

NAME \_\_\_\_\_ HR \_\_\_\_\_ DATE \_\_\_\_\_

1. Where do the fastest predators in the ocean live?
2. How long can Striped Marlin get?
3. What is the 2<sup>ND</sup> hunter that joins the feeding frenzy?
4. How much does the Saye Whale weigh?
5. How long across is the Manta Ray?
6. What animal feeds on the spawning clouds of eggs & sperm from the Surgeon Fish?
7. How long does it take Yellow Fin Tuna to reach adulthood?
8. How long are newly hatched Yellow Fin Tuna?
9. How far does the pod of Pacific Spotted Dolphin travel in a day?
10. What do they do as the travel?
11. What happens to the Sailfish's body when it becomes excited?
12. What keeps the Blue Fin Tuna at a body temperature significantly warmer than the surrounding water?
13. What bright red animal spends most of its life afloat?
14. What is the animal that defends its man-made home of flotsam?
15. What protects the Rock Fish as they grow up?
16. What is the fish that is the heaviest bony fish in the sea?
17. What do the Half-Moon Fish do for the sunfish?
18. What effect is caused by the meeting of cold & warm water?
19. Why do Hammerhead Sharks visit the sea mount?
20. Why do the White-Tip Reef Sharks hunt at night?
21. What do the small fish detect in the water from approaching predators?

22. What adult animals follow the Spinner Dolphin to help find prey?
23. What are the Pilot Whales doing "in the sun"?
24. How deep can the Shearwater Birds dive?
25. How long are adult Yellow Fin Tuna?
26. What is the largest habitat on earth?
27. "More people have traveled to \_\_\_\_\_ than to the deep."
28. How long does a Sperm Whale hold its breath?
29. How far down does the Sperm Whale hunt?
30. What is unique about the animals' bodies in the Twilight Zone?
31. How long is the "death trap" set out by the Colonial Jelly?
32. What are the color-changing cells that protect the Hatchet Fish from attack from all sides?
33. What is the part of the ocean over 1000 meters down known as?
34. Which fish has the largest teeth compared to body size in all of the ocean?
35. What color are many animals in the Dark Zone?
36. What is the "monster" that is a half-meter across & is being seen for the 1<sup>ST</sup> time in the movie?
37. What is the animal that can swallow prey almost as big as itself?!!
38. What generates the light within the Deep Sea Angler?
39. What sex anglers have the flashing lures?
40. What type of light gives fish a "sniper scope" on their prey?
41. Why do the squid journey into the shallow water at night?
42. What daily activity triggers the largest migration of animals on Earth?

43. "Below \_\_\_\_\_ photosynthesis is impossible."
44. How much greater is the water pressure at the depth of the continental slope than at the surface?
45. What type of coral has the largest polyps?
46. Chimera are related ("cousins") to what surface predator?
47. How long are the 6-Gilled Sharks?
48. What "ancient creatures" are usually the 1<sup>ST</sup> to arrive at a carcass?
49. How long did it take to strip the whale's carcass?
50. What is the name of the submersible that can reach 4,500 meters (3 miles) below surface?
51. What is the land form that covers over half the earth's surface?
52. What is the family of fish that reach the abyssal plane?
53. "We know more about the \_\_\_\_\_ than we do about the Abyssal Plane."
54. What are the largest geological structures that are in the Abyssal Plane?
55. What were the 1<sup>ST</sup> animals found living in/on the encrusted chimneys?
56. What provides Tube Worms with energy?
57. What extraordinary discovery was made in 1990?
58. What chemical provides the nutrients for the oasis-animals?
59. How old are the Tube Worms in the vast fields?
60. How much of the deep ocean floor has been explored?

## “KINGDOM ANIMALIA” What is an animal?

### I. Characteristics

- A. \_\_\_\_\_ with membrane-bound organelles ( \_\_\_\_\_ )
- B. feed on other organisms ( \_\_\_\_\_ )
- C. Have \_\_\_\_\_ in some stage of life (MOBILE)
1. Some animals move to find food ex. lizards, birds, people
  2. Some stay in place and bring food to them ex. barnacles, sponges
  3. the more \_\_\_\_\_, the more complicated its movement
- D. Break down food for use as energy ( \_\_\_\_\_ )
1. Some have an internal cavity \_\_\_\_\_
  2. In less complex animals, digestion takes place \_\_\_\_\_
  3. Less complex- \_\_\_\_\_ opening in the digestive tract ex. food enters and wastes leave through the same opening.
  4. more complex – \_\_\_\_\_ openings = one direction of movement  
ex. earthworm food enters and exits through different openings.
- E. no \_\_\_\_\_ ; cell adaptations for different jobs

DAY 1

### II. Development of Animals

- A. Division of the egg
1. single-celled \_\_\_\_\_ divides into a hollow ball of cells around fluid-filled space = \_\_\_\_\_ – 10 hours
  2. GASTRULA –
    - a. Two layers formed by \_\_\_\_\_
    - b. \_\_\_\_\_ – \_\_\_\_\_ - forms skin and nervous tissue
    - c. \_\_\_\_\_ – \_\_\_\_\_ – forms lining of digestive tract
    - d. All animal embryos except sponges form a gastrula
  3. PROTOSTOMES AND DEUTEROSTOMES
    - a. Protostomes –
      - 1) Opening of gastrula becomes \_\_\_\_\_
      - 2) includes earthworms and insects
    - b. Deuterostomes –  
Opening of gastrula becomes \_\_\_\_\_
      - 2) includes fish, birds, and HUMANS!

### III. BODY PLANS AND ADAPTATIONS

- A. Symmetry-
1. balance in body proportions  
enables the animal to \_\_\_\_\_
- B. Types of Symmetry
1. \_\_\_\_\_ (w/out symmetry) – sponges
  2. \_\_\_\_\_ (can be divided along any plane through a central axis) – starfish
  3. \_\_\_\_\_ (can be divided into right and left halves that form mirror images) – flatworms, insects, birds, mammals
    - a. \_\_\_\_\_ (head) and \_\_\_\_\_ (tail)
    - b. \_\_\_\_\_ (back) and \_\_\_\_\_ (belly)
    - c. allows more efficient movement because of muscular control

#### IV. BILATERAL SYMMETRY AND BODY PLANS

A. bilateral body plan allows development of body cavities for internal organs.

These are called the \_\_\_\_\_

B. This allowed animals to -

1.

2.

C. w/out a body cavity – animals rely on diffusion to take in food and eliminate waste

D. if animals have a \_\_\_\_\_ (middle layer of cells) internal organs, can be -

1. Acoelomate – \_\_\_\_\_ – ex. flatworms – flat, solid, compact bodies-

2. Pseudocoelomate – \_\_\_\_\_ – provides a rigid space for muscle attachment – ex. roundworms

3. Coelomate – body \_\_\_\_\_ – ex. humans, fishes – internal organs suspended in fluid-filled cavity – allows for larger size.

#### V. ANIMAL PROTECTION AND SUPPORT

A. Exoskeleton – \_\_\_\_\_

1. prevents \_\_\_\_\_

2. provides \_\_\_\_\_

3. Invertebrate – animal w/out \_\_\_\_\_ – ex. crabs, spiders, beetles

B. Endoskeleton – \_\_\_\_\_

1. protects \_\_\_\_\_

2. provides \_\_\_\_\_

Vertebrates – animals with \_\_\_\_\_

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### INVERTEBRATE ANIMALS I

#### SPONGES, CNIDARIANS, FLATWORMS, ROUNDWORMS, MOLLUSKS, AND SEGMENTED WORMS

##### I. SPONGES (Phylum – \_\_\_\_\_ )

A. Ocean and freshwater habitats

B. Sessile

C. Feeding method → \_\_\_\_\_

D. No tissues, organs, or organ systems (asymmetry)

E. Reproduction – both sexual and asexual

1. \_\_\_\_\_ – an individual can produce both eggs and sperm

2. Produce free-swimming \_\_\_\_\_ that attach to surface

F. Importance of sponges

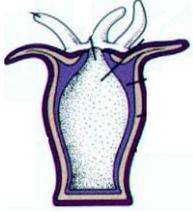
1. Used for cleaning and bathing

2. Give off toxic chemicals that may be used to treat cancer

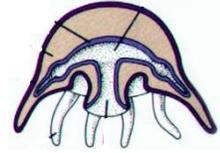
3. anti-fungal properties

4. sponge Superglue → used to repair human tissues

## II. CNIDARIANS

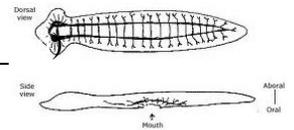


- A. Corals, jellyfishes, sea anemones
- B. Marine
- C. \_\_\_\_\_ symmetry
- D. One body opening, two cell layers
- E. Simple nervous systems
- F. Body Forms
  - 1. \_\_\_\_\_ – tube-shaped body with mouth surrounded by tentacles
  - 2. \_\_\_\_\_ – umbrella-shaped with tentacles hanging down
- G. Feeding adaptations – NEMATOCYSTS – \_\_\_\_\_
- H. Reproduce sexually (during \_\_\_\_\_ stage) & asexually (budding – \_\_\_\_\_ stage)
- I. Importance of Cnidarians –
  - 1. Marine ecosystem
  - 2. Many people get stung – some can kill (Australian box jelly)
  - 3. Coral- form reefs that serve as food sources and shelter many other animals



## III. FLATWORMS (PLATYHELMENTHES)

- A. Acoelomate
- B. Include parasitic and disease-causing tapeworms, flukes; lab animal- *Planaria*
- C. Possess \_\_\_\_\_ (mad, glad, eat, poop)
- D. Reproduce – sexual ( \_\_\_\_\_ ) and asexual ( \_\_\_\_\_ )
- E. Adaptations as parasites
  - 1. Get food from inside the bodies of hosts
  - 2. Mouthparts have hooks to hold on
  - 3. Less nervous, muscular tissue
  - 4. Tapeworm – can grow to 10 m (30 feet); live in intestines; have body sections ( \_\_\_\_\_ ) can break off and contain



## IV. ROUNDWORMS (NEMATODA)

- A. Live in soil, animals, and freshwater and saltwater
- B. Free-living or parasitic
- C. Pseudocoelom and tube like digestive system
- D. First group with 2 body openings – \_\_\_\_\_
- E. Some have sense organs ( \_\_\_\_\_ )
- F. Economic importance – common human and animal \_\_\_\_\_ – e.g. Heartworm, hookworm, pinworm

## V. MOLLUSKS

- A. Members of phylum mollusca
- B. General characteristics
  - 1. \_\_\_\_\_ Symmetry
  - 2. Coelom
  - 3. Two body openings
  - 4. A muscular foot for movement
  - 5. \_\_\_\_\_
    - a. Thin membrane; surrounds internal organs
    - b. Secretes the shell

C. Habitats

1. Marine
2. Freshwater
3. Land
4. Sessile or free-moving

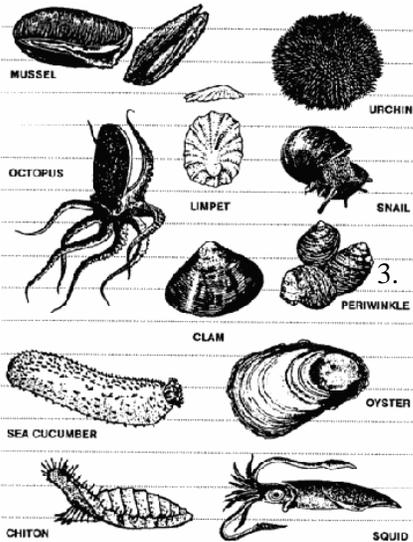
D. Classes of Mollusks

1. Gastropoda

- a. stomach-footed mollusks
- b. large foot positioned under body
- c. may or may not have a \_\_\_\_\_
- d. snails, slugs, sea slugs
- e. adaptations
  - \_\_\_\_\_ – used for feeding
  - nervous system – \_\_\_\_\_
  - well-developed \_\_\_\_\_ (open)
  - \_\_\_\_\_ – gills and primitive lung for land snails
  - first group to have excretory structures – \_\_\_\_\_
  - hermaphrodites or use external fertilization
- f. gastropods w/out shells ( )
  - protected by thick layer of \_\_\_\_\_
  - sea slugs – may be poisonous

2. Bivalves

- a. two-shelled mollusks
- b. source of pearls
- c. clams, oysters, and scallops
- d. marine or freshwater habitats
- e. use large muscular foot for \_\_\_\_\_
- f. \_\_\_\_\_



3. Cephalopods

- a. head-footed mollusks
- b. octopus, squid, chambered nautilus
- c. most complex and recently evolved mollusks
- d. habitat – \_\_\_\_\_
- e. foot has been modified to \_\_\_\_\_
- f. radula and beaklike jaw
- g. circulatory system – \_\_\_\_\_

## VI. SEGMENTED WORMS

### A. Characteristics of Phylum Annelida

1. 3 classes – 12,000 species
  - a. Oligochaeta - earthworms
  - b. Hirudinae - leeches
  - c. Polychaeta – bristleworms (marine)
2. Bilateral symmetry
3. Coelom
4. Two body openings → Anterior and posterior ends
5. Segmented body – looks like tiny rings (roundworms do not have these)
  - Internally – each segment is separated from the others by a partition
  - Provides an important advantage – each segment has own muscles, allowing for shortening and lengthening of body for movement
  - Allows for specialization – each segment has excretory organs and nerve; some segments have digestive and reproductive organs

DAY 3

### B. The Earthworm

1. Lives in soil, important as food source and for loosening, aerating, and fertilizing the soil.
2. Nocturnal – moves about at night
3. Receives oxygen by diffusion through skin
4. Parts of earthworm (see also diagram)
  - a. Mouth/anus
  - b. Crop – holds soil before it moves to gizzard
  - c. Gizzard – has muscular walls that grinds soil.
  - d. Intestine – runs length of body
  - e. Nervous system
    - nerve fibers in each segment
    - Simple brain above mouth
    - Ventral nerve cord
  - f. Circulatory System –
    - closed – blood in vessels
    - heart – 5 pairs of enlarged vessels at anterior end
  - g. Excretory System
    - nephridia – found in each segment
    - eliminate wastes
  - h. External structures – setae → fine bristles that anchor their bodies in soil and allow muscles to move them along
5. Reproduction
  - a. Hermaphrodites – but must mate with another worm
  - b. Clitellum – external bandlike structure that is important for reproduction
  - c. During mating – both worms exchange sperm
  - d. Each forms a capsule where fertilization occurs
  - e. Capsule slips off worm into soil, where eggs hatch.

## C. LEECHES

1. Segmented worms with flattened bodies and no bristles
2. Most live in freshwater
3. Parasites – live off blood/body fluids
5. Their saliva contains anesthetic and anticlotting agents
6. Medicinal uses – draw excess fluid off wounds

## INVERTEBRATE ANIMALS II

### ARTHROPODS, ECHINODERMS, AND INVERTEBRATE CHORDATES

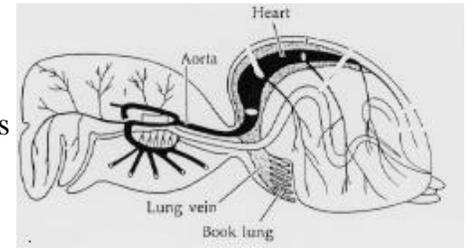
#### I. ARTHROPODS

##### GENERAL

- bilateral symmetry
  - coelom
  - exoskeleton = hard outer body covering
    - made of protein and chitin
    - protects and supports internal tissues
    - provides place for muscle attachment
    - in terrestrial (land) species = protects against water loss
    - molting = shedding of old exoskeleton
      - animal contracts posterior muscles, forces blood forward.
      - anterior swells, causes old exoskeleton to split
  - appendages = jointed structures that grow out of the body
    - sensory, walking, feeding, mating
    - allow for more powerful movements
  - segmentation into 1 – 3 segments
    - 1 segment = head i.e. tick
    - 2 segments = cephalothorax and abdomen i.e. shrimp
    - 3 segments = head, thorax, and abdomen i.e. beetle
  - respiratory structures
    - arthropods have efficient respiratory structures to ensure quick oxygen delivery to cells
  - circulation = open circulatory system
    - blood is pumped by one or more hearts
    - vessels carry blood away from hearts and then flows out freely from the vessels over the tissues of the rest of the body
  - reproduction = sexual
    - fertilization is usu. internal in terrestrial species, often external in aquatic species
    - some are hermaphrodites
    - some parthenogenesis (develop from unfertilized egg)
-

A. ARACHNIDS (Class \_\_\_\_\_)

- ex: spiders, scorpions, mites, ticks
- respiration = \_\_\_\_\_
- air-filled chambers that contain leaflike plates



**SPIDERS**

- only 2 segments = \_\_\_\_\_
- 6 pairs of jointed appendages
  - \_\_\_\_\_ = 1<sup>ST</sup> pair; located near mouth; modified into \_\_\_\_\_
  - \_\_\_\_\_ = 2<sup>ND</sup> pair; adapted for \_\_\_\_\_
  - \_\_\_\_\_ - male spiders = carry sperm during reproduction
  - remaining 4 pairs are for \_\_\_\_\_
- no antennae
- all spiders spin silk, not all spiders make webs
  - silk glands in abdomen secrete silk; spun into thread by \_\_\_\_\_



**TICKS AND MITES**

- only 1 segment
- mites are often too small to be seen with the naked eye
- ticks feed on \_\_\_\_\_ from reptiles, birds, and mammals

**SCORPIONS**

- many abdominal body segments
- related to horseshoe crabs of Class \_\_\_\_\_
- living fossils = haven't changed since Cambrian period

B. CRUSTACEANS (Class \_\_\_\_\_) see also: crayfish diagram

- mostly \_\_\_\_\_
- 2 or 3 body segments
- respiration = \_\_\_\_\_
  - large surface area, enables large amt. of blood-rich tissue to be exposed to water containing oxygen
  - \_\_\_\_\_ are exchanged when water passes over gills
- \_\_\_\_\_ (jaws) for crushing food
  - open and close from side to side
- 2 pairs of \_\_\_\_\_ for sensing
- 2 compound \_\_\_\_\_, usu. located on moveable stalks
- 5 pr. of walking legs- walking, seizing prey, and self -cleaning

C. CENTIPEDES ( ) AND MILLIPEDES ( )

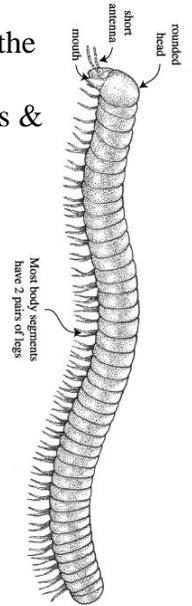
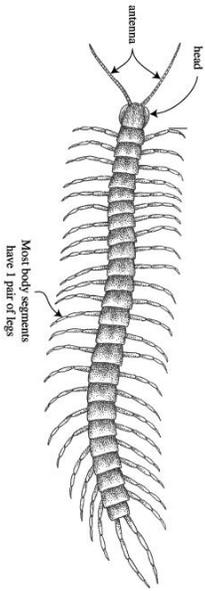
- respiration = \_\_\_\_\_
- branching networks of hollow tubes that carry air throughout the body
- \_\_\_\_\_ = openings in the thorax & abdomen where air enters & exits

Centipedes

- \_\_\_\_\_ = eat snails, slugs, worms
- \_\_\_\_\_ of legs per body segment
- fast moving

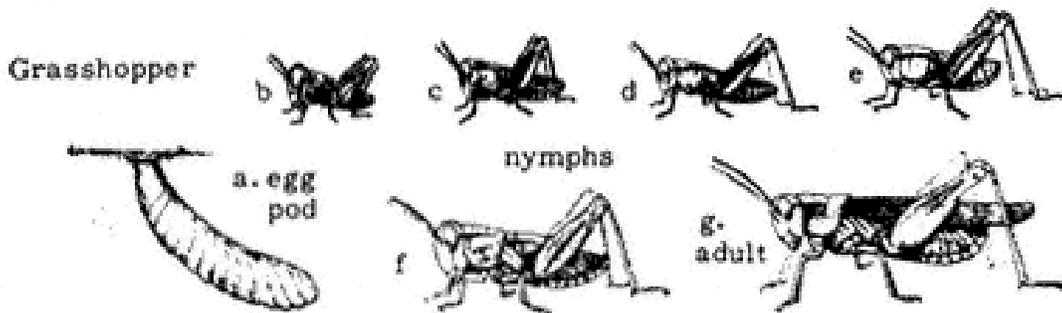
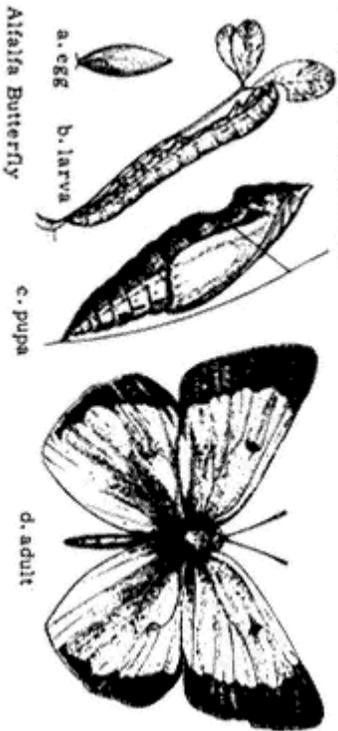
Millipede

- eats mostly \_\_\_\_\_ on forest floor
- do not bite; spray stinky fluid from stink gland
- \_\_\_\_\_ per body segment
- slow moving



D. INSECTS (Class )

- largest group
- reproduction = once or a few times (at most!) throughout life
- \_\_\_\_\_, shells form around them
- female lays \_\_\_\_\_ of eggs
- \_\_\_\_\_ = series of changes controlled by chemical substances
- COMPLETE METAMORPHOSIS = 4 stages
  - is an advantage b/c larvae \_\_\_\_\_
  - 1. egg
  - 2. \_\_\_\_\_ = free-living wormlike stage "caterpillar"
  - 3. \_\_\_\_\_ = period of reorganization in which the tissues and organs of the larva are broken down & replaced by adult tissues
  - 4. \_\_\_\_\_ = fully formed; emerges from pupa
- INCOMPLETE METAMORPHOSIS = 3 stages
  - 1. egg
  - 2. \_\_\_\_\_ = same general appearance as adult; only smaller
    - may lack certain appendages (i.e. wings)
    - cannot \_\_\_\_\_
    - molts several times, develops missing structures
  - 3. adult



## II. ECHINODERMS

- \_\_\_\_\_; found in all of the oceans
- \_\_\_\_\_
- spiny or bumpy \_\_\_\_\_ covered by a thin \_\_\_\_\_
- \_\_\_\_\_ symmetry
  - can sense food & predators in all directions
  - stationary or move very slowly
- \_\_\_\_\_ system
  - hydraulic system
  - movement, exchange gases, capture food, and excrete wastes
- Larvae have \_\_\_\_\_ symmetry
- \_\_\_\_\_ = no brain; have nerve net and nerve ring instead
  - cells that detect light and touch; no sensory organs

**Diversity of Echinoderms**

## A. Starfishes

- most have \_\_\_\_\_ rays; some have more than 40

## B. Brittle stars

- extremely fragile!!
- \_\_\_\_\_ = regrowth of missing parts
- use \_\_\_\_\_ to pass particles of food into mouth
- slithering motion of \_\_\_\_\_ to propel them

C. [Sea Urchins](#) and [Sand Dollars](#)

- globe- or disk-shaped; covered with \_\_\_\_\_
- do not have rays
- \_\_\_\_\_ live on ocean bottoms
- \_\_\_\_\_ inhabit rocky areas

## D. Sea Cucumbers

- leathery covering allows them to be \_\_\_\_\_
- pull themselves along ocean floor using \_\_\_\_\_
- in danger = expel tangled sticky mass of tubes \_\_\_\_\_
- \_\_\_\_\_
- predator feeds on expelled mass

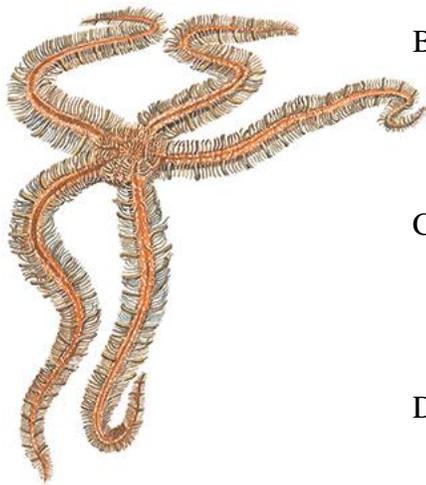
E. [Sea Lilies and Feather Stars](#)

- resemble \_\_\_\_\_
- sea lilies = only \_\_\_\_\_ echinoderms
- feather stars = sessile in \_\_\_\_\_ form; adult uses \_\_\_\_\_ to swim

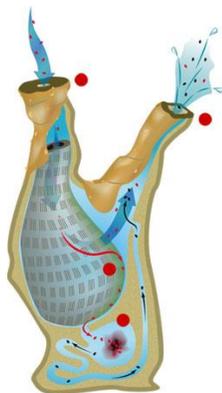
## III. INVERTEBRATE CHORDATES (Phylum Chordata)

## ALL CHORDATES...

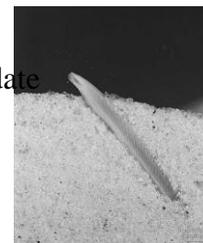
- A. have \_\_\_\_\_ = long semirigid, rodlike structure
  - invertebrates = do not develop \_\_\_\_\_
- B. \_\_\_\_\_ = bundle of nerves housed in a fluid-filled canal that lies above the notochord
  - adults = posterior portion develops into the \_\_\_\_\_ ; anterior portion develops into \_\_\_\_\_
- C. \_\_\_\_\_ = paired openings located in the pharynx, behind the mouth
- D. \_\_\_\_\_ = modified body segments that consist of stacked muscle layers



## E. Sea Squirts and Lancelets



- Subphylum \_\_\_\_\_ (Sea Squirts – “tunicates”)
  - adults retain only \_\_\_\_\_ as indication of chordate relationship
  - mostly live attached to objects on seafloor
  - may squirt out jet of water
- Subphylum \_\_\_\_\_ (Lancelets)
  - small & streamlined, usu. about 5 cm. long
  - spend most of life \_\_\_\_\_
  - retain all chordate features throughout life



DAY 1

## VERTEBRATES I (Amphibians – Fishes)

### I. GENERAL

- Phylum \_\_\_\_\_
- Subphylum \_\_\_\_\_
- notochord
- gill slits
- \_\_\_\_\_ nerve chord

### II. FISHES

- huge range of habitats and body appearances

#### A. Class \_\_\_\_\_ (lampreys and hagfishes)

- jawless fishes
- no scales, no fins
- skeletons made of \_\_\_\_\_
- breathe using \_\_\_\_\_ containing tiny \_\_\_\_\_
- reproduce \_\_\_\_\_ ; \_\_\_\_\_ fertilization
- \_\_\_\_\_ heart, like all fish
  - one chamber receives deoxygenated blood from body tissues; 2nd chamber pumps blood directly to the capillaries of the gills; \_\_\_\_\_ are exchanged in the capillaries
- hagfish = slit-like toothed mouth; feed on dead or dying fish
  - drill a hole and suck blood and insides from animal
- lampreys = \_\_\_\_\_ ; attack other fish and attach with sucker-like mouths
  - scrape away flesh, then suck out the prey's blood

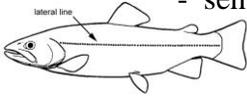


#### B. Class \_\_\_\_\_ (sharks, skates, and rays)

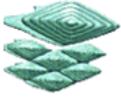
- composed entirely of \_\_\_\_\_
  - \_\_\_\_\_ ! = classified in same genera as species that swam 100,000+ years ago
- paired fins = \_\_\_\_\_ , supported by stiff spines called rays; used for balance, swimming, and steering



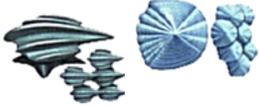
- \_\_\_\_\_ evolved; enabled animal to grab and crush prey w/great force
- sensory systems - fine-tuned sense of smell
- \_\_\_\_\_ = line of fluid-filled canals running along the sides of a fish that detects movement and vibrations in the water



- \_\_\_\_\_ - thin bony plates formed from the skin
- age of some species determined by counting annual growth rings on scales



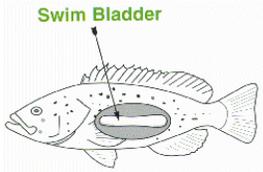
- DIFFERENT SHAPES OF SCALES



- \_\_\_\_\_ = primitive bony fishes
- \_\_\_\_\_ = bony fishes
- \_\_\_\_\_ = sharks
- SHARKS - 6-20 rows of teeth; continually replaced; point \_\_\_\_\_ which prevents prey from escaping once caught
- RAYS – flat bodies and broad \_\_\_\_\_ on the sides
  - some species have sharp spines with poison glands on the tails, some others have organs that generate electricity to kill prey and predators
- INTERNAL FERTILIZATION for sharks and rays

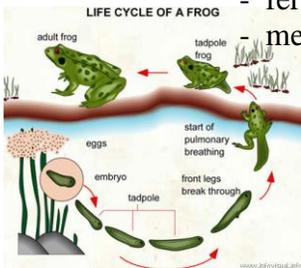
C. Class \_\_\_\_\_ (bony fishes)

- most fishes
- bony skeleton, gills, paired fins, highly developed sense organs
- bony skeleton (instead of cartilage) -> allowed fishes to adapt to different aquatic environments and eventually land
- vertebrae = provides \_\_\_\_\_ ; important in \_\_\_\_\_
- \_\_\_\_\_ = thin-walled, internal sac found just below the backbone
  - can be filled with mostly oxygen or nitrogen that diffuse out of a fish's blood
- fish control their depth by regulating the \_\_\_\_\_ in the bladder
- African lungfish has a structure that allows it to obtain oxygen by gulping air!
- Reproduction - \_\_\_\_\_ fertilization
  - \_\_\_\_\_ -> produce millions of eggs; only small % survive
  - some are live bearers -> offspring born fully developed (swordtails!)

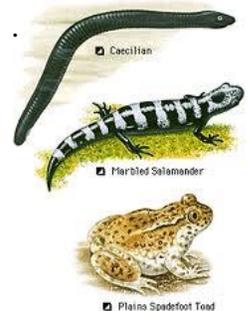


III. CLASS \_\_\_\_\_

- "double life" = life on \_\_\_\_\_
- most adult amphibians can live on land; nearly all rely on water for \_\_\_\_\_
  - eggs lack protective membranes and shells -> must be laid in water to keep them moist



- fertilization is \_\_\_\_\_ - need \_\_\_\_\_ for transporting sperm
- metamorphosis = (FROG/TOAD) egg, \_\_\_\_\_, adult
  - tadpole – aquatic habitat, fins, gills, \_\_\_\_\_ heart (like fishes)
  - adult - terrestrial legs, lungs, \_\_\_\_\_ heart
    - heart helped move to land <- walking requires more \_\_\_\_\_ is more important than \_\_\_\_\_ for gas exchange
- SALAMANDER - young resemble adults
  - young have \_\_\_\_\_ ; adults do not
  - breathe through their moist \_\_\_\_\_ or with \_\_\_\_\_
  - thin moist skin and no claws
- ectotherms = body temp. \_\_\_\_\_ with the temp. of the surroundings



- A. Order \_\_\_\_\_ (frogs and toads)
  - have vocal cords = \_\_\_\_\_ bands of tissue in the throat
- B. Order \_\_\_\_\_ (salamanders)
  - have long, slender body with a neck and tail
- C. Order \_\_\_\_\_ (legless caecilians)
  - long & have no limbs; look like worms, but have eyes covered by skin

DAY 2

## VERTEBRATES II (Reptiles - Birds)

### IV. Class \_\_\_\_\_

- scaly skin – cannot \_\_\_\_\_ through scaly skin; rely on \_\_\_\_\_
- terrestrial reproduction
  - \_\_\_\_\_ = provides nourishment to the embryo and contains membranes that \_\_\_\_\_ it while it develops
  - internal fertilization
- legs positioned under the body
- most have a \_\_\_\_\_ heart; some are 4-chambered
- ectotherms

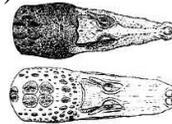
#### A. Order \_\_\_\_\_ (turtles and tortoises)

- slow moving
- have shells
- aquatic (“turtle”) or terrestrial (“tortoise”)
- no teeth; powerful jaws to crush food



#### B. Order \_\_\_\_\_ (crocodiles and alligators)

- crocodiles = \_\_\_\_\_ snout
- alligators = \_\_\_\_\_ snout
- powerful jaws w/sharp teeth



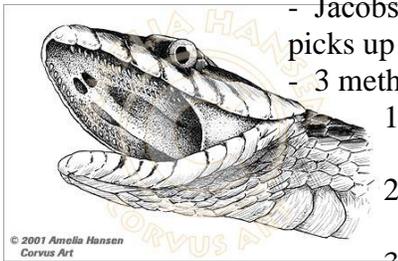
#### C. Order \_\_\_\_\_ (snakes and lizards)

- many vertebrae allow snakes to move quickly even though they don't have limbs

- Jacobson's organ = \_\_\_\_\_ in the roof of a snake's mouth; picks up airborne chemicals

- 3 methods of killing prey (snakes)

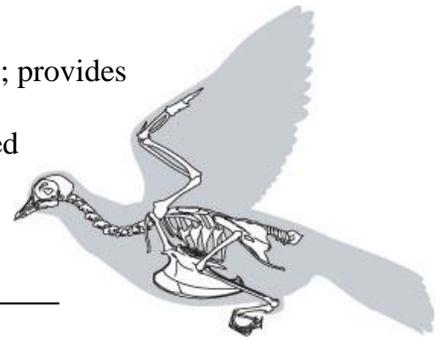
1. \_\_\_\_\_ = wrap around prey
  - ex. boa, python, anaconda
2. \_\_\_\_\_ = inject prey w/poison from glands
  - ex. rattlesnake, viper, cobra
3. \_\_\_\_\_ = no venom or constriction
  - most snakes eat this way



### V. Class \_\_\_\_\_ (birds)

- thecodont = fossil evidence shows origin from small, animal
  - complete evolutionary history is not clear...
    - fossil record is incomplete -> bird skeletons are \_\_\_\_\_ ; easily destroyed
  - clawed toes and scales on their feet
  - internal fertilization w/amniotic eggs
  - Body adaptations

- only organism w/feathers = \_\_\_\_\_ ; provides insulation and enables flight
- sternum = \_\_\_\_\_ ; powerful flight muscles attached
- \_\_\_\_\_ bones
- different beak shapes for different types of food
- \_\_\_\_\_ rapidly beating heart
  - endotherm = \_\_\_\_\_



### VERTEBRATES III (Mammals)

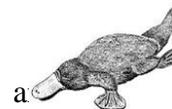
#### VI. Class Mammalia

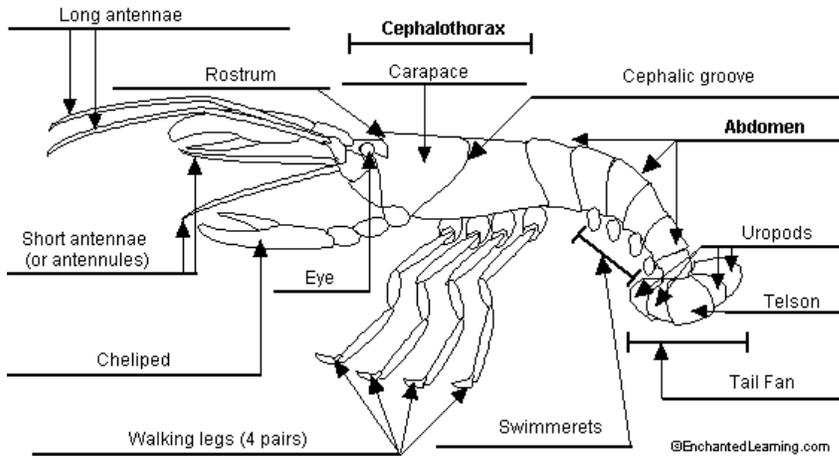
- endotherms
- hair = insulation, camouflage, signals, protection
- adaptations for secretion
  - \_\_\_\_\_ = cell or group of cells that secretes fluids
  - ex. saliva, hormones, milk, enzymes, sweat
- \_\_\_\_\_ = sheet of muscle located beneath the lungs
  - separates chest & abdominal cavities
  - allows large amts of oxygen into body
- adaptations for obtaining and consuming food
  - ex. opposable thumbs, digging claws
  - consuming food - different types of teeth
    - teeth = incisors, canines, molars
    - cud-chewing = swallowed plants are brought back up to the mouth and chewed again; further breakdown of cellulose
- nurse young
  - \_\_\_\_\_ = secrete milk; enables mothers to nurture & protect

young



- better chance of survival for young
- intelligence levels are superior
- \_\_\_\_\_ = heavy-set animals that had characteristics of reptiles and mammals
- grouped by methods of reproduction
  - Placental = carries young inside uterus until completely developed
    - \_\_\_\_\_ = time in which placental mammals develop inside the uterus
    - \_\_\_\_\_ = hollow, muscular organ; development of offspring happens
    - \_\_\_\_\_ = nourishes young inside the uterus
  - Marsupial = young have a short period of development w/in the mother's body
    - then finish development in pouch made of skin and hair found on outside of mother's body
  - Monotreme = lays eggs
    - only 3 species living today
    - platypus & 2 types of \_\_\_\_\_





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