

AS Level Biology A
H020/02 Depth in biology

Question Set 17

1. *Paramecium caudatum* is a protocist. The structure of this organism is shown in Fig. 1.

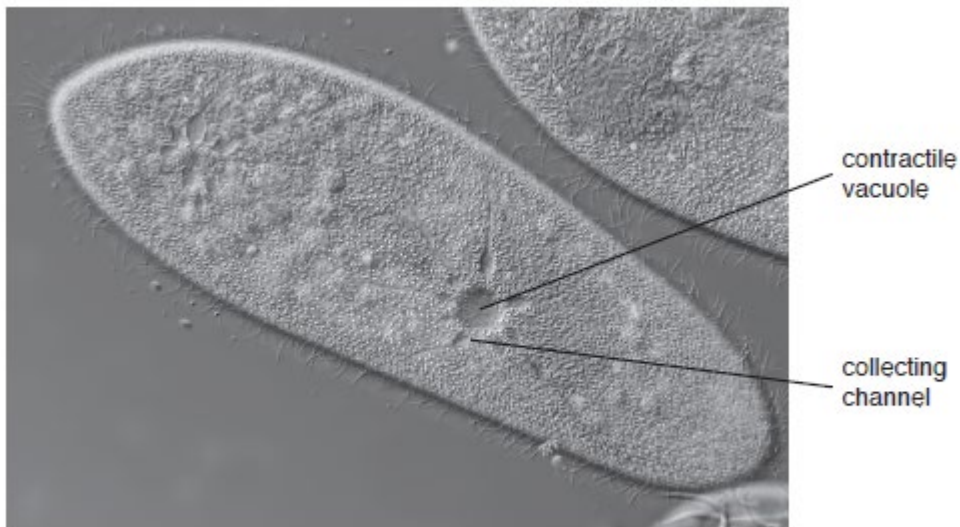


Fig. 1

Most species of *Paramecium* are freshwater organisms. Over a period of time water from the cytoplasm is collected by the collecting channels. They pass the water into the contractile vacuole. Once the contractile vacuole is full, it contracts, expelling the contents from the cell.

- (a) Explain why *Paramecium* needs to expel water when in fresh water.

[2]

- (b) An experiment was carried out in which the frequency of vacuole contraction was observed when *Paramecium* was bathed in different concentrations of sodium chloride solution. The results are shown in Table 1.

| Concentration of sodium chloride solution (mol dm ⁻³) | Mean number of contractions (min ⁻¹) |
|-------------------------------------------------------------------|--------------------------------------------------|
| 0.00 | 6.5 |
| 0.01 | 6.2 |
| 0.03 | 5.7 |
| 0.05 | 4.9 |
| 0.10 | 4.4 |
| 0.15 | 3.9 |
| 0.20 | 1.2 |

Table 1

- (i) Calculate the percentage decrease in the mean number of contractions as the concentration of sodium chloride solution increases from 0.00 mol dm^{-3} to 0.15 mol dm^{-3} .

percentage decrease = % [2]

- (ii) Explain why there is a decrease in the activity of the contractile vacuole as the concentration of sodium chloride increases. [2]

- (iii) The cytoplasm of *Paramecium* contains salt crystals. These salt crystals can be used to alter the water potential of the cytoplasm.

Suggest and explain how the water potential can be altered **and** how this could benefit the *Paramecium* living in freshwater. [3]

- (iv) The experiment described in **Table 1** was extended to find out the effect of reducing the dissolved oxygen concentration on the mean number of contractions at each concentration of sodium chloride.

When the dissolved oxygen concentration of the solution was reduced, the mean number of contractions was lower at each concentration of sodium chloride.

Suggest an explanation for these findings. [2]

Total Marks for Question Set 17: 11

OCR

Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge