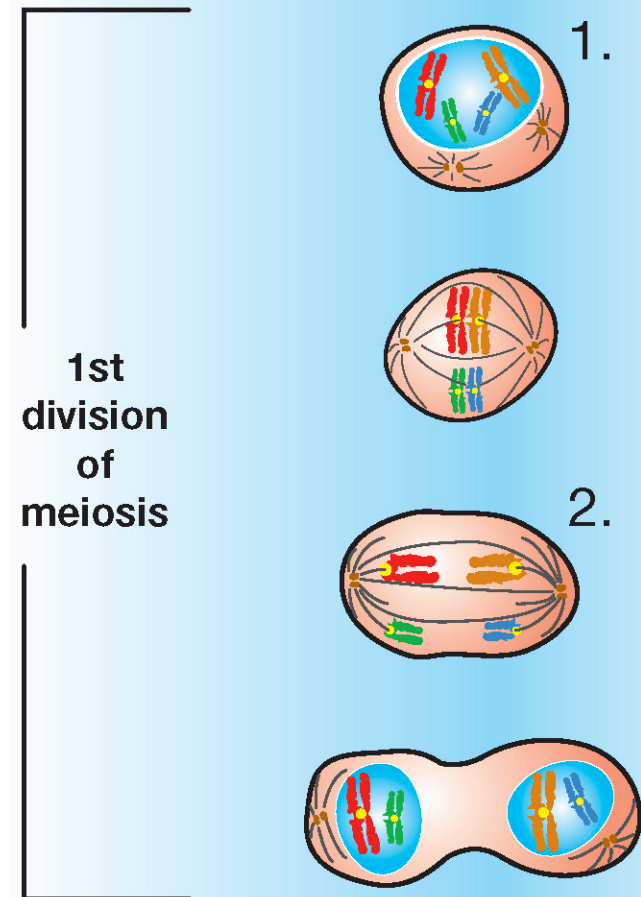
**Second division**



Four  
cells

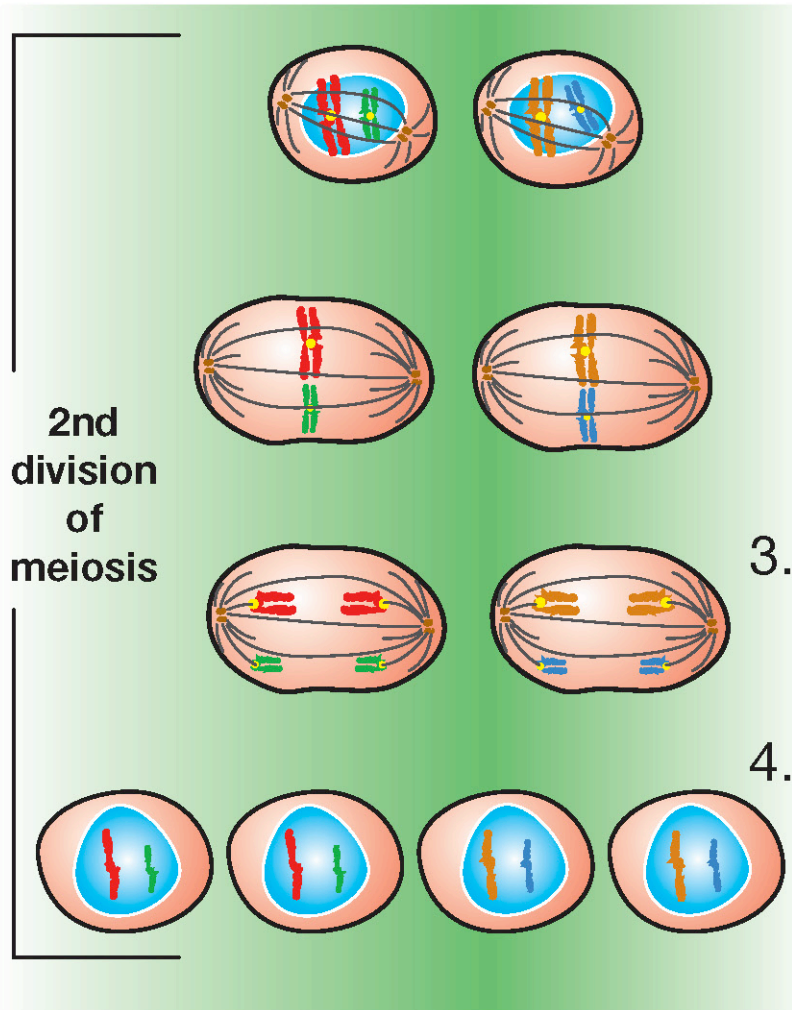
## 10.2 What happens in meiosis?

- The events in meiosis are smooth and continuous:
  - Chromosomes double and thicken.
  - Nuclear membrane disappears.
  - Homologous chromosomes line up at the cell's center.
  - Spindle fibers attach.
  - The nuclear membrane reforms.
  - Two cells form that are identical and diploid.





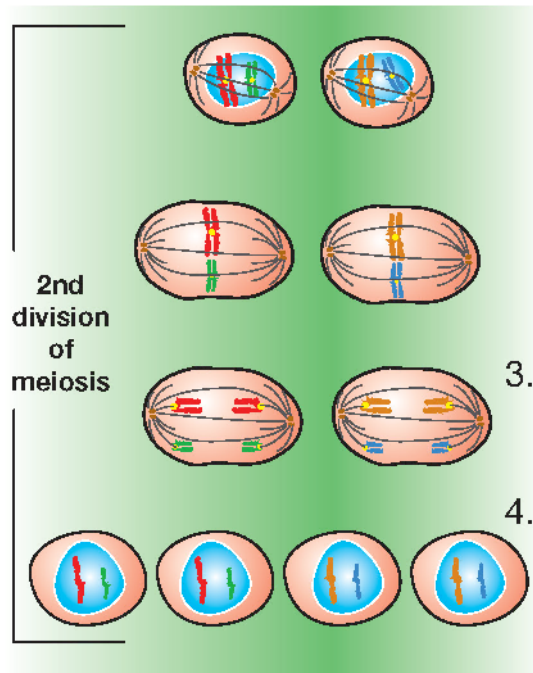
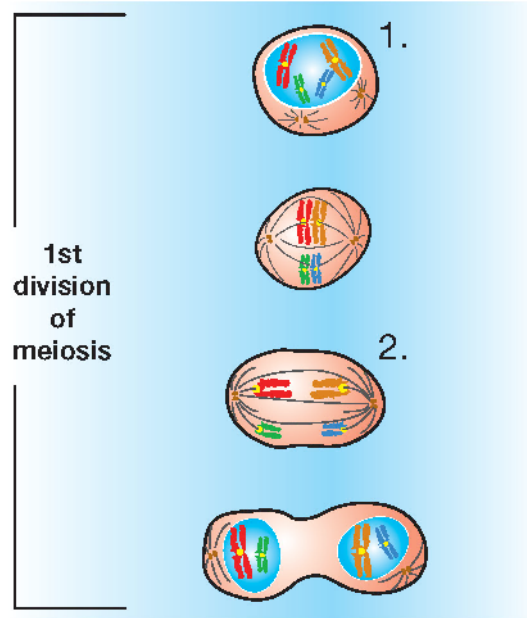
# 10.2 What happens in meiosis?



In the second division, the chromosomes do not double.

- Chromosomes thicken and line up at cell's center.
- Spindle fibers attach.
- Chromosomes are pulled to opposite side of cell by spindle fibers.
- Four new cells form when the nuclear membranes reform and cells separate.
- The four new cells are unique and haploid so they have half the number of chromosomes compared to starting cells.

# Meiosis



## 10.2 Diploid, haploid and fertilization

- A complete set of chromosomes is called a **diploid** set.
- A half set of chromosomes is called a **haploid** set.
- Most animal cells have a diploid set of chromosomes except in sex cells.



### Diploid set

Human  
46

Chicken  
78

House fly  
12

Tomato  
24

### Haploid set

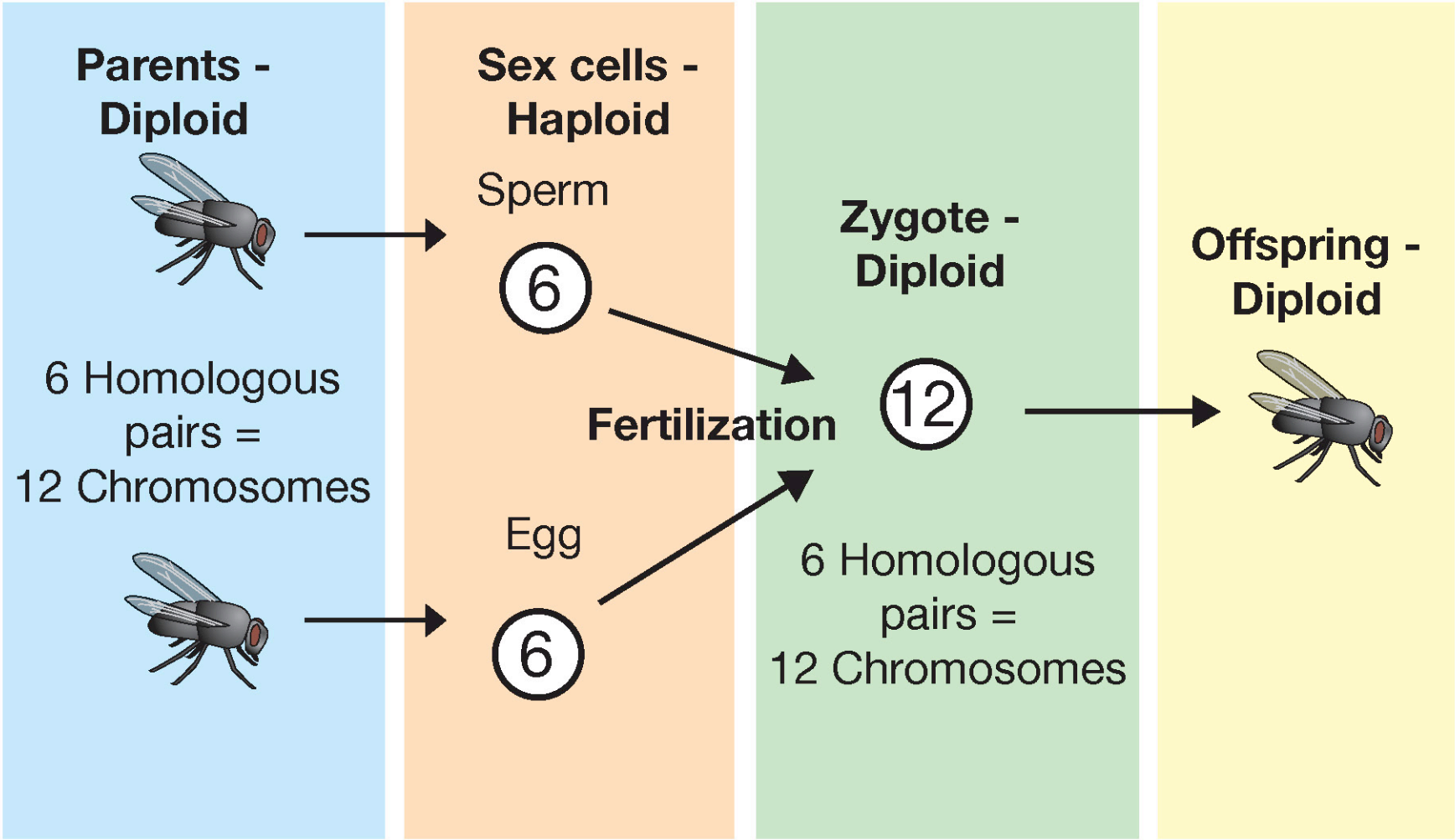
Human  
23

Chicken  
39

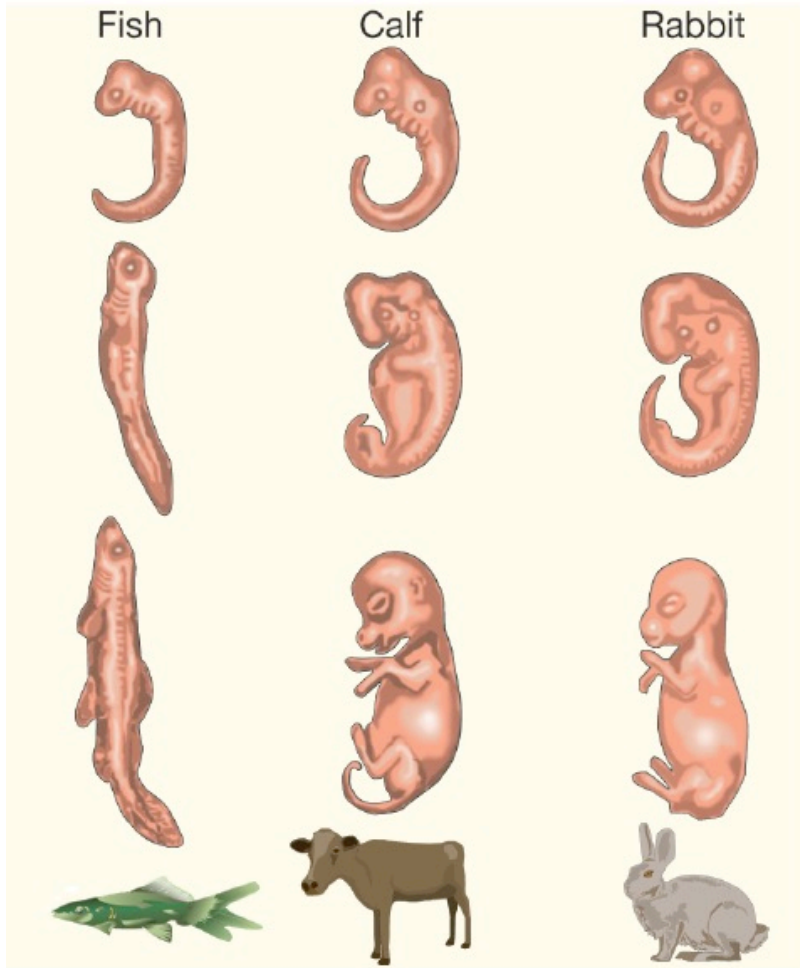
House fly  
6

Tomato  
12

# Fertilization



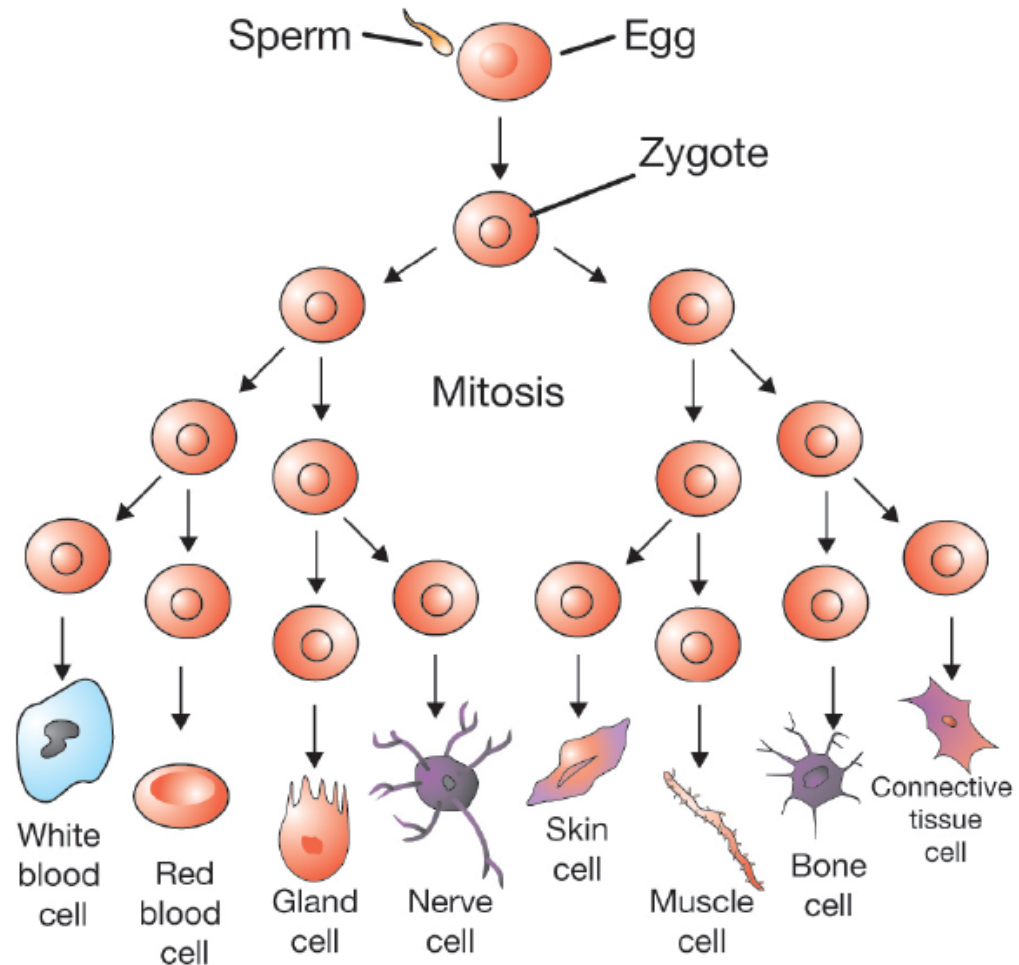
## 10.2 Specialized cells



- An **embryo** is an organism in its earliest stages of development.
- A multicellular organism ends up with many different types of *specialized* cells.
- All of those cells can be traced back to the zygote.

## 10.2 Cell differentiation

- **Cell differentiation** is the process of cell specialization.
- As cells differentiate, they give rise to different tissues.
- These tissues eventually form the organs.



# Medicine Connection

## Differences Between Twins Start with Cells

- What is the difference between identical and fraternal twins?



# Activity

## Chromosome Square Dance

- In this activity, you will imagine you and your classmates are chromosomes at a square dance.

