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**

OUTLINE 5

V. Animal development: pattern

- **A. Gametes**
  - **1. spermatazoan**
  - **2. ovum**
- **B. Fertilization overview**
- **C. Details of fertilization**
- **D. Cleavage**
  - **1. major features**
  - **2. patterns**
    - **a. radial**
    - **b. spiral**
  - **3. later stages of cleavage**
    - **a. morula**
    - **b. blastula (blastomere, blastocoel)**

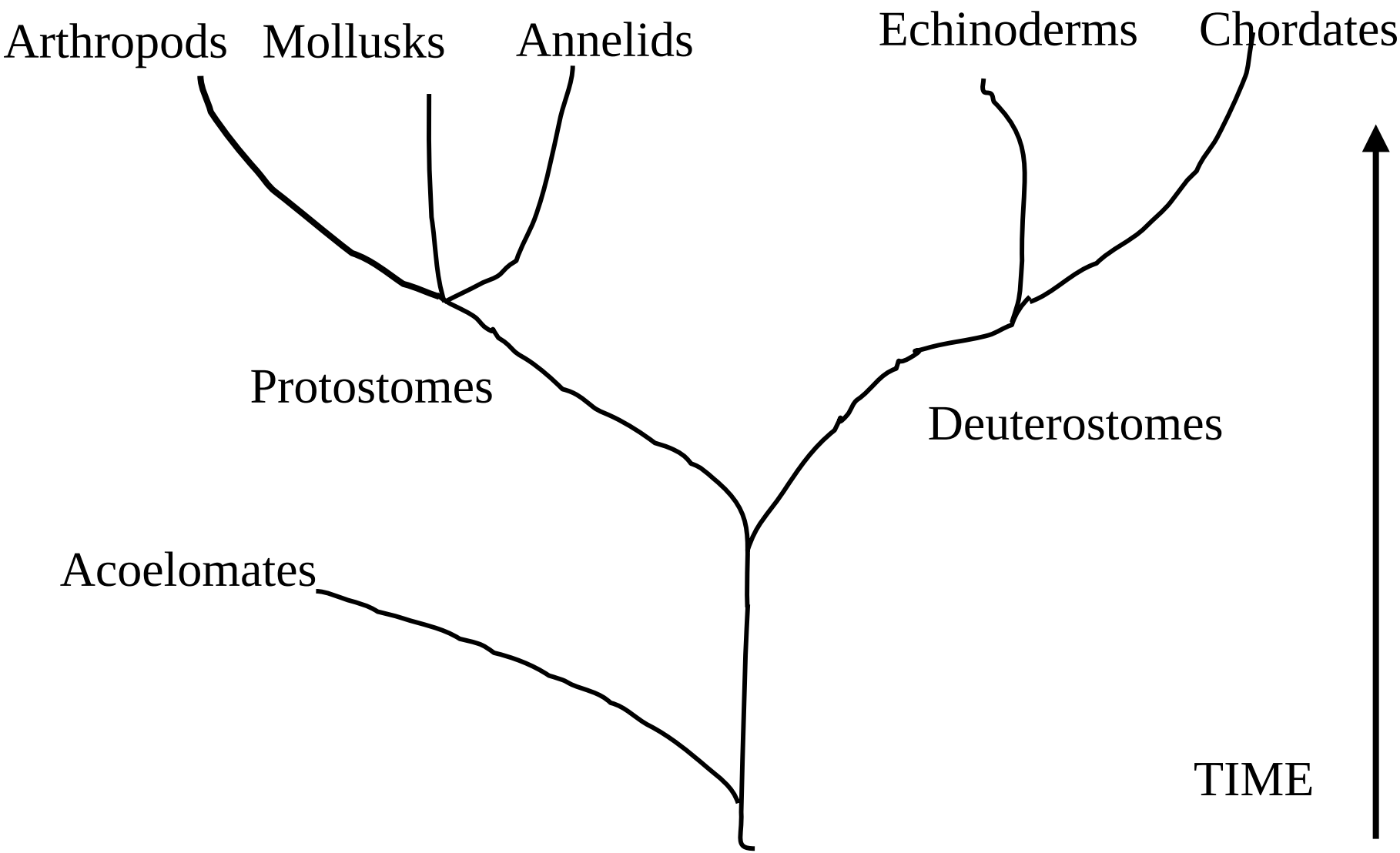
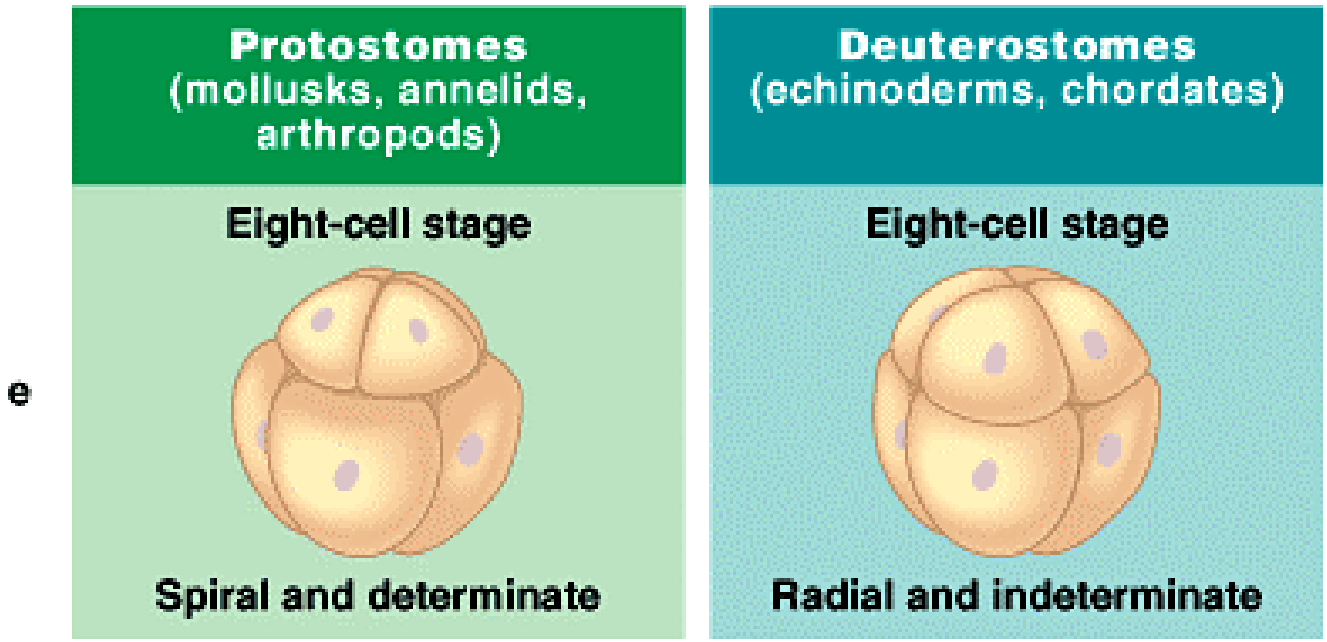

Arthropods
Mollusks
Annelids
Echinoderms
Chordates
Protostomes
Deuterostomes
Acoelomates
TIME

Fig. 32.7a



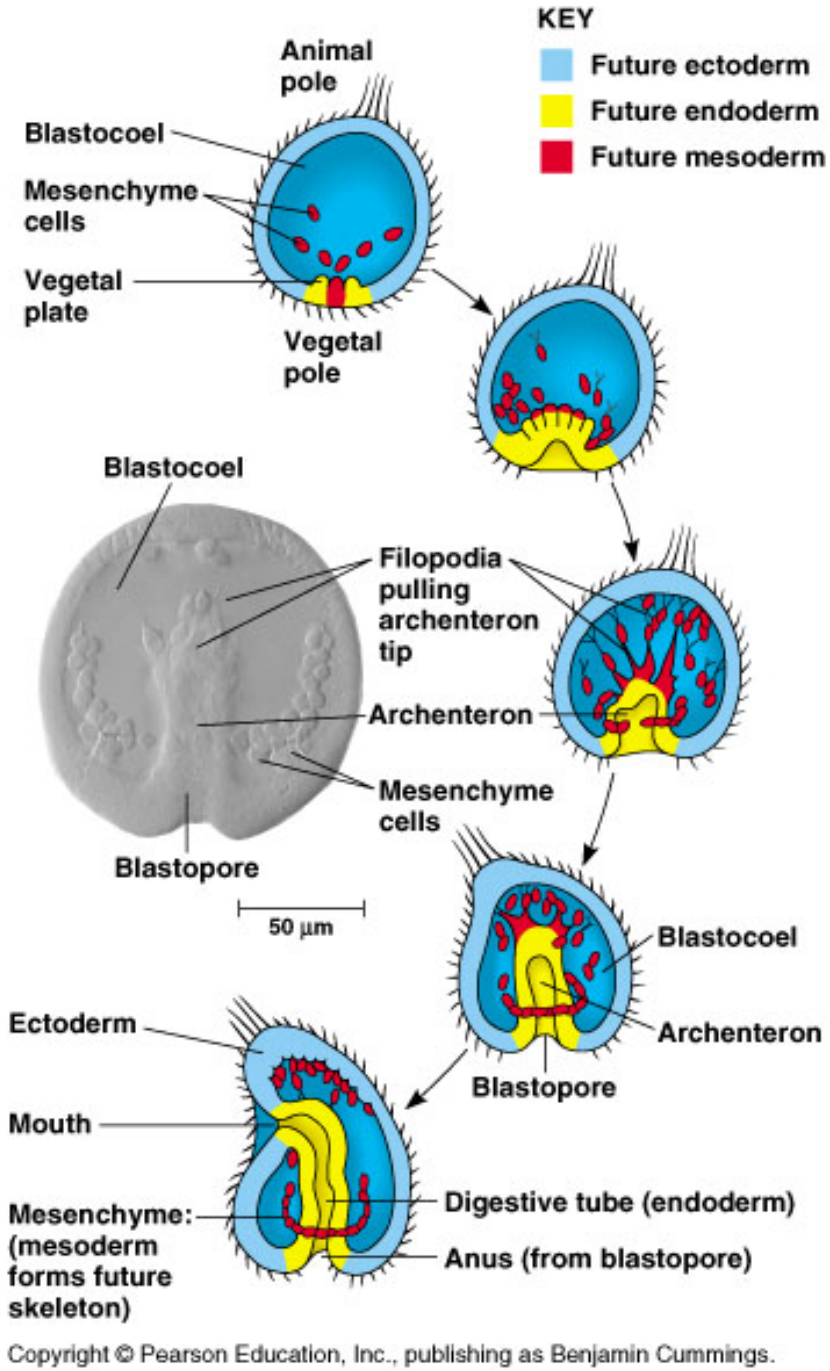
Cells NOT totipotent Cells totipotent

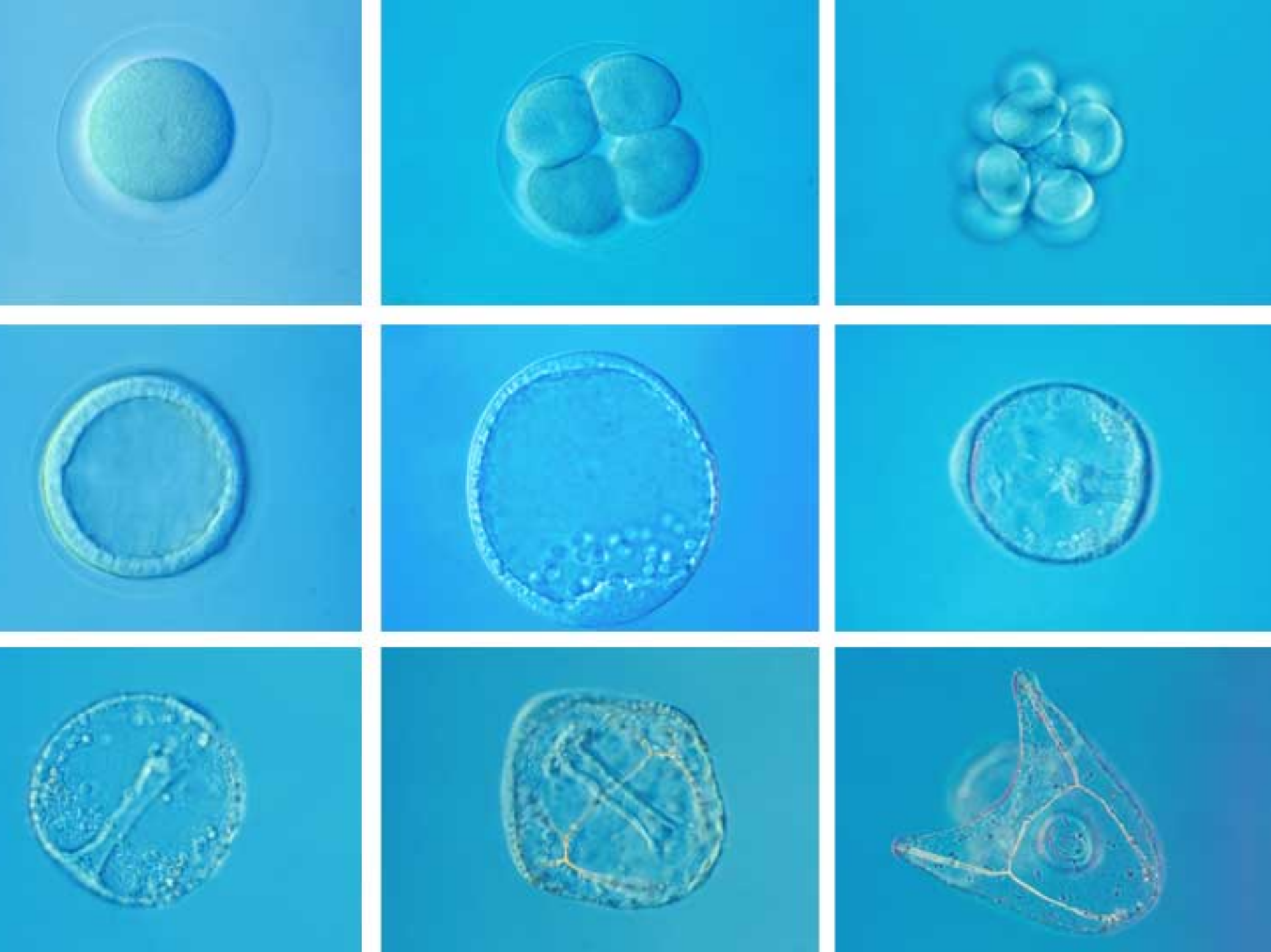
Fig. 47.6

Early cleavage stages

Fig. 47.9

Gastrulation in the Sea urchin



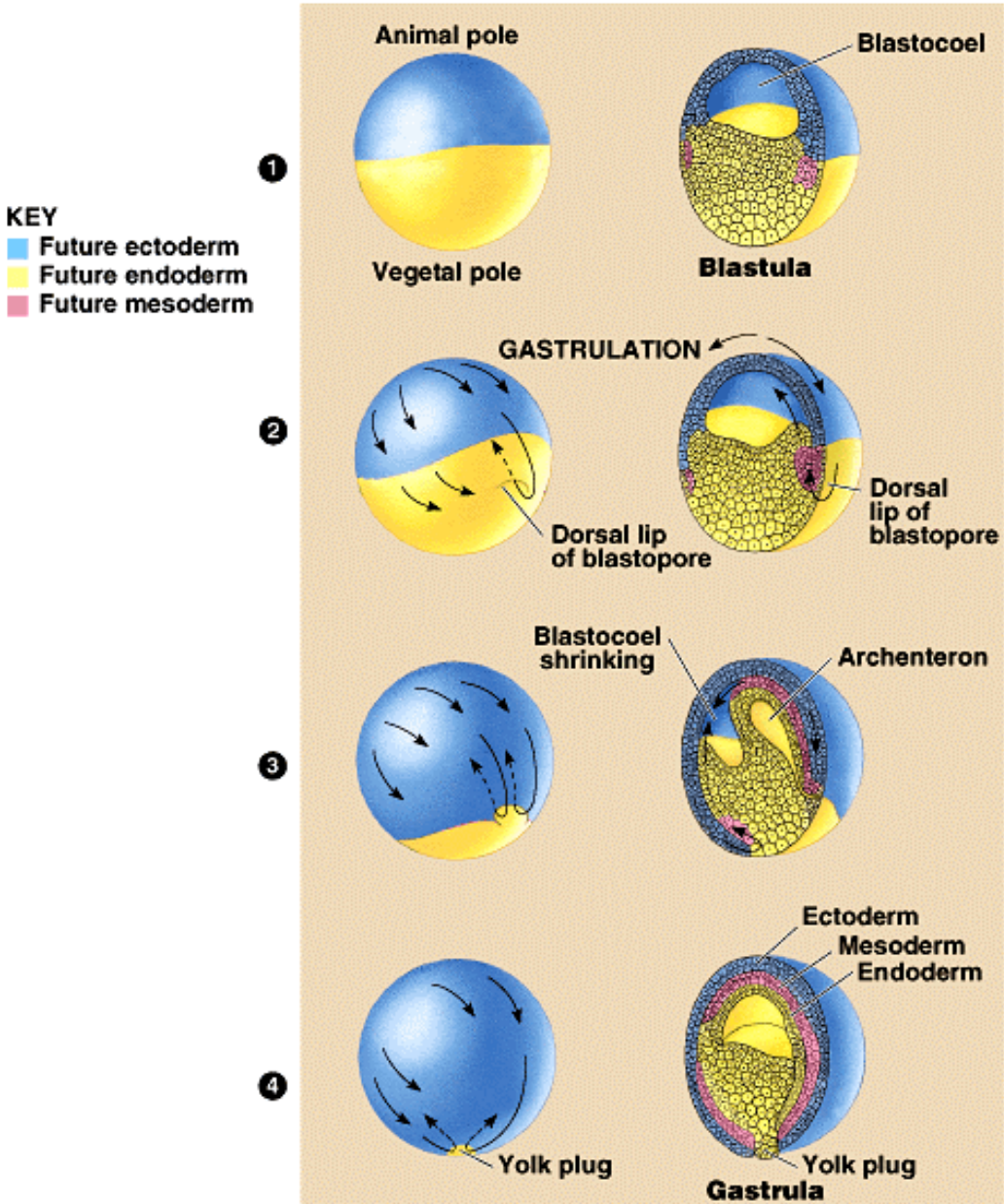


Sea urchin fertilization and early development

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

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**

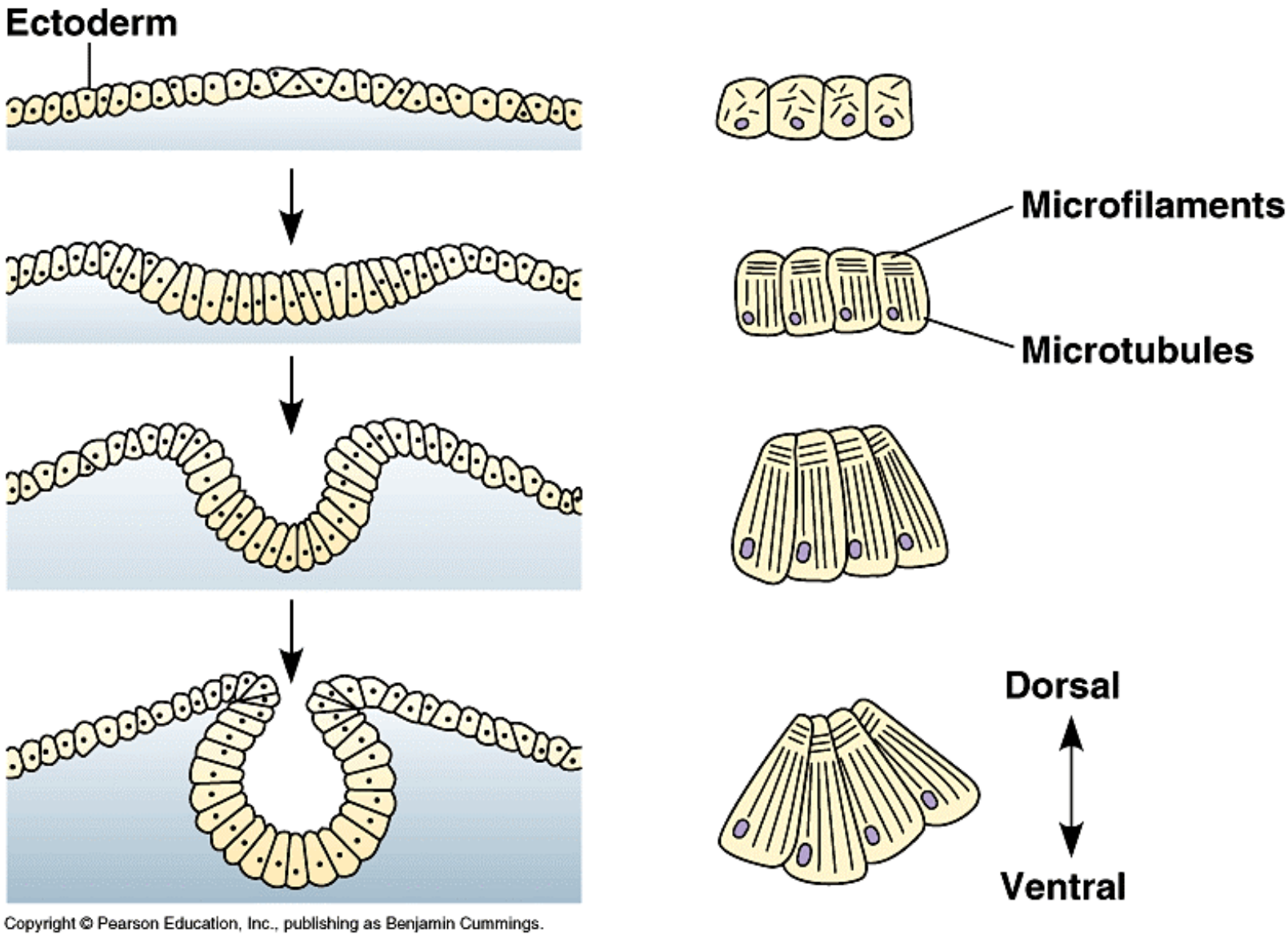
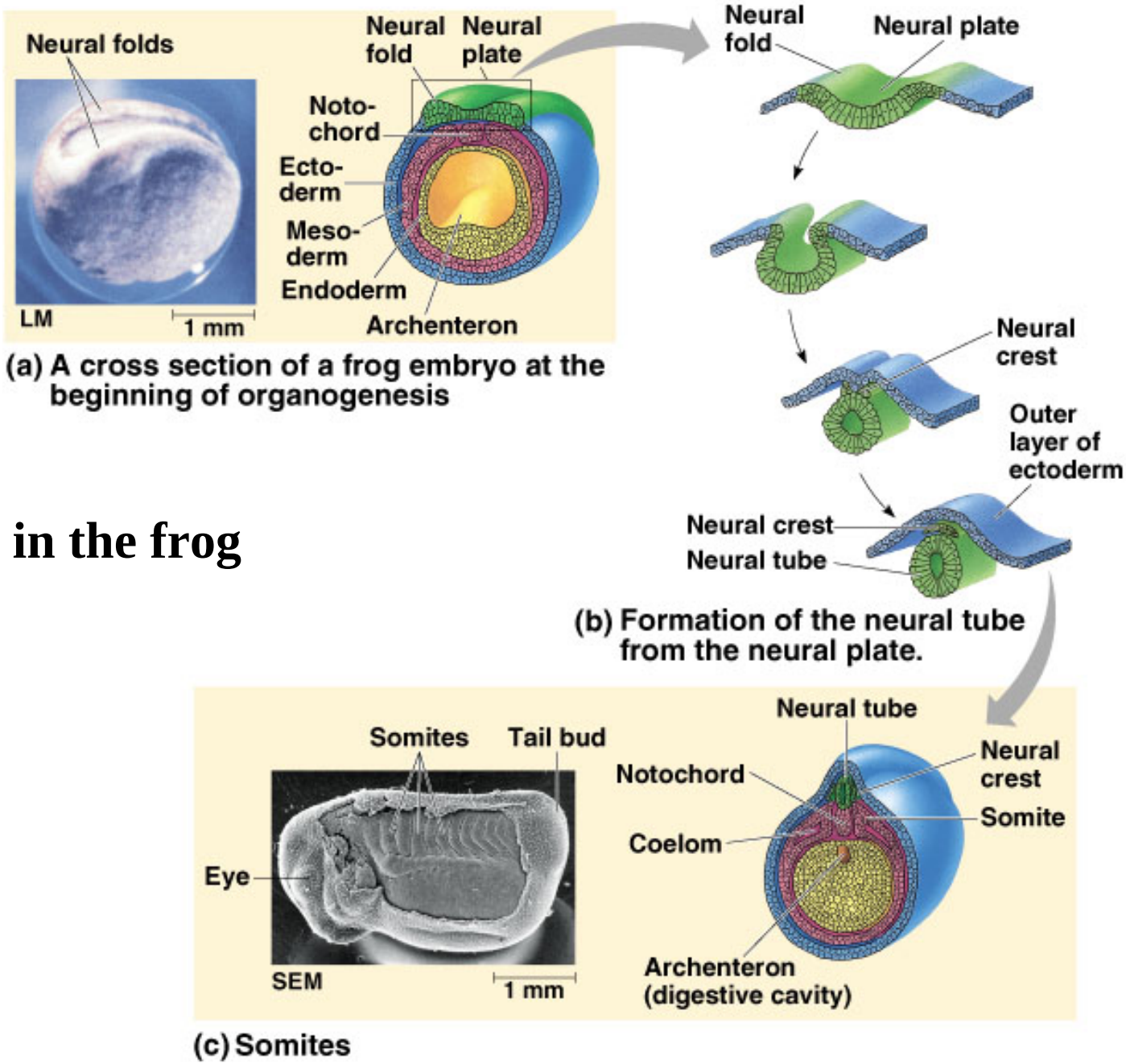


Fig. 47.11



Neurulation in the frog

Gastrulation and neurulation in the frog

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