OUTLINE 7

VII. Mechanisms of Animal Development

- **A. Cytoplasmic determinants**
  - **1. axes of symmetry in amphibians**
  - **2. bicoid gene in Drosophila**
- **B. Cell communication**
  - **1. Holtfreter's work**
  - **2. mechanisms of cell recognition**
  - **3. induction**
- **C. Morphogens and pattern formation (chick limb bud)**
- **D. Hormones (in amphibian development)**
  - **1. pattern of metamorphosis**
  - **2. role of thyroxin**
  - **3. evidence**

OUTLINE 6

VI. Morphogenesis

- A. General features of gastrulation
- B. Cell movement
  1. extension and contraction
  2. adhesion
- C. Gastrulation in the sea urchin
- D. Gastrulation in the frog
- E. Three layers of cells
  1. ectoderm
  2. mesoderm
  3. endoderm
- F. Neurulation

Fig. 47.9

Gastrulation in the Sea urchin

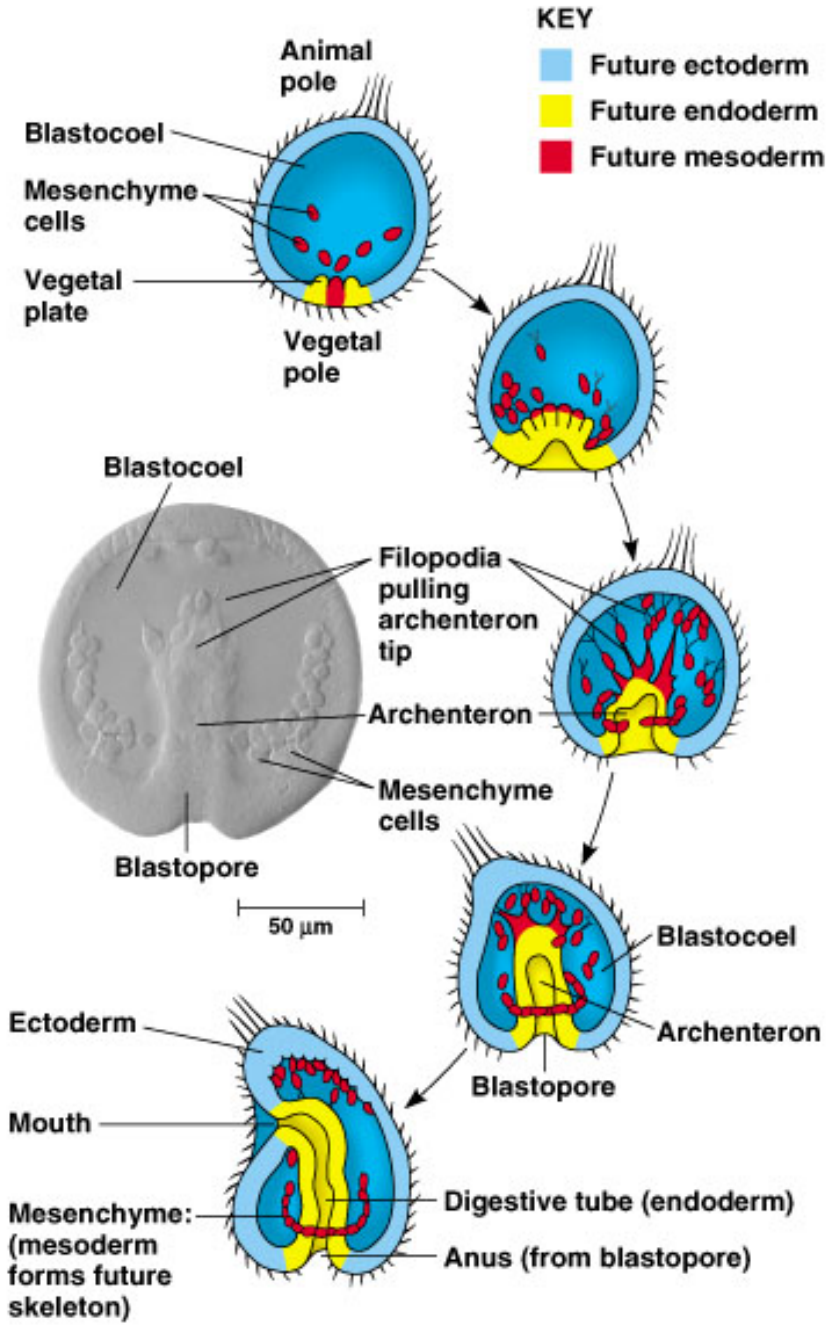
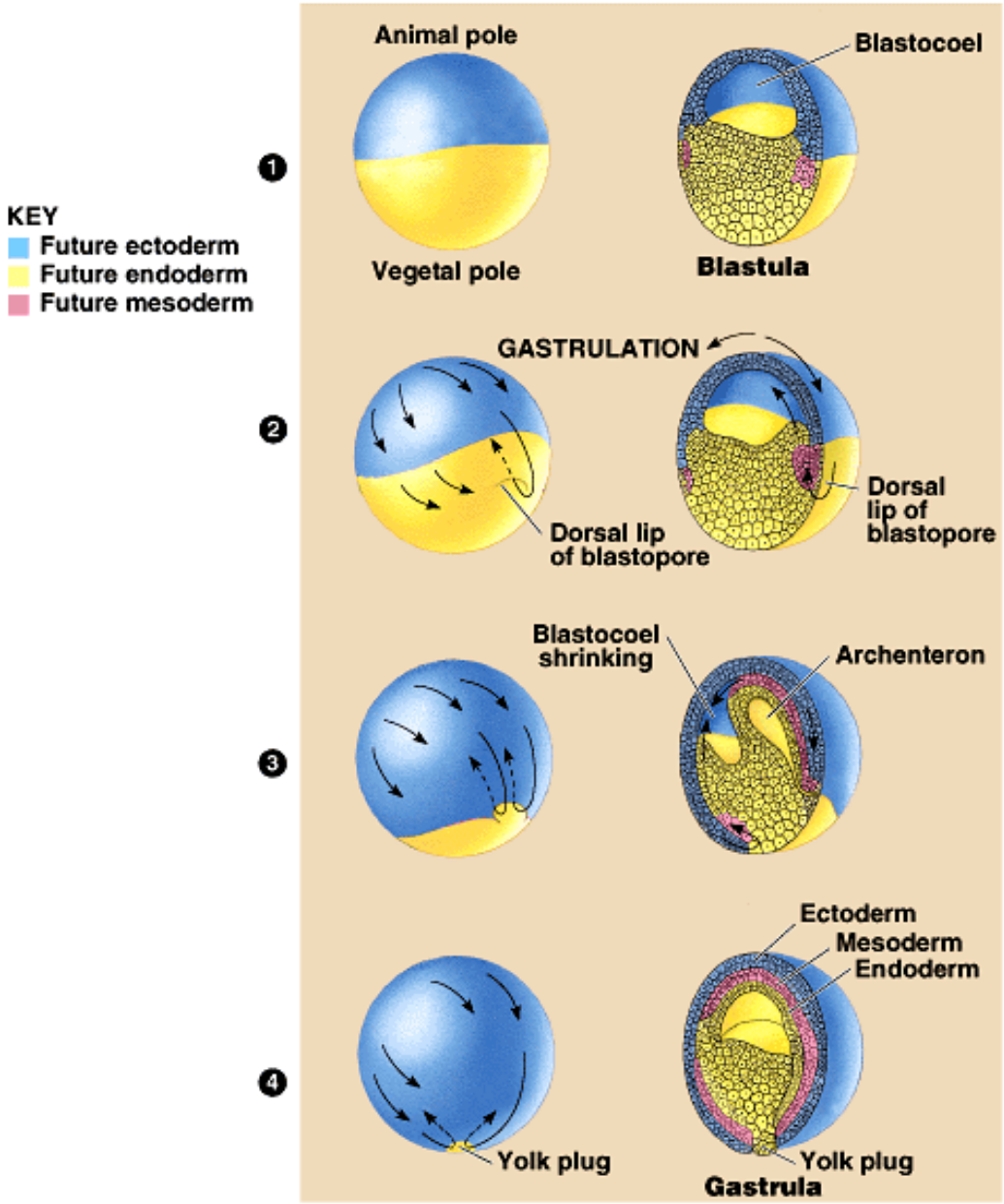


Fig. 47.10

Gastrulation in the frog



Frog gastrulation (cross section)

QuickTime™ and a
Microsoft Video 1 decompressor
are needed to see this picture.

Fig. 47.16 **Changes in cell shape during morphogenesis**

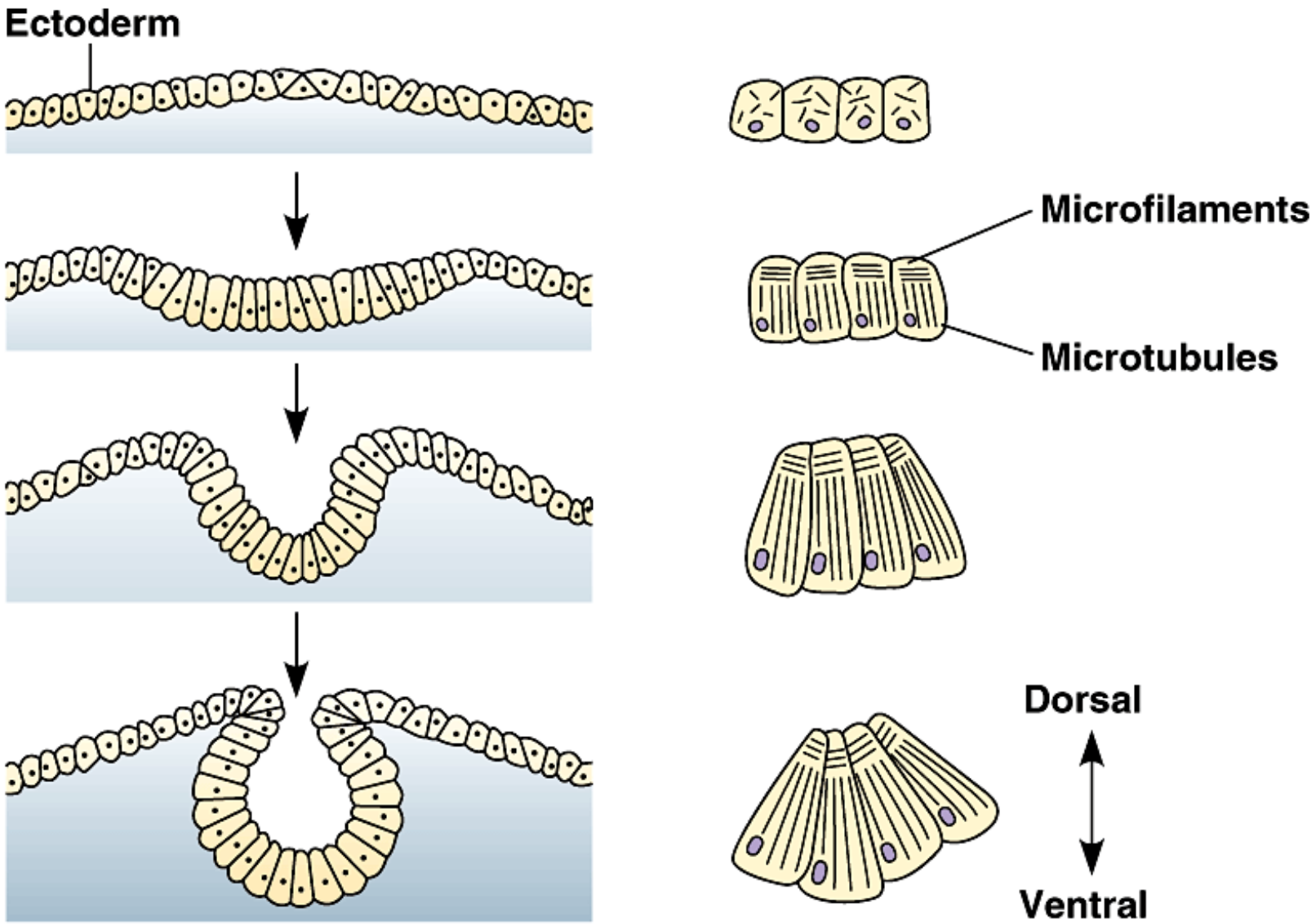
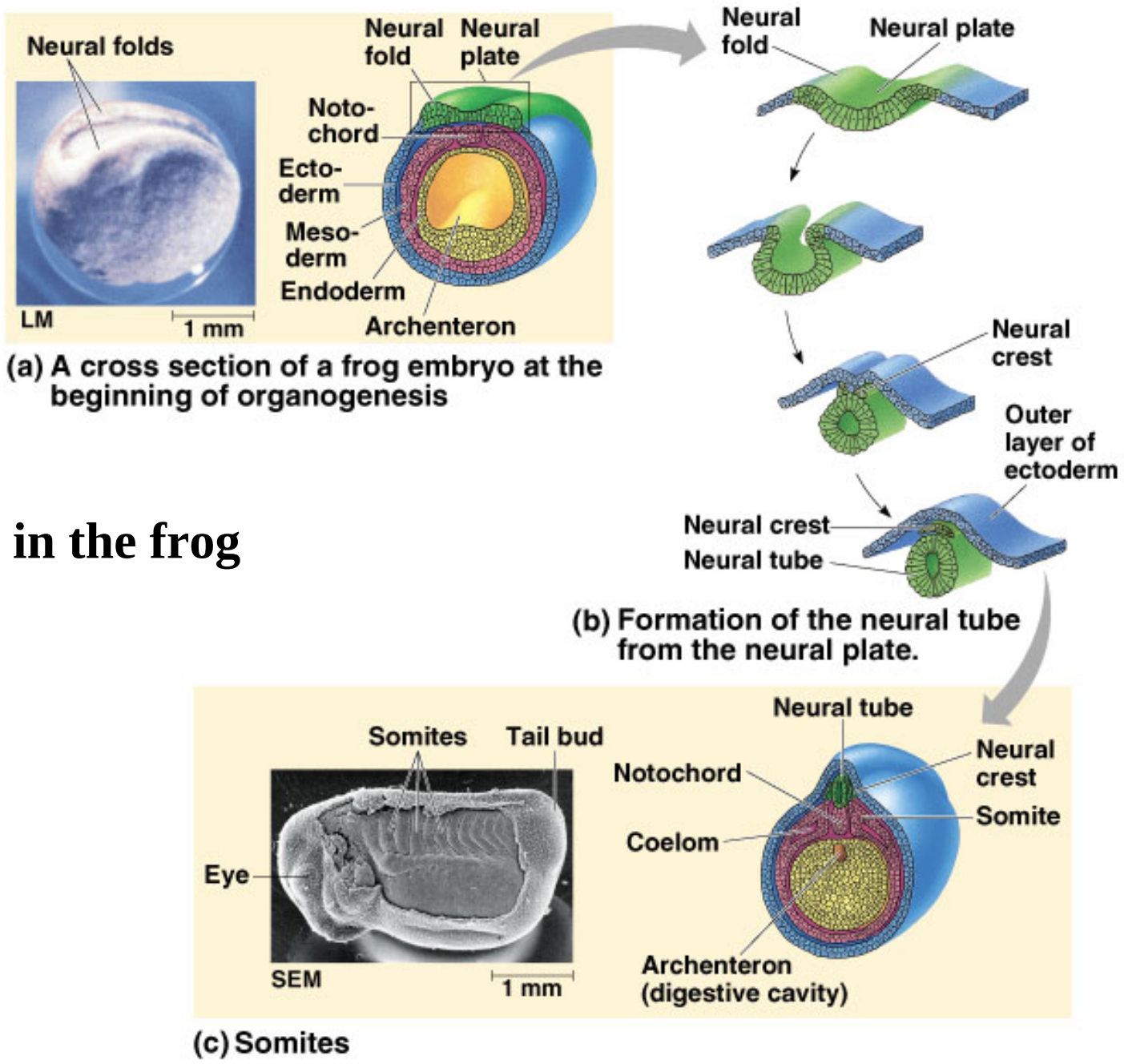


Fig. 47.11



Neurulation in the frog

Gastrulation and neurulation in the frog

QuickTime™ and a
Cinepak decompressor
are needed to see this picture.

Fig. 47.7

Determination of axes of symmetry in the frog

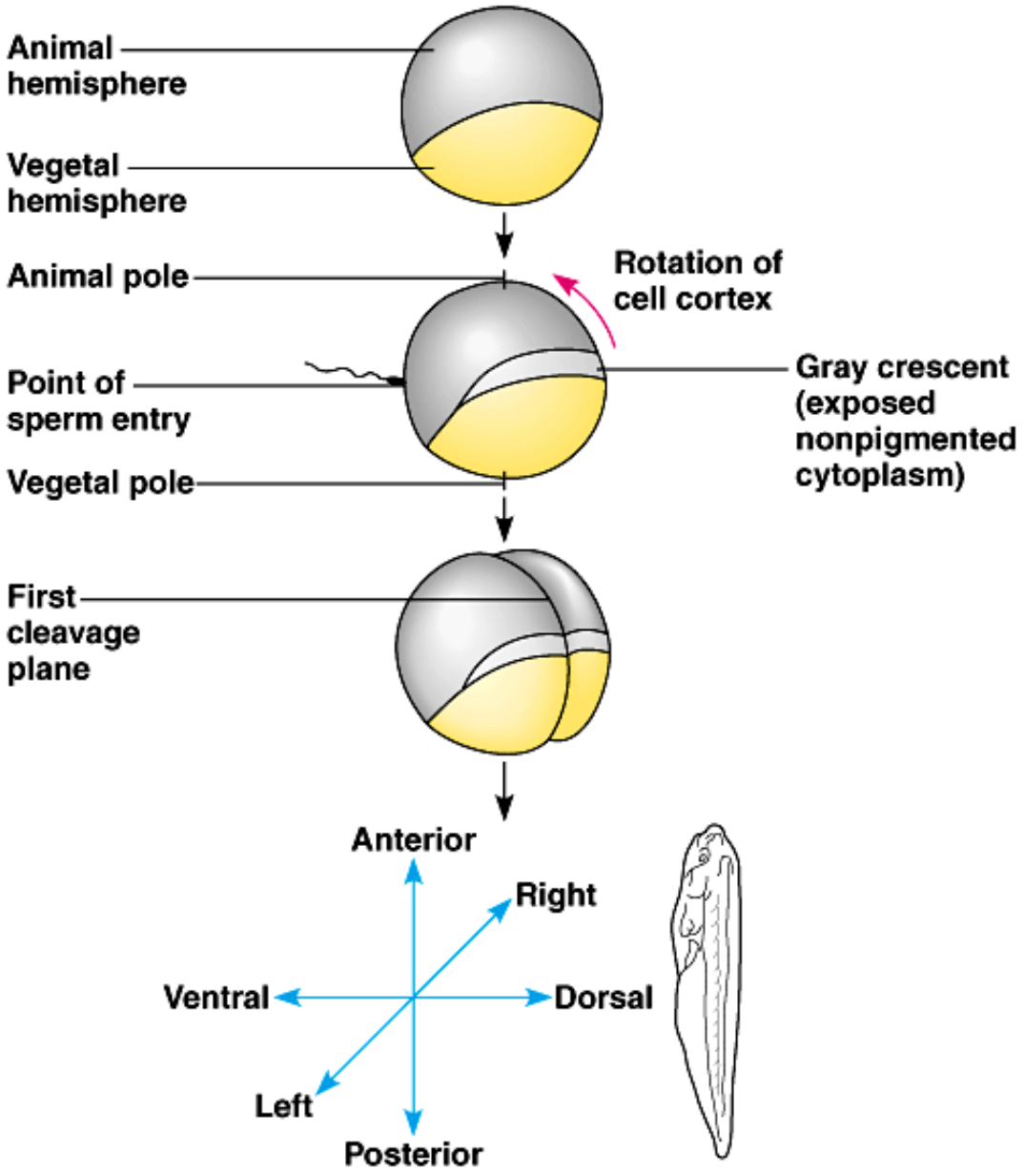


Fig. 21.23

Development in the fly

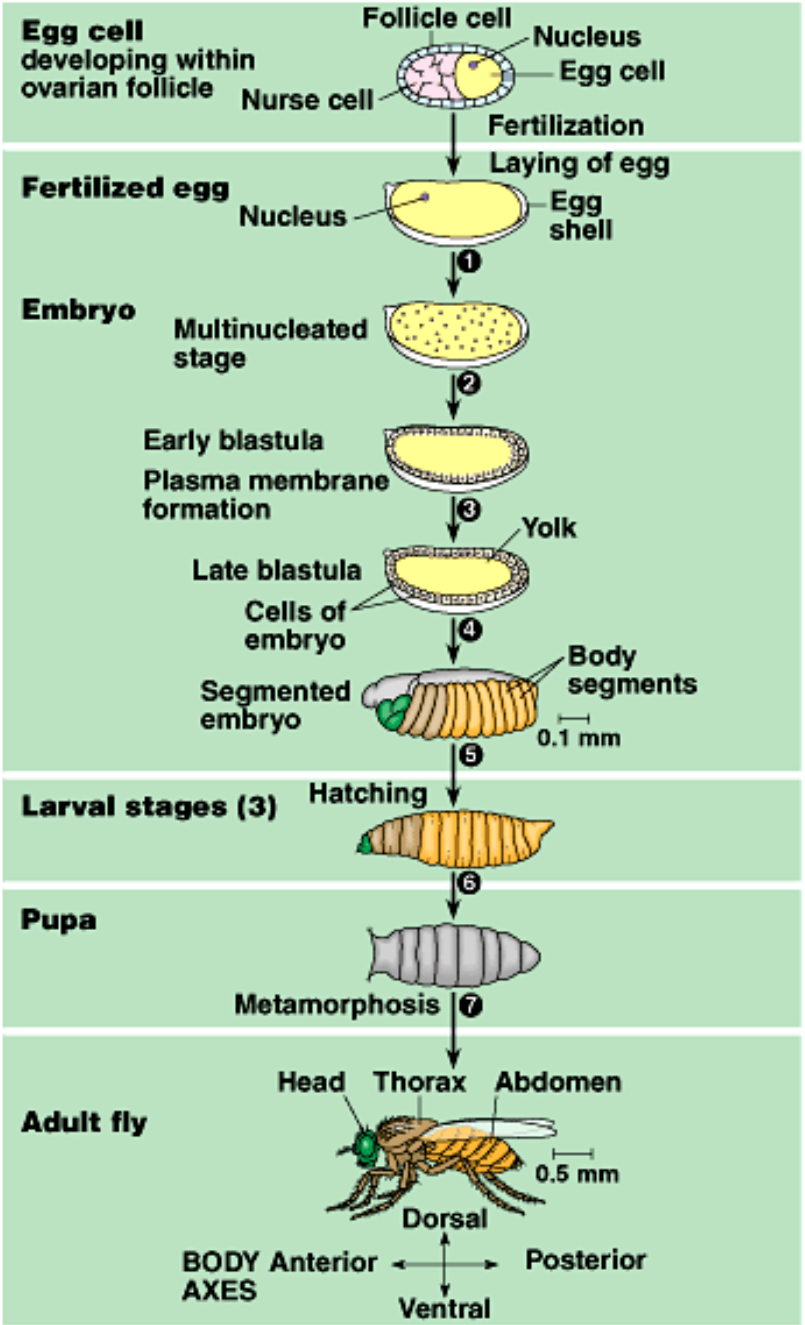
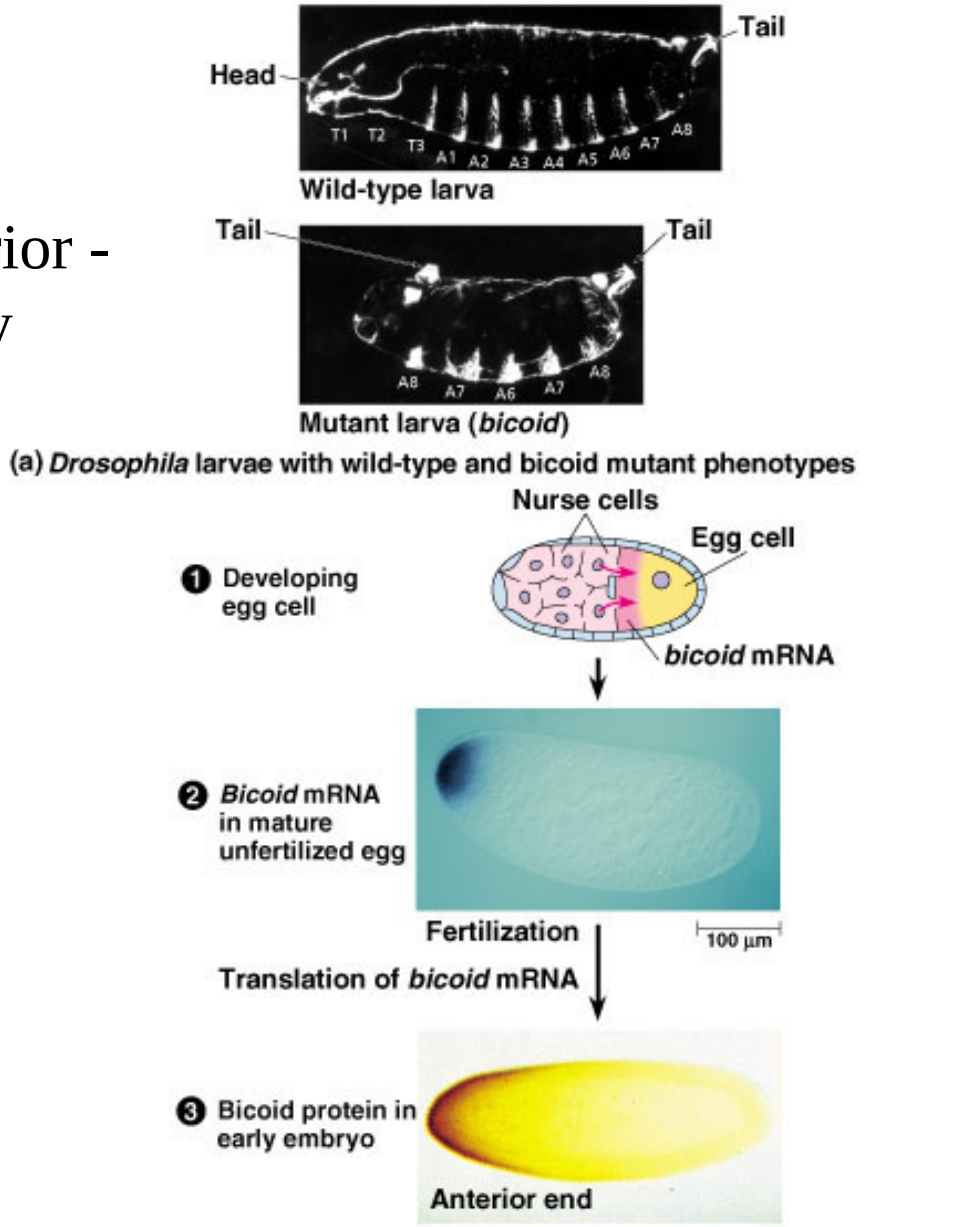
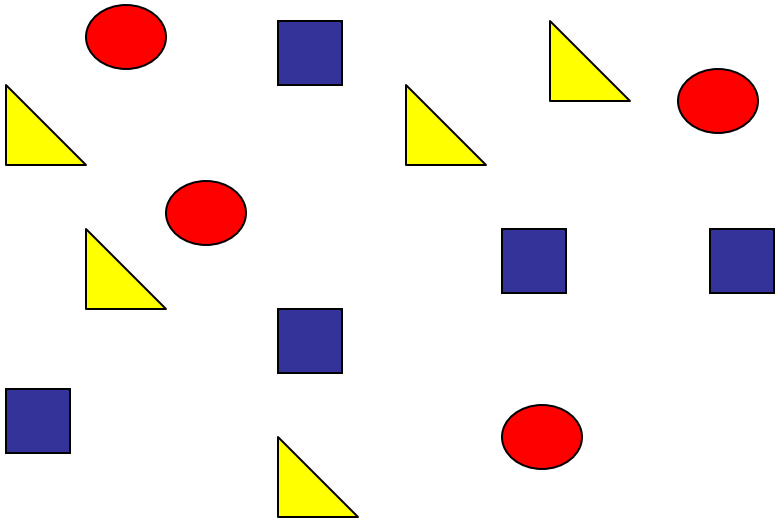


Fig. 21.24

Determination of anterior - posterior axis in the fly

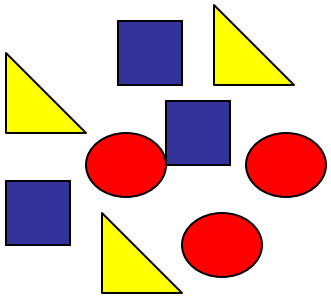


ectoderm mesoderm endoderm

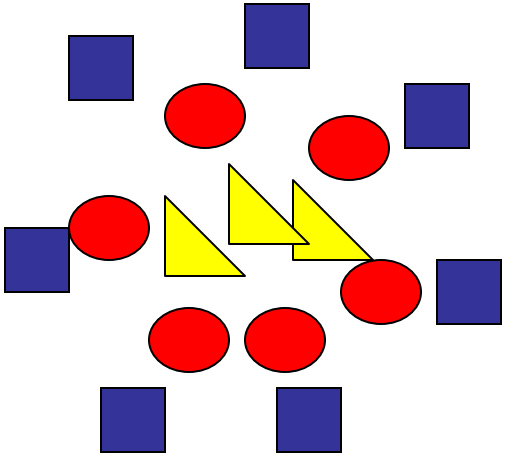


1. dissociation

2. reaggragation



3. resegregation



Holtfretter 1955

Fig. 47.22

Spemann and Mangold: an organizer

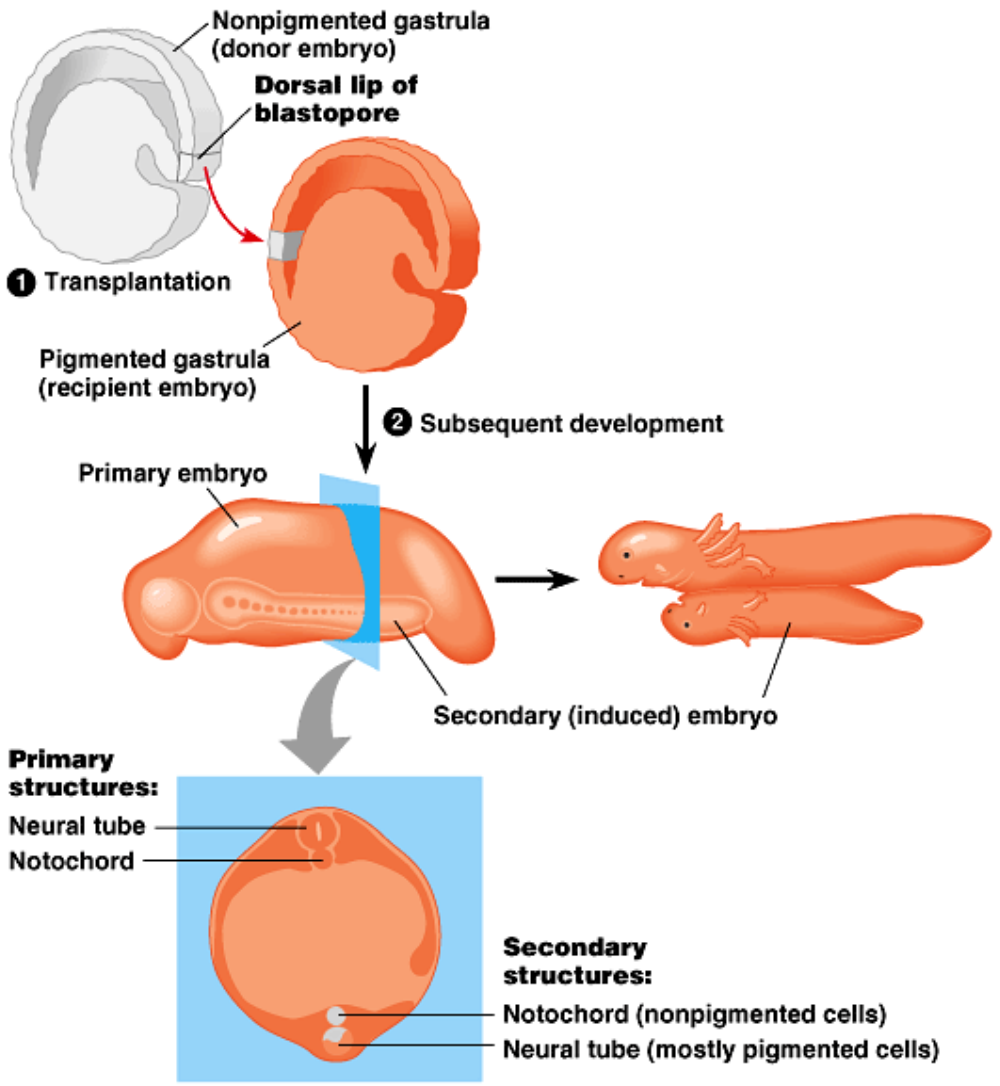
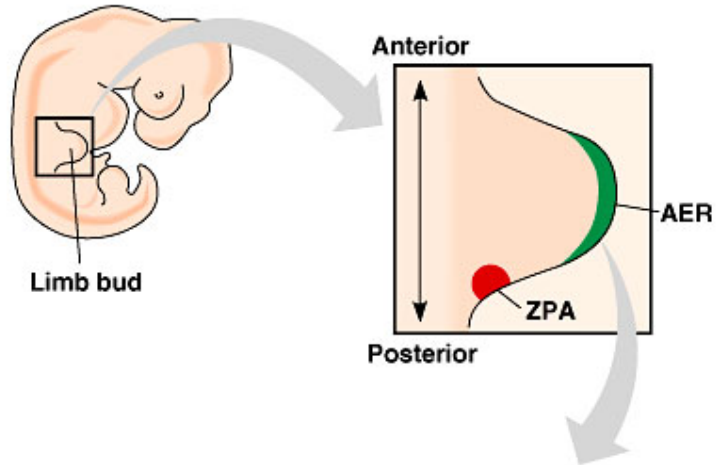
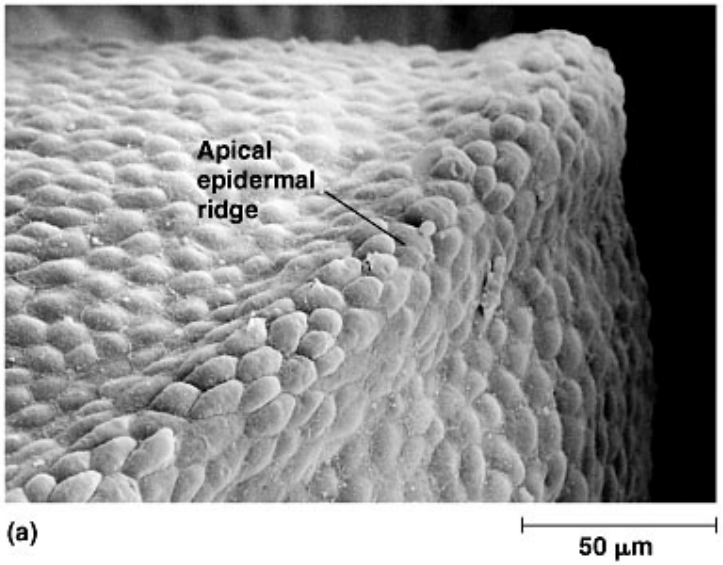


Fig. 47.24 Pattern formation: the chick limb bud





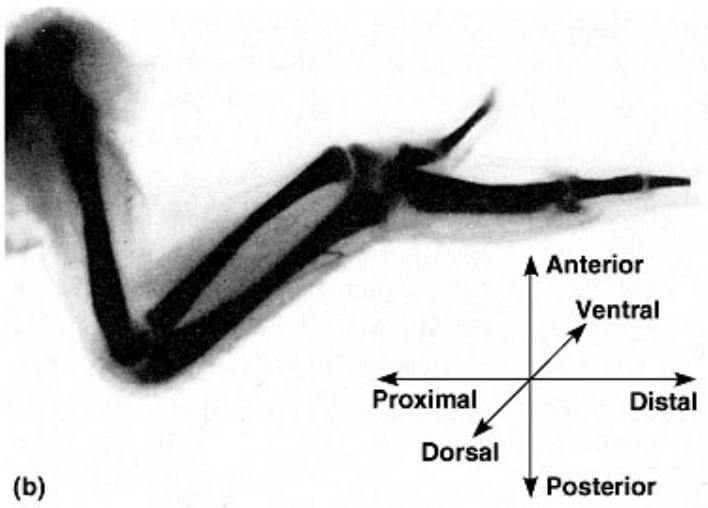
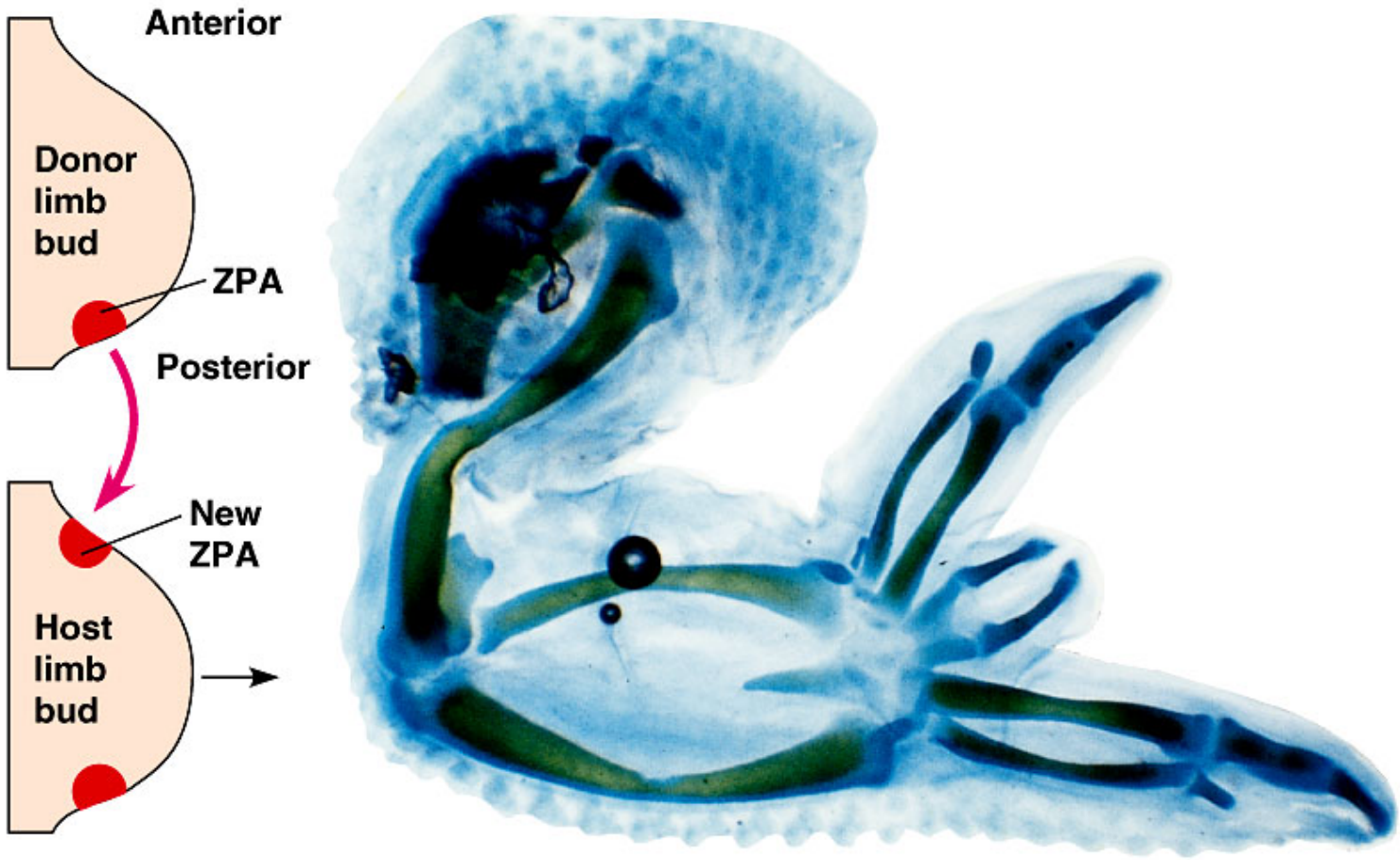
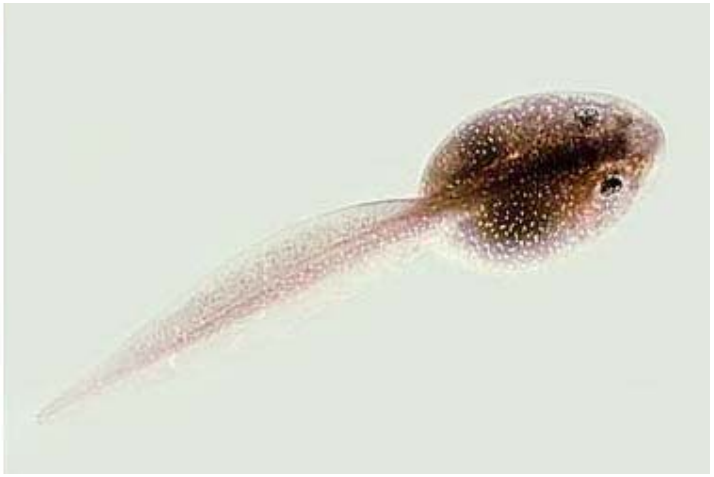


Fig. 47.24

Pattern formation: the chick limb bud





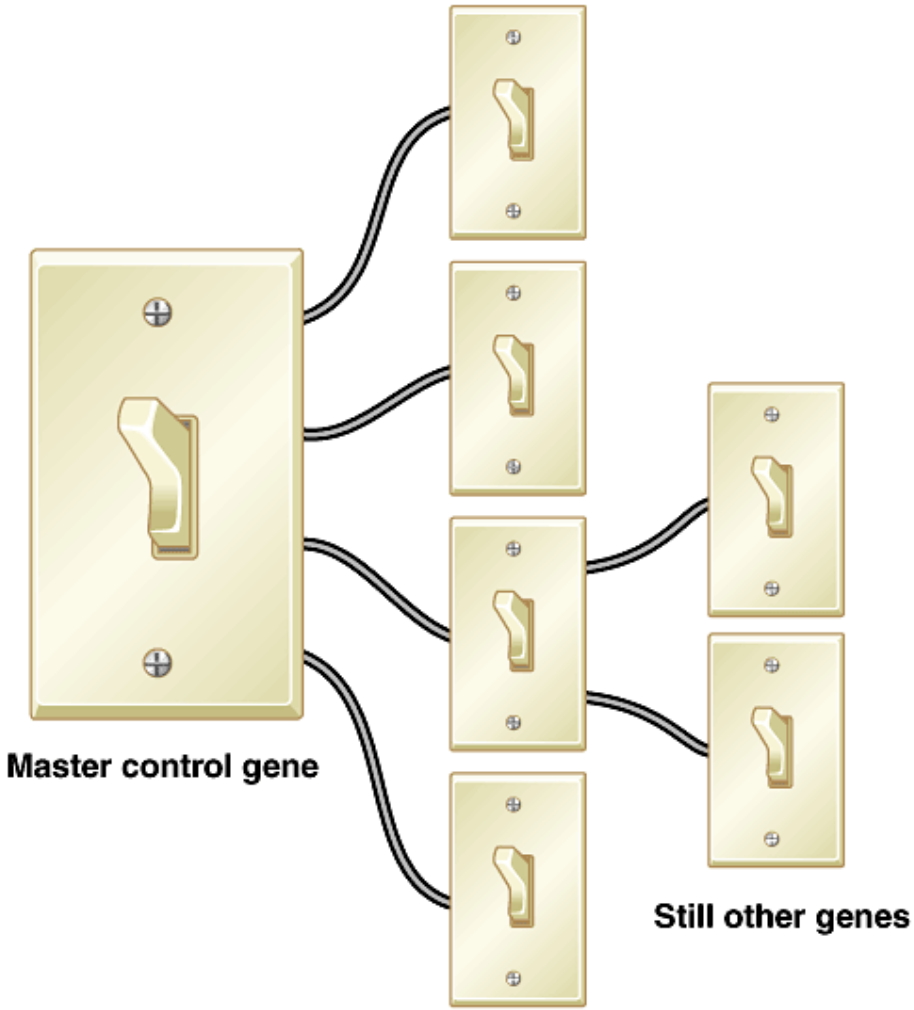
Tadpole

Aquatic
Gills
Herbivorous
Swimming

metamorphosis

Frog

Terrestrial
Lungs
Carnivorous
Jumping

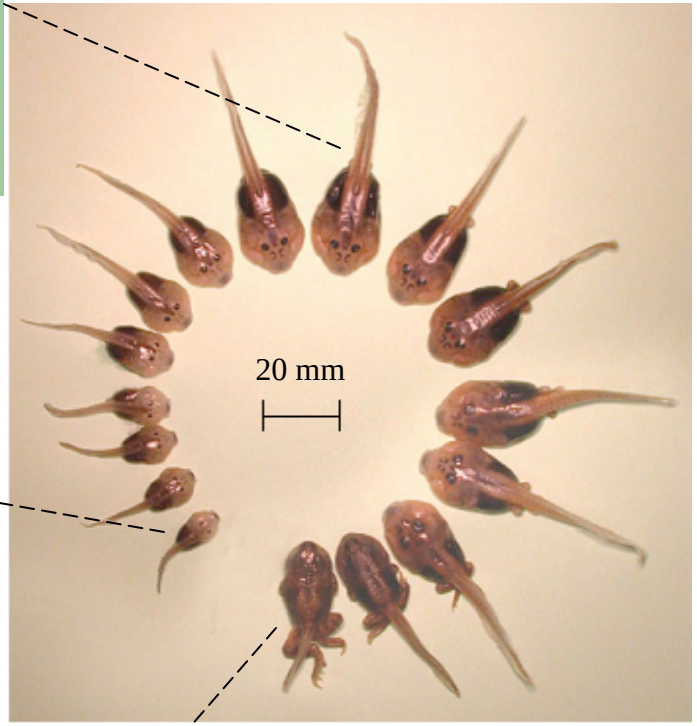


Omnivore

Carnivore

Stage 36

Stage 27



Stage 42

Comparison of beaks of spadefoot tadpoles

Omnivore

Carnivore

Comparison of digestive systems of spadefoot tadpoles

Carnivore Omnivore