University of BRISTOL

Reinventing laboratory teaching in Microbiology and Pathology

Supported by The Higher Education Academy

UK Centre for Bioscience

Ann Pullen, Cellular and Molecular Medicine

Goal of this project

To test the hypothesis that students can work in collaboration with academic staff to generate high quality learning materials suitable for on-line delivery, marking and feedback. Including:

- experimental information
- pre-lab questions
- post-lab assignments
- associated feedback

Based on the successful systems developed at the University of Bristol

Gus Cameron Biochemistry

Nick Norman Chemistry

In collaboration with

Katy Aldrich and John Eastman

Learning Science Limited

eBioLabs Integrated tools for laboratory teaching

Login

eBiolabs – a dynamic laboratory manual for the biosciences.

Students and staff log in to eBiolabs here.

Students from previous years: you can review your course here.

eBiolabs is a set of integrated tools that help students prepare for laboratory classes and help staff track student achievement. It is an on-line system and so accessible from any computer with an internet connection. eBiolabs has been developed out of necessity by the School of Biochemistry and AIMS, with the active support of the JISC and the Faculty of Medical and Veterinary Sciences.

By combining interactive media with formative self-evaluation assessments students learn the methods and techniques they will use in the lab, without risking valuable time, equipment or materials. Because students first experiment on-line there is a reduced chance of cognitive overload during the practical and they are more able to concentrate on the wider aims of the experiment, rather than blindly following the lab instructions.

Here is an example of an interaction that demonstrates why centrifuges must be balanced before use.

It is important to make sure the centrifuge is balanced before running it; an unbalanced rotor is dangerous.

You have **1** more tube that needs spinning – click the rotor where you want to add it to

eBioLabs
Integrated tools for laboratory teaching

Dynamic Laboratory Manual

Marking

Hooray - nothing to mark!

Resources

- Safe Conduct in Biochemistry
- Numeracy in Biochemistry
- Techniques
- How to Use Excel
- My grades

Weekly outline

Biochemistry 1G Practicals

News and announcements

4 October - 10 October

pH AND BUFFERS

Maintaining pH within set limits is one of the great challenges faced by living organisms. All cells, from the simplest prokaryotes to the most complex multicellular organisms have evolved mechanisms to sense and control intracellular pH.

But why is pH so important, what does this phenomenon look like and how can it best be explained? And as biochemists, how can we control pH when we carry out experiments?

Before your lab session work through the experimental information and pre-lab quiz (the links are just below). Don't forget to bring the lab book you were given on enrolment to the class but don't worry about lab coats - we supply them for you.

Experiment information
pH and buffers prelab
pH and buffers postlab

11 October - 17 October

No labs this week. See your Unit Handbook for details of your tutorial.

18 October - 24 October

USE OF A SPECTROPHOTOMETER

The ultraviolet-visible spectrophotometer is one of the most important instruments available to biochemists. With it scientists can measure the intensity of light, and, as the absorption of light is proportional to concentration, spectrophotometers can be used to quantify substances that absorb light. As a trainee scientist you need to know both the theory and practice of using a UV-vis spectrophotometer.

Before your lab session work through the experimental information and pre-lab quiz (the links are just below). Don't forget to bring the lab book you were given on enrolment to the class but don't worry about lab coats - we

Latest News

Add a new topic...

1 Oct, 15:51
Gus Cameron
eBiolabs - the Biochemistry Department's new online presence. more...

Older topics ...

Administration

Grades
Profile

- Use of interactive environment with videos, interactive simulations and static graphics
- Provides an opportunity to become familiar with techniques and equipment
- Students enter the labs better prepared and are more engaged
- http://www.bris.ac.uk/ebiolabs

Reinventing laboratory teaching in Microbiology and Pathology

- Aim was to have students develop eBiolabs for units offered by the School of Cellular and Molecular Medicine

Reinventing laboratory teaching in Microbiology and Pathology

Introduction to Microbiology • Microscopy • Aseptic technique • The lac operon • Virology • Bacterial fermentation	**Biology of Normal & Tumour Cells** • Cell and tissue structure I • Cell and tissue structure II • Cells in culture I • Cells in culture II
Microbes and Disease • Adhesins and phase variation • Identification of bacteria • Acquisition of antibiotic resistance • Mycology	**Pathological Responses of Cells** • Immunology I • Immunology II • Genetic and environmental disease • Cell damage

Reinventing laboratory teaching in Microbiology and Pathology

- Three students were taken on for 8 weeks during the summer vacation 2010

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James Wilson

Krishan Talsania

Rebekah Sherburn

Reinventing laboratory teaching in Microbiology and Pathology

- Three students were taken on for 8 weeks during the summer vacation 2010
  - Reviewed first year practicals
  - Practical handbooks
  - Powerpoint presentations from relevant lectures
  - Highlighted areas they had had difficulty with
  - Looked for resources already available via the internet

Reinventing laboratory teaching in Microbiology and Pathology

- The students developed new materials
  - Story boards for flash animations and video clips
  - Videos of practical techniques
  - Experimental information
    including overview, safety, introduction and experiments
  - Pre-practical quizzes and post-practical assignments using Moodle

Reinventing laboratory teaching in Microbiology and Pathology

- Collaboration with academic staff
  - Initial training was provided on use of software and content development
  - Staff provided critique of materials under development
  - Weekly team meetings with one or two members of staff and project lead from Learning Science
  - Students supportive of each other

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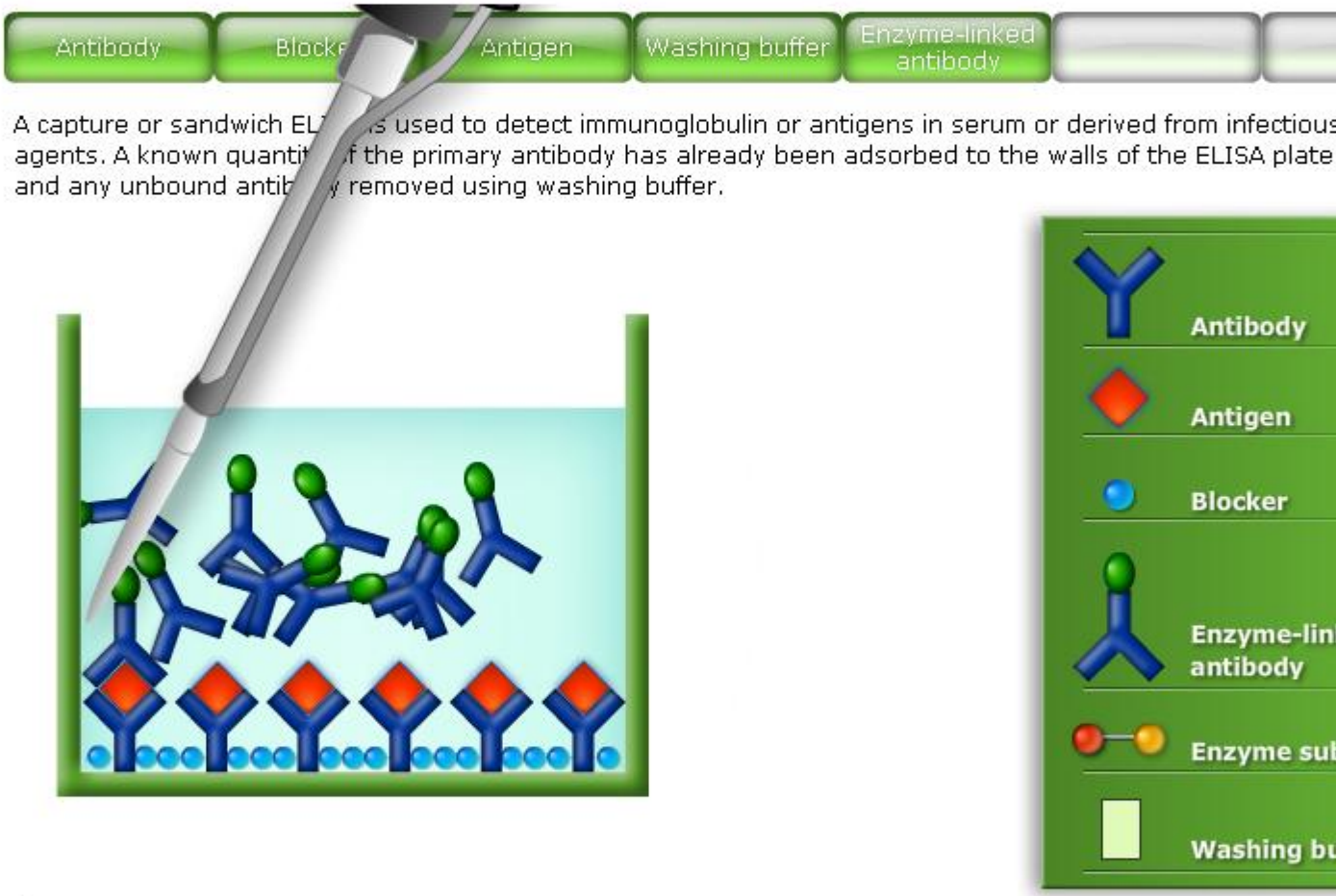
Capture ELISA

During this practical you will be using a capture ELISA to assay the concentration of IgM in a serum sample. The assay process is the one demonstrated last week.

A serum sample is a complex mix of antigens and a capture ELISA increases specificity. An animation of the capture process is s



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Streak plate technique

Streak plate technique

Sterilise the loop
Add loop of culture to plate
Streaking the remaining quadrants

Hold the loop in one hand and the culture bottle in the other. Open the culture, keeping hold of the lid, and pass the lip of the bottle through the flame to sterilise (not shown here). Dip the loop into the culture after it has cooled down and replace the lid. Streak your sample onto your agar plate, replace the lid immediately and resterilise the loop.

Identification of Bacteria 1

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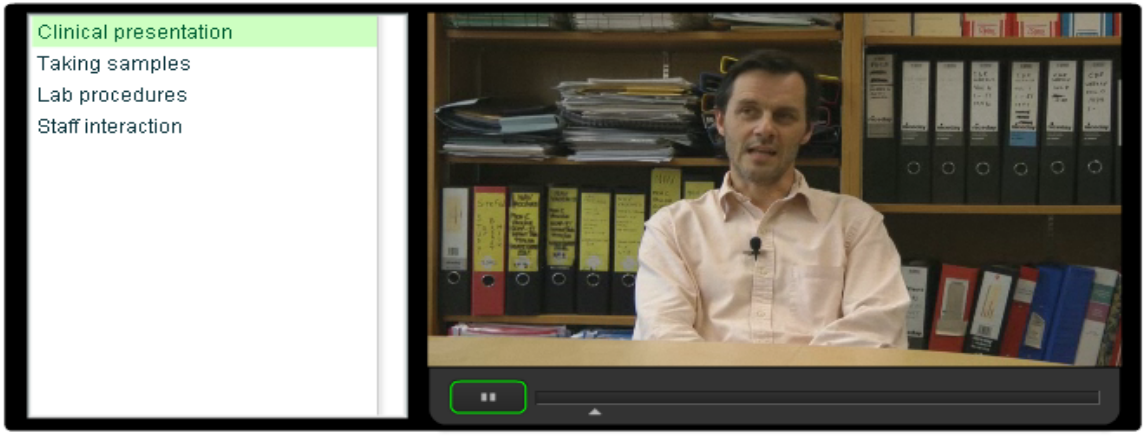
Introduction

When working with bacteria in a laboratory, it is essential that you know or can verify which bacterial species has been isolated. This is extremely importan microbiology where misidentification could mean the difference between life and death.

When a patient has a suspected bacterial infection, the doctor will prescribe a broad-spectrum antibiotic in order to cover a range of options. However, once been identified the doctor may switch treatment to a more appropriate narrow range drug, especially if the patient is in hospital, to avoid favouring the emerg spectrum resistance. Therefore, the importance of identifying the causative microbe (and its antibiotic resistance as you will see in subsequent practicals) c overemphasized.

Clinical importance of identifying bacteria



Professor Adam Finn
Professor of Paediatrics, School of Cellular and Molecular Medicine, University of Bristol; Professor of Paediatrics, School of Clinical Sciences, University of Bristol; Honorary Consultant Paediatrician, Bristol Royal Hospital for Children, United Bristol Healthcare Trust

Bacterial identification involves tests and observations of various kinds. You may have met some of these in previous practicals both in this unit and in 'Intro Microbiology' including colony morphology, microscopic examination with and without staining, biochemical tests and agglutination tests. More recently, DN hybridization and polymerase chain reaction (PCR) are also being used.

Preview Adhesins and phase variation pre-lab

Start again

1
Marks: 1

Primary attachment of the Neisseria bacteria to the epithelial membrane is mediated by [ ]

Opa
antibodies
pili
flagella

2
Marks: 1

Opa⁻, pili⁻ colonies are transparent.

Answer:

- True
- False

3
Marks: 1

A stereomicroscope is able to produce a 3-dimensional image because...

Choose one answer.

- a. it utilises sounds waves
- b. it utilises two light pathways
- c. it has a higher resolution
- d. it has a higher magnification

4
Marks: 1

In experiment 1, alkaline phosphatase is conjugated to the [ ].

5

Why is a blocking agent used in experiment 1?

Preview Identification of bacteria 2 post-lab

Start again

1

Marks: 3

Experiment 1

Submit your results for your SMA agar plates by completing the following table.

Culture	Growth
A	Growth
B	No growth
C	Growth

2

Marks: 6

Submit your results for your PREP agar plates by completing the following table.

Culture	Growth	Colour
A	Good growth	
B		Pink Yellow No growth/colour
C		

eBioLabs
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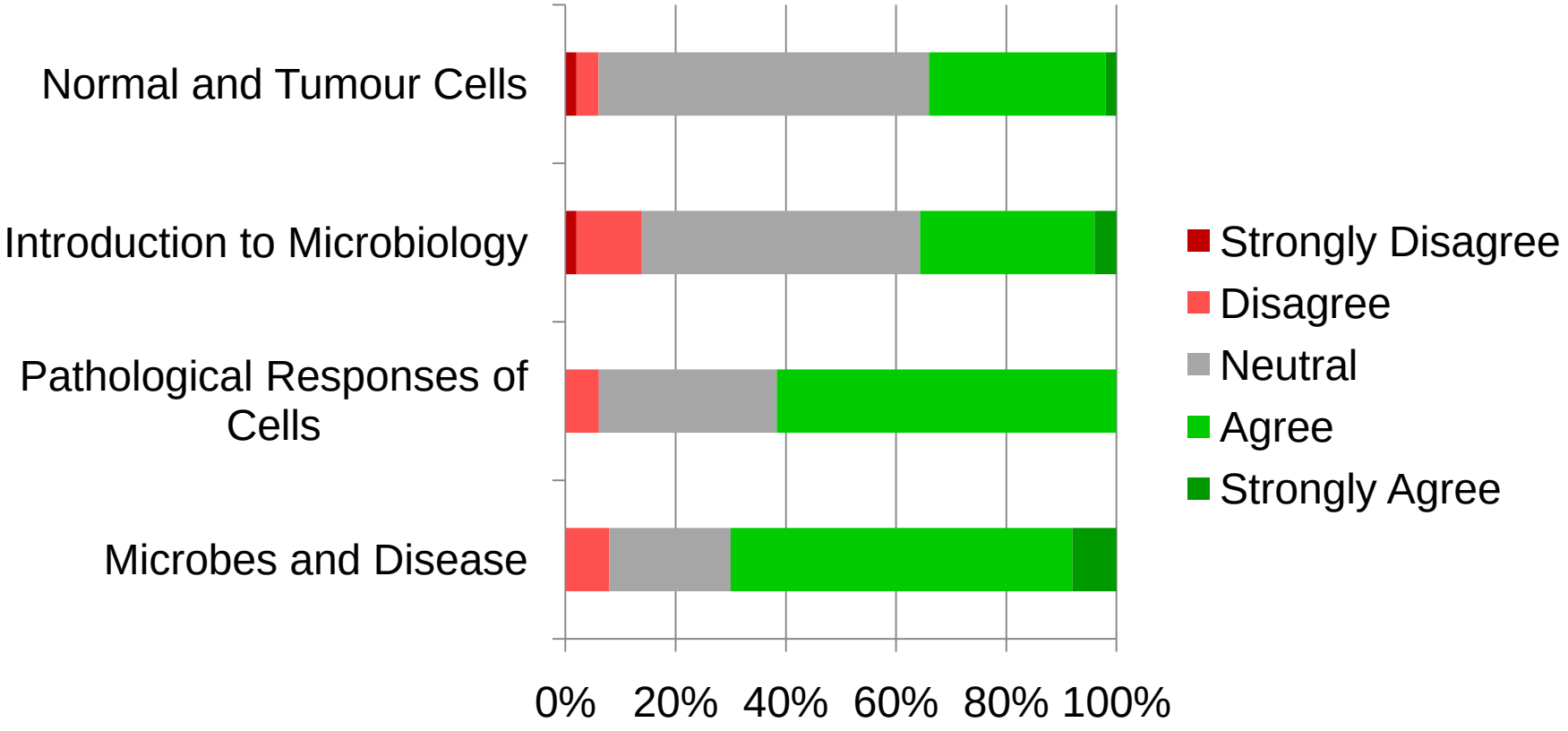
- Student feedback has been encouraging:
- *"Pre-practical information is often more clear and easier to understand than the same thing delivered in lectures (more info, better diagrams)"*
- *"eBiolabs are very helpful!"*
- *"Like the little videos ☺ "*

I feel well prepared for the session when I enter the laboratory



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- Staff feel that the project was successful:
- *“An excellent initiative. It did appear that the students got more from the practicals this year.”*

eBioLabs
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- Staff feel that the project was successful:

- *“I certainly felt the students arrived prepared to carry out the experiments in the practical. This was very positive compared to previous years as time was always tight in these practical classes.”*

- *“Another key advantage was there was more time to discuss the actual data generated and consequences.”*

eBioLabs
Integrated tools for laboratory teaching

- Staff feel that the project was successful:

- *“With the students more focused on the outcomes rather than a lack of understanding of methodology and aims, I felt they got more out of the practial classes compared with previous years.”*

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- Staff feel that the project was successful:
- *“It improves engagement with pre-lab information”*
- *“The students expect it”*
- *“It reduces marking load”*

eBioLabs
Integrated tools for laboratory teaching

- All practical organisers involved agree that:
- The introduction of eBiolabs was beneficial and was worth the additional time spent
- It will result in less marking this year and in the future
- Estimated that approximately 70 hours of marking time was saved this year for Microbes & Disease

Reinventing laboratory teaching in Microbiology and Pathology

- All staff agreed that the student developers:
  - Made a valuable contribution to the production of the eBiolabs Dynamic Laboratory Manual
  - Put together useful experimental information
  - Generated useful pre-practical quizzes
  - Helped drive the project forward

Reinventing laboratory teaching in Microbiology and Pathology

- Feedback from the student developers has also been very helpful
  - What do you think were the benefits of employing you to work on the project, rather than people with experience of developing eLearning materials?
  - *“A thorough knowledge of the course and insight into the areas students had difficulty with.”*

Reinventing laboratory teaching in Microbiology and Pathology

- Feedback from the student developers has also been very helpful
  - *“Experience was the key benefit. It helped us to develop the materials with the student in mind…”*

Reinventing laboratory teaching in Microbiology and Pathology

- We have demonstrated that students can work in collaboration with academic staff to generate high quality learning materials
- We are now planning to engage students to help develop eBiolabs to support our second year molecular genetics practicals

The Student Developers

Rebekah Sherburn

James Wilson

Krishan Talsania

Collaborators

Gus Cameron

Phil Langton

Katy Aldrich and

John Eastman

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