

NAME _____

BIO 32

EXAM # 2

April 8, 2003

(KEY)

SCORE:

Section

I. Practical _____ /35

II. Fill-in/ Match /Multiple Choice _____ /28

III. Don't get Nervous _____ /10

IV. Tissue Interactions _____ /6

V. Circulation _____ /21

TOTAL _____ /100 (= _____ %)

I. PRACTICAL (26pts)

Identify the following on your chick slides. Raise your hand when ready. Remember, second opinions must be requested instantly.

Chick (33 hr, sagittal):

- _____ subcephalic pocket
- _____ extraembryonic somatopleure
- _____ space within the neural tube
- _____ endoderm of foregut
- _____ skin ectoderm

Chick (33 hr, cross-sections):

- _____ splanchnic mesoderm
- _____ future epidermis
- _____ roof of midgut
- _____ neural groove
- _____ head mesenchyme

A. 48 hour

- _____ *sinus venosus*
- _____ *pharynx*
- _____ *future site for photoreceptor cells*
- _____ *vitelline artery*
- _____ *aortic arch 1*
- _____ *stomodeum*
- _____ *diencephalon*
- _____ *future eardrum*

72 hour

- _____ *internal carotid*
- _____ *vitelline artery*
- _____ *ventricle*
- _____ *mesencephalon*
- _____ *auditory vesicle*
- _____ *Myelencephalon*
- _____ *Acousticofacialis ganglion*
- _____ *Wing bud*

Identify the labeled structures in these sections of 48 hour chick 7.5).

1. Dermatome (Somite #1: ok)
2. Chorion
3. Precardinal vein
4. Dorsal Aortae
5. Amniotic cavity
6. 3rd pharyngeal pouch
7. 3rd closing plak or equiv.
11. Myocardium of bulbus cordis
12. Aortic sac
13. Nasal placode
14. Notochord
15. Descending aorta
16. md. of peritoneal cavity
17. Cranial Intestinal portal
18. Vitelline Vein

Part II

A. Fill ins: indicate whether the origin is from:
neural tube ectoderm, skin ectoderm, neural crest, somitic mesoderm, somatic mesoderm, splanchnic mesoderm, or endoderm. (12 pts)

1. Lens placode: skin ecto
2. Inner layer of optic cup: neural t. ecto
3. Blood islands: (splanc) meso
4. External surface of cornea: skin ecto
5. Sweat gland: skin ecto
6. Back dermis (medial area): somatic mes
7. Pupillary constrictor muscle: neural crest
8. Auditory tube lining: endo
9. External surface of tympanic membrane: skin ecto
10. Pharyngeal pouch lining: endo
11. Cells of Stratum granulosum: skin ecto
12. Membranous labyrinth: skin ecto

B. MATCH the lettered structures with the numbered items below. (9 pts)

Use each answer only ONCE!

- I derivative of skin ectoderm + head mesenchyme
- H endolymph-filled structure
- A develops from evagination of the diencephalon
- B induced by notochord
- C layer with distinctive cohesive properties
- G holdover of first *almost* gill slit
- D will form atria and ventricles
- J induced by optic vesicle
- F former jaw components

- | | |
|-------------------------------------|-----------------------|
| A. optic vesicle | E. keratin |
| B. gray matter of the ventral horns | F. auditory ossicles |
| C. stratum spinosum | G. tympanic membrane |
| D. endocardial tubes | H. semicircular canal |

I. cornea

J. lens

C. Multiple Choice. Choose the best SINGLE answer. (7 pts):

c 1. The mantle layer-

- a. generates sensory neurons
- b. is a precursor of the white matter
- c. is the future site of the spinal cord nerve cell bodies
- d. is the precursor of the meninges

d 2. All are true of neuroglia, except they-

- a. are the gray matter precursors
- b. derive from neural tube epithelium
- c. are found in the layer derived from the marginal zone
- d. grow axons into areas inhabited by skeletal muscle masses

b 4. The pigmented layer of the retina

- a. derives from a placode
- b. is a neural tube derivative
- c. derives from a condensation of local head mesenchyme
- d. will form a transparent layer
- e. forms the white of the eye

a 5. The ciliary muscle-

- a. is a derivative of the neural crest
- b. is a derivative of myotome
- c. is a derivative of motile mesoderm
- d. becomes striated

c 6. Dorsally migrating neural crest cells give rise to

- a. sympathetic ganglia
- b. sensory ganglia
- c. melanocytes
- d. motor neurons within the gray matter of the spinal cord

b 7. Ventrally migrating neural crest cells give rise to

- a. facial muscles
- b. sensory ganglia
- c. melanocytes
- d. motor neurons within the gray matter of the spinal cord
- e. sensory neurons within the gray matter of the spinal cord

a 8. Defects in the development of the Organ Of Corti can be traced to infection with Rubella. Which ear structure must have been damaged to cause deafness in this case?

- a. auditory vesicle

- b. Eustachian tube
- c. external surface of tympanic membrane
- d. stapes
- e. branchial arch 1 and 2 tissue

III. Don't Get Nervous (10pts)!

The structure below is an outline of the spinal cord.

For each item indicated with a guideline, identify what it is and also its germ layer origin.

	<u>Structure</u>	<u>Germ layer Origin</u>
A.	Central canal	neural tube OR ectoderm (either answer is ok)
B.	sensory nerve cell	neural crest OR ecto
C.	Autonomic motor nerve cell	neural tube OR ecto
D.	Somatic motor nerve cell	neural crest OR ecto
E.	Autonomic nerve cell, post synaptic	neural crest OR ecto

IV. TISSUE INTERACTIONS: What can you predict for epidermal differentiation, as the result of the following transplantation experiments? These are far fetched, but apply what you know about inductive relationships and competence. (6 pts)

1. mesoderm from chick forelimb is switched with mesoderm from chick hindlimb.

What will be the character of the integument on the wing?: scales on wing

What will be the character of the integument on the leg?: feathers on leg

2. mouse back dermis is transplanted underneath chick wing ectoderm.

How will the chick wing look? Back feathers (on wing)

3. chick back dermis is transplanted under future corneal epithelium.

what will form in the "eye" area? Back feathers

4. The reason for the answers in 1,2, and 3 is: meso influences what type of integumentary appendage to be formed by adjacent ectoderm and ectoderm responds to make the kind of appendage for which it is programmed (i.e. bird ecto cannot make hair, only feathers, scales, etc.)

Va. What is the specific developmental fate of the following (e.g., degenerates; forms blah-blah-blah". (21 pts)

Examples:

Fate of left aortic arch 5: Degenerates

Origin of right subclavian artery: Right aortic arch 4

1. Fate of skeletal primordia of archs 1 and 2 (in mammals):auditory ossicles + jaw + hyoid bone
____; is this fate symmetric on right and left? yes
2. Origin of the carotid arteries (that supply head area: arch 3)
3. Fate of right aortic arch 6 Rt. Pulm. Art; is fate symmetric on right and left? No
4. Fate of right dorsal aorta degenerates; is fate symmetric on right and left? No
5. Origin of the ductus arteriosus Left arch 6

b 1. Which fetal vessels have blood with poorest oxygenation?

- a. vitelline veins
- b. vitelline arteries
- c. chorioallantoic veins
- d. sinus venosus

b 2. Which fetal vessels have blood with the richest oxygenation?

- a. umbilical arteries
- b. umbilical veins
- c. pulmonary arteries
- d. pulmonary veins

Vb. The development of a four chambered heart is key to homeotherms. The strategy for its development includes growth of septa, fusion of tissue masses, and programmed cell death, and temporary shunts. With these concepts in minds, answer the questions that follow.

•Why is a four chambered heart of particular importance to homeotherms? (2)

(TWO points need to be made)

- Separation of flow paths of deox venoces return + Oxygenated pulmonary return ensure that there is most efficient delivery of Oxygenated blood to tissue that require this.
- The oxygen needs of tissue in homeotherms are greater than in heterotherms, due to higher sustained metabolic rate (O2 consumption rate)

- What are the three fetal shunts in mammalian fetal circulation?
List each by name, and indicate what would be the situation if it failed to close postnatally (eg “ blood would flow from XXX to YYY, which would cause ZZZZ. This would be detrimental (why); have no effect, be compensated by ...”)

1	ductus arteriosus	Output from rt. ventricle (deox) would admix w/ blood from (oxygenated) left ventricle → aorta → less efficient.
2	foramen orale	De ox blood from rt. atrium admixes w/ Ox. Blood in left Atrium → less efficient.
3	ductus venosus	Blood into liver disperses into liver capillary bed – No big Problem since umbilical vessels (veins) now are superfluous.