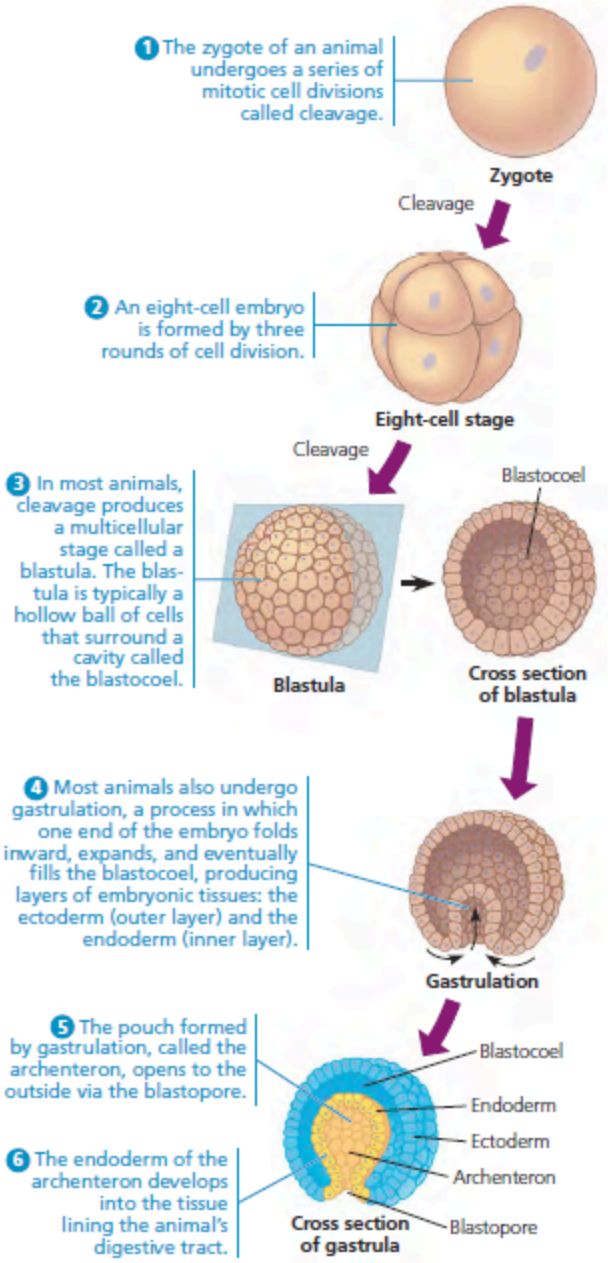
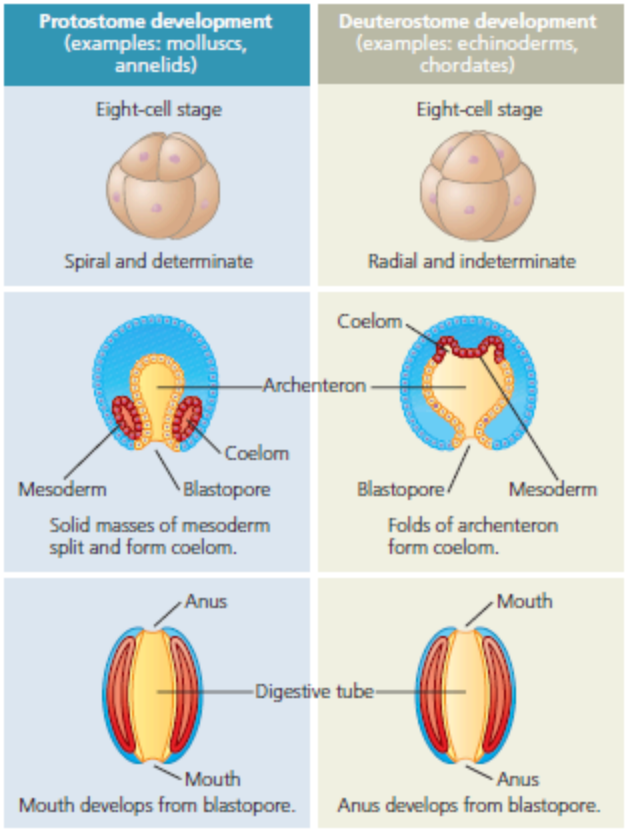
Cheat Sheet



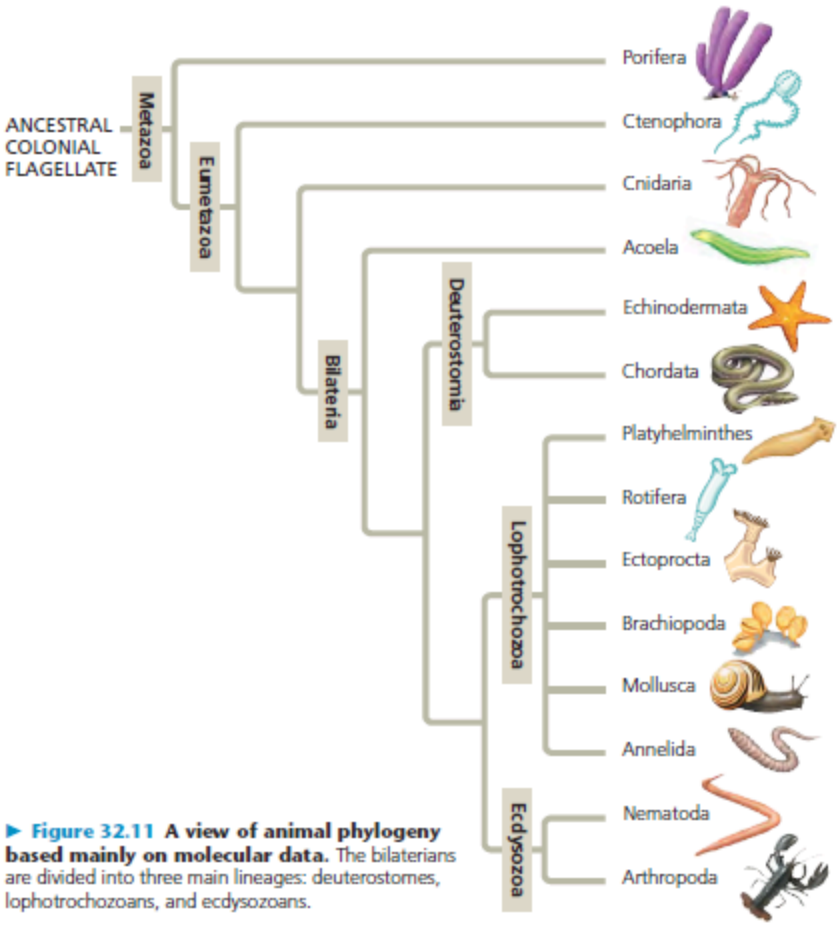
▲ **Figure 32.2 Early embryonic development in animals.**



(a) Cleavage. In general, protostome development begins with spiral, determinate cleavage. Deuterostome development is characterized by radial, indeterminate cleavage.

(b) Coelom formation. Coelom formation begins in the gastrula stage. In protostome development, the coelom forms from splits in the mesoderm. In deuterostome development, the coelom forms from mesodermal outpocketings of the archenteron.

(c) Fate of the blastopore. In protostome development, the mouth forms from the blastopore. In deuterostome development, the mouth forms from a secondary opening.



► **Figure 32.11 A view of animal phylogeny based mainly on molecular data.** The bilaterians are divided into three main lineages: deuterostomes, lophotrochozoans, and ecdysozoans.

Chapter 32 Questions

1. **How is the nutritional mode of animals different from plants and fungi?**
2. **What do animals have to make up for the lack of a cell wall?**
3. **What are tissues?**
4. **What is cleavage?**
5. **What is a blastula?**
6. **What is gastrulation?**
7. **What is a larva?**
8. **What is metamorphosis?**
9. **Describe the 6 steps of embryonic development in animals.**
10. **What are homeoboxes?**
11. **Which animals lack *Hox* genes?**
12. **When did animals originate?**
13. **What are the closest living relatives of animals (evidence)?**
14. **What is *Monosiga brevicollis*?**
15. **What are cadherins?**
16. **What are the Ediacaran biota?**
17. **What is the Cambrian explosion?**
18. **What are bilaterians?**
19. **What are three hypotheses as to why Ediacaran diversity declined?**
20. **Which animals were the first to adapt to terrestrial habitats (evidence)?**
21. **What occured in the Mesozoic and Cenozoic Eras?**
22. **What is a body plan?**
23. **What is radial symmetry?**
24. **What is bilateral symmetry**
25. **How do body plans vary with respect to tissue organization?**
26. **What is ectoderm?**
27. **What is endoderm?**
28. **What does diploblastic mean?**
29. **What is the mesoderm?**
30. **What is a body-cavity (coelom)?**
31. **What are coelomates?**
32. **What is a pseudocoelom?**
33. **What is a pseudocoelomate?**
34. **What are acoelomates?**
35. **What are the two developmental modes in animals?**
36. **What is the archenteron?**
37. **What is the blastopore?**
38. **Draw the phylogenetic trees of animals.**
39. **What are eumetazoans?**
40. **What are invertebrates and vertebrates?**

41. What is Deuterostomia?
42. What is Ecdysozoa?
43. What is Lophotrochozoa?

Chapter 32 Answers

1. Cannot synthesize all organic molecules, ingest organic material and use enzymes to digest it within their bodies
2. Proteins external to cell membrane that connect cells to one another, most abundant is collagen (not found in plants or fungi)
3. groups of similar cells that act as a functional unit
4. Succession of mitotic cell divisions without cell growth between the divisions
5. Multicellular embryonic stage formed by cleavage, usually a hollow ball
6. Process where layers of embryonic tissues that will develop into adult body parts are produced (results in gastrula)
7. Sexually immature form of animal that is morphologically distinct from the adult, usually eats different food (present in most animals)
8. Developmental transformation that turns the animal into a juvenile that resembles an adult but is not sexually mature
9. see picture
10. sets of DNA sequences in developmental genes that regulate expression of other genes
11. sponges, but have other homeobox genes
12. 770 mya
13. Choanoflagellates (indistinguishable morphologically to collar cells of sponges (choanocytes), similar collar cells found nowhere else except animals/choanoflagellates)
14. Unicellular choanoflagellate whose genome is used to compare with animals
15. proteins that play key roles in how animal cells attach to one another. those of animals have domains found in a similar protein in choanoflagellates plus a highly conserved region not found in choanoflagellates (CCD domain)
16. 560 mya, early group of soft-bodied multicellular eukaryotes, name comes from Ediacara Hills of Australia where organisms were first discovered, many classified as molluscs (or close relatives) or sponges/cnidarians (sea anemones/relatives), has evidence of predation
17. Wave of animal diversification 535-525 mya during Cambrian period of Paleozoic era. Only few animal phyla observed in strata before explosion, after explosion scientists found oldest fossils of half of all extant animal phyla (e.g. arthropods, chordates, echinoderms)
18. Enormous clade that have a bilaterally symmetric form and complete digestive tract (mouth and anus), includes most animal phyla (except sponges and cnidarians)
19. Predators acquired novel adaptation (natural selection selected against Ediacarans) Increase in atmospheric oxygen selected animals with larger bodies/metabolic rates Genetic changes affecting development facilitated evolution of new body forms
20. Arthropods, fossilized fern galls (enlarged cavities formed in response to resident insects, date back 302 mya
21. Animals spread to new habitats (coral reefs formed first time, reptiles returned to water, wings originated, dinosaurs emerged, first mammals emerged)

Rise of large mammalian herbivores/predators, global climate cooled gradually

22. Particular set of morphological and developmental traits integrated into an organism
23. Type of symmetry found in a flowerpot (top-bottom but no front-back/left-right sides), mostly sessile (living attached to substrate) or planktonic (drifting/weakly swimming)
24. front to back (anterior-posterior) and top to bottom (dorsal-ventral), sensory equipment concentrated at anterior end including central nervous system, move actively
25. Sponges/other groups lack tissues
    All other animals, embryo becomes layered during gastrulation (layers called germ layers that form various tissues/organs)
26. Germ layer covering surface of embryo, gives rise to outer covering of animal and sometimes central nervous system
27. Innermost germ layer, lines pouch that forms during gastrulation (archenteron), gives rise to lining of digestive tract/cavity and lining of organs
28. Having two germ layers
29. Third germ layer in all bilaterally symmetric animals, fills space between ecto/endoderm (bilaterally symmetric animals said to be triploblastic (three germ layers)), forms muscles and most other organs between digestive tract/outer covering of animal
30. Fluid- or air-filled space located between digestive tract and outer body wall, true coelom forms from tissue from mesoderm, inner/outer layers of tissue that surround cavity connect/form structures that suspend internal organs, cushions suspended organs, can act as skeleton (filled with non compressible fluid), enables internal organs to grow/move independently of outer body wall
31. Animals with a true coelom
32. body cavity formed from mesoderm and endoderm
33. Animals that have a pseudocoelom
34. Triploblastic animals that lack a body cavity
35. Protostome development (molluscs, annelids) - Undergo spiral cleavage (planes of cell division are diagonal to vertical axis of embryo) and determinate cleavage (determines the developmental fate of each cell very early). Solid masses of mesoderm split/form coelom. Mouth develops from blastopore (comes before anus opening)

    Deuterostome (echinoderms, chordates) - undergo radial cleavage (cleavage planes parallel or perpendicular to vertical axis of embryo) and indeterminate cleavage (each cell produced by cleavage retains capacity to develop into complete embryo). Mesoderm buds from wall of archenteron, cavity becomes coelom. Mouth derived from second opening (blastopore forms anus)

    See picture
36. blind pouch that becomes the gut
37. Indentation that during gastrulation leads to formation of archenteron
38. see picture

39. true animals, have tissues (basal eumetazoans (cnetophora/cnidaria) have radial symmetry and are diploblastic)
40. Animals that lack backbone, animals that have backbone (only Chordata)
41. Bilaterian clade of acorn worms (hemichordates), starfish (echinoderms), and chordates (some animals with deuterostome development are not in this clade)
42. Includes nematodes, arthropods, animals that secrete exoskeletons, shed old exoskeletons (process called ecdysis)
43. Some (such as ectoprocts) develop lophophore (crown of ciliated tentacles that function in feeding), individuals of other phyla (such as molluscs/annelids) go through developmental stage called trochophore