

Cell Cycle and Mitosis



BRITISH MYCOLOGICAL SOCIETY FUNGAL EDUCATION & OUTREACH

SECONDARY RESOURCE

INTRODUCTION

Asexual reproduction involves only one parent and no fusion of gametes. There is no mixing of genetic information. This leads to genetically identical offspring (clones). Only mitosis is involved.

Learning Objectives Linked to Mitosis:

- Explain why sexual reproduction produces variation in the offspring, but asexual reproduction does not.
- Define the term clone. Observe exhibition showing asexual reproduction in different organisms (Fungi, Yeast example)
- Describe the sequence of events of mitosis
- Outline Mitosis as part of the cell cycle

THIS ACTIVITY SUPPORTS THE FOLLOWING STATUTORY CURRICULUM REQUIREMENTS:

KS4 Curriculum Links

AQA Biology 8461 IVE SOW 4.1.6.1/4,1,6,3 /4.6.2.5 Asexual Reproduction/Advantages and Disadvantages of Asexual Reproduction/Cloning

Edexcel Level 1/Level 2 GCSE (9 - 1) in Biology (1BI0) Paper 1 Topic 2 Cells and Control 2.1-2.3

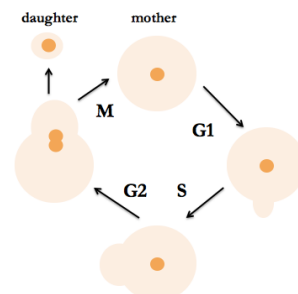
OCR Gateway Science Suite - Biology A (9-1) - J247 B2.1b

WJEC GCSE in BIOLOGY (From 2016) 2.2 Cell Division and Stem Cells

SCOTTISH National 5 Biology C807 75 Biology: multicellular organisms – Producing new cells



yeast mitosis



Cell Cycle and Mitosis

METHOD AND RESOURCES:

Observing Mitosis in Yeast

Background Information

Saccharomyces cerevisiae, commonly known as Baker's yeast, is a unicellular fungus that reproduces by budding. During S phase of the cell cycle (a second copy of the genome is made at this stage), a small bud emerges from the mother cell. The bud grows in preparation for cell division (mitosis in M phase). In mitosis the nucleus splits and a full complement of DNA is packaged into the large bud before it is pinched off. In G1 all cells grow and then start a cell cycle. Observation of the shape and size of *S. cerevisiae* allows us to find each cell's place within the cell cycle.

Technical Notes:

- Add a sachet of baker's yeast to a beaker containing a sugary water solution (Stock solution of sugary water: Add 1 dessertspoon of sugar (glucose) to 100 ml lukewarm tap water)
- Cover the mixture and allow the solution to stand until it is obvious that the yeast is respiring (froth from CO₂ will be seen) Approximately 90 minutes standing time needed to allow cells to complete 1 cell cycle.
- Dilute this mixture by taking 1 ml and placing in 99ml water and shake well. This is the solution that pupils should take their drop for observation from otherwise there will be too many cells packed into the field of view.

Observation procedure

1. Prepare your slide of yeast by dropping one drop of the yeast/sugary water mixture provided onto a microscope slide.
2. Place a coverslip on top of the sample by first resting one edge of the coverslip on the slide at the edge of the drop and then gently lower the opposite edge of the coverslip (This approach minimizes the formation of air bubbles which you could confuse for cells).
3. Turn on the microscope and place the slide (coverslip up) on the microscope stage, using the clip to keep it firmly in place.
4. Start with the lowest power (4x) objective pointing toward the slide. Using the coarse focus wheel move the lens up and down until you can see the cells (they will still be very small at this magnification!). When you have the cells in sight, switch to the 10x objective. You should now be able to see cells which are budding, mating, etc. Do not use magnification higher than this or you will break the slide.
5. Draw three columns in your book labeled G1, S, and G2/M.
6. Work with a partner with one of you looking down the microscope at yeast cells and the other recording the observations. Work from left to right and describe each cell to your partner whether it has a small bud (S), a large bud (looks almost like two full-size cells stuck together) (M) or no bud (G1). For each cell your partner will record a tick in the column
7. Swap tasks with your partner when you have finished and get them to move to a different part of the slide and score the cells in that region. Repeat this procedure until you have counted 100 cells on the slide. Then estimate the percentage of cells in each cell cycle stage.

USEFUL LINKS AND RESOURCES

Edexcel Pearson Specification

http://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/Specification/Edexcel_GCSE_L1-L2_Biology.pdf

AQA Specification.

<http://www.aqa.org.uk/subjects/science/gcse/biology-8461>

OCR Specification.

<http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-biology-a-j247-from-2016/>

WJEC Specification.

http://www.wjec.co.uk/qualifications/science/gcse/biology-gcse-2016/wjec-gcse-biology-spec-from-2016.pdf?language_id=1

Scottish National Specification

https://www.sqa.org.uk/files_ccc/BiologyCourseSpecN5.pdf

For fun...

Watch a yeast cell with a small bud and see how long it takes a larger bud to emerge and split from the mother cell!