

Natural and Artificial Selection

Question Paper 6

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Selection and evolution
Sub Topic	Natural and artificial selection
Booklet	Theory
Paper Type	Question Paper 6

Time Allowed : 57 minutes

Score : / 47

Percentage : /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

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- 2 Modern varieties of wheat have developed from numerous hybridisation events between different species of wild grasses. Fig. 4.1 shows some of the possible steps that are believed to have been involved in the development of bread wheat, *Triticum aestivum*.

The letters **A**, **B** and **C** represent three different sets of seven chromosomes.

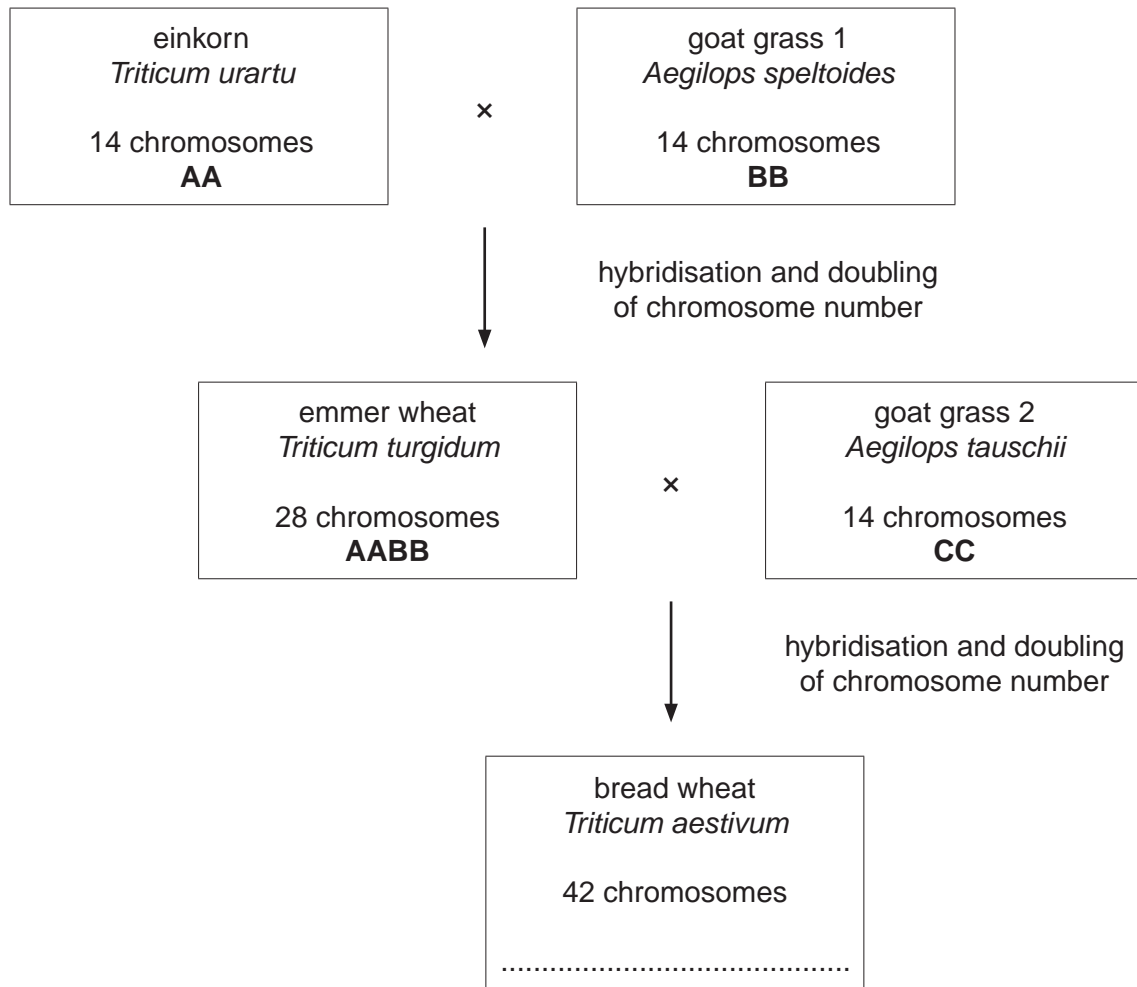


Fig. 4.1

- (a) Complete Fig. 4.1 by writing letters to represent the sets of chromosomes in bread wheat.

Write your answer on Fig. 4.1. [1]

- (b) Explain why hybridisation between emmer wheat and goat grass 2 would have produced a sterile hybrid, if doubling of chromosome number had **not** occurred.

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- (c) With reference to Fig. 4.1, suggest why *Triticum urartu* and *Triticum turgidum* are classified as different species.

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..... [2]

- (d) *Triticum turgidum* emerged as a new species without being geographically isolated from *Triticum urartu*.

Outline how geographical isolation may result in speciation.

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..... [3]

[Total: 9]

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- 4 Scallops, which are bivalve molluscs, are important commercially throughout the world. The marine bay scallop, *Argopecten irradians*, has three distinct shell colours, yellow, orange and black. The shell colour is controlled by a gene with three alleles, yellow, S^y , orange, S^o , and black, S^b .

Scallops are hermaphrodite and are able to fertilise themselves to produce offspring.

Single mature adult specimens of yellow, orange and black scallops were collected and kept in separate tanks of seawater until they produced young. The young were then scored for shell colour. The results were as follows.

yellow scallop – 25 yellow and 8 black

orange scallop – 31 orange and 9 black

black scallop – 27 black

- (a) Explain the results from the orange and black scallops, using the symbols given.

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(b) Orange scallops are more valued for human consumption.

Describe how a marine biologist could produce a pure-breeding line of orange scallops for commercial exploitation using the offspring from the single orange scallop.

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.....[2]

[Total : 8]