

Basic Avian Anatomy - Student Notes

Directions:

Fill in the blanks.

1. Avian Body Systems

- Include the following:
 - cardiovascular
 - _____
 - endocrine
 - excretory
 - immune
 - integumentary
 - muscular
 - nervous
 - reproductive
 - respiratory
 - skeletal

2. The Cardiovascular System

- Delivers _____ to body cells
- Removes _____ wastes
- Helps maintain a bird's body temperature
- Consists of the heart and blood vessels

Metabolism – chemical processes which occur in a living organism and are necessary for the maintenance of life, such as turning oxygen into carbon dioxide

3. The Avian Heart

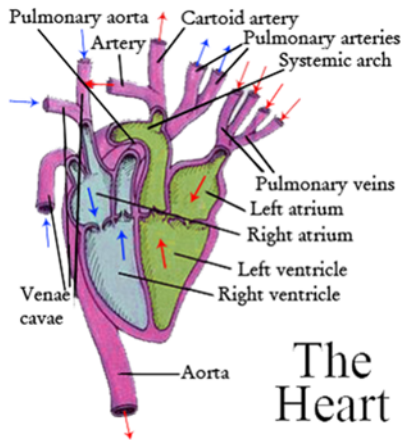
- Pumps blood throughout the body using blood _____
- Is _____ chambered, consisting of two atria and two ventricles
- Is larger than mammalian hearts in relation to body size and mass, which is necessary to meet the metabolic demands of flight

Fun Fact: Small birds tend to have larger hearts than big birds, and the hummingbird heart is the largest of all

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4. Avian Blood Vessels

- Deliver blood pumped from the heart throughout the body
- Include the following:
 - _____: carry blood away from the heart
 - _____: carry blood back to the heart



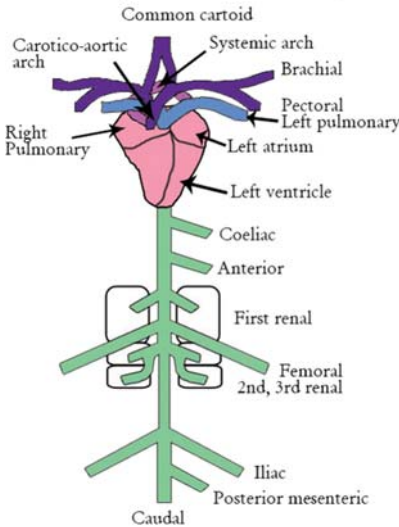
5. Major Avian Arteries

- Include the following:
 - carotids: carry blood to the head and brain
 - _____: deliver blood to the wings
 - pectorals: take blood to the flight muscles
 - systemic: _____ blood everywhere except the lungs
 - pulmonary: brings blood to the lungs

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6. Major Avian Veins

- Include the following:
 - _____: carries blood away from the head and brain
 - _____: takes blood away from the wings
 - superior vena cava: brings blood away from the front of the body
 - inferior vena cava: brings blood away from the back of the body



7. The Digestive System

- Takes in food, breaks it down into nutrients and the nutrients are absorbed in the _____
- Converts food into raw materials used to build and fuel the body's cells
- Rids the body of _____ materials

8. The Digestive System

- Includes the following:
 - mouth
 - esophagus
 - _____
 - small intestine
 - large _____

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9. The Mouth

- Has no _____
- Secretes saliva to _____ food and aid in swallowing
- Houses the tongue which manipulates food and aids in swallowing food whole

Fun Fact: Hummingbirds eat about every 10 minutes and consume twice their body weight in honey every day

10. The Esophagus

- Connects the mouth to the _____
- Moves food from the mouth to the stomach using wave like muscle contractions
- Often deposits food in the _____ of many birds before going to the stomach

Crop – a pouch found in the esophagus of many birds which stores food for later digestion or regurgitation for offspring

11. The Stomach

- Is often divided into two parts in birds, including the following:
 - _____: glandular part of the stomach where food is partially digested
 - _____: muscular portion of the stomach which grinds food, often with the help of ingested stones or grit

Grit – coarse grained particles such as sand

12. The Small Intestine

- Varies in length depending on _____
 - _____ in herbivorous birds
 - shorter in carnivorous birds
- Absorbs the most food products

Herbivorous – animals which feed only on plants

Carnivorous – a flesh eating or predatory animal

13. The Large Intestine

- Is also known as the _____
- Absorbs water, dries out indigestible items and eliminates waste products
- Contains bacteria which allow birds to metabolize remaining nutrients
- Connects to the _____, where all waste products meet to exit the body

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14. The Endocrine System

- Consists of glands and hormones which _____ growth, development, reproduction and behavior
- Produces, uses and stores energy
- Works with the _____ system to maintain nutrition, metabolic processes and balance of salt and water

15. The Endocrine System

- Includes the following:
 - adrenal
 - pancreas
 - _____
 - thyroid

16. The Adrenal Glands

- Are located on top of each _____
- Release hormones in response to stress or excitement
- Produce the following hormones:
 - _____: regulates salt and water balance in the body
 - cortisol: controls carbohydrate, protein and fat metabolism

17. The Pancreas

- _____ acids found in the mixture of food passed from the stomach
- Produces insulin which breaks down _____ and other nutrients in the body

Glucose – a sugar which acts as a very important source of energy

18. The Pituitary Gland

- Is located on the base of the _____
- Creates the hormone prolactin which causes birds to create large amounts of fat _____ their skin
 - this fat provides the energy needed in order to migrate over long distances

19. The Thyroid Gland

- Is located at the base of the _____
- Controls rate of metabolism, growth and development
- Regulates how fast a bird _____ energy or makes proteins
- Determines how sensitive a bird is to other hormones

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20. The Excretory System

- Controls the amount of _____ in the body
- Removes metabolic wastes
- Includes the _____ and urethra

21. The Kidneys

- _____ waste products out of blood
- Reabsorb needed substances such as glucose
- Form and excrete urine
- Regulate _____ and electrolyte balance

22. The Urethra

- Is a _____ tube used for excreting wastes
- Carries feces and urine to the outside of the body
 - feces and urine are excreted at the _____ in birds

23. The Immune System

- Identifies and kills _____
- Divides into two categories
 - _____
 - adaptive

Pathogen – any disease causing agent, such as a virus or bacteria

24. The Innate Immune System

- Acts as the first line of defense
- Works nonspecifically, meaning it tries to keep everything out
- Includes feathers, skin, mucous and stomach acids
- Is _____
 - does not have a _____
 - will not learn to keep out substances even after repeated exposure

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25. The Adaptive Immune System

- Attacks specific threats to the body
- Plans different defenses for various invaders
- Works with the innate _____ system in order to prevent attacks and memorize how to kill the pathogens
- Is adaptive
 - has a _____
 - remembers how to treat an infection
 - overcomes threats faster if exposed again

26. The Integumentary System

- Includes _____, feathers and claws
- Protects and separates the bird from its surroundings
- Communicates with birds by acting as a receptor for touch, pain, pressure and temperature
- Acts as an innate _____ system

27. Skin

- Is composed of the following three layers:
 - _____: outermost layer of skin
 - dermis: connective tissue which provides the body with cushioning from stress and strain as well as housing sweat glands, hair follicles and nerve endings
 - _____ tissue: provides insulation and nutrient storage

28. Feathers

- Provide _____ for a bird
- Keep dirt, water and bacteria from reaching the skin
- Become worn out and must be replaced once or twice a _____ depending on the breed of bird

Fun Fact: The longest feathers ever recorded belonged to an ornamental chicken bred in Japan which measured 35 feet long

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29. The Muscular System

- Allows _____ in birds
- Consists of all the muscles in a bird, which can be divided into the following:
 - voluntary
 - _____
 - smooth
 - cardiac
 - skeletal

30. Voluntary Muscle

- Can be controlled by _____
- Consists mainly of _____ muscle
- Includes the muscles located in the wings and legs

31. Involuntary Muscle

- Cannot be controlled by _____
- Consists mainly of muscles which line organs
- Includes muscles found in the _____ and stomach

32. Smooth Muscle

- Is voluntary muscle tissue
- Cells have _____ nucleus
- Forms thin layers or sheets of _____ muscle

33. Cardiac Muscle

- Is _____ muscle tissue
- Is found exclusively in the _____
- Is adapted to the continuous rhythmic beating of the heart

34. Skeletal Muscle

- Is usually voluntary muscle
- Cells have _____ nuclei
- Connects to a bone
- Is _____

Striated – to be marked with stripes or streaks

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35. The Nervous System

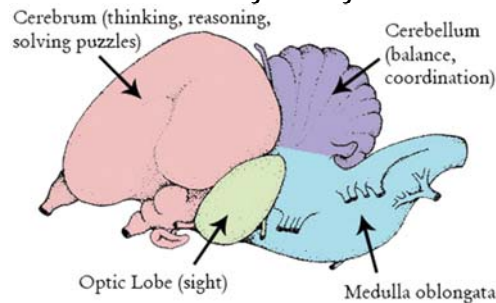
- Consists of specialized tissue which controls the actions and reactions of birds concerning their environment
 - Controls the activity of _____
 - Uses sensory stimulation to cause _____
 - Can be divided into the central and peripheral nervous systems
- Motor Response – activities which result in muscular reaction

36. The Central Nervous System

- Includes the following:
 - _____
 - spinal cord

37. The Brain

- Receives sensory _____ from the environment and tells the body how to respond
- Stores _____ information
- Controls voluntary and involuntary body functions



38. The Brain

- Has large _____ lobes, allowing for good eyesight
- Has small olfactory lobes, resulting in poor smelling
- Is mostly controlled by the middle of the cerebral hemisphere, which lacks learning capacities
 - bird behavior is often instinctive
- Can be significantly altered by _____

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39. The Spinal Cord

- Consists of nerve tissue protected by _____
- Starts at the bottom of the brain and continues down the spine
- Is divided into sections depending on which part of the body it serves
- Allows nerves to branch out, forming the _____ nervous system

40. The Peripheral Nervous System

- Includes the following:
 - cranial nerves
 - _____ nerves
 - autonomic nerves

41. Cranial Nerves

- Are located in the _____
- Carry impulses to the head and neck
- Include the following nerves:
 - olfactory: controls smell
 - optic: controls vision
 - _____: controls swallowing and head movement

42. Spinal Nerves

- Extend from the _____
- Provide information to the areas of the body below the neck
- Contain both sensory and motor _____

Neurons – impulse conducting cells which carry and transmit electrical signals throughout the nervous system

43. Autonomic Nerves

- Monitor the body's _____ environment and cause change if necessary
- Control the contractions of both cardiac and smooth muscle
- Communicate with body organs including the following:
 - heart
 - _____
 - glands

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44. The Female Reproductive System

- Includes the following:
 - ovaries
 - infundibulum
 - _____
 - isthmus
 - uterus

45. The Ovaries

- Left ovary
 - grows _____ than right ovary
 - contains all the egg cells the female will ever have at birth
- Right ovary
 - normally goes back to an _____ state

46. The Infundibulum

- Consists of two parts, a funnel and a tubular part
 - tunnel portion is the site where _____ fertilize eggs
 - _____ section holds the egg after fertilization

Fun Fact: The most yolks ever found in a single egg was nine

47. The Magnum

- Provides the egg with _____ needed for development
- Is the longest and most coiled portion of the reproductive tract
- Consists of very _____ walls
- Contains many glands releasing chemicals such as sodium and calcium

48. The Isthmus

- Is a _____ portion of the reproductive tract
- Creates the inner and outer shell of the egg
- Initiates _____

Calcification – the hardening or solidifying of a substance due to exposure to calcium

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49. The Uterus

- _____ the egg the longest
- Adds watery solutions to the egg, _____ its size
- Connects to the vagina, where the egg is secreted

50. The Male Reproductive System

- Includes the following:
 - testes
 - _____
 - ductus deferens

51. The Testes

- Are located inside male birds just above the _____
- Become enlarged during _____ season
- Are largely composed of seminiferous tubules, the site of sperm production

52. The Epididymis

- Is an elongated organ situated at the _____ of the testicle
- Is the site where sperm travel after leaving the testes
- Connects the testes to the _____ deferens

53. The Ductus Deferens

- Carries sperm from the _____ to the ejaculatory duct
- Is _____ packed with sperm during mating season
- Is the end location of sperm after traveling from one to four days from the testes

54. The Respiratory System

- Delivers _____ to organs and tissues
- Removes carbon dioxide from the body
- Allows birds to fly at _____ altitudes where very little oxygen is present
- Takes two inhalations and exhalations for the oxygen to make a complete cycle throughout the body

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55. The Respiratory Cycle

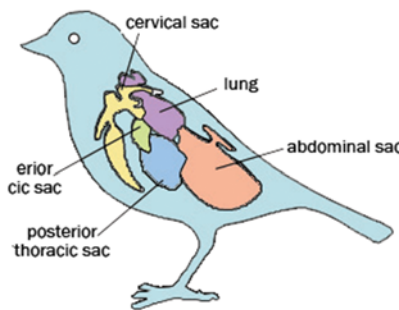
- First inhalation:
 - air enters through _____
 - travels down the larynx, trachea and syrinx (voice box)
 - air divides into the _____
 - ends in posterior air sacs

Bronchi – the two major branches of the trachea

Air Sacs – anatomical structure in birds which allow for the unidirectional flow of oxygen throughout the body

56. The Respiratory Cycle

- First exhalation:
 - air travels from posterior sacs through the dorso- and _____
 - dorso- and _____ deliver air to the lungs



57. The Respiratory Cycle

- Second inhalation
 - air moves to the _____ air sacs
- Second exhalation
 - air moves through the _____, trachea and larynx and out the nostrils

58. The Skeletal System

- Has adapted to flight by being constructed of lightweight, _____ bones
- Includes bones which have been _____ together in order to lessen the number of bones
- Provides support and structure
- Includes the keel bone, a pronounced area on the sternum to which the flight muscle connects

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59. The Avian Skeleton

- Differs from humans in that its bones are _____ in order to fly
- Includes the wings and strong support system which goes with them, while humans have arms
- Includes a _____ bone which has fused to form the wishbone
- Places the sternum on the underside of a bird, while a human's ribs and spine connect to its sternum