



CHEMISTRY ONLINE
— **TUITION** —

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BIOLOGY

FOUNDATIONS IN BIOLOGY

| | |
|-----------------|--------------------|
| Level & Board | OCR (A-LEVEL) |
| TOPIC: | CELL STRUCTURE |
| PAPER TYPE: | QUESTION PAPER - 2 |
| TOTAL QUESTIONS | 8 |
| TOTAL MARKS | /29 |

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Cell Structure - 2

1.

Sago pondweed is an aquatic plant that may be seen growing all over the world.

A transmission electron micrograph of a sago pondweed cell is displayed in Fig. 1.1.

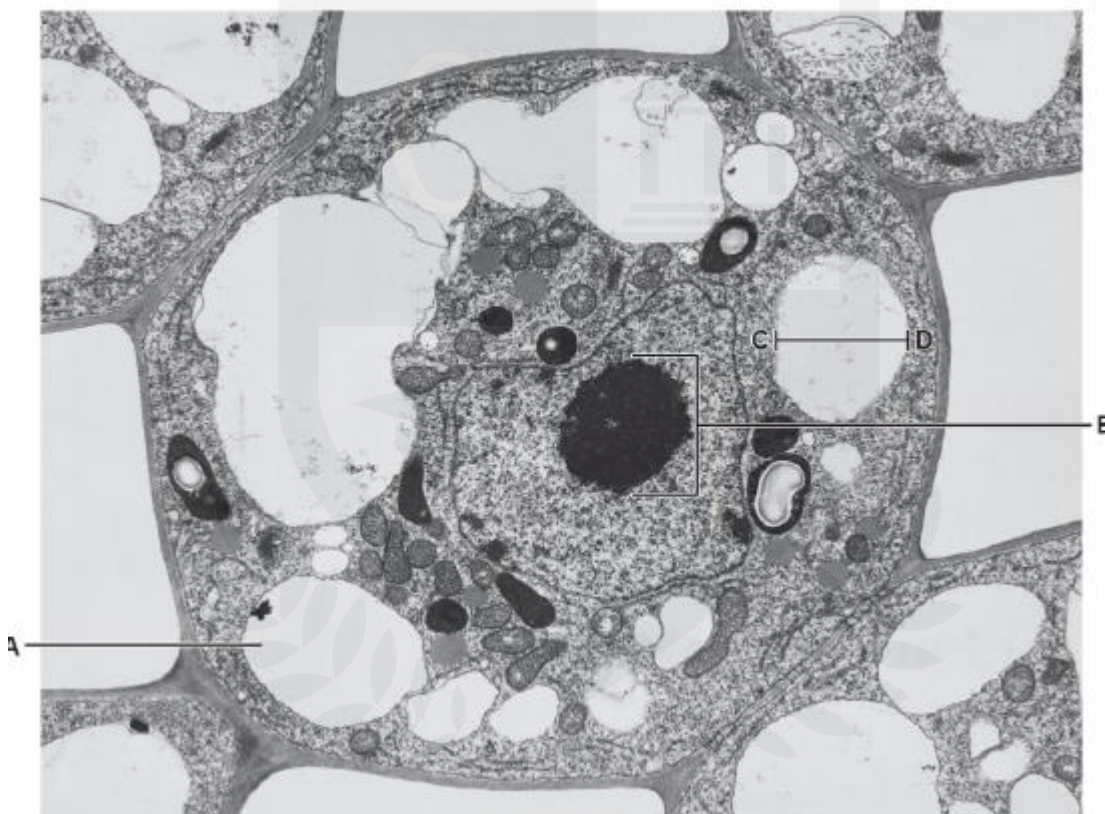


Fig. 1.1

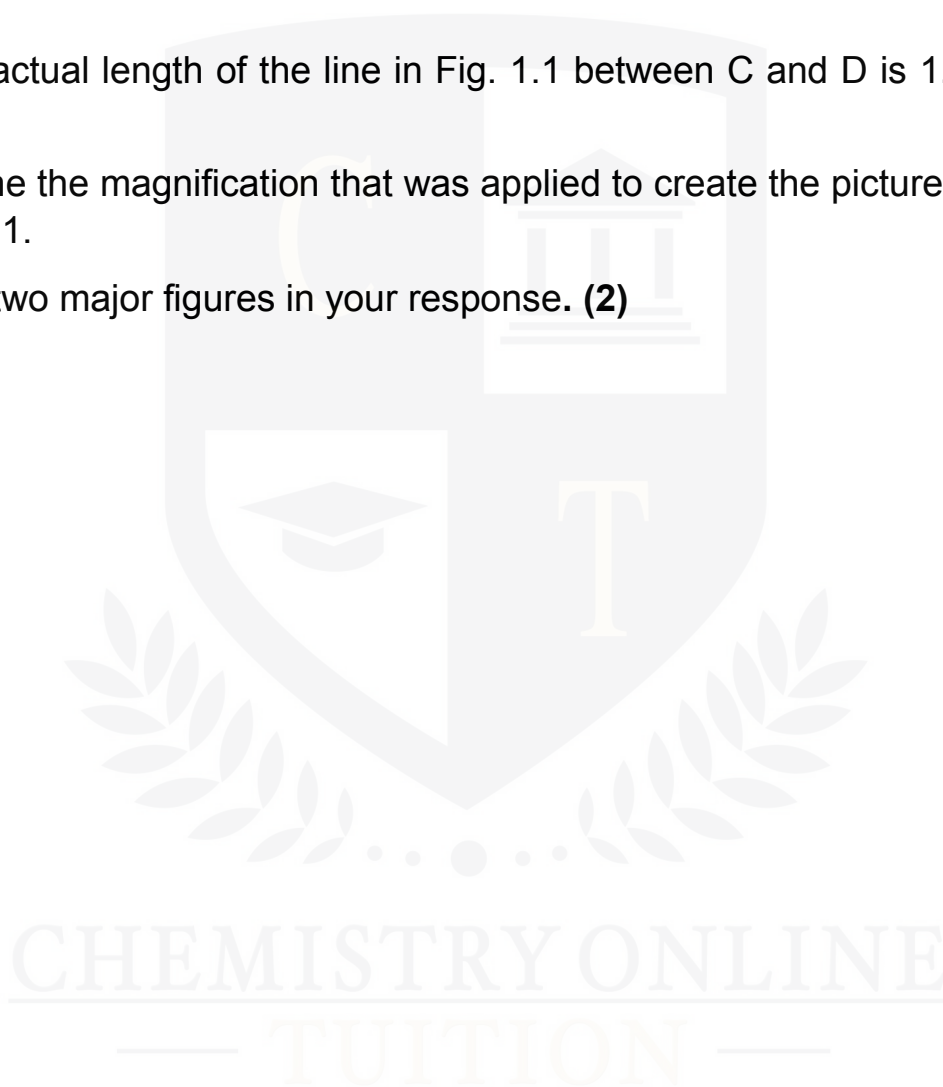
(a) Name the cellular elements that are displayed at A and B. (2)

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(b) The actual length of the line in Fig. 1.1 between C and D is 1.4×10^{-6} m.

Determine the magnification that was applied to create the picture shown in Figure 1.1.

Provide two major figures in your response. **(2)**



A student's depiction of a different sago pondweed cell that was examined under a light microscope is displayed in Fig. 1.2. The pupil drew something with a sharp pencil but left it unlabeled.

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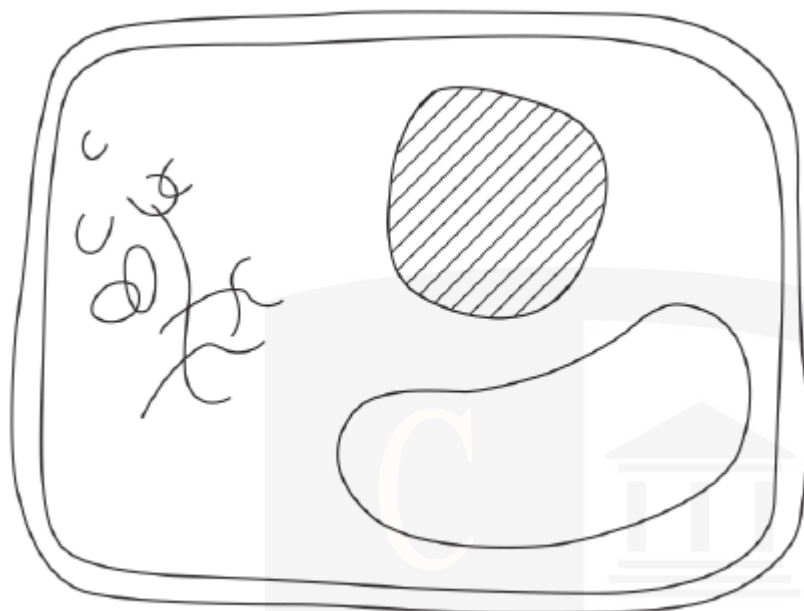


Fig. 1.2

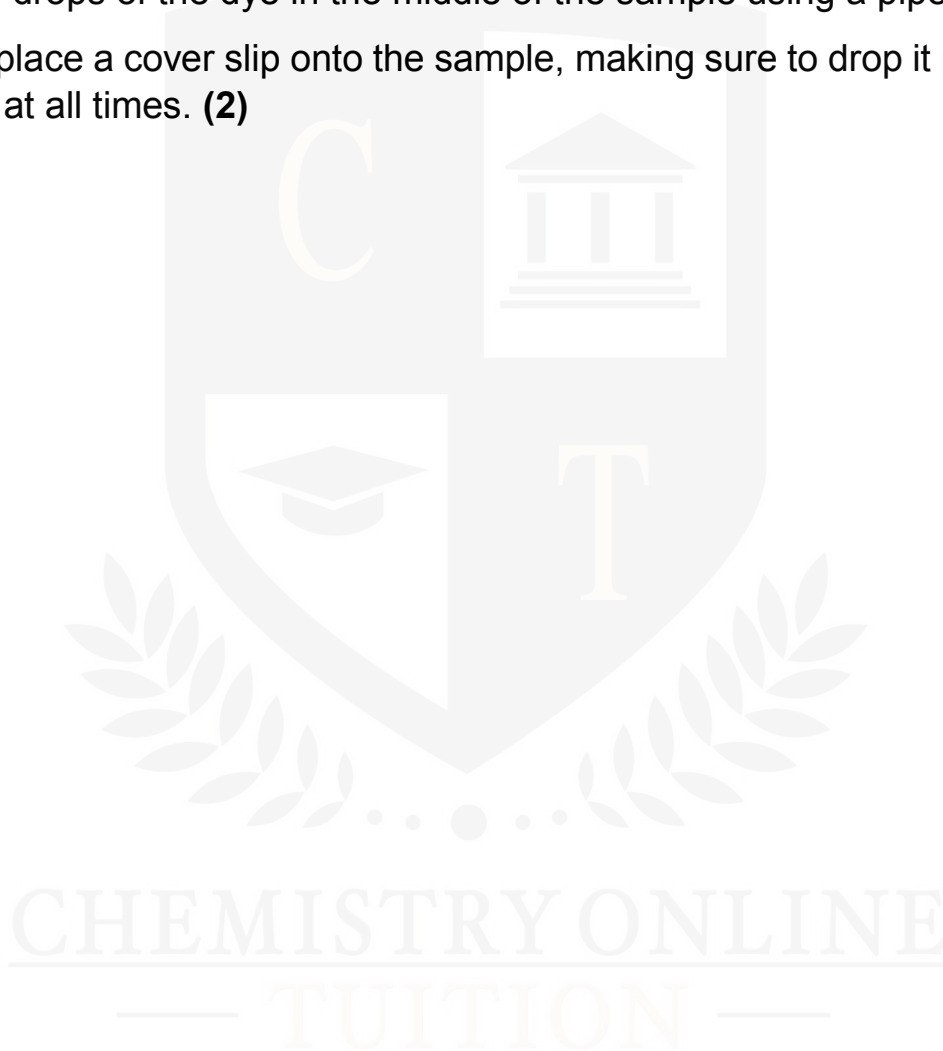
(c) Give two more suggestions about how to make the drawing better. (2)

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(d) To enhance the contrast between cellular components when viewed under a microscope, the student dyed a sample of sago pondweed. The student stained the sample by following these steps:

- Transfer the sample to a glass slide using forceps.
- Put two drops of the dye in the middle of the sample using a pipette.
- Gently place a cover slip onto the sample, making sure to drop it parallel to the slide at all times. **(2)**



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2.

In a eukaryotic cell, some protein translation occurs in the rough endoplasmic reticulum.

(a) Describe the function of the rough endoplasmic reticulum membrane. **(2)**



3.

A student was using a light microscope to examine onion epithelial cells. These cells were photographed, and the resulting image is displayed in Fig. 1.1. After that, the student drew a few cells from this picture. The illustration can be seen in Fig. 1.2.

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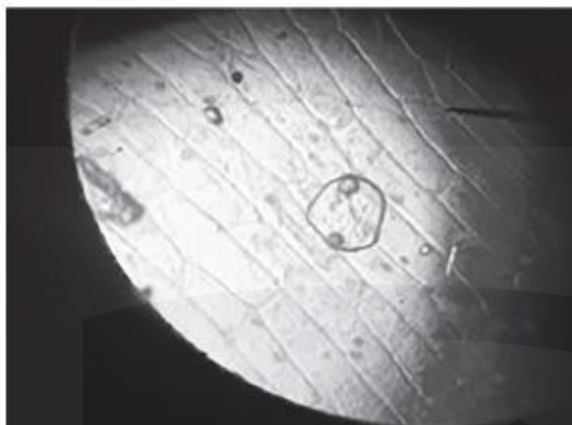


Fig. 1.1

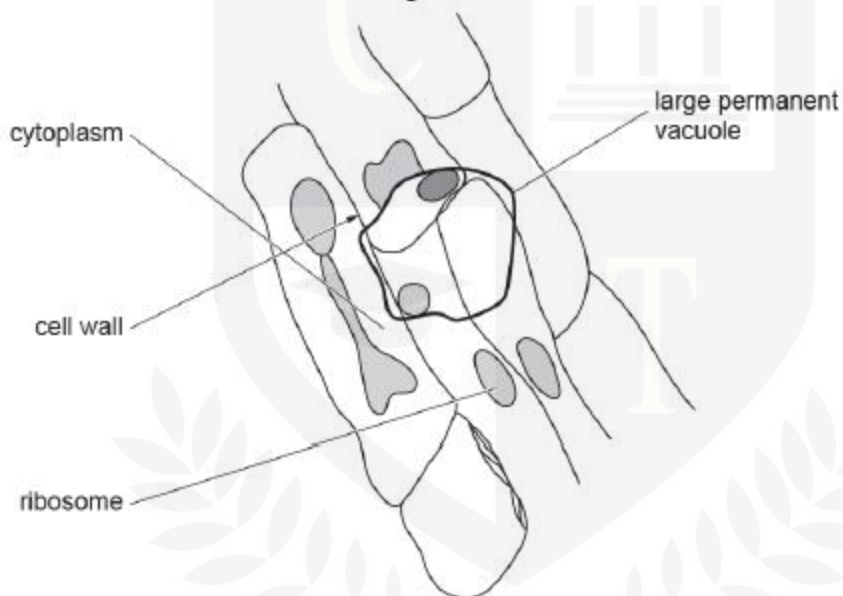
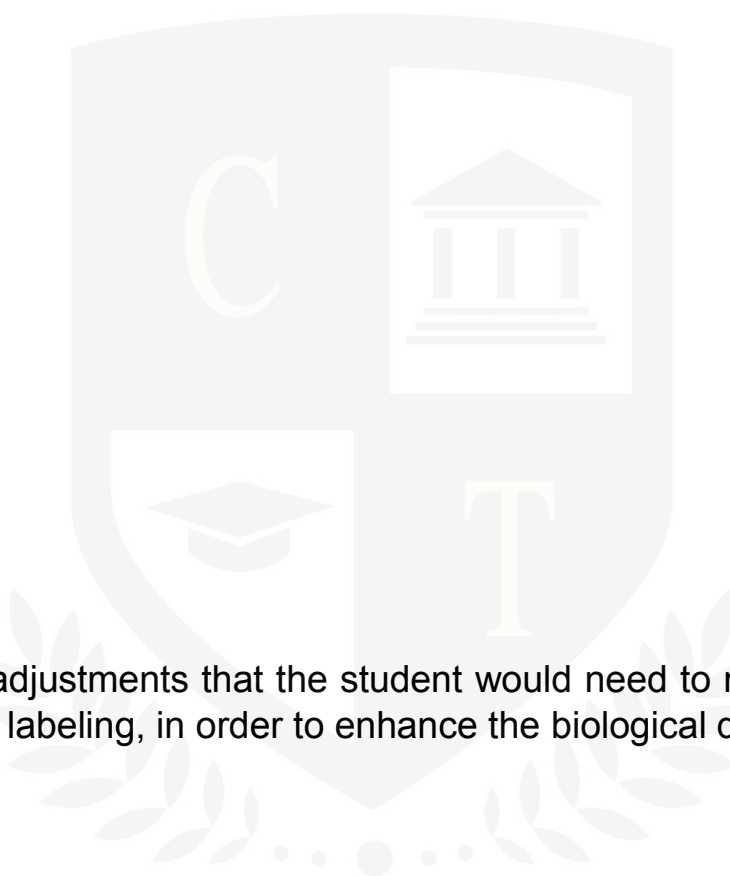


Fig. 1.2

The instructor pointed out that the biological picture in Fig. 1.2 was of low quality and that two of the labels were wrong.

(a) Point out one erroneous label and describe your response. **(3)**

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(b) List three adjustments that the student would need to make to Fig. 1.2, aside from the labeling, in order to enhance the biological drawing. **(3)**

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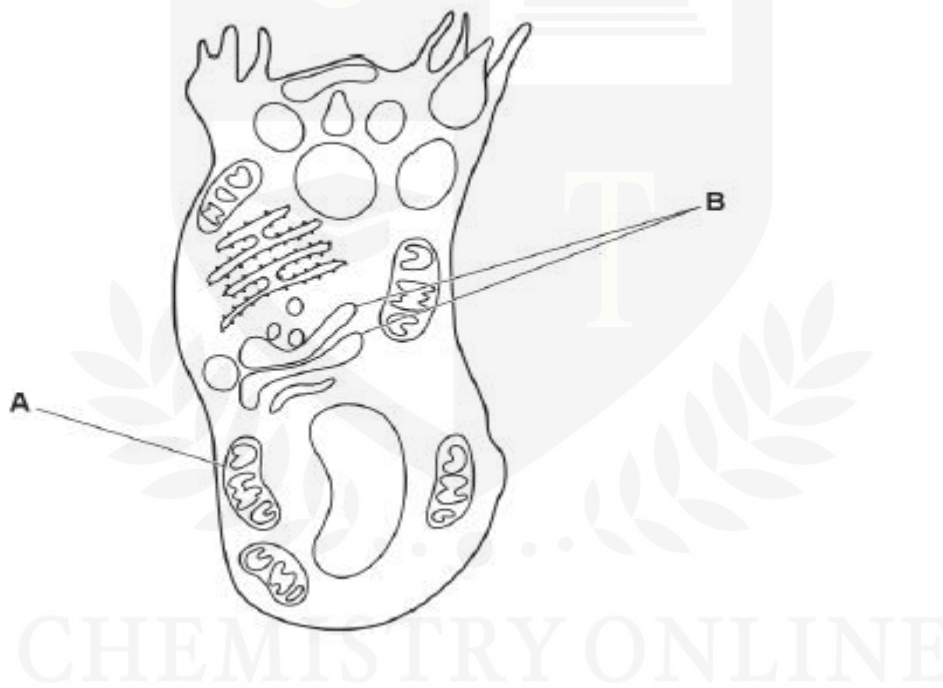
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4.

Triglycerides, proteins, carbs, and water make up mucus.

Globular cells release mucus.

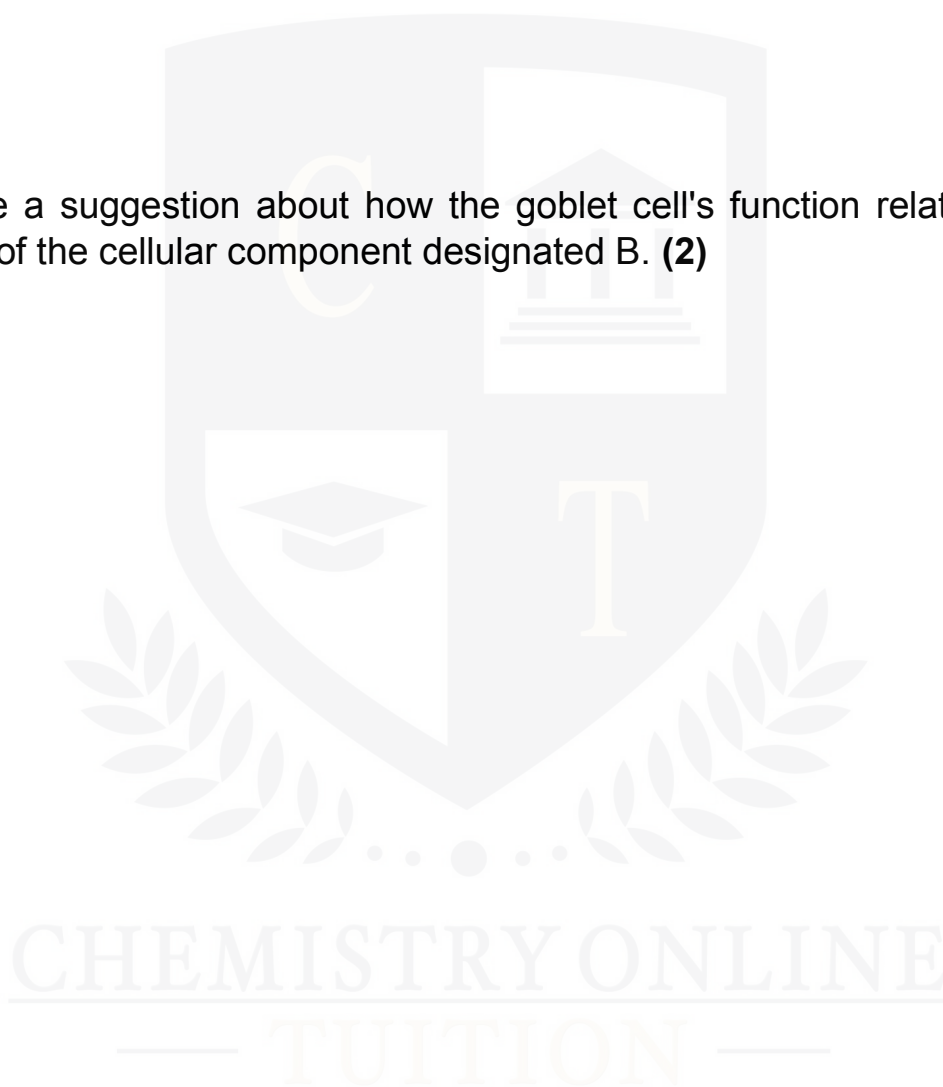
A schematic of a goblet cell observed through an electron microscope can be found below.



(a) Explain why there are a lot of the cellular component A in goblet cells. (2)

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(b) Make a suggestion about how the goblet cell's function relates to the function of the cellular component designated B. **(2)**



5.

A comparison of several characteristics of plant, animal, yeast, and bacterial cells may be seen in Table 2.1.

Finish the table. **(4)**

| Feature | Animal | Plant | Yeast | Bacterium |
|------------------------|-------------|-------------|--------|----------------|
| Means of cell division | cytokinesis | cytokinesis | | binary fission |
| Presence of nucleus | | | | |
| Material in cell wall | none | | chitin | |
| Presence of ribosomes | | | | |

Table 2.1

6.

A smear of human blood is seen in the picture below.



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Trypanosoma is the parasite depicted in cell E. Which statement or statements below best support the theory that Trypanosoma is a eukaryote?

(1)

Statement 1 a nucleus is present

Statement 2 it is a similar size to blood cells

Statement 3 the presence of flagella

A 1, 2 and 3

B only 1 and 2

C only 2 and 3

D only 1

7.

According to the notion of endosymbiosis, mitochondria could have originated from bacteria that were incorporated into other cells.

After that, these cells gave rise to eukaryotes.

(a) List two mitochondrial structural characteristics that lend credence to this notion. **(2)**

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(b) Describe the mechanism by which the earliest eukaryotes were able to proliferate faster than non-mitochondrial cells. **(3)**



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8.

Soil contains the fungus *Armillaria mellea* and the bacteria *Sporangium cellulosum*.

Which of the rows, A through D, accurately depicts the components found in each organism? (2)

| | Free ribosomes in cytoplasm | Membrane bound nucleus | DNA in a single loop | Cell wall present |
|---|---|---|---|---|
| A | <i>S. cellulosum</i> and <i>A. mellea</i> | <i>A. mellea</i> | <i>S. cellulosum</i> | <i>S. cellulosum</i> and <i>A. mellea</i> |
| B | <i>S. cellulosum</i> and <i>A. mellea</i> | <i>A. mellea</i> | <i>S. cellulosum</i> and <i>A. mellea</i> | <i>S. cellulosum</i> and <i>A. mellea</i> |
| C | <i>S. cellulosum</i> | <i>S. cellulosum</i> and <i>A. mellea</i> | <i>S. cellulosum</i> | <i>A. mellea</i> |
| D | <i>A. mellea</i> | <i>S. cellulosum</i> | <i>S. cellulosum</i> and <i>A. mellea</i> | <i>S. cellulosum</i> |

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