Welcome to A-level Biology

Key Information

Edexcel SNAB Biology (A) A – level course
10 Lessons over a 2 week period
Two teachers
Given a A-level Maths book, Edexcel course book and practical folder to borrow for the course
No course work but there is a teacher assessed practical competency

Welcome!

Topics are:

Topic 1: Lifestyle, Health and Risk
Topic 2: Genes and Health
Topic 3: Voice of the Genome
Topic 4: Biodiversity and Natural Resources

Year 12

Topic 5: On the Wild Side
Topic 6: Immunity, Infection and Forensics
Topic 7: Run for your Life
Topic 8: Grey Matter

Year 13

Welcome!

As Examinations

Paper 1	Paper 2
80 Marks	80 Marks
1.5 Hours	1.5 Hours
50% weighting	50% weighting
Topics 1-2	Topics 3-4

10% Maths

Welcome!

A-level Examinations

Paper 1	Paper 2	Paper 3
100 Marks	100 Marks	100 Marks
2 Hours	2 Hours	2 Hours
33.3% weighting	33.3% weighting	33.3% weighting
Topics 1-6	Topics 1-4 + 7-8	Topics 1-8

10% Maths

A-Level Biology at Newent School

Expectations:

1. You will take responsibility for your own resources (stationary/ notes/ textbooks/ revision materials)

2. If you are absent it is your responsibility to catch up on work missed

3. You must complete prior reading before lessons in order to keep up with the pace of the course

4. Any homework will need to be completed to a good standard and handed in on time

Failure to meet expectations will result
in study frees being taken off you!
This is to ensure that you catch up.

Summer task 1

You have a choice of 2 tasks

Please find attached a planning sheet for a Core Practical you will be undertaking in term 1. Investigation of the effect of temperature on membrane structure.

Read and carry out the tasks described:

- Research relevant information (science methods) and state what you will investigate.
- Develop a testable hypothesis and support with biological knowledge.
- Plan your own experimental design. Variables, apparatus, controls etc.
- Complete a risk assessment for your procedure

Summer task 2

You have a choice of 2 tasks

To create a science poster on the properties of water.

A scientific poster is a visual presentation of scientific research in a standard form. Please find some information on the properties of water and present your information in a scientific poster.

Attached is an example of a scientific poster.

MORAN MIRABAL GROUP

SUPER-RESOLUTION IMAGING OF NATIVE CELLULOSE NANOSTRUCTURE

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McMaster University

INTRODUCTION

Cellulose Structure

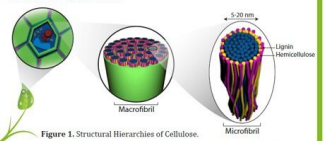


Figure 1. Structural Hierarchies of Cellulose.

- Cellulose - a β-1,4 D-glucose polymer - constitutes the largest component of Earth's biomass.
-Heavily used in the production of lumber, paper, foods, biocomposites & other biomaterials.
-Organized into compact microfibril bundles
-Amorphous regions of cellulose are disordered; accessible by enzymes & prone to chemical modifications
-Crystalline regions are highly ordered and are more difficult to modify and hydrolyze.
-Understanding the nanostructure of cellulose is critical for the improvement of the efficiency of industrial processes.

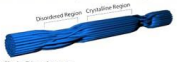


Figure 2. Glucan Chain Disorderness

Super-Resolution Imaging

-Resolution of conventional fluorescence microscopy is diffraction-limited to ~200 nm

$$R = \frac{\lambda}{2NA}$$ **Equation 1.** Abbe's Diffraction Limit

-Direct stochastic optical reconstruction microscopy (dSTORM)

Figure 3. Fundemental Principle of dSTORM

METHODS

Cellulose Sample Preparation & Imaging

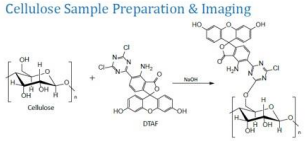


Figure 4. Grafting of Dichlorotriazinylamino Fluorescein (DTAF) onto Cellulose

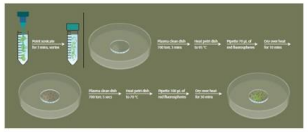


Figure 5. Cellulose Sample Preparation for dSTORM

-Buffer optimization experiments explored the effect of changes in pH and cysteamine (MEA) cncentrations on localization uncertainty (resolution) (Figure 8).
-DTAF was grafted onto cellulose at two different concentrations (3:1 and 1:1 of cellulose:DTAF).

Data Analysis

-Single-molecule localizations performed by ThunderSTORM (ImageJ plugin).
-Patterns of labeling noticed (Figure 7)
Spacings were measured for both 3:1 and 1:1 cellulose:DTAF samples (Figure 6 & 9).

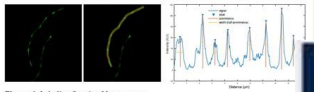


Figure 6. Labeling Spacing Measurment

RESULTS & DISCUSSION

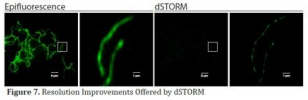


Figure 7. Resolution Improvements Offered by dSTORM

-Buffer system robust to changes in pH and [MEA]
-Smaller spacings observed in 1:1 cellulose:DTAF sample
-unlabel spaces could suggest areas of crystalline cellulose

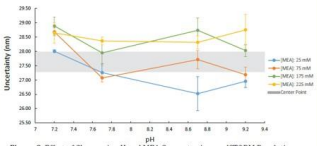


Figure 8. Effect of Changes in pH and MEA Concentration on dSTORM Resolution

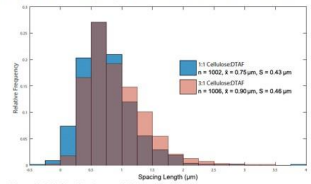
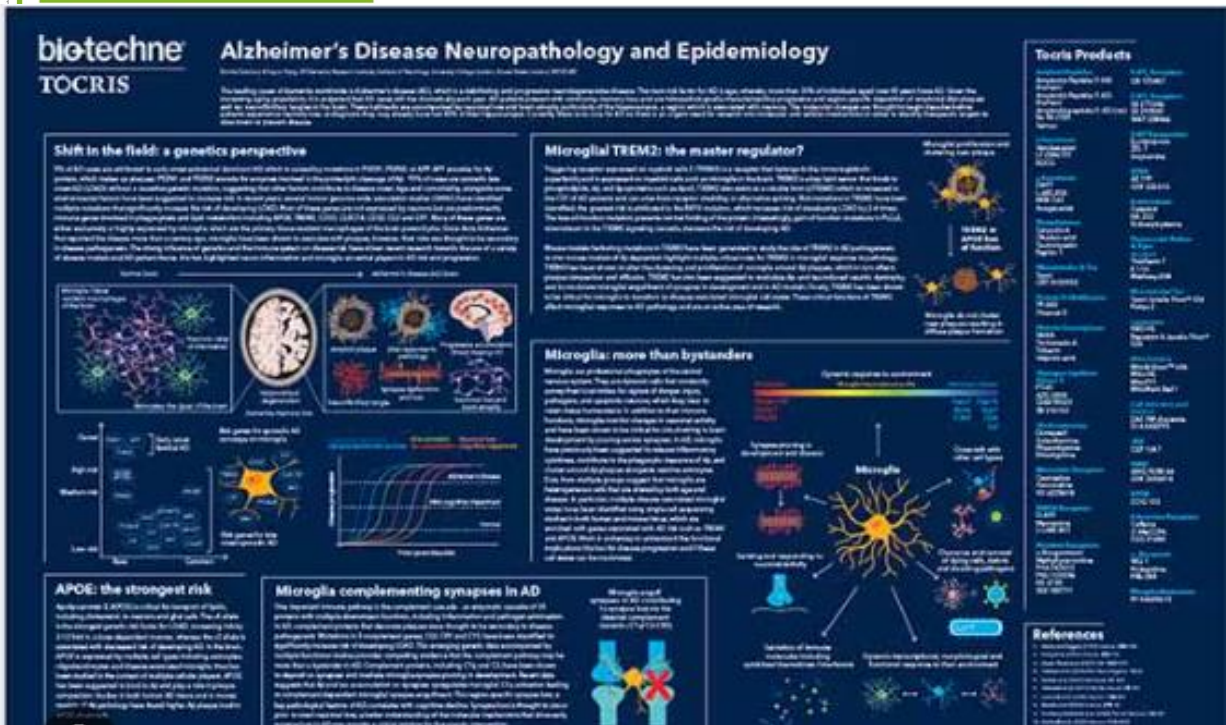


Figure 9. Labeling Spacings on Cellulose Microfibrils

Scientific poster examples



Properties of water research

Properties of Water - YouTube

Properties of Water (A-level Biology) - Study Mind