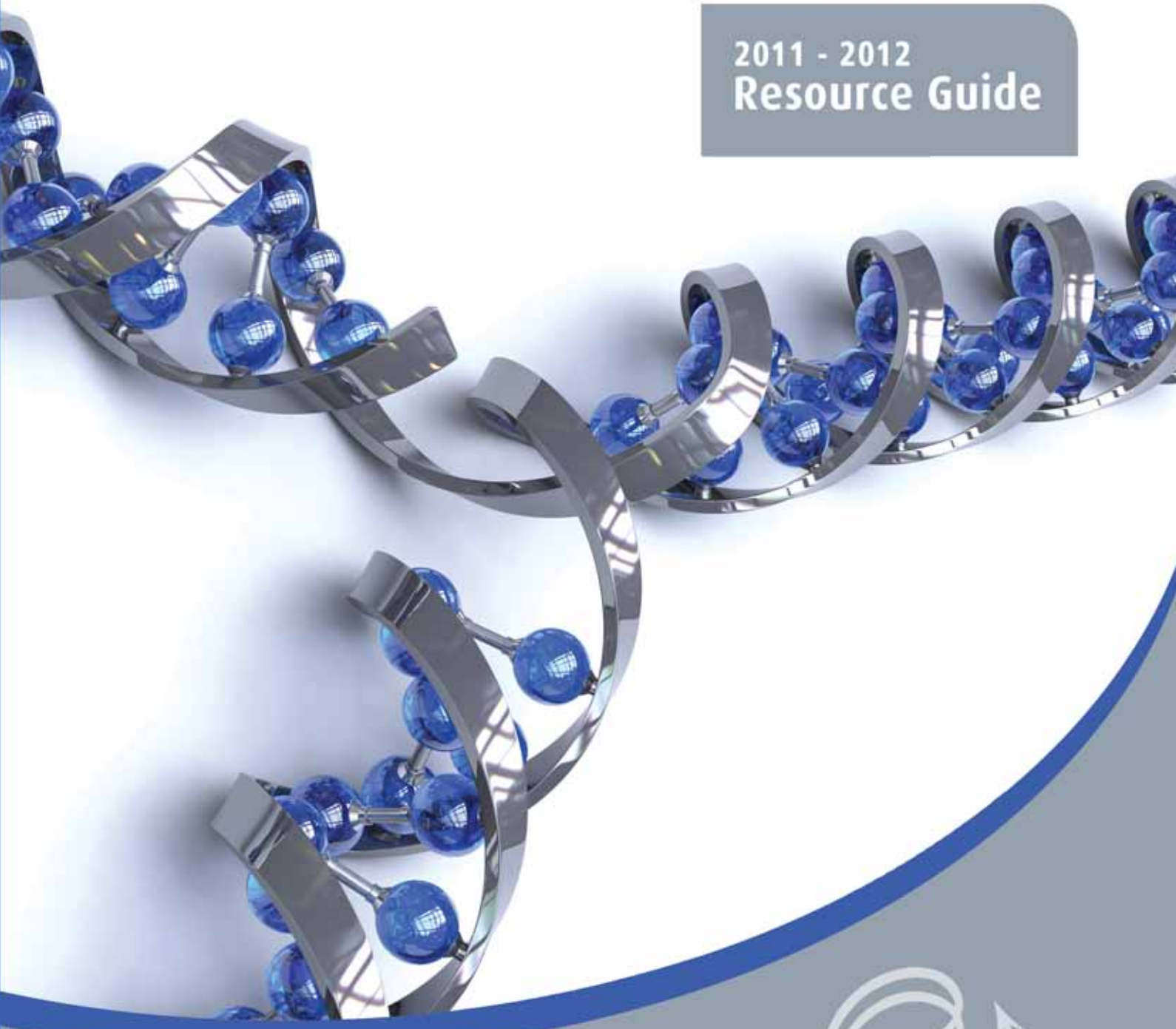
Discovering DNA

EXCITE | EXPLORE | ENGAGE

2011 - 2012 Resource Guide



EDVOTEK®

The Biotechnology Education Company®

Our Philosophy

Teaching should always be fun
Learning should always be enjoyable

Experiments should always work
Preparation should always be easy

Science shouldn't be expensive
The environment shouldn't suffer

Lessons should always be relevant
Science should never be called boring

DNA is nothing to be scared of
Science is a way of life

This catalogue is printed on paper from sustainable sources.

EDVOTEK®

Cutting-edge experiments without the pain!

Contents

Quantity of lab groups per kit Time required Product order number Related products

Science Education that Doesn't Cost the Earth

what have we done so far?

- Redesigned our Resource Guide to reduce the number of pages by a third. This saves a huge amount of paper!
- The reduced weight of our Resource Guide means less energy was used to transport this copy to you.
- We chose wood-free or near wood-free paper for the Resource Guide.
- We've simplified our supply chain so we send more direct shipments to our customers. This will greatly improve our service and help the environment.
- We use recycled card in our kit box outer packaging.
- We encourage people to walk, jog and bicycle to work. Several of our employees telecommute.
- We recycle our toner cartridges – simple and easy, yet effective.
- We recycle all our paper.

what will we do next?

- Our employees will be commuting using public transportation to further reduce our carbon footprint.
- Reduce our use of plastics & non-recyclable materials in our kits.
- Plant trees and take part in projects that enable us to offset our carbon emissions.
- Provide our instruction manuals online so less paper is used.
- Use recycled paper or wood-free paper.
- We feel that it is through small changes by many rather than grand actions by few that will make the difference.

EDVOTEK®

Over 20 years of Biotechnolgy Education

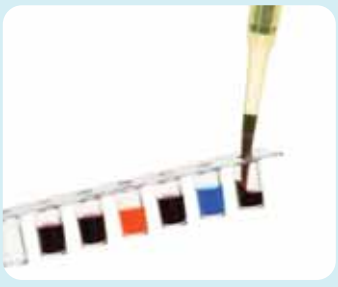
Since 1987

What's New?

TetraSource™ 300
Power any combination of electropohoresis units with this mighty supply. See p. 81!

SyBr®Safe, an ultra-sensitive dye, that is safe for the biotechnolgy classroom! See p. 29!

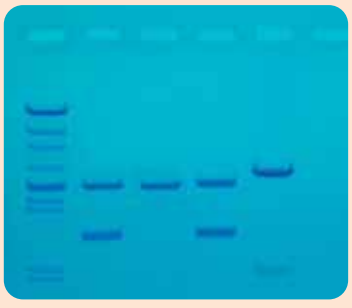
Rapid Transformation
Transform different DNA plasmids & visualize colorful colonies! See p. 54!



QuickStrips™ samples are pre-aliquotted for you! Simply hand a strip of samples to your students! See p. 11!

MegaCycler™
Taking Classroom PCR one step further! NEW 49-place block! See p. 83!

White Light Box
View gels easier with new large 15 x 23 cm surface! See p. 89!



FlashBlue™ Stain - Safe, super fast & effective. Quick analysis without UV light!

DNA DuraGel™
Learn to pipette samples with reusable gels. See p. 15!

New UV Transilluminator!
Midrange UV transilluminator with a large viewing surface & UV blocking cover! See p. 89!

EDVOTEK®

The Biotechnology Education Company®

SECTION ONE

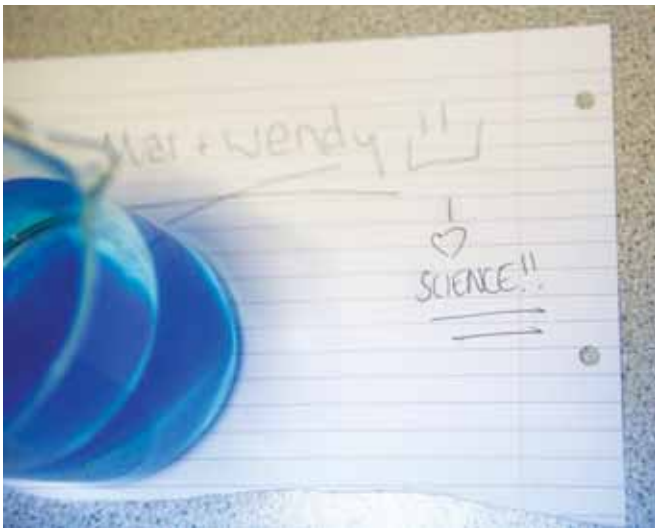
1 Introduction to DNA

We have discovered the secret of life!

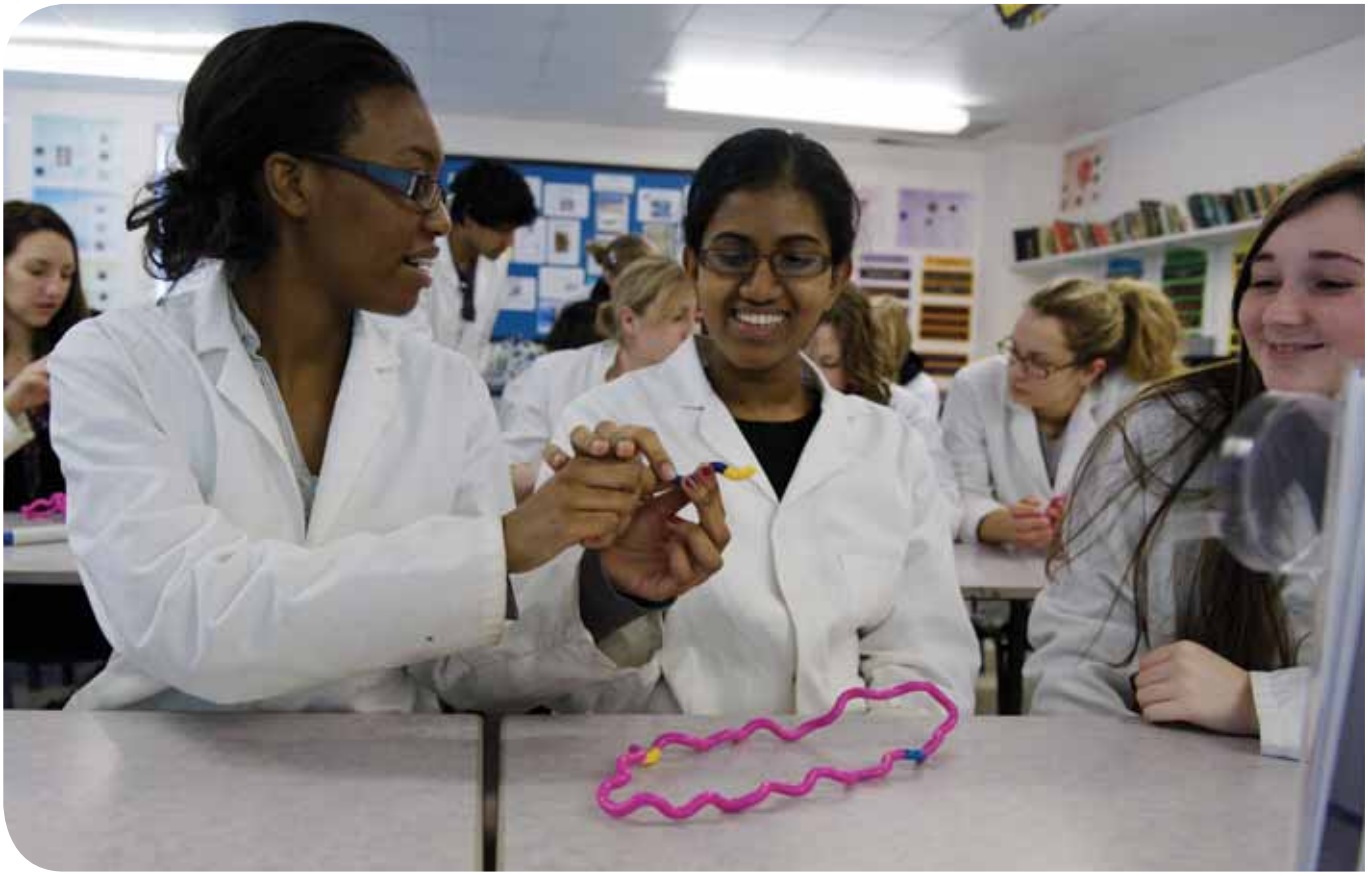
FRANCIS CRICK, AT THE EAGLE PUB, CAMBRIDGE, 28TH FEBRUARY 1953

In the Beginning...

Every molecular biology experiment begins with the extraction of DNA. Why not give your students the opportunity to explore the fundamentals of DNA with our games, models and easy experiments?



In this section you'll find ways to show your students how transcription and translation work with our colourful models. Your students will have lots of fun unravelling the genetic code with our board games "Genes of Fortune" and "Genetic Dice." But the most impressive way to learn about DNA is to look at your own! With our "Genes in a Tube" kit, your students will extract their very own DNA and keep it in a necklace! Whatever you choose, you are sure to inspire your students to want to know more! After all, seeing is believing...



The Basics

What Does DNA Look Like?

BEST SELLER

This fun and easy lab activity shows your students what real chromosomal DNA looks like and allows them to explore the procedures involved in DNA extraction. Just overlay with 95% ethanol or isopropyl alcohol and spool the DNA on the glass rod!

For 10 Lab Groups
Complete in 30 minutes
Cat No S-10

Kit includes: instructions, DNA extraction buffer, DNA sample in capped test tube, transfer pipettes, minilinks, glass rod, DNA spooling rods, test tubes, salt.

How Do You Clone A Gene?

In this kit, a set of multi-coloured links demonstrate a variety of molecular biology simulations. Students learn about digesting DNA with restriction enzymes, cloning genes in plasmids, protein structure and more!

For 10 Lab Groups
Complete in 30 minutes
Cat No S-20

Kit includes: instructions, molecular biology models, small plastic bags.

What is Osmosis? NEW

Your students will be able to see and understand the principles of osmosis for themselves! Using dialysis tubing, various salt concentrations, and dyes of different molecular weights you can visually show osmosis in action.

For 10 Lab Groups
Complete in 45 minutes
Cat No S-74

Kit includes: instructions, high & low molecular weight dyes, dialysis tubing, transfer pipettes.

You need: 300-400 ml beakers, table salt, apple and beetroot juice, distilled water.

Genes in a Tube™ NEW

Teach your students how to extract and precipitate their own DNA in this exciting and easy activity. Students can transfer their DNA to a tube that can be used as a pendant on a necklace! All you need is ice cold alcohol (95% ethanol or isopropyl alcohol) and a 56°C waterbath.

For 25 students + One for you!

Complete in 30 minutes

Cat No 119

Kit includes: instructions, lysis buffer, NaCl solution, Protease, Tris buffer, Methylene Blue Plus solution, microcentrifuge tubes, sterile cotton tipped applicators, transfer pipettes, tubes for DNA precipitation, Gene Tubes, and string.

Do Onions, Strawberries and Bananas Have DNA?

Your students can construct DNA models and then extract DNA from onions, strawberries or bananas. You provide the fruit or vegetables and 95-100% isopropyl alcohol, your students extract DNA.

For 10 Lab Groups

Complete in 30 minutes

Cat No S-75

Kit includes: instructions, DNA extraction buffer, DNA sample in capped test tube, transfer pipettes, pop beads, glass rod, DNA spooling rods, test tubes, salt.

Principles of DNA Sequencing

DNA sequencing is used to determine the primary structure of DNA. This experiment is a dry lab that explains DNA sequencing and analysis. Actual autoradiograms from DNA sequencing experiments are provided for identification of mutated nucleotides.

For 6 Lab Groups

Complete in 20-30 min.

Cat No 106

Kit includes: instructions, 6 autoradiograms

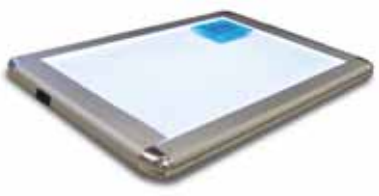
You need: white light visualization system

Perfect Partner

White Light Box

Great for viewing gels! See page 89 for full details.

Cat No 552



The Basics

Classroom Molecular Biology Toys and Games

BEST SELLER

Gene of Fortune™
This novel "Bingo" game is an excellent resource to introduce concepts of the genetic code. The games can be played over several lessons. Concepts reinforced include the genetic code, single and three letter amino acid abbreviations, and the characteristics of amino acids. The game includes the Gene of Fortune Spinner, 10 different cards, game chips, and instruction manual.

Genetic Dice™
Using Genetic Dice, students will have fun while they learn about DNA. This resource utilizes a set of game boards, genetic dice, and game chips to reinforce concepts centering on Watson-Crick DNA base pair rules.

Cat No S-80

www.edvotek.co.uk

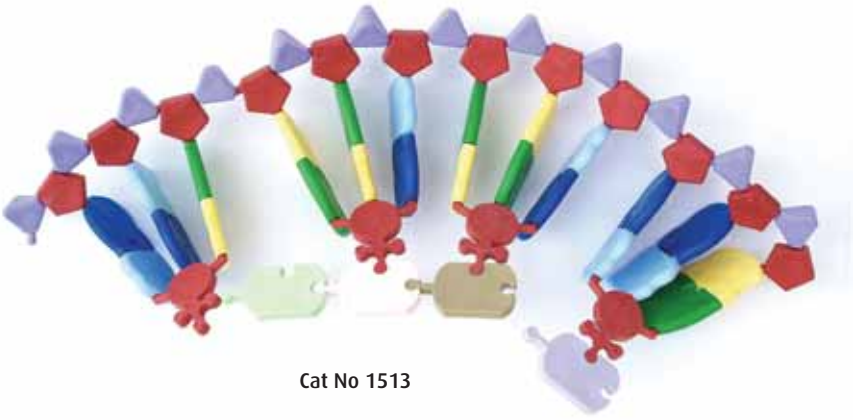
Cat No 1511

DNA Models

BEST SELLER

Your students can build a model of DNA with this simple and colourful system. The parts are colour-coded to represent the purines, pyrimidines, deoxyribose and phosphate groups that make up the double helix of DNA. This kit includes differently sized purines and pyrimidines, the correct number of hydrogen bonds and the minor and major grooves are shown. Ideal for modelling DNA replication. Use together with the RNA Protein Synthesis Kit to model translation and transcription.

Cat No 1511 12 Layer Kit
Cat No 1512 22 Layer Kit
Cat No 1513 RNA Protein Synthesis Kit

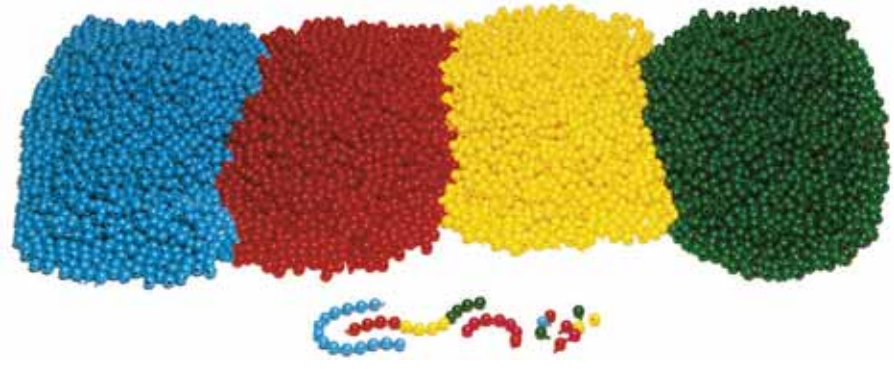


Cat No 1513

Coloured Beads

A set of coloured beads that can be designated to represent the Watson-Crick DNA bases (A, T, G, C). The beads can be used in a variety of ways to demonstrate concepts related to the structure and biology of DNA. Includes detailed outline of various sample demonstrations. Includes 150 beads of each colour.

Cat No 1500



SECTION TWO

2 Discovering DNA Electrophoresis

...although the work we did was often tedious and sometimes frustrating, it was generally great fun and a deep pleasure and joy to get an understanding to what seemed initially to be a great mystery.

CHRISTIANE NÜSSLEIN-VOLHARD, NOBEL PRIZE FOR FRUITFLY GENETICS

DNA Electrophoresis Made Easy

DNA electrophoresis is an easy, fun, exciting and safe activity to perform in the classroom. It is a widely used technique that is carried out in DNA fingerprinting, paternity testing, genetic testing and genetic engineering. For example, DNA electrophoresis was used to prove that Dolly the sheep was the world's first cloned mammal.

You can bring a wide variety of exciting classroom activities into your lessons with our electrophoresis kits. We save you time by providing complete scenarios that can be used with ANY age group!

See page 15
for the basic equipment
you will need to get started!

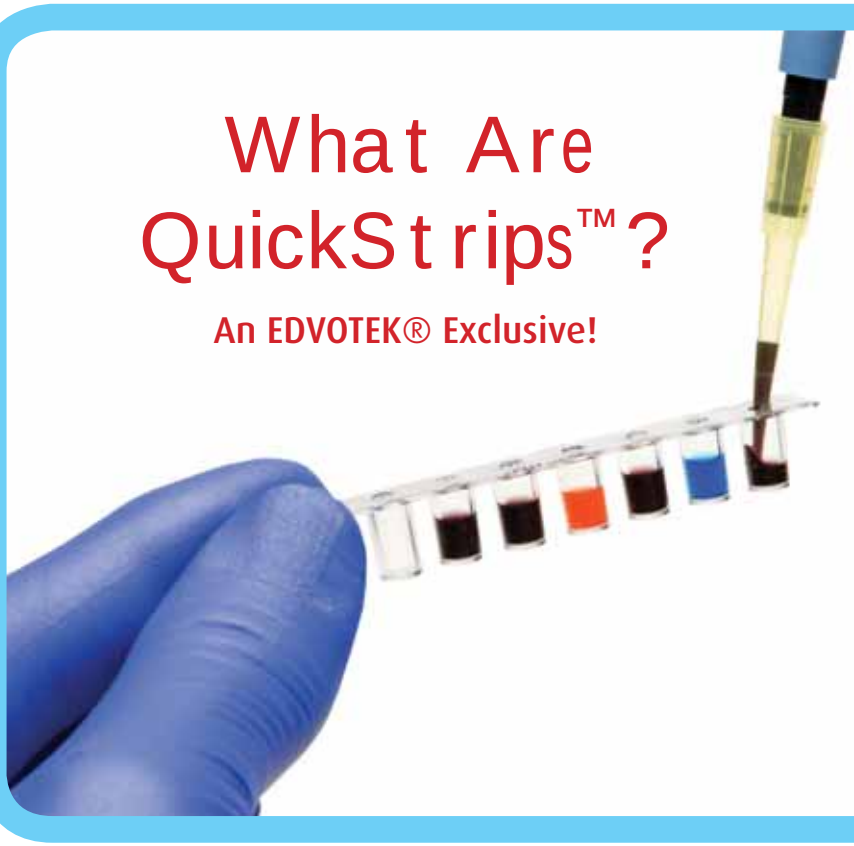
Using colourful dyes makes the results easy to understand and no staining is needed. For electrophoresis using real DNA, check out our Ready-to-Load™ Electrophoresis kits, or our DNA Extraction and Analysis kits.

Our classroom gel electrophoresis system enables you to simply and affordably introduce DNA electrophoresis into your lessons. All you need is an electrophoresis apparatus, power supply and one of our electrophoresis kits to get started!

We think you'll be amazed at how easy classroom electrophoresis can be!

What Are QuickStrips™?

An EDVOTEK® Exclusive!



Spending a lot of time preparing for your labs?

QuickStrips™ conveniently provide each student group the required samples and eliminate the need for PreLab teacher sample preparation.

Each single serve mini-tube is sealed with leak-proof foil that is easily punctured with a pipette tip!

Provided in all EDVOTEK® 100 series kits at no additional cost!

DISCOVERING DNA ELECTROPHORESIS

Simulations of DNA Electrophoresis

Whose DNA Was Left Behind?

BEST SELLER READY TO LOAD

DNA obtained from a single hair left behind at a crime scene can be used to identify a criminal. In this experiment, students will compare simulated crime scene DNA with that of two suspects.

- For 10 Lab Groups
- Complete in 45 minutes
- Cat No S-51

Kit includes: instructions, Ready-to-Load dye sample, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.

In Search of My Father

READY TO LOAD

Solve the mystery of two boys separated from their parents a decade ago. Their biological mother is identified by mitochondrial DNA and their biological father from chromosomal DNA.

- For 10 Lab Groups
- Complete in 45 minutes
- Cat No S-49

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.

Why Do People Look Different?

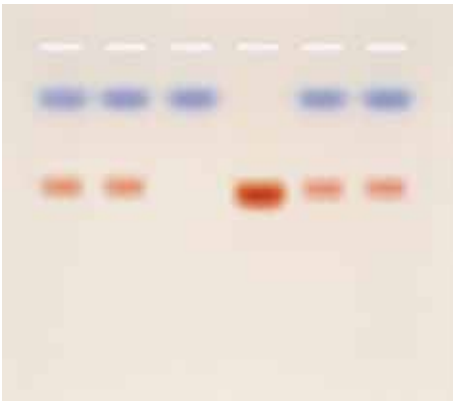
BEST SELLER READY TO LOAD

Teach your students how people's physical traits are a reflection of their genes. In this simulation your students will use electrophoresis to separate dyes which represent genetic traits.

- For 10 Lab Groups
- Complete in 45 minutes
- Cat No S-50

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.



Micropipetting Basics

BEST SELLER

Teach your students how to use a micropipette with ease and accuracy with multi-coloured dyes. A fun and cost effective way to learn this important skill.

For 10 Lab Groups
Complete in 45 minutes
Cat No S-44

Kit includes: instructions, various coloured dye samples and a Pipette Card.

All you need: 5-50 µl adjustable or 10 µl fixed micropipette and tips.

Perfect Partners

Edvotek Variable Micropipette

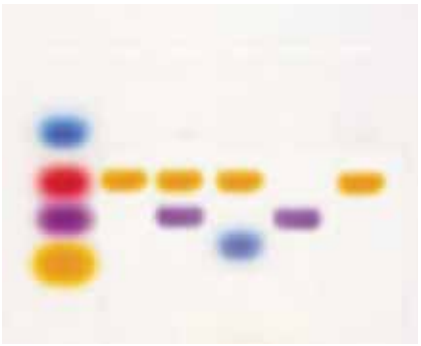
Sturdily designed, easy to use, & highly accurate! 5 - 50 µl Micropipette.

Cat No 590

10 µl Fixed Volume Minipipette

No need to calibrate. Impossible to measure the wrong volume!

Cat No 586



What Size Are Your Genes?

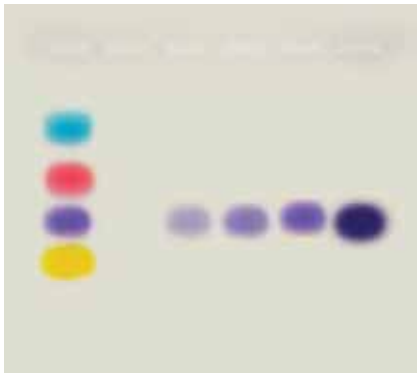
READY TO LOAD

Teach your students how agarose acts as a molecular sieve during electrophoresis to separate different sized pieces of DNA quickly and simply using brightly coloured dyes.

For 10 Lab Groups
Complete in 45 minutes
Cat No S-45

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.



What Is PCR & How Does It Work?

READY TO LOAD

This simulation experiment demonstrated the process of DNA amplification by PCR and how the amplified product is detected by separating the reaction mixture by agarose gel electrophoresis.

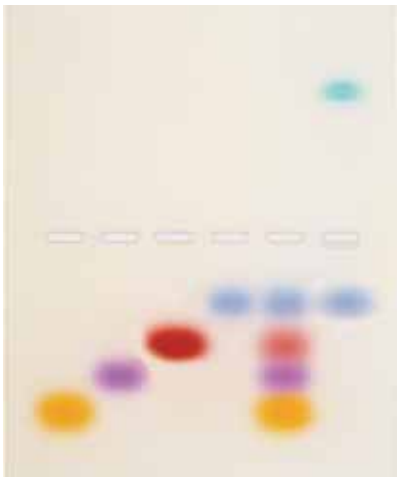
For 10 Lab Groups
Complete in 45 minutes
Cat No S-48

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.

Principles & Practice of Agarose Gel Electrophoresis

BEST SELLER READY TO LOAD



Show your class that electrophoresis separates molecules on the basis of size and charge. A safe, colourful, fast and simple way to teach the technique which will engage your students.

For 6 Lab Groups
Complete in 45 minutes
Cat No 101

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.

ALSO Available - Dye Samples Only
Cat No 101-B 12 Gels
Cat No 101-C 24 Gels

The Mystery of the Crooked Cell

NEW READY TO LOAD

This simple experiment demonstrates detection of the mutation that causes Sickle Cell Anemia. In this simulation, your students will use electrophoresis to separate dyes that represent patient samples and controls.

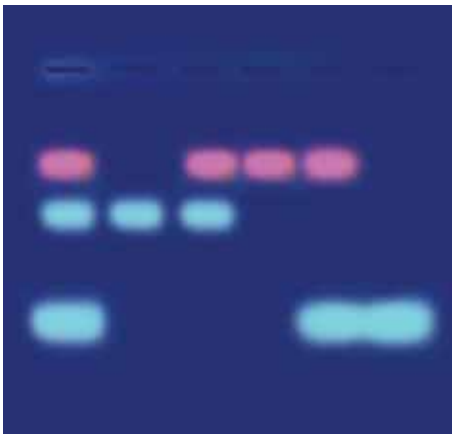
For 10 Lab Groups
Complete in 45 minutes
Cat No S-53

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.

The Case of the Invisible Bands

NEW READY TO LOAD



Solve the mystery of the invisible bands. Bring the excitement of fluorescence to your electrophoresis with this innovative and exciting experiment.

For 10 Lab Groups
Complete in 45 minutes
Cat No S-52

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank, power supply, and black light (Cat No 969 recommended).

Perfect Partner

Long Wave UV Mini Lamp

A safe, long-wave UV lamp to view fluorescence.

Cat No 969

DNA Electrophoresis Equipment For your Whole Class!

An amazingly good value way to bring DNA electrophoresis to your whole class! This LabStation provides all you need to run any of our DNA or dye electrophoresis kits with your students. It includes an electrophoresis tank, power supply, six pipettes and tips!

Set Includes:

1 HexaGel Electrophoresis Tank (for six gels)
1 EVT300 Power Source (75/125 V)
6 Gel trays with GelCaps and combs
6 40 µl MiniPipettes and tips

For 6 Lab Groups

Cat No RLSHE-3

DNA DuraGel™ NEW

Micropipetting is a critical skill required in molecular biology. To help your students practice loading gels, why not try our reusable DNA DuraGels! Each DuraGel is a clear, reusable simulation of an agarose gel with two different well sizes. Save valuable preparation time and expense of pouring practice gels.

Kit Includes: DNA DuraGels™, gel loading samples, plastic pipetting.

All you need: Micropipettes are recommended.

For 6 Gels (12 to 24 students)

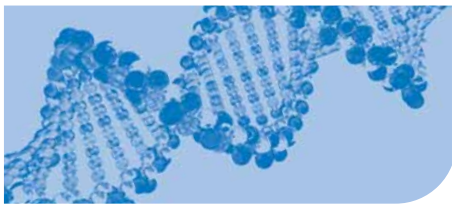
Cat No S-43

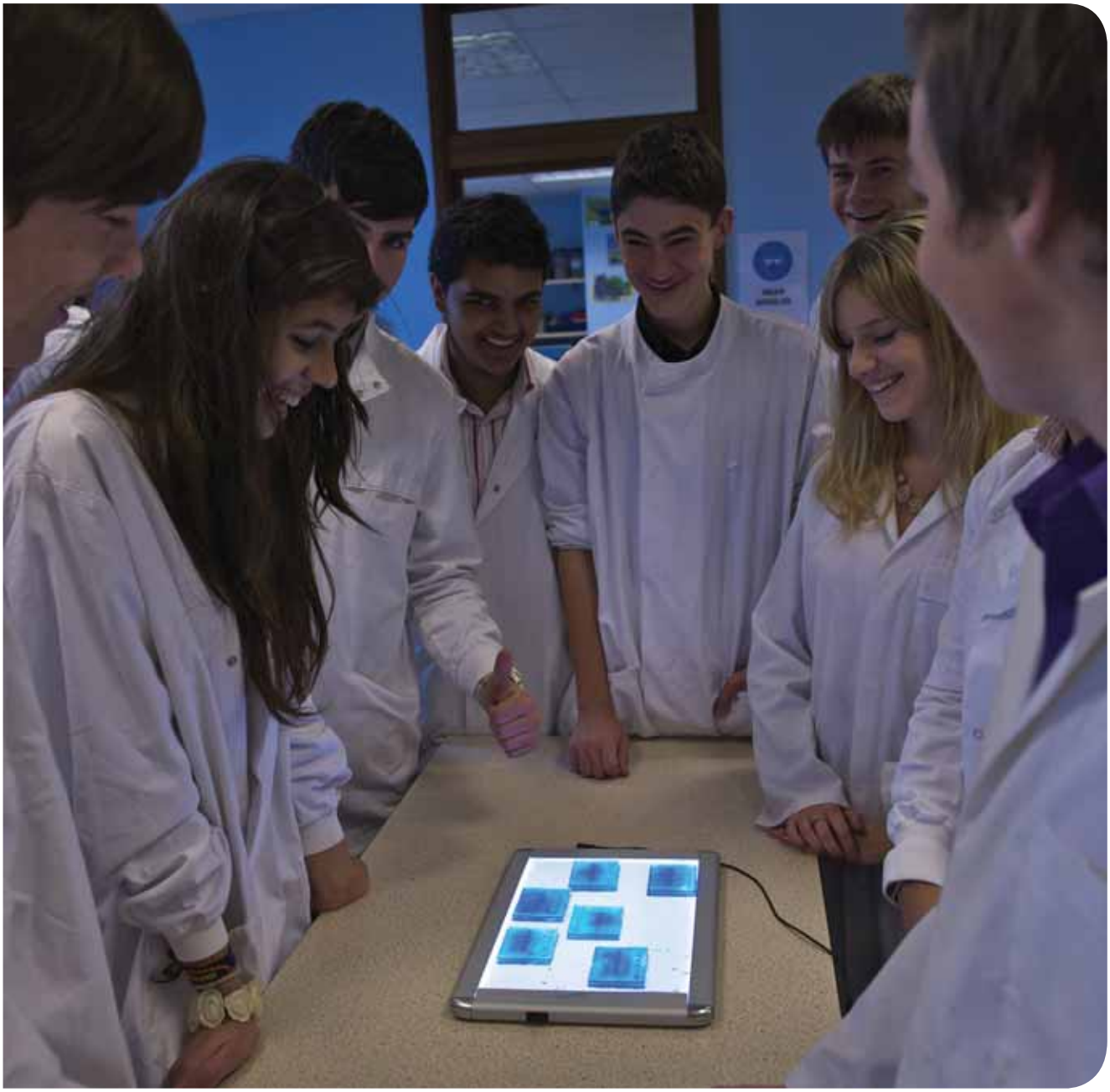
For 2 Gels (4 to 8 students)

Cat No S-43-20

SECTION THREE

3 DNA Electrophoresis "Ready-to-Load"





Any sufficiently advanced technology is indistinguishable from magic.

SIR ARTHUR C. CLARKE, SCIENCE-FICTION AUTHOR, INVENTOR, AND FUTURIST.

What is Ready-to-Load™?

Take a step up from dye electrophoresis with our simple Ready to Load kits!

"Ready-to-load" means samples are prepared for your students to load directly onto the gel. A variety of topics are covered including DNA fingerprinting, PCR and genetic testing. The difference between these kits and our dye simulation kits is that you use real DNA so the gels must be stained to see the result. However, our easy to use InstaStain cards make this simple to do. The whole experiment takes around 50 minutes to complete.

All Ready-to-Load kits include:

instructions, DNA samples, agarose, running buffer, InstaStain DNA stain, practice gel loading solution, 1 ml calibrated drop pipette, 100 ml graduated cylinder and microtipped transfer pipettes.

All you need for Ready-to-Load kits:

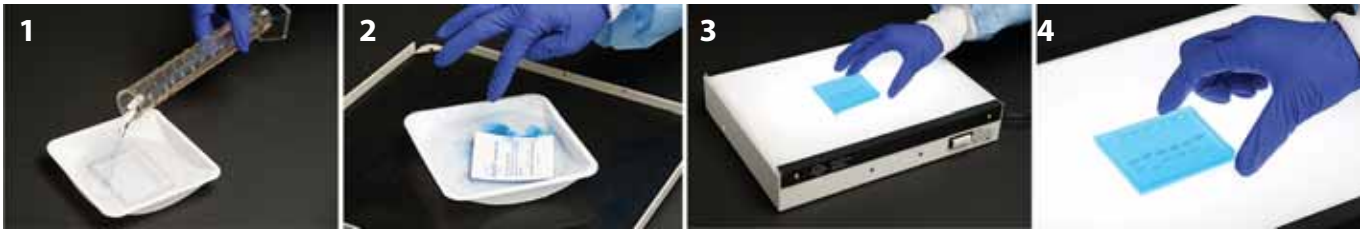
electrophoresis tank, power supply, micropipettes (5-50 µl adjustable or 40 µl fixed volume) and a white light box is recommended (see page 89).

What's the Difference Between InstaStain Blue and FlashBlue Liquid Stain?

All of our Ready-to-Load kits come with InstaStain Blue and our new FlashBlue stain, so you can choose how to stain your gels!

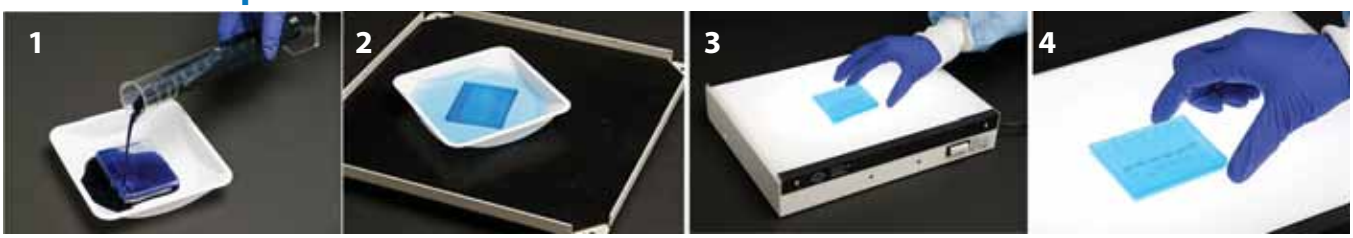
Save time and minimize chemical waste with InstaStain Blue! InstaStain Blue is an excellent alternative if time does not permit staining during a regular class session by allowing 3-hour to overnight incubation!

InstaStain Blue

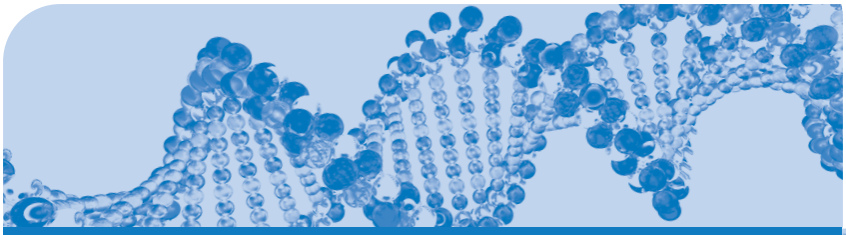


1. Remove the agarose gel from its bed and totally submerse the gel in a small, clean tray. To stain a 7 x 7 cm gel, add 75 ml of distilled or deionized water. The agarose gel should be completely covered with liquid.
2. Gently float a card of InstaStain® Blue with the stain side facing the liquid (blue side down). The gel will be ready for visualization in approx. 3 hours. For best results, cover the gel and let soak in the liquid overnight.
3. The gel is now stained, destained and ready for photography.
4. For optimum visibility, transfer the gel to a white light visualization system.

FlashBlue™ Liquid Stain

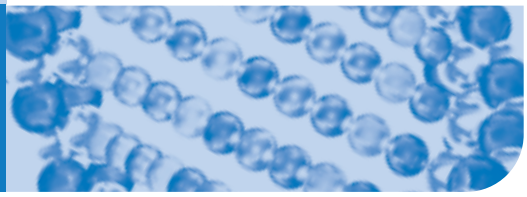


1. After electrophoresis, wear gloves and place the gel in a small gel staining tray. Pour 75 ml of FlashBlue™ stain into the tray, enough to cover the gel. Allow the gel to stain for no longer than 5 minutes.
2. Transfer the gel to another container with 250-300 ml distilled water. Gently agitate container every few minutes or place on a shaking platform. Destain for at least 20 minutes (longer periods may yield better results).
3. After destaining, gel should have a light blue background and well-stained DNA bands.
4. For optimal visibility, examine the gel on a white light visualization system.



DISCOVERING DNA ELECTROPHORESIS

Ready-to-Load™ DNA Electrophoresis



Restriction Enzyme Cleavage Patterns of DNA

READY TO LOAD

Plasmid and lambda DNA are pre-digested with restriction enzymes endonucleases that recognize and cut double-stranded DNA within or near defined base sequences. Digests are separated by agarose gel electrophoresis.

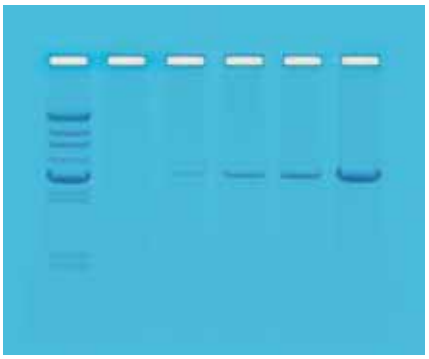
For 6 Lab Groups

Cat No 102 6 gels
Cat No 102-B 12 gels (DNA samples only)
Cat No 102-C 24 gels (DNA samples only)

PCR - Polymerase Chain Reaction

READY TO LOAD

This experiment introduces students to the principles and applications of the Polymerase Chain Reaction (PCR). This simulation experiment does not contain human DNA and does not require a thermal cycler.



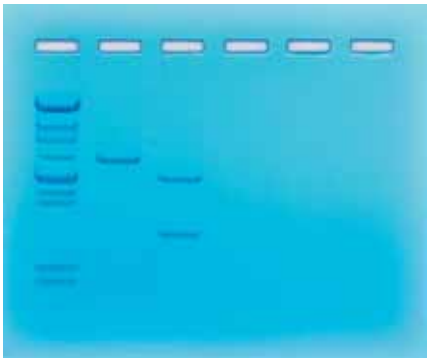
For 6 Lab Groups

Cat No 103 6 gels
Cat No 103-B 12 gels (DNA samples only)
Cat No 103-C 24 gels (DNA samples only)

Size Determination of DNA Restriction Fragments

READY TO LOAD

DNA sizing is an excellent tool used in many biotech applications, such as DNA mapping and forensic science. Your students will separate DNAs on agarose gels and learn how to use a standard curve to determine the sizes of unknown fragments.

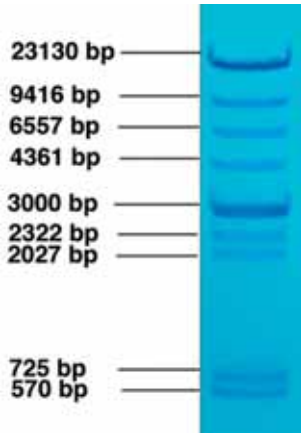


For 6 Lab Groups

Cat No 104 6 gels
Cat No 104-B 12 gels (DNA samples only)
Cat No 104-C 24 gels (DNA samples only)

What is a DNA Marker?

DNA is measured in base pairs. The size of unknown DNA fragments are determined by comparing them with standard DNA fragments. Most of our Ready-to-Load kits come with the DNA marker shown below. You can also order our DNA marker as a stand-alone item, see Cat No 750 on page 90.



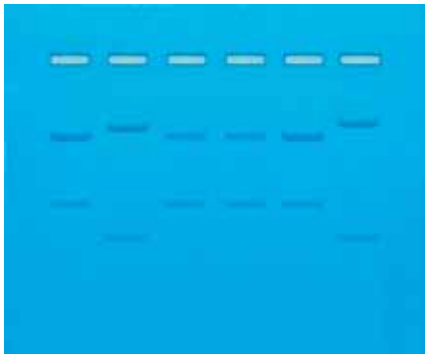
Mapping of Restriction Sites on Plasmid DNA

READY TO LOAD

DNA mapping is a common procedure used to determine the location of genes. In this experiment, DNA markers and pre-digested plasmid DNA fragments are mapped using agarose gel electrophoresis.

For 6 Lab Groups

Cat No 105	6 gels
Cat No 105-B	12 gels (DNA samples only)
Cat No 105-C	24 gels (DNA samples only)



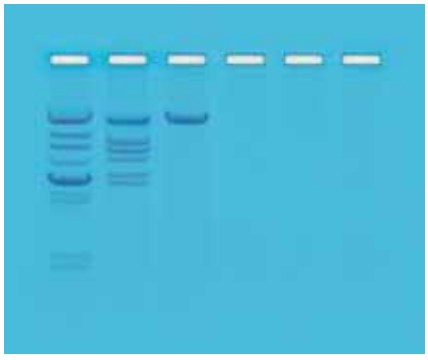
DNA Fingerprinting I: I.D. of DNA by Restriction Fragmentation Patterns

READY TO LOAD

Basic concepts of DNA fingerprinting are featured in this lab by comparing crime scene DNA with suspect DNAs. Fingerprint patterns are separated by agarose gel electrophoresis and the students determine who may have done-it!

For 6 Lab Groups

Cat No 109	6 gels
Cat No 109-B	12 gels (DNA samples only)
Cat No 109-C	24 gels (DNA samples only)



Analysis of *Eco* RI Cleavage Patterns of Lambda DNA

READY TO LOAD

Introduce the use of restriction enzymes as a tool to digest lambda DNA at specific nucleotide sequences.

For 6 Lab Groups

Cat No 112	6 gels
Cat No 112-B	12 gels (DNA samples only)
Cat No 112-C	24 gels (DNA samples only)

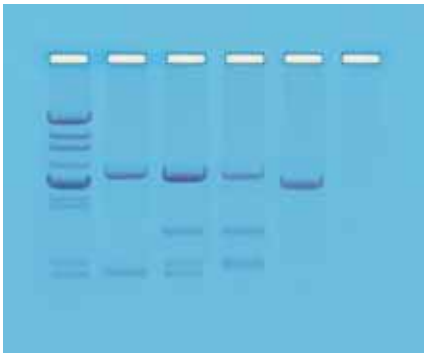
See page 17 for details of what comes in Ready-to-Load kits.

DNA Paternity Testing

BEST SELLER

READY TO LOAD

This experiment introduces students to the use of DNA fingerprinting in a simulated paternity determination. A child's DNA fingerprint is compared with his parents.



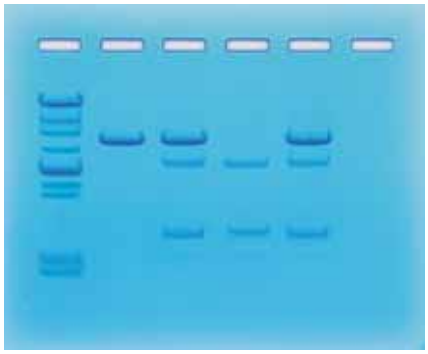
For 6 Lab Groups

Cat No 114 6 gels
Cat No 114-B 12 gels (DNA samples only)
Cat No 114-C 24 gels (DNA samples only)

Family Pedigree Cancer Gene Detection

READY TO LOAD

In this experiment, students determine a pedigree for a family thought to be carriers of a mutation in their p53 genes. This is followed by a diagnostic agarose gel analysis to diagnose the state of the p53 gene in individual family members.



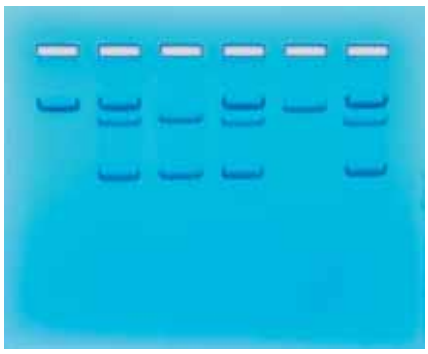
For 6 Lab Groups

Cat No 115 6 gels
Cat No 115-B 12 gels (DNA samples only)
Cat No 115-C 24 gels (DNA samples only)

Genetic Disease Screening (DNA-based)

READY TO LOAD

Genetic tests are becoming more commonplace than ever. This kit shows how a restriction enzyme can be used to screen DNA for Sickle Cell Anemia.



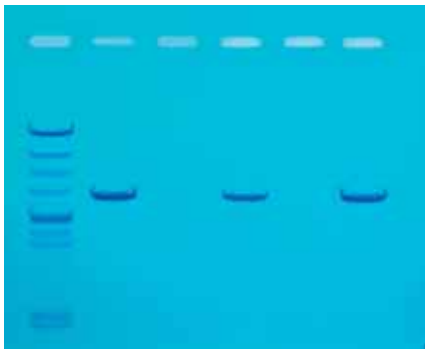
For 6 Lab Groups

Cat No 116 6 gels
Cat No 116-B 12 gels (DNA samples only)
Cat No 116-C 24 gels (DNA samples only)

Detection of Mad Cow Disease

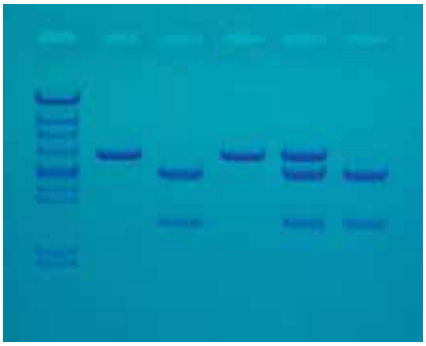
READY TO LOAD

Bovine spongiform encephalopathy (BSE), better known as mad cow disease, is a neurodegenerative, fatal condition in cattle. Consuming BSE-infected beef is believed to be the cause of a similar condition in humans, Creutzfeldt-Jakob disease. In this experiment, students examine simulated PCR products from several feed mills, to determine any possible violations of the ban on including animal parts in cattle feed.



For 6 Lab Groups

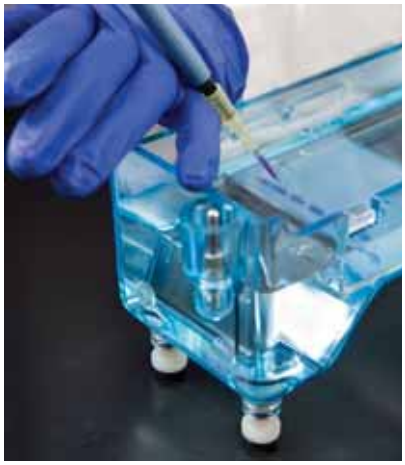
Cat No 117 6 gels
Cat No 117-B 12 gels (DNA samples only)
Cat No 117-C 24 gels (DNA samples only)



Cholesterol Diagnostics

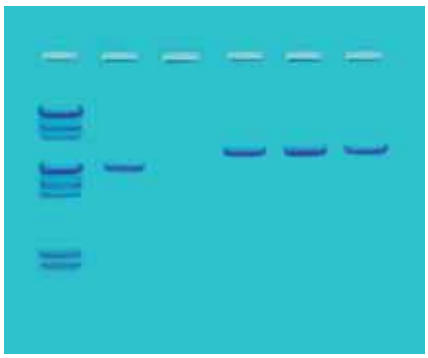
READY TO LOAD

Genetic testing can be used to identify people with a genetic condition which causes them to have an elevated level of cholesterol and which can be fatal. Your students can see how genetic testing is carried out and learn about DNA electrophosresis.



For 6 Lab Groups

Cat No 118	6 gels
Cat No 118-B	12 gels (DNA samples only)
Cat No 118-C	24 gels (DNA samples only)



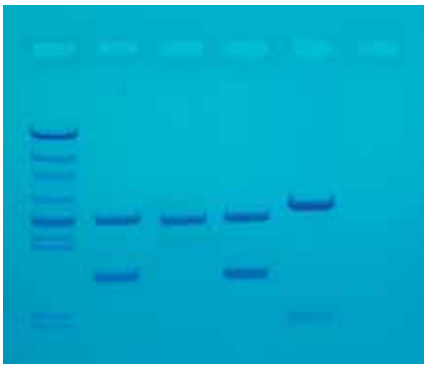
DNA-Based Screening for Smallpox

READY TO LOAD

This experiment presents a bioterrorism scenario, with students examining a simulated DNA fingerprinting test for the detection of smallpox.

For 6 Lab Groups

Cat No 124	6 gels
Cat No 124-B	12 gels (DNA samples only)
Cat No 124-C	24 gels (DNA samples only)



Amplification of DNA for Fingerprinting

BEST SELLER

READY TO LOAD

Forensic DNA fingerprinting has become a universally accepted crime-fighting tool. Recent advances use the polymerase chain reaction (PCR) to amplify human DNA obtained from crime scenes. This experiment, based on a crime scene scenario, has an inquiry-based component.

For 6 Lab Groups

Cat No 130	6 gels
Cat No 130-B	12 gels (DNA samples only)
Cat No 130-C	24 gels (DNA samples only)

See page 17 for details of what comes in Ready-to-Load kits.

SECTION FOUR

4 Forensic Science

At first the images looked a complicated mess. Then the penny dropped. We had found a method of DNA-based biological identification.

PROF SIR ALEC JEFFREYS, INVENTOR OF DNA FINGERPRINTING

Innocent Until Proven Guilty

If you ask almost anyone what they know about DNA, they'll probably say it is used to solve crimes. So what better way to get your students interested in DNA by asking them to solve a crime in the classroom?

This section has some fun and exciting activities to give your students the opportunity to learn about forensics. Your students will enjoy solving a mystery through actual fingerprinting, blood typing simulated blood and DNA fingerprinting with dyes or real DNA.

FREE DNA Fingerprinting Poster for Your Classroom!

Scientific progress is rarely linear. Many seemingly unrelated scientific discoveries came together in the development of DNA fingerprinting. Our colourful classroom poster highlights the major events that enabled Alec Jeffreys to come up with DNA fingerprinting. For your FREE copy of our Discovering DNA Fingerprinting poster, contact us today!

Order your FREE poster today at www.edvotek.co.uk

FORENSIC SCIENCE

Crime Solving & DNA Fingerprinting

Whose Fingerprints Were Left Behind?

Evidence left behind at a crime scene can identify a potential culprit. Even in this age of DNA, fingerprints and blood stains are still important at helping to identify a criminal. In this experiment, your students will solve a crime by dusting for fingerprints and use fluorescent dust to search for and identify trace amounts of blood.

For 10 Lab Groups
Complete in 50 minutes
Cat No S-91

Kit includes: instructions, brushes, magnifying lens, fingerprint cards, black dusting powder, fluorescent green and grey dye dusting powder, fingerprint lifters.

All you need: alcohol and long wave U.V. light.

Perfect Partner:

Long Wave UV Lamp

Cat No 969

Blood Typing

ABO and Rh typing of blood left at the scene of a crime can help to narrow down a list of suspects. In this experiment your students will use agglutination to identify the blood group of unknown blood samples as a step to identify a criminal.

For 10 Lab Groups
Complete in 45 minutes
Cat No 140

Kit includes: instructions, control ABO Rh simulated blood samples, unknown simulated blood samples, transfer pipettes, microscope slides.

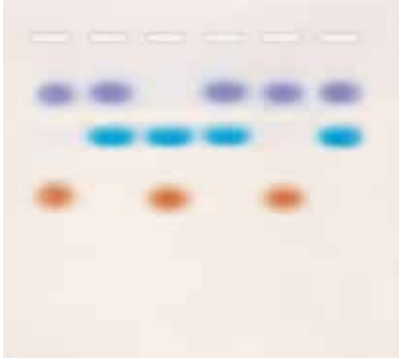
All you need: Students!

Whose DNA Was Left Behind?

READY TO LOAD

BEST SELLER

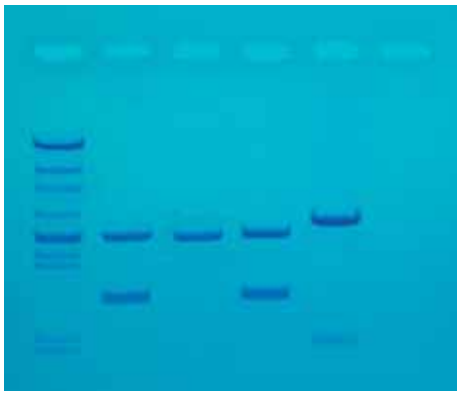
Incredibly DNA obtained from a single hair left at a crime scene can be used to identify a criminal. Students will use DNA fingerprinting to compare simulated crime scene DNA with that of two suspects and try to catch the criminal!



For 10 Lab Groups
Complete in 45 minutes
Cat No S-51

Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.



DNA for Fingerprinting - Made Simple

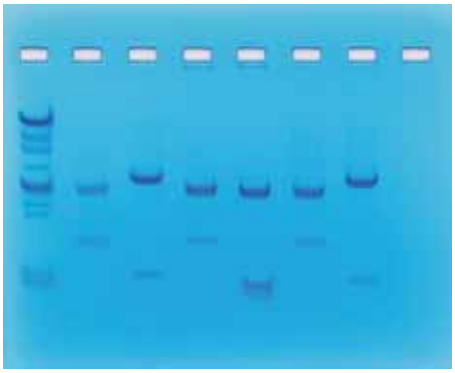
READY TO LOAD

Your students will solve a crime using real DNA! This Ready-to-Load kit means you can quickly teach DNA fingerprinting in your class and show your students how DNA evidence is used in modern forensics. This experiment allows for varied results depending on the selection of DNA fingerprinting patterns.

For 6 Lab Groups
Complete in 50 min.
Cat No 130

Kit includes: instructions, Ready-to-Load DNA samples, agarose powder, practice gel loading solution, electrophoresis buffer, InstaStain Methylene Blue, Methylene Blue Plus liquid stain, and microtipped transfer pipettes.

You need: electrophoresis tank & power supply!



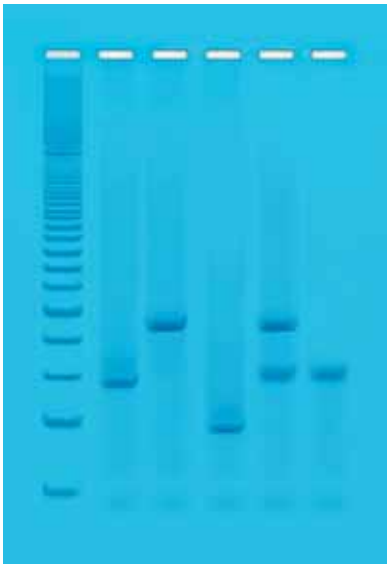
DNA Fingerprinting-Using Restriction Enzymes

Teach your students about restriction enzyme digests in the context of forensic science! Your students will cut DNA with restriction enzymes and then compare the "barcode" pattern of the crime scene DNA versus that of the suspects using DNA electrophoresis.

For 6 Lab Groups
Complete in 90 min.
Cat No 225

Kit includes: instructions, DNA samples, DNA ladder, Dryzymes (*Eco* RI and Hind III), agarose, practice gel loading solution, loading dye, electrophoresis buffer, microtipped transfer pipettes, gel stain.

All you need: micropipettes to measure between 5 & 50 µl (or 5, 10, 15 µl fixed volume minipipettes), tips, waterbath, electrophoresis tank and power supply.



DNA Fingerprinting-Using PCR

Give your students the opportunity to carry out PCR in the classroom! This kit provides easy to follow instructions for your students to develop various crime scene scenarios independently. Plasmid DNA is provided that, when amplified by PCR, provides products that represent individual DNA profiles. Your students can then solve a crime!

For 6 Lab Groups
Complete in 2.5 hours
Cat No 371

Kit includes: instructions, PCR beads, DNA template, primers, DNA ladder, ultra pure water, wax beads, agarose, loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 & 50 µl (or 5, 10, 30, 50 µl fixed volume minipipettes), tips, thermal cycler, electrophoresis tank and power supply.

FORENSIC SCIENCE

Experimenting with Forensics

Forensics Blood Typing

NEW

What Forensics Information Does Blood Typing Provide?

A sample that appeared to be blood was recovered from the handle of a gun left at a murder crime scene. The police identified three suspects with motives for this murder. While awaiting DNA testing it was decided to try and match blood samples from suspects to the recovered blood. In this classroom experiment, students will first identify if the recovered red material from the handle of the gun is actually dried blood and use a rapid blood type test to focus further investigation.

For 10 groups

Complete in 50 min.

Cat No 191

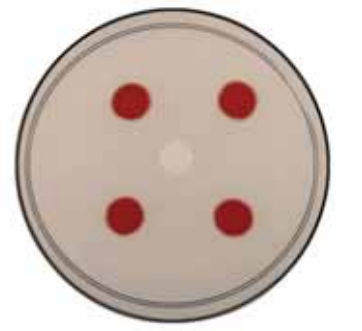
Kit includes: instructions, Control ABO simulated blood samples, simulated crime scene, and suspect blood samples, anti-A and Anti-B serums, blood detection stock solutions, transfer pipettes, microtiter plates, tubes, filter paper, cotton swab.

All you need: 95-100% Ethanol, distilled water
Optional: automatic micropipette (5 – 50 µl).

Forensics Antigen Detection

NEW

Can A Dead Cat Tell Us If The Owner Was Murdered?



A young woman who lives alone with her cat was last seen on her daily run. After two days she was reported missing to the police by her friends. Upon entering her flat, her cat was found dead in a pool of blood. Tiny drops of blood were found trailing from her bed sheets to the blood by the cat. The detective in charge concluded that the woman and the cat were brutally murdered, her body was removed from the scene. Samples were obtained from the blood around the dead cat and from the blood stains on the bed sheets to determine if it was human or cat blood. Students will determine the validity of the hypothesis set forth by the detective.

For 10 groups

Module I: Complete in 35 min.
Module II: Incubation overnight.

Cat No 192

Kit includes: instructions, Simulated control and crime scene blood samples, antigen/antibody detection reagents, microtiter plates, UltraSpec-Agarose™, practice loading solution, petri plates, well-cutters.

All you need: Students!

Forensics Enzymology NEW

Can Enzymes Be A Detective's Best Friend?

In a head-on car crash, each driver claimed that the other driver fell asleep at the wheel and caused the accident. The two passengers, one from each car were critically injured but the drivers were barely hurt. The attending police officer recorded the required information and arranged for all victims to be taken to the local hospital. Upon arrival, one of the critically injured patients was pronounced dead, making the case a murder. The attending doctor examined the two drivers, took blood and urine samples, and measured their temperature using a disposable plastic mouthpiece and a tongue depressor that he saved. The physician had read that the level of saliva amylase increases in humans due to sleep deprivation. Students will determine the level of saliva amylase for the two drivers to determine who was responsible for the accident due to falling asleep at the wheel.

For 10 groups

Modules I and II: Complete in 45 min. each

Cat No 193

Kit includes: instructions, simulated control and driver saliva samples, starch, HCl, Iodine, and detection solutions, transfer pipettes, microtiter plates, microtest tubes.

All you need: visible wavelength spectrophotometer.

Forensics Enhancement Techniques NEW

Show Me The Blood That I Cannot See?

Trace amounts of blood can be more than enough to identify the individual responsible for a crime, burglary or other illegal activities. Enhancement procedures can make a small stain of body fluid or tissue visible to the naked eye. Reagents that are routinely used as a first screen will be used to detect simulated blood and DNA. Biological materials will be recovered from splatters, blood trajectory and small droplets of simulated human materials.

For 10 groups

Complete in 35 min.

Cat No 194

Kit includes: instructions, simulated blood, leucocrystal violet solution, luminol solution, spray bottle, transfer pipettes, microtest tubes.

All you need: gloves, face masks.

SECTION FIVE

5 Polymerase Chain Reaction

My scientific studies have afforded me great gratification; and I am convinced that it will not be long before the whole world acknowledges the results of my work.

GREGOR MENDEL

EdvoCycler™

Finally, a PCR machine at an affordable price!

MegaCycler™

Taking Classroom PCR One Step Further!

The EdvoCycler and MegaCycler are stand alone classroom PCR machines that are easy to use! Both come pre-programmed with all Edvotek PCR protocols, plus there's extra memory slots for more! The vivid 7-line LCD displays all program parameters on a single screen. A heated oil-free lid makes operation a snap!

See pages 82-83 for details!

New SAFE stain, perfect for PCR!

SYBR® Safe

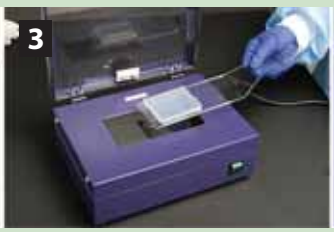
SYBR Safe DNA Stain

Concentrate, for 750 ml
Cat No 608

- **Safe for your students**
  Displays no acute oral toxicity and greatly reduced genotoxicity.
- **Safe for the Environment**
  Offers non-hazardous waste status and Clean Water Act compliance.
- **Safe for your school and your budget**
  Increased sensitivity requires less DNA and saves you money. Reduces waste storage and disposal costs.
- **Safe for your nucleic acid samples**
  Improved staining efficiency without altering the DNA

After electrophoresis, wear gloves and place the gel in a small gel staining tray. Add approx. 75 ml of 1x SYBR® Safe stain to the tray, enough to cover the gel.

Allow the gel to stain for 10-15 minutes. (Agitation is optional.)



Wearing gloves, carefully remove the gel and transfer to a short/mid-range UV or blue light transilluminator.

Be sure to wear UV protective goggles. while visualizing DNA bands.

POLYMERASE CHAIN REACTION

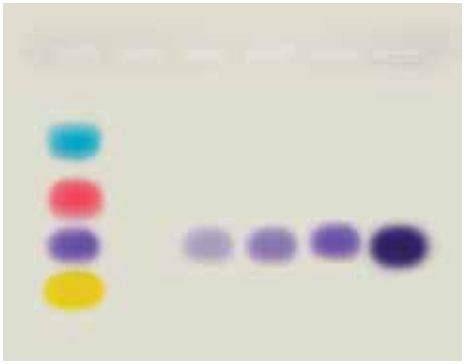
Experimenting with PCR

What is PCR and How Does it Work?

BEST SELLER

READY TO LOAD

Teach your students about PCR without a thermal cycler! Using colourful dyes, your students will see how increasing cycle number produces more DNA for analysis. NO preparation & NO staining!



- For 10 Lab Groups
- Complete in 45 minutes
- **Cat No S-48**

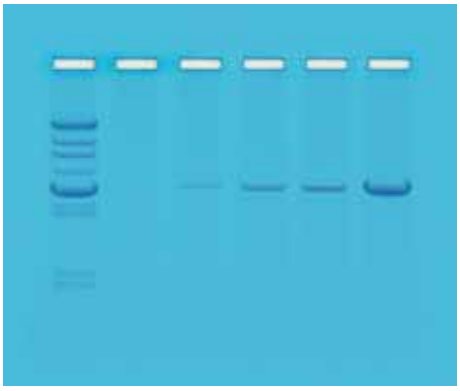
Kit includes: instructions, Ready-to-Load dye samples, agarose powder, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.

PCR - Polymerase Chain Reaction

READY TO LOAD

Your students will learn the principles of PCR using real DNA in this Ready-to-Load experiment. Using gel electrophoresis your students will see for themselves that more DNA is produced with every cycle of the reaction. No thermal cycler is required.



- For 6 Lab Groups
- Complete in 45 minutes
- **Cat No 103**

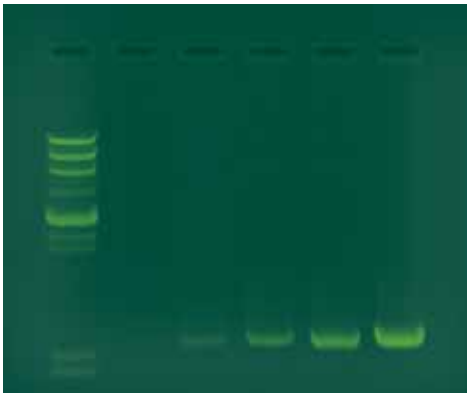
Kit includes: instructions, Ready-to-Load DNA samples, agarose, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes, gel stain.

All you need: electrophoresis tank and power supply.

Amplification of DNA by PCR

BEST SELLER

In this easy PCR experiment, students will make billions of copies of a small amount of DNA in just 90 minutes! They will just need to mix template DNA & primers with PCR beads that contain all of the other components required to carry out a PCR reaction. Students will see the increasing amounts of DNA for themselves, taking samples every few cycles and analyzing them on a DNA gel.



SYBR® Safe

- For 10 Lab Groups
- PCR 3 hours or overnight Electrophoresis 45 min.
- **Cat No 330**

Kit includes: instructions, PCR beads, DNA template and primers, DNA size ladder, ultrapure water, wax beads, gel loading dye, agarose, electrophoresis buffer, gel stain.

All you need: 5-50 µl adjustable micropipettes, tips, thermal cycler, electrophoresis tank and power supply.

Quick PCR

BEST SELLER

A real time saver, this experiment uses PCR to amplify a small section of Lambda DNA via a two-step process, saving valuable classroom time and allowing completion of the lab in one session.

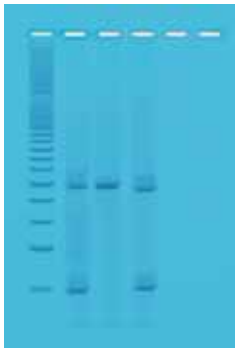
For 10 Lab Groups

Complete in 60 min.

Cat No 372

Kit includes: instructions, PCR beads, DNA template & primers, DNA size ladder, ultrapure water, wax beads, gel loading dye, agarose, electrophoresis buffer, gel stain.

All you need: 5-50 µl adjustable micropipettes, tips, thermal cycler, electrophoresis tank and power supply.



Drosophila Genotyping Using PCR

Students will learn about DNA polymorphisms by amplifying DNA regions that vary between wild & mutant *Drosophila*. Amplified DNA from wild-type and white-eyed flies are separated by agarose gel electrophosesis and analyzed.

For 10 Lab Groups

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 90 min.

Cat No 337

Kit includes: instructions, PCR beads, primers, DNA extraction buffer, 200 bp ladder, Proteinase K, *Drosophila* (wild type and white eye), agarose, electrophoresis buffer, gel stain.

All you need: thermal cycler, electrophoresis tank and power supply, automatic micropipette with tips, microwave, waterbath, UV transilluminator, microcentrifuge.

Real Time PCR

In Real Time PCR, amplification is monitored while the reaction is ongoing and allows for a quantitative analysis. A fluorescent dye added to the PCR reaction, binds to the DNA as it is being amplified, and the resulting fluorescence is measured during the reaction. In this Real Time PCR experiment, the reaction will be monitored for product throughout the cycling steps without the use of agarose gel electrophoresis.

For 10 Lab Groups

Requires 50 min.

Cat No 370

Kit includes: instructions, PCR beads, DNA template and primers, Ultrapure water, wax beads, ethidium bromide, microtiter plates.

All you need: thermal cycler, automatic micropipette with tips, microcentrifuge, balance, UV transilluminator.

Cloning of a PCR Amplified Gene

INCLUDES LYPHOCELLS NEW

Teach your students about cloning with this exciting and exclusive lab! An antibiotic gene is amplified using PCR and then the size is determined by using DNA standard markers and agarose gel electrophoresis. T4 DNA Ligase is used to insert the antibiotic gene into a plasmid vector and the resulting recombinant DNA ("clone") is used to transform *E. coli* LyphoCells. The transformed cells are plated and transformants are counted to determine transformation efficiency.

For 5 Lab Groups

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 331

Kit includes: instructions, biologicals, buffers and reagents for PCR, ligation and transformation, ReadyPour Luria Broth agar, DNA size ladder, wax beads, agarose, electrophoresis buffer, gel stain.

All you need: thermal cycler, two waterbaths, incubation oven, electrophoresis tank and power supply, automatic micropipette with tips, UV transilluminator.

POLYMERASE CHAIN REACTION

Human PCR

Mitochondrial DNA Analysis Using PCR

The mitochondria are thought to have evolved from a symbiotic relationship between prokaryotic and eukaryotic cells. Mitochondria have their own DNA and are only inherited via the maternal line. In this experiment, your students will amplify two regions of their mitochondrial DNA.

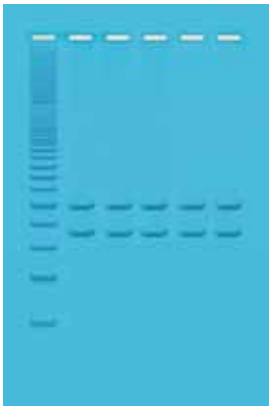
For 25 Students

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 332

Kit includes: instructions, proteinase K, PCR beads, control DNA and primers, microtubes, chelating agent, agarose, DNA ladder, practice gel loading solution, gel loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl, tips, waterbath, thermal cycler, electrophoresis tank and power supply.



PCR-Based Alu-Human DNA Typing

Your students use primers for a 300 base pair Alu insertion in chromosome 16 (PV92) to determine their own genotype! They can then compare their class results with others around the world over the internet.

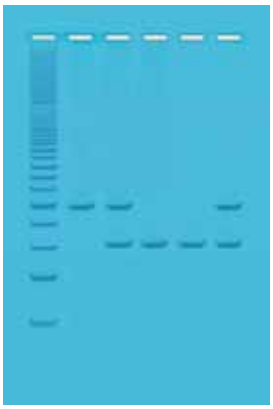
For 25 Students

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 333

Kit includes: instructions, proteinase K, PCR beads, control DNA and primers, microtubes, chelating agent, agarose, DNA ladder, practice gel loading solution, gel loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl, tips, waterbath, thermal cycler, electrophoresis tank and power supply.



PCR-Based VNTR Human DNA Typing

In DNA fingerprinting, variable number tandem repeats (VNTR) are used to identify individuals. In this kit, students will type themselves at the D1S80 locus on chromosome 1. This region contains between 14 and 40 copies of a 16 base pair repeat.

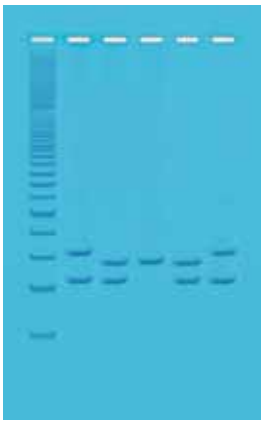
For 25 Students

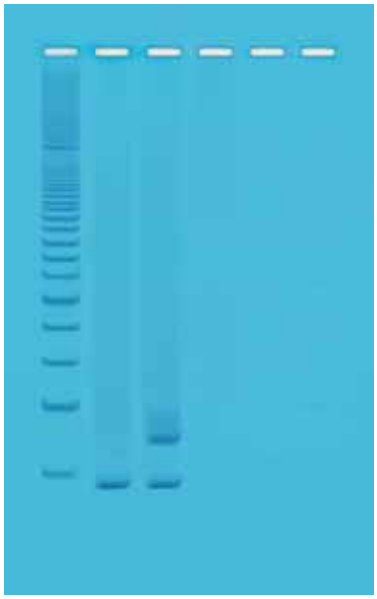
Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 334

Kit includes: instructions, proteinase K, PCR beads, control DNA and primers, microtubes, chelating agent, agarose, DNA ladder, practice gel loading solution, gel loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl, tips, waterbath, thermal cycler, electrophoresis tank and power supply.





RT-PCR: A Model for the Molecular Biology of HIV Replication

A specific mRNA is reverse transcribed to double-stranded DNA. This DNA product is then amplified by PCR. This reaction demonstrates the mode of replication of HIV, which contains reverse transcriptase. This experiment is the first introduction of a commercial RNA experiment for the classroom laboratory.

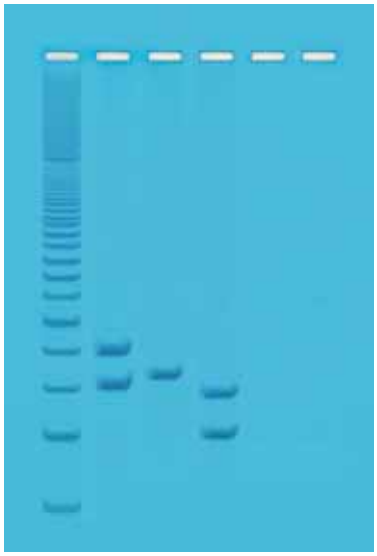
For 6 Lab Groups

Reverse Transcription 35 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 335

Kit includes: instructions, RNA Template, Primer Mix, RT-PCR reaction beads, RNase-free water, DNA size ladder, agarose, electrophoresis buffer, gel stain.

All you need: thermal cycler, electrophoresis tank and power supply, automatic micropipette with tips, microwave, waterbath, UV transilluminator.



Human PCR Tool Box™

Carry out three PCR experiments in your class at once! This kit provides three sets of primers to carry out the PCR amplification of Alu element (PV92) on chromosome 16, the VNTR locus (D1S80) on chromosome 1, and two regions of the mitochondrial gene. For 6 runs of each PCR reaction.

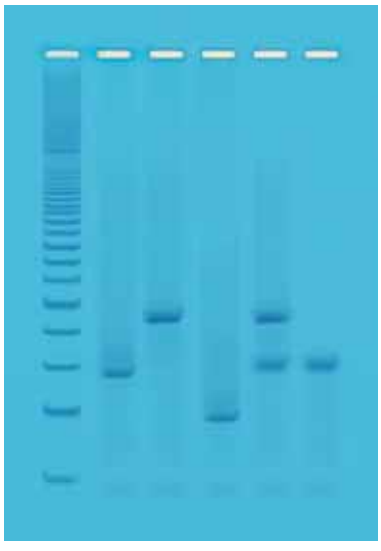
For 18 Students:
6 x 3 reactions

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 369

Kit includes: instructions, proteinase K, PCR beads, control and primer DNA, microtubes, chelating agent, agarose, DNA ladder, practice gel loading solution, gel loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl, tips, waterbath, thermal cycler, electrophoresis tank and power supply.



DNA Fingerprinting - Using PCR

Your students can solve a crime using PCR. Plasmid DNA is provided that, when amplified by PCR, provides products that represent individual DNA profiles. Your students can then solve a crime!

For 6 Lab Groups

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

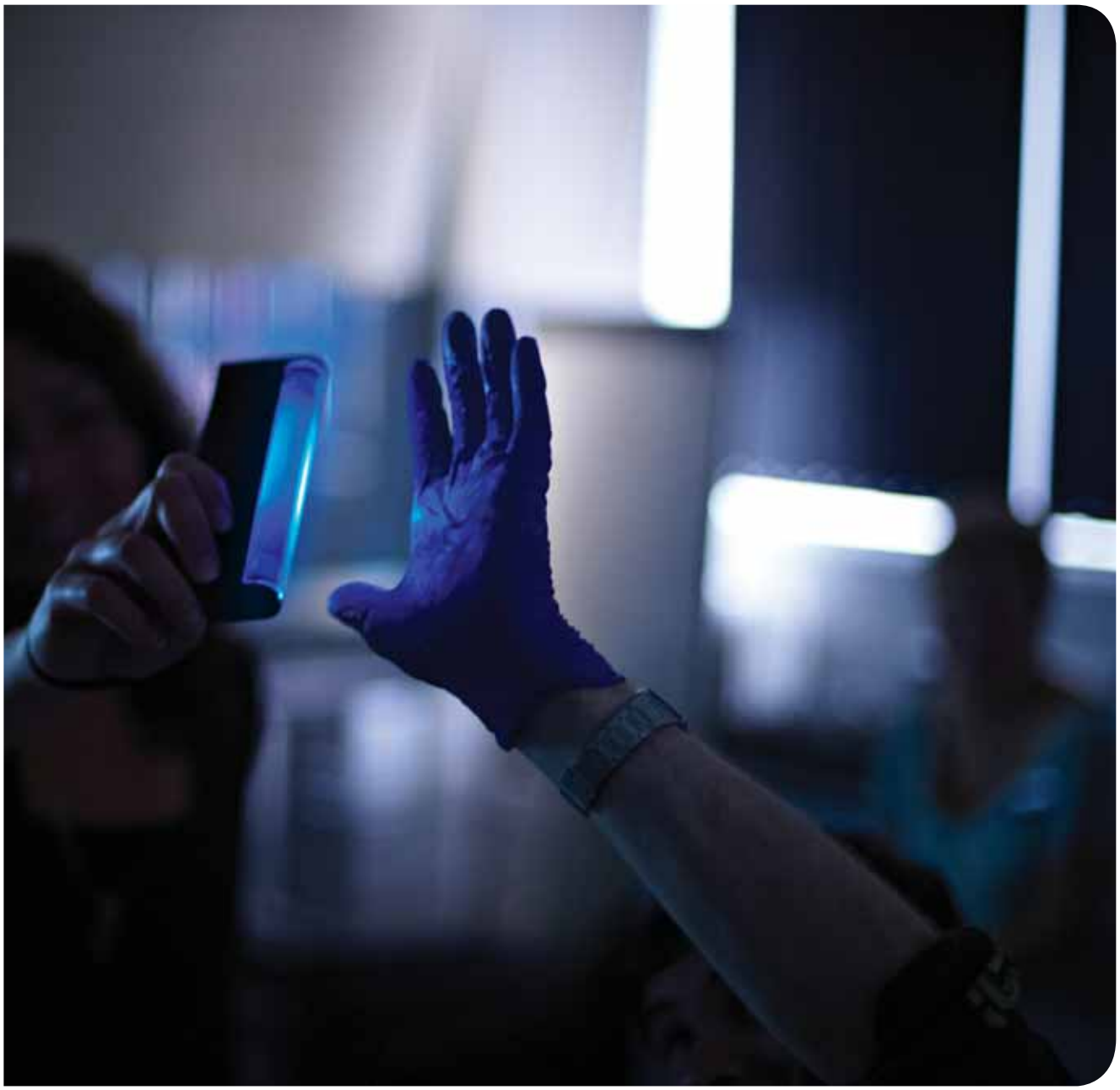
Cat No 371

Kit includes: instructions, PCR beads, DNA templates, primers, DNA ladder, ultrapure water, wax beads, agarose, loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl, tips, waterbath, thermal cycler, electrophoresis tank and power supply.

SECTION SIX

6 Medical Diagnostics



Nothing in life is to be feared. It is only to be understood.

MADAME MARIE CURIE, NOBEL PRIZE WINNING SCIENTIST

New hope but at a price

In recent years, there has been a revolution in how medical diagnosis is carried out. The Human Genome Project has offered new ways of screening for diseases and our understanding of the molecular basis of cancer, infectious disease and inherited disease has helped to develop new therapies. For instance, although more needs to be done, there has been a dramatic rise in the survival rates for all cancers and huge strides have been made in our understanding of how this disease develops. As we begin to understand, we can begin to develop new treatments.

Scientists are also developing new ways of testing for disease. With the availability of genetic tests, we have a chance to screen out many diseases that have occurred for many thousands of years. Some of these, such as Sickle Cell Anemia, may have given humanity an advantage through improved resistance to malaria in the past. But now they pose a problem themselves. We can screen for these diseases in children and adults, in the womb before birth, or even *in vitro* before embryo implantation. These tests offer great hope and promise but raise huge ethical, social and moral issues for society.

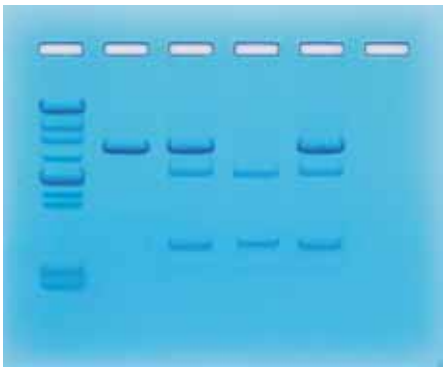
Thus, the revolution in our understanding of disease offers improvements in diagnosis leading to more accurate treatments and improved quality of life but the science needs to be understood in the wider social context.

Cancer

Family Pedigree Cancer Gene Detection

READY TO LOAD

In this experiment, students determine a pedigree for a family thought to be carriers of a mutation in their p53 genes. This is followed by a diagnostic agarose gel analysis to diagnose the state of the p53 gene in individual family members.



For 6 Lab Groups
Complete in 60 min.
Cat No 115

Kit includes: instructions, Ready-to-Load DNA samples, agarose powder, practice gel loading solution, electrophoresis buffer, calibrated pipette, 100 ml graduated cylinder, microtipped transfer pipettes, stain.

All you need: electrophoresis tank and power supply.

Blood-based Cancer Diagnostics

Cancer cells differ from normal cells by the combinations of proteins that are present on their surfaces. Antibodies against these proteins will specifically bind to cancer cells and not to normal cells. This allows early detection of cancer and potentially a way of delivering cancer therapies. In this simulation experiment the reaction of cancer cell markers and their corresponding antigens are demonstrated.

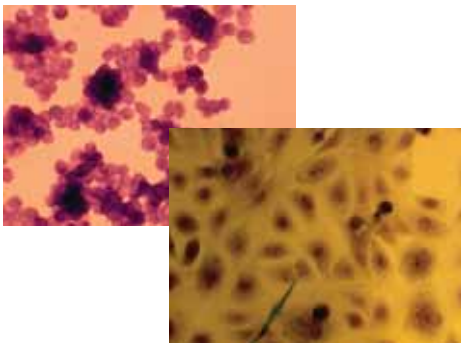
For 10 Lab Groups
Complete in 35 min.
Cat No 141

Kit includes: instructions, microtitre plates, cancer cell markers, normal cell markers, transfer pipettes, buffer.

All you need: water!

Morphology of Cancer Cells

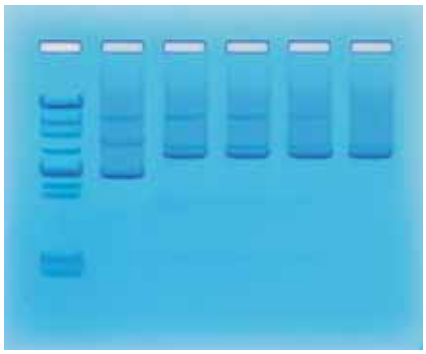
When normal cells are grown in culture they stop growing when they become overcrowded. This is called contact inhibition. Cancer cells in culture grow in an uncontrolled way because they have lost this property. This helps tumors to form in the body. In addition, many different cell types can be present in a single tumor. This experiment allows students to see the differences between normal and cancer cells in both their growth and cell types.



For 6 Lab Groups
Complete in 35 min.
Cat No 990

Kit includes: instructions, multispot slides (2 cell types each), fixing agent, eosin and methylene blue stain, mounting medium, cover slips, transfer pipettes, immersion troughs.

All you need: microscope with 400x magnification.



DNA Damage & Repair

According to the World Health Organization, between 2 and 3 million cases of skin cancer occur globally every year. Many of these cancers are caused by preventable damage to DNA by UV light. In this experiment, your students will expose plasmid DNA to shortwave UV light to simulate the effect of sunbathing. The DNA is then analyzed by agarose gel electrophoresis to observe the damage.

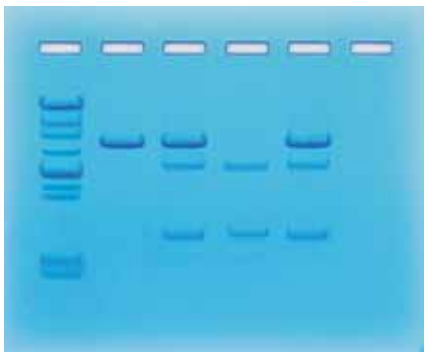
For 10 Lab Groups

Complete in 2 hours

Cat No 957

Kit includes: instructions, standard DNA fragments, plasmid DNA, gel loading solution, agarose, electrophoresis buffer, 1 ml pipette, microtest tubes, 100 ml graduated cylinder.

All you need: UV transilluminator, electrophoresis tank and power supply.



In Search of the Cancer Gene

READY TO LOAD

Suppressor genes such as p53 are essential for cell functions. Mutations in the p53 gene can be correlated to predisposition for certain cancers. Mutations in genes can either be inherited or accumulated due to environmental insults. This experiment deals with a family pedigree determination of several generations relating to cancer formation due to p53 gene mutation. This experiment does not contain human DNA.

For 6 Lab Groups

Complete in 60 min.

Cat No 314

Kit includes: instructions, Ready-to-load Predigested DNA samples, UltraSpec-Agarose powder, practice gel loading solution, electrophoresis buffer, stain, pipette, 5 autoradiograms.

You need: electrophoresis tank & power supply, automatic micropipette with tips, balance, microwave oven or hot plate, waterbath (65°C), UV Transilluminator, pipette pump or bulb, 250 ml Flasks, distilled or deionized water.

Cell Culture

Preparation of HeLa Cell Chromosomal Spreads

Show your students how to perform a chromosome spread by dropping cells onto a microscope slide, allowing the chromosomes to break out of the cells.

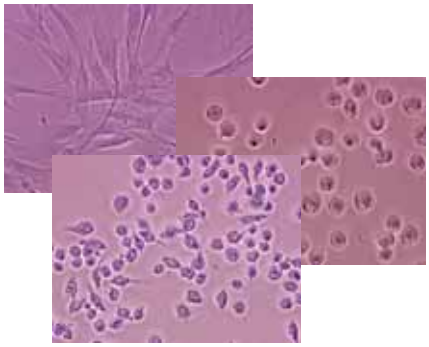
For 10 Lab Groups

Complete in 35 min.

Cat No 985

Kit includes: instructions, slides, HeLa cells, eosin and methylene blue stain, mounting medium, cover slips, transfer pipettes.

All you need: microscope with 400x magnification.



Analysis & Comparison of Mammalian Cell Types

Your students will be amazed at the differences they observe between various mammalian cell types and how these cells function. Cells are fixed on microscope slides and students stain the cells on the slide to view morphological characteristics of the cell types. These cells are very safe for classroom use.

For 6 Lab Groups

Complete in 35 min.

Cat No 986

Kit includes: instructions, multispot slides (4 cell types each), eosin and methylene blue stain, mounting medium, cover slips, transfer pipettes, immersion troughs.

All you need: is a microscope with 400x magnification.

Infectious Diseases

What is an Epidemic & How Does An Infection Spread?

Infectious agents such as bacteria and viruses can spread rapidly through a population and cause widespread disease and death. In this experiment, students will use coloured solutions to simulate the spreading of a disease in the classroom.

For 10 Lab Groups
Complete in 30 min.
Cat No S-68

Kit includes: instructions, HCl solution, NaOH, colour indicator, test tubes & pipettes.

All you need: students!

How Does a Doctor Test for AIDS?

Your body defends itself from attack by infectious agents like bacteria & viruses by producing antibodies. Enzyme Linked Immunosorbent Assays (ELISA) test for antibodies present in the blood, which indicate infection. In this kit, students perform a simulated ELISA test to identify infected samples & compare them to control samples.

For 10 Lab Groups
Complete in 45 min.
Cat No S-70

Kit includes: instructions, antigens, positive and negative controls, sera, secondary antibody, substrate, detection strips, transfer pipettes and test tubes.

All you need: Just water!

Detection of a Simulated Infectious Agent

An infectious outbreak requires prompt & accurate identification of the biological agent. Often, early clinical symptoms are first identified in exposed individuals & then infectious agents are identified by lab tests. In this experiment, students will transmit a simulated infectious agent (chemical dye) between classmates which is only visible under long UV light. The pattern of transmission and primary source will be documented.

For 25 students
Requires in 30-45 min.
Cat No 166

Kit includes: instructions, reagents for simulating an infectious agent (fluorescent dye indicator and negative sample), test tubes & caps, transfer pipettes, one long UV mini-light, cotton swabs, petroleum jelly, gloves.

All you need: students!

Simulation of HIV Detection by ELISA

BEST SELLER

An HIV test detects HIV infection indirectly using an ELISA test against HIV antibodies in the blood. The test works by taking antibodies from the patient's blood and adding them to a microtitre plate coated with HIV antigen. If HIV antibodies are present, they will bind to the antigens on the plate. In this experiment, your students will perform an ELISA test by coating microtitre plate wells with simulated HIV antigen and then test simulated donor serum for anti-HIV antibodies.

For 10 Lab Groups
Requires 1 hour
Cat No 271

Kit includes: instructions, simulated HIV antigens, positive and negative controls, simulated donor serum, secondary antibody, substrate, microtitre plates, transfer pipettes, microtubes.

All you need: 37°C incubation oven

Simulation of HIV Detection by Western Blot

The second assay used to confirm a positive HIV ELISA result is the Western Blot. Your students will separate protein samples from hypothetical patients on agarose gels. The proteins are then transferred to a membrane and simulated HIV proteins are detected.

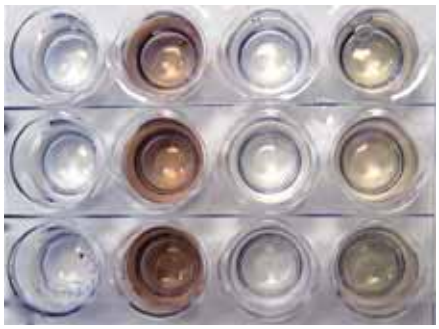
For 6 Lab Groups

Electrophoresis 45 min.
Blot overnight
Detection 25 min.

Cat No 275

Kit includes: instructions, positive and negative controls, simulated patient samples, standard molecular weight markers, protein agarose, buffer, PVDF membrane, protein stain, filter paper, practice gel loading solution.

All you need: electrophoresis tank, power supply, isopropanol, glacial acetic acid, 37°C incubation oven.



One-Step Antibody ELISA for Diagnostics

Teach your students the ELISA technique in less than half the time of traditional ELISAs! This experiment eliminates the need for the primary and secondary antibody normally needed for ELISAs because the detection antibody has an enzyme linked to it directly. Simply add substrate to discover which patient is infected.

For 10 Lab Groups

Complete in 20 min.

Cat No 267

Kit includes: instructions, antigens & antibodies, substrate, phosphate buffered saline, tubes, plates, and transfer pipettes.

All you need: 37° C incubation oven, automatic micropipettes with tips.

In Search of the "Kissing Disease"

Infectious mononucleosis is commonly known as the "kissing disease". The causative agent is Epstein-Barr virus (EBV) which can be transmitted through saliva during kissing. In this experiment, students search for the presence of EBV using the ELISA reaction to detect specific viral proteins.

For 10 Lab Groups

Requires 50 min.

Cat No 274

Kit includes: instructions, samples, antigens & antibodies, various solutions and reagents, pipettes and microtest tubes.

All you need: 37°C incubation oven, automatic micropipettes with tips.

Vaccination Readiness

The ultimate aim of research into infectious diseases is eradication. Smallpox was eradicated through the development of a vaccine which completely prevented the spread of the disease. Vaccines stimulate the body to produce antibodies against an infectious agent. A single vaccination does not necessarily give a person immunity to an infectious disease for life, and so sometimes boosters may be required to prevent illness. With this kit, your students will test the sera of several patients to see if they still have immunity to a hypothetical infectious agent.

For 10 Lab Groups

Complete in 2 hours

Cat No 280

Kit includes: instructions, simulated sera from vaccinated and unvaccinated patients, PBS, blocking agent, stop solution, microtitre plates, transfer pipettes, microtubes.

All you need: 37°C incubation oven.

MEDICAL DIAGNOSTICS

Inherited Diseases

Genetic Disease Screening (DNA-based)

READY TO LOAD

Genetic tests are becoming more commonplace than ever. This kit shows how a restriction enzyme can be used to screen DNA for Sickle Cell Anemia.

For 6 Lab Groups

Complete in 45 min.

Cat No 116

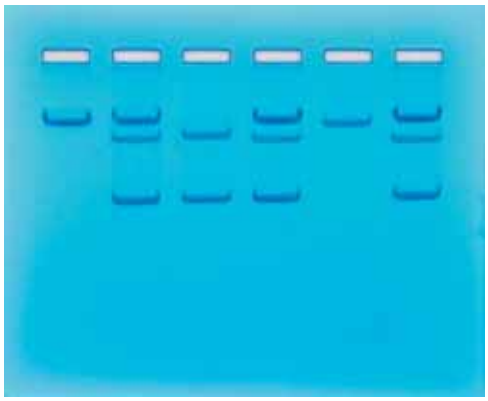
Kit includes: instructions, Ready-to-Load DNA, agarose, practice gel loading solution, electrophoresis buffer, micro-tipped transfer pipettes, gel stain.

All you need: electrophoresis tank, power supply and waterbath.

Also Available - DNA samples only

Cat No 116-B 12 gels

Cat No 116-C 24 gels



In Search of the Sickle Cell Gene by Southern Blot

READY TO LOAD

Southern blotting is an important technique used widely in clinical genetics and research. By transferring DNA from an agarose gel onto a membrane, the method allows you to analyse and identify the DNA bands on a gel precisely.

Your students will use Southern blotting to find a point mutation in the hemoglobin gene indicating Sickle Cell Anemia.

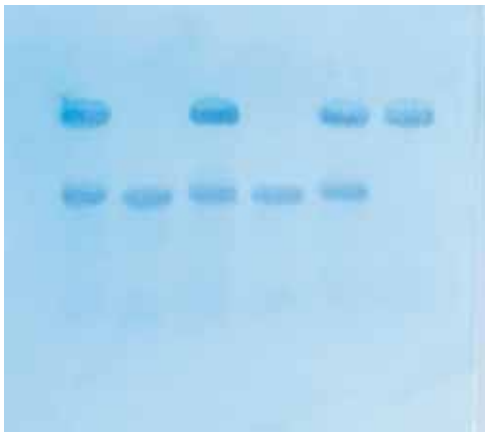
For 5 Lab Groups

Electrophoresis 45 min
Blotting overnight
Staining & destaining 10 min

Cat No 315

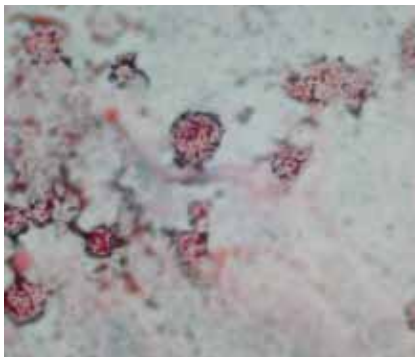
Kit includes: instructions, Ready-to-Load DNA samples, agarose, electrophoresis buffer, nylon membranes, filter paper, blot stain.

All you need: electrophoresis tank, power supply, waterbath and 80°C incubation oven.



MEDICAL DIAGNOSTICS

Lifestyle Diseases



Obesity - Differentiation of Fat Cells

Preadipocytes are the precursors of fat cells (adipocytes) but they are hard to study in the body as they are uncommon. Thus, scientists have developed a cell culture model of adipocyte differentiation to understand the steps involved. It is hoped that by chemically blocking one or more of these steps, it will be possible to stop adipocyte development and thus prevent obesity.

When cells called fibroblasts are treated with a combination of growth factors, they become preadipocytes. In this experiment, your students will be able to see the difference between adipocytes and preadipocytes by staining with Oil Red O.

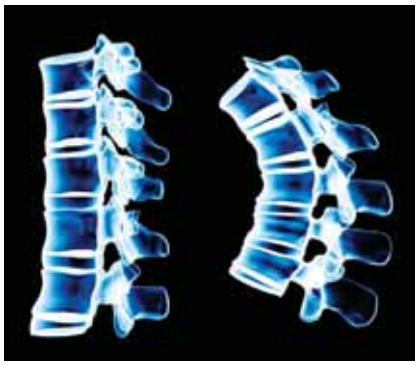
For 6 Lab Groups

Complete in 35 min.

Cat No 992

Kit includes: instructions, cell fixing agent, slide cover slips, fixing reagent, stains.

All you need: microscope with 400x magnification.



The Biochemistry of Osteoporosis

Osteoporosis is a disease of decreased bone density that affects the entire skeleton. Osteoporosis is caused by an increase in the activity of bone-destroying cells known as osteoclasts. In this experiment, students will model the bone-destroying effects of osteoclasts by placing bones in acid and protease and observing their deterioration (as would occur in osteoporosis).

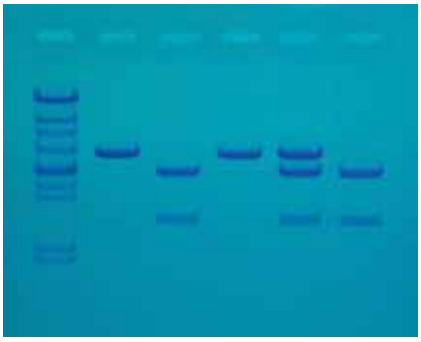
For 10 Lab Groups

Several weeks of observation.

Cat No 138

Kit includes: instructions, plastic petri dishes, collagenase enzyme, buffer.

All you need: chicken, turkey or steak bones, glacial acetic acid, automatic pipettes.



Cholesterol Diagnostics

READY TO LOAD

Genetic testing can be used to identify people with a genetic condition which causes them to have an elevated level of cholesterol and which can be fatal. Your students can see how genetic testing is carried out and learn about DNA electrophoresis.

For 6 Lab Groups

Complete in 45 min.

Cat No 118

Kit includes: instructions, Ready-to-Load DNA, agarose, practice gel loading solution, electrophoresis buffer, microtipped transfer pipettes, gel stain.

All you need: electrophoresis tank, power supply and waterbath.

MEDICAL DIAGNOSTICS

Pregnancy & Paternity

In Search of My Father

READY TO LOAD

BEST SELLER

Your class will enjoy discovering the true identity of two boys who were separated from their parents a decade ago. Their mothers are identified by mitochondrial DNA and their fathers from chromosomal DNA. Will it be a happy ending?

For 10 Lab Groups

Complete in 45 min.

Cat No S-49

Kit includes: instructions, Ready-to-Load dye samples, practice gel loading solution, agarose, electrophoresis buffer, microtipped transfer pipettes.

All you need: electrophoresis tank and power supply.

Immunology of Pregnancy Tests

Use this simulation of a pregnancy test to show your student's how the widely used pregnancy test works. The kit also explains the important clinical and research technique of Enzyme-linked Immunosorbent Assay (ELISA) in its most familiar context.

For 10 Lab Groups

Complete in 60 min.

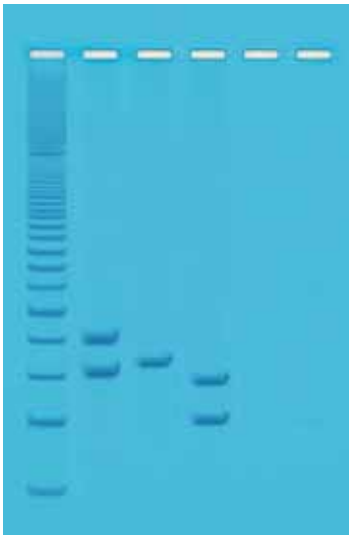
Cat No 279

Kit includes: instructions, positive control, hCG antibody, anti-hCG peroxidase conjugate, hydrogen peroxidase, peroxidase co-substrate, PBS, microtitre strips, microtubes.

All you need: 37°C incubation oven.

Human PCR Tool Box

Polymerase Chain Reaction (PCR) is commonly used to determine paternity as it is a very sensitive method for DNA analysis. Your students will gain an understanding of the principles behind this non-forensic use of DNA Fingerprinting using their own DNA! This kit provides three sets of primers to carry out the PCR amplification of Alu element (PV92) on chromosome 16, the VNTR locus (D1S80) on chromosome 1, or 2 mitochondrial genes. For 6 runs of each PCR reaction.



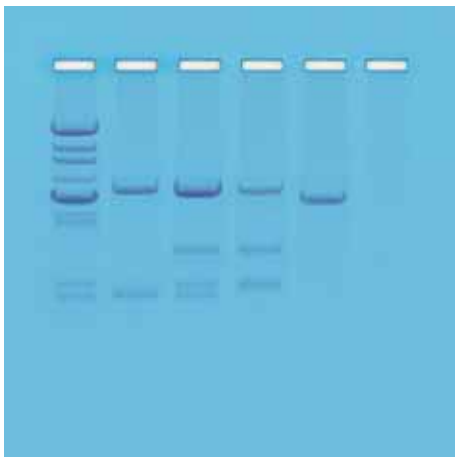
For 6 Lab Groups (18 Individuals)

Set up 30 min.
PCR 2 hours or overnight
Electrophoresis 45 min.

Cat No 369

Kit includes: instructions, proteinase K, PCR Beads, control and primer DNA, microtubes, chelating agent, agarose, DNA ladder, practice gel loading solution, gel loading dye, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl (or 5,10, 30, 50 µl fixed volume minipipettes), waterbath, thermal cycler, electrophoresis tank and power supply.



DNA Paternity Testing Simulation

READY TO LOAD

Your students' will compare a child's DNA with DNA from two possible fathers to find out which is the biological father. The experiment is an excellent way to teach one of the most compelling and difficult social issues to arise from DNA testing. The kit also teaches your class the fundamentals of DNA electrophoresis.

For 6 Lab Groups

Complete in 45 min.

Cat No 114

Kit includes: instructions, Ready-to-Load DNA, agarose, practice gel loading solution, electrophoresis buffer, micro-tipped transfer pipettes, gel stain.

All you need: electrophoresis tank, power supply and waterbath.

Also Available - DNA samples only

Cat No 114-B 12 gels

Cat No 114-C 24 gels

Southern Blot Analysis

READY TO LOAD

This experiment introduces your students to Southern blotting as a tool for "DNA Fingerprinting" in a hypothetical paternity determination. DNA fragments are first separated by agarose gel electrophoresis, then transferred to a nylon membrane and finally visualised by staining.

For 5 Lab Groups

Electrophoresis 45 min.
Blotting overnight
Staining & destaining 10 min.

Cat No 207

Kit includes: instructions, DNA samples for electrophoresis, practice gel loading solution, UltraSpec-Agarose, electrophoresis buffer, pipettes, 5 pre-cut nylon membranes, 5 pre-cut blotting filter papers, Blue-Blot DNA Stain.

All you need: electrophoresis tank & power supply, 65° C Waterbath, DNA visualization system, staining net & tray, automatic micropipettes, lab glassware, microwave oven, distilled water, NaCl, NaOH, concentrated HCl, plastic wrap, forceps.

DNA Fingerprinting: Southern Blot Analysis Using Non-Isotopic Detection of DNA

In this experiment, students gain experience in non-isotopic DNA detection & the use of Southern Blot analysis in DNA fingerprinting for a hypothetical paternity test. Includes three modules: agarose gel electrophoresis, Southern Blot transfer, and non-isotopic detection of DNA.

For 5 Lab Groups

Electrophoresis - 45 min
Blotting - overnight
Non-Isotopic Detection 3-4 hrs.

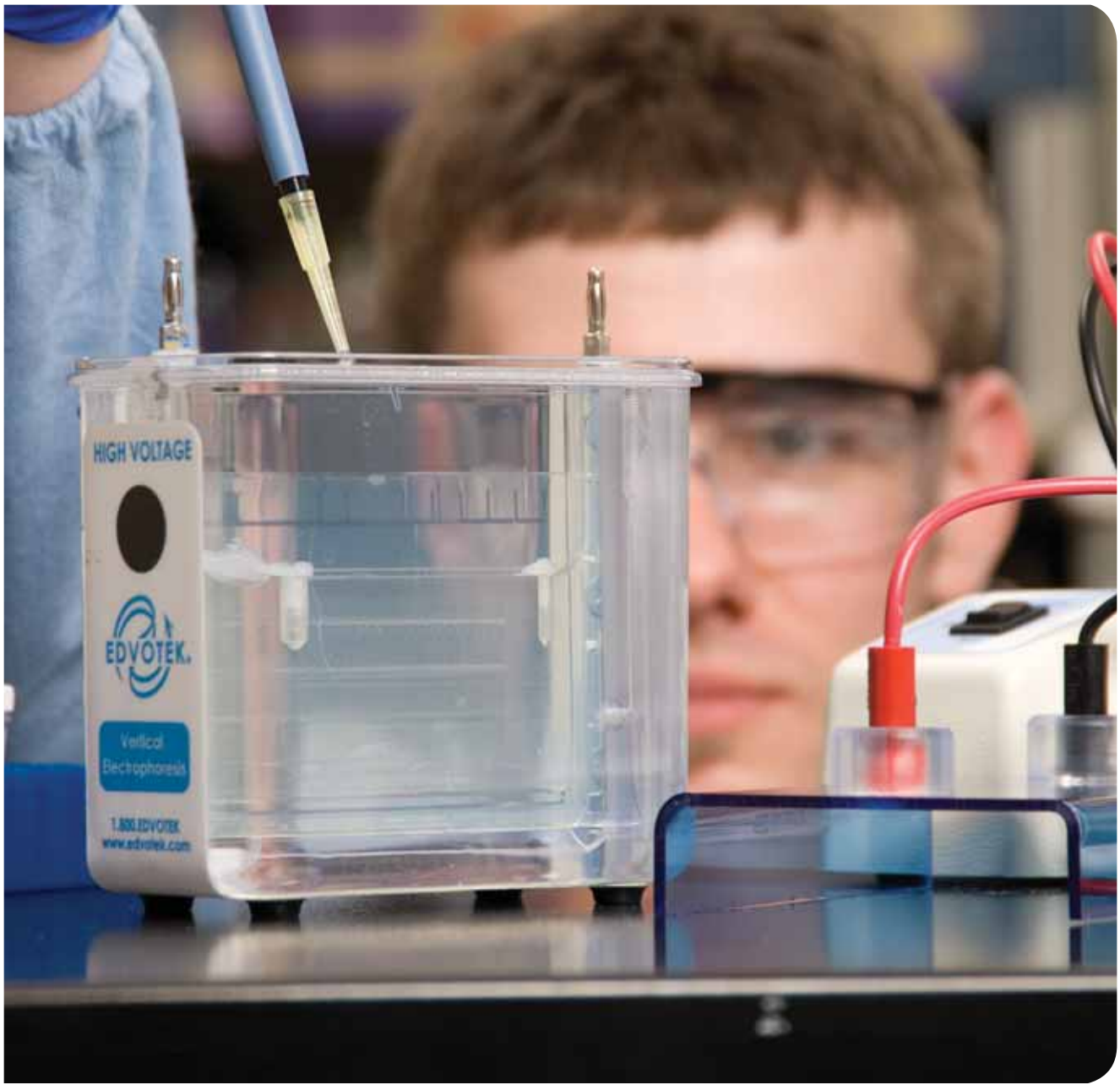
Cat No 311

Kit includes: instructions, predigested DNA samples, buffers, NBT/BCIP tablets, streptavidin-Alkaline Phosphatase, nylon membranes, filter paper, UltraSpec-Agarose powder.

You need: electrophoresis tank & power supply, automatic micropipette with tips, balance, waterbath, incubation oven.

SECTION SEVEN

7 Proteins, Enzymes & Chromatography



Systems biology is the science of discovering, modelling, understanding and ultimately engineering at the molecular level the dynamic relationships between the biological processes that define living organisms.

LEROY HOOD, PRESIDENT OF THE INSTITUTE FOR SYSTEMS BIOLOGY

Back to the Future

Alongside the genome, scientists now talk of the proteome (proteins), transcriptome (mRNA) and even the metabolome (metabolic pathways). These individual fields are gradually coming together (along with bioinformatics and other computer based technologies) under a single umbrella called "systems biology".

The idea behind the phenomenon of systems biology is that you must study of all the parts of the organisms from the molecular and cellular level through to the highest level together in a complete way to understand the complex multi-level interactions that govern what we call life. The theory underpinning systems biology is the old adage that the whole equals more than the sum of the parts.

A key element is the idea that the component parts, when combined together, have what are called "emergent properties". The Institute for Systems Biology in Seattle, uses the (non-eco) light bulb to explain this. When the parts of such a light bulb are taken individually (tungsten wire, metal cap and glass bulb) they don't give a clue that together they produce the emergent property of light! Complex systems (like life) have even less predictable emergent properties so it is necessary to study the whole, as well as the parts, for a full understanding.

Systems biology is a paradigm shift in our approach to biology away from the reductionist extremism of molecular biology. It sounds like an interesting approach and one that offers great hope for the future. It is also refreshing to see such a return to a more traditional whole organism approach to biology. Maybe macro and micro meet at last!

Protein & Enzyme Analysis

Enzyme Microarrays

Microplate microarray technology is a new technology that allows scientists to screen large numbers of samples simultaneously. This technology has led to cost savings by saving time and reducing sample size, while yielding accurate results. Students will apply various reagents to enzyme reactions in a microtiter plate to screen for positive and negative reactions. They will also make quantitative determinations based on the colourimetric product.

For 10 Lab Groups

Requires 60 min.

Cat No 246

Kit includes: instructions, enzymes and substrates, microtiter plates, microtest tubes, pipettes.

All you need: 37°C incubation oven, 5-50 µl adjustable micropipette or 10 µl and 100 µl fixed volume micropipettes.

Principles of Enzyme Catalysis

This easy and safe experiment allows your students to learn about enzyme catalysis, the nature of enzyme action and protein structure-function relationships. Students will perform an enzyme assay and determine the rate of the enzymatic reaction.

For 10 Lab Groups

Requires 30-45 min.

Cat No 282

Kit includes: instructions, catalase solution, hydrogen peroxide, phosphate buffer, assay reagent, acidification solution, colour enhancer & developer.

All you need: visible wavelength spectrophotometer, 1 ml, 5 ml & 10 ml pipettes, linear graph paper.

Biochemical Analysis of Plant Enzymes

With this experiment, your students will demonstrate general enzyme principles using specific plant enzymes which have important functions in biotechnology. Students perform tissue prints of seeds to examine what happens during malting. An additional activity allows students to quantify the activity of the enzyme amylase.

For 10 Lab Groups

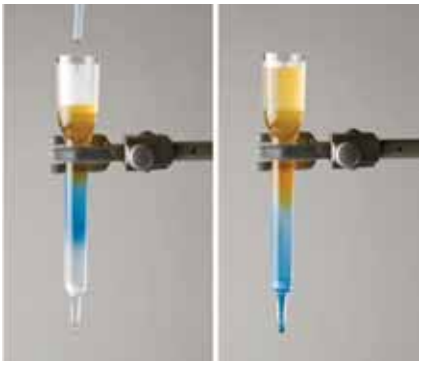
Requires 2 hours

Cat No 904

Kit includes: instructions, 3 types of barley seeds, iodine solution/stain, reaction buffer, starch, amylase enzyme powder, 1 ml pipettes, starch indicator paper, petri plates, graph paper template.

All you need: waterbath, spectrophotometer, 5-50 µl adjustable micropipette with tips, test tubes, microscope or magnifying lens.

Chromatography & Purification



Principles of Gel Filtration Chromatography

Introduce chromatographic separation to your class and show them how dyes of different colours separate on the basis of their size and shape. This experiment contains materials for dye separation which include dye sample, elution buffer and plastic disposables. Columns may be rinsed and reused.

For 10 Lab Groups

Packing Column 20 min.
Column Separation 40 min.

Cat No 108

Kit includes: instructions, sample mixture, chromatography columns, dry matrix, elution buffer, transfer pipettes, microtest tubes.

All you need: 50 or 100 ml beakers, 25 ml beaker or test tube, ring stands with clamps, distilled water.

Principles of Thin Layer Chromatography

This experiment introduces chromatographic theory and methods of thin layer chromatography. A mixture of dyes are separated on a cellulose-based TLC plate using two different solvent systems.

For 8 Lab Groups

Spotting Plates 20 min.
TLC Separation 5 min.

Cat No 113

Kit includes: instructions, samples, reagents and solvents, cellulose thin layer plate, 5 µl glass capillary pipettes.

All you need: 5 or 10 ml pipettes.

Ion Exchange Chromatography

Most molecules have a net charge within a pH range of 2 to 10. When the pH is altered, the net charge on molecules can change drastically. In this experiment, a mixture of two chemicals is absorbed onto a solid support ion-exchange column and separated during elution under conditions that influence their net charge.

For 6 Lab Groups

Requires 60-90 min.

Cat No 243

Kit includes: instructions, ion exchanger, chemical mixture, potassium acetate buffer, chromatography columns.

All you need: spectrophotometer & cuvettes, ring stands and clamps, 5 ml pipettes.

Microscale Enzyme Catalysis Using a Recombinant Enzyme

Genetically engineered microorganisms can produce a large amount of a desired product. In this experiment, recombinant ß-galactosidase is used in colourimetric microscale reactions carried out in microtiter wells. The enzyme reactions are rapid and can be visually quantitated.

For 10 Lab Groups

Requires 50 min.

Cat No 244

Kit includes: instructions, recombinant ß-galactosidase, colourimetric enzyme substrate, enzyme stop solution, microtiter plate.

All you need: spectrophotometer & cuvettes, .ring stands and clamps, 5 ml pipettes.

Electrophoresis of Proteins

Molecular Weight Determination of Proteins (Agarose-based)

Introduce a simple method to determine protein subunit molecular weights using horizontal electrophoresis. As the protein standards and "unknowns" are prestained, the separation of proteins can be observed during electrophoresis. Included in the experiment is our formulation of protein grade agarose, which provides an alternative to the use of polyacrylamide gels.

For 4 Lab Groups

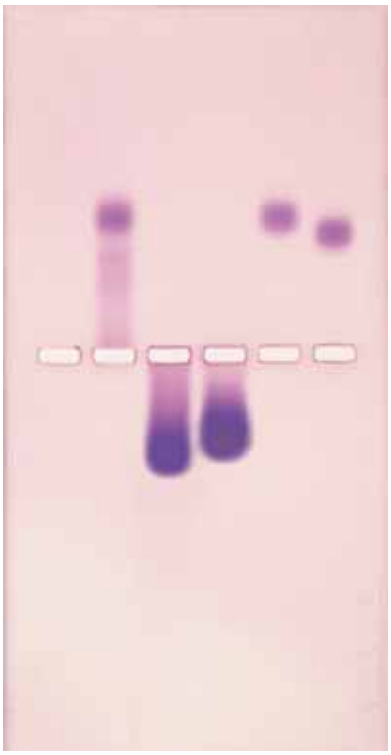
Complete in 1 hour followed by overnight staining.

Cat No 110

Kit includes: instructions, prestained LyphoProtein samples, gel loading solution, agarose, electrophoresis buffer, stain, SDS solution.

All you need: horizontal electrophoresis apparatus, power supply, white light visualization system, 5-50 µl adjustable or 20 µl fixed volume micropipette, methanol, glacial acetic acid.

Electrophoretic Properties of Native Proteins (Agarose-based)



Proteins are complex biomolecules with varying charge, size and shape that can be analyzed by agarose gel electrophoresis. Gel analysis of native proteins enables students to evaluate natural charge and shape characteristics of proteins. Following electrophoresis, the protein samples are stained for visualization.

For 6 Lab Groups

Complete in 1 hour followed by overnight staining.

Cat No 111

Kit includes: instructions, protein samples, gel loading solution, agarose, electrophoresis buffer, stain.

All you need: horizontal electrophoresis apparatus, power supply, white light visualization system, 5-50 µl adjustable or 40 µl fixed volume micropipette, methanol, glacial acetic acid.

What Equipment Do I Need
for Agarose Protein Electrophoresis?

HexaGel DNA Electrophoresis Tank

Easily run an entire class of samples in one go! Separates six groups of student samples in just 30-40 minutes. The gel tank is very easy to use. Excellent results every time!

Cat No 515

DuoSource Power Supply

Produce excellent results from your dye & DNA electrophoresis experiments quickly and easily. Run samples in just 40 minutes!

Cat No 507

EDVOTEK Fixed Volume MiniPipets

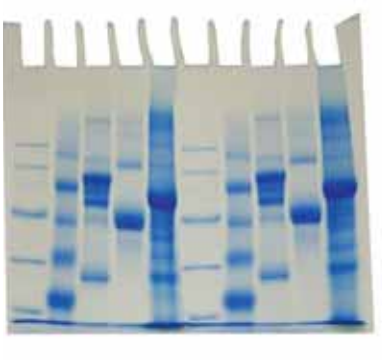
EDVOTEK MiniPipets are precise and cost-effective. They utilize standard disposable micropipet tips.

Cat No 588
40 µl MiniPipet

Cat No 586-1
20 µl MiniPipet

See our EQUIPMENT section for our full range of electrophoresis and power supplies.

Survey of Protein Diversity (Polyacrylamide-based)



Learn about the diversity of proteins by studying the electrophoretic profiles of various sources. Your students will separate proteins from bacterial, plant, serum, and milk proteins alongside a standard protein marker.

For 6 Lab Groups (sharing 3 gels)

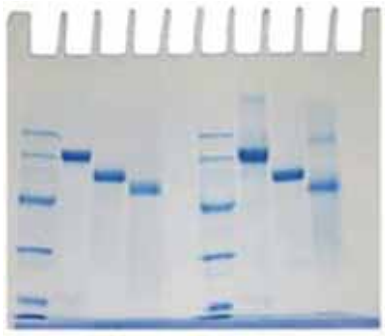
Electrophoresis 60 min.
Staining 20 min.
Destaining 2 hours

Cat No 150

Kit includes: instructions, denatured LyphoProtein samples, standard protein markers, gel loading solution, buffer, Protein Plus stain & Protein InstaStain.

All you need: 3 polyacrylamide gels (12%), MV10 vertical gel electrophoresis apparatus, power supply, white light box, 5-50 µl adjustable or 20 µl fixed volume micropipette, fine tips, methanol, glacial acetic acid.

Determination of Protein Molecular Weight (Polyacrylamide-based)



Using prestained LyphoProteins, subunit molecular weights are determined by analysis using denaturing SDS vertical polyacrylamide gel electrophoresis. Prestained Proteins with unknown molecular weights are assigned molecular weights based on the relative mobility of prestained standard protein markers.

For 6 Lab Groups (sharing 3 gels)

Electrophoresis 60 min.
Staining 20 min.
Destaining 2 hours

Cat No 153

Kit includes: instructions, denatured LyphoProtein samples, standard protein markers, gel loading solution, buffer, Protein Plus stain & Protein InstaStain.

All you need: 3 polyacrylamide gels (12%), MV10 vertical gel electrophoresis apparatus, power supply, white light box, 5-50 µl adjustable or 20 µl fixed volume micropipette, fine tips, methanol, glacial acetic acid.

Diversity of Fish Proteins

Study the diversity of fish with these pre-stained, lyophilized proteins. Total protein from Perch, Walleye and Salmon is extracted and pre-stained using an indicator dye. Each fish protein sample has a characteristic banding pattern when separated by denaturing SDS-polyacrylamide gel electrophoresis, which can be used to identify the specific species.

For 6 Lab Groups (sharing 3 gels)

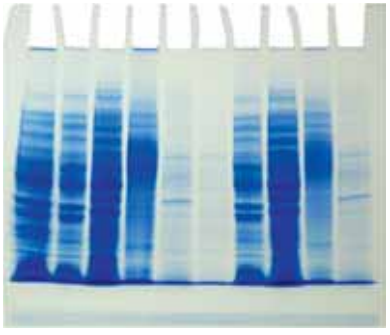
Electrophoresis 60 min.
Staining 20 min.
Destaining 2 hours

Cat No 253

Kit includes: instructions, fish LyphoProtein samples, protein molecular weight standards, practice gel loading solution, buffer, Protein InstaStain.

All you need: 3 polyacrylamide gels (12%), MV10 vertical gel electrophoresis apparatus, power supply, microcentrifuge, white light box, 5-50 µl adjustable or 20 µl fixed volume micropipette, fine tips, methanol, glacial acetic acid.

Identification of Bacterial Protein Profiles



In this experiment, total protein extracts from several bacterial sources are extracted and compared. The unique patterns of protein bands, obtained by SDS vertical polyacrylamide electrophoresis, can be used to identify various bacterial strains.

For 6 Lab Groups (sharing 3 gels)

Grow up colonies overnight
Electrophoresis 60 min.
Staining 2-3 hours

Cat No 252

Kit includes: instructions, bacterial cultures and reagents, LyphoProteins, Lysozyme, buffers, Protein Plus stain & Protein InstaStain, practice gel loading solution, protein sample buffer, unknown proteins ready for electrophoresis, ReadyPour Agar, nutrient broth.

All you need: 3 polyacrylamide gels (12%), MV10 vertical gel electrophoresis apparatus, power supply, microcentrifuge, incubation oven, white light box, 5-50 µl adjustable or 15 µl, 20 µl, & 25 µl fixed volume micropipettes, fine tips, methanol, glacial acetic acid.

What Do I Need For Vertical Protein Electrophoresis?

MV20 Vertical Electrophoresis Tank

Designed for separation of proteins on Polyacrylamide gels. The MV20 holds two 9 x 10 cm pre-cast gel cassettes. Features a unique gel clip system which enables the use of most pre-cast & self-made gels.

Cat No 581

DuoSource Power Supply

Produce excellent results from your dye & DNA electrophoresis experiments quickly and easily. Run samples in just 40 minutes!

Cat No 507

EDVOTEK Fixed Volume MiniPipettes

EDVOTEK MiniPipettes are precise and cost-effective. They utilize standard disposable micropipette tips.

Cat No 588 40 µl MiniPipette

Cat No 586-1 20 µl MiniPipette

Protein Reagents

Precast Polyacrylamide Gels

Cat No 651 3 gels (12%)
Cat No 652 6 gels (12%)

Tris-glycine-SDS Buffer

For vertical polyacrylamide gel electrophoresis
Cat No 655 (10x for 5 L) (500 ml)

Tris-glycine Buffer

For vertical polyacrylamide gel electrophoresis
Cat No 656 (10x for 5 L) (500 ml)

Tris-HCl-SDS-2-Mercaptoethanol

This sample preparation buffer contains mercaptoethanol to break disulfide bonds in proteins. This buffer solution can be used for molecular weight determination. Requires -20°C freezer storage.
Cat No 658 10 ml

Prestained Lyophilized Protein Gel Markers

Molecular Weight Standards
Cat No 752 For 20 gels

Protein InstaStain

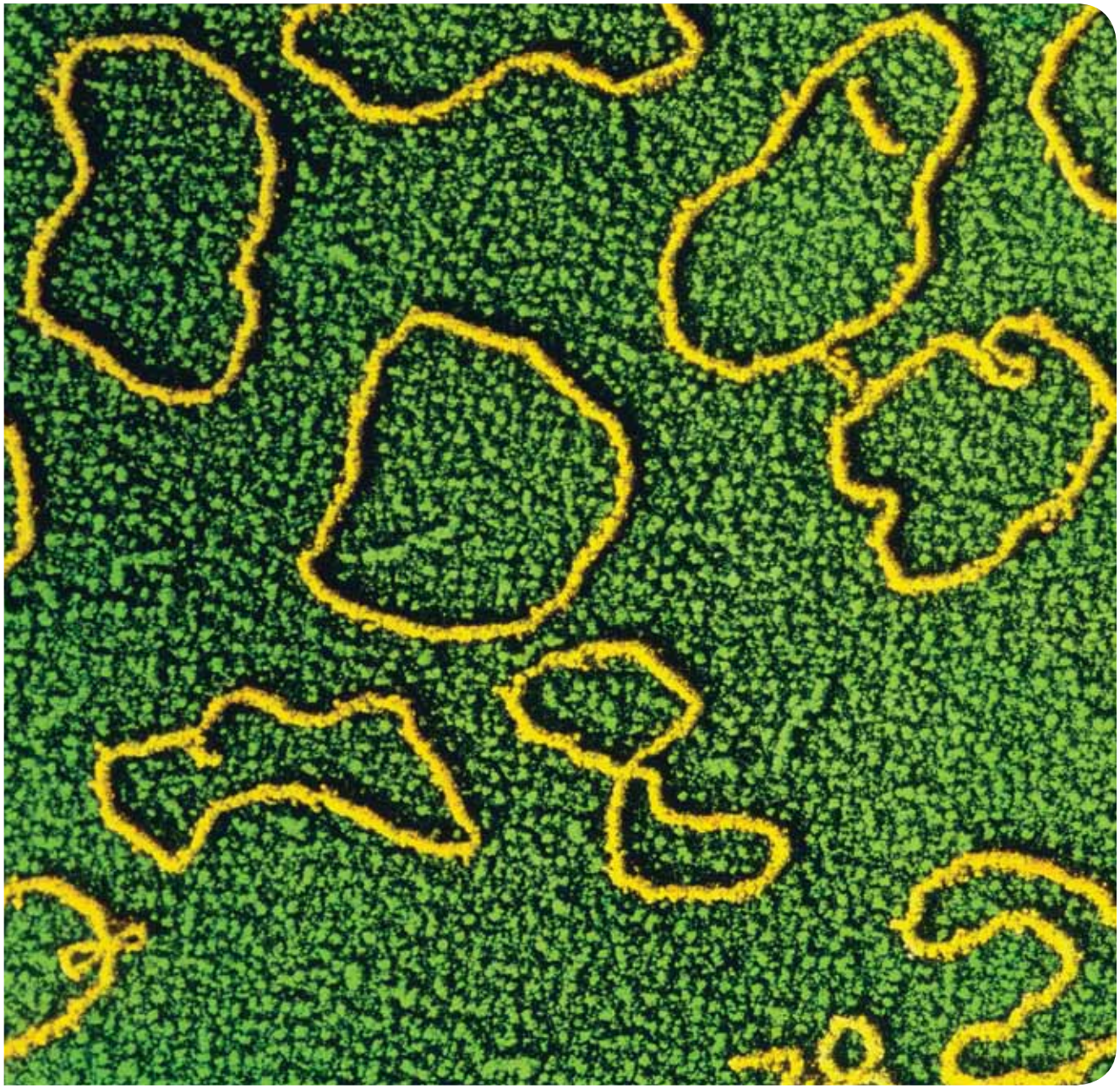
Protein InstaStain sheets stain gels faster than conventional methods. Protein InstaStain gives high quality and uniform gel staining with excellent results for photography. They are also environmentally friendly because they use a solid matrix, avoiding large amounts of liquid stain and waste disposal.

Cat No 2016 For 15 gels, 10 x 10 cm

Cat No 2017 For 30 gels, 10 x 10 cm

SECTION EIGHT

8 Genetic Engineering & Transformation



It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change.

CHARLES DARWIN

What is Life?

Schrödinger asked this question in 1948. Craig Venter, the man behind the privately funded human genome project (yes, he really did sequence his own genome!) has been trying to find the answer to this question by looking at what needs to be present for a cell to be alive. The minimal cell project has made a big step in finding out if you can re-programme confusingly similarly named bacteria with synthetic DNA. The answer is YES! Next he hopes to create a true synthetic cell. If he succeeds, it opens the way for true synthetic life and perhaps eventually multi-cellular life designed on a computer. Complex problems lie ahead not the least being the ethical questions being raised by the project. However, the question being asked is surely so fundamental to biology that the project will continue.

"My lab uses the fruit fly to understand the fundamental biological processes of growth and neuronal development. We manipulate the flies genetically and use techniques such as bacterial transformation and PCR to help us find human versions of the fly genes. Amazingly these same genes are involved in cancer and neurological disease in humans!"

Joseph Bateman, PhD
The Wolfson Centre for Age-Related Diseases
King's College London

What are fluorescent proteins?

Many jellyfish use bioluminescence (biologically produced light) to attract prey, defend themselves and to find a mate. They produce bioluminescence using special fluorescent proteins that when illuminated with one wavelength of light, emit light in a different wavelength.

Scientists have studied this most closely in the jellyfish *Aequorea victoria*. The bioluminsence protein Green Fluorescent Protein (GFP) was identified from these jellyfish in the 1960's and the gene characterised in 1992.

What was incredible was that the jellyfish gene causes bioluminescence in many other types of organism including bacteria, mammals and plants! By attaching the GFP gene to another gene, you can follow where the second gene is switched on (or expressed) in living cells. GFP has been so useful that scientists have introduced a mutation to generate Blue Fluorescent Protein (BFP). Nowadays there is a rainbow of fluorescent proteins available, including red, yellow and even purple!

Transformation

Rapid Transformation

NEW

Avoid waiting times that are required in traditional transformation experiments. Complete the entire experiment in less than 20 minutes and obtain sufficient colonies to assure a great learning experience as a first step in molecular genetics. Students will transform DNA plasmid in *E.coli* cells and allow the transformants to grow on a selective plate. They will then visualize the colonies. Designed for introductory biology classes.

For 10 Lab Groups

Complete in 30 minutes and grow overnight

Cat No 200

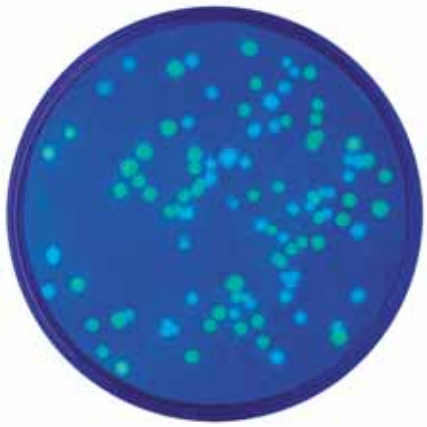
Kit includes: instructions, plasmid DNA, cells for transformation, buffer, IPTG, Ampicillin, Calcium Chloride, ReadyPour™ Luria Broth Agar, Luria Broth Media, Petri plate, pipettes, toothpicks, microtest tubes, inoculating loops.

All you need: incubation oven, microwave or hot plate, automatic micropipette and tips, ice, UV or blue light.

Transformation with Blue & Green Fluorescent Proteins

BEST SELLER

The Green Fluorescent Protein from the jellyfish *Aequorea victoria* is used extensively in all areas of science. Many organisms have been transformed with the GFP gene, the gene responsible for bioluminescence in jellyfish. It has proven to be so useful that scientists have mutated it to produce Blue Fluorescent Protein (BFP). In this simple experiment your students will transform bacteria either with GFP, BFP or both!



For 10 Lab Groups

Complete in 50 minutes and grow overnight

Cat No 222

Kit includes: instructions, cells, plasmid DNA, IPTG, ampicillin, transformation solution, ReadyPour agar, Luria broth, petri dishes, sterile pipettes and loops.

All you need: waterbath, 37°C incubation oven, long wave UV lamp.

Transformation with Green Fluorescent Protein

In this experiment, transformed cells take up a plasmid containing the GFP gene. The GFP gene was isolated from the jellyfish *Aequorea victoria*. Transformed colonies expressing the GFP protein are visibly green in normal light but will fluoresce brightly when exposed to long wave UV light.

For 10 Lab Groups

Plating 5 min.
Incubation overnight
Transformation efficiency 15 min.

Cat No 223

Kit includes: instructions, cells, plasmid DNA, IPTG, ampicillin, transformation solution, ReadyPour agar, Luria broth, petri dishes, sterile pipettes, loops and microtubes.

All you need: waterbath, 37°C incubation oven, long wave UV lamp.

Purification & Size Determination of Green & Blue Fluorescent Proteins

When bacteria are used to make medicinally useful proteins by transformation, the protein of interest must be separated from all of the other cellular proteins. In this experiment, the unique fluorescent properties of GFP and BFP will be used as an assay during their purification from an *E. coli* extract. The column fractions containing GFP or BFP will be identified by fluorescence and then purified. As an optional activity, purified protein fractions can be separated by SDS polyacrylamide gel electrophoresis (SDS-PAGE) to estimate the purity and size of the GFP and BFP proteins.

For 6 Lab Groups

Packing & running column 45 min.
Optional electrophoresis 60 min.
Staining 30 min.
Destaining 2 hours

Cat No 255

Kit includes: instructions, columns and matrix, GFP and BFP extracts, buffer, protein gel reagents for optional activity.

All you need: waterbath, long wave UV lamp, ring stand & clamps, automatic micropipette, vertical gel electrophoresis apparatus, power supply, polyacrylamide gels (12%).

Perfect Partner for kits #200, 222, 223, & 255

Long Wave UV Mini Lamp

A safe, long-wave UV lamp to view fluorescent transformed bacteria, GFP protein and BFP protein.

Cat No 969

How Do You Clone A Gene?

In this kit, a set of multicoluored links demonstrate a variety of molecular biology simulations. Students learn about digesting DNA with restriction enzymes, cloning genes in plasmids, protein structure and more!

For 5 Lab Groups

Complete in 30 minutes

Cat No S-20

Kit includes: instructions, molecular biology models, small plastic bags.

Transformation of *E.coli* with pGAL™

INCLUDES LYPHOCELLS

BEST SELLER

In this experiment, your students can see a blue colour change in transformed cells due to the switching on of a gene. The pGAL plasmid gives them a blue colour due to the production of the ß-galactosidase protein by the *lacZ* gene. IPTG is not required in this experiment since pGAL contains the complete *lacZ* gene.

For 10 Lab Groups

Complete in 50 minutes and grow overnight

Cat No 221

Kit includes: instructions, Lyphocells, plasmid DNA, buffer, media, ampicillin, X-Gal, ReadyPour agar, petri dishes, sterile pipettes, loops and microtubes.

All you need: 37°C incubation oven, waterbath.

Transformation of *E.coli* with Plasmid pBR322

INCLUDES LYPHOCELLS

Transformation is of central importance in molecular cloning since it allows for the selection, propagation, expression and purification of a gene. Positive selection for cells containing plasmid DNA is accomplished by antibiotic growth selection. In this experiment, your students will transform bacteria with the first plasmid made for genetic engineering in 1970, pBR322.

For 10 Lab Groups

Complete in 50 minutes and grow overnight

Cat No 201

Kit includes: instructions, LyphoCells, plasmid DNA, buffer, ampicillin, calcium chloride, ReadyPour Agar, Luria broth, Petri dishes, sterile pipettes and loops, microtubes.

All you need: 37°C incubation oven, waterbath.

Have you heard of LyphoCells™?

INCLUDES LYPHOCELLS

The experiments with this icon include LyphoCells, an exclusive bacterial transformation system which eliminates the need for dry ice shipping and -70°C storage of competent cells. A simpler way to great science!

Transformation Supplies

Small Petri Dishes

60 x 15 mm (one shelf pack)

Cat No 633

Large Petri Dishes

100 x 15 mm (one shelf pack)

Cat No 643

Inoculating Loops

Sterile (pack of 20)

Cat No 772

Luria Broth Media

Cat No 611

Bacterial Plating Agar

Cat No 612

IPTG

Cat No 613

X-Gal

Cat No 614

ReadyPour™ Luria Broth (LB) Agar Base

Cat No 615

ReadyPour Luria Broth (LB) Agar with Ampicillin

Cat No 616

Transformation Reagents

Includes AMP, X-Gal, and pGal.

Cat No 617

LyphoCells for Transformation

Includes *E. coli* JM109 cells, reconstitution media & induction buffer.

Cat No 618

E.coli JM109

Cat No 726

E.coli HB101

Cat No 727

SECTION NINE

9 Plants

The imagination of nature is far, far greater than the imagination of man.

RICHARD FEYNMAN, NOBEL PRIZE WINNING PHYSICIST

From Peas to PCR!

Our present day understanding of the basis of genetics was largely unravelled by Gregor Mendel's study of pea plants over one hundred years ago. In recent years, the techniques of molecular biology have opened up our understanding of how plants evolve, develop, and can be used as crops and even as pharmaceutical factories.

The first plant genome to be sequenced in 2000 was that of the most humble member of the *Brassicacea* family, *Arabidopsis thaliana*. As with its animal counterpart, the fruit fly *Drosophila melanogaster, Arabidopsis* has been used to unravel the molecular genetics of the plant kingdom.

Similar to *Drosophila*, many thousands of *Arabidopsis* mutants are available for scientists to study and understand how plant genes function. These studies have contributed to the controversial

developments of GM plants for food, but also to plants for producing medicines, and plants to supplement people's diets in the developing world. They have also allowed horticulturists to develop new varieties for gardeners. A new classification of plants has emerged with the molecular basis supplementing morphological systems of classification.

The future of plant genetics is likely to remain controversial but with the current interest in climate change fueling speculation over what best to use as carbon sinks, perhaps a new chapter will emerge for nature's very own carbon sinks – plants. And who said plants were boring?

Engage your students with some of the key techniques of molecular biology that are changing the way we view and use plants. From growing mutants to tissue culture to PCR, we have something for you to try out in your classroom.

Arabidopsis thaliana is the most commonly used plant for studying genetics.

Plant Biology

Which Quick Plant™ Is the Mutant?

BEST SELLER

Gregor Mendel studied pea plants over the course of many years to understand inheritance. Now your students can use 3 different genetic strains of Quick Plants to see the genetic ratios for themselves.

For 15 Lab Groups

Requires several weeks for growth

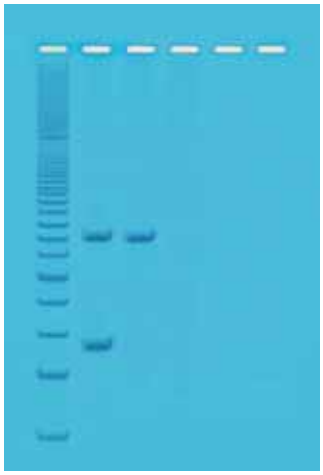
Cat No S-41

Kit includes: instructions, wild, sward, & pale seeds, seed gel, peat pellets, growth containers, fertilizer, and magnifying glasses.

All you need: fluorescent plant growth lights (recommended).

Determining Quick Plant Genetics Using PCR

Your students will see for themselves the relationship between genotype and phenotype by performing PCR using DNA extracted from Quick Plants. Unlike the wild type Quick Plants, the *glabra* mutant lacks trichomes (single-celled hairs) on its leaves. Using PCR your students will compare a region of DNA that differs between the *glabra* mutant and wild type plants, so they will see this variation at the DNA level.



For 10 Lab Groups

Set up 30 min.
PCR 2 hrs or overnight
Electrophoresis 45 min.

Cat No 336

Kit includes: instructions, Quick Plant seeds, potting soil pellets and pots, PCR Beads, microtubes, primers, DNA extraction buffer, plant homogenization pestles with tubes, agarose, electrophoresis buffer, DNA ladder, gel stain.

All you need: micropipettes to measure between 5 and 50 µl (or 5,10, 30, 50 µl fixed volume MiniPipettes), waterbath, thermal cycler, electrophoresis tank and power supply.

Isolation of Plant Mitochondria & Chloroplasts

In this two-part experiment, your students will explore the techniques used to isolate plant organelles. Two cell organelles are isolated from pea seedlings by differential centrifugation. First, students identify mitochondria by the enzyme activity of cytochrome c oxidase. Then, chloroplasts are isolated and identified under the microscope.

For 6 Lab Groups

Requires approx. 5.5 hrs. for completion over three consecutive lab periods.

Cat No 910

Kit includes: instructions, genomic DNA extraction solutions, chloroplast isolation reagents, mitochondrial DNA isolation reagents, transfer pipettes, pea seeds, UltraSpec-Agarose, electrophoresis buffer, gel loading solution, stains.

All you need: microscope, spectrophotometer, blender, waterbath, microcentrifuge, centrifuge (10,000 x g), cheesecloth, acetone, vermiculite, automatic micropipettes & tips, electrophoresis tank, power supply, white light box, isopropanol, ethanol, mortar & pestle.

Biochemical Analysis of Plant Enzymes

With this experiment, your students will demonstrate general enzyme principles using specific plant enzymes which have important functions in biotechnology. Students perform tissue prints of seeds to examine what happens during malting. An additional activity allows students to quantify the activity of the enzyme amylase.

For 10 Lab Groups

Requires 60 min.

Cat No 904

Kit includes: instructions, 3 types of barley seeds, iodine solution/stain, reaction buffer, starch, amylase enzyme powder, 1 ml pipettes, starch indicator paper, petri plates, graph paper template.

All you need: waterbath, spectrophotometer, 5-50 µl adjustable micropipette with tips, test tubes, microscope or magnifying lens.

Introduction to Plant Cell Culture

Genetic modification of plants is a highly controversial area of biotechnology. All such experiments in plants begin with establishing plant cells in culture. This involves de-differentiating plant cells to form plant "stem cells". Your students will establish cell cultures of African Violets from leaves. They will then use plant growth regulators to encourage root growth from the cultured cells, and produce a mature plant.

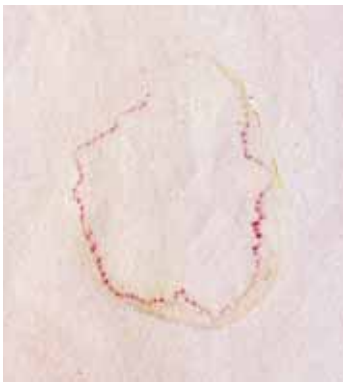
For 10 Lab Groups

Complete in 60 min. plus several weeks for growth

Cat No 908

Kit includes: instructions, shoot initiation and elongation growth medium, Tween, Petri dishes, growth containers, peat pellets.

All you need: A healthy African Violet (*Saintpaulia ionantha*)



Tissue Printing: Detection of *Brassica* Phloem Cells

Multicellular organisms are made up of many different types of highly specialized cells each with a particular function. Different cell types can be identified from the combination of proteins that are expressed on a cell's surface. These can be detected using monoclonal antibodies. In this experiment your students will identify phloem cells in any *Brassica* family member (broccoli, brussel sprouts or cauliflower) by tissue printing a freshly cut stem onto a charged membrane. Using a primary and secondary antibody, the phloem cells will be clearly identified as bright red.

For 10 Lab Groups

Complete 2.5 hrs.

Cat No 940

Kit includes: instructions, buffer, non-fat dry milk, primary and secondary antibodies, Fast Red Salt, Naphthol salt, Petri dishes, nylon membranes.

All you need: plant tissue (cauliflower, brussel sprout, broccoli or other *Brassica*), magnifying glass or microscope.

What Are Quick Plants?

Arabidopsis plants are used extensively in biotechnology and genetics laboratories because of their useful growth characteristics. They are small, self-pollinating and complete their life cycle in only 5-6 weeks which makes them ideal for both research and classroom use. *Arabidopsis* are members of the mustard family, *Brassicacea*, which includes cabbage, broccoli and watercress.

We have several different mutants for your students to study. They can see Mendelian ratios for themselves and even genotype the mutants using one of the most exciting molecular biology techniques in classroom - PCR.

SECTION TEN

10 Eco Science

Water is essential for life. Yet many millions of people around the world face water shortages. Many millions of children die every year from water-borne diseases. And drought regularly afflicts some of the world's poorest countries. The world needs to respond much better.

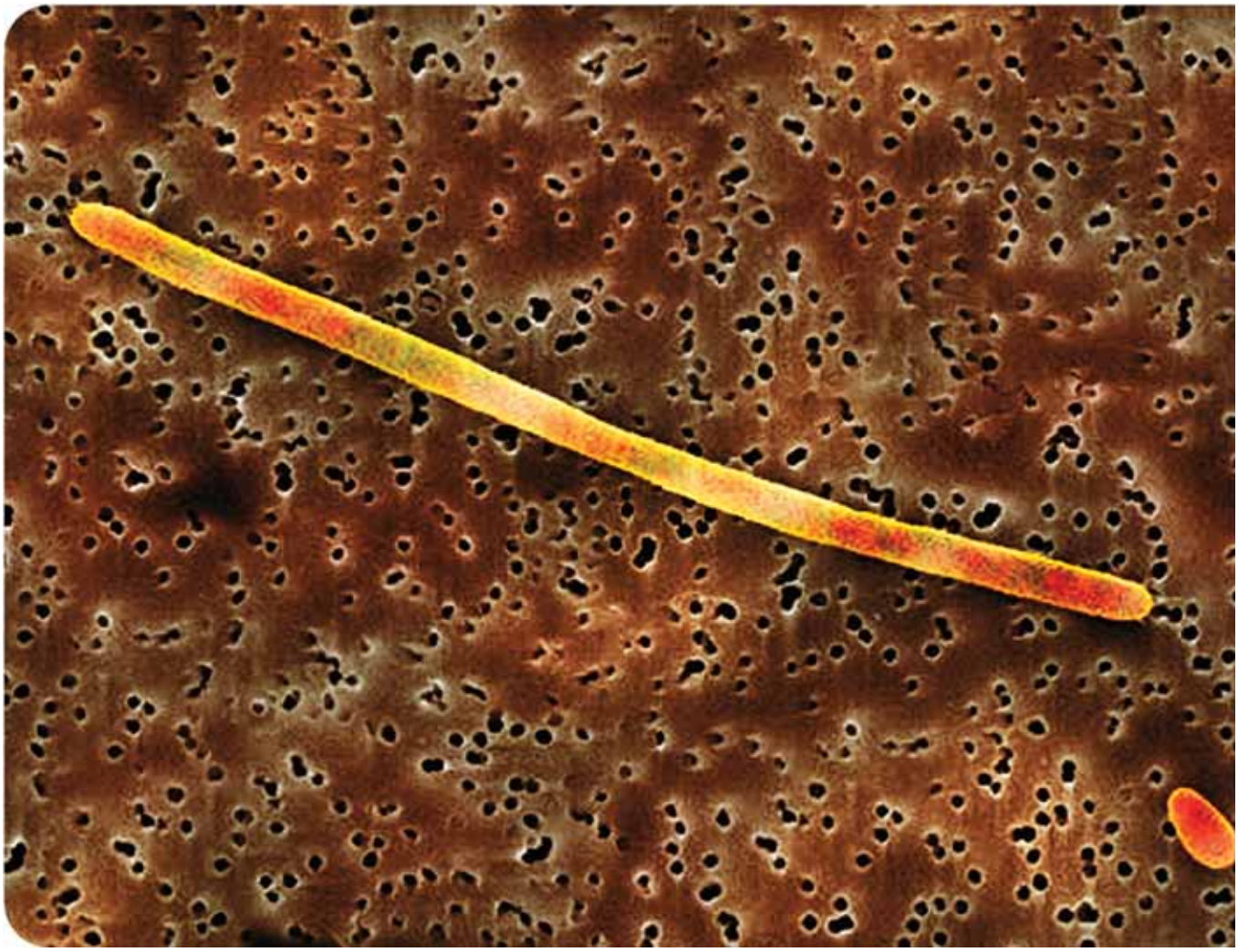
KOFI ANNAN FORMER UNITED NATIONS SECRETARY-GENERAL

Nature Fights Back!

Water is a necessity for life, yet through our lifestyle we pollute it. Industrial waste, sewage and accidental chemical spillages can all render water undrinkable. It is not always possible to see the contamination, so we must find ways to test water to see if it is safe. Biotechnology offers ways to detect pollution and even clean it up!

Water can carry deadly diseases. To determine if water is drinkable it is tested for a characteristic type of gut bacteria – Coliforms- as an indicator of fecal contamination. Your students can see how this works and try testing water themselves with our Water Quality Testing I Kit. The Polymerase Chain Reaction (PCR) is now used to can be used to detect deadly pathogens quickly and with complete accuracy. Your students will enjoy optimising the PCR reaction and testing samples they have brought in with our Water Quality Testing II kit.

Another high profile water contaminant is oil. Oil spillages cause devastation and often the methods to clean them up are also toxic, like dispersal chemicals or controlled burning of the oil. Biotechnology offers another solution: oil eating bacteria! You can show your students how it works with our "Bioremediation" kit allows your students to simulated an oil spill clean up in the classroom!



Ecotechnology

Bioremediation by Oil Eating Bacteria

Oil spills cause devastation to the environment killing sea life, birds, and coastal plants. Spraying areas of contamination with oil-eating microbes accelerates the degradation of the oil. This process is known as bioremediation. In this open-ended experiment, students will grow a mixture of oil-eating bacteria and observe their effectiveness at degrading a variety of oils.

For 10 Lab Groups

After establishment of cultures, lab requires 50 min. (Can be done over several days or weeks.)

Cat No 956

Kit includes: instructions, oil-eating bacteria, growth medium, pipettes.

All you need: incubation oven, growth flasks, vegetable oil (or other food oils).

Use of NanoBiotechnology in Our Daily Lives

NEW

In an elegant but simple experiment, we will demonstrate the effect of nanoparticles on plant growth. The students will grow pea seeds provided into individual seedlings in separate plants. A serial dilution of the nanoparticle solution will be applied to the plant during germination. Students will then observe the effect of nanoparticles on plant growth/development. In addition, they will observe and note which part of the plant shows visible effects.

For 10 Groups

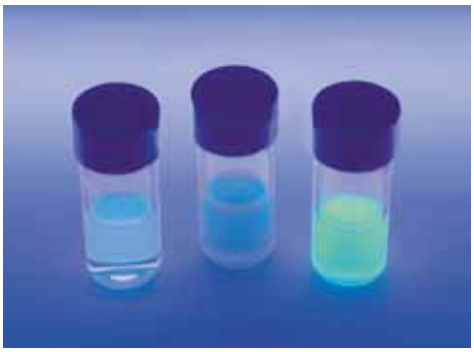
Requires 60 min. plus observation time for growth of seedlings.

Cat No 801

Kit includes: instructions, Pea seeds, Seed gel, Peat pellets, Fertilizer solution, Carbon nanoparticle solution, Contrast enhancer.

All you need: Microscope, Magnifying glass, Auto pipettes.

Water Quality Testing I: Chromogenic Analysis of Water Bacteria Contaminants



Safe drinking water is vitally important to health. Both pathogenic and harmless bacteria can be found in the guts of mammals and birds. Testing water for every possible type of pathogenic bacteria is slow and costly. Thus, water is tested for a characteristic type of gut bacteria - the coliforms - including the familiar *E.coli*. Presence of coliforms is an indicator of fecal contamination.

In this experiment your students will test for coliforms in simulated contaminated water using colour and fluorescent reagents. They can use these same reagents to test water samples from the environment. As an extension activity, a Gram Stain test can be performed on the collected samples.

For 10 Lab Groups

Complete in 30 minutes and grow overnight

Cat No 951

Kit includes: instructions, ReadyPour Agar, fluorescent reagents, Petri dishes, inoculating loops, sterile swabs, microtubes.

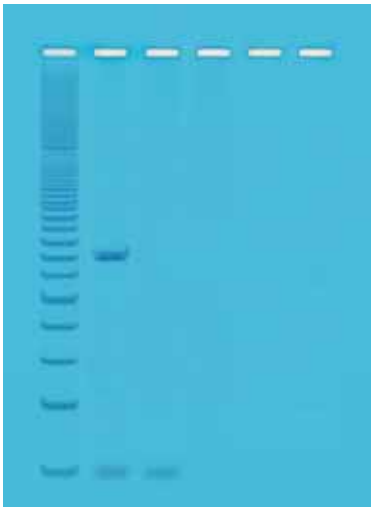
All you need: long wave UV lamp, microscope, slides and coverslips.

Perfect Partner

Long Wave UV Mini Lamp

A safe, simple to use battery-operated portable mini long wave ultraviolet light.

Cat No 969



Water Quality Testing II: PCR-Based Testing of Water Contaminants

Now your students can use PCR to detect water pollution due to sewage contamination. In this experiment safe bacterial strains will be provided and dilutions will be made to determine the number of bacterial cells that are required to obtain a successful PCR result. As an extension to this experiment students will be able to test for water contamination in samples they provide.

For 10 Lab Groups

PCR 120 min. or overnight Electrophoresis 45 min.

Cat No 952

Kit includes: instructions, control DNA and primers, DNA ladder, *E. coli* control strain, chelating agent, proteinase K, PCR beads, gel loading dye, agarose, electrophoresis buffer, gel stain.

All you need: micropipettes to measure between 5 and 50 µl (or 5,10, 30, 50 µl fixed volume minipipettes), waterbath, microcentrifuge, thermal cycler, electrophoresis tank and power supply.

SECTION ELEVEN

11 Bringing it All Together

Science is a way of thinking much more than it is a body of knowledge.

CARL SAGAN, ASTRONOMER AND ASTROCHEMIST.

Just When You Thought It Was Safe...

Carrying out high level biotech experiments for the first time can be scary but don't feel reluctant to give them a try!

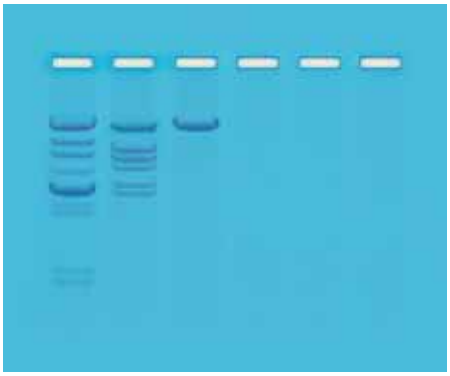
Nowadays, biology is as much about organizing and interpreting data as it is about collecting it. Help your students get a feel for how biology is really carried out by giving them a chance to try the highest level of science experiments around. These kits are perfect for university and college level courses but they are also suitable for advanced school students and for project work.

The topics range from standard molecular biology techniques to exciting mini-research projects. We offer mini-prep, restriction enzyme mapping, cloning of a recombinant molecule, southern blotting, western blotting and isolation of chloroplast DNA. Try one of our advanced experiments today! You'll be amazed at how much you and your students will get out of the experience!

BRINGING IT ALL TOGETHER

Restriction Enzymes

Cleavage of Lambda DNA with *Eco* RI Endonuclease: Intro to Restriction Enzymes



The DNA from bacteriophage lambda is a well-characterised linear molecule containing six recognition sites for *Eco* RI (5 distinct sites; 2 are very close in size). In this experiment, Lambda DNA is digested by the *Eco* RI endonuclease. The digestion products are analysed by agarose gel electrophoresis.

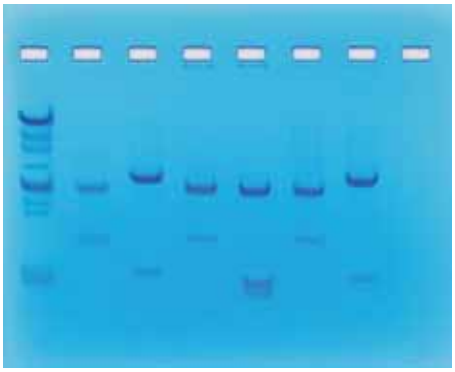
For 5 Lab Groups
Complete in 90 min.
Cat No 212

Kit includes: instructions, Lambda DNA, Dryzymes, Reconstitution buffer, Restriction enzyme reaction buffer, enzyme grade water, Standard DNA Fragments, various solutions and buffers, agarose powder, stains.

All you need: electrophoresis tank, power supply, 5-50 µl adjustable or 5 µl and 40 µl fixed volume micropipettes, waterbath, white light box.

DNA Fingerprinting - Using Restriction Enzymes

BEST SELLER

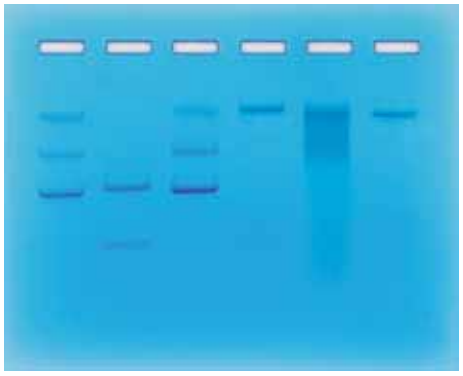


Teach your students about restriction enzyme digests in the context of forensic science! Your students will cut DNA with restriction enzymes and then compare the banding pattern of the crime scene DNA versus that of two suspects using agarose gel electrophoresis.

For 6 Lab Groups
Complete in 90 min.
Cat No 225

Kit includes: instructions, "crime scene" Ready-to-Load DNA samples, Standard DNA Fragments, Dryzymes - *Eco* RI and Hind III, various solutions & buffers, plasmid DNA, enzyme grade water, agarose powder, stains.

All you need: electrophoresis tank, power supply, 5-50 µl adjustable or 5, 10, 15 and 40 µl fixed volume micropipettes, waterbath, balance, white light box.



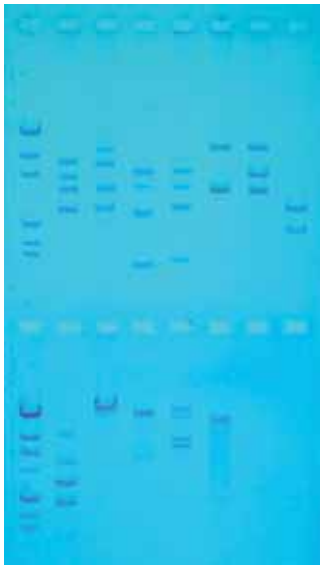
Restriction Modification (Methylation) of DNA

Bacteria that produce restriction enzymes also harbor a related DNA methylase that has identical base recognition sequences. When the recognition sequence is methylated, the restriction enzyme cannot cleave the DNA. In this experiment, the effect of the restriction enzyme on unmethylated and methylated DNA are examined. Reaction products are analysed by electrophoresis.

For 6 Lab Groups
Complete in 2 hours
Cat No 205

Kit includes: instructions, plasmid and chromosomal DNA, Hind III, Eco RI and Eco RI Methylase, Adomet, various solutions and buffers, agarose powder, stains.

All you need: electrophoresis tank and power supply, waterbath, 5-50 µl adjustable or 5, 25, and 40 µl fixed volume micropipettes, white light box.



Cleavage of DNA with Restriction Enzymes

This open-ended laboratory activity allows students to design experiments that will generate specific DNA fragments and determine the accuracy of predicted sizes after separation by agarose gel electrophoresis.

For 6 Lab Groups
Complete in 90 min.
Cat No 213

Kit includes: instructions, plasmid DNAs, Lambda DNA, Standard DNA Fragments, Dryzymes - *Eco* RI and Bam HI, Restriction enzyme dilution and reaction buffers, enzyme grade water, various solutions and buffers, agarose powder, stains.

All you need: electrophoresis tank, power supply, waterbath, 5-50 µl adjustable or 5 µl and 35 µl fixed volume micropipettes, white light box.

Purification of the Restriction Enzyme *Eco* RI

In this experiment, students actually purify the restriction enzyme, *Eco* RI! This procedure utilizes an ion exchange chromatography step for *Eco* RI purification. Column fractions are assayed for the enzyme using Lambda DNA and digestion products are identified by agarose gel electrophoresis. Fractions that contain *Eco* RI are identified and pooled. The total & specific activities are calculated. Recommended for advanced courses.

For 5 Lab Groups
Complete in 3 hours
Cat No 302

Kit includes: instructions, ion exchange matrix, chromatography columns, *E.coli* cell extract, equilibration & elution buffer, Lambda DNA, Lambda/*Eco* RI Marker, KCl, glycerol, dilution & reaction buffers, gel loading solution, agarose, electrophoresis buffer, stain.

All you need: electrophoresis tank, power supply, UV visualization system, waterbath, microcentrifuge, UV spectrophotometer & cuvettes, automatic micropipette with tips, ring stands & clamps, 10 ml pipettes.

DNA Isolation

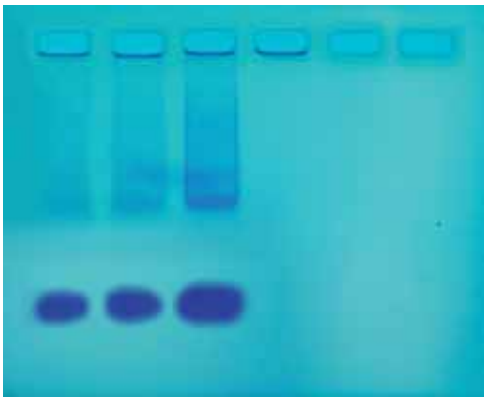
Mini-Prep Isolation of Plasmid DNA

Small-scale rapid isolation of plasmid DNA is a routine procedure used for screening and analysis of recombinant DNAs in cloning and subcloning experiments. In this experiment, students isolate plasmid DNA without the use of toxic chemicals such as phenol or chloroform.

For 5 Lab Groups
Complete in 60 min.
Cat No 202

Kit includes: instructions, various solutions and buffers, agarose powder, stains.

All you need: electrophoresis tank and power supply, waterbath, microcentrifuge (10,000 rpm), 5-50 µl adjustable or 40 µl & 50 µl fixed volume micropipettes, 95-100% isopropanol, white light box.



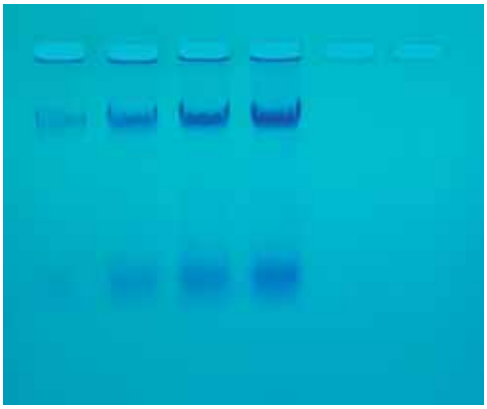
Isolation of *E. coli* Chromosomal DNA

Isolation of high molecular weight chromosomal DNA is the first step in molecular cloning since it is the source of genes in cells. This experiment provides DNA Extraction LyphoCells and reagents for isolating chromosomal DNA from *E. coli*. After spooling from solution, the DNA can be dissolved and analysed by agarose gel electrophoresis as an optional lab extension activity.

For 5 Lab Groups
Complete in 60 min.
Cat No 203

Kit includes: instructions, LyphoCells, various solutions and buffers, agarose powder, stains.

All you need: waterbath, 95-100% isopropanol. For optional electrophoresis: electrophoresis tank, power supply, 5-50 µl adjustable or 40 µl fixed volume micropipette, white light box.



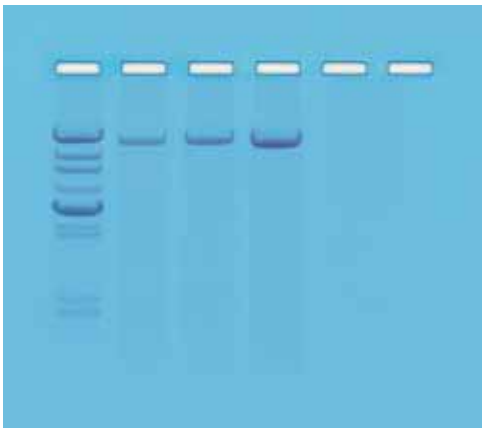
Isolation & Gel Analysis of DNA from Plants

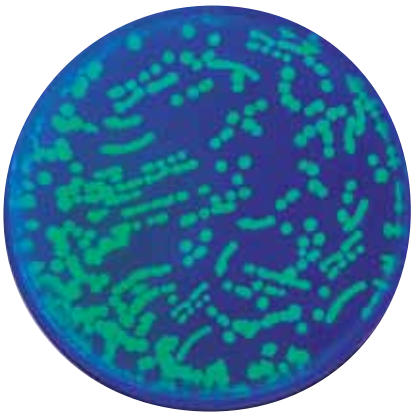
A complete experiment kit for the isolation of plant DNA from pea plants. Students will grow and then harvest plants, air dry them, and perform the steps necessary to isolate the plant DNA. The DNA is analysed by agarose gel electrophoresis.

For 6 Lab Groups
Complete in 90 min.
Cat No 907

Kit includes: instructions, pea seeds, DNA extraction buffer, B-mercaptoethanol, Ammonium acetate, TE buffer, standard genomic DNA, gel loading solution, UltraSpec-Agarose powder, electrophoresis buffer, InstaStain Methylene Blue.

All you need: electrophoresis tank, power supply, waterbath, Sorvall centrifuge, micropipette, microcentrifuge, 95-100% isopropanol, horticulture grade vermiculite, white light box.





Exploring Biotechnology with Green Fluorescent Protein (GFP)

Four experimental modules are combined into one experiment to provide a **comprehensive** biotechnology exploration focusing on the green fluorescent protein (GFP). Bacterial cells are transformed to express the green fluorescent protein (GFP). The transformed cells are then grown and the GFP is purified by column chromatography. Finally, the purity of the protein fractions are analysed by SDS polyacrylamide electrophoresis.

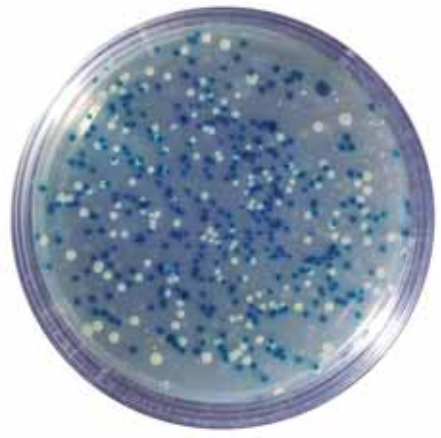
For 6 Lab Groups

Transformation 50 min.
plus overnight incubation
Chromatography 45 min.
Optional electrophoresis 90 min.

Cat No 303

Kit includes: instructions, transformation cells, plasmid DNA for GFP, IPTG, ampicillin antibiotic, calcium chloride, ReadyPour luria broth agar, luria broth media for recovery, petri plates, pipettes, calibrated transfer pipettes, inoculating loops, microtest tubes with attached caps, toothpicks, dry matrix for columns, chromatography columns, green and blue fluorescent protein extracts, elution buffer, protein molecular weight standards, protein denaturation solution, glycerol solution, Tris-Glycine-SDS buffer, stains

All you need: incubation oven, waterbaths, automatic micropipette and tips, long wave UV light, ring stand and clamps, lab glassware, ice, vertical gel electrophoresis apparatus and power supply, 3 Polyacrylamide Gels (12%), glacial acetic acid, methanol.



Blue/White Cloning of a DNA Fragment & Assay of ß-galactosidase

INCLUDES LYPHOCELLS

When DNA is subcloned in the pUC polylinker region, ß-galactosidase production is interrupted, resulting in the inability of cells to hydrolyse X-Gal. This results in the production of white colonies amongst a background of blue colonies. This experiment provides a DNA fragment together with a linear plasmid and T4 DNA Ligase. Following the ligation to synthesize the recombinant plasmid, competent *E. coli* cells are transformed and the number of recombinant antibiotic resistant white and blue colonies are counted. ß-galactosidase activity is assayed from blue and white bacterial cells.

For 5 Lab Groups

Ligation 60 min.
Transformation 40 min.
plus overnight incubation

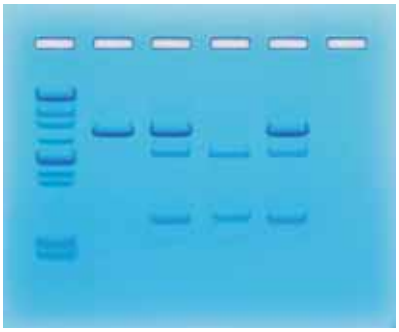
Cat No 300

Kit includes: instructions, Linearized pUC plasmid & DNA fragment, T4 Ligase, Bacterial LyphoCells for transformation, reconstitution buffer, X-Gal in solvent, IPTG, calcium chloride, antibiotic, ReadyPour Luria Broth Agar, Luria broth media for recovery, growth media, assay components, plastic supplies

All you need: incubation oven, waterbaths, automatic micropipette and tips, spectrophotometer, centrifuge, microcentrifuge.

Genetic Disorders

In Search of the Cancer Gene



Suppressor genes such as p53 are essential for cell functions. Mutations in the p53 gene can be correlated to predisposition for certain cancers. Mutations in genes can either be inherited or accumulated due to environmental insults. This experiment deals with a family pedigree determination of several generations relating to cancer formation due to p53 gene mutation.

For 6 Lab Groups

Complete in 60 min.

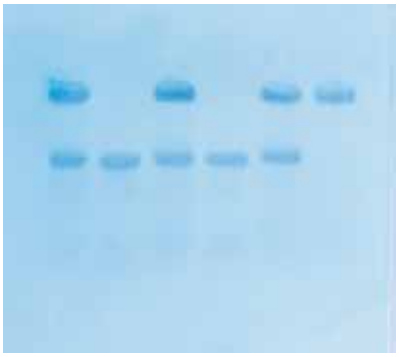
Cat No 314

Kit includes: instructions, Ready-to-load Predigested DNA samples, UltraSpec-Agarose powder, practice gel loading solution, electrophoresis buffer, InstaStain Ethidium Bromide, pipette, 5 autoradiograms.

All you need: electrophoresis tank & power supply, automatic micropipette with tips, waterbath (65°C), UV Transilluminator.

In Search of the Sickle Cell Gene by Southern Blot

READY TO LOAD



Southern blotting is an important technique used widely in clinical genetics and research. By transferring DNA from an agarose gel onto a membrane, the method allows you to analyse and identify the DNA bands on a gel precisely. Your students will use Southern blotting to find a point mutation in the hemoglobin gene indicating Sickle Cell Anemia.

For 5 Lab Groups

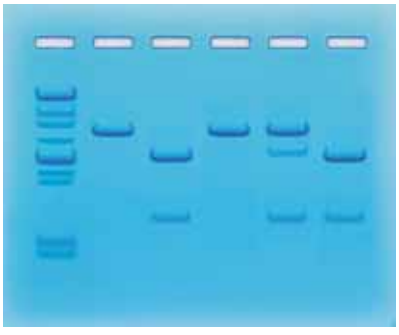
Electrophoresis 45 min
Blotting overnight
Staining & destaining 10 min

Cat No 315

Kit includes: instructions, Ready-to-Load DNA samples, agarose, electrophoresis buffer, nylon membranes, filter paper, blot stain.

All you need: electrophoresis tank, power supply, waterbath and 80°C incubation oven.

In Search of the Cholesterol Gene



Coronary heart disease and stroke are major causes of death in the Western world. Elevated blood cholesterol levels are a serious risk factor for both conditions. The genetic disease familial hypercholesterolemia (FH) causes an increase in blood levels of the "bad" form of cholesterol, low density lipoprotein (LDL). In untreated patients with the mutant FH gene, the condition can cause premature death. This experiment introduces the colourimetric enzymatic reaction which is the basis of the clinical cholesterol test. In addition, using agarose gel electrophoresis, students will analyse a simulated genetic screening for a disease.

For 10 Lab Groups

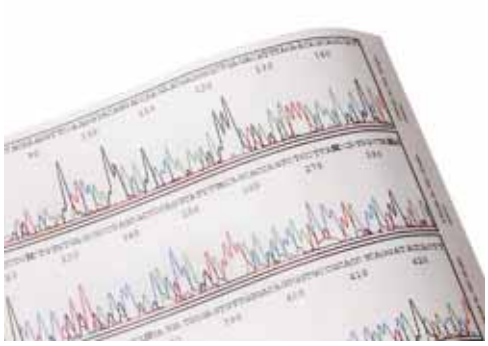
Gel Prep 30 min.
Electrophoresis 45 min.
Staining 2 min.
Cholesterol assay 60 min.

Cat No 316

Kit includes: instructions, cholesterol standard solution, standard DNA markers, control samples, simulated patient serum samples and DNA samples, cholesterol oxidase enzyme, potassium iodide, acidification solution, colour enhancer & colour developer, agarose, electrophoresis buffer, stain.

All you need: electrophoresis tank, power supply, automatic micropipette with tips, incubation oven or waterbath, spectrophotometer and cuvettes, transilluminator.

Human DNA



Sequencing the Human Genome

Actual data representing important genes from automated DNA Sequencers are provided. Students will determine the DNA sequence, compare and extrapolate database information and identify the gene product and other closely related proteins. Data is discussed within the framework of the Human Genome Project.

For 10 Lab Groups.

Complete in 45 min.

Cat No 339

Kit includes: instructions, automated sequencing printouts

All you need: the internet!

DNA Bioinformatics

DNA sequence information is being compiled by various genome initiatives and numerous research groups around the world. The management of this data is known as bioinformatics. This information is stored in various DNA sequence databases which can be readily accessed via the internet. In this experiment, students read x-rays containing DNA sequences which represent segments of important cellular genes. Using bioinformatics databases, students compare and extrapolate database information and identify the gene product.

For 12 Lab Groups.

Complete in 45 min.

Cat No 340

Kit includes: instructions, 3 sets of 4 autoradiograms

All you need: white light box, the internet.

DNA Fingerprinting: Southern Blot Analysis Using Non-Isotopic Detection of DNA

In this experiment, students gain experience in non-isotopic DNA detection & the use of Southern Blot analysis in DNA fingerprinting for a hypothetical paternity test. Includes 3 modules: agarose gel electrophoresis, Southern Blot transfer, and non-isotopic detection of DNA.

For 5 Lab Groups

Electrophoresis - 45 min
Blotting - overnight
Non-Isotopic Detection 3-4 hrs.

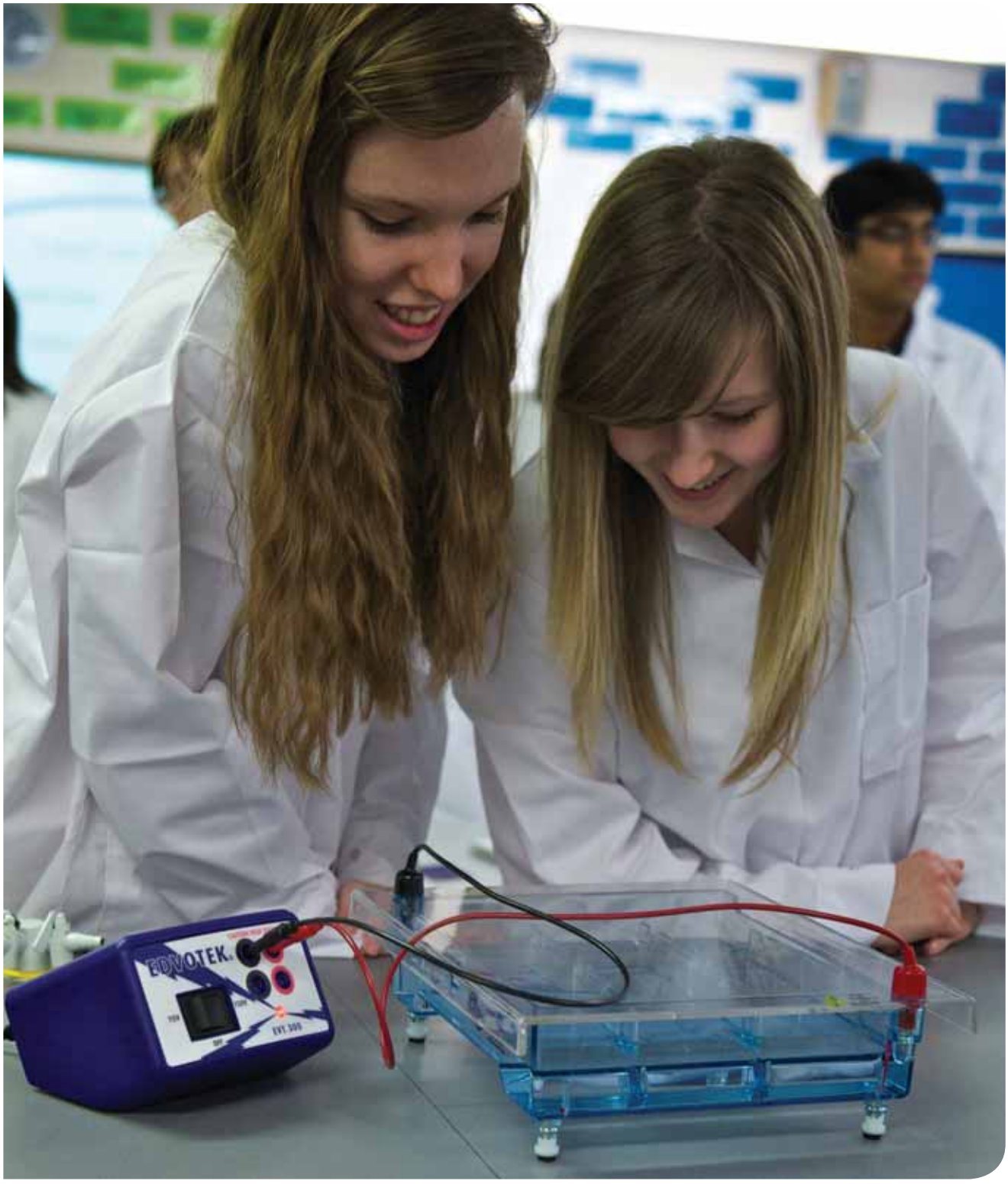
Cat No 311

Kit includes: instructions, predigested DNA samples, buffers, NBT/BCIP tablets, streptavidin-Alkaline Phosphatase, nylon membranes, filter paper, UltraSpec-Agarose powder.

All you need: electrophoresis tank & power supply, automatic micropipette with tips, waterbath, incubation oven, NaCl, NaOH, concentrated HCl.

SECTION TWELVE

12 Equipment & Reagents



Technology Drives Biology

These days, advances in our understanding in biology are driven as much by advances in technology as in our ability to come up with new theories. The human genome project could not have happened until super fast DNA sequencing machines were developed
nor could the data be interpreted until super fast computers were built. With advances in technology comes an ability to ask new questions.

Bring your students into this exciting world. Using the latest in molecular biology equipment, your classroom will be transformed into a state-of-the-art research lab!

See page 82

For information about our affordable EdvoCycler!

What Are LabStations™?

LabStations are pre-selected packages that save you money!

EDVOTEK offers a variety of LabStations for all classroom sizes and budgets.

We also offer CUSTOM LabStations to suit your individual needs.

For more information, contact a Bioeducation specialist at EUinfo@edvotek.com

Electrophoresis

DNA Electrophoresis Equipment For your Whole Class!

BEST SELLER

An amazingly good value way to bring DNA electrophoresis to your whole class! This LabStation provides all you need to run any of our DNA or dye electrophoresis kits with your students. It includes an electrophoresis tank, power supply, six pipettes and tips!

Set Includes:

1 HexaGel Electrophoresis Tank (for six gels)
1 EVT300 Power Source (75/125 V)
6 Gel trays with GelCaps and combs
6 40 µl MiniPipettes and tips

For 6 Lab Groups

Cat No RLSHE-3

Classroom PCR LabStation

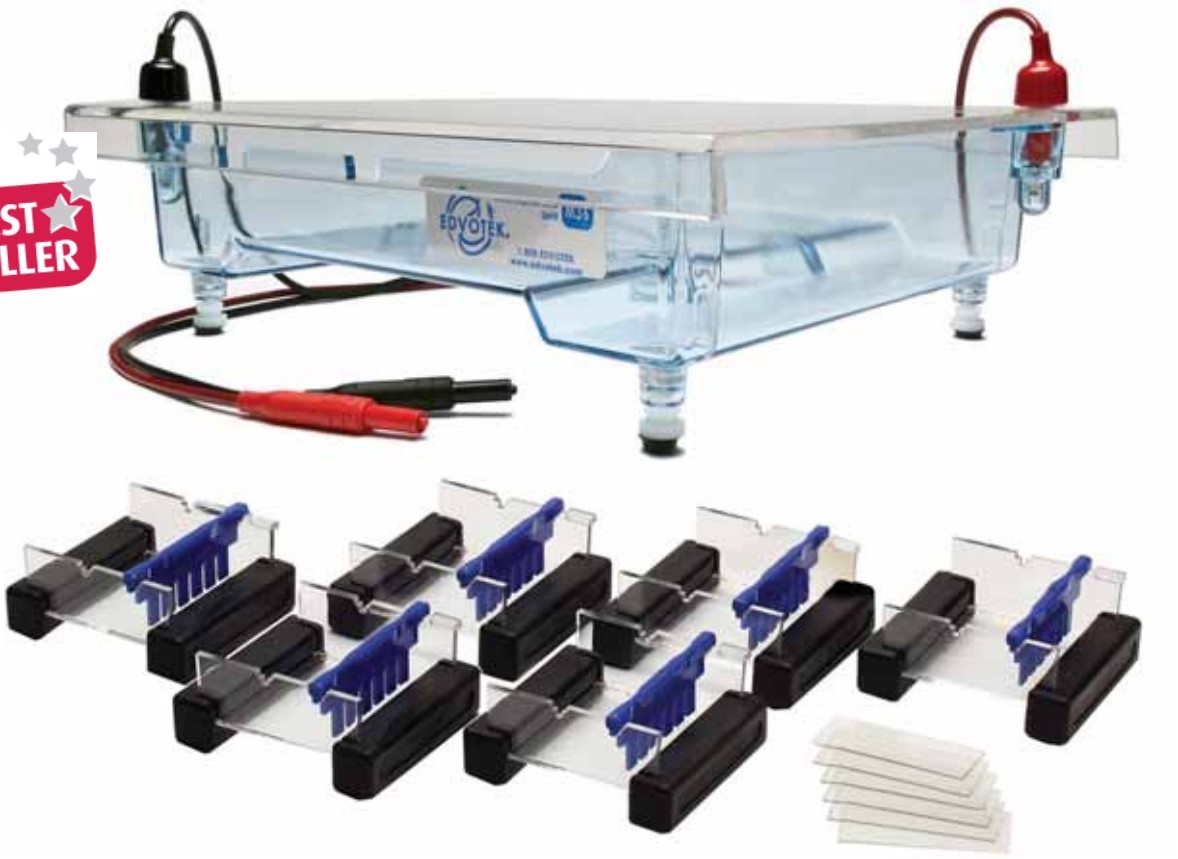
Our PCR LabStation gives you enough equipment to carry out any of our PCR kits with your entire class! This set is sure to give you great results every time!

For 6 Lab Groups

Cat No 5067-1

LabStation Includes:

6	Cat No 502	M12 Electrophoresis Tank (7 x 14 cm Tray)
3	Cat No 509	EVT 300 Dual Power Source (75/150 V, for 1 or 2 units)
6	Cat No 590	Variable MicroPipette (5 - 50 µl)
2	Cat No 534	Piccolo centrifuge
1	Cat No 541	EdvoCycler (25 x 0.2 ml)
1	Cat No 552	White Light Box



M36 HexaGel™ Electrophoresis Tank

DNA electrophoresis for your whole class with just a single gel tank! Six groups of students can load their own individual gels and the six gels are run together in 30-40 minutes giving excellent results! Eliminate cumbersome gel tray taping and pour gels quickly and easily with our innovative gel tray sealing rubber end caps.

Features:

- Six 7 x 7 cm Trays
- Six 6-tooth combs
- Twelve rubber end caps
- Tank dimensions (W x D x H) 28 x 33 x 12 cm

For 6 Lab Groups

Cat No 515

All of our electrophoresis tanks feature:

- Seamless injection-molded bases
- Safety interlock cover
- Corrosion-resistant platinum electrodes
- Safety insulated electrical leads
- Adjustable leveling feet

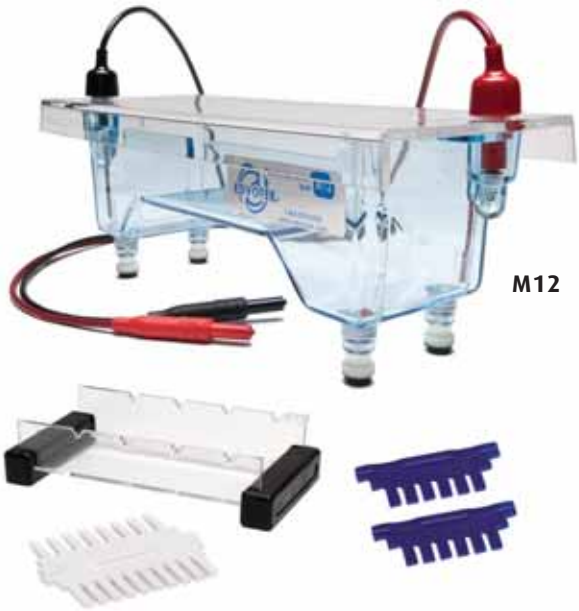
M6Plus Electrophoresis Tank

Runs one group of student samples (or a classroom demonstration) in 30-40 minutes.
Durable and easy to use!
Excellent results every time!

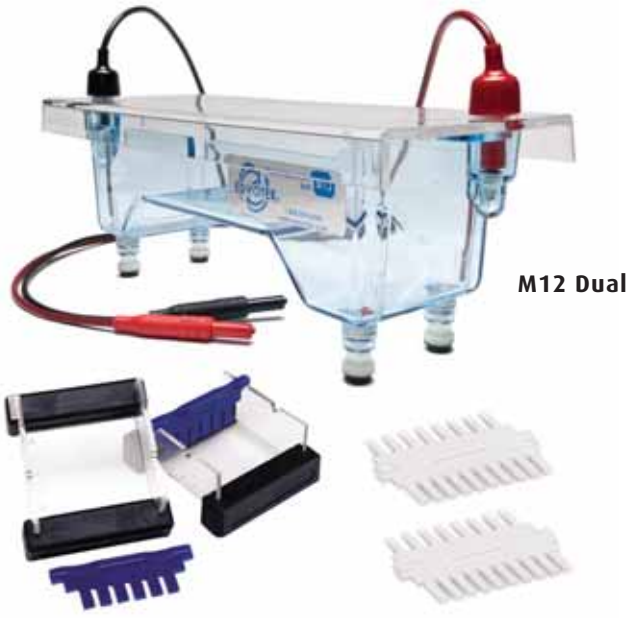
M6Plus Features:
- One 7 x 10 cm Tray
- One Six 6 tooth comb
- One 8/10 tooth comb
- Two rubber end caps

For 1 Lab Group

Cat No 500



M12



M12 Dual

M12 or M12 Dual Electrophoresis Tank

Run up to two groups of student samples at the same time. Chose either two 7 x 7 cm gel trays or one 7 x 14 cm gel tray. Gives excellent results in 30-40 minutes.

M12 Features:
- One 7 x 14 cm Tray
- Two Six 6 tooth combs
- One 8/10 tooth comb
- Two rubber end caps

For 2 Lab Groups

Cat No 502

M12 Dual Features:
- Two 7 x 7 cm Trays
- Two Six 6 tooth combs
- Two 8/10 tooth combs
- Four rubber end caps

For 2 Lab Groups

Cat No 504

Electrophoresis Accessories

6 Tooth Comb
Cat No 680

Double Comb 8/10
Cat No 683

Gemini Split Tray for #M12
Cat No 535

E-Z Align™ Tray 7 x 7 cm
Cat No 684

NEW

E-Z Align Tray 7 x 10 cm
New double tray for the M6Plus!
Cat No 686

E-Z Align Tray 7 x 14 cm
Cat No 685

MV20 Vertical Polyacrylamide Electrophoresis Tank

NEW

Designed for separation of proteins on polyacrylamide gels. All-new injection molded MV20 allows you to run two vertical polyacrylamide gels simultaneously. You can also run just one gel using the provided gel spacer and accommodate most pre-cast or self-made gels. All parts are colour-coded to ensure proper orientation.

MV20 Features:
- Holds one or two gel cassettes
- All platinum electrodes
- Safety interlock cover
- Safety electrical leads

For 2 Lab Groups (sharing a gel)

Cat No 581

PreCast Polyacrylamide Gels

Cat No 651
Includes three 12% precast gels
Requires refrigeration

Cat No 652
Includes six 12% precast gels
Requires refrigeration

Power Supplies

DuoSource™
75 V Power Supply

The DuoSource™ power supply runs gels quickly... in only 40-50 minutes! Can operate two M6Plus units, two M12 units or two HexaGels (at 75 V).

75 V for 1 or 2 units

Cat No 507

EVT 300
75/150 V Power Supply

BEST SELLER

The EVT 300 is a great value and runs gels quickly...in only 20-30 minutes (at 150 V)! Can operate two M6Plus units, two M12 units or two HexaGels.

75 V /150 V for 1 or 2 units

Cat No 509

TetraSource™ 300
30-300 V Power Supply

NEW

Power any combination of EDVOTEK electrophoresis units with this mighty 650 mA power supply! Features an easy-to-use, fully programmable interface for setting voltage, current or timer control with each parameter displayed in real-time. Programs may be paused or resumed at any point. Run experiments in the least time possible with this powerful and versatile unit!

10-300 V for 1 to 4 units

Cat No 5010

PCR Equipment

BEST SELLER

EdvoCycler™

Finally, a PCR machine at an affordable price!

Now you can teach your students about PCR with a practical! The EdvoCycler is a purpose built classroom PCR machine that is easy to use. Your students can amplify DNA from a variety of sources, including their own DNA, with one of our many PCR kits. (See Section 5 for more details.)

EdvoCycler Features:

- Holds 25 x 0.2ml tubes
- Heated lid with magnetic latch
- Pre-programmed with all Edvotek PCR kit protocols
- Vivid LCD display with live programme information
- Easy to use

Dimensions 41cm x 22cm x 18cm

Cat No 541

PCR Bath™

Our unique three-chambered PCR waterbath is ideal for both PCR experiments and for general lab use. Three individual 1.2 L chambers are built into one casing, allowing multiple temperature settings. Temperature control is from ambient to 99°C (with cover). Includes a chamber cover and test tube rack to easily transport samples between baths. Chambers are stainless steel, corrosion resistant, and temperature controlled with an accuracy of ±0.5°C. Chamber dimensions (W x D x H): 15 x 14 x 6 cm. External dimensions: 52 x 20 x 10 cm.

Cat No 544

MegaCycler™

Taking Classroom PCR One Step Further!

The all-new MegaCycler™ has the innovative features of the EdvoCycler™ but nearly twice the sample capacity with its 49-place block!

Cat No 542

Features:

- MegaCycler™ holds 49 x 0.2 ml PCR samples
- Heated oil-free lid with magnetic latch
- Pre-programmed Edvotek PCR protocols
- Vivid 7-line LCD display with live program information
- Standalone machine - no PC required!
- Temperature Range: 4 to 99° C
- Maximum Ramp Rate: 3° C/sec.
- Dimensions: 41 cm x 22 cm x 18 cm

EdvoCycler™ has a 25 place block.

MegaCycler™ has a 49 place block!

Teachers and technicians learning about PCR at our DNA in a DAY™ course.

Pipettes & Liquid Handling

Variable Micropipettes

Our Variable Micropipettes are sturdily designed with volumes ranging from 0.1 to 5000 µl. They are easy to use, highly accurate and use standard micropipette tips. The volume is easily selected by twisting the top. The lightweight design and tip ejector makes operation fast & easy. A tool and instructions are included for self-calibration.

Cat No 589-2	0.1 - 2.5 µl Micropipette
Cat No 589	0.5 - 10 µl Micropipette
Cat No 589-1	2 - 20 µl Micropipette
Cat No 590	5 - 50 µl Micropipette
Cat No 591	10 - 100 µl Micropipette
Cat No 591-1	20 - 200 µl Micropipette
Cat No 592-1	100 - 1000 µl Micropipette
Cat No 593-1	1000 - 5000 µl Micropipette

BEST SELLER

Micropipette Tips

Ultra Micropipette Tips (0.5-10 µl)
Cat No 635 2 racks of 96 each

Yellow Micropipette Tips (1-200 µl)
Cat No 636 2 racks of 96 each

Cat No 636-B Bag of 1000 tips

Blue Micropipette Tips (200-1000 µl)
Cat No 637 2 racks of 96 each

Cat No 637-B Bag of 1000 tips

Fine Tip Micropipette Tips (1-200 µl)
Cat No 638 2 racks of 96 each

Pipette Stand

For 6 Micropipettes
Cat No 796

Pipettes & Liquid Handling

Fixed Volume MiniPipettes™

Robust, accurate, easy to use, colour coded, fun & cost effective micropipettes which use standard micropipette tips. No need to calibrate and impossible to measure the wrong volume!

Cat No 585	5 µl	**Cat No 588-1**	50 µl
Cat No 586	10 µl	**Cat No 588-2**	75 µl
Cat No 586-1	20 µl	**Cat No 588-3**	100 µl
Cat No 587	25 µl	**Cat No 588-4**	200 µl
Cat No 587-1	30 µl		
Cat No 587-2	35 µl		
Cat No 588	40 µl		

BEST SELLER

Electronic Pipetting Pump

The all-new Electronic Pipetting Pump is a lightweight cordless pipetting controller ideally suited as an aliquoting tool for instructors and teaching assistants. It uses all standard serological pipettes. The speed can be fine-tuned by applying varying finger pressure to the operating buttons.

Cat No 594

Pumps & Pipettes

Green Pipetting Pump (For pipettes 5-10 ml)
Cat No 640

Blue Pipetting Pump (For pipettes up to 2 ml)
Cat No 641

1 ml Pipettes, Disposable
Cat No 644 200/pkg

5 ml Pipettes, Disposable
Cat No 645 50/pkg

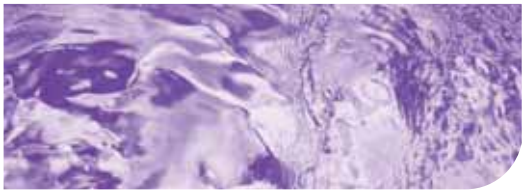
10 ml Pipettes, Disposable
Cat No 646 50/pkg

Transfer Pipettes

Micro Transfer Pipettes, Disposable
Cat No 632 400/pkg

Calibrated 1 ml Transfer Pipettes
Cat No 647 200/pkg

Waterbaths/Dry Block Baths



Edvotek 1.8 L Digital Waterbath

BEST SELLER

This classic Edvotek waterbath has been improved to now include digital temperature control! We've also added a low-water sensor to prevent burn-outs and deepened the chamber to hold more bottles and flasks. The stainless steel chamber is corrosion-resistant and temperature controlled from ambient to 95°C with cover. Chamber Dimensions (W x D x H): 15 x 14 x 10 cm.

Cat No 539

Edvotek 10 L Digital Waterbath

The all-new Edvotek 10 L waterbath incorporates digital temperature control and an optional shaking capability! We've also added a low-water sensor to prevent burn-outs and the deep chamber holds virtually any bottle or flask. The stainless steel chamber is corrosion resistant and temperature controlled from ambient to 95°C with cover. Chamber Dimensions (W x D x H): 22 x 38 x 15 cm

Cat No 538

Dry Block Baths

No more mess! A great alternative to water baths for incubating your samples. Perfect for many uses, such as incubating restriction enzyme digests, and transformation tubes accurately. Base unit comes with a standard single or double block. Other blocks are available - please specify if you want an alternative when ordering. Dimensions (W x D x H): 20 x 27 x 8 cm.

Cat No 520
Dry Block Bath with Single Block (20 x 1.5/2.0 ml Tubes)

Cat No 521
Dry Block Bath with Double Block (40 x 1.5/2.0 ml Tubes)

Cat No 522
Block (24 x 0.5 ml Tubes)

Cat No 523
Block (48 x 0.2 ml Tubes)

Cat No 524
Block (12 x 15 ml Tubes)

Cat No 525
Block (5 x 50 ml Tubes)

Incubator, Rocker, Vortexer

Mini Incubator

Compact and accurate with a broad temperature range, our mini incubator is great for all experiments requiring incubation such as transformation and ELISA.

- Temperature range: ambient +5 to 60°C
- Dimensions (W x D x H)
  Exterior 28.5 x 28 x 33.5 cm
  Interior 23 x 20 x 20 cm

Cat No 545

Perfect Partner

Non Mercury Thermometer

Range: -20 to 110°C

Cat No 765

Rock 'n' Roll Rocker™

Our rockers are designed for use when staining gels and for general mixing. The rockers are compact with a choice of one or two platforms. You just provide the samples and the music!

Features:
- Variable rocking speed
- Compact size
- Large, corrosion resistant stainless steel platforms
- Dimensions (W x D x H) 29 x 32 x 14.5 cm

Cat No 527
Rock 'n' Roller - Single decker

Cat No 528
Rock 'n' Roller - Double decker

Tornado Vortexer™

A compact vortex mixer that will accommodate single tubes or a whole handful at once! Two modes, "touch" or continuous operation, make this ideal for any experiments that require vigorous mixing.

Features:
- Powerful motor for efficient mixing
- Two modes: "touch" or continuous operation
- Speed range: 0 - 2,850 rpm
- Dimensions (W x D x H) 14 x 16 x 13 cm

Cat No 5023

Microcentrifuges

Piccolo Centrifuge™

Our smallest size yet big enough for many classroom uses.
Ideal for quickly spinning down samples and for mixing solutions.

Features:
- Maximum speed 6,000 rpm/2,000 x g
- Safe on/off switch
- Starts and stops in seconds
- Capacity for 6 x 1.5/2.0 ml tubes
- Dimensions (W x D x H) 15 x 15 x 12 cm

Cat No 534

Mezzo Centrifuge™

Perfectly proportioned for an entire class to use.
For quick spins and general mixing.

Features:
- Maximum speed 10,000 rpm/7,176 x g
- Quiet and cool running
- Timer 1 to 60 minutes or continuous
- Capacity for 12 x 1.5/2.0 ml tubes
- Dimensions (W x D x H) 21 x 23 x 19 cm

Cat No 533

Grande Centrifuge™

Our largest centrifuge - suitable for an entire class to use!
Ideal for more demanding applications such as PCR.

Features:
- Maximum speed 14,000 rpm/16,000 x g
- Extremely quiet and cool running
- Quick button for momentary operation
- Timer 1 to 30 minutes or continuous
- Capacity for 18 x 1.5/2.0 ml tubes
- Dimensions (W x D x H) 21 x 23 x 19 cm

Cat No 530

Cat No 530-1
Adaptor for 0.2 ml tubes & strips.

Cat No 530-2
Grande centrifuge with 24 x 1.5/2.0 capacity

Gel Visualization & Photodocumentation

Midrange UV Transilluminator NEW

The all-new Midrange UV Transilluminator is designed to visualize DNA stained with ethidium bromide. UV filter size is 7 x 14 cm and is optimal for visualizing almost every EDVOTEK® experiment kit utilizing ethidium bromide. Safety features include a UV-blocking cover and a power cut-off switch when the cover is opened.

Cat No 558
7 x 14 cm UV Filter

Personal Digital Photodocumentation

UV System or White Light System

EDVOTEK has combined an easy-to-use digital camera and specially designed hood to provide a low cost alternative for gel photos. Custom hood blocks reflections so lab lights can be left on during use. All close-up lenses and filters are built into the hood for easy operation. Will accommodate gels up to 9.5 x 11 cm. Photos may be downloaded to computer and printed, or stored for future use.

Cat No 551-WL
Digital White LIght System

Cat No 551-UV
Digital UV System

Advanced Digital Photodocumentation

This compact workstation is for capturing images of fluorescent and colourimetric gels, membranes, plates, blots, film and assays. The system combines an advanced camera, lightweight camera hood with sample viewer and easy access door, UV transilluminator and software.

Features:

- Advanced digital camera
- Midrange Transilluminator (20 x 20 cm filter)
- Rechargeable battery, charger and AC adapter
- USB 2.0 computer interface
- Analysis software

Cat No 556

White Light Box NEW

Our White Light Box is designed to make viewing gels easier. The viewing surface of 15 x 23 cm is big enough to see any stained gel clearly! It is also great for seeing autoradiograms.

Cat No 552

Long Wave UV Light

A safe, simple to use battery-operated portable mini long wave ultraviolet light.

Cat No 969

Reagents

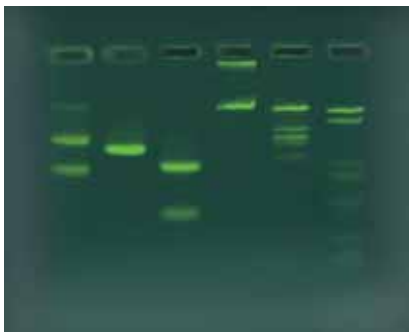
NEW

SYBR® Safe

- SAFE for the Biotechnology Classroom!
- More sensitive than ethidium bromide
- Non-mutagenic

Save time, money, the environment... and get better gel results!

SYBR® Safe DNA Stain
Concentrate, for 750 ml
Cat No 608



SYBR® Safe is a registered trademark of Life Technologies Corporation.

Melt & Pour™ UltraSpec-Agarose

A quick & easy way to make gels! 0.8% UltraSpec-Agarose prepared with TAE buffer. Melt, cool, and pour!

Cat No 601
UltraSpec-Agarose 400 ml

Cat No 601-B
UltraSpec-Agarose 5 x 400 ml

UltraSpec-Agarose Powder

Agarose powder for making DNA gels. Gels are both clearer and stronger than the standard DNA agarose.

Cat No 605
UltraSpec-Agarose 20 g

Cat No 605-B
UltraSpec-Agarose 100 g

Gel Loading (10x) Solution

1 ml concentrate for 200 samples.

Cat No 606

Electrophoresis Buffer 50x TAE

This 50-fold concentrated solution (Tris-acetate, EDTA, pH 7.8) is sufficient for making 5 litres of diluted working buffer for making agarose gels and electrophoresis chamber buffer.

Cat No 607

Electrophoresis Buffer 10x TBE

This 10-fold concentrated solution (Tris- borate-EDTA) is sufficient for making 5 liters of diluted working buffer.

Cat No 607-1

InstaStain Blue

InstaStain Blue sheets stain gels in minutes and give high quality and uniform gel staining with excellent results for photography. They are environmentally friendly, avoiding large amounts of liquid stain and waste disposal.

Cat No 2003
10 gels, 7 x 7 cm

Cat No 2004
100 gels, 7 x 7 cm

Cat No 2006
For various gel sizes, Roll - 14 x 350 cm

FlashBlue™ DNA Staining System

Our new FlashBlue staining system offers a simple and rapid staining procedure that can be completed in less then 30 minutes! FlashBlue stain yields better results, is easy to dispose of and is environmentally friendly! (for 3L).

Cat No 609

DNA Gel Markers

Standard DNA Fragments (20 µg for 20 gels).

Cat No 750

Digested Lambda DNA

20 µg for 20 gels.

Cat No 709
Eco RI

Cat No 710
Eco RI and Hind III

Cat No 711
Hind III

Digested pUC8 Plasmid DNA with *Eco* RI

20 µg for 20 gels.

Cat No 712

What are Dryzymes™?

The three most frequently used restriction enzymes are Eco RI, Bam HI, and Hind III. Each enzyme catalyses cleavage at the defined base sequence. Because of this property, they are important reagents for biotechnology. All enzymes are lyophilized and contain 1500 units. One unit is defined as the amount of enzyme required to digest 1.0 µg of lambda DNA in 60 minutes at 37°C in a total reaction mixture of 50µl.

Dryzyme Bam HI

Recognition 5′-GGATCC-3′
Site: 3′-CCTAGG-5′

The restriction endonuclease Bam HI is isolated from *Bacillus amyloliquefaciens* H cells.

Cat No 717

Dryzyme Hind III

Recognition 5′-AAGCTT-3′
Site: 3′-TTCGAA-5′

The first type restriction endonuclease activity was isolated from *Haemophilus influenzae* Rd cells. Subsequently the presence of two enzymes (Hind II and Hind III) in this cell strain was established.

Cat No 716

Dryzyme Eco RI

Recognition 5′-GAATTC-3′
Site: 3′-CTTAAG-5′

This enzyme is isolated from the RY13 strain of *E.coli*.

Cat No 715

Dryzymes are shipped at room temperature.

Restriction Enzyme Reaction Buffer

Concentrated reaction buffer (2 ml) for restriction enzymes. Sufficient for 200 reactions.
Requires storage in the freezer.

Cat No 610

DNA

Bacteriophage Lambda DNA

50 micrograms

Cat No 701

Plasmid pUC8

10 micrograms

Cat No 703

Plasmid pBR322

10 micrograms

Cat No 702

Plasmid pUC18

10 micrograms

Cat No 704

PCR Bead

Each PCR Bead contains:
- Taq DNA Polymerase
- Taq DNa Polymerase Buffer
- dNTP Mixture
- $MgCl_2$

Cat No 625
PCR Bead for 25 Reactions

Proteinase K

Proteinase K is required to prepare the lysis solution for isolation of DNA from hair.

Cat No 626

Chelating Agent

Chelating agent required for extraction of DNA to be used for PCR. Includes 0.4 grams of chelating resin & buffer for resuspension.

Cat No 629

Nylon Membranes for Southern Blots

Use nylon membranes to perform Southern blots on any of your favourite DNA electrophoresis experiments. Set of 5 blots.

Cat No 665

Microtube Boxes

Perfect for organising up to one hundred 1.5/2.0 ml microtubes. Can be frozen (to -80°C). Available in 5 colours or in a rainbow pack.

Cat No 695-G
Microtube Box with green lid
Cat No 695-B
Microtube Box with blue lid
Cat No 695-P
Microtube Box with pink lid
Cat No 695-O
Microtube Box with orange lid
Cat No 695-Y
Microtube Box with yellow lid

Cat No 695-R
Rainbow - one of each colour

Floating Foam Tube Rack

Cat No 691

Nano Cooler

No more ice buckets! Small benchtop cooler for enzymes and samples. Fit 12 x 1.5/2.0 ml tubes. Keeps samples at 0°C for at least 8 hours!

Cat No 526

Microtest Tubes

500 tubes - 1.5 ml

Cat No 630

Microtest Tube Racks

Colours may vary.

Cat No 639

Index & Ordering Information

Acknowledgments

We'd like to thank the following for quotes and images:

Dr. Joseph Bateman, Kings College London, UK
Prof Sir Alec Jeffreys, Leicester University, UK
Dr. Kary Mullis, Newport Beach, California, USA
David Mack/Science Photo Library
Kofi Annan, United Nations Secretary-General, at the launch of the Water for Life Decade
Prof. Eva Engvall, The Burnham Institute, California, USA
Prof. Dr. Christiane Nüsslein-Volhard, Max Planck Institute for Developmental Biology, Tübingen, Germany
iStockphoto
Melanie Fields and students, The Sidwell Friends School
John Emmerson
Nonie Day and students, Westcliff High School for Girls
Megan Gillan and students, Rickmansworth School

Please visit www.edvotek.co.uk for details of upcoming events and training courses where you can meet our friendly staff and see our latest products!

Ordering Information

5 Easy Ways to Order

Simply place your order one of the following ways:

web	**www.edvotek.co.uk**
email	**EUinfo@edvotek.com**
phone	**+44 (0) 1992 410 140**
fax	**+44 (0) 1992 410 106**
mail	**Edvotek Europe Ltd, PO Box 280, Hertford, Hertfordshire, SG13 9DG, UK**

Shipping

UK & Europe A standard delivery charge of £10/€15 is applied to all orders. Normal time for UK deliveries is 5-10 working days.

International Delivery of goods to international destinations will be calculated per order. To obtain a price quote, please email EUinfo@edvotek.com.

Terms and Conditions

Definitions

"Seller" means Edvotek Europe Ltd.

"Buyer" means individual, company or other party with whom the seller contracts.

"Contract" means the contract or order for the purchase and sale of goods or services.

Terms

No minimum order required.

All prices are quote in Pounds Sterling and Euros and are subject to change.

All prices exclude VAT.

The seller reserves the right to invoice the buyer prior to delivery.

Payment is due within 30 days of the invoice date.

The buyer shall be responsible to the seller for ensuring the accuracy of any order submitted and for giving the seller any necessary information relating to the goods or services within a sufficient time to enable the seller to perform the contract in accordance with its terms.

No order shall be binding on the seller unless or until such order is accepted by the seller in writing.

Any special delivery requirements must have been notified by the buyer to the seller at the time of placing the order. The seller reserves the right to recover delivery costs due to the failure of the buyer to accept delivery or to have given inadequate delivery instructions.

The seller reserves the right to make any changes in the specification of the goods which are required to conform with any applicable safety or other statutory requirements or, where the goods are to be supplied to the buyer's specification, which do not materially affect their quality or performance.

Delivery dates quoted are approximate only, and the seller shall not be liable for any delay in delivery. Time of delivery shall note be of the essence unless previously agreed by the seller in writing. The buyer shall not be entitled to cancel, delay or refuse payment should delivery be made after the established delivery date.

Claims for missing articles, shipping damages or losses must be made within 15 days of receipt.

The buyer shall be required to pay a restocking fee for wrongly ordered goods at the discretion of Edvotek Europe Ltd.

Conditions

Any statement (whether written or oral), description,drawing, photograph, illustration, diagram or specification concerning the goods made before the contract are for the purpose of information and guidance only.

Where goods are sold by reference to a description in the catalogue, the goods are sold subject to tolerances and variations expressed or implied in the catalogue.

All equipment is under warranty for one year. The liability of the seller is limited to the repair of defects or the replacement of the product at its option. The seller cannot accept responsibility for user conversion, abusive use, lack of or improper maintenance or equipment.

The items supplied by the seller are intended for laboratory experimental use only and are not intended to be used with food or drink for human consumption or for use as drugs.

International Orders

All terms and conditions apply to international orders. The shipping costs to international orders will be added to the cost of goods.

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