

Call for Classroom Media Reviews Editor

The American Biology Teacher wishes to thank Kerry Henrickson for serving in this role for the past year. This position solicits and coordinates unbiased reviews of educational technology for the biology classroom, especially those that employ standards-based inquiry strategies for student learning. Prior experience with classroom technologies is advisable. Please respond to William Leonard at Leonard@clemson.edu.

CLASSROOM MEDIA REVIEWS

KERRY HENRICKSON, DEPARTMENT EDITOR

CLASSROOM BIOLOGY KITS

Inquiries in Science™ Series. *Cycling Through Mitosis.* Carolina Biological Supply Company.

Any science instructor who purchases kits to supplement the curriculum knows that all kits are not created equal—many kits require the teacher to spend a great deal of time dividing the components into smaller amounts or groups and some kit manuals are content-rich while others merely contain a lab procedure. The new **Inquiries in Science™ Series** recently produced and released by Carolina Biological Supply Company is an exemplary model of an ideal kit. The **Inquiries in Science™ Biology Series** is composed of 19 modules divided into five strands: cell, genetics, ecology, evolution, and physiology. The classroom field-tested modules may be purchased as an entire lab package, single strand, or individually. Each individual module (which varies in price) is designed for 30 students. Within each kit, most components are already divided and prepared for each student group. For example, the ***Cycling Through Mitosis*** kit contains eight small bottles of hydrochloric acid so that one can be placed at each student station with minimal preparation by the teacher. Additional items that are required but not supplied in the kit are clearly listed in the *Teacher's Manual*.

It's evident that Carolina Biological Supply Company's primary objective is to develop inquiry-based labs and activities with both the teacher and student in mind. The kits are packaged in a green sturdy cardboard box ideal for storage. The *Teacher's Manual and Student Guide* is an invaluable resource that includes the following: learning goals, content standards, time requirements, materials, safety, instruc-



tional approach, science content, preparation, implementation, helpful hints, student misconceptions, differentiated instruction, extension activities, and additional resources. Created by college and high school life science instructors, *The Teacher's Manual and Student Guide* are presented together as one spiral-bound book, making it durable, easy to photocopy, and prevents teachers from misplacing any of the pages. The outside margin of each page in *The Teacher's Manual* contains space for additional notes so the instructor can keep all resources in one place.

Each module in the **Inquiries in Science™ Biology Series** is based on a guided-inquiry approach to teach concepts using the learning cycle (focus, explore, explain, and apply). In the ***Cycling Through Mitosis*** kit, students are first asked to focus on the topic by brainstorming a list of ideas about cancer and its causes while recording them in a science notebook. Students are also encouraged to create a list of reasons for cell division and propose a method of how a cell accomplishes the task. After students focus and record their thoughts, they explore their predictions in a series of three activities. The first activity, "Preparing and Observing Onion Root Tip Slides," requires

the instructor to grow onion root tips approximately 48 hours before the lesson. I've tried numerous methods for making onion root tip cell spreads; however, Carolina's protocol is superb; as a matter of fact, every student group observed at least a few mitotic cells on its slide! After preparing and viewing the slide, students are required to draw a picture of each different cell they see under the microscope. At this point, students have not been introduced to

the names of mitotic phases; rather, they are merely noting that some cells appear to be different from one another in the root tip. After placing their cell diagrams in sequential order (based on their current understanding) and discussing the different views of a cell, the instructor distributes a handout depicting the phases of mitosis in an animal cell and a plant cell. Students can compare their drawings to the diagrams on the handout. Because students have invested time in preparing and viewing a slide, drawing diagrams of various cells, and inferring the sequence of mitotic events, they are eager to compare their results to the handouts. The room was buzzing with actively-engaged students who were confirming and/or modifying their ideas about mitosis, thereby deepening their understanding of cell division.

The second activity, "Modeling Mitosis," is an ingenious lesson because it encourages students to use chalk to draw a nuclear membrane that can later be erased during late prophase, on the lab table. Students simulate the four stages of mitosis in an animal cell by drawing a nuclear membrane on their lab table with chalk, using string for the cell membrane, and manipulating plastic chromosomes. Since

students often possess the misconception that mitosis occurs in four distinct steps, the kit includes a CD-ROM that contains a short video clip of an actual cell undergoing mitosis. Upon watching the video, one student said, "Now I understand – mitosis is like a movie and each phase represents a single frame of the movie."

The final Explore activity, "Designing and Conducting an Inquiry Activity," encourages students to design and conduct an investigation that reveals the proportion of the cell cycle spent in interphase and each phase of mitosis. Students are then supposed to use a protractor to depict their data in the form of a pie chart. Although the directions indicate that students should use the slides they prepared in Activity 1, I found it useful to have prepared slides available for groups who had only a handful of mitotic cells on their slide.

In the next phase of the learning cycle, Explain, the instructor distributes a handout that describes the cell cycle and contains a drawing and microscopic view of interphase, prophase, metaphase, anaphase, and telophase. The instructor may or may not choose to give a lecture at this point; my students required only a brief explanation since they had already explored the cell cycle by engaging in three activities. Finally, students apply what they have learned by answering a series of ten open-ended assessment questions.

An **Inquiries in Science™ Biology Series** module is worth the investment for several reasons: Most of the components in the kit are divided into groups, the kit is packaged in a sturdy box for long-term storage, the spiral-bound *Teacher's Manual*

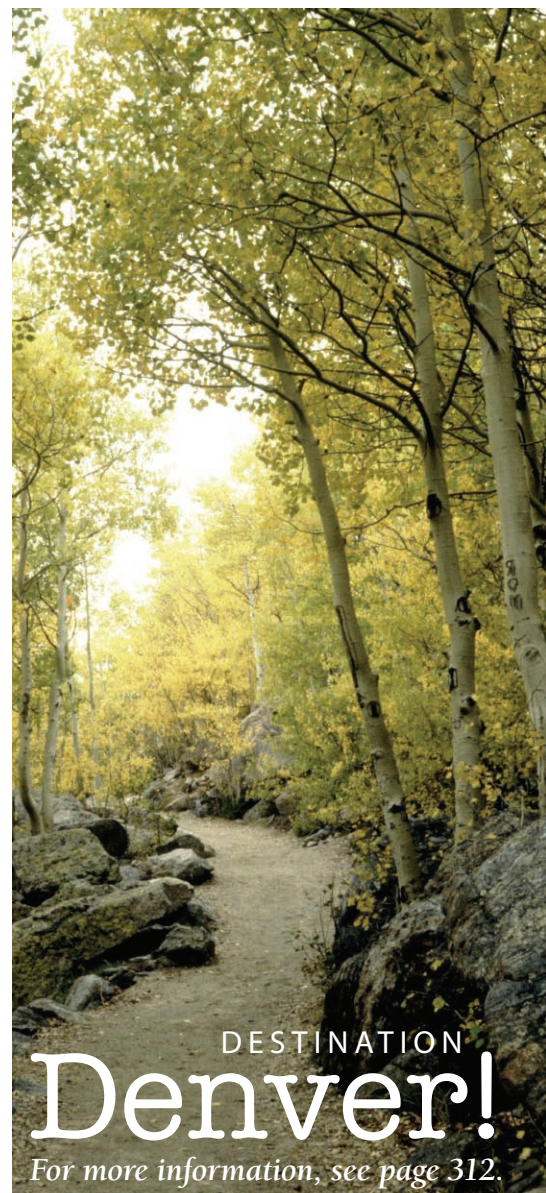
and *Student Guide* is easy and convenient to use, the activities were developed and field-tested by life science instructors, the kits are affordable and designed for large classes, and the guided-inquiry based activities and labs follow the learning cycle.

While I admit that I regularly purchase supplies from several other vendors, the **Inquiries in Science™ Biology Series** has caused me to seriously reconsider returning to Carolina Biological Supply Company to purchase all of my supplies. I've used kits from many of the major life science companies, but none of them have been as well-developed, packaged, and executed.

Note: If you are interested in viewing pictures of the **Cycling Through Mitosis** kit, including pictures of onion root tip cell spreads taken by my students, you may view them on the Brebeuf Jesuit Biotechnology Blog at <http://bjpsbiotech.edublogs.org/labs-activities/mitosis-labs-activities/>.

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