

5 (a) Fig. 5.1 is a photomicrograph of a longitudinal section through part of the stem of a plant.

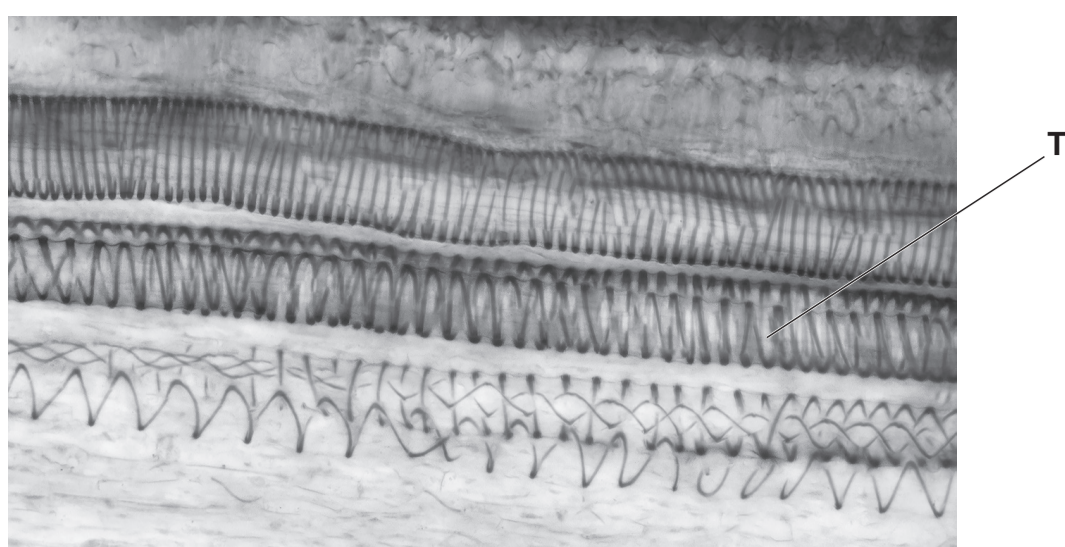


Fig. 5.1

(i) Name **one** substance transported in **T** in Fig. 5.1.
 [1]

(ii) State the name of the substance that forms the spiral thickening around the structure labelled **T** in Fig. 5.1.
 [1]

(b) A scientist studied the effect of leaf temperature on the rate of transpiration from the leaves of the wheat plant, *Triticum aestivum*.

The scientist repeated the investigation using the cotton plant, *Gossypium hirsutum*.

The results of the investigation are shown in Table 5.1.

Table 5.1

leaf temperature /°C	rate of transpiration of <i>T. aestivum</i> /mmolm ⁻² s ⁻¹	rate of transpiration of <i>G. hirsutum</i> /mmolm ⁻² s ⁻¹
25	7	9
30	12	10
35	15	11
40	22	12
45	31	14

(i) Suggest explanations for the relationship between leaf temperature and the rate of transpiration of *T. aestivum* as shown in Table 5.1.

 [3]

(ii) Suggest **one** difference between the structure of the leaves of *T. aestivum* and the leaves of *G. hirsutum* that could explain the results shown in Table 5.1.

 [1]

(c) Nematodes are microscopic animals that infect a wide range of economically important plant crops including cotton plants. Nematodes feed on the roots of plants, limiting their growth.

When root cells become infected, the nematodes disrupt the plant mitotic cell cycle. This causes the formation of a special type of feeding cell (cell **G**) in the plant, from which the nematodes absorb nutrients. Cell **G** is formed as a result of multiple cell cycles without any cytokinesis.

(i) Suggest how cell **G** differs from cells produced during a mitotic cell cycle that has **not** been disrupted by a nematode.

 [1]

(ii) Nematodes can also stimulate a process called endoreplication. This process causes a plant cell to go through multiple S phases during one cell cycle without entering mitosis or undergoing cytokinesis.
 State how the nucleus of a cell that has been through endoreplication may differ from the nucleus of a cell in the same plant that has **not** been affected by the nematode.

 [1]