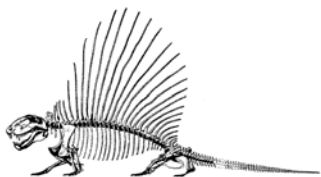


## FINAL EXAMINATION (PART 1)

Name \_\_\_\_\_ Date \_\_\_\_\_

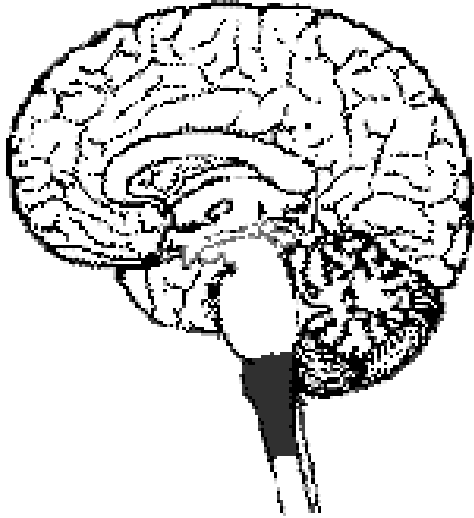
**MULTIPLE CHOICE.**—For the following multiple choice questions circle the letter in front of the response that best answers the question or completes the sentence. (10%, 1% each)

- To what is the human **Eustachian tube homologous in the shark**?
  - mouth
  - otic capsule
  - semicircular canal
  - spiracle
  - None of the above.
- Which of the following in you (a human) is **homologous with the posterior naris** in an actinopterygian?
  - interior naris
  - exterior naris
  - Eustachian tube
  - nasolacrimal duct
  - None of the above.
- Which of the following, relatively, is much **smaller in mammals** than in most vertebrates?
  - cerebellum
  - cerebrum
  - medulla oblongata
  - optic tectum
  - pons
- The **hypophyseal portal system** extends between which of the following two areas?
  - hypothalamus and median eminence
  - hypothalamus and pars nervosa
  - median eminence and pars distalis
  - pars nervosa and pars distalis
  - pars tuberalis and median eminence
- Which of the following structures of the eye is derived from an epidermal **placode**?
  - iris
  - lens
  - optic nerve
  - retina
  - None of the above
- Which of the following is an **endochondral skull bone**?
  - dentary
  - ethmoid
  - frontal
  - parietal
  - None of the above (all are *not* endochondral)
- Which of the following senses has **neurons functioning directly as receptor cells**?
  - balance
  - gustation
  - hearing
  - olfaction
  - sight
- Which of the following **pectoral girdle bones/cartilages** is present in ALL gnathostomes?
  - clavicle
  - cleithrum
  - interclavicle
  - postcoracoid
  - scapula
- A **very** geeky person comes up to you and painfully says “One of my notochordal remnants is protruding from its dense connective tissue sheath.” What does he mean?
  - He fractured a vertebral centrum.
  - He has a severe gastric ulcer.
  - He has an inguinal hernia.
  - He has ruptured an intervertebral disk.
  - Nothing. This is gibberish and he must be kinda crazy.
- Which of the following **does not have a cloaca**?
  - alligator
  - chicken
  - platypus
  - tuna
  - None of the above. (All of the above have cloacas)

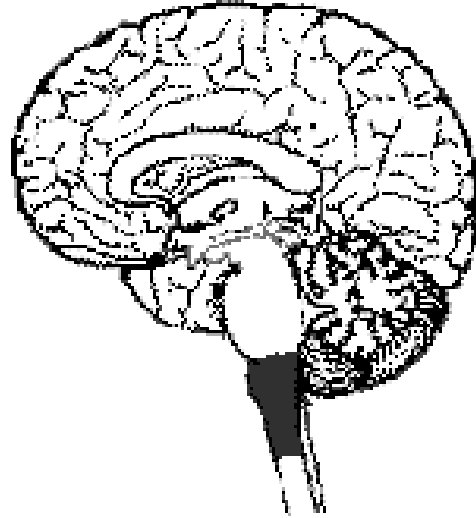


**FILL-IN-THE-BLANK/LABEL.**—For the following exercises write the appropriate word or words in the available space. (5%)

Label the saggital section (medial view of right side) diagram of a human brain below with the following (2.5%):  
**diencephalon, mesencephalon, metencephalon, myelencephalon, telencephalon**



Label the saggital section (medial view of right side) diagram of a human brain below with the following (2.5%):  
**cerebellum, cerebrum, medulla oblogata, pineal gland, pons**



**DEFINITIONS.**—For the following words or phrases define them as accurately and concisely as possible. (10%, 2% each)

1. Branchiomic muscles

2. Dorsal root ganglion:

3. Hair cell (Hint: this type of cell is associated with some kinds of SENSORY systems):

4. Myelin:

5. Monophyletic Group:

**BIOLOGY 406 FINAL EXAMINATION (PART 2)**

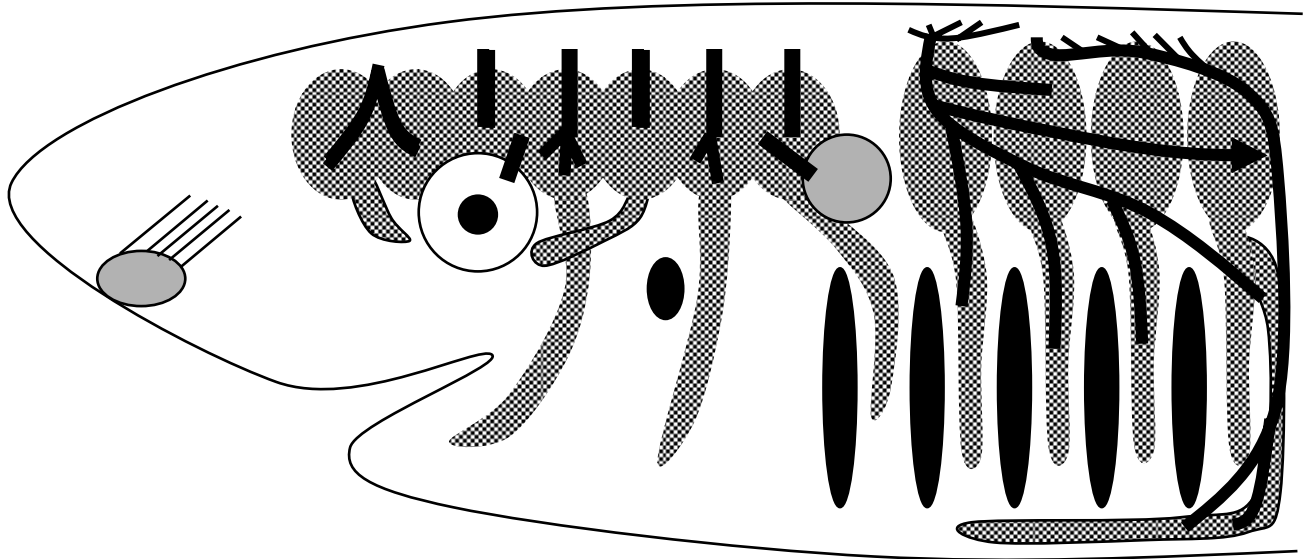
Name \_\_\_\_\_ Date \_\_\_\_\_

**SHORT ANSWER.**—Address each question in as concise and lucid a manner as possible. Do NOT exceed the space provided.

1. Fill in the lines below for cranial nerves I-X. (You do not need to indicate cranial nerves 0, XI, and XII.) (10%)

<u>cranial nerve name</u>	<u>Sensory, motor, or both?</u>	<u>Which pharyngeal arch(es) innervated (or none)?</u>
I - _____	- _____	- _____
II - _____	- _____	- _____
III - _____	- _____	- _____
IV - _____	- _____	- _____
V - _____	- _____	- _____
VI - _____	- _____	- _____
VII - _____	- _____	- _____
VIII - _____	- _____	- _____
IX - _____	- _____	- _____
X - _____	- _____	- _____

Then on the diagram below label each cranial nerve using the appropriate Roman numeral. Sensory “capsules” are indicated on this drawing, as are pharyngeal openings (black) and somitomeres/somites (patterned). (5%)



Finally, in one sentence, explain how the above shows that vertebrates are segmentally organized in much of their nervous and muscular systems. (0.5%)

2. Briefly explain how the vertebrate pituitary (hypophysis) develops. (Feel free, but do not feel obliged, to use labeled sketches as part of your answer.) (4.5%)

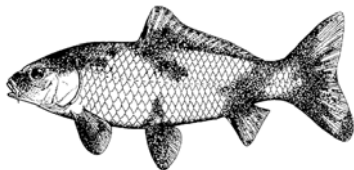
3. Briefly explain how the musculature of the gnathostome head develops including mention of the two types of muscles involved and from what the muscles for opening and closing the jaws are derived. (Feel free, but do not feel obliged, to use a table and/or sketches for your answer. Hint: If you're stuck, look at the diagram on the previous page for some help.) (5%)

**BIOLOGY 406 COMPARATIVE VERTEBRATE ANATOMY, SPRING 2006**  
**FINAL EXAMINATION (PART 3)**

Name \_\_\_\_\_ Date \_\_\_\_\_

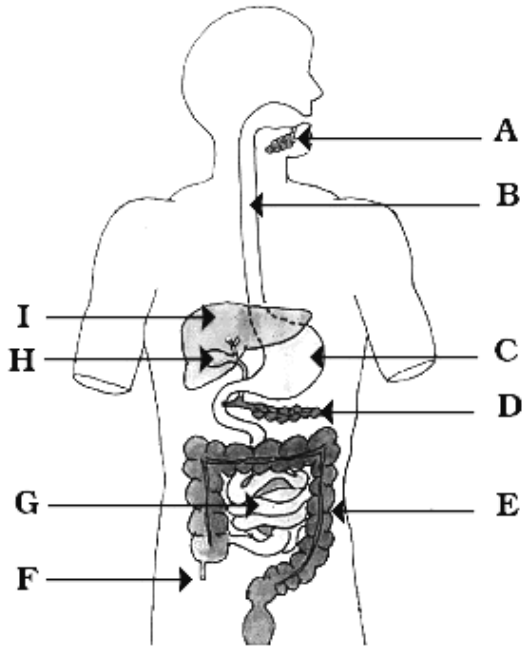
**MULTIPLE CHOICE.**—For the following multiple choice questions circle the letter in front of the response that best answers the question or completes the sentence. (10%, 1% each)

1. Which of the following is derived from **ectoderm**?
  - a. gonad
  - b. kidney
  - c. liver
  - d. pituitary
  - e. None of the above.
2. Which of the following is derived from **mesoderm**?
  - a. epidermis
  - b. melanocytes (pigment cells)
  - c. salivary glands
  - d. vertebra
  - e. None of the above
3. Which of the following is primarily derived from **endoderm**?
  - a. dermis
  - b. kidneys
  - c. pancreas
  - d. vertebrae
  - e. None of the above
4. Which of the following embryonic **aortic arches** forms “the aorta” in humans?
  - a. III
  - b. left IV
  - c. right IV
  - d. left V
  - e. right V
  - f. None of the above
5. Which of the following human structures is derived from embryonic **genital tubercle**?
  - a. cloaca
  - b. labial folds (labia majora & minora)
  - c. scrotum
  - d. vagina
  - e. None of the above
6. Which of the following best describes **mammalian teeth**?
  - a. acrodont, diphyodont, heterodont
  - b. acrodont, polyphyodont, homodont
  - c. pleurodont, diphyodont, homodont
  - d. thecodont, diphyodont, heterodont
  - e. thecodont, polyphyodont, homodont
7. Which of the following substances forms the majority of the **matrix of bone tissue**?
  - a. calcium carbonate
  - b. calcium phosphate
  - c. elastin
  - d. keratin
  - e. plasma
8. Which of the following types of cells is **NOT** found in the **gnathostome central nervous system**?
  - a. astrocytes
  - b. ependymal cells
  - c. microglial cells
  - d. oligodendrocytes
  - e. Schwann cells
9. Which of the following is **NOT** an outgrowth of the diencephalon?
  - a. epiphysis
  - b. neurohypophysis
  - c. olfactory
  - d. optic nerves & retinas
  - e. Schwann cells
10. The book *Mutants* describes certain birth defects associated with early development such as siromelia, cycloopia, and double faces. Clearly vertebrates can produce these diverse anatomies. Why don't we see these morphologies as the norm in some living vertebrate groups?
  - a. Because they only occur in humans.
  - b. Because they only can be produced in the laboratory.
  - c. Because they're purely environmental and not genetic.
  - d. Because they're usually fatal or dysfunctional.



**FILL-IN-THE-BLANK/LABEL.**—For the following exercises write the appropriate word or words in the available space. (5%)

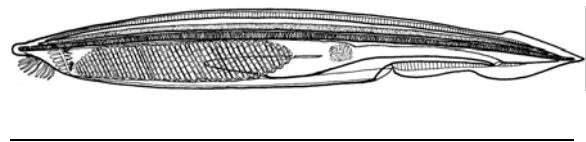
1. Label the indicated letters corresponding to the human diagram on the left in the appropriate spaces to the right. (2.5%):



Label based on the diagram at left. (0.5% each)

- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_
- E. \_\_\_\_\_
- F. \_\_\_\_\_
- G. \_\_\_\_\_
- H. \_\_\_\_\_
- I. \_\_\_\_\_

What is the organism depicted below? Feel free to use a common name or the name of its taxonomic group. (0.5%)



**DEFINITIONS.**—For the following words or phrases define them as accurately and concisely as possible. (10%, 2% each)

1. Cleft palate:

2. Dorsal mesentery:

3. Epithelium:

4. Notochord:

5. Primary neurulation:

**BIOLOGY 406 FINAL EXAMINATION (PART 4)**

Name \_\_\_\_\_ Date \_\_\_\_\_

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**SHORT ANSWER.**—Address each question in as concise and lucid a manner as possible. Do NOT exceed the space provided.

1. Explain the homology of the **malleus, incus, and stapes** in a mammal to other bones in a reptile, and an actinopterygian. (Feel free, but do not feel obliged, to use a table and/or labeled sketches for your answer.) (6%)

2. Compare and contrast the **kidneys, urinary ducts, and genital ducts** of a human, a lissamphibian, and a lamprey. Remember that in some cases the sexes may differ. (Feel free, but do not feel obliged, to use a table and/or labeled sketches for your answer.) (6%)

3. Identify the four **chambers of the “ancestral” vertebrate heart** (as they are still found in hagfishes, lampreys, and chondrichthyans). Then explain how these four chambers (or their equivalents) were modified evolutionary and are modified developmentally in adult **actinopterygians**, adult **lissamphibians**, adult **lepidosaurs**, adult **archosaurs**, and adult **mammals**. Note the **presence/absence or anatomical modification** of heart chambers from the ancestral condition for each. (Feel free, but do not feel obliged, to use a table and/or labeled sketches for your answer.) (10%)

4. Briefly explain why these drawings are misconceptions about evolution and explain why they could lead to erroneous conclusions about vertebrate anatomy. (3%)

