



## **FACULTY OF SCIENCE**

### **DEPARTMENT OF BOTANY AND PLANT BIOTECHNOLOGY**

**MODULE      BOT02A2 PLANT ANATOMY AND CYTOLOGY**

**CAMPUS      APK**

**EXAM      JULY 2019**

**DATE: 16 JULY 2019**

**SESSION: 11:30 – 13:30**

**ASSESSOR:**

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**INTERNAL MODERATOR:**

**MRS J WILLIAMSON**

**DURATION: 2 HOURS**

**MARKS: 100**

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**NUMBER OF PAGES: 8 PAGES**

**INSTRUCTIONS: ANSWER ALL THE QUESTIONS.**

**REQUIREMENTS: EXAM BOOK**

## BOT02A2 – ANATOMY & CYTOLOGY

### QUESTION 1

Study the micrograph of plant structures (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 the plant structures. (1)
- 1.4 Identify the structure **A**. (2)
- 1.5 Do structure A belong to the gametophyte or sporophyte generation? (2)
- 1.6 What is the magnification of this micrograph? (2)

**[10]**

### QUESTION 2

Study the micrograph of a cell (Fig. 2)

- 2.1 By referring to two (2) specific structures in the micrograph, explain whether this is a plant or an animal cell. (3)
- 2.2 What type of microscope was used to take this image? Do not use abbreviations. (2)
- 2.3 Identify each of the following structures in detail: **a, b, c, d, e, f, g**. (7)
- 2.4 Give *one* (1) main function of: (4)
  - 2.4.1 **d**
  - 2.4.2 **g**
- 2.5 What tissue could this cell form part of? Motivate your answer. (2)
- 2.6 This micrograph is magnified 1500 times (x 1500). What is the approximate size of this cell (CS) ? Show your calculations (4)

**[22]**

### QUESTION 3

Study the microphoto (Fig. 3) of a portion of a cell with a complete plastid and answer questions that follow.

- 3.1 What type of microscope was used to take this image? Do not use abbreviations. (1)
- 3.2 Mention *one* (1) significant advantage of using this type of microscope and *one* (1) disadvantage. (2)
- 3.3 This plastid is in the process of changing from one type to another.

- 3.3.1 What are these two (2) types? Explain your answer by referring to a characteristic feature of each of these plastids visible in the microphoto. (4)
- 3.3.2 Give an example of an event in the life of a plant when this process would take place. (2)
- 3.4 Name two (2) structures (not necessarily visible in this microphoto) which are characteristic of *all* plastids. (2)
- 3.5 What is the approximate size of this plastid? (2)
- [13]**

#### QUESTION 4

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

- 4.1 Is this a C3 or C4 plant? Explain your answer by referring to one (1) anatomical structure. (3)
- 4.2 Draw a line diagram (no details of cells required) to show the following: bundle sheath extension, conductive bundle, xylem, phloem, palisade mesophyll, spongy mesophyll, stoma. Label these structures. (7)
- 4.3 Label the adaxial (upper) epidermis and the abaxial (lower) epidermis of the leaf you have drawn in question 4.2. Explain your answer by referring to two anatomical differences between upper and lower sides of a leaf. (4)
- 4.4 Is this a sun or shade leaf? Motivate your answer. (2)
- [16]**

#### QUESTION 5

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

- 5.1 What type of section is represented in the Figure? (3)
- 5.2 Is the plant a gymnosperm, monocotyledon or dicotyledon? Motivate your answer. (2)
- 5.3 Identify each of the following structures in detail: a, b, c, d (4)
- 5.4 Mention the main function of structures **b** and **c** respectively. (2)
- [11]**

#### QUESTION 6

Study the diagrams which represent a transverse (cross) section through a plant organ and its portion (Figure 6).

- 6.1 Identify this organ. (1)
- 6.2 Is the plant a monocot or a dicot? Motivate your answer. (3)

- 6.3 Identify each of the following structures in detail: **1, 2, 3, 4, 5.** (5)
- 6.4 Mention the main function of the structure **4.** (2)
- [11]**

#### **QUESTION 7**

- 7.1 Mention two (2) main differences between microtubules and microfilaments (excluding functions). (2)
- 7.2 Which portion of a cell wall (middle lamella, primary wall, secondary wall) is the furthest away from the plasmalemma? (1)
- 7.3 Mention the most significant difference in the fertilization process between gymnosperms and angiosperms. (1)

**[4]**

#### **QUESTION 8**

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

- 8.1. Figure 7 a – d represent various seeds. For each of these figures, write down the number of the label line pointing to:
- 8.1.1 the radicle, and
- 8.1.2 the endosperm, if present. (8)
- 8.2 Study Figure 8. What type of germination is shown? Explain your answer. (2)
- [10]**

#### **QUESTION 9**

Give the correct term for each of the following:

- 9.1 A microsporangium of angiosperms. (1)
- 9.2 The secondary protective tissue. (1)
- 9.3 The generation in the life cycle of plants which develops from spores. (1)

**[3]**

**TOTAL [100]**

Figure 1

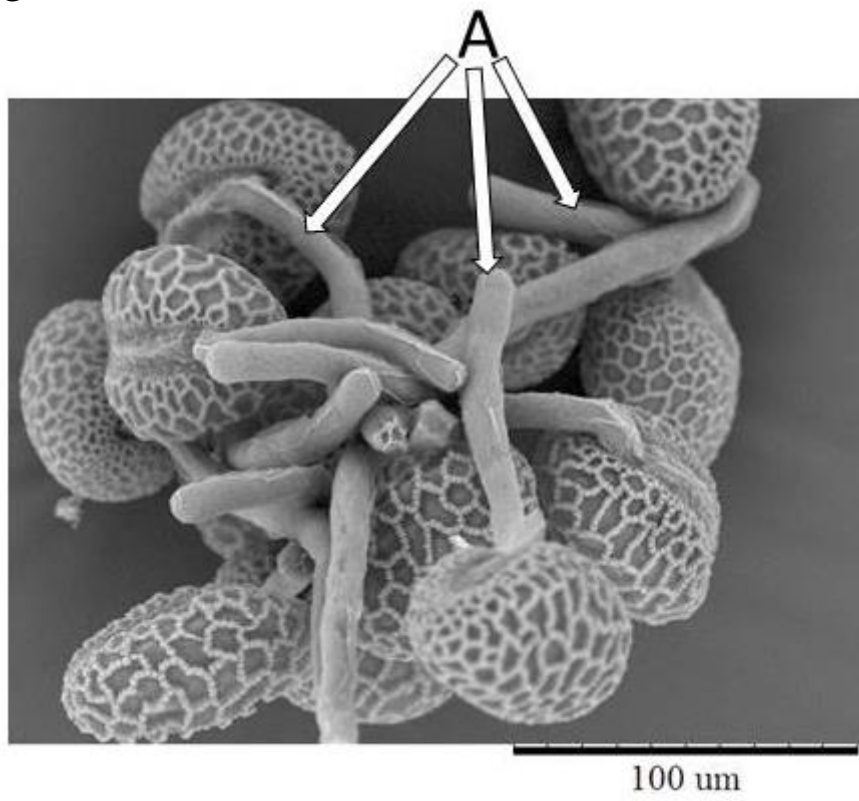


Figure 2

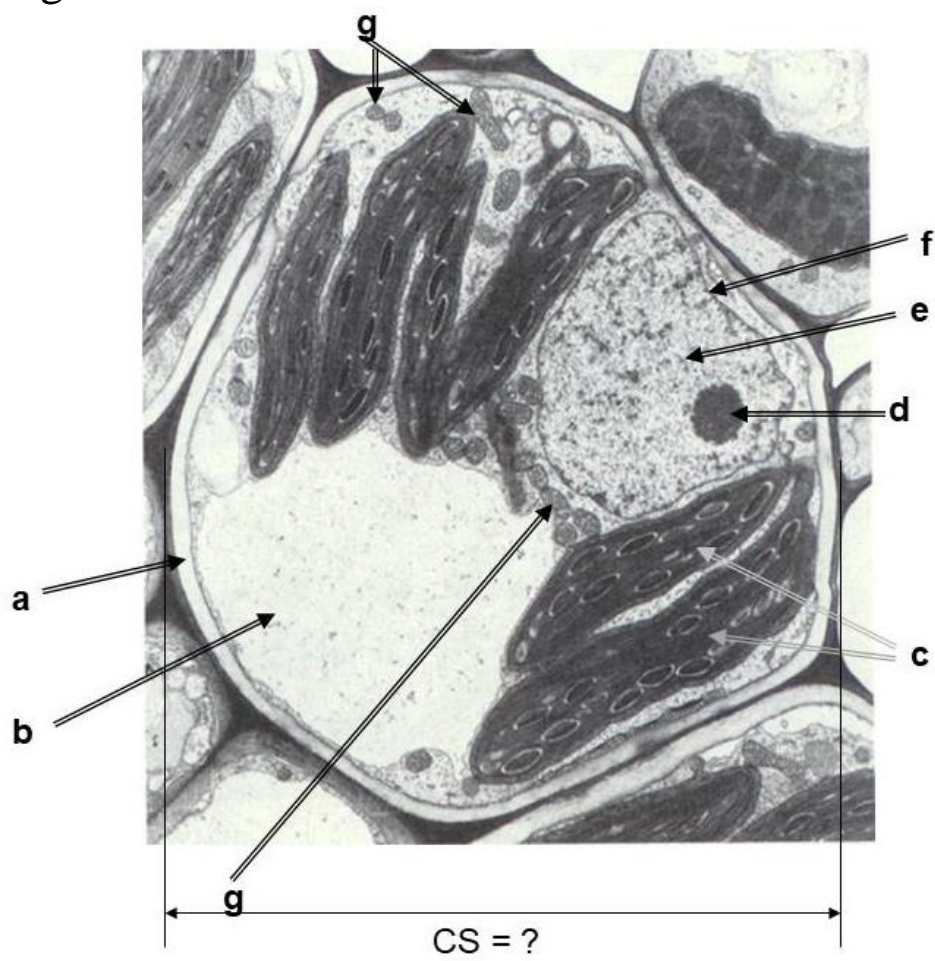


Figure 3

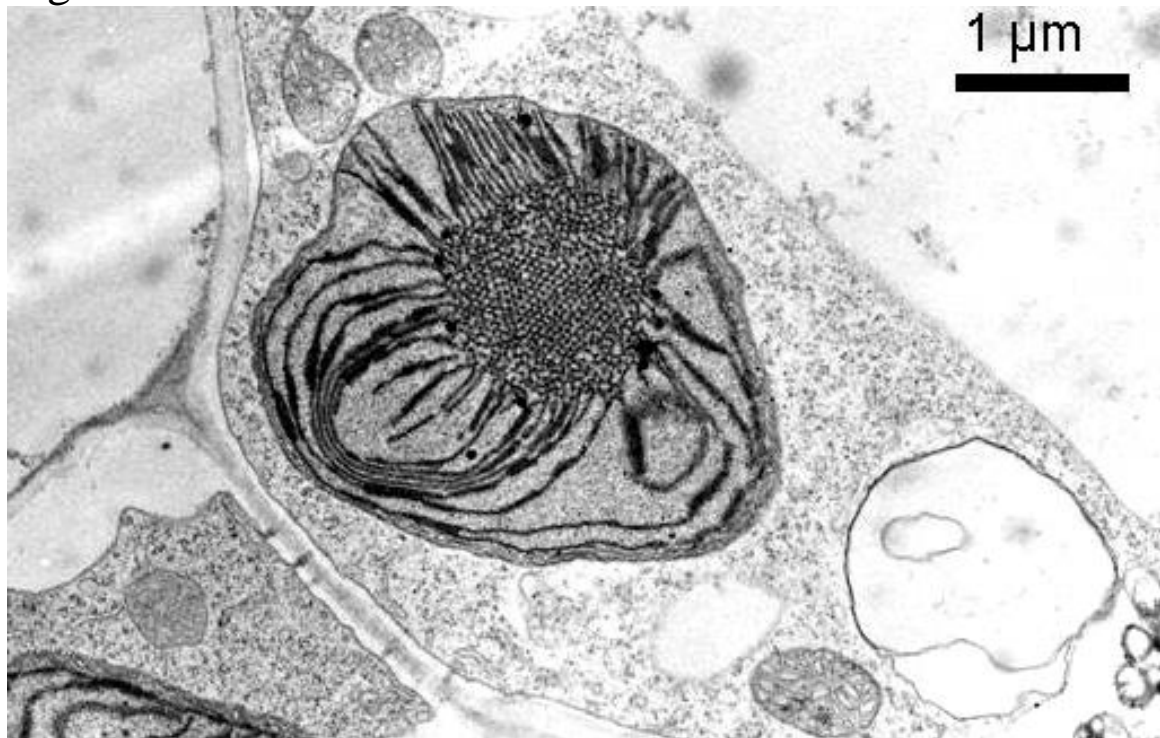


Figure 4

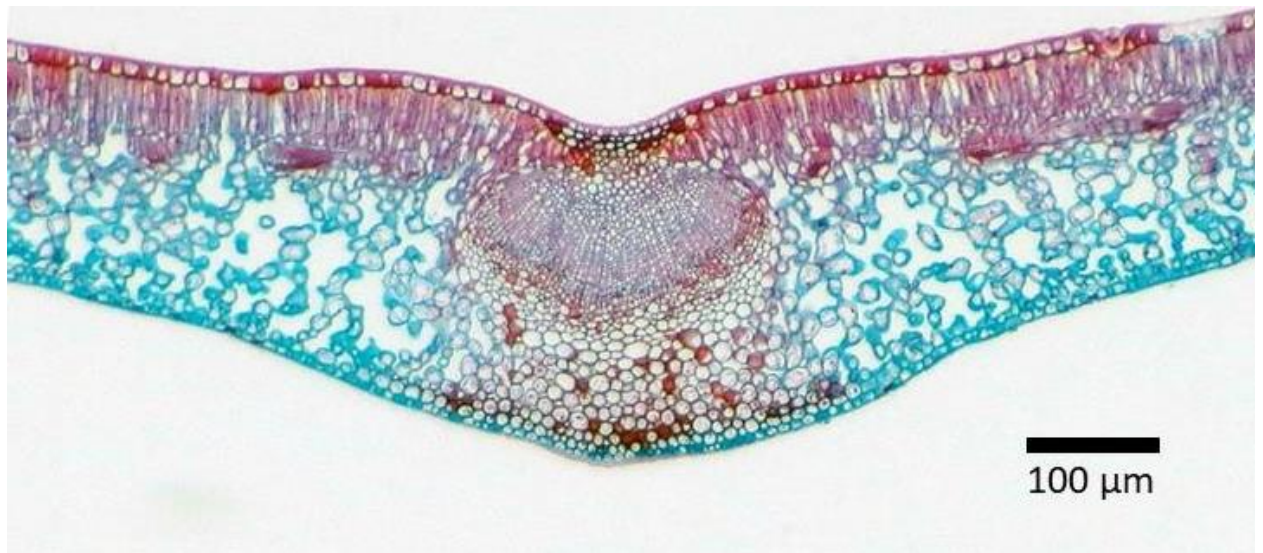


Figure 5

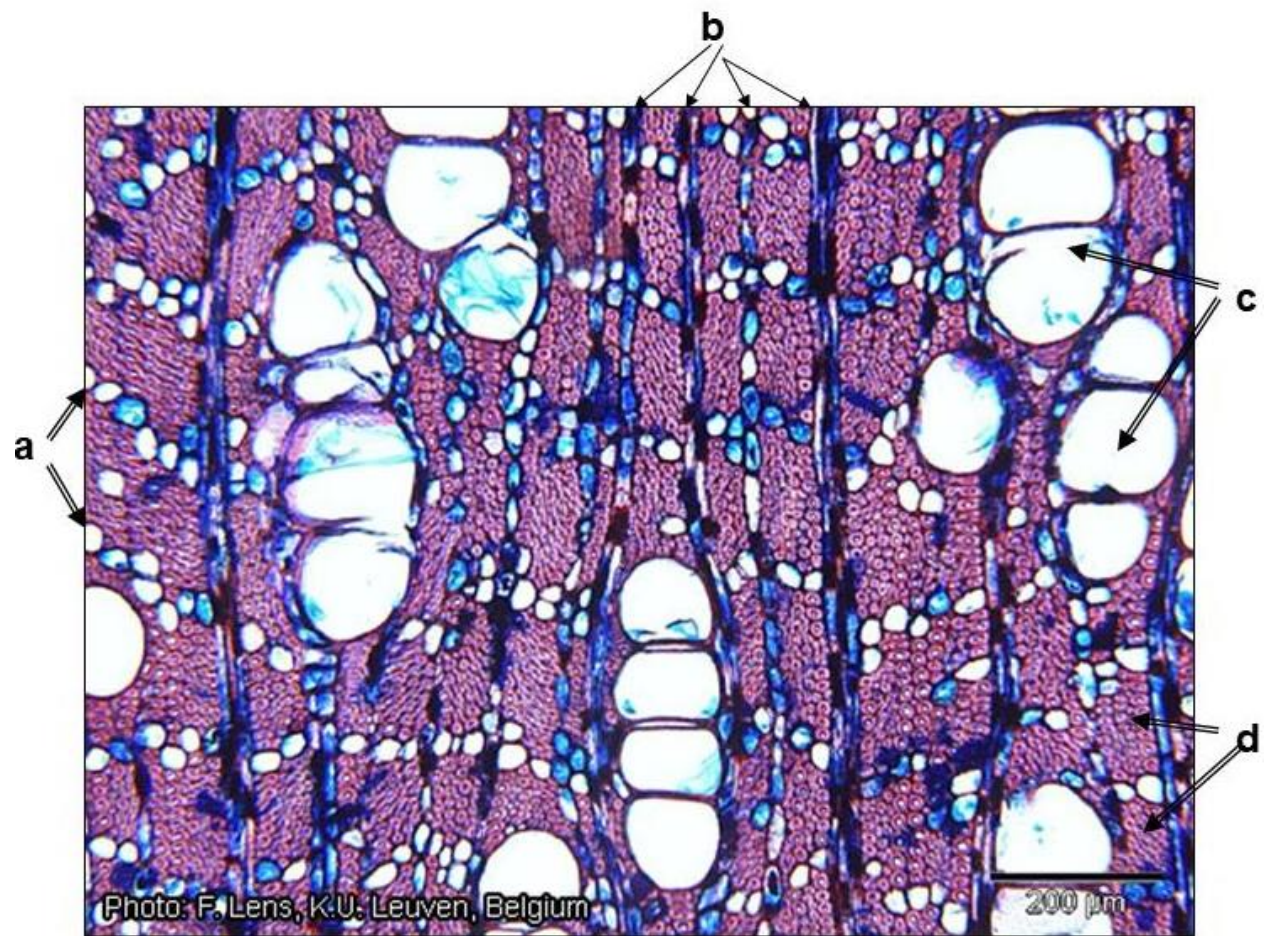


Figure 6

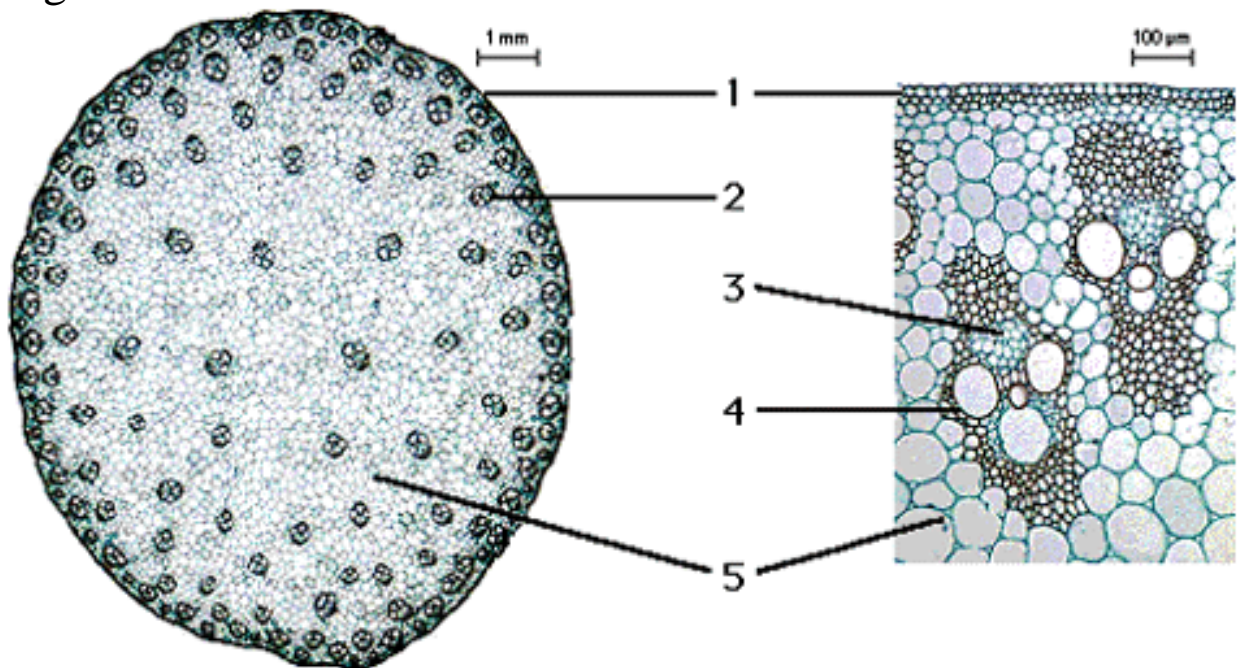


Figure 7

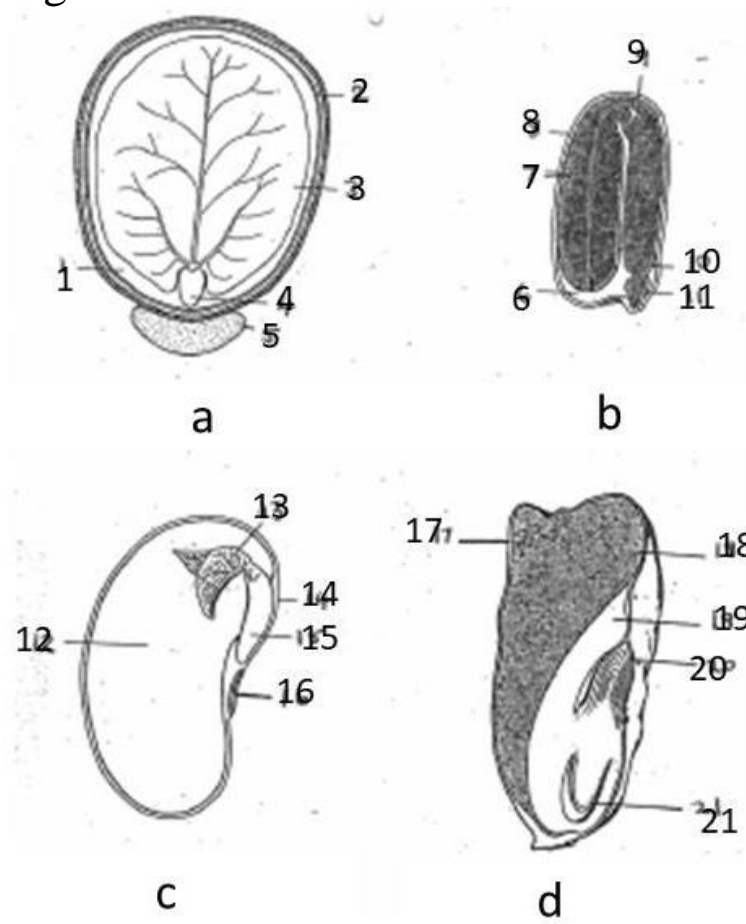


Figure 8

