

BIO-RAD Explorer

ADVANCING STUDENT DISCOVERY



Identify a species!

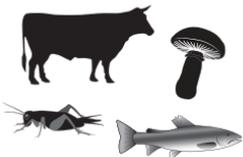
BIO-RAD

Investigate organismal biodiversity and contribute to global conservation!

Details on page 2

New and Improved DNA Barcoding Kits — identify a species of your choice.

Select mammalian,
insect, fungal, or
fish sample



Amplify target gene



Analyze DNA via
electrophoresis

Perform sequencing
and bioinformatics
analysis



DNA sequence analysis has never been more important — from identifying SARS-CoV-2 variants to personalizing therapies, this essential biotechnology impacts students' everyday lives.

With the new and improved modular Mammals, Insects, and Fungi DNA Barcoding Kit, students are able to participate in cataloging local species diversity and help accelerate global conservation efforts through the International Barcode of Life project. Students use DNA extraction, PCR, and then bioinformatics analysis — the same workflow as the trusted Fish DNA Barcoding Kit.

Ordering Information

17007366EDU	New Mammals, Insects, and Fungi DNA Barcoding Kit	\$351.20
17007432EDU	Improved Fish DNA Barcoding Kit	331.20

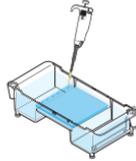
Cost-saving kit bundles, refills, and individual modules are available: visit bio-rad.com/barcoding for more info.

Pre-amplified PCR Detection COVID Activity

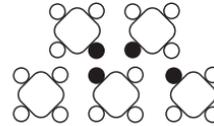
Diagnostic lab using reverse transcription PCR to detect a SARS-CoV-2 infection



Electrophorese restaurant patrons' pre-amplified DNA



Identify SARS-CoV-2 infected patrons



Hypothesize how the virus spread



Investigate the real-life spread of SARS-CoV-2 that occurred in a restaurant. In this activity, students use agarose gel electrophoresis to analyze pre-amplified DNA samples from simulated patrons based on a real spreading event, then propose ways the virus may have spread.

Scan the QR code to learn more.

Download the free activity instructions and presentation!

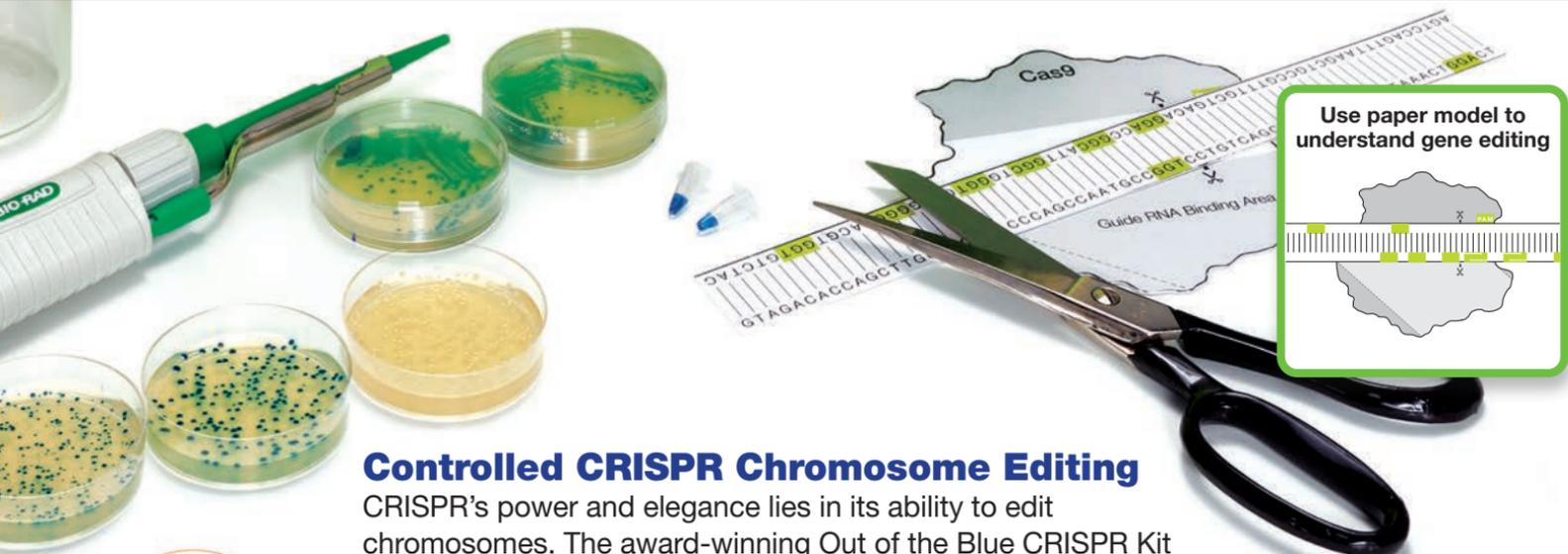


Ordering Information

This activity uses the reagents and pre-amplified DNA samples from the Science of Opioid Dependence Kit.

17005316EDU	Science of Opioid Dependence Kit	\$118.40
17005297EDU	Science of Opioid Dependence Kit plus Fast Blast Electrophoresis Reagents	132.00
17005313EDU	Science of Opioid Dependence Kit plus UView Electrophoresis Reagents	140.00

Out of the Blue CRISPR and Genotyping Extension Kits — true and blue!



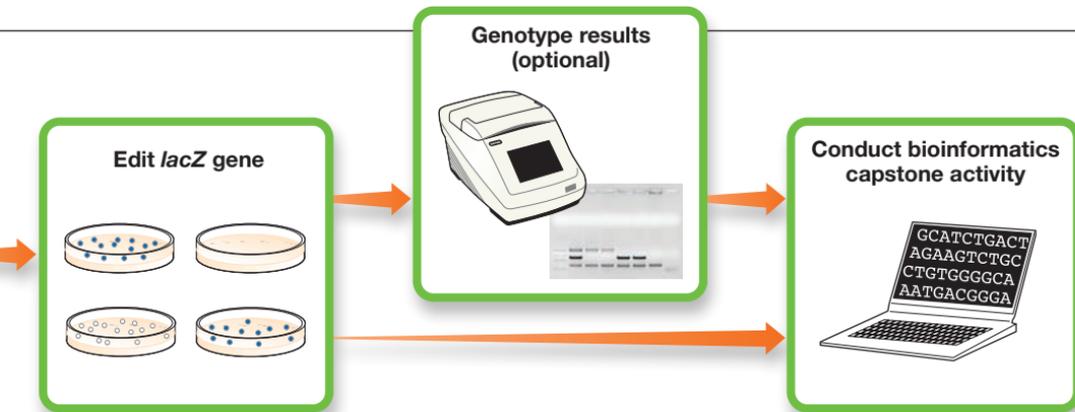
Controlled CRISPR Chromosome Editing

CRISPR's power and elegance lies in its ability to edit chromosomes. The award-winning Out of the Blue CRISPR Kit places you and your students at medicine's cutting edge as you edit the *lacZ* gene on the bacterial chromosome with real CRISPR-Cas9 cutting and repair events.

A vibrant blue-white colony screening reveals the phenotypic change associated with gene editing. The optional genotyping extension kit allows your students to confirm the genetic edit with PCR analysis and gel electrophoresis. Armed with experimental evidence, have your students explore the possibilities and ethics of CRISPR technology in therapeutic applications — and even hold a bioethics debate.

As always, Bio-Rad includes experimental controls that deepen student understanding.





“The Out of the Blue CRISPR kit really does exceed all expectations. The level of controls make it a better option for students first learning about CRISPR gene editing!”

Caitlin Bowen
 High School AP Biology and
 Biotechnology Teacher

Planning on remote learning? Check out bio-rad.com/teachCRISPR for our free teaching resources on CRISPR gene editing including:

- Video playlist
- CRISPR paper model activity
- Bioinformatics activity
- CRISPR topics and history infographic

Scan the QR code to learn more.

Check out our new Out of the Blue CRISPR Quick Guide video!

Ordering Information

17006081EDU	Out of the Blue CRISPR and Genotyping Extension Kits	\$530.40
12012608EDU	Out of the Blue CRISPR Kit	312.80
12012607EDU	Out of the Blue Genotyping Extension	264.80
12012620EDU	Out of the Blue CRISPR Kit Refill Pack	264.80
12012708EDU	Out of the Blue Genotyping Extension Refill Pack	224.80

Visit bio-rad.com/outoftheblue for more cost-saving bundles.

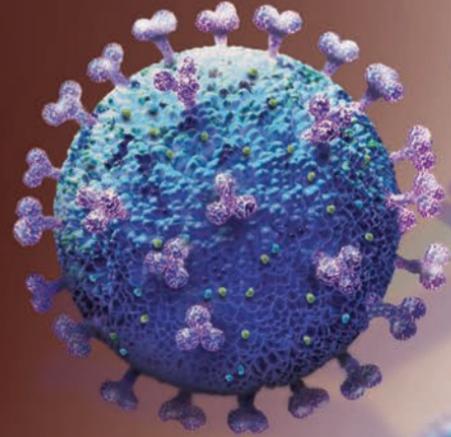
Pandemic Relevance — antibodies as a surveillance tool!

Are your students intrigued by COVID-19 diagnosis?

Or, are they exhausted with that topic and would prefer to learn more about HIV, ebola, or any number of bacterial or viral diseases? The highly versatile ELISA Immuno Explorer Kit lets you choose a scenario your students care about as they use real antibodies to identify patient zero. Enzyme-linked immunosorbent assay (ELISA) is a powerful antibody-based biodetection tool used to hunt pathogens. Teach about the immune system and the unique properties of antibodies, which have revolutionized medicine, epidemiology, and life science research. These topics have never been more relevant to students' lives.

Check out [bio-rad.com/classroomresources](https://www.bio-rad.com/classroomresources) for our free teaching resources, including:

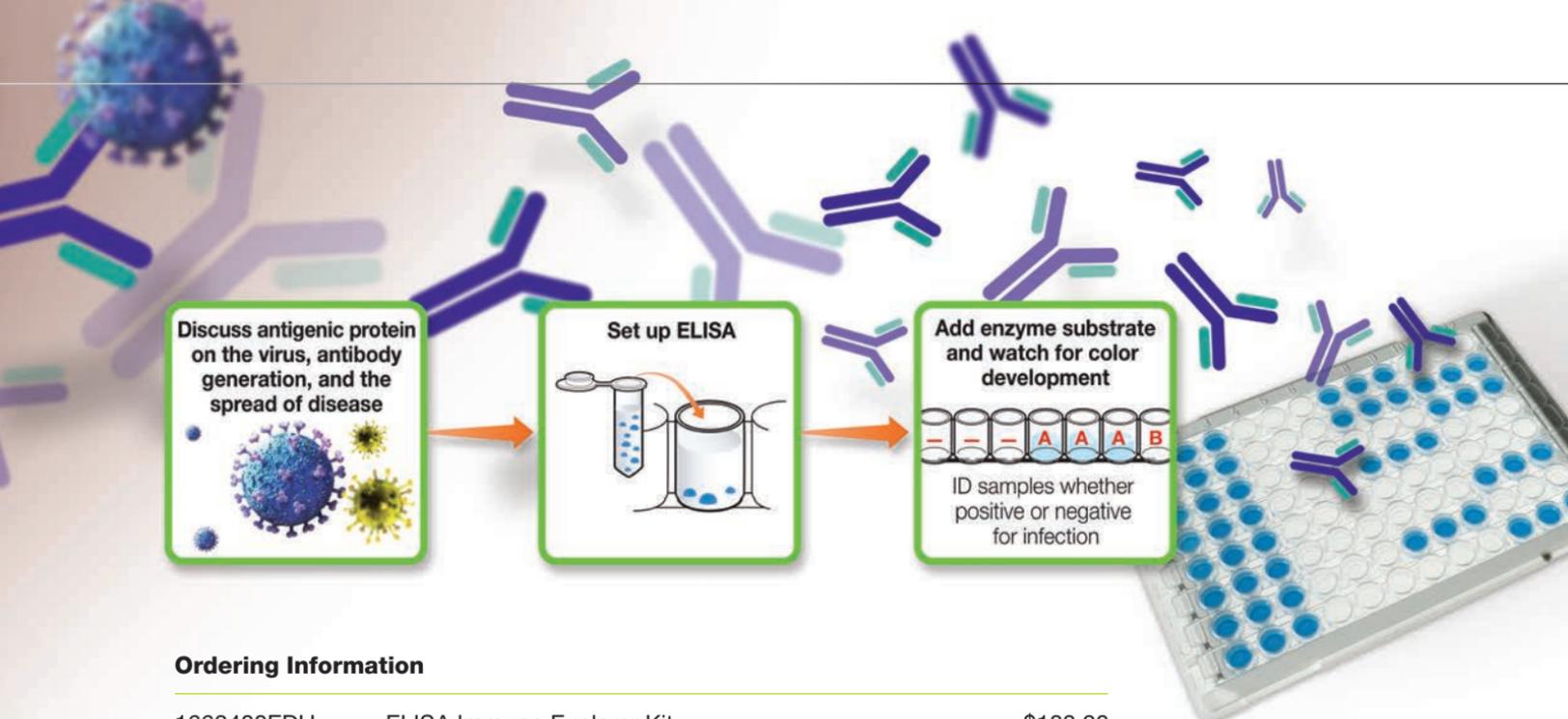
- ELISA paper model activity
- Premade ELISA slide presentations
- **New!** Videos and step-by-step animations
- Guide for use in socially distanced classrooms or at home



Scan the QR code to learn more.

Check out our
COVID teaching
resources including
how to use our ELISA
kit to teach about
SARS-CoV-2





Ordering Information

1662400EDU	ELISA Immuno Explorer Kit	\$183.20
1662401EDU	ELISA Kit Reagent Refill Pack	138.40

Also check out how to use ELISA to teach giant panda reproductive endocrinology and conservation biology.

17002878EDU	The Giant Panda Problem Kit for AP Biology	\$183.20
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Featuring wastewater testing, agricultural advances, and pedagogical best practices.

Scan the QR code to learn more.

To register
to attend the
Advanced
PCR Webinar
Series



Join us for this exciting webinar series produced in partnership with InnovATEBIO on the cutting-edge applications of Droplet Digital PCR (ddPCR) and real-time quantitative PCR. Hear from experts in these fields and learn how they apply these technologies in various applications ranging from testing wastewater to monitor COVID-19, investigating the antibiotic resistome, or developing new winter-hardy crops to improve yields for food, bioenergy, and animal feed. Also hear from experts who will provide pedagogical strategies for incorporating these cutting-edge and engaging topics into your class.



Elizabeth Dreskin
Bio-Rad Laboratories R&D, Applications Manager — Liz will provide an overview of PCR techniques used in industry with a focus on the exciting new ddPCR technology



Joshua Steele
Southern California Coastal Water Research Project, Microbiologist — Joshua will discuss the fascinating utility in ddPCR technology in wastewater testing



Rahul Patharkar
Rahul Patharkar, CoverCress Inc., Molecular Geneticist — Rahul will talk about the role of gene editing and real-time PCR in developing a beneficial new cover crop

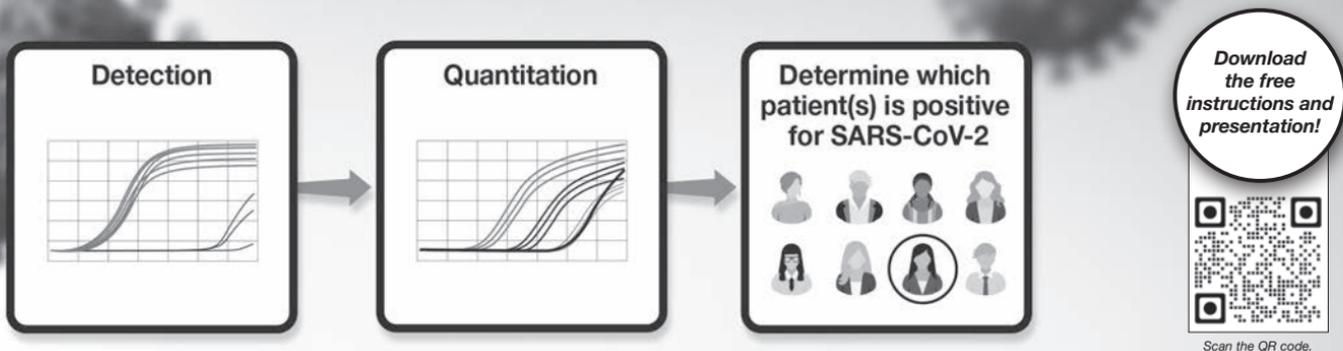


Betsy Boedecker
St. Louis Community College, District Director — Betsy will discuss pedagogical tactics and strategies for teaching advanced PCR topics



Linnea Fletcher
Austin Community College, InnovATEBIO PI — Linnea will share her experiences and expertise with implementing advanced PCR curricula

Real-Time PCR-Based SARS-CoV-2 Detection Activity



Real-time PCR is currently a gold standard for COVID-19 diagnosis. In this activity, use real-time PCR to detect SARS-CoV-2 in simulated patient samples. Students analyze amplification and melt curves to determine which patients are positive and then quantify viral RNA.

Ordering Information

This activity uses the reagents and DNA samples from the PCR Basics Real-Time PCR Starter Kit.

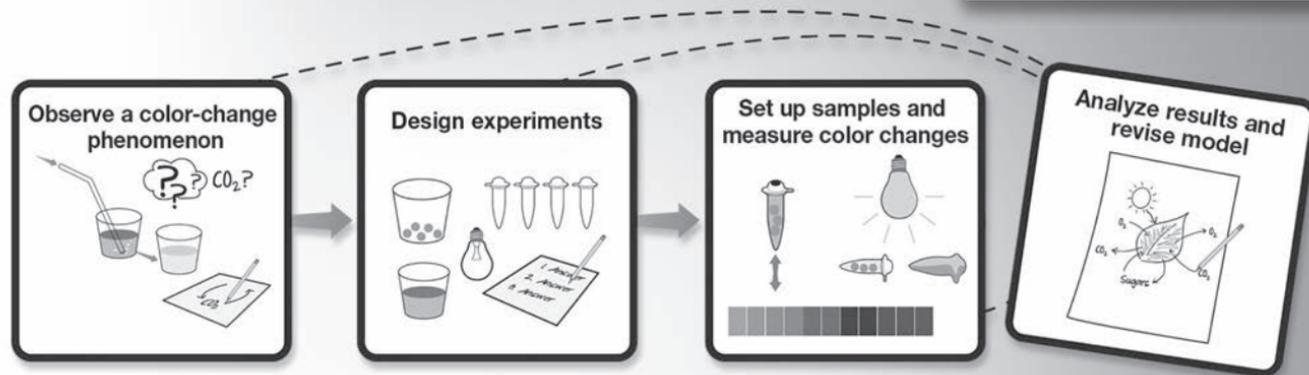
1662660EDU

PCR Basics Real-Time PCR Starter Kit

\$658.40

Photosynthesis and Cellular Respiration Kits

Check out our new Photosynthesis and Cellular Respiration Kit for AP Biology quick guide video at bio-rad.com/eduvqg/photosynthesis



Energy transfer your students can see!

Reusable algae beads cause a dramatic shift in the color of indicator solution when doing either photosynthesis or cellular respiration.

Lead your students from phenomenon to scientific explanation.

Put your students at the center of instruction as they design experiments and create models to discover photosynthesis and cellular respiration — with algae beads. *Great activity for single workstations!*

Ordering Information

12005534EDU Photosynthesis and Cellular Respiration Kit for General Biology \$192.80

Also available for AP Biology

17001238EDU Photosynthesis and Cellular Respiration Kit for AP Biology 192.80

12002353EDU Photosynthesis and Cellular Respiration Reagent Refill Pack 158.40

Refill reagents for both the General and AP Biology versions

Get the Bio-Rad Career Poster — your students can make a difference.

Be part of the solution: inspire a life science career!

Free Giant Poster



Visit bio-rad.com/classroomresources to request your free copy of the Bio-Rad career poster.

BIO-RAD

Free Bio-Rad Explorer Career Poster and more

Name Title _____

- Free Bio-Rad Career Poster (bulletin 7397)
- Free Bio-Rad Explorer Catalog (bulletin 2112)

Institution _____

Department _____

Bldg. _____

Room no. _____

We want to hear from you!

What science classes do you teach? _____

Address _____

City _____

Province _____

Postal Code _____

Which life science skills, topics, or concepts would you like to see addressed in a kit?

() _____

Phone

() _____

Fax

- Please have a Bio-Rad curriculum training specialist contact us about meeting our teaching goals and professional development needs in our own district today.

Email _____

(By providing my email address I agree to receive email about Bio-Rad products and events.)

Fill in and return this card today or visit us online at bio-rad.com/explorercatalog to request your free catalog. For immediate information, call **1-800-361-1808**.

Join Us at These 2021–22 Teacher Conferences



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1329 Meyerside Drive
Mississauga, ON L5T 1C9

2021–22 Teacher Conference and Workshop Schedule

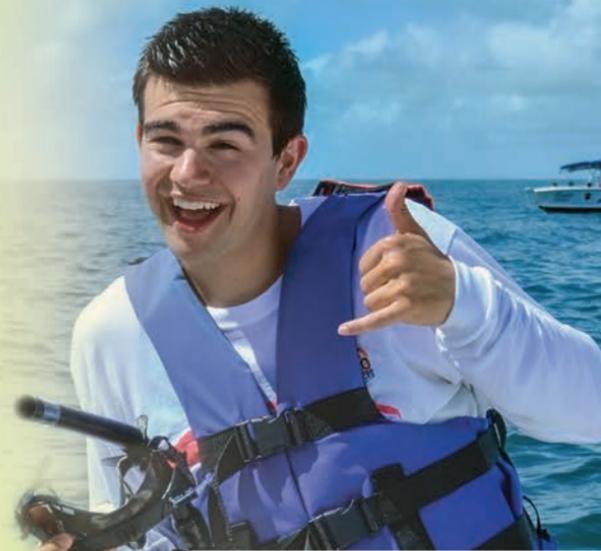
Go to
bio-rad.com/explorerworkshops
for a complete schedule.

Growing with Bio-Rad

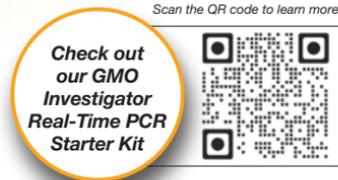
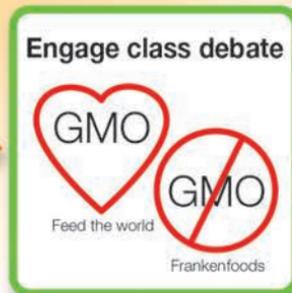
Andrew Kravariotis recalls seeing Bio-Rad’s “iconic green brand” as a student when he first performed gel electrophoresis in his AP Biology class in San Ramon, CA. This experience unexpectedly shaped his future and career. Like many young students, Andrew originally envisioned a career as a notable public servant, like a firefighter. ***He didn’t feel particularly gifted in science and math and never thought to pursue those fields.*** However, this hands-on experience in high school made a world of difference to him. It piqued a new interest and uncovered an unknown aptitude in science and set him on a new course. Being able to work with real research equipment and reagents made him realize that he could do experiments that real scientists do.

After high school, Andrew pursued a biochemistry degree at Los Positas Community College, where he learned more advanced techniques such as PCR and imaging. He transferred to Cal Poly San Luis Obispo to complete his upper division studies. ***There he enrolled in a rigorous course in protein techniques and was required to perform undergraduate lab research and write a thesis.*** He joined Dr. Katherine Watts’ natural products chemistry lab, where he purified bacterial proteins and designed primers to look for novel antimicrobials.

After graduation from college, Andrew joined a diagnostic supply company as an R&D scientist. ***His scientific background has given him a solid basis to explore other career paths*** including business development management and currently as an account manager in the Clinical Diagnostics field and jokes that he developed an infatuation with Bio-Rad and a personal connection to the reagents and instruments that shaped his career.



To talk with a specialist for ideas on inspiring your students or to start a new biotech unit, course, or program — contact us at [bio-rad.com/explorerhelp](https://www.bio-rad.com/explorerhelp)

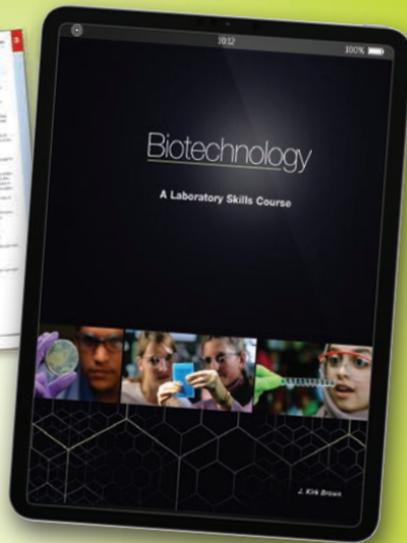
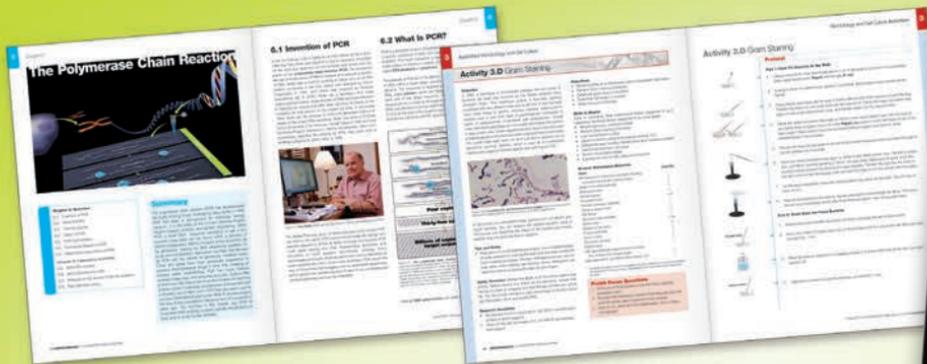


Are GM crops a good thing? Have your students detect GMOs in the foods they eat every day. Then hold a debate! It's a great way to add engaging and relevant context to the concepts of genetics, DNA, and PCR.

Visit bio-rad.com/mail/GMOdebate to download our GMO debate activity, including starter questions and resources.

Ordering Information

1662500EDU	GMO Investigator Kit	\$248.80
1660450EDU	Small Fast Blast DNA Electrophoresis Reagent Pack	121.60
1662550EDU	GMO Investigator Kit Plus Small Fast Blast DNA Electrophoresis Reagent Pack	311.20
1662560EDU	GMO Investigator Real-Time PCR Starter Kit	744.80



New digital format

The second edition of *Biotechnology: A Laboratory Skills Course* gets your students doing real hands-on science right away.

There has never been a more important time to start or expand your biotech teaching!

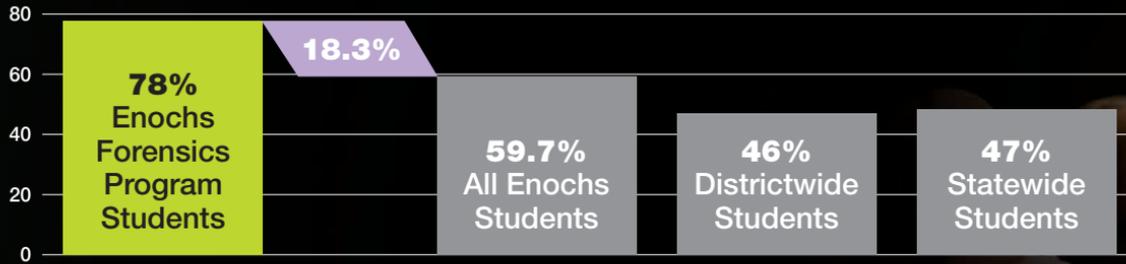
Biotechnology: A Laboratory Skills Course will give students from all backgrounds the skills and understanding they need to process what they are hearing in the news. Plus, its alignment to the industry recognized Biotechnician Assistant Credentialing Exam (BACE) helps them demonstrate their career-readiness.

Visit bio-rad.com/textbook for the full range of textbook options available.

**Help your students
be the change
with the power
of biotech.**

Science Activities Contribute to Increased Performance

Enochs Forensic students performed over 18% better than all Enochs, district, and state students.



Three-year average test scores of students who tested proficient or advanced using California State Testing and Reporting (STAR) CST exams (2010–11, 2011–12, and 2012–13)

How do you improve student performance in one of the nation's most challenged regions? James C. Enoch's High School in Modesto, CA, serves a community that Forbes has characterized as a U.S. city with high unemployment and crime rates, and with 51% of its students considered at risk.

We Are Here to Help You and Your Students!

Explorer

Start Small.... Even our author did

- What if you had
 - one gel box
 - one power supply
 - one micropipette



Take innovative and motivated teachers and put them in a supportive environment. Then mix that with popular media topics that pique students' interest and you have a recipe for success and achievement. These stimulating topics include crime scene investigation and zombies. And when they're combined with Bio-Rad's hands-on lab activities, they lead to greater student learning, as demonstrated by improved scores on standardized tests.

We can help with:

- Learning and teaching advanced topics, techniques, and skills
- Starting and expanding biotech programs
- Integrating student research and novel data collection into class

...and more: we tailor training to your needs and budget. We're experts in instructor training and program development. Let's chat about how together we can determine and customize in-person and/or remote trainings and workshops for you and your school!

Get started now at bio-rad.com/explorerhelp

Get support, training, and professional development tailored to your budget and the needs of your teachers, school, and district. Only Bio-Rad offers support, training, and professional development for biology and life science educators with the expertise trusted by research and medical professionals.

Read the full article, "Using biotechnology, CSI, and zombies to promote science education in one of America's most challenging regions," as published in the Journal of Commercial Biotechnology (2015) 21(1), 69-77. doi: 10.5912/jcb682.

Jamie Allison of Loveland High School and a Workforce & Education Consultant at BioOhio participated in a professional development event using Bio-Rad's GFP Chromatography activity as a model of the connections between agriculture and the medical world.

“In the midst of COVID, it was so refreshing to see teachers embrace their inner child and reignite their enthusiasm for sharing real, hands-on exploration with their students.”

DNA > RNA > Protein > Trait — Green Fluorescence!

The original pGLO Bacterial Transformation Kit led to a three-dimensional approach and an inquiry-based adaptation for general biology and AP Biology classrooms. Each of these different approaches can be followed by GFP purification and visualization on an SDS-PAGE gel. Our pGLO Kits elegantly and timelessly illustrate the central doctrine of biology, from the transformation of DNA to the expression of a protein to the visualization of a trait.

Ordering Information

1660003EDU	pGLO Bacterial Transformation Kit	\$132.00
17006991EDU	pGLO Bacterial Transformation Kit for General Biology	132.00
1660335EDU	pGLO Bacterial Transformation and Inquiry Kit for AP Biology	238.40
1660005EDU	Green Fluorescent Protein Chromatography Kit	132.00
1660013EDU	pGLO Kit SDS-PAGE Extension	136.00

High Quality, Low Prices – real science exploration for under \$150



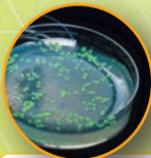
Agarose Gel Electrophoresis

Catalog No		EDU Price
1665075EDU	IDEA Kit – Inquiry Dye Electrophoresis Activity	\$72.80
1660001EDU	Analysis of Precut Lambda DNA Kit	132.00
1665080EDU	STEM Electrophoresis Teacher Demonstration Kit	132.00
1665085EDU	STEM Electrophoresis Engineering Kit	76.00
17005297EDU	Science of Opioid Dependence Kit plus Fast Blast Electrophoresis Reagents	132.00



DNA Analysis

Catalog No		EDU Price
1660001EDU	Analysis of Precut Lambda DNA Kit	\$132.00
1662000EDU	DNA Extraction Module	126.40
1662250EDU	DNA Helix Necklace Module	90.40
1667015EDU	DNA Model	33.60
17005297EDU	Science of Opioid Dependence Kit plus Fast Blast Electrophoresis Reagents	132.00



Bacterial Culture and Transformation

Catalog No		EDU Price
1660003EDU	pGLO Bacterial Transformation Kit	\$132.00
1665030EDU	Microbes and Health Kit	132.00



Protein Analysis

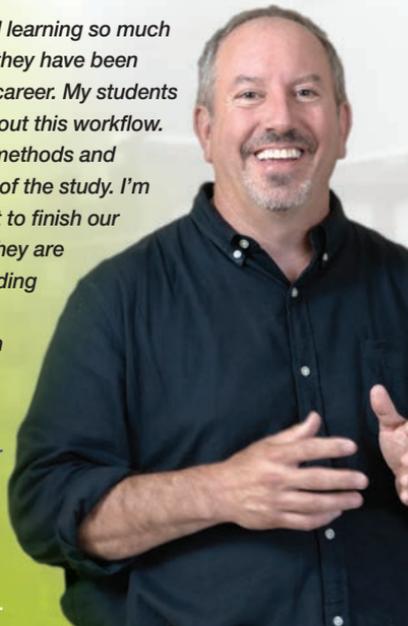
Catalog No		EDU Price
1660013EDU	pGLO SDS-PAGE Extension	\$136.00
1660005EDU	Green Fluorescent Protein Chromatography Kit	132.00
1660008EDU	Size Exclusion Chromatography Kit	118.40
17005278EDU	Engineering Solutions for Global Health Kit	132.00

Even in the midst of a pandemic, teachers make a lasting impact on their students and provide them with meaningful experiences. For example, this year **Ray Cinti** brought gene editing and genotyping into his classroom using the **Out of the Blue CRISPR and Genotyping Extension Kits**.

It's been a transformative experience.

“ My students are enjoying and learning so much from these experiments and they have been some of the best days of my career. My students have been so enthusiastic about this workflow. They are really grasping the methods and reasoning behind all aspects of the study. I'm using it as a capstone project to finish our study of molecular biology. They are truly engaged and understanding the significance and current relevance of this investigation and its many applications.”

Thank you to all the teachers like Ray who have been there for their students throughout the year and have made such a positive and lasting impact on their lives. We applaud you and your efforts! See page 4 for CRISPR kit details.



BIO-RAD

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