UNIVERSITY OF TEXAS AT ARLINGTON

DEPARTMENT OF BIOLOGY

PRINCIPLES OF ANIMAL PHYSIOLOGY
(Biol 3442)

Dr. David G. Bernard

SECOND INTRASESSIONAL EXAMINATION

NOVEMBER 01, 2007

NAME: Cuong Le _____ UTA ID # _____

There are 44 items in this booklet. Be careful not to overlook any pages in the examination booklet. You have 80 minutes to complete these questions.

During the course of the examination students will remain in their assigned seats. If assistance is needed, the student should raise his/her hand and a proctor will then attend the individual need of that student.

Upon completion of the exam, each student is to remain seated, raise her/his hand, and the exam materials will be collected by the proctors. At no time is the student to leave his/her seat and carry the exam materials to the proctors or other areas of the room.

After collection of exam materials, the student is to immediately and promptly leave the Examination Room.

NO EXTRA TIME WILL BE ALLOWED AT THE END OF THE EXAMINING PERIOD FOR ANSWERS TO BE TRANSFERRED TO THE ANSWER SHEET.

GOOD LUCK!

DIRECTIONS: **Each of the numbered items or incomplete statements in this section is followed by answers or completions of the statement. Select the ONE lettered answer or completion that is BEST in each case. Each multiple choice question is worth 2 points.**

1. Sound waves are converted into mechanical movements by the:
   A. auditory ossicles B. cochlea C. oval window
   D. round window E. tympanic membrane

2. The cyclic nucleotide whose modulation is most closely associated with phototransduction in vertebrates is:
   A. cGMP B. cCMP C. cAMP
   D. cIMP E. 5'-GMP

3. The senses of equilibrium and hearing are provided by receptors of the:
   A. outer ear B. middle ear C. inner ear
   D. bony labyrinth E. perilymph

4. The pitch of a sound is determined by the _____ of vibrations, and in that respect is most similar to the _____ of light.
   A. amplitude; brightness B. amplitude; color C. frequency; color
   D. frequency; brightness E. tone; color

5. Brain centers for controlling cardiovascular, respiratory and digestive activities via the autonomic system are located in the:
   A. cerebrum B. hypothalamus C. spinal cord
   D. medulla oblongata E. sympathetic chain ganglia

6. The tracts that connect the cerebellum to the brainstem are located in the:
   A. medulla oblongata B. pons C. mesencephalon
   D. diencephalon E. thalamus

7. What structure is highly vascular and closely adheres to the surface of the brain?
   A. pia mater B. arachnoid C. dura mater
   D. cranial plexus E. choroid plexus

8. An autonomic motor neuron whose cell body lies in the CNS is called _____ neuron.
   A. an upper motor B. a lower motor C. a preganglionic
   D. a postganglionic E. a somatomotor

9. A receptor potential large enough to produce an action potential is called a(n):
   A. action potential instigator B. generator potential C. automatic potential
   D. external result E. None of the above.

10. Sensory information that arrives at the CNS is routed according to _____ of the stimulus.
    A. nature B. temperature C. location
    D. speed E. Both A and C are correct

11. The basic receptors in the inner ear are the:
    A. utricles B. saccules C. hair cells
    D. supporting cells E. ampullae

12. The structure that separates the scala media (cochlea duct) from the scala tympani (tympanic duct) is the:
    A. tectorial membrane B. basilar membrane C. bony labyrinth
    D. membranous labyrinth E. stapedius

13. Sensory receptors that monitor the position of the joints are called?
A. nociceptor B. chemoreceptor C. baroreceptors
D. proprioceptors E. thermoreceptors

14. The somatosersory cortex is located in the _____ lobe of the cerebrum.
A. frontal B. parietal C. temporal
D. occipital E. insula

15. Which of the following vertebrate brain structures has changed least over evolutionary time?
A. cerebrum B. cerebral cortex C. brain stem
D. forebrain E. diencephalon

16. Which of the following are types of adrenergic receptors?
A. alpha receptors B. nicotinic receptors C. beta receptors
D. muscarinic receptors E. A and C

17. Pupillary constriction results from contraction of the _____ muscle of the iris as a consequence of _____ stimulation.
A. circular; sympathetic B. circular; parasympathetic
C. radial; sympathetic D. radial; parasympathetic
E. suspensory; somatic motor

18. Electrical synapses send signals:
A. through synaptic clefts B. through gap junctions
C. using neurotransmitters D. using dopamine
E. using serotonin

19. The frequency of firing of an afferent axon in response to sensory stimulation depends primarily upon:
A. duration and magnitude of the graded receptor potential
B. duration of stimulus
C. the properties of the afferent axon
D. the size of the afferent axon
E. none of the above

20. A tropic hormone is:
A. one secreted at altitudes close to the equator
B. one whose function is to trigger cellular development
C. one whose function is to stimulate endocrine tissue to secrete hormones
D. a hormone found in the thyroid gland
E. None of the above

21. Transduction involves all of the following, **EXCEPT**:
A. a stimulus altering the permeability of a receptor membrane
B. changes in the transmembrane potential of the sensory receptor
C. the production of a generator potential
D. the generation of an action potential that can be processed and interpreted by the CNS
E. an inhibition of certain specific regions in the cerebral cortex

22. Which of the following statements about the endocrine system is true?
A. Each endocrine gland secretes a single type of hormone.
B. Each endocrine hormone is secreted by a single endocrine tissue.
C. Each endocrine hormone acts on a single target tissue.
D. Each endocrine hormone activates a single type of receptor.
E. Many endocrine tissues have other non-endocrine functions.

23. Our perception of our environment is incomplete because of all of the following, **EXCEPT**:
   A. receptors respond in an all-or-nothing manner
   B. transduction converts a real stimulus into a neural event that must be interpreted
   C. abnormal receptor function can produce sensations that have no basis in fact
   D. our receptors have varying ranges of sensitivity

24. Among the following endocrine disrupting compounds present in the environment, which would you predict to be particularly abundant in sewage discharge?
   A. synthetic estrogens derived from contraceptive pharmaceuticals
   B. pesticides
   C. dioxins from white paper products
   D. Both A and B are correct
   E. Both A and C are correct.

25. Endocrine cells:
   A. are a type of nerve cells
   B. release their secretions onto an epithelial surface
   C. release their secretions directly into body fluids
   D. contain very few vesicles
   E. are modified connective tissue cells

26. Cortisol is secreted by the adrenal cortex in response to stress. In addition to its function in a stress response, it functions in negative feedback by:
   A. inhibiting the hypothalamus so that corticotropin releasing hormone (CRH) secretion is reduced
   B. inhibiting the anterior posterior's ability to respond to CRH by reducing the pituitary's sensitivity to CRH
   C. Both A and B are correct.
   D. None of the above are correct.

27. The following is a list of the steps that occur in the production of an auditory sensation.
   i. the pressure wave distorts the basilar membrane on its way to the round window
   ii. movement of the tympanic membrane causes displacement of the malleus
   iii. displacement of the stereocilia stimulates sensory neurons of the cochlear nerve
   iv. movement of the malleus causes movement of the incus and stapes
   v. distortion of the basilar membrane causes distortion of the hair cells
   vi. movement of the oval window establishes pressure waves in the perilymph of the vestibular duct

   The proper sequence for these steps is:
   A. ii, iv, i, vi, v, iii
   B. ii, iv, vi, iii, v, i
   C. ii, i, iv, vi, v, iii
   D. ii, iv, vi, i, v, iii
   E. ii, v, iv, vi, i, iii

28. A spinal nerve is a:
   A. neuron located entirely within the spinal cord, e.g. an interneuron
   B. neuron associated with the basal ganglia, or nuclei, which has many sites for synapse formation by virtue of its dendritic spines
   C. collection of peripheral axons collected within a connective tissue sheath and continuous with the dorsal and ventral roots of a spinal segment
   D. a nerve root coming out of the spinal cord
   E. None of the above.

29. Nerve nets:
   A. are the simplest type of nervous system
   B. are simple
   C. are found in cnidarians
   D. are not primitive
   E. All of the above

30. In terms of vision, the first order cells are the _____, while the _____ and _____ are the second and third order cells, respectively.
   A. photoreceptors; bipolar cells; ganglions cells
   B. photoreceptors; ganglion cells; bipolar cells
   C. bipolar cells; ganglion cells; photoreceptors
   D. bipolar cells; photoreceptors; ganglion cells
   E. ganglion cells; bipolar cells; photoreceptors

31. The term light adaptation refers to:
   A. the adjustments made by the visual system to improve vision under conditions of bright light
   B. the evolutionary changes that enable a species to maintain a diurnal life style
   C. the change in a body's metabolism that results from dieting or fasting and enables it to be more efficient in extracting calories from food stuff
   D. None of the above

32. The ossicles connect the:
   A. tympanic membrane to the oval window
   B. tympanic membrane to the round window
   C. oval window to the round window
   D. cochlea to the tympanic membrane
   E. cochlea to the oval window

33. Found on the cell bodies of neurons in both the parasympathetic and sympathetic ganglia, _____ exemplify
   A. nicotinic receptors; ligand-gated ion channels
   B. nicotinic receptors; G-protein coupled receptors
   C. muscarinic receptors; ligand-gated ion channels
   D. muscarinic receptors; G-protein coupled receptors
   E. adrenergic receptors; G-protein coupled receptors

34. The term gray matter refers to:
   A. the part of the cerebral cortex which contains neuronal cell bodies and glial cells
   B. one of the layers of the meninges
   C. part of the brain affected by Alzheimer's disease and showing signs of senescence
   D. fiber tracts carrying information from one par to the brain to another
   E. None of the above.

35. Which of the following is **NOT** a function of cerebrospinal fluid?
   A. provides cushing for delicate neural tissues
   B. provides buoyant support for the brain
   C. acts as a transport medium of nutrients
   D. provides a medium for nerve impulse transmission
   E. acts as a transport medium for chemical messengers

36. Perception of the strength of a stimulus is determined by:
   A. saltatory conduction
   B. myelination of the fiber
   C. the diameter of the fiber
   D. the frequency of the action potentials
   E. Schwann cells

37. The difference between electrotonic and saltatory conduction is that:
   A. saltatory conduction requires the presence of myelin
   B. during electrotonic conduction only subthreshold depolarizations are conducted
   C. saltatory conduction is a graded event
   D. in electrotonic conduction the amplitude of the signal gets smaller
   E. they cannot be observed on an oscilloscope

38. A hormone may:
   A. stimulate the synthesis of an enzyme or structural protein not already present in the cytoplasm by activating appropriate genes in the cell nucleus
   B. increase or decrease the rate of synthesis of a particular enzyme or other protein by changing the rate of transcription of translation
   C. turn an existing enzyme on or off by changing its shape and structure
   D. All of the above are correct.
   E. None of the above are correct.

39. Which hormone, known to control development in insects, is **NOT** produced by neurosecretory cells.
   A. Juvenile hormone
   B. Prothoracicotropic hormone (PTTH)
   C. Eclosion hormone
   D. Bursicon
   E. none of the above

40. Tonic receptors:
   A. become phasic once they have adapted
   B. adapt more slowly than phasic receptors
   C. adapt more rapidly than phasic receptors
   D. exhibit an "off response"
   E. are important to the sense of touch

Short Answer Questions

Please answer these questions briefly. Label diagrams correctly, with lines pointing to the proper structures. Partial credit will be given where appropriate. Write legibly!!

You can use the back of the last page to continue any question. Number them, please.

41. Trace the path of cerebrospinal fluid from it site of production until it is returned to the circulation (10 points)

1) Produced by plexuses
2) circulated throughout the ventricles
3) exits the fourth ventricle
4) and into the subarachnoid space between meningeal layers
5) reabsorbed from the subarachnoid space into the venous blood through microvilli structure.

0.8

42. Describe the CNS pathway from the ganglion cells of the retina to the cerebral cortex/lobe where light is perceived. (5 points)

1) ganglion cells →
2) optic nerves through optic disc
3) across at the optic chiasm
4) go into the left and right occipital lobes

3

43. Define the following: (8 points)

A. Autocrine – secreted by a cell to act on itself

B. Paracrine – secreted by a cell to act on its local and neighbored cells

C. Endocrine – secreted by endocrine cells into the body fluid(blood) and usually effect distant effectors.

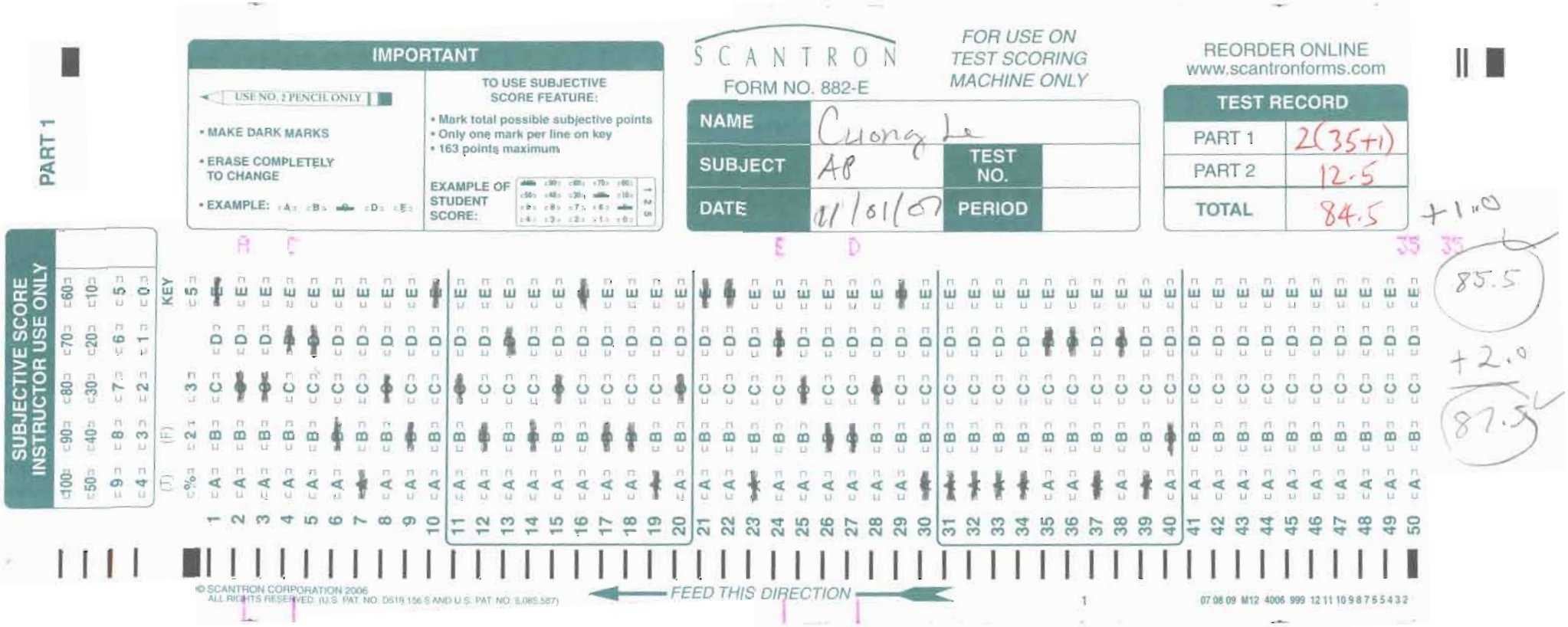
D. Exocrine – secreted by a cell that enter the external environment through ducts

8 A

44. What would happen if the ventral root of a spinal nerve were severely damaged or cut? (5 points)

The victim can still receives and processes the sensory information, but the victim can not control his/her effectors. For example, the ANS system can not regulate their visceral organs.

2



PART 1

IMPORTANT

USE NO. 2 PENCIL ONLY

- MAKE DARK MARKS
- ERASE COMPLETELY TO CHANGE
- EXAMPLE: A B D E

TO USE SUBJECTIVE SCORE FEATURE:

- Mark total possible subjective points
- Only one mark per line on key
- 163 points maximum

EXAMPLE OF STUDENT SCORE:

SCANTRON

FORM NO. 882-E

FOR USE ON TEST SCORING MACHINE ONLY

REORDER ONLINE
www.scantronforms.com

NAME	Chong Le		
SUBJECT	AP	TEST NO.	
DATE	11/01/07	PERIOD	

TEST RECORD	
PART 1	2(35+1)
PART 2	12.5
TOTAL	84.5

+1=0

85.5

+2.0

87.5

SUBJECTIVE SCORE
INSTRUCTOR USE ONLY

KEY

A C E D

35 35

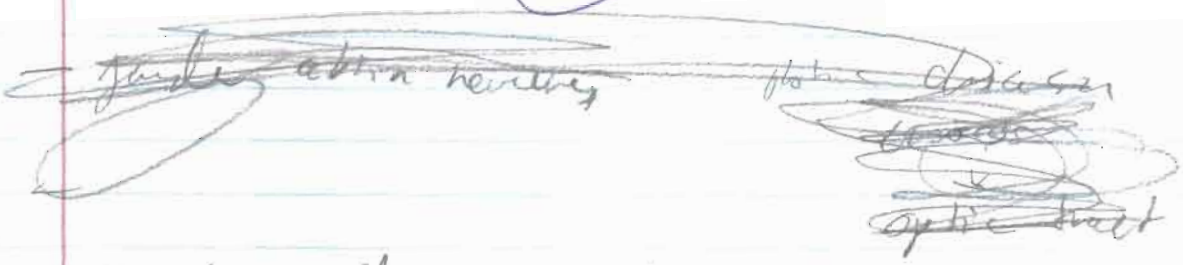
FEED THIS DIRECTION

1

07 08 09 M12 4006 999 12 11 10 9 8 7 6 5 4 3 2

Cuong Le
10/25/07

6



→ ganglion cell → optic nerve → optic Chiasm
→ optic tract → optic radiation →
optic occipital

Chang K
10/23/07

(2)

- greater than 3
- True
- Nerve fascicle - composed of nerve fibers