Biology 7 Study Guide – Exam #2

This is a list of general topics you should be prepared to answer questions on for each chapter. This guide is NOT what you should study but rather is a guide to help organize your studying of the material listed. Your actual studying should involve the Powerpoint slides, your notes and textbook. Keep in mind that you will not be tested on material in the book that was not covered in class, and you should know the new terminology for each chapter (see terms in bold type).

Chapter 32 (Animal Diversity)

- the general characteristics associated with animals
- body symmetry (radial, bilateral)
- the 3 germ layers – endoderm, mesoderm, ectoderm – and the tissues/organs they give rise to
  - diploblastic vs triploblastic animals
- body cavity – coelom (coelomates), pseudocoelom (pseudocoelomates), acoelomates
- characteristics of protostome and deuterostome development
- close relation of animals (in particular sponges) to choanoflagellate protists
- the evolutionary order of appearance of the major animal groups
- basis of the Cambrian explosion and characteristics of animals from this period
- dinosaurs dominated the Mesozoic era during which the first mammals evolved
- mass extinction at the end of the Mesozoic era (Cretaceous) led to the dominance of mammals during the Cenozoic era

sample questions:

1. Arrange the following groups in the order in which they are currently thought to have evolved from earliest to latest: Ctenophora, Deuterostomia, Porifera, Acoela, Cnidaria.
2. What feature(s) do sponges have in common with choanoflagellates?

Chapters 33 (Invertebrates)

- differences between sponges (Porifera) and other members of the animal kingdom
- characteristics and examples of Cnidaria
  - examples of Medusazoans – Scyphozoans, Cubozoans, Hydrazoans
  - Anthozoans
- characteristics of Lophotrochozoans
  - characteristics, examples of flatworms (Platyhelminthes)
  - blood fluke life cycle
  - body structure of a tapeworm
  - characteristics, examples of molluscs – Polyplacophora, Gastropods, Bivalves, Cephalopods
  - characteristics, examples of Annelids – Errantia, Sedentaria
- characteristics of Ecdysozoans
  - characteristics, examples of roundworms (Nematoda)
  - characteristics, examples of Arthropods – Chelicerates, Myriapods, Pancrustaceans, Insects
- characteristics of Deuterostomes
  - characteristics, examples of Echinoderms – Asteroidia, Ophiuroidea, Echinoidia, Crinoidia, Holothuroidea
sample questions:

1. How do Echinoderms differ from other invertebrate animals?
2. Describe the life cycle of a blood fluke.

Chapter 34 (Vertebrates)

- the general characteristics/derived characters of chordates and the order in which they appear in evolutionary history
- the evolutionary order of appearance of the major chordate groups
- roles of Hox genes in chordate evolution
- invertebrate chordates – Cephalochordata (lancelets), Urochordata (tunicates)
- general characteristics, examples of Cyclostomes (jawless fish) – Myxini (hagfish), Petromyzontida (lampreys)
- general characteristics of Gnathostome fished (jawed fish)
  - oviparous vs ovoviviparous vs viviparous
  - characteristics, examples of Chondrichthyes (cartilaginous fish)
  - characteristics, examples of Actinopterygii (ray-finned fish)
  - characteristics, examples of Sarcopterygii (lobe-finned fish)
- general characteristics of Tetrapods
  - characteristics, examples of Amphibians – Urodeles, Anurans, Apoda
  - characteristics, examples of Actinopterygii (ray-finned fish)
  - characteristics, examples of Sarcopterygii (lobe-finned fish)
  - general characteristics of Amniotes
    - structure and advantages of amniotic egg (chorion, amnion, yolk sac, allantois)
    - ectothermic vs endothermic vs poikilothermic
    - general characteristics of reptiles (Diapsids)
      - characteristics, examples of archosaurs (e.g., theropods, birds)
      - characteristics, examples of lepidosaurs (e.g., lizards, snakes)
    - general characteristics of mammals (Synapsids)
      - characteristics, examples of monotremes
      - characteristics, examples of marsupials
      - characteristics, examples of eutherians (placental mammals)
        - characteristics, examples of primates
        - characteristics, one example of extinct Hominin
      - examples of transitional fossils (Tiktaalik, archaeopteryx)

sample questions:

1. Describe the unique characteristics of chordates relative to the rest of the animal kingdom.
2. What characteristic distinguishes monotremes from other mammals?

Chapter 40 (Animal Form & Function)

- examples of how biological form relates to function
- hierarchical organization of animal bodies: organism > organ systems > organs > tissues > cells
- characteristics and examples of all 4 tissue types – epithelium, muscle, nerve, connective tissue
- concepts of homeostasis, conformer vs regulator, positive vs negative feedback
- various ways in which animals modulate their body temperatures (thermoregulation)
- the concepts of ectothermy vs endothermy and physiological thermostats
- changes in the physiological thermostat – fever and torpor
- various ways to measure metabolic rate
• concepts of **basal metabolic rate** (endotherms) and **standard metabolic rate** (ectotherms)
• relationship between metabolic rate and body mass

sample questions:
1. Define homeostasis and distinguish a conformer from a regulator.
2. Describe the general features of nerve tissue and indicate two general cell types contained in nerve tissue.

**Chapter 41 (Animal Nutrition)**

• **herbivores vs carnivores vs omnivores**
• feeding provides organisms with energy, organic building blocks, essential nutrients
• concept of essential nutrients – essential amino acids for humans and importance in diet
• distinguish vitamins from minerals
• different modes of **ingestion** in the animal kingdom
• concepts of mechanical and chemical digestion
• roles of each digestive organ (alimentary canal and accessory organs)
• chemical and mechanical digestion in the oral cavity and stomach
• chemical digestion and absorption in the small intestine
• 3 types of structures that increase surface area in the small intestine
• absorption of lipids vs other nutrients
• importance of bacteria, water absorption in the large intestine
• adaptations of digestive systems in the animal kingdom with regard to diet
• hormones that control the release of digestive substances – **secretin, gastrin, CCK**
• general roles of **ghrelin, leptin, PYY, insulin** on appetite
• opposing effects of **insulin** and **glucagon** on blood glucose levels

sample questions:
1. What is the role of mechanical digestion in the digestive process.
2. What is the role of bile in digestion, where is bile produced, and where is bile stored?

**Chapter 42 (Circulation & Gas Exchange)**

• the physiological roles of circulatory systems
• **gastrovascular cavities** vs **open circulatory systems** vs **closed circulatory systems**
• **double vs single circulation; pulmonary vs systemic circuit**; examples of organisms with each
• **2-chambered** vs **3-chambered** vs **4-chambered** hearts and examples of organisms with each
• pathway of mammalian blood circulation (systemic and pulmonary circuits)
• anatomy of the mammalian heart (chambers, valves, blood vessels)
• concepts of **systole, diastole, heart rate, stroke volume, cardiac output**
• regulation of the heartbeat
• structures of **arteries, veins, capillaries** the roles of each in blood distribution
• characteristics of capillaries that facilitate exchange with surrounding tissues
• basic structure and function of the lymphatic system
• components of blood plasma
• relative amounts, roles of red blood cells (**erythrocytes**) and white blood cells (**leukocytes**)
• general process of blood cell formation in the bone marrow
• general process of blood clotting and its role in cardiovascular disease
• cholesterol transport (HDL/LDL) and its relation to cardiovascular disease
• the physiological roles of gas exchange, diffusion
• the role of each organ in the mammalian respiratory system
• different structures used in the animal kingdom for gas exchange (birds, fish, insects)
• the process of breathing/ventilation in various types of animals
• roles of hemoglobin and other respiratory pigments in oxygen, carbon dioxide transport

sample questions:
1. Describe the pulmonary circuit of mammalian blood circulation.
2. Describe the basis of gas exchange in the alveoli of lungs.

Chapter 44 (Osmoregulation & Excretion)

• concepts of diffusion, osmosis, osmolarity, hyperosmotic vs hypoosmotic vs isoosmotic
• challenges faced by marine & fresh water animals
  o osmocomformers vs osmoregulators, euryhaline vs stenohaline
  o how marine and freshwater fish accomplish osmoregulation
• energy requirements, epithelial structures required for osmoregulation
• different forms of nitrogenous waste (ammonia, urea, nitric acid)
  o types of animals that excrete each type of nitrogenous waste
  o advantages, disadvantages of each
• various animal structures used for excretion (protonephridia, metanephridia, Malpighian tubules, kidneys) and types of animals that use each
• structure and function of each organ in the human excretory system
• general kidney structure, nephron structure
• the general roles of each nephron segment in the filtration process
  o glomerulus, proximal tubule, descending & ascending loops of Henle, distal tubule
• the sources and roles of hormones in osmoregulation, how they affect kidney function
  o antidiuretic hormone, the renin, angiotensin, aldosterone system, atrial natriuretic peptide

sample questions:
1. What osmoregulatory problems do freshwater fish face and how do they deal with them?
2. Describe how the renin, angiotensin, aldosterone system modulates kidney function.

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