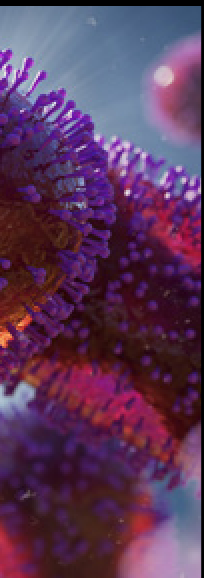
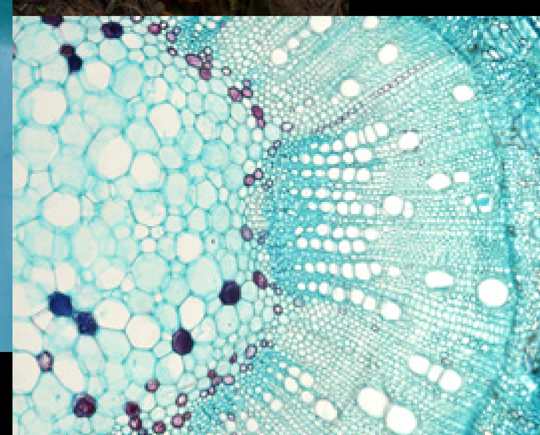
High School

NATIONAL GEOGRAPHIC

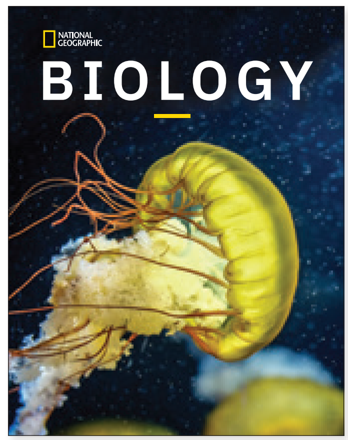
BIOLOGY

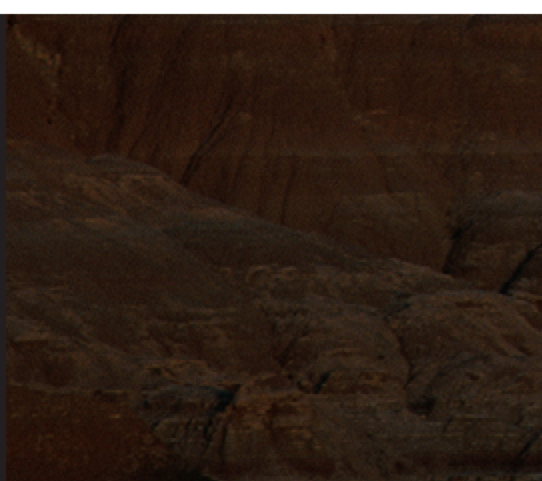


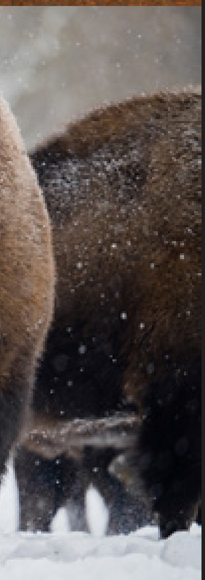


PHENOMENA-BASED INSTRUCTION WITH NATIONAL GEOGRAPHIC RESOURCES

As teaching shifts towards multidisciplinary approaches to learning, *National Geographic Biology* is designed specifically to meet the needs of Phenomena-Based instruction. Deepen concept knowledge and inquiry skills by combining phenomena-based instruction with National Geographic resources. *Biology* empowers all students to investigate real-world scenarios and build skills towards academic and career success.







Available in English and Spanish

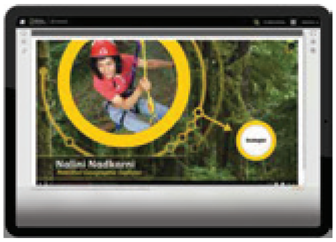
BUILT FOR 3-DIMENSIONAL INSTRUCTION

The 3-Dimensional approach to teaching is changing the way science and biology are taught. *National Geographic Biology* was created to guide teachers through 3D instruction by incorporating Disciplinary Core Ideas (DCI), Science and Engineering Practices (SEP), and Crosscutting Concepts (CCC) into each lesson to prepare students to master the Performance Expectations.

AUTHENTIC NATIONAL GEOGRAPHIC EXPERIENCE

National Geographic Biology connects students to the field of biology through content and features that showcase the experiences of diverse National Geographic Explorers and photographers. This engaging content consists of lessons with featured articles, videos, and Virtual Investigations in the digital platform hosted by the National Geographic explorers themselves.

Cengage MindTap



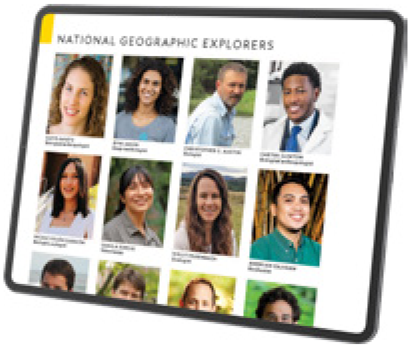
Online Learning Platform
National Geographic Explorer videos appear in MindTap. Explorers take students into the field introducing students to science phenomena.

With the help of the MindTap digital platform, students are transported into the world of biology with:

- realistic simulations allowing them to interact with data and graphs
- guided Virtual Investigations where they are immersed in field-relevant environments
- engaging videos embedded in the interactive eBook

ENGAGE STUDENTS WITH AUTHENTIC BIOLOGY STORIES

Diverse National Geographic Explorers share their personal backgrounds and exciting biology stories that engage students with relevant content that resonates!

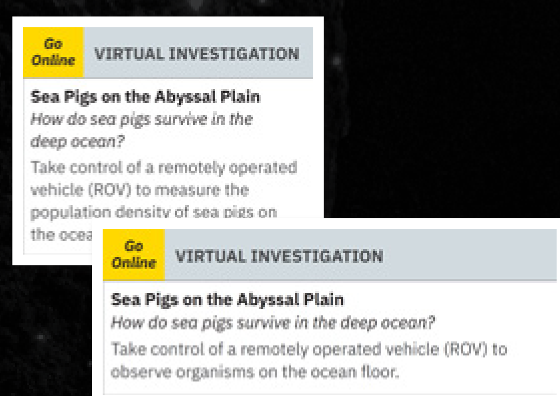


National Geographic "On Assignment" photo features illuminate stories and transport students into the biological world around them.

A video series featuring National Geographic Explorers highlighting their unique biology stories and research supports the phenomena in the print text. Students see themselves reflected in these diverse biologists.

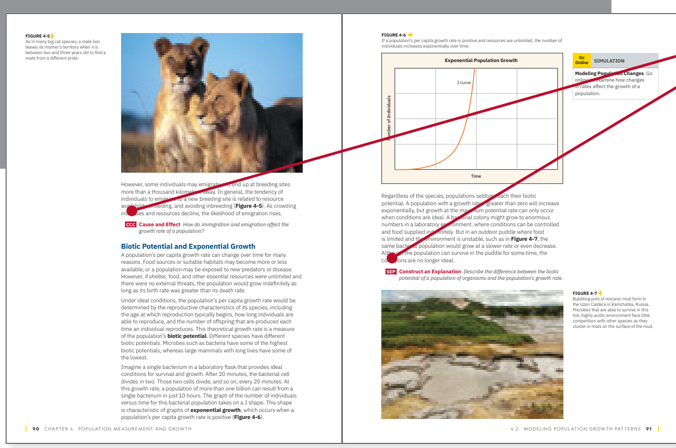
Digital Biology Explorations

Transport students into the field with simulations, engaging videos, and Virtual Investigations where a National Geographic Explorer guides students through a virtual biology research project.



ENSURING BIOLOGY STANDARDS ARE MET

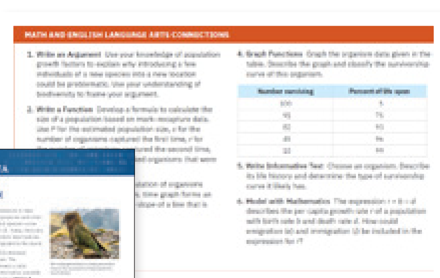
National Geographic Biology was created specifically to teach 3-Dimensional standards and the NGSS to support high school life science standards core ideas, practices, and concepts.



Questions and prompts throughout each chapter serve as 3D checkpoints, prompting students to engage with Disciplinary Core Ideas, Crosscutting Concepts, and Science and Engineering Practices.

SEP Construct an Explanation *Describe the difference between the biotic potential of a population of organisms and the population's growth rate.*

Connections to other disciplines in the student book and Teacher's Edition reinforce skills used throughout high school in all courses.



Crosscurricular Connections

Chemistry Remind students of endo- and exothermic reactions, ones that absorb or release thermal energy. Show an instant hot pack, sealed in its package. When the package is opened and the pouch removed, the chemical inside, often iron, reacts with oxygen in the air to form iron (III) oxide, a reaction that releases heat. A simple demonstration of an endothermic reaction can be done by stirring baking soda into vinegar and measuring the temperature before and after.

Connect to Careers

Evolutionary Ornithologist Ornithology is the study of birds. Evolutionary ornithologists study how avian species have changed over time, using phylogenetics, evolutionary evidence of feathers from fossils, and a variety of other methods. They may use traditional field biology techniques, genetic testing, and technology such as drones and field cameras to collect data. Evolutionary ornithologists typically need a bachelor or master's degree in biology. Evolutionary ornithologists who lead research projects or work in specialized positions typically have a master's degree or higher degree. Universities, museums, and wildlife and conservation organizations hire evolutionary ornithologists to study birds in the field and in laboratory settings.

Wildlife Rehabilitator As environments continue to change, animals are more affected by human activities. Wildlife rehabilitators care for injured and ill animals and assist residents with animal conflicts. They work for nonprofit or governmental agencies to promote conservation of species and educate the public about wildlife. Wildlife rehabilitators are required to have knowledge about ecology, biology, and medical care, but a college degree is not always required.

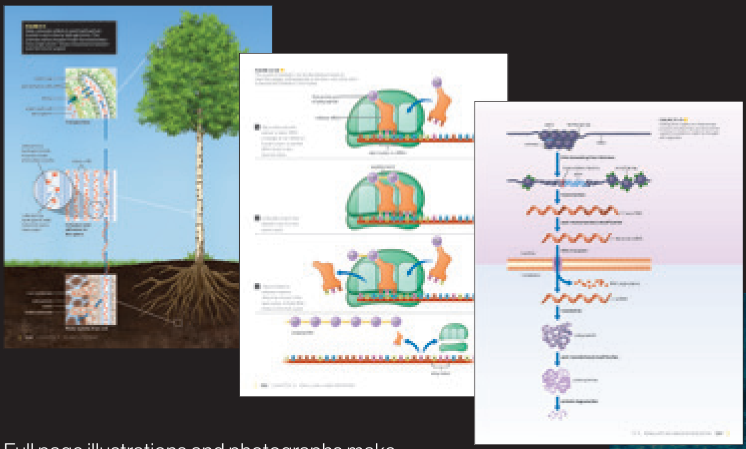
PREPARE STUDENTS FOR COLLEGE AND CAREER

Skills introduced in *National Geographic Biology* build a foundation for other high school science courses and for other disciplines. Projects, assessments, and personal stories cultivate the problem solving and critical thinking skills needed for college and/or careers.

Explorer stories and case studies inspire views into science careers

CONNECT ALL STUDENTS IN QUALITY LEARNING

Student and teacher resources provide tools and strategies allowing all students to access the text, experience biology concepts through various media, remediate where needed, and be challenged when ready.



Full page illustrations and photographs make the details of biology visible and tell visual stories

The Teacher's Edition includes support throughout each lesson to address the needs of all students including ELL, struggling, advanced, students with disabilities, and economically disadvantaged students.

DIFFERENTIATED INSTRUCTION | English Language Learners

Ask and Answer Questions Working in pairs, have students take turns reading an assigned paragraph from the Case Study out loud. Explain to students that asking and answering questions can help them understand the main idea and supporting details in the article.

Beginning Have each student in a pair ask one question about the article. They can then work together to find the answer, conferring in their native language if necessary.

Intermediate Have each student ask one question and then swap with their partner. Tell them to work together to find the answers. Encourage the use of English, using their native language only when needed.

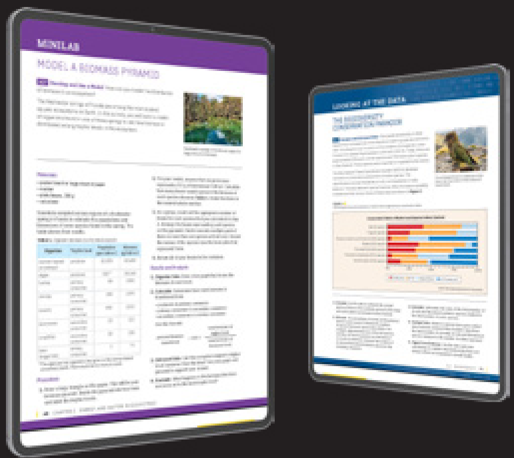
Advanced Have each student ask one question and then swap with their partner. E... answer an... English.

DIFFERENTIATED INSTRUCTION | Leveled Support

Struggling Students For students struggling with the concept of habitat destruction and recovery efforts for the El Rincon stream frog, have them look for local examples of habitat loss. Ask them to record what caused the habitat loss, such as clearing land for building, and what organisms were affected. They may then work in pairs to write their own species recovery plan.

Advanced Learners For students who easily grasp the concepts discussed here, assign them the role of an investigative reporter. Have them work in groups to develop a list of questions that they would like to pose to Dr. Kacoliris about his work, his career, or other topics related to what they are learning in this chapter about interactions and relationships in ecosystems.

HANDS-ON BIOLOGY AND DATA ACTIVITIES



Applying Biology with Hands-on Science and Data Activities

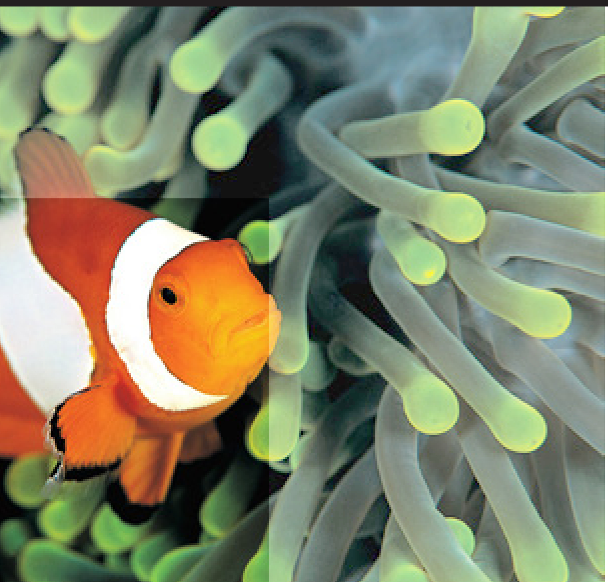
Each chapter provides multiple opportunities for hands-on learning. Quick minilabs and full laboratory investigations give students practice with lab equipment and lab safety procedures. Data analysis activities give students practice reading data and identifying patterns in data sets.

Labs, Engineering Activities, and Research Projects

Chapter Investigations provide more in-depth laboratory experiences with Guided Inquiry, Open Inquiry, and Design-Your-Own approaches. Also included are Engineering Design activities, research and writing activities in the “Tying It All Together” lesson for each chapter, and Claims, Evidence, Reasoning (CER) activities for each unit. Lab guides, worksheets, and rubrics are available in the MindTap digital platform.

Support for All Learners

Student and teacher resources provide tools and strategies allowing all students to access the text, experience biology concepts through various media, review where needed, and be challenged when ready.



Teacher Support for All Levels

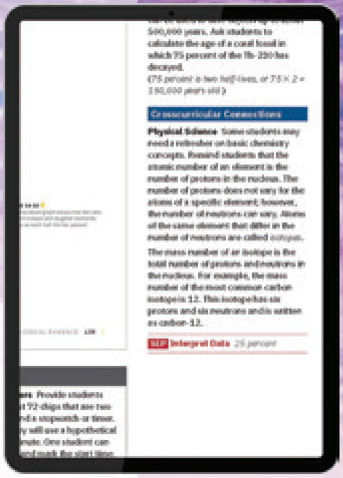
The Teacher’s Edition includes support throughout each lesson to address the needs of all students including ELL, struggling, advanced, students with disabilities, and economically disadvantaged students.

COURSE SUPPORT AND TEACHER TOOLS

National Geographic Biology supports teachers in the classroom with a thoughtfully designed Teacher's Edition and a wealth of teacher resources and assessments built in to the MindTap digital platform.

Teacher's Edition

The print and digital resources guide teachers through each unit and chapter to prepare students for 3-Dimensional skills, practices, and Performance Expectations including lessons built on the 5E lesson model, background information, and connections to math and English language arts.



CROSSCUTTING CONCEPTS | Energy and Matter

Modeling at Varied Scales This chapter focuses on modeling energy and matter transfer at ecological scales: between organisms in a community, between organisms and their environment, and among the biosphere, atmosphere, hydrosphere, and geosphere. Some fields of biology, such as physiology, cell biology, molecular biology, and biochemistry, essentially study how energy and matter enable life processes at various scales. Chapters 5 and 6 in Unit 2 addresses transformations of energy and matter at the molecular and cellular levels. Further reinforce this crosscutting concept throughout Unit 3 by having students organize information about living systems in terms of how they enable an organism to obtain energy and matter from its surroundings, transfer energy and matter within its body, and use energy and matter to survive.

SCIENCE AND ENGINEERING PRACTICES
Developing and Using Models

Limits of Models Students should recognize that food chains generally do not represent all members of a community and that they are subsets of food webs that can be constructed to represent the whole community (with more than one species at each trophic level). Students may notice that detritivores and decomposers are not represented in **Figure 2-8**. Ask students how they would refine the food web model shown here to include these types of organisms. You may wish to draw students' attention back to the Anchoring Phenomenon by encouraging them to build a food web based on the sea pig's deep-sea ecosystem.

Students can do a similar analysis of the limitations of the pyramid models presented in the next section.

Teachers are provided with targeted support for 3D instruction and cross-curricular connections to Math, English Language Arts, and other science disciplines.

Connect to Mathematics

Define Quantities for Modeling Have students return to **Figure 2-8** and apply estimated quantities to a pyramid of biomass and a pyramid of numbers for an Antarctic food web. For example, students can research the average mass of an elephant seal and the number of elephant seals in an average Antarctic colony. They can then work backwards to estimate the average mass and numbers of squid, krill, and phytoplankton to support that food chain.

ASSESSMENTS IN A VARIETY OF FORMATS

Biology prepares students for end of course exams through frequent formative assessment and through activity-based summative assessments getting students to master higher level depths of knowledge on biology content and science practice skills.

SUMMATIVE ASSESSMENT

Chapter Assessments offer a combination of open-response and machine-scored items carefully designed to measure students' understanding and retention of the content. **Unit Performance Tasks** assess bundled Performance Expectations.

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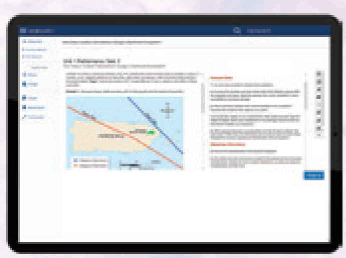

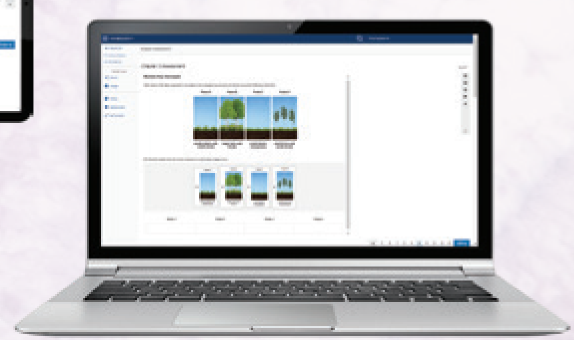

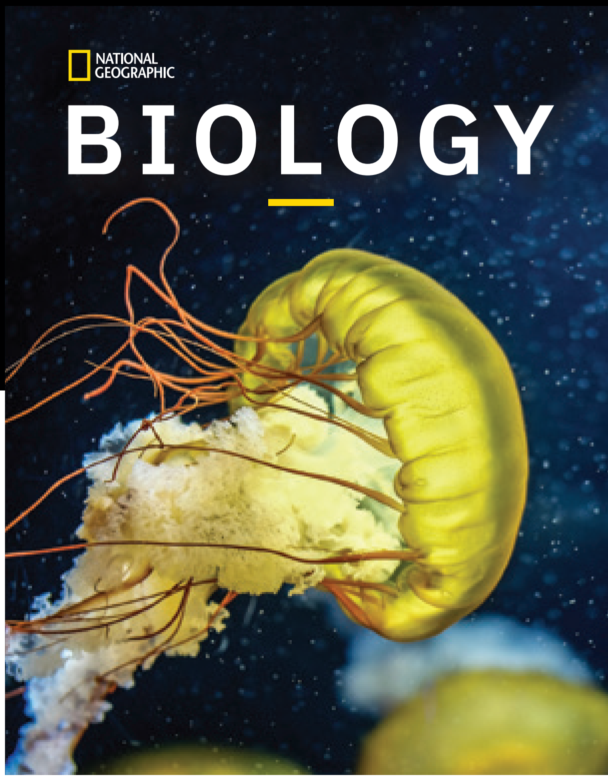

NATIONAL GEOGRAPHIC LEARNING | Cengage

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