SI A&P - Full Discipline Demo - Fetal Pig

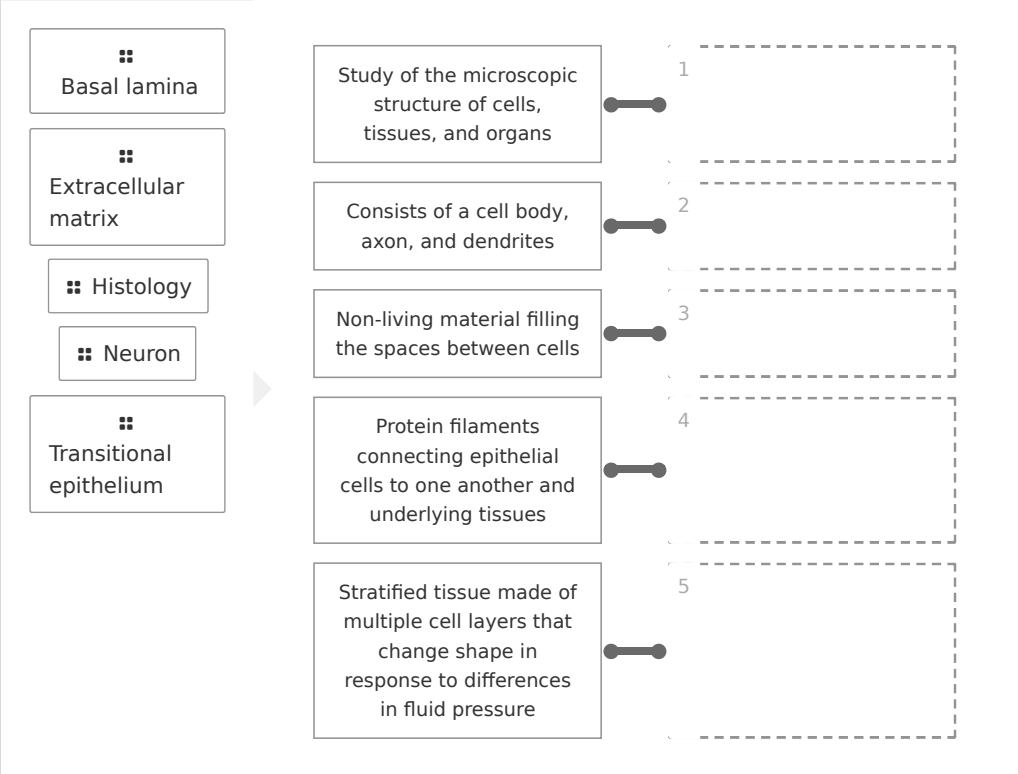
Tissues and Histology

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI A&P - Full Discipline Demo - Fetal Pig
Course	SI A&P - Full Discipline Demo - Fetal Pig
Instructor	Sales SI Demo

Test Your Knowledge

Match each term to the best description.



Correct answers:

1 Histology 2 Neuron 3 Extracellular matrix 4 Basal lamina

5 Transitional epithelium

Classify each statement as true or false.

Epithelium functions for protection, secretion, absorption, excretion, filtration, diffusion, and sensory perception.

Epithelial tissue is composed of a dense arrangement of cells containing the contractile filaments actin and myosin.

Connective tissue is the most abundant tissue type in the body and is composed of a low density of cells surrounded by an extensive extracellular matrix.

Glial cells maintain homeostasis, form myelin, and provide support and protection for neurons.

True	False
1	2

Correct answers:

1

Glial cells maintain homeostasis, form myelin, and provide support and protection for neurons.

Epithelium functions for protection, secretion, absorption, excretion, filtration, diffusion, and sensory perception.

Connective tissue is the most abundant tissue type in the body and is composed of a low density of cells surrounded by an extensive extracellular matrix.

2

Epithelial tissue is composed of a dense arrangement of cells containing the contractile filaments actin and myosin.

Exploration

Tissues are ensembles of structurally similar cells with highly related functions.

- [x] True
- [ ] False

Mammalian skin is an example of _____ epithelial tissue.

- [ ] simple squamous
- [x] stratified squamous
- [ ] simple columnar
- [ ] pseudostratified columnar

_____ tissue consists of cells that are filled with almost 80% fat globules.

- [ ] Loose connective
- [ ] Reticular connective
- [ ] Dense connective
- [x] Adipose

_____ muscle tissue is characterized by branching cells with centralized nucleus and intercalated discs.

- [ ] Skeletal
- [x] Cardiac
- [ ] Smooth
- [ ] Transitional

Neurons consist of _____.

- [ ] a cell body
- [ ] dendrites
- [ ] an axon
- [x] All of the above

Exercise 1

How did the squamous epithelial tissue examined from the lung differ from that examined from the skin? How do the differences between these two tissues relate to their functions?

The squamous tissue of the lung is simple, consisting of a single layer of cells. The squamous tissue of the skin was both stratified and keratinized. The epithelial tissue in the lungs functions for the diffusion of gases into and out of the bloodstream which if facilitated by the single layer of cells. The epithelial tissue of the skin functions for protection which is facilitated by multiple layers of cells which contain keratin.

What type of epithelial cells are specialized for the secretion of molecules? Which slide(s) contained examples of these secretory cells in this exercise?

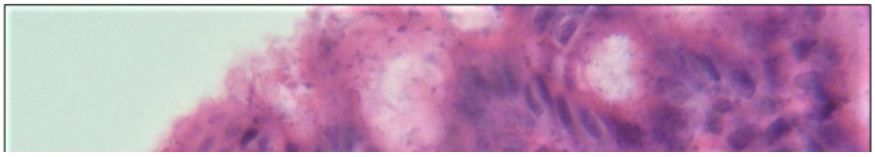
Simple cuboidal cells are well suited for the secretion of molecules. The thyroid gland contained simple cuboidal cells surrounding the masses of colloid as labeled in Photo 2.

Data Table 1: Microscopic Examination of Epithelial Tissue
(SAMPLE ANSWER BELOW)

Slide	Magnification	Comments
Simple Columnar, Stomach	600X	Student answers will vary.
Thyroid Gland	600X	Student answers will vary.
Simple Squamous, Lung	600X	Student answers will vary.
Stratified Squamous	600X	Student answers will vary.
Strat. Squamous Non-K	600X	Student answers will vary.
Pseudostrat. Ciliated, Trachea	600X	Student answers will vary.

Photo 1: Simple Columnar Epithelial Tissue - Stomach
(SAMPLE ANSWER BELOW)

Simple



Simple
Columnar
Epithelial
Tissue

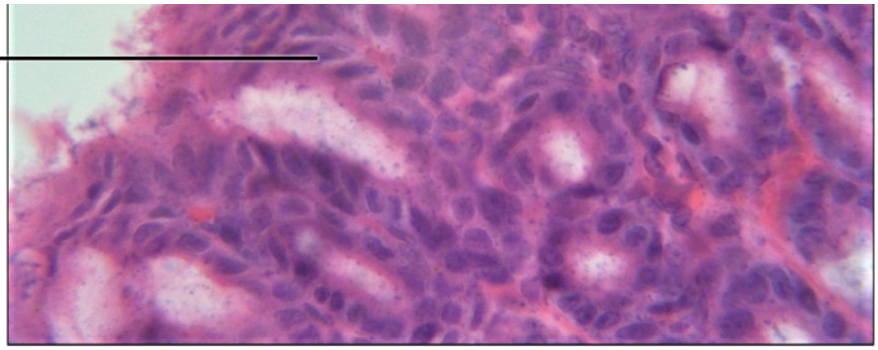
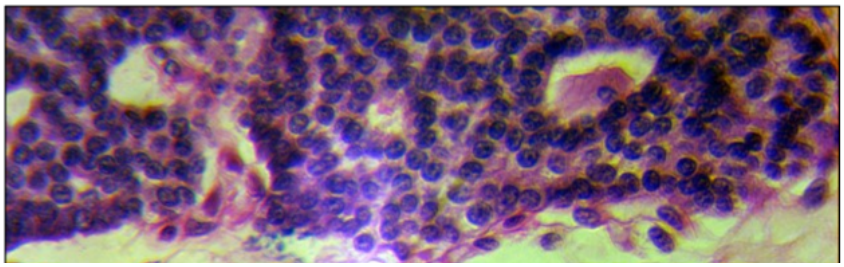


Photo 2: Thyroid Gland

(SAMPLE ANSWER BELOW)



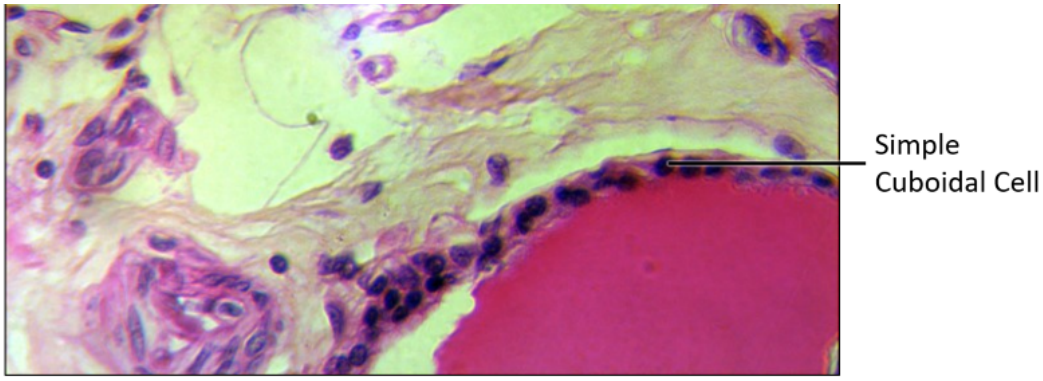
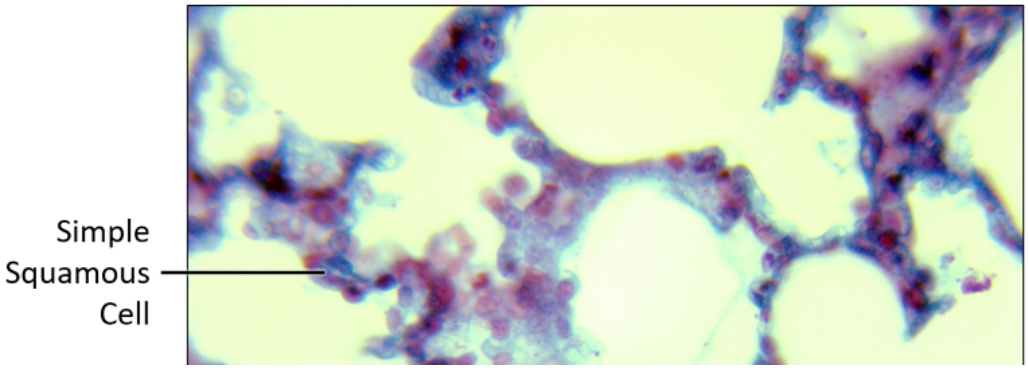


Photo 3: Simple Squamous Epithelial Tissue - Lung

(SAMPLE ANSWER BELOW)



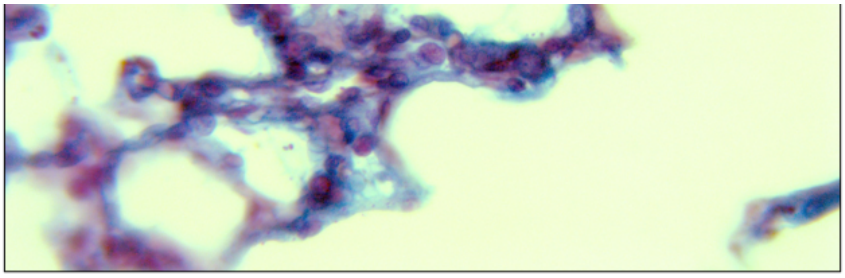
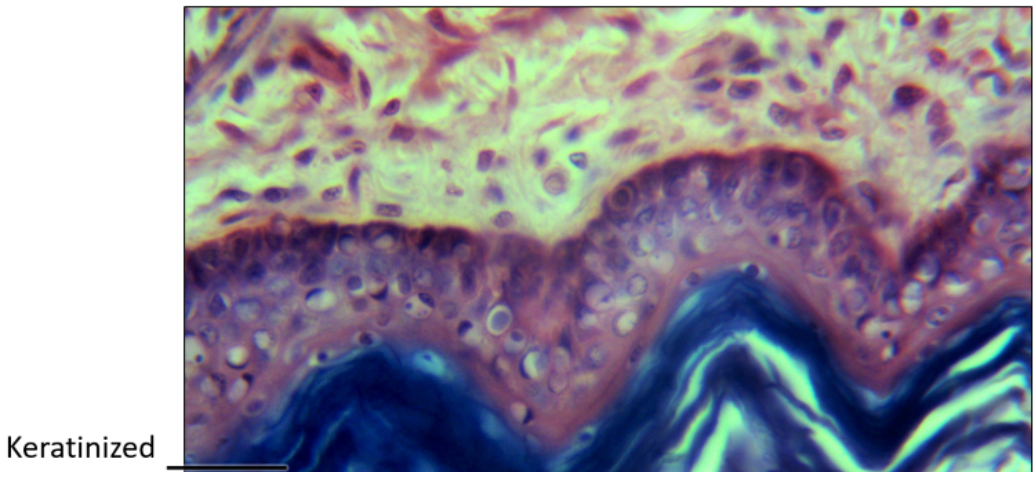


Photo 4: Stratified Squamous - Skin
(SAMPLE ANSWER BELOW)



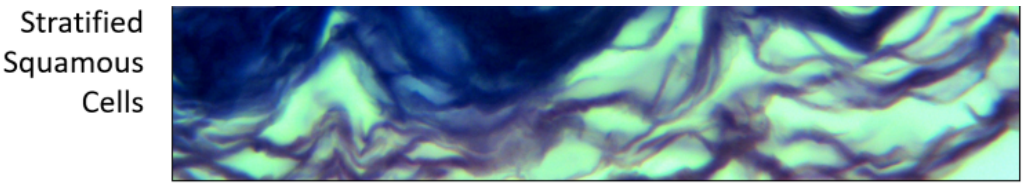


Photo 5: Stratified Squamous Non-K

(SAMPLE ANSWER BELOW)

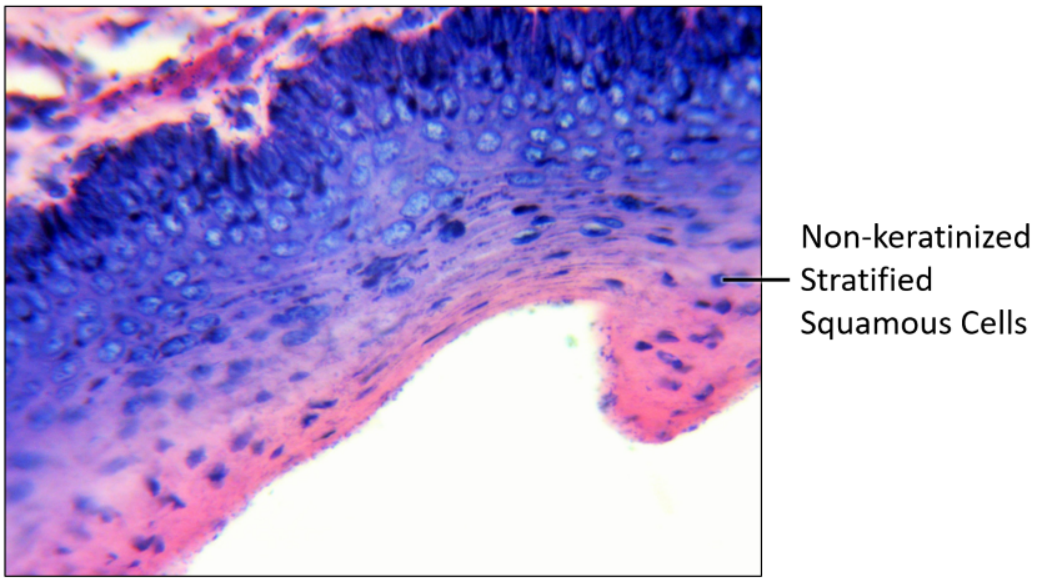
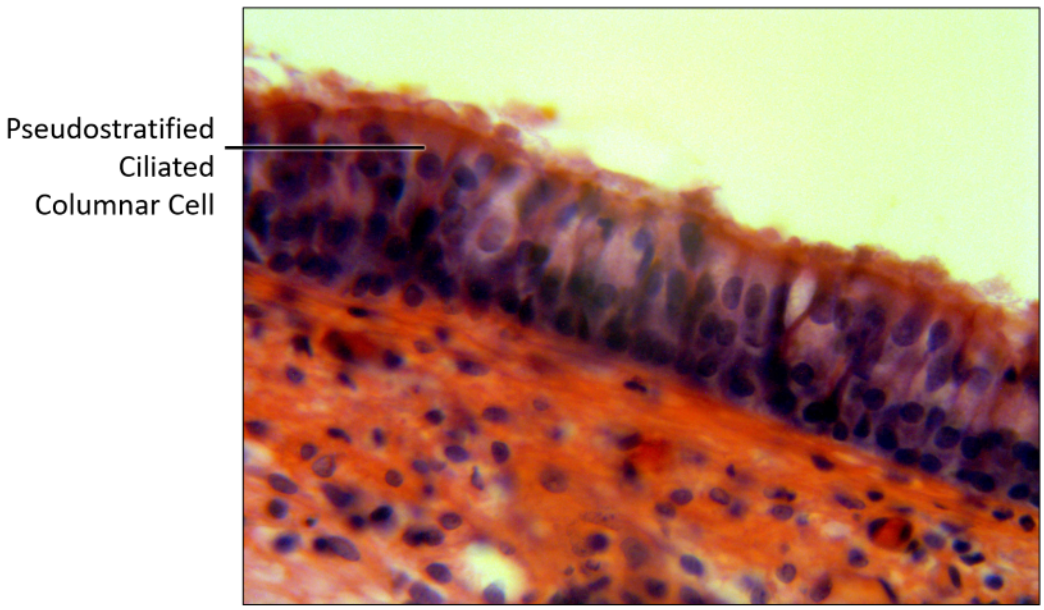


Photo 6: Pseudostratified Ciliated Columnar Epithelium - Trachea
(SAMPLE ANSWER BELOW)



Exercise 2

How do the structures of loose, dense, and reticular connective tissues observed in this exercise effect each of their functions?

Loose connective tissue is composed of more ground substance than protein fibers and functions to insulate and protect the organs that it surrounds. Reticular connective tissue consists of reticular fibers that provide scaffolding for other cells in lymph nodes and bone marrow where it is located. Dense connective tissue is composed of more protein fibers than ground substance and is found in tendons, ligaments, and the tissues that cover muscles and nerves where it provides elasticity and strength to these structures.

How were you able to distinguish the adipose tissue in the cross section of the trachea?

Adipose tissue consists of cells that are filled with almost 80% fat globules which appears as large white speres in the image of the trachea cross section.

Data Table 2: Microscopic Examination of Connective Tissue
(SAMPLE ANSWER BELOW)

Type of Connective Tissue	Magnification	Comments
Loose	150X	Students will only comment if they are unable to identify a structure.
Dense	600X	Students will only comment if they are unable to identify a structure.
Reticular	600X	Students will only comment if they are unable to identify a structure.

Photo 8: Loose Connective Tissue
(SAMPLE ANSWER BELOW)

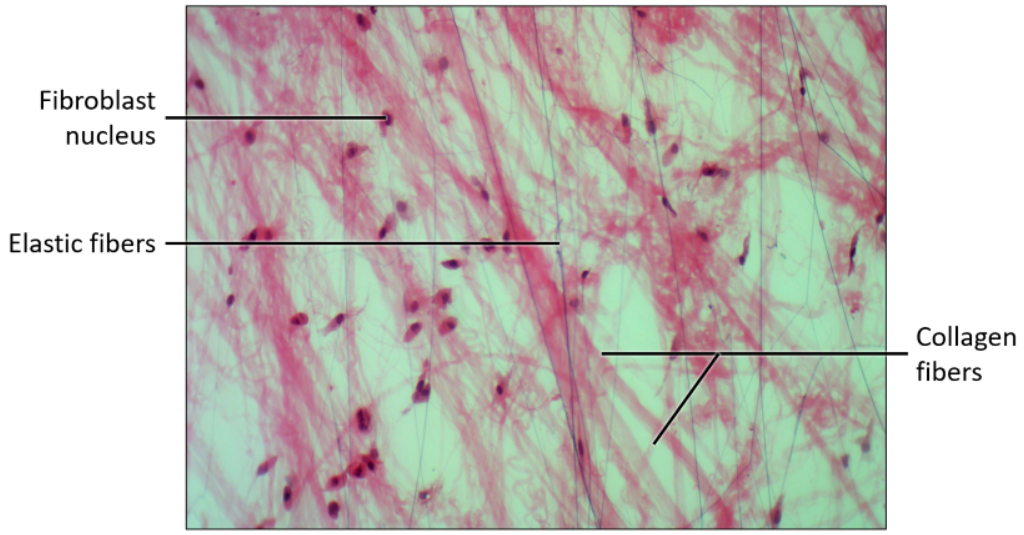


Photo 9: Reticular Connective Tissue
(SAMPLE ANSWER BELOW)

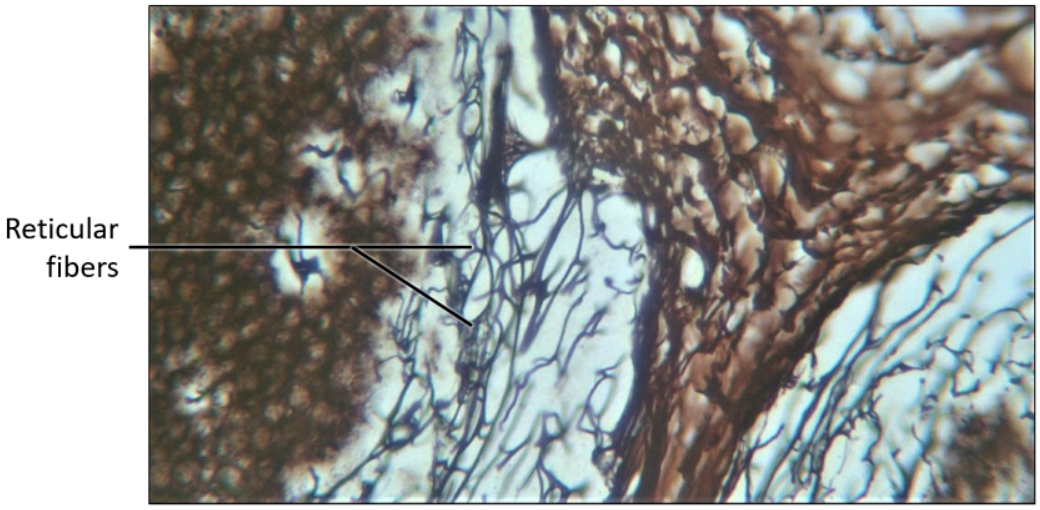


Photo 10: Dense Connective Tissue
(SAMPLE ANSWER BELOW)

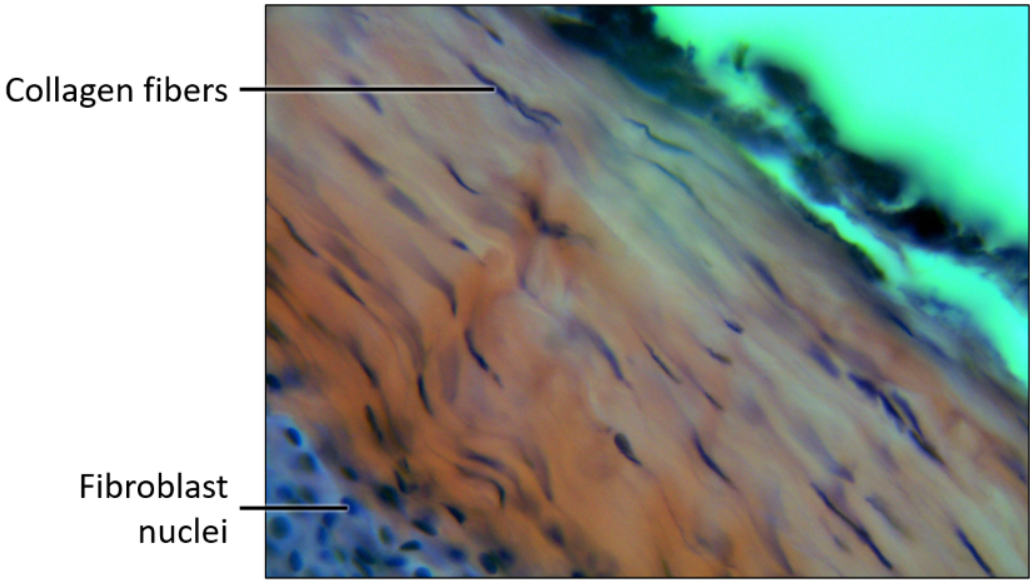
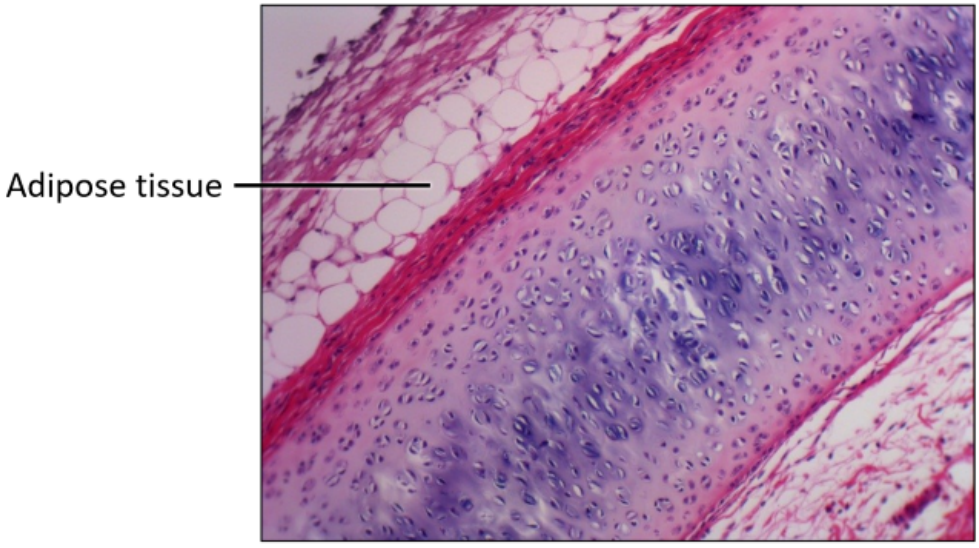


Photo 11: Trachea Cross Section 150x
(SAMPLE ANSWER BELOW)



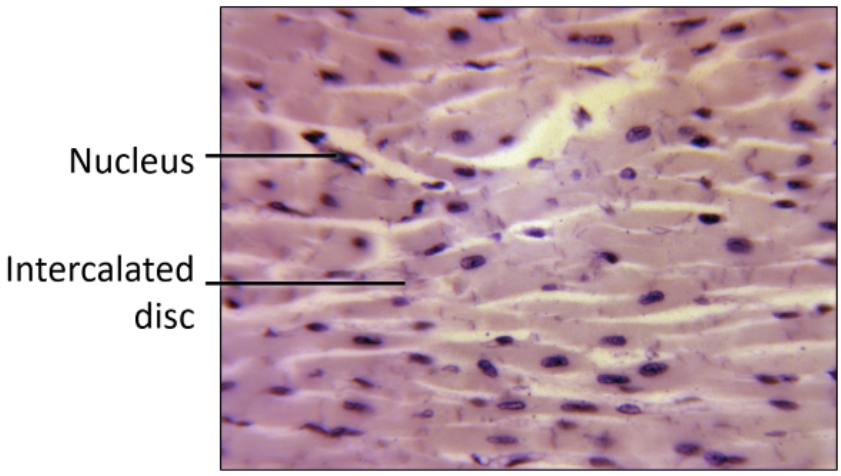
Exercise 3

How did the cell shape and nuclei differ between the three types of muscle tissue examined in this exercise?

Skeletal muscle cells possessed visible striations with nuclei located on the sides of the cells. Cardiac muscle cells were branching with centralized nuclei and intercalated discs. Smooth muscle cells were spindle shaped cells with large, centralized nuclei.

What is the function of the mammalian motor nerve axon examined in this exercise?

Photo 12: Cardiac Muscle
(SAMPLE ANSWER BELOW)



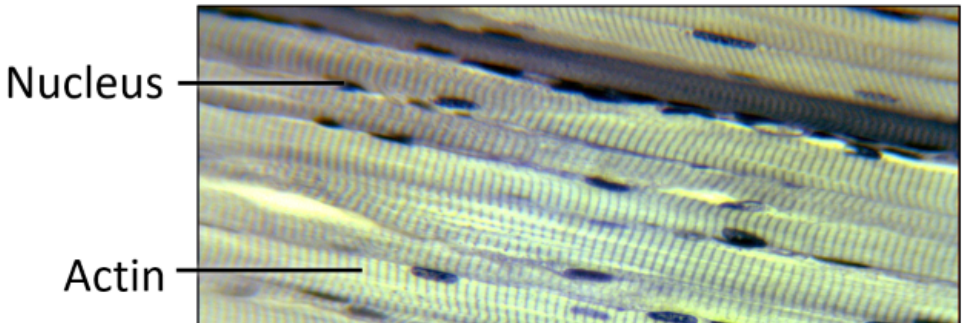
Data Table 3: Muscle and Nervous Tissue

(SAMPLE ANSWER BELOW)

Type of Tissue	Magnification	Comments
Cardiac muscle	150X	Students will only comment if they are unable to identify a structure.
Skeletal muscle	600X	Students will only comment if they are unable to identify a structure.
Smooth muscle	600X	Students will only comment if they are unable to identify a structure.
Motor nerve	150X	Students will only comment if they are unable to identify a structure.

Photo 13: Skeletal Muscle

(SAMPLE ANSWER BELOW)



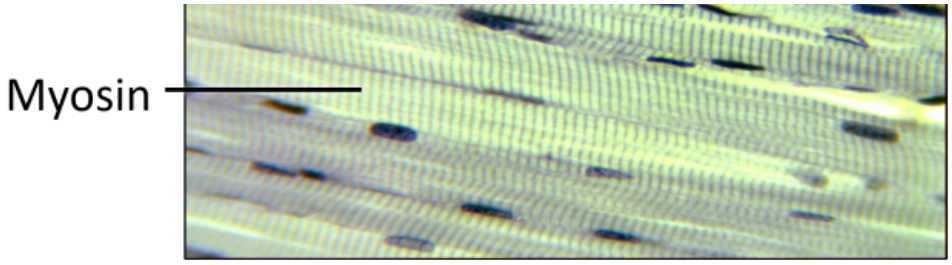
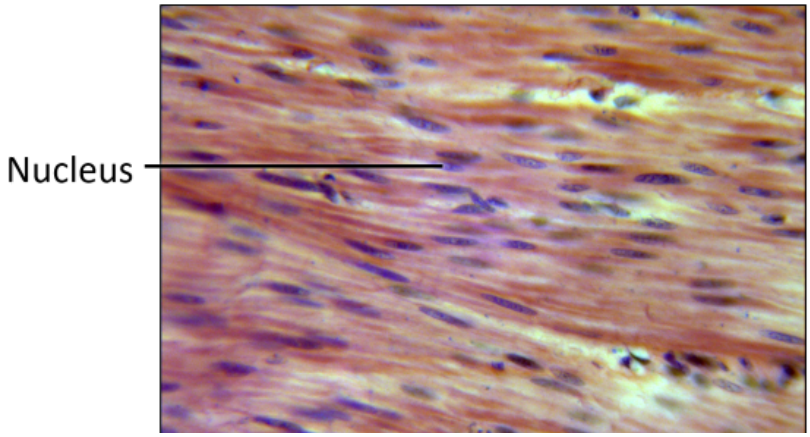


Photo 14: Smooth Muscle
(SAMPLE ANSWER BELOW)



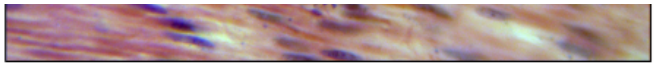
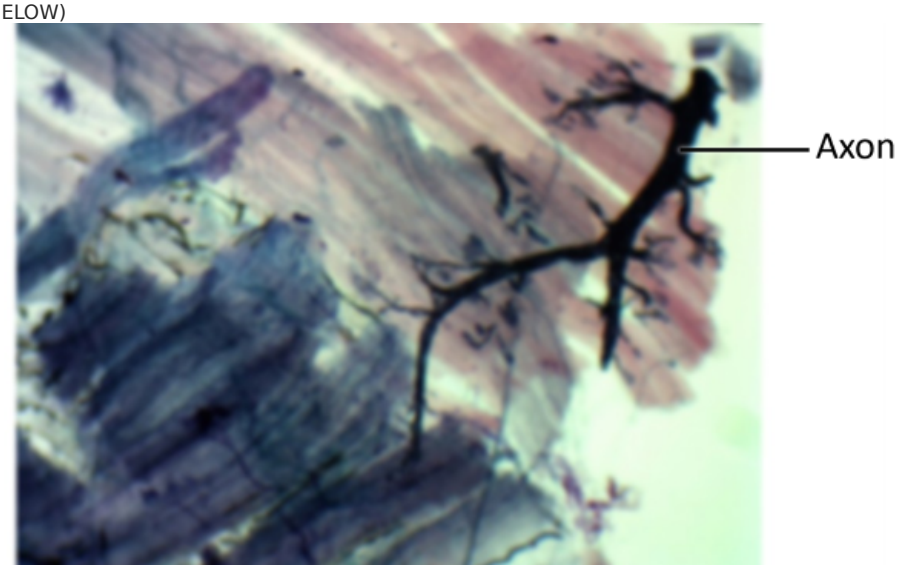


Photo 15: Nervous Tissue
(SAMPLE ANSWER BELOW)



Competency Review

Studying cells and tissues at a microscopic level is important to understanding the functions of organs and organ systems.

- [x] True ✔
- [ ] False

_____ epithelium is found exclusively in the urinary system.

- [ ] Simple cuboidal
- [ ] Simple columnar
- [ ] Stratified squamous
- [x] Transitional ✔

The apical cells of stratified squamous epithelium are flat.

- True ✔
- False

_____ connective tissue provides scaffolding for other cells in lymph nodes and bone marrow.

- Dense
- Reticular ✔
- Cuboidal tissue
- Smooth tissue

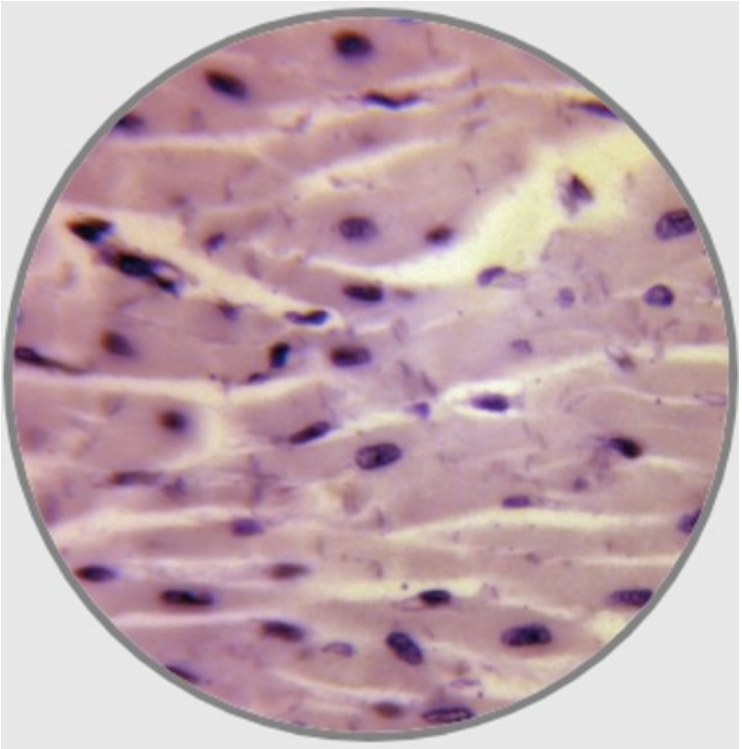
_____ muscle tissue is characterized by spindle shaped cells with large, centralized nuclei.

- Cardiac
- Skeletal
- Smooth ✔
- Keratinized

Nervous tissue consists of neurons and glial cells and is found in the _____.

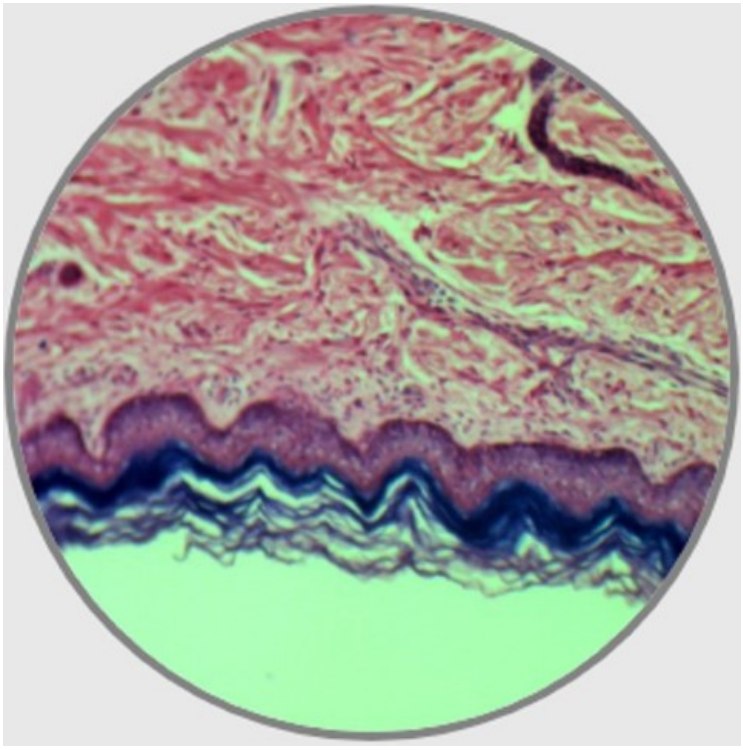
- brain
- spinal cord
- peripheral nerves
- All of the above ✔

The micrograph below is an example of _____ tissue.



- loose connective
- cardiac muscle ✔
- simple squamous epithelial
- reticular connective

The dark-stained outer layer of the epithelial tissue in the micrograph below functions for protection.



- True ✔
- False

Extension Questions

Carcinoma is a cancer that develops from epithelial cells. Apply your knowledge of epithelial tissue histology to predict at least four bodily functions that could be compromised by carcinomas. (SAMPLE ANSWER BELOW)

Carcinoma associated with simple squamous tissue would compromise fluid and gas exchange within the kidneys and lungs respectively. Carcinoma associated with simple cuboidal tissue would compromise the secretion of molecules from the thyroid and other glands in the body. Carcinoma associated with simple columnar tissue would compromise the lining the the digestive system, bronchi, and fallopian tubes and their associated functions of mucus secretion, particle movement, and egg propulsion respectively. Carcinoma of stratified squamous tissues would compromise the function of the skin and uterine lining. Carcinoma associated with pseudostratified columnar tissue would compromise the removal of unwanted substances from the trachea.