



FACULTY OF SCIENCE

DEPARTMENT OF BOTANY AND PLANT BIOTECHNOLOGY

MODULE BOT02A2 PLANT ANATOMY AND CYTOLOGY

CAMPUS APK

EXAM JUNE 2019

DATE: 08 JUNE 2019

SESSION: 08:30 – 10:30

ASSESSOR:

DR A OSKOLSKII

INTERNAL MODERATOR:

MRS J WILLIAMSON

DURATION: 2 HOURS

MARKS: 100

NUMBER OF PAGES: 8 PAGES

INSTRUCTIONS: ANSWER ALL THE QUESTIONS.

REQUIREMENTS: EXAM BOOK

BOT02A2 - PLANT ANATOMY AND CYTOLOGY SUPPLEMENTARY

QUESTION 1

Study the micrograph of a plant tissue (Fig. 1).

- 1.1 What type of microscope was used to take this image? Do not use abbreviations. (1)
 - 1.2 Mention *one* (1) significant advantage of using this type of microscope and *one* (1) disadvantage. (2)
 - 1.3 Name this plant tissue. (2)
 - 1.4 Identify each of the following structures (the same structure can be marked by different letters): **a, b, c, d, e, f** (12)
 - 1.5 What is the magnification of this micrograph? (2)
- [19]**

QUESTION 2

Study the micrograph of a cell (Fig. 2).

- 2.1 By referring to one (1) specific structure in the micrograph, explain whether this is a plant or an animal cell. (2)
 - 2.2 What type of microscope was used to take this image? Do not use abbreviations. (1)
 - 2.3 Identify each of the following structures in detail: **a, b, c, d, e, f, g, h** (8)
 - 2.4 Give *one* (1) main function of
 - 2.4.1 **f** (2)
 - 2.4.2 **e** (2)
 - 2.5 Is this cell meristematic? Motivate your answer. (2)
 - 2.6 What is the size (diameter) of structure **d** ? (2)
- [19]**

QUESTION 3

Study the microphoto (Fig. 3) of a portion of cell wall between two adjacent plant cells and then answer the following questions.

- 3.1 What type of microscope was used to take this image? Do not use abbreviations. (1)

QUESTION 3 (CONTINUING)

- 3.2 Mention *one* (1) significant advantage of using this type of microscope and *one*(1) disadvantage. (2)
- 3.3 Identify each of the following structures in detail: **a, b, c** (3)
- 3.4 Name a portion of structure **a** which are found inside **c**. (1)
- 3.5 Is there the secondary cell wall(s) between these cells? Motivate your answer. (3)
- 3.6 Give *one* (1) main function of structure **b**. (1)
- 3.7 This micrograph is magnified 20 000 times (x 20 000). What is the approximate size of the structure **b**? Show your calculations. (2)

[13]

QUESTION 4

Study the diagram of a transverse section through the leaf of a grass (Fig. 4).

- 4.1 Is this a C3 or C4 plant? Explain your answer by referring to two (2) anatomical structures. (3)
- 4.2 Draw a line diagram (no details of cells required) to show the following: bundle sheath cells, mesophyll cells, epidermis, stomata. Label these structures. (4)
- 4.3 Label the adaxial and abaxial sides of the leaf you have drawn in question 4.2. Motivate your answer. (2)

[9]

QUESTION 5

Study the microphoto of a portion of wood (Fig. 5).

- 5.1 What type of section is it? (2)
- 5.2 Is the plant a gymnosperm, monocotyledon or dicotyledon? Motivate your answer. (2)
- 5.3 Name the type of cells which are the most abundant in the composition of this wood. Give the main functions of these cells. (4)
- 5.4 Identify structure **a**. (2)

[11]

QUESTION 6

Study the microphoto of a section through the ovule of a lily (*Lilum* sp.) and the diagram which represents a portion of this ovule (Fig. 6).

- 6.1 Write down *only the letter* which represents each of the following parts: (9)

- 6.1.1 Antipodals
- 6.1.2 Egg
- 6.1.3 Embryo sac
- 6.1.4 Synergids
- 6.1.5 Funiculus
- 6.1.6 Central cell
- 6.1.7 Micropyle
- 6.1.8 Polar nuclei
- 6.1.9 Integument(s)

- 6.2 Are the following structures haploid or diploid? (4)
- 6.2.1 **c**
- 6.2.2 **d**
- 6.2.3 **f**
- 6.2.4 **g** [13]

QUESTION 7

- 7.1 Mention three (3) significant differences **in the structure** between the root apical meristem (RAM) and the shoot apical meristem (SAM). (3)
 - 7.2 What is double fertilization and what are the results of this process? (3)
- [6]**

QUESTION 8

Refer to Figures 7 and 8 in order to answer the following:

- 8.1 Figure 7, A-C represent various seeds. For each of these diagrams, write down the number of the label line pointing to: (6)
 - 8.1.1 the cotyledon(s),
 - 8.1.2 the endosperm, if present.
 - 8.2 Study Figure 8 showing a seedling of an oak tree. What type of germination is shown? Explain your answer. (1)
- [7]**

QUESTION 9

Give the correct term for each of the following:

- 9.1. Decay-resistant outer coating of a pollen grain. (1)
- 9.2. Layer of periderm formed inside of cork cambium. (1)
- 9.3. The protein of which microfilaments are composed. (1)
- 9.4. The diploid generation in the life cycle of plants. (1)

[4]
TOTAL 100

Figure 1

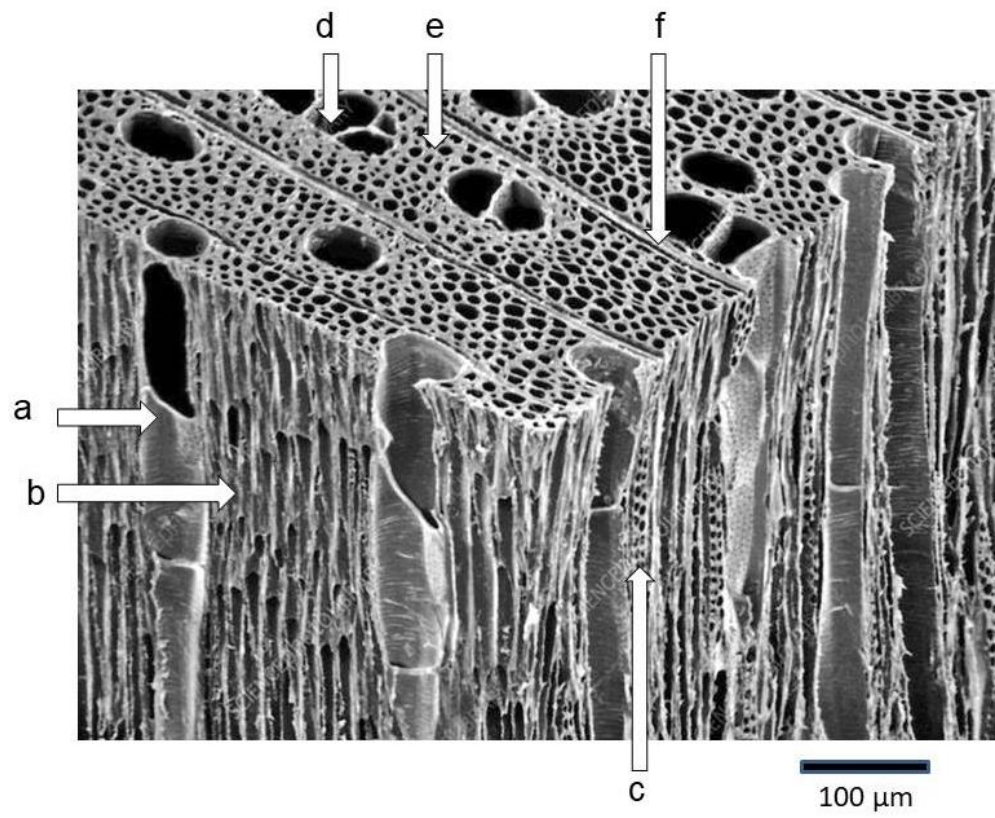


Figure 2

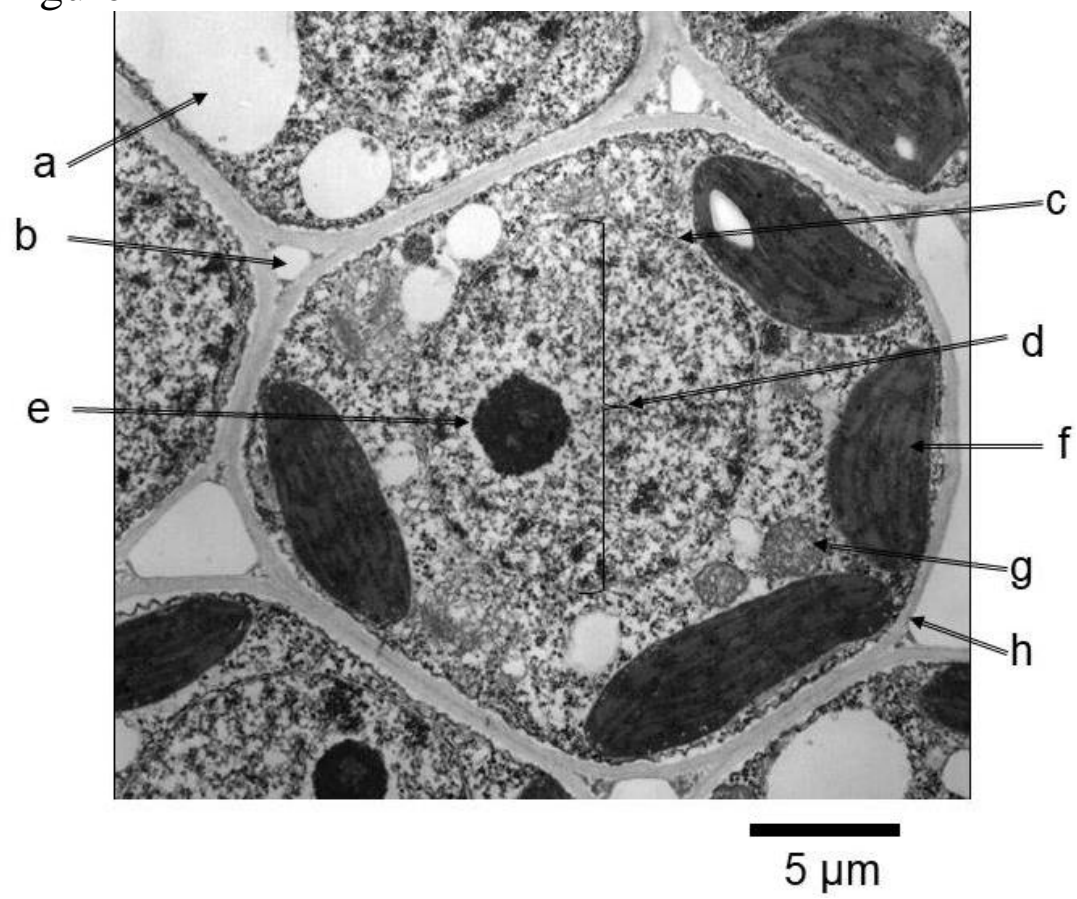


Figure 3

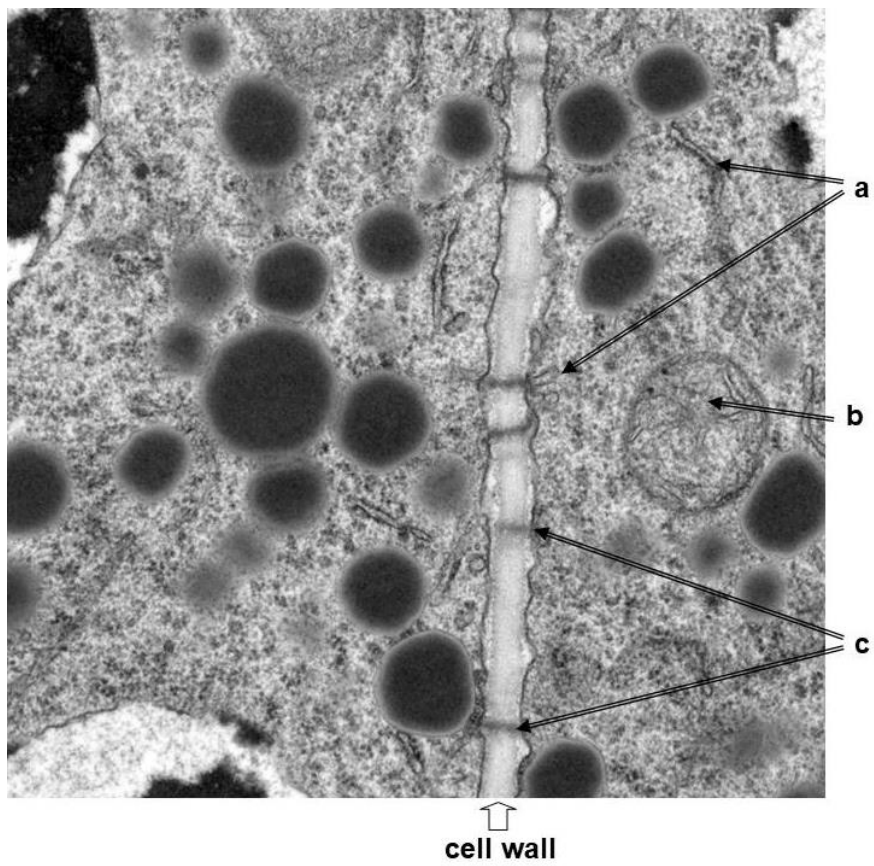


Figure 4

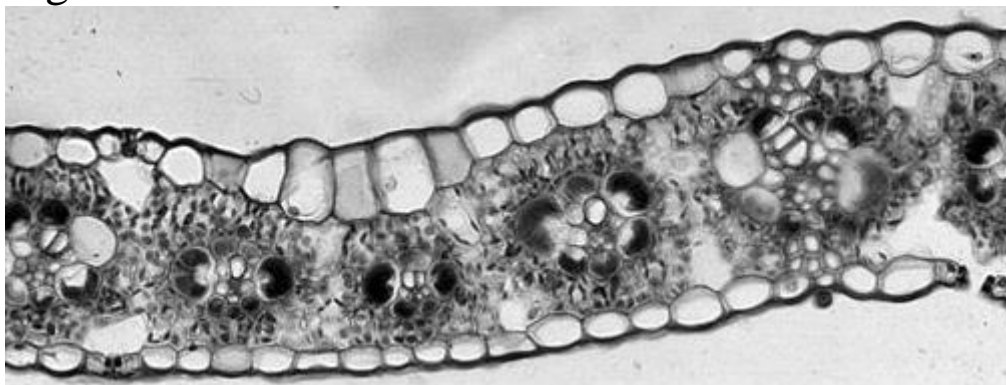


Figure 5

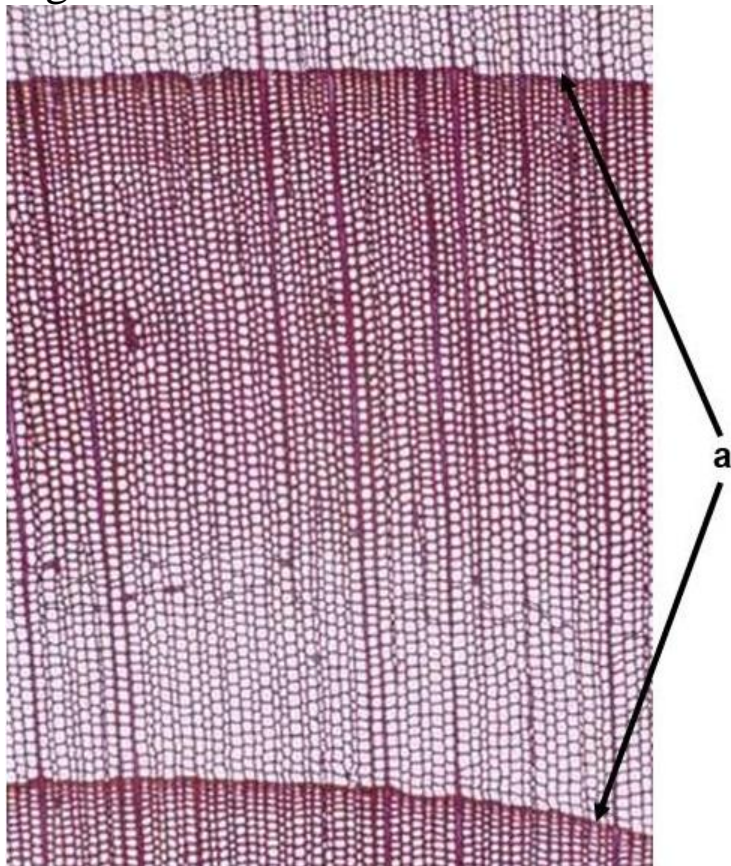


Figure 6

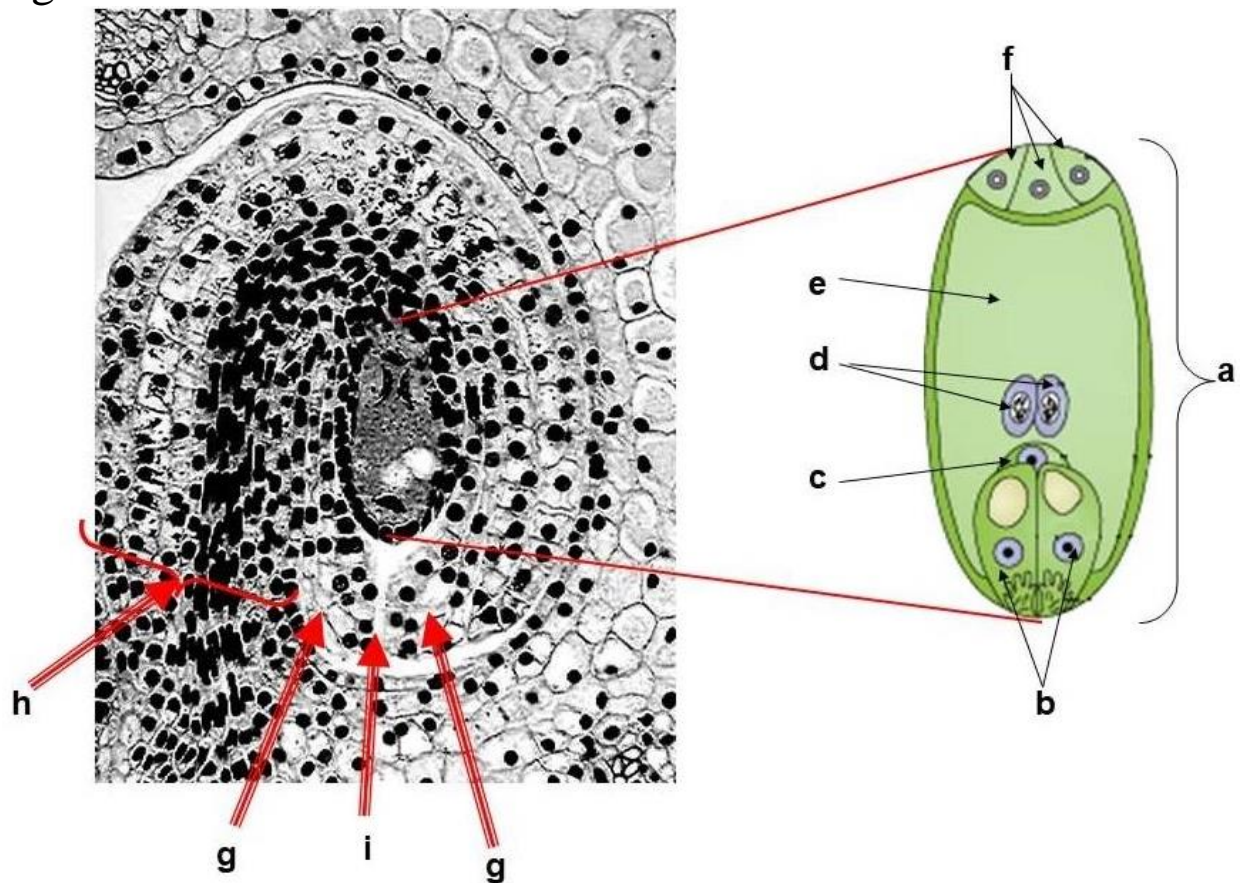
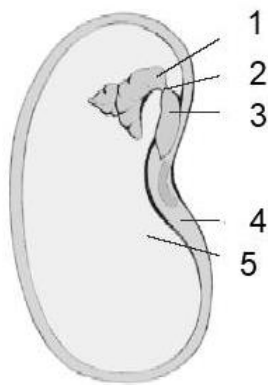
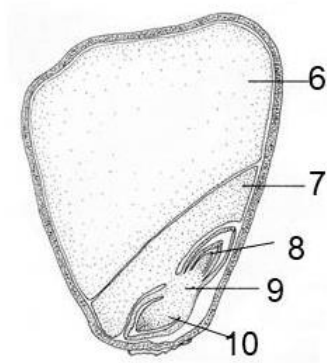


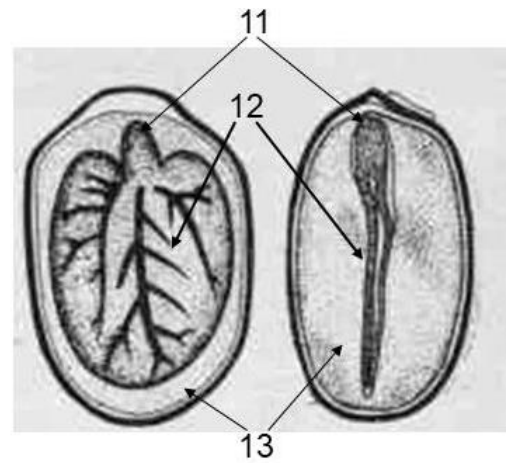
Figure 7



A. Bean seed



B. Maize seed



C. Castor oil plant seed

Figure 8

