UNIVERSITY OF JOHANNESBURG

FACULTY OF SCIENCE

DEPARTMENT OF BOTANY AND PLANT BIOTECHNOLOGY

MODULE **BOT2A10 PLANT ANATOMY AND CYTOLOGY**

CAMPUS **APK**

EXAM **JULY 2015**

DATE: **02 JULY 2015** **SESSION: 11:30 – 13:30**

ASSESSOR: **DR AA OSKOLSKII**

INTERNAL MODERATOR: **PROF PM TILNEY**

DURATION: 2 HOURS **MARKS: 100**

NUMBER OF PAGES: 9 PAGES

INSTRUCTIONS: ANSWER ALL THE QUESTIONS.

REQUIREMENTS: EXAM BOOK

BOT2A10 - PLANT ANATOMY AND CYTOLOGY SUPPLEMENTARY

QUESTION 1

Study the micrograph of a plant structure (Fig. A).

1.1 What type of microscope was used to take this image? Write your answer in full. (1)

1.2 Mention *one* significant advantage of using this type of microscope and *one* disadvantage. (2)

1.3 Name this plant structure. (1)

1.4 Is this structure haploid or diploid? (2)

1.5 Name the substance which is a major component of the tough outer coat of this structure. (2)

1.6 What is the magnification of this micrograph? (2)

[10]

QUESTION 2

Study the micrograph of a cell (Fig. B)

2.1 By referring to one 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? Write your answer in full. (1)

2.3 Identify each of the following letters as specifically as possible: **a, b, c, d, e, f, g, h, i.** (9)

2.4 Give *one* main function of (2)
2.4.1 **c**
2.4.2 **e**

2.5 Mention two significant differences in structure and/or chemical composition between **a** and **i.** (2)

2.6 Is this cell meristematic? Motivate your answer. (3)

[19]

QUESTION 3

Study the micro photo (Figure C) of a portion of a cell with a complete plastid and then answer the following questions relating to it.

3.1 What type of microscope was used to take this image? Write your answer in full. (1)

QUESTION 3 (CONTINUING)

3.2 Mention *one* significant advantage of using this type of microscope and *one* disadvantage. (2)

3.3 This plastid is in the process of changing from one type to another.

3.3.1 What are these two types? Explain your answer by referring to a characteristic feature of each of these plastids visible in the micro photo. (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 This micrograph is magnified 32 000 times (x 32 000). What is the approximate length of this plastid? Show your working. (4)

3.5 Name two structures (not necessarily visible in this micro photo) which are characteristic of *all* plastids. (2)

[15]

QUESTION 4

Study the diagram of a transverse section through the leaf of a grass (Figure D).

4.1 Is this a C3 or C4 plant? Explain your answer by referring to two anatomical structures. (3)

4.2 Draw sufficient of the 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. Motivate your answer. (4)

[11]

QUESTION 5

Study the micro photo of a portion of wood (Figure E).

5.1 What type of section is it? (1)

5.2 Is the plant a gymnosperm, monocotyledon or dicotyledon? Motivate your answer. (2)

5.3 Draw a diagram of it and label it fully. (4)

5.4 Mention the main function of each of three major types of cells shown on the micro photo. (3)

[10]

QUESTION 6

Study the diagram which represents a portion of a transverse (cross) section through a stem (Figure F)

6.1 Write down *only the number* which represents each of the following parts: (5)

6.1.1 The vascular cambium
6.1.2 The first-formed growth ring
6.1.3 Primary xylem
6.1.4 Dilated ray in the secondary phloem
6.1.5 Phellem

6.2 What is the approximate width of the growth ring 19 (in radial direction)? (3)

6.3 What is the age of this stem in completed years? Motivate your answer. (2)
[10]

QUESTION 7

7.1 Name two organelles that are **usually** found in plant cells but are absent in mature sieve tube elements. (2)

7.2 Mention two significant differences in the structure of the female gametophyte between gymnosperms and angiosperms. (2)

7.3 What is double fertilization and what are the results of this process? (4)

7.4 In which plant groups is double fertilization present? (1)
[9]

QUESTION 8

Refer to the diagrams (Figure G and H) in order to answer the following:

8.1 Diagrams (Figure G a – d) represent various seeds. For each of these diagrams, write down the number of the label line pointing to

8.1.1 the cotyledon(s)
8.1.2 the endosperm, if present (8)

8.2 Study diagram (Figure H). 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 cell that originates jointly with a sieve tube member from the same mother cell. (1)

9.2. A vertically-elongated cell that forms part of the vascular cambium. (1)

9.3. A meristem that gives rise to the root cap. (1)

9.4. A connection in a cell wall where protoplasm of one cell is in contact with that of the adjacent cell. (1)

9.5. The characteristic end wall of vessel elements. (1)

9.6. The diploid generation in the life cycle of plants. (1)

[6]

TOTAL 100

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Figure A

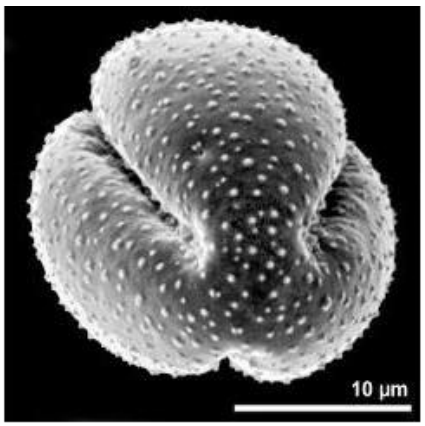


Figure B

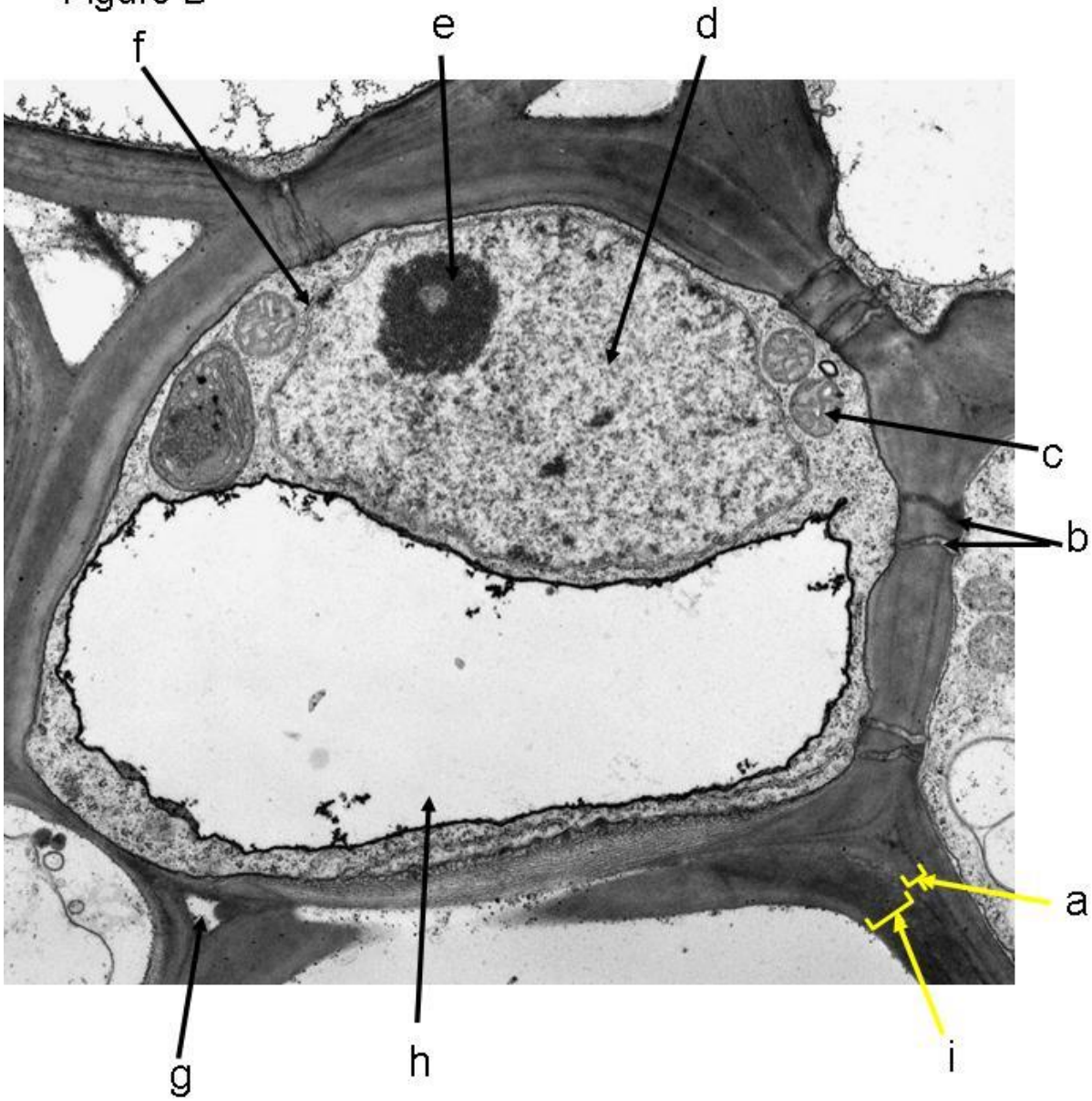


Figure C

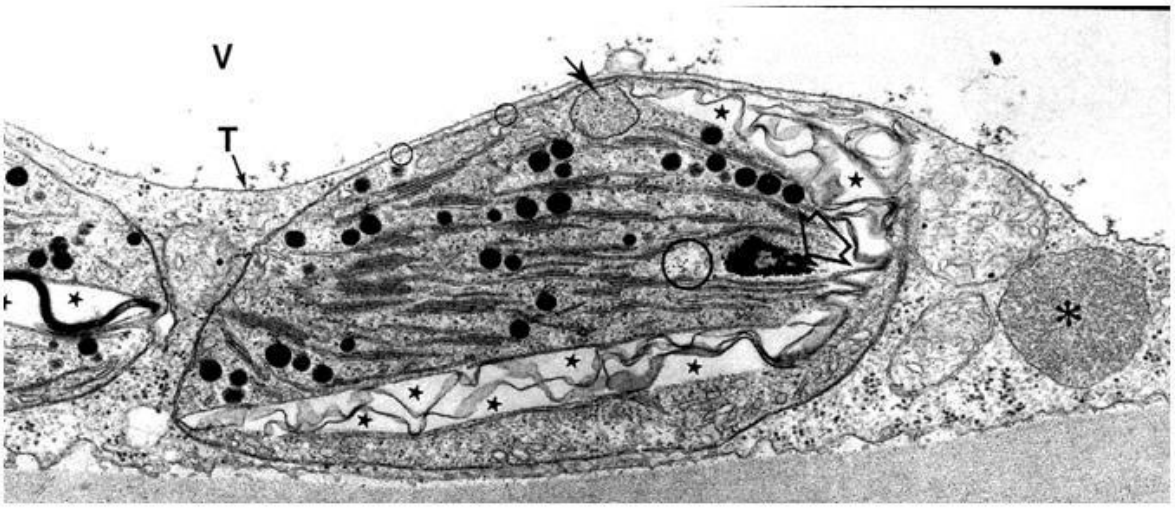
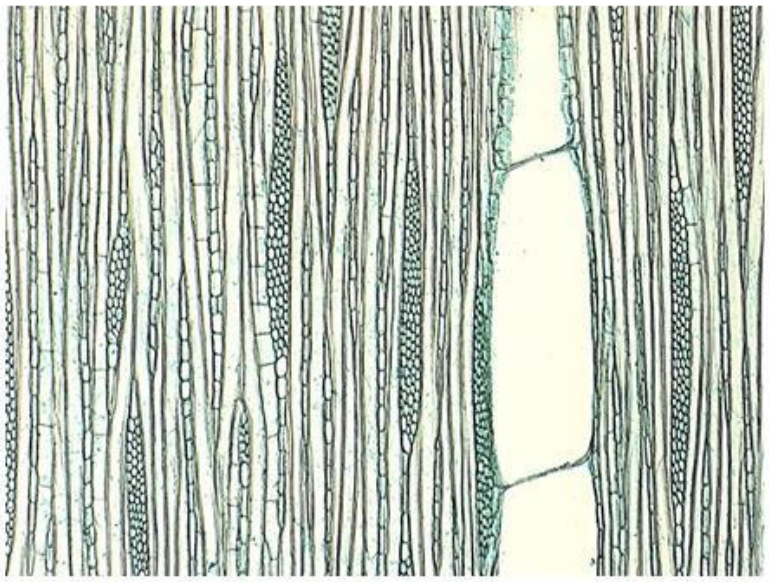


Figure D

Figure E



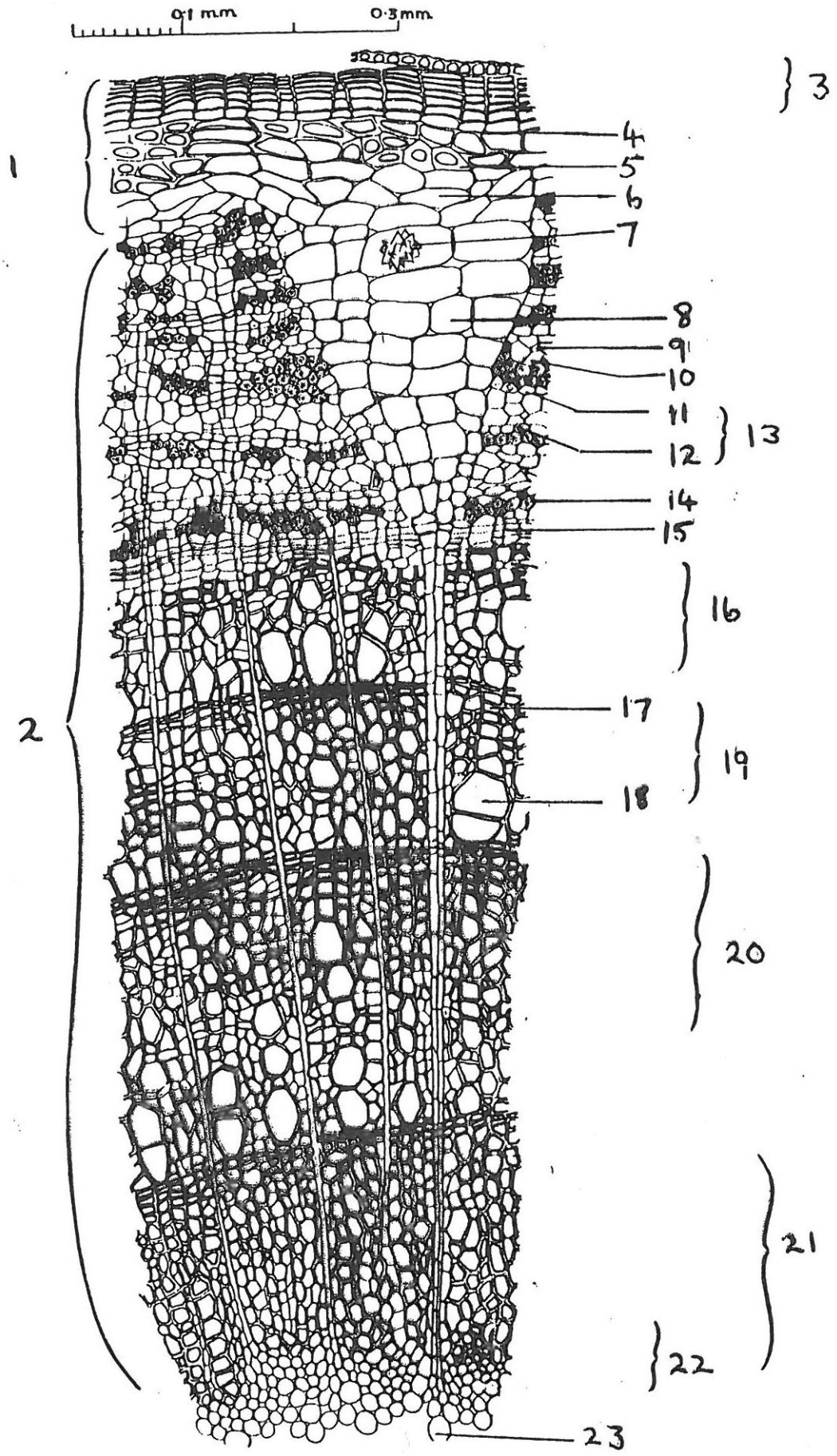

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Figure G

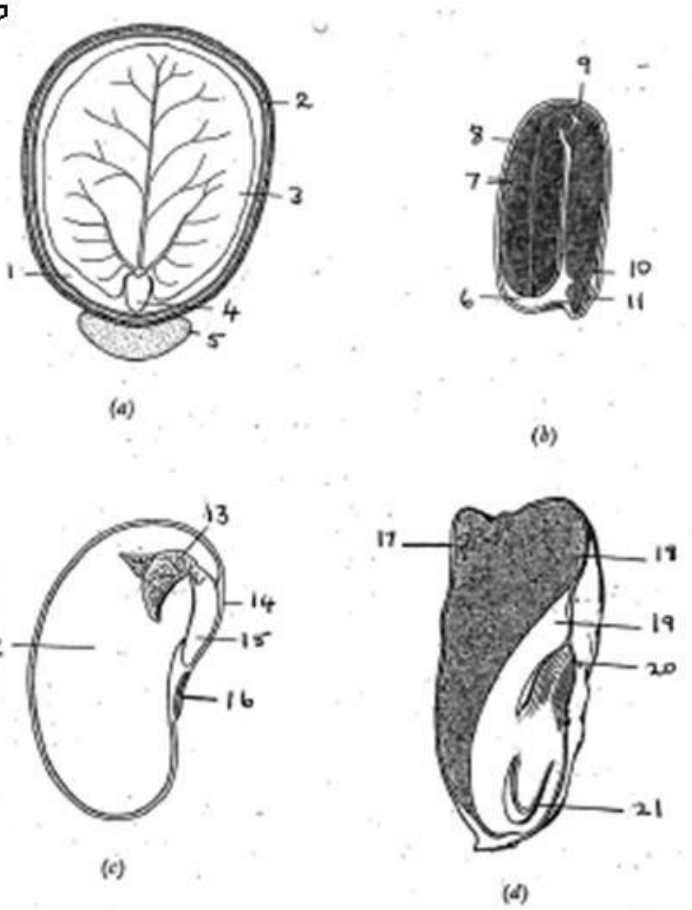
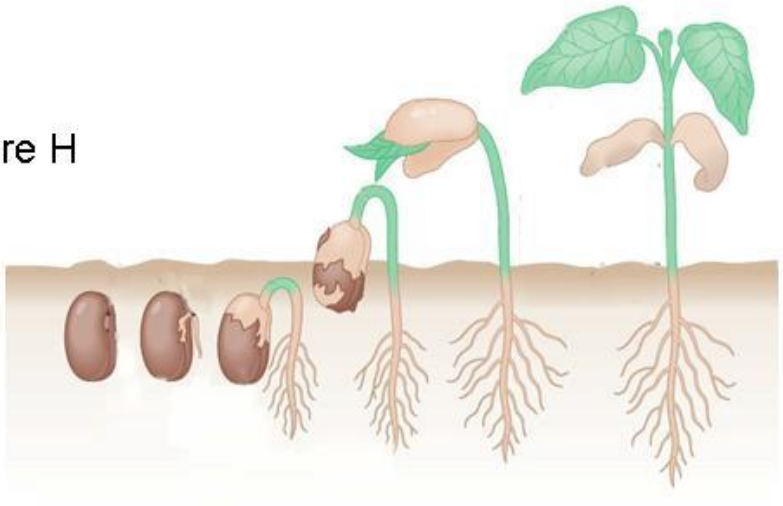


Figure H



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