Biology Chapter 26 Notes – Sponges and Cnidarians

All animals are
  Heterotrophs, Eukaryotic, Multicellular, Do not have cell walls

All Animals do the following things to survive:
  Feeding by ingesting other organisms
  Respiration – take in oxygen and release carbon dioxide in the process of making energy
  Circulation – tiny animals can get by with diffusion but all other animals have circulatory systems
  Excretion – a system that eliminates metabolic waste
  Response – animals respond to their environment using neurons (nervous system cells)
  Movement – all animals have methods for moving body parts
  Reproduction – reproduce sexually by producing haploid gametes and many can reproduce asexually as well

Types of tissues in animals
  Epithelial – line surfaces
  Muscular – contract to move parts of the body
  Nervous – carry impulses to all parts of the body and brain
  Connective tissue – supports an animal’s body and supports its parts

Groups of specialized cells = tissues
Groups of specialized tissues = organs
Groups of specialized organs = organ systems
Groups of specialized organ systems = organs

Complex animals have:
  High levels of cell specialization
  High levels of internal body organization
  Bilateral body symmetry
  A front end or head with sense organs
  A body cavity

Animals that Reproduce Sexually – Stages of Early Development
  1. Zygote = fertilized egg
  2. Blastula = hollow sphere with a single opening called a blastopore
  3. Blastocyst = when the blastula implants into the wall of the uterus
  4. Embryo = when the blastocyst is surrounded by embryonic sac
  5. Fetus = when all organs have started to form
Protosome
In a blastula, the mouth is formed from a blastopore
Invertebrates

Deuterosome
In a blastula, the anus is formed from a blastopore
Echinoderms and all vertebrates are Deuterostomes

Three layers of tissue in an embryo and the tissue they turn into
Endoderm – innermost germ layer – turns into lining of the digestive tract, respiratory system
Mesoderm – middle layer – turns into muscles, circulatory, reproductive, and excretory system
Ectoderm – outer layer – turns into sense organs, nervous system, outer layer of skin

Symmetry

Asymmetry – there is no way of dividing an organism so that the segments match
Radial symmetry – body parts that repeat around the center of the body
Bilateral symmetry – an imaginary plane can divide the body into right and left sides

Types

Cephalization – concentration of organs and nerve cells at the front end of the body.
  Allows animals to respond more quickly to their environment
  More cephalization often becomes more complex

Body cavity formation – the body cavity is a fluid filled space that lies between the digestive tract and the body wall. It provides a space for internal organs where they have room to change shape in response to movement.

Sponges – Phylum Porifera

Simplest and most unusual animals –
  Eukaryotic, multicellular, heterotrophic, with specialized cells

Attached to Single spot their entire life
NO mouth, organs, gut – just specialized cells
Assymmetrical
Body around a large central cavity through which water is circulated
No nervous system but respond through the movement of choanocytes as well as the production and release of toxins to repel predators

Choanocytes – specialized cells that use flagella to move water through the sponge
  This movement of water allows for feeding, respiration, circulation, excretion
Archaeocytes – cells that divide and specialize to create all the other cells in the sponge. These cells also form spicules.

creating the skeletal system of the sponge and move around inside the sponge

Spongin – flexible, silk-like protein fibers that makes up the skeleton of some sponges, making these sponges softer and more pliable. These are the sponges that people use for beauty products, painting, and other industrial applications.

Spicule – spike-shaped structures made of calcium carbonate or silica making up the skeleton of some sponges, these make the sponge harder than spongin

Feeding

   Choanocytes move water through the sponge
   Sponge cells filter out organic particles and microorganisms
   The food is engulfed by choanocytes that line the body cavity
   Inside the choanocyte cells, the food is digested

Reproduction

   Sexual Reproduction
       Bisexual – single sponges can produce both eggs and sperm
       In the case of sponges, eggs and sperm are produced at different times
       Internal fertilization – eggs and sperm are fertilized inside the sponge
       Sperm is released from a sponge and carried through water until they
       Enter the pores of another sponge
       Archaeocytes carry the sperm to the egg (in the wall of the sponge)
       Zygote turns into larva

   Asexual Reproduction
       Budding – new organism grows from an outgrowth or bud
       Gemmules – groups of archaeocytes surrounded by a tough layer of spicules
       Can survive freezing temperatures and drought

Larva – immature stage of an organism that looks different than the adult form

Importance of Sponges

   Create habitat for marine animals in a commensalism relationship
   Mutualistic relationships with photosynthetic organisms
       Spicules act as magnifying glasses, directing the light to the photosynthetic organisms living inside the sponge.
Cnidarians – Phylum Cnidaria

Jellyfish, hydra, sea anemones, corals

Animals - Eukaryotic, multicellular, heterotrophic, with specialized cells

Soft bodied
Carnivores
Stinging tentacles in circles around their mouth
Radial symmetry
Simple bodies only one cell thick

Cnidocytes – stinging cells located along their tentacles used for defense and hunting
These cells contain a nematocyst

Nematocyst – a poison-filled stinging structure that contains a tightly coiled dart
Poison can paralyze or kill other organisms

Gastrovascular cavity – cavity in which digestion takes place

Tissue layers:
Epidermis – outer layer
Mesoglea – middle layer
Gastroderm – middle layer

Feeding
Organism I paralyzed by the poison in the nematocyst
Food enters through the mouth and moves into the gastrovascular cavity
Digestion is extracellular (in the cavity but not inside the cells)
Partially digested food is absorbed by the gastroderm
Digestion is completed intracellularly within the gastroderm cells
Anything not digested leaves through the mouth

Nutrients, gases, wastes are transported by diffusion through the body wall.

Nerve net – a loosely organized network of nerve cells that allow Cnidarians to detect movement.
Statocysts – sensory cells that help Cnidarians determine the direction of gravity
Ocelli – eyespots made of cells that detect light

Movement –
hydrostatic skeleton – circular muscles and longitudinal muscles that help the Cnidarian move
water moving into and out of the gastrovascular cavity propels the Cnidarian
Life Cycle with Two Stages – Polyp and Medusa
Polyp – cylindrical structure, mouth opens upward, arm-like tentacles
Sessile (does not move)
Medusa – bell-shaped body, mouth opens downward, arm-like tentacles

Reproduction
Asexual – polyps (2N) reproduce asexually by budding and the new organism is the form of a male or female medusa (2N)
Sexual – medusas reproduce sexually through external fertilization
Female medusa releases eggs (N) into the water
Male medusa releases sperm (N) into the water
Egg and sperm fuse during fertilization creating a zygote which becomes a larva
Larva attach to a surface and become a polyp (2N)

Jellyfish – Class Scyphozoa
“cup animals”
Most of their life cycle is spent as medusas, polyps are very small larval stages
Do not form colonies

Hydras and close relatives - Class Hydrozoa
Polyps grow in branching colonies that can be as long as a yard
Polyps within the colony are specialized to perform different functions
Hydras
Most common freshwater Hydrozoan
Exception to the others due to NO medusa stage and do NOT create colonies
Reproduce asexually by budding
Reproduce sexually by producing eggs and sperm in the body wall

Sea Anemone and Corals – Class Anthozoa
Animals with only POLYPs in life cycle
Central body surrounded by tentacles in radial symmetry
Reproduction
Eggs and sperm are released into the water → fertilize → zygote → larva
Larva is ciliated and can swim
Asexual reproduction by budding or splitting in two halves
Sea anemone – solitary polyp
Coral – colonial polyp whose individuals grow together and fuse
Hard corals – larva settles together on hard surface and develops single polyp
New polyps are produced by budding
The new polyps secrete calcium carbonate → limestone → coral reefs
Require warm water & high levels of light for photosynthetic algae (mutualistic)
Coral bleaching – high temperature water kills the algae → coral death →
All that is left is the white coral skeletons