

**AS Level Biology A**  
**H020/01 Breadth in Biology**

**Question Set 9**

1. Semi-conservative replication describes the process by which DNA is replicated in all living organisms.

(a) (i) Explain the meaning of the phrase *semi-conservative replication*.

[1]

(ii) DNA ligase is one enzyme involved in the replication of DNA.

State **two** other enzymes involved and describe their functions.

[4]

(b) In 1958, Matthew Meselson and Franklin Stahl carried out an experiment that provided evidence to support the hypothesis of semi-conservative replication of DNA.

Meselson and Stahl grew *E. coli* bacteria in a growth medium that contained only the heavy isotope of nitrogen  $^{15}\text{N}$ . They transferred the bacteria to a growth medium that had the light  $^{14}\text{N}$  isotope and allowed the bacteria to undergo cell division.

After each division, the DNA from some of the bacteria was extracted from the culture and centrifuged to separate it. Fig. 25 shows the bands of DNA in the centrifuge tubes after a specific number of divisions.

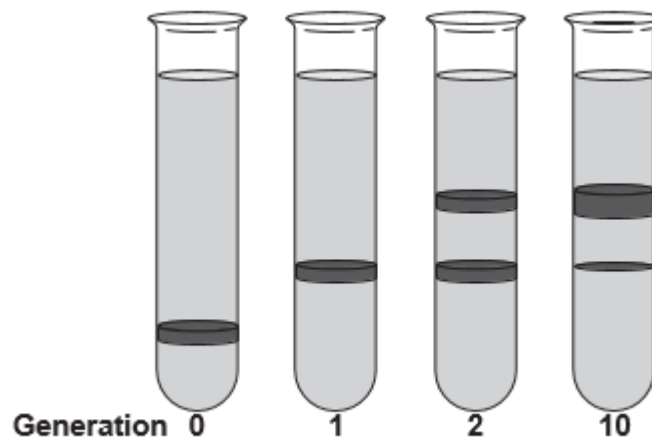


Fig. 25

The tube labelled **Generation 0** in Fig. 25 shows a single band of DNA containing bases that contain only the heavy isotope of nitrogen  $^{15}\text{N}$ .

Explain how the results from the other generations provide evidence to support the hypothesis that DNA replication is semi-conservative.

[2]

**Total Marks for Question Set 9: 7**

---

# 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](http://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