

# Unit 7

## Genetics of Development

### Description

Organisms as different as flies, fish, and humans share a similar set of genes, known as a genetic toolkit, which guides development in multicellular organisms. Understanding these developmental pathways and processes not only tells us more about how multicellular organisms evolved, it also could help researchers who are attempting to make adult stem cells form new tissues.

### Menu of Unit Activities

**Note:** All activities, handouts, solutions, and tips can be found in the Appendix of this guide.

**Activity 1: Fact or Fiction?** (15 minutes + 30 minutes of video)

Ten statements about development are evaluated for the five that are amazing-yet-true.

**Activity 2: Mommie Dearest** (45 minutes)

Readings and genetic problems that highlight the effects of mutations in genes that direct development.

**Activity 3: Small Cells, Big Controversies** (60 minutes)

Readings and discussions on the applications of embryonic stem cells and the controversies about generating them.

# Before the Session

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**Facilitator:** Copy and assemble the following activity materials. (See the Activities section in the Appendix of this guide for master copies of transparencies and handouts, plus Tips and Suggested Answers.)

**Activity 1: Fact or Fiction?** requires:

- One transparency of the *Drosophila* Head Micrographs
- One copy of the Statements per person (master copy provided)
- One copy of the Genetics of Development online text chapter per two people (available online at <http://www.learner.org/channel/courses/biology>)
- Tips and Suggested Answers

**Activity 2: Mommie Dearest** requires:

- One copy of the Readings, Worksheet, and Discussion Questions per person (master copy provided)
- Tips and Suggested Answers

**Activity 3: Small Cells, Big Controversies** requires:

- One copy of the Discussion Questions per person (master copy provided)
- One copy of the Interview Transcript Excerpts per person (master copy provided)

**Facilitator:** Make sure that the room has these supplies:

- pens or pencils and paper
- VCR and TV
- overhead projector and markers
- black/white board with chalk or markers

# Session Activities and Video

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## Activity 1a: Fact or Fiction?—Pre-Video Exercise (10 minutes)

- Put the transparency of the *Drosophila* Head Micrographs on the overhead and read the Setup.
  - Have each person take a copy of the Statements.
  - Spend 5–10 minutes on the statements, deciding which five are true.
- Facilitator:** Emphasize that participants should try to find the five statements that are entirely true. The point of this exercise is not to get all the right answers, but to think about some amazing or amusing facts of developmental research.

## Video (30 minutes)

- Watch the Genetics of Development video.

## Activity 1b: Fact or Fiction?—Post-Video Discussion (5 minutes)

- As a group, review the statements, deciding which are true. Compare answers to those found in Tips and Suggested Answers.

## Activity 2: Mommie Dearest (45 minutes)

- Read the Setup and arrange into pairs.
- Have each person take a copy of the Readings, Worksheet, and Discussion Questions.
- Spend 5–10 minutes on the reading.
- Spend 10–15 minutes working in pairs on the worksheet problems.
- As a group, go over the answers from the pairs, comparing them to those found in Tips and Suggested Answers.
- As a group or in pairs, talk about the Discussion Questions. Compare challenge question answers to the explanation given in Tips and Suggested Answers.

# Session Activities and Video, cont'd.

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## Activity 3: Small Cells, Big Controversies (60 minutes)

- Read the Setup and arrange into teams of three or four.
- Have each person take a copy of the Discussion Questions and a copy of the Interview Transcript Excerpts.
- Spend five minutes reading Excerpt 1.
- As a group, discuss the corresponding discussion questions.
- Repeat for Excerpts 2 and 3, and their corresponding questions.
- As a group, discuss any questions that were especially controversial in the smaller team discussions.

## Summary (5 minutes)

- If time permits, as a group or in pairs, define the major ideas or “take home” lessons of this unit and its applications.