



## **FACULTY OF SCIENCE**

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

**MODULE            BOT02A2 PLANT ANATOMY AND CYTOLOGY**

**CAMPUS            APK**

**EXAM                JULY 2018**

**DATE:                17 JULY 2018**

**SESSION: 11:30 – 13:30**

**ASSESSOR:**

**DR A OSKOLSKII**

**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 - PLANT ANATOMY AND CYTOLOGY SUPPLEMENTARY**

### **QUESTION 1**

Study the micrograph of a plant structure (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 structure. (2)
  - 1.4 What tissue could this structure form part of? Motivate your answer (1)
  - 1.5 What is the magnification of this micrograph? (2)
- [8]**

### **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 **g** (2)
    - 2.4.2 **h** (2)
  - 2.5 Is this cell meristematic? Motivate your answer. (3)
  - 2.6 What is the size (diameter) of structure **b** ? (2)
- [20]**

### **QUESTION 3**

Study the microphoto (Figure 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 **b** which are found inside **a**. (2)
- 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 **c**. (2)
- 3.7 This micrograph is magnified 20 000 times (x 20 000). What is the approximate size of the structure **b**? Show your working. (2)
- [15]**

### QUESTION 4

Study the diagram of a transverse section through the leaf of a grass (Figure 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 extension, bulliform cells, xylem, phloem, epidermis. 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. (4)
- [11]**

### QUESTION 5

Study the microphoto of a portion of wood (Figure 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 each of the following structures in detail: **a, b, c** (3)
- [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 (Figure 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 **a**
- 6.2.2 **c**
- 6.2.3 **e**
- 6.2.4 **f** [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). (6)
  - 7.2 What is double fertilization and what are the results of this process? (4)
- [10]**

### QUESTION 8

Refer to the diagrams (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. What type of germination is shown? Explain your answer. (2)
- [8]**

### QUESTION 9

Give the correct term for each of the following:

- 9.1. A cell that originates jointly with a sieve tube member from the same mother cell. (1)
- 9.2. Layer of periderm formed outside of cork cambium. (1)
- 9.3. Plant tissues formed by lateral meristems. (1)
- 9.4. The diploid generation in the life cycle of plants. (1)

**[4]**  
**TOTAL 100**

Figure 1

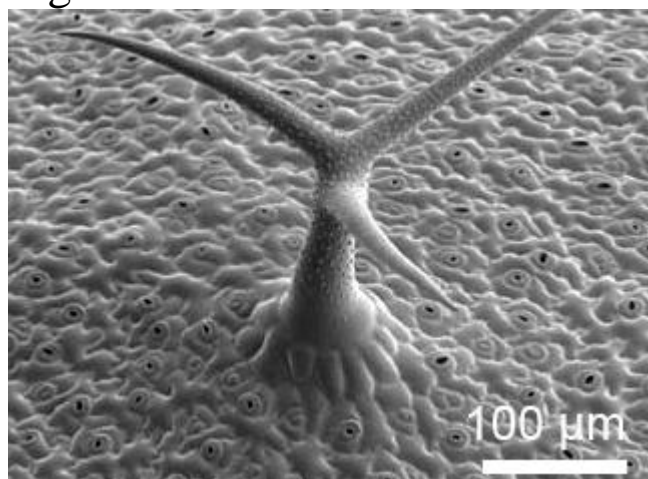


Figure 2

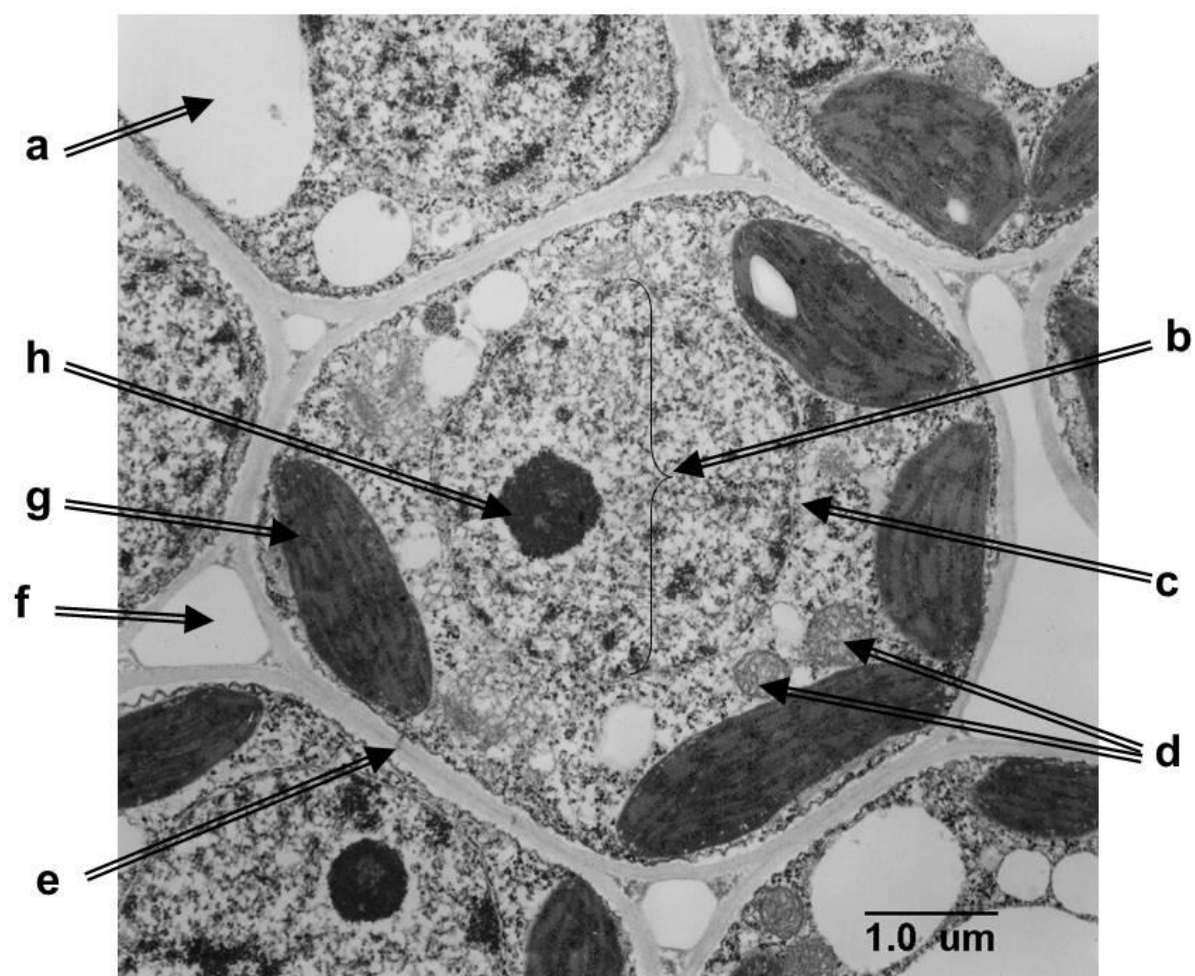


Figure 3

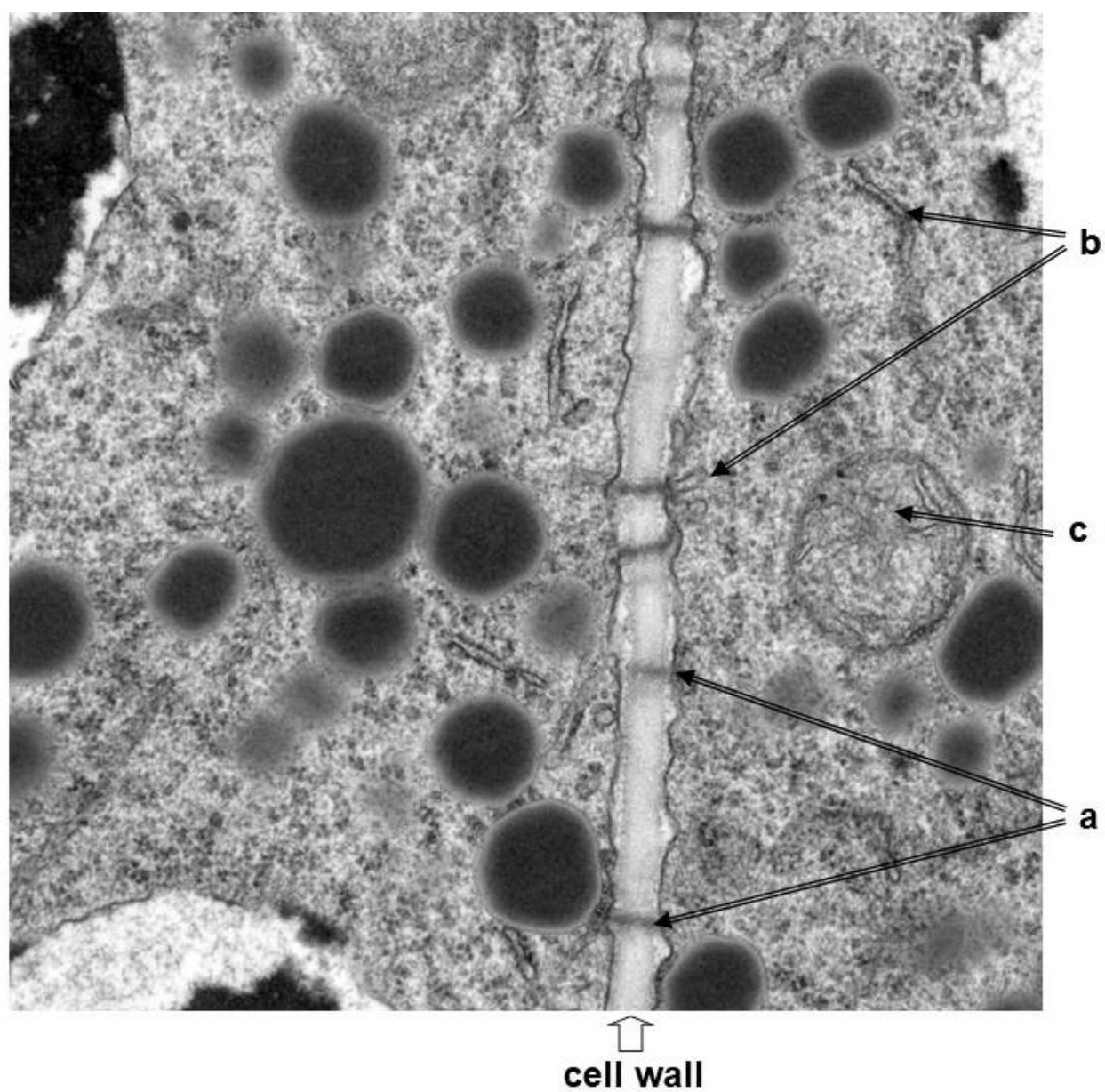


Figure 4

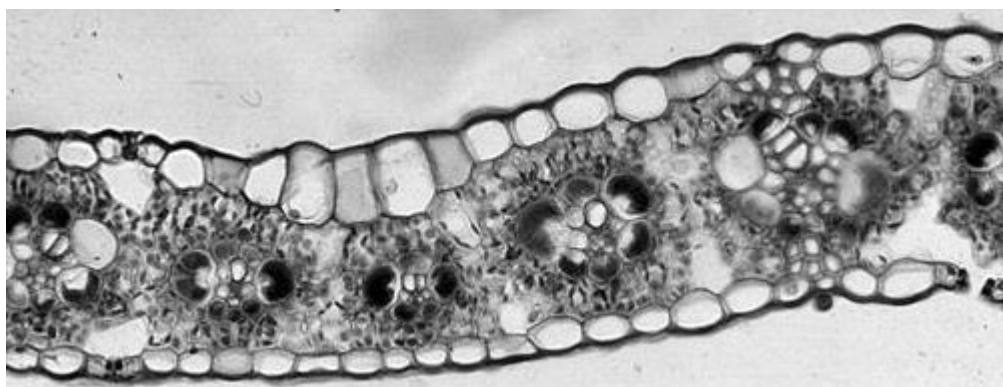


Figure 5

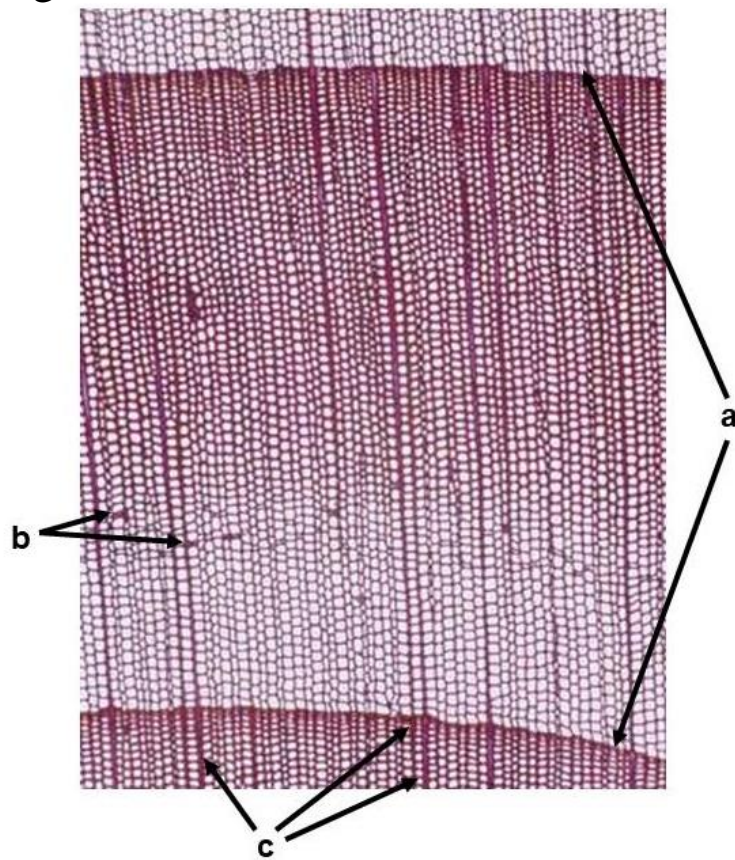


Figure 6

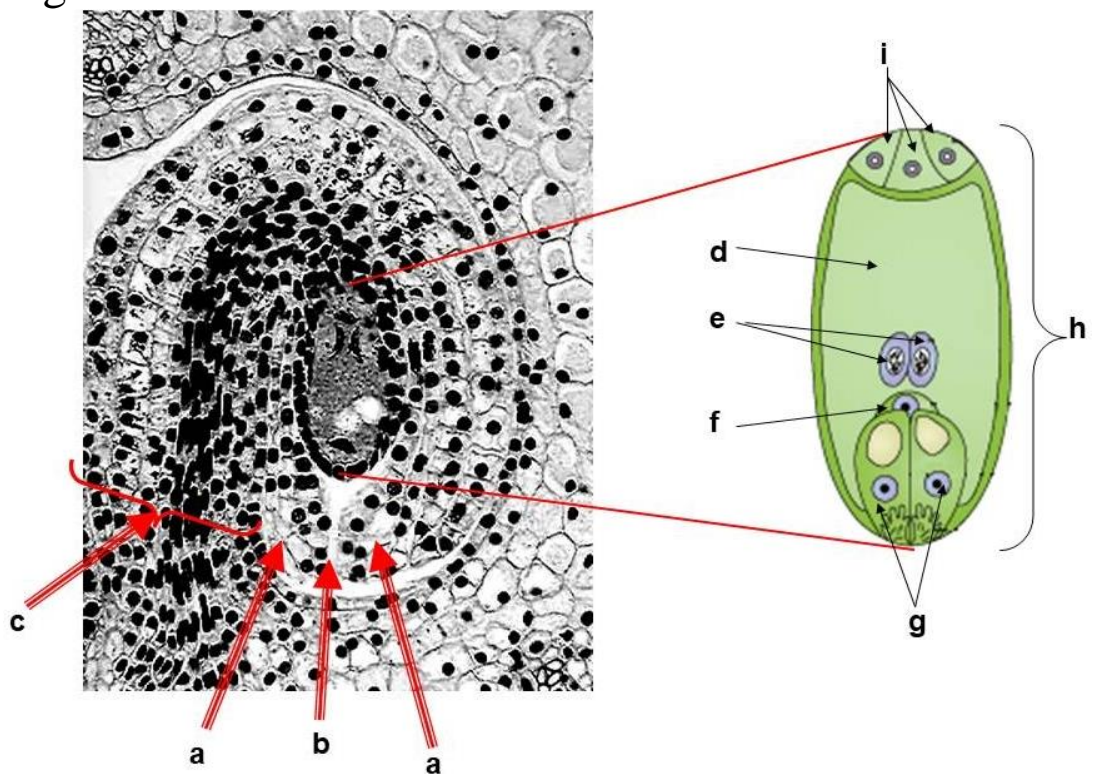
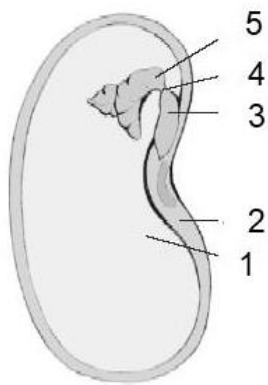
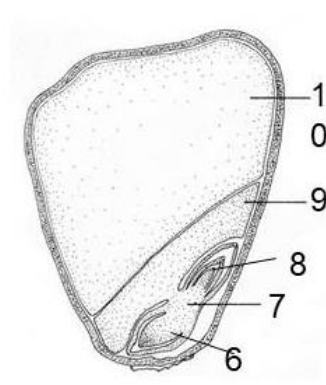




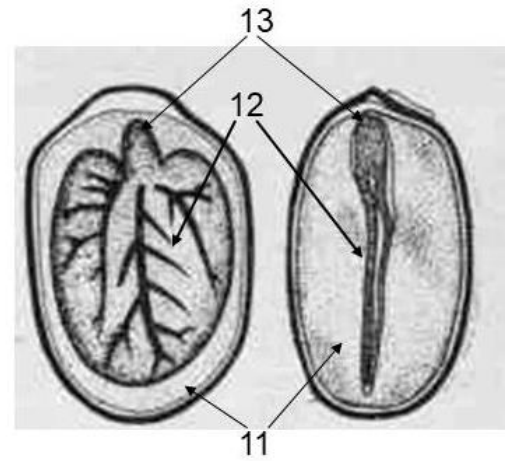
Figure 7



A. Bean seed

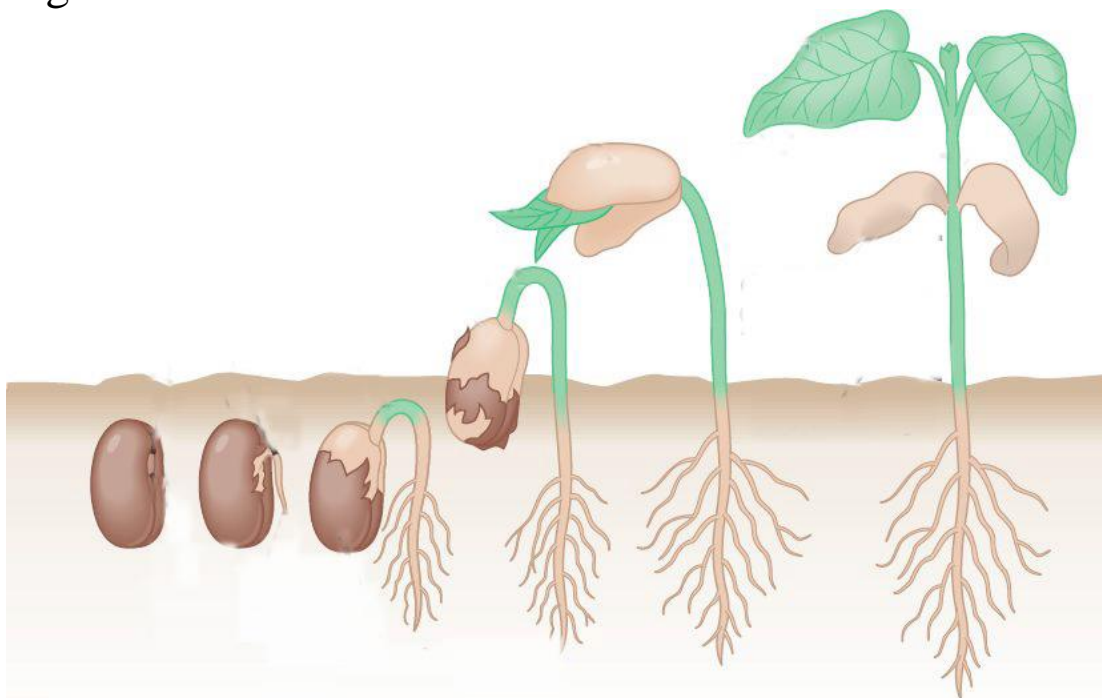


B. Maize seed



C. Castor oil plant seed

Figure 8



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