



# Biology Resources

2017 CATALOGUE • AUSTRALIA



“ I have been using the BIOZONE Student Workbooks for over a decade. The depth and breadth of the concepts is comprehensive and flexible allowing students to master the most fundamental of concepts as well as extend motivated students beyond the set curriculum.

The provision of extended answers for every question make it a complete package.

It is rare to find a resource that both teachers and students find equally engaging and I would be lost without them.

”

**Tracey Edmonds**  
*Mt. Maria College  
Queensland*



## Course Workbooks

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Liz  
Manager



Helen  
Admin/Marketing

*Dear biology educator,*

*We'd like to show you BIOZONE's exciting collection of biology resources specifically designed for your curriculum. Our workbooks are the perfect mix of resources, a textbook lite, activities and study guide all rolled into one.*

*Purchase five or more of the same title direct from BIOZONE and receive a **27.5% discount** off the recommended retail price.*

*You can see full previews of our resources on our website [www.biozone.com.au](http://www.biozone.com.au), and also subscribe to our eNewsletter for special offers, the latest samples, previews and product updates.*

*If you have any questions we would be delighted to hear from you.*

*Call us on **(07) 5535 4896** or email: [sales@biozone.com.au](mailto:sales@biozone.com.au)*

**Liz Hayde and Helen Smith**  
BIOZONE Learning Media Australia

# What our course workbooks look like

The topic in the specific **state courses** (QLD, WA & SA) to which this chapter applies.

A list of important **key terms** used throughout the chapter. These terms may appear in the chapter's literacy activity.

QLD As required  
WA ATAR Unit 2  
SA Theme C

## Cell Structure

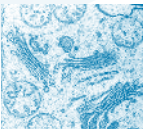
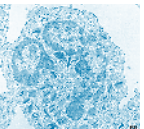
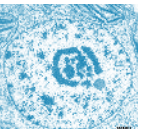
**Key terms**

- activation energy
- active site
- amino acid
- carbohydrate
- cell wall
- centrioles
- chloroplast
- cilia
- cytoplasm
- electron micrograph
- endoplasmic reticulum (ER)
- eukaryotic cell
- flagella
- Golgi apparatus
- light (=optical) microscope
- lipid
- lysosome
- magnification
- mitochondrion
- nuclear envelope
- nuclear pore
- nucleic acid
- nucleolus
- nucleus
- organelles
- plasma membrane
- prokaryotic cell
- protein
- resolution
- ribosome
- rough ER (rER)
- smooth ER (sER)
- specificity
- stain
- vacuole

**Biological molecules**

*Learning aims and skills*

<ul style="list-style-type: none"> <li><input type="checkbox"/> 1 Describe the basic biochemical components of cells. Describe the importance of organic molecules and inorganic ions in biological systems.</li> <li><input type="checkbox"/> 2 Using examples, describe the basic structure and roles of carbohydrates, amino acids, proteins, lipids, and nucleic acids.</li> <li><input type="checkbox"/> 3 Describe the properties and mode of action of enzymes, including the role of the active site and specificity, and activation energy. Recognise that most enzymes are proteins.</li> <li><input type="checkbox"/> 4 Describe how chromatography is used to separate and identify biological molecules such as proteins and pigments.</li> </ul>	<p><b>Activity number</b></p> <p>21</p> <p>22-26</p> <p>27</p> <p>28</p>
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**Microscopy**

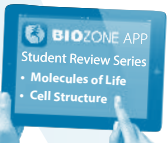
*Learning aims and skills*

<ul style="list-style-type: none"> <li><input type="checkbox"/> 5 Describe the structure and basic principles of light (optical) microscopes. Appreciate that microscopy has a long history and its development was important in the development of cell theory.</li> <li><input type="checkbox"/> 6 Distinguish between the structure and use of compound and dissecting (stereo) light microscopes. Use dissecting and compound light microscopes to locate material and focus images.</li> <li><input type="checkbox"/> 7 Explain the purpose of stains when preparing specimens for viewing with an optical microscope. Use simple staining techniques to show features of cells.</li> <li><input type="checkbox"/> 8 Explain the difference between magnification and resolution. Compare the magnification and resolution achieved using different microscopes. Calculate the linear magnification of images viewed with a microscope.</li> </ul>	<p><b>Activity number</b></p> <p>34 35</p> <p>35</p> <p>36</p> <p>35 37</p>
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**Cells as living entities**

*Learning aims and skills*

<ul style="list-style-type: none"> <li><input type="checkbox"/> 9 Outline the cell theory and explain its development.</li> <li><input type="checkbox"/> 10 Describe the characteristics of living organisms and explain why viruses do not fulfil the criteria for being living cells. Describe the main differences between the cells of fungi, plants, protists, animals, and bacteria.</li> <li><input type="checkbox"/> 11 Describe the requirements of cells in terms of their immediate environment.</li> <li><input type="checkbox"/> 12 Describe the range of cell sizes. Express cell sizes in different units of measurement (mm, <math>\mu\text{m}</math>, nm). Calculate the linear magnification of images viewed with a microscope.</li> <li><input type="checkbox"/> 13 Use drawings and electron micrographs to compare and contrast the structure of prokaryotic cells and eukaryotic cells.</li> <li><input type="checkbox"/> 14 Use drawings and photomicrographs to compare and contrast the structure and ultrastructure of plant cells and animal cells.</li> </ul>	<p><b>Activity number</b></p> <p>29</p> <p>29 30 31</p> <p>32</p> <p>33</p> <p>39-44</p> <p>38 40-44</p>
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The **objectives** provide a point by point summary of what should be achieved by the end of the chapter.

The **activity numbers** for the material relating to each learning aim.

You can use the **check boxes** to mark aims to be completed (a **dot** to be done; a **tick** when completed).

# SIGNIFICANT BENEFITS:

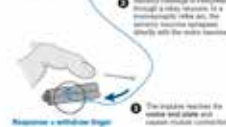
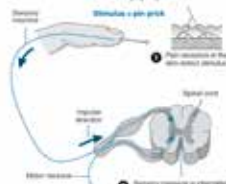
- **Streamline** the coverage of extensive curricula.
- **Concept-based** content allows complex ideas to be broken down into manageable pieces.
- **Student engagement** is increased with information, questions, and student-required answers all on the same page.
- **Critical-thinking** questions challenge student understanding - great for test prep.
- **Visually rich** content, including clear explanatory diagrams, appeals to today's learning styles.

Comprehensive **diagrams** provide an engaging, highly visual delivery of the important information.

## 190 Reflexes

**Key Idea:** Reflexes permit rapid responses to stimuli as responses do not require conscious decisions. A reflex is an automatic response to a stimulus involving a small number of neurones and a central nervous system (CNS) processing point (spinal cord or brain stem). This type of neural circuit is called a **reflex arc**. Reflexes are classified according to the number of CNS synapses involved.

**Pain Withdrawal: A Polysynaptic Reflex Arc**



**Respiration - ventilator input**

1. Why are reflexing and conscious thought not necessary or desirable features of reflex behaviour?

2. Distinguish between a spinal reflex and a cranial reflex and give an example of each:

3. (a) Distinguish between a monosynaptic and a polysynaptic reflex arc and give an example of each.

(b) What would produce the most rapid response, given similar length sensory and motor pathways? Explain.

4. (a) With reference to examples, describe the adaptive value of primitive reflexes in vertebrates.

(b) Why are reactions faster for the presence of these reflexes?

according to the number of CNS synapses involved. **monosynaptic reflexes** involve only one CNS synapse (e.g. knee-jerk reflex), **polysynaptic reflexes** involve two or more (e.g. pain withdrawal reflex). Both are spinal reflexes. The pain reflex involving the knee of the pupil is an example of a crossed reflex.



The jawless (hagfish) reflex is a simple reflex because the afferent and efferent pathways of the pupil. As a response to the light stimulus, the pupil constricts and the eye is closed to prevent light from entering the eye.



Normal vertebrates exhibit a number of primitive reflexes in response to particular stimuli. These reflexes disappear within a few months of birth in the young (e.g. Moro reflex, startle reflex, grasp reflex, Babinski reflex, etc.). The reflexes that remain in the adult are the reflexes that are essential for survival and are the basis of many reflexes.

**Links** identify related activities expanding on the content of the current worksheet.

**Weblinks** provide direct links to useful animations, video clips and illustrative material.

**Key idea** Each activity has a key idea summarising its primary focus. The key idea facilitates student understanding of the message of the page.

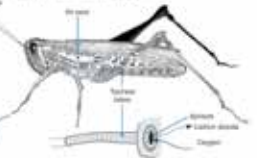
## 93 Gas Exchange in Animals

**Key Idea:** The gas exchange system of an animal is influenced by its body form, its oxygen demands, and by the environment in which the animal lives.

Small, aquatic organisms, such as sponges and flatworms, need no specialised respiratory structures, but larger animals need more complex exchange systems to support their metabolic activities. The complexity of these systems is related to the efficiency of gas exchange required. This is determined by the oxygen demands of the organism.

**Gas exchange in insects (right)**

Insects respire oxygen and release carbon dioxide through a system of branching tubes called tracheae (or tracheal tubes). The gases move by diffusion across the moist lining directly to and from the tissues. Larger insects can increase the air moving in and out of these tubes by contracting and expanding the abdomen.



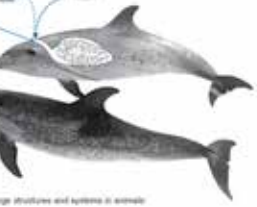
**Bony fish, sharks, and rays (left)**

Fish obtain oxygen dissolved in water which they extract by using gills. Gills can achieve 80% extraction rate, more than three times the rate of human lungs (see 95). The gills can be exposed directly to the environment without loss of the gas exchange membrane (gill net).



**All breathing vertebrates (right)**

The gas exchange surface in mammals and other air-breathing vertebrates is formed in internal lungs. This keeps the membranes moist, so that gases can diffuse across it. Mammals have large lungs and most breathe in air through the nostrils. Many have modified their membranes to allow living in water.



1. Describe two reasons for the development of gas exchange structures and systems in animals:  
(a) \_\_\_\_\_  
(b) \_\_\_\_\_
2. Describe two ways in which all breathing animals keep their gas exchange surfaces moist:  
(a) \_\_\_\_\_  
(b) \_\_\_\_\_
3. Explain why gills would not work in a terrestrial environment: \_\_\_\_\_
4. Explain why mammals must ventilate their lungs (breathe in and out): \_\_\_\_\_

KNOW 93 94 95 96

**Critical thinking questions** challenge the student's understanding of the concepts presented... Students write their answers directly on the page, creating an ideal resource for review.

### Activity codes

Page codes indicate the type of activity on each page (e.g. KNOW indicates that the main focus of the activity is understanding the content). Other codes indicate a focus on practical skills, assessment, data handling, or literacy.

## YEAR 11 BIOLOGY Student Workbook

BIOZONE's **Year 11 Biology Student Workbook** is an excellent resource for **classroom activities, homework, extension, and exam preparation** for Year 11 biology. It is a powerful resource for use in both *structured* and *independent learning environments*, facilitating enquiry and **critical thinking**.

### Features and benefits include:

- **NEW!** A succinct **key idea** provides the clear focus at the beginning of each activity
- **Revised content** supporting current Australian curricula
- **Annotated diagrams** are used throughout to explain complex ideas
- Clear **learning aims** provide students with a **checklist** of performance expectations
- Appealing **concept-based activities** engage learners of all backgrounds and abilities
- **Paper interactives** and **modelling** promote understanding of difficult concepts
- Strong use of **real-world contexts** with a balanced mix of explanation and application.
- **WA customers:** Requirements for the new **WACE ATAR** course are included in this new edition

### WHAT THE TEACHER SAYS

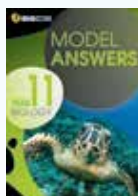
*"I very much doubt you can make a more significant impact on student learning for such a small outlay in terms of department budget."*

Maurie Wetherall

Science Coordinator  
University Senior College  
Adelaide University



STUDENT WORKBOOK



MODEL ANSWERS



TEACHER'S DIGITAL EDITION <sup>Δ</sup>



PRESENTATION MEDIA



WEBLINKS

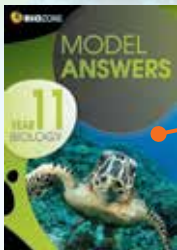
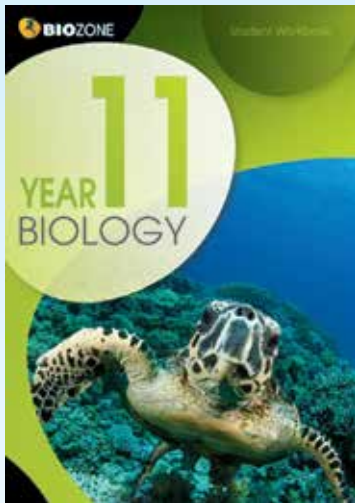
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FORMAT	A4 paperback (2 colour)	A5 paperback (B&W)	CD-ROM	CD-ROM	Web Page
AVAILABILITY	NOW	NOW	NOW	TBC	NOW
PAGES	402	68	NA	NA	NA
RRP	\$39.95 (1-4 copies)	\$11.85 (1st copy free)	\$399.95	TBC	FREE
DISCOUNT PRICE	<b>\$28.95*</b> (5+ copies)	<b>\$7.70*</b> (1st copy free)	<b>\$59.95**</b>	NA	NA

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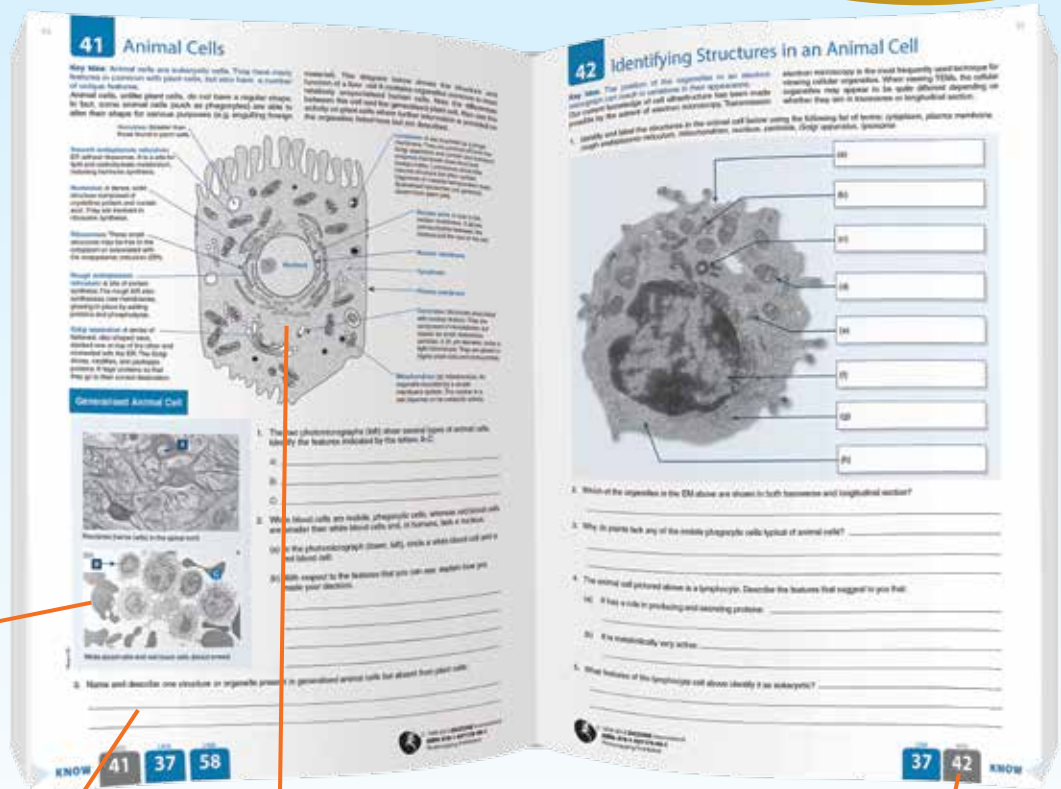
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**Evaluate** student performance with **Model Answers**



**Engage** students with write-on activities directly in the **Student Workbook**



**Elaborate** on and review ideas using the **Teacher's Digital Edition** with "reveal answers" feature



**Enhance** workbook activities with **Presentation Media** - editable PowerPoint slides (Availability TBC)



**Explore** extra content with comprehensive **weblinks**

## YEAR 12 BIOLOGY Student Workbook

BIOZONE's **Year 12 Biology Student Workbook** is an excellent resource for **classroom activities, homework, extension, and exam preparation** for Year 12 biology. It is a powerful resource for use in both *structured* and *independent learning environments*, facilitating enquiry and **critical thinking**.

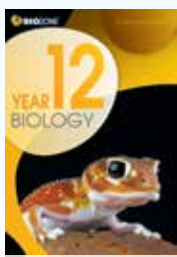
### Features and benefits include:

- **NEW!** A succinct **key idea** provides the clear focus at the beginning of each activity
- **Revised content** supporting current Australian curricula
- **Annotated diagrams** are used throughout to explain complex ideas
- Clear **learning aims** provide students with a **checklist** of performance expectations
- Appealing **concept-based activities** engage learners of all backgrounds and abilities
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- Strong use of **real-world contexts** with a balanced mix of explanation and application.
- **WA customers:** Requirements for the new **WACE ATAR** course are included in this new edition

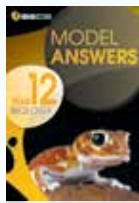
## WHAT THE TEACHER SAYS

*"As a coordinator I would recommend the workbooks to any school who wanted an excellent resource for both students and teachers."*

*Karyn Negus,  
Coordinator of Biology,  
St Joseph's College,  
Brisbane, Queensland*



STUDENT WORKBOOK



MODEL ANSWERS



TEACHER'S DIGITAL EDITION <sup>Δ</sup>



PRESENTATION MEDIA



WEBLINKS

ISBN	978-1-927173-97-8	978-1-927173-99-2	978-1-927309-06-3	NA	NA
FORMAT	A4 paperback (2 colour)	A4 paperback (B&W)	CD-ROM	CD-ROM	Web Page
AVAILABILITY	NOW	NOW	NOW	TBC	NOW
PAGES	402	68	NA	NA	NA
RRP	\$39.95 (1-4 copies)	\$11.85 (1st copy free)	\$399.95	TBC	FREE
DISCOUNT PRICE	<b>\$28.95*</b> (5+ copies)	<b>\$7.70*</b> (1st copy free)	<b>\$59.95**</b>	NA	NA

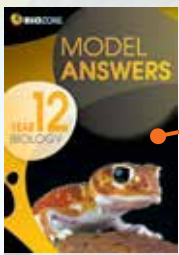
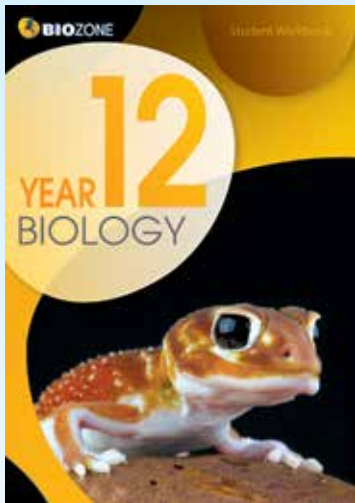
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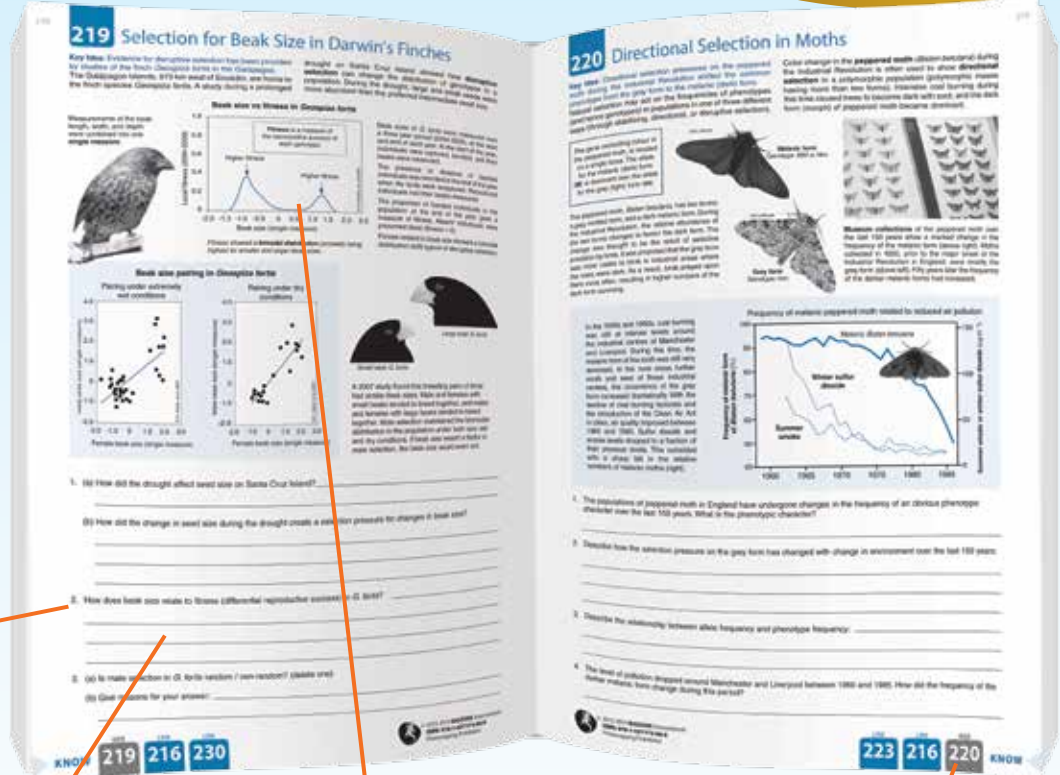
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**Evaluate** student performance with **Model Answers**



**Engage** students with write-on activities directly in the **Student Workbook**



**Elaborate** on and review ideas using the **Teacher's Digital Edition** with "reveal answers" feature



**Enhance** workbook activities with **Presentation Media** - editable PowerPoint slides (Availability TBC)



**Explore** extra content with comprehensive **weblinks**

## Teacher's Digital Editions

These products are supplied as ancillary resources and are an ideal teaching companion to the corresponding workbooks. Review the activities on an interactive whiteboard to provide targeted instruction and feedback.

### Key Features

- Ideally suited for use with an **interactive whiteboard**. Use digital versions of the Student Workbooks and Model Answers as non-printable PDF files.
- **Display answers on-screen**: Reveal single and multiple-part answers with the click of a button.
- **Excel® spreadsheets** directly support the ICT activities provided.
- **BONUS Presentation Media Sample**: Mutations (worth \$50).

**LICENCE** 1 year ( 5 Staff User Licence )  
This product is Digital Rights Managed.  
\*This is renewable upon the anniversary of first registration date.

**IMPORTANT:** A minimum purchase of 10 corresponding workbooks is needed to qualify for discount price. **Full conditions can be viewed at:** <http://www.biozone.com.au/faqconditionsofuse/>

Provided with **Zoom in/out capabilities** to show detail.

**Display and hide answers on-screen** using the digital versions of the workbooks.

Reveal **single and multiple-part answers**.

## Weblinks

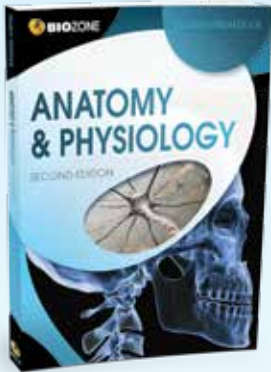
The Weblinks pages for Year 11 & Year 12 Biology Series provides links to **external websites** with supporting information for the activities. These sites are separate to those provided in the BIOLINKS area of BIOZONE's website. Almost exclusively, they are narrowly focussed animations and video clips directly relevant to the activity page on which they are cited. They provide great support to aid student understanding of basic concepts.

## Weblinks are only accessible to users of BIOZONE'S workbooks

**Chapter** in the workbook

**Activity** in the workbook

**Hyperlink** to the external website page

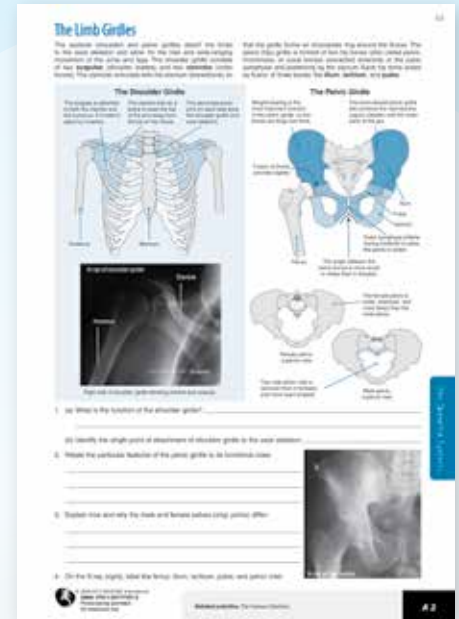


# Anatomy & Physiology

Second Edition

The Anatomy and Physiology Student Workbook explores the essentials of human structure and function through engaging, generously illustrated write-on activities. Much of the content in the first edition has been revised to include larger diagrams, more photographs, and greater depth of coverage in key areas. Sound biological principles are emphasized throughout, and key interactions between body systems are indicated using annotated introductory figures. Using key examples, students are encouraged to explore each body system within the contexts of disease, medicine and technology, aging, and exercise. The result is a rounded exploration of the functioning human.

- Cells and Tissues
- The Integument and Homeostasis
- The Skeletal System
- The Muscular System
- The Nervous System
- The Endocrine System
- The Cardiovascular System
- The Lymphatic System and Immunity
- The Respiratory System
- The Digestive System
- The Urinary System
- Reproduction and Development



STUDENT WORKBOOK



MODEL ANSWERS



PRESENTATION MEDIA

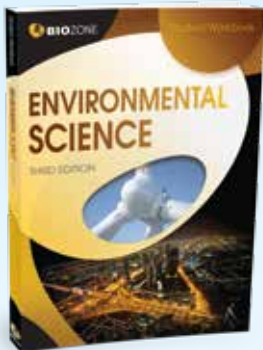


WEBLINKS

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FORMAT	A4 paperback (2 colour)	A4 paperback (B&W)	CD-ROM	Web page
PAGES	282	38	1072 slides	NA
RRP	\$35.95 (1-4 copies)	\$7.70 (1-4 copies)	\$499.95	FREE
DISCOUNT PRICE	<b>\$23.95*</b> (5+ copies)	<b>\$7.70*</b> (1st copy free)	NA	NA
SUITABILITY	Year 12 Human Biology, Tertiary Life Sciences			

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♦ Discount price only applies when purchasing direct from Biozone. First copy free with a minimum purchase of 5 copies of the same title.

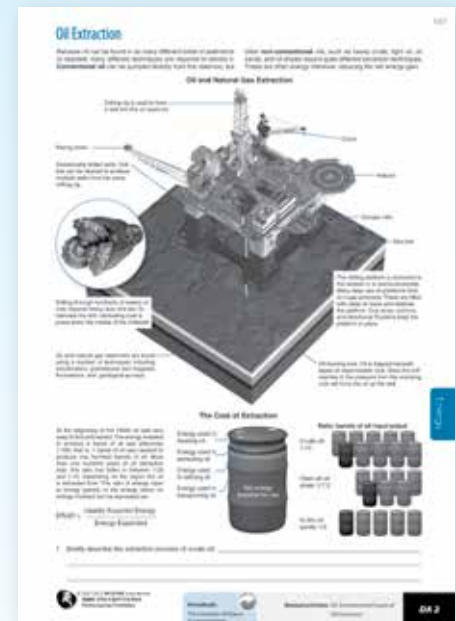


## Environmental Science

Third Edition

The ideal companion to the IB Environmental Systems and Societies. Environmental Science Student Workbook introduces students to the Earth's physical and biological systems, and the interactions of humans with these. This revision introduces new content and aligns the workbook to its supporting digital resources. Content developments include updates on the Gulf of Mexico oil spill and the Fukushima Daiichi nuclear disaster, and in-depth coverage of energy extraction issues, pollution, and the wider environmental implications of urban development.

- The Earth's Systems
- Ecosystems
- Natural Ecosystem Change
- Populations
- Investigating Ecosystems
- Land and Water
- Energy
- Pollution
- Global Change



STUDENT WORKBOOK



MODEL ANSWERS



PRESENTATION MEDIA



WEBLINKS

	STUDENT WORKBOOK	MODEL ANSWERS	PRESENTATION MEDIA	WEBLINKS
ISBN	978-1-927173-55-8	978-1-927173-60-2	NA	NA
FORMAT	A4 paperback (2 colour)	A4 paperback (B&W)	CD-ROM	Web page
PAGES	250	38	750 slides	NA
RRP	\$35.95 (1-4 copies)	\$7.70 (1-4 copies)	\$499.95	FREE
DISCOUNT PRICE	<b>\$23.95*</b> (5+ copies)	<b>\$7.70*</b> (1st copy free)	NA	NA

**SUITABILITY** Earth & Environmental Sciences

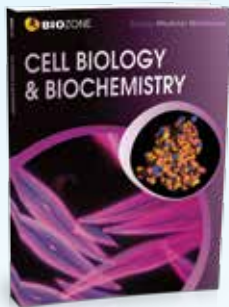
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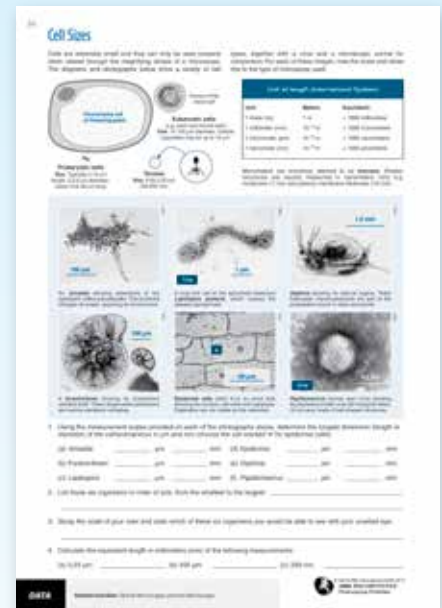
# Cell Biology & Biochemistry

Second Edition

Challenging concepts are presented clearly and in a way that is accessible even to those with a limited background in chemistry. Cell Biology & Biochemistry covers the structure, function, and study of cells and their components and is an ideal support volume for a wide range of courses in life sciences.



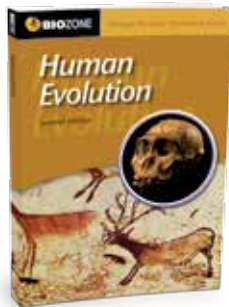
**ISBN** 978-1-927-173-73-2  
**PAGES** 100  
**RRP** \$18.95  
 (1-4 copies)  
**DISCOUNT PRICE** \$14.95  
 (5+ copies)  
**SUITABILITY** Year 11 & 12 Biology or tertiary



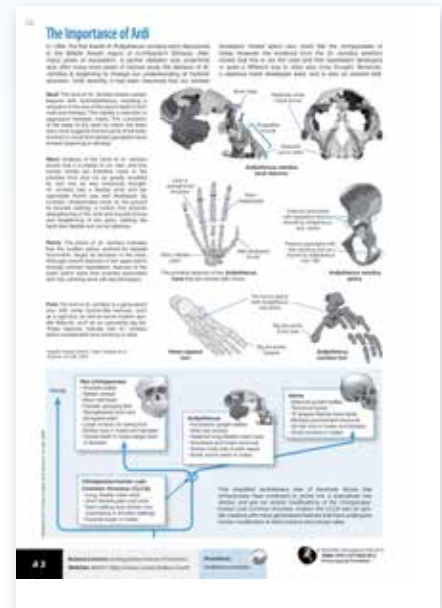
# Human Evolution

Second Edition

A comprehensive treatment of human origins; one of biology's most controversial and rapidly changing topics. With an engaging treatment of primate biology, and full up-to-date coverage of both human physical and cultural evolution, Human Evolution is the perfect supplement for both biology and anthropology students.



**ISBN** 978-1-877462-99-3  
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**RRP** \$18.95  
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 (5+ copies)  
**SUITABILITY** Year 11 & 12 Biology or tertiary



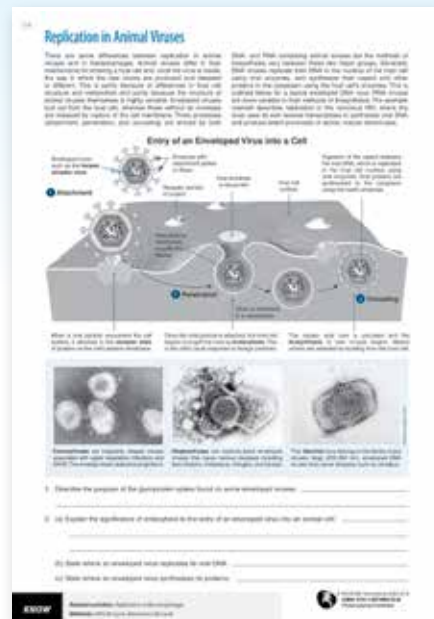
## Microbiology & Biotechnology

Third Edition

This compact but thorough supplement provides objectives and activities through which students can explore aspects of microbial diversity and modern biotechnology, including genetic engineering, cloning, and genome research.



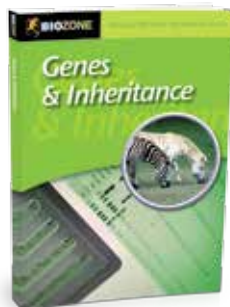
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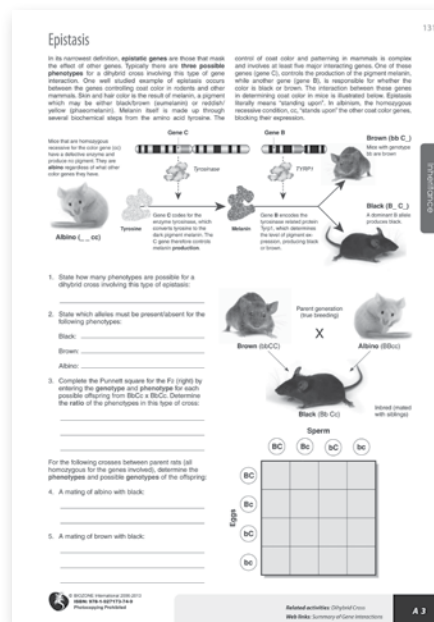
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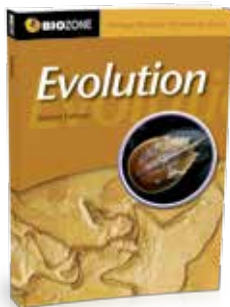
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## Evolution

Second Edition

A fresh approach to teaching evolutionary principles at this level. Students are invited to explore and critically evaluate the wealth of evidence for our current understanding of evolution through a variety of engaging and thought-provoking activities.



<b>ISBN</b>	978-1-877462-98-6
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**Geographical Distribution**

1. The atlas cover conventionally uses **0°** to refer to the equatorial regions of Central and South America. Explain why the **0°** line is important in relation to the distribution of camels and llamas.

2. Explain why the camel is found only in the Middle East and North Africa, and why the llama is found only in the Andes mountains of South America.

3. Explain how the camel and llama are related to each other.

4. Explain the present distribution of the llama family and suggest why it is a suitable characteristic.

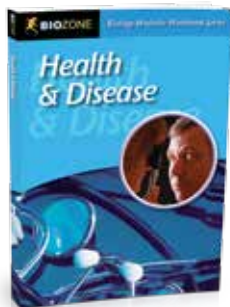
**Origin and Dispersal of the Camel Family**

**AB 2**

## Health & Disease

First Edition

The ideal companion for students of the life sciences. Health & Disease provides comprehensive coverage of human health, human disease, and the role of modern medicine in treating and preventing health disorders.



<b>ISBN</b>	978-1-877462-13-9
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**Inflammation**

Damage to the body's tissues can be caused by physical agents (e.g. sharp objects, heat, radiant energy or electricity), microbial infection, or chemical agents (e.g. gases, acids and bases). The body responds to a wide range of damage by initiating a response called inflammation, which is characterised by four symptoms: pain, redness, heat and swelling. The inflammatory response is beneficial and has the following functions: (1) to destroy the cause of the reaction and (2) to remove it and its products from the body. (3) To limit the effects on the body by confining the reaction to a small area. (4) To repair or replace tissue damaged by the reaction. The process of inflammation can be divided into three distinct stages. These are described below.

**Stages in Inflammation**

1. Outline the three stages of inflammation and identify the beneficial role of each stage:

(i) \_\_\_\_\_

(ii) \_\_\_\_\_

(iii) \_\_\_\_\_

2. Identify two features of phagocytes important in the response to microbial invasion: \_\_\_\_\_

3. State the role of histamines and prostaglandins in inflammation: \_\_\_\_\_

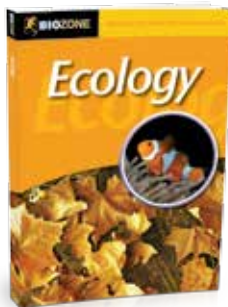
4. Explain why pus forms at the site of infection: \_\_\_\_\_

**A 1**

## Ecology

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Explore fundamental concepts in ecology, from the nature of ecosystems and the basics of ecosystem structure and function, to the complex relationships within and between species and between humans and their environment.



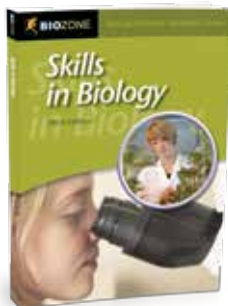
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## Skills in Biology

Third Edition

An essential supplement for all biology students, Skills in Biology provides clear guidelines for planning and executing biological investigations in both the laboratory and the field. Comprehensive coverage of data handling and analysis is also provided.



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**PAGES** 156  
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**SUITABILITY** Year 11 & 12 Biology or tertiary

### The Nitrogen Cycle

Nitrogen is a crucial element for all living things, forming an essential part of the structure of proteins and nucleic acids. The Earth's atmosphere is about 80% nitrogen gas ( $N_2$ ), but molecular nitrogen is so stable that it is only made available directly to organisms and is often in short supply in biological systems. Bacteria play an important role in transferring nitrogen between the biotic and abiotic environments. Some bacteria are able to atmospheric nitrogen, while others convert ammonia to nitrite and thus make it available for incorporation into plant and animal tissues. Nitrogen-fixing bacteria are found living freely in the soil (Azotobacter) and living symbiotically with some plants in root nodules (Rhizobium). Lightning discharges also cause the oxidation of nitrogen gas to nitrate which ends up in the soil. Denitrifying bacteria reverse the activity and return fixed nitrogen to the atmosphere. Humans intervene in the nitrogen cycle by producing, and applying to the land, large amounts of nitrogen fertilizer. Some applied fertilizer is lost as gaseous sources (e.g. green crops and manures) but much is inorganic, produced from atmospheric nitrogen using an energy-intensive industrial process. Chemicals of nitrogen fertilizer may need to be soluble in water to be effective, particularly where land clearance increases the amount of washing and runoff into ground and surface waters.

1. Describe five instances in the nitrogen cycle where bacterial action is important. Include the name of each of the processes and the changes to the form of nitrogen involved.

100  
90  
80  
70  
60  
50

Code: RA. 3

### Graphing Time Dependent Data

Once you have completed an experiment it is often helpful to graph the information. Graphs enable you to see that trends at a glance to see trends or relationships between different variables. Plotting graphs properly involves attention to a few basic details, including correct construction and labelling of the axes, and accurate plotting of points. They enable researchers to draw conclusions to produce graphs and interpret data.

**Background**

- Plants take water in at the root system from the ground and stem. This can move through xylem, a water-conducting tissue, to the leaves. The water is used for photosynthesis and other metabolic processes.
- The amount of water lost through the leaves is called transpiration. This is affected by environmental conditions such as temperature, humidity, and wind speed.
- A potometer can be used to measure transpiration. The amount of water lost through the leaves is measured by the volume of water taken up by the plant over a period of time.
- The potometer can be used to measure the rate of transpiration under different conditions.

**Table 1: Potometer readings**

Time (min)	0	5	10	15	20	25	30	35	40	45	50
Volume (cm <sup>3</sup> )	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
Rate (cm <sup>3</sup> min <sup>-1</sup> )		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Mean (cm <sup>3</sup> min <sup>-1</sup> )		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

1. Using an appropriate graph, plot the potometer data in Table 1. Use the grid provided for your graph.

2. (a) Identify the control.

(b) How does leaf area influence water loss?

(c) How does leaf temperature influence water loss?

(d) Why did the plant lose less water in humid conditions?

Code: RA. 3



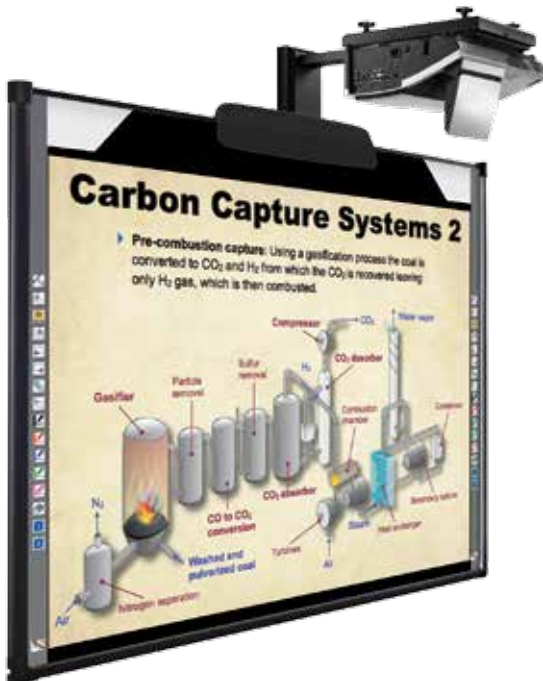


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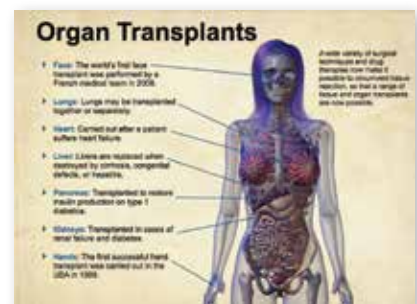
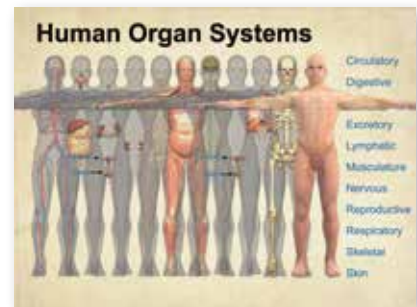
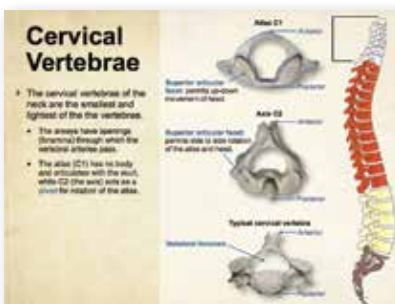
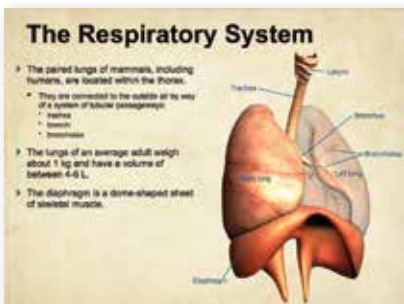
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## Anatomy & Physiology

Anatomy and Physiology provides a comprehensive supplement to support students and teachers of human biology. Each body system is explored through colour diagrams and photographs, with the critical and increasingly important role of medical technology discussed in context throughout.

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- Cells and Tissues
- The Integument and Homeostasis
- Skeletal and Muscular Systems
- The Nervous System
- The Endocrine System
- The Cardiovascular System
- The Lymphatic System and Immunity
- The Respiratory System
- The Digestive System
- The Urinary System
- Reproduction and Development



## Genes & Inheritance

Genes & Inheritance provides comprehensive coverage of molecular genetics, Mendelian inheritance, and gene interactions through clearly explained, vibrant diagrams and illustrations.

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- Mutations
- Nature of Genes
- Inheritance
- Gene Interactions

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<b>PRICE</b>	<b>\$239.95</b>



### Sickle Cell Mutation

The mutation responsible for causing sickle cell disease is a point substitution mutation.

Normal Red Blood Cells (containing normal hemoglobin) are smooth and round. Hemoglobin molecules are made up of 2  $\alpha$ -chains and 2  $\beta$ -chains linked together. In sickle cell disease, a point mutation in the  $\beta$ -chain of hemoglobin causes it to be abnormal (HbS). Hemoglobin molecules cluster together to form fibers which deform the red blood cells into a sickle shape.

The sickle cell mutation involves the substitution of one base for another in the  $\beta$ -globin gene, causing a single amino acid to be altered.

### Codominance in Cattle

In a cross between two heterozygous (roan) shorthorn cattle, red, roan, and white offspring are produced in a 1:2:1 ratio.

Parents: Roan bull (R<sup>1</sup>R<sup>2</sup>) x Roan cow (R<sup>1</sup>R<sup>2</sup>)

Offspring: Red (R<sup>1</sup>R<sup>1</sup>), Roan (R<sup>1</sup>R<sup>2</sup>), White (R<sup>2</sup>R<sup>2</sup>)

### Coat Color in Dogs

The coat color in Labrador dogs is an example of an epistatic interaction of two genes at different loci, each with two alleles. The E gene determines if the pigment will be deposited in the fur, and the B gene determines how dark the pigment will be.

The presence of ee modifies the effect of dark pigment in the fur.

Genotypes: E<sup>+</sup>E<sup>+</sup> (dark pigment in fur), E<sup>+</sup>e (dark pigment in fur), ee (no dark pigment in fur).

Phenotypes: Black (E<sup>+</sup>E<sup>+</sup>B<sup>+</sup>B<sup>+</sup>), Brown (E<sup>+</sup>E<sup>+</sup>b<sup>+</sup>b<sup>+</sup>), Yellow (ee B<sup>+</sup>B<sup>+</sup> or ee b<sup>+</sup>b<sup>+</sup>).

### Pleiotropy

A single gene may produce a product that influences a number phenotypic characteristics. The sickle cell mutation in humans has such pleiotropic effects:

- A point mutation in the gene coding for the beta chain in the hemoglobin molecule produces an abnormal hemoglobin which crystallizes when oxygen content is low. This shape change deforms the red blood cells into a sickle shape (below).
- The deformed cells block circulation and this has multiple effects on the body's organ systems.

### Overview of Translation

Polypeptide chain is an essential stage of synthesis.

Components: Initiating tRNA, Growing polypeptide, Elongating tRNA, Ribosome, Messenger RNA, Uncharged tRNA, Release factor.

### Control of DNA Replication

DNA replication is controlled by enzymes at key stages:

Key enzymes: DNA helicase, DNA topoisomerase, Single-strand binding protein, RNA primase, DNA polymerase I, DNA polymerase II, DNA polymerase III, DNA ligase.

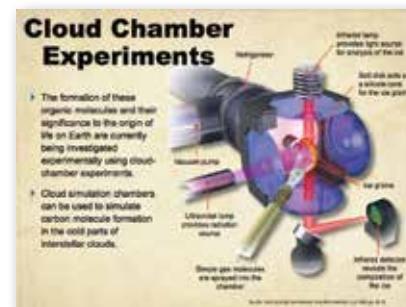
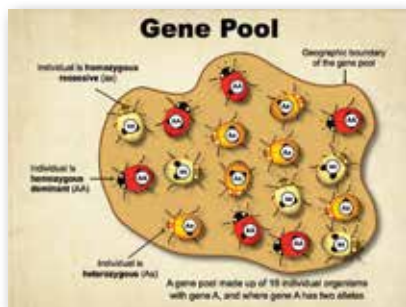
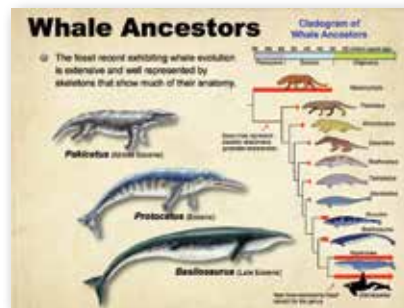
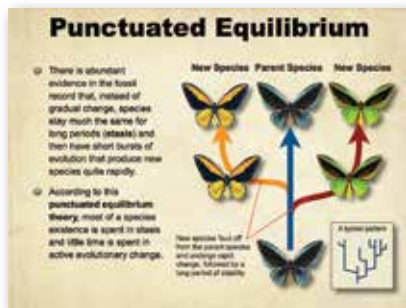


## Evolution

Explore evolution within both an historical context and in the light of current developments in gene technology. Engaging diagrams and photographs are used to simply and effectively explain basic principles in evolutionary biology as well as real world examples.

- Origin of Life
- Evidence for Evolution
- Mechanisms of Evolution
- Patterns of Evolution
- Human Intervention in Evolution

<b>NO. OF SLIDES</b>	<b>313</b>
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<b>PRICE</b>	<b>\$179.95</b>
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## Human Evolution

Human Evolution takes students on an exploration of human history, from our primate heritage to the trends predicted for our future evolution.

- Primate Evolution
- Hominin Evolution
- Cultural Evolution

**NO. OF SLIDES** 234

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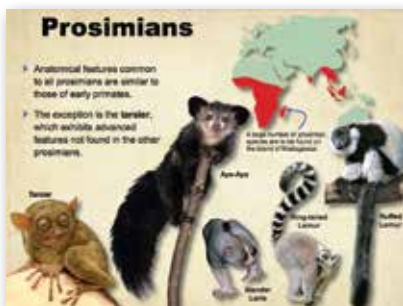
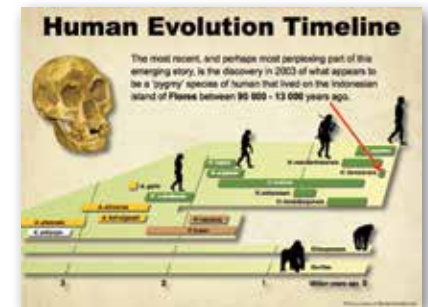
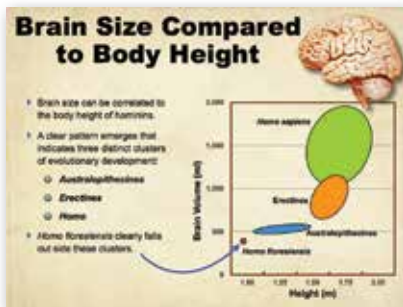
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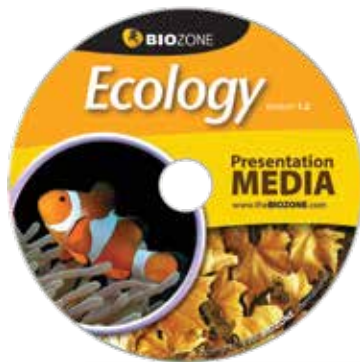


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## Ecology

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- The Ecological Niche
- Populations & Interactions
- Practical Ecology
- Communities
- Biodiversity & Conservation
- Human Impact

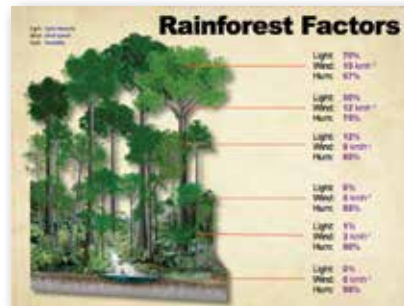
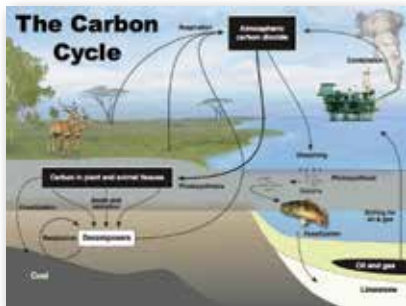
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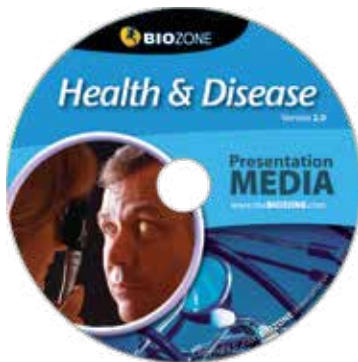
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## Health & Disease

Comprehensive coverage of human health, human disease, and the role of modern medicine in treating and preventing health disorders. Thorough and clearly presented, with up-to-date coverage of current issues in epidemiology.

- The Nature of Disease
- Infectious Disease
- Non-Infectious Disease
- Defence & Immune System

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### Antigens and Antibodies 2

Antibodies (immunoglobulins) are proteins made in response to **antigens**.

- Antibodies recognize and bind to antigens.
- Antibodies are highly specific and can help destroy antigens.
- Each antibody has at least two sites that can bind to an antigen.

### The Action of Phagocytes

Phagocytes are white blood cells that ingest microbes and digest them by **phagocytosis**.

- Detection**: Phagocytic cells recognise the microbe (they give off substances) and the microbe start to be engulfed.
- Ingestion**: The phagocyte uses pseudopodia to engulf the microbe, engulfing it and forming a vesicle.
- Phagosome forms**: A phagosome (phagocytic vesicle) is formed, enclosing the microbe.
- Fusion with lysosome**: Phagosome fuses with a lysosome containing powerful enzymes that can digest the microbe.
- Digestion**: The microbe are broken down by enzymes into their chemical components.
- Excretion**: Digested material is discharged from the phagocyte.

### Viral Infection

Viral particles (viruses) are engulfed by phagocytes (phagocytic white blood cells) as part of the host's normal defense response.

### Avian Influenza A (H5N1)

The emergence of avian flu in the human population has been the result of **zoonosis** - the movement of the virus from natural animal 'reservoirs'.

### Use of Cardiac Pacemakers

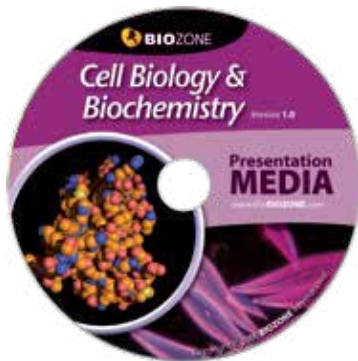
There are two types of pacemakers: **permanent** and **temporary**.

Temporary pacemakers are often used after cardiac surgery or heart attacks to maintain a regular heartbeat until the patient's heart has had time to heal.

### Amniocentesis

Amniocentesis is used to detect nearly 300 chromosome disorders, such as **Down syndrome** and **spina bifida**.

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## Cell Biology & Biochemistry

Cell Biology & Biochemistry covers the structure, function, and study of cells and their components. Well illustrated with both diagrams and photographs, it is an ideal support volume for a wide range of biology courses.

- Molecules of Life
- Introduction to Cells
- Cell Structure
- Cell Membranes & Transport
- Cellular Energetics
- Processes in the Nucleus

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<b>PRICE</b>	<b>\$299.95</b>



### Mesoderm

- ▶ The **mesoderm** is the middle germ layer, between the ectoderm and endoderm.
- ▶ The mesoderm differentiates to give rise to:
  - ⊙ muscles
  - ⊙ circulatory system (heart and blood vessels)
  - ⊙ excretory system
  - ⊙ dermis (inner skin layer)
  - ⊙ skeleton, and other supportive and connective tissues.

### Reversible Inhibitors

- ▶ **Reversible inhibitors** are used to control enzyme activity. There is often an interaction between the **substrate** and **end product** and the enzymes controlling the reaction.
- ▶ Buildup of the end product or a lack of substrate may deactivate the enzyme. **Competitive inhibition** involves competition for the active site.
- ▶ **Non-competitive inhibitors** work either to slow down the rate of reaction, or block the active site altogether and prevent its functioning (**allosteric inhibition**).

### The Genetic Material

- ▶ The genetic material of eukaryotic cells is deoxyribonucleic acid (**DNA**).
- ▶ When cells are not dividing, the chromosomal DNA is dispersed within the nucleus as fiber-like **chromatin**.
- ▶ Chromatin is made up of:
  - ⊙ a cell's DNA
  - ⊙ proteins (mainly **histones**)
- ▶ Chromatin is packed in a way that allows a large amount of genetic material to be organized in a compact way in the nucleus.
- ▶ If the DNA from one human cell was stretched out it would stretch to approximately 1 m long.

### Golgi Apparatus

- ▶ **Located:** Cytoplasm, associated with the ER.
- ▶ **Structure:** Stack of flattened, membranous sacs called **cisternae**.
- ▶ **Function:**
  - ⊙ Modification of proteins and lipids received from the ER.
  - ⊙ Sorting, packaging, and storage of proteins and lipids.
  - ⊙ Transport of these materials in vesicles through the cell.
  - ⊙ Manufacture of certain macromolecules, e.g. hyaluronic acid.
- ▶ **Size:** 1-3 µm diameter
- ▶ **Also called:** Golgi, Golgi body

### Electron Transport Chain

- ▶ The electron transport chain (ETC) is the final stage in cellular respiration.
- ▶ The electron transport chain is a series of hydrogen and electron carriers, located on the membranes of the mitochondrial cristae.
- ▶ This final stage involves oxidative phosphorylation and ATP generation.

### Preparing a Wet Mount

- ▶ The procedure for making a temporary wet mount is simple:
  - ⊙ Place the specimen in the center of a clean, grease-free microscope slide.
  - ⊙ Cover the specimen with a drop of water or other suitable mountant such as glycerol.
  - ⊙ Hold a coverslip at an angle so that its bottom edge is in contact with the drop on the slide.
  - ⊙ Use a mounted needle to support the coverslip and lower it gently over the specimen. This avoids including air in the mount.

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- Ecosystems
- Natural Ecosystem Change
- Populations
- Investigating Ecosystems
- Land and Water
- Energy
- Pollution
- Global Change

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### Hybrid Vehicles

Hybrid vehicles (vehicles using both electric and combustion engines) have been in the marketplace since about 1997.

By using a combination of batteries and a combustion engine overall fuel consumption is less compared to an ordinary car.

Labels in diagram: Fuel tank, Small efficient engine (runs only when the car requires extra power, such as accelerating), Automatic transmission, Electric motor (used when stopping or starting, instant speed), Battery pack (stores electrical energy for using the motor/generator system), Regulator (controls flow of electricity between battery and electric motor), Regenerative braking (braking that is used to recharge the battery), Electric motor (used when stopping or starting, instant speed).

### Reactor 1

Reactor 1 automatically shuts down after the earthquake.

- The emergency cooling system starts but shuts down minutes later.
- High pressure coolant injection system withheld.
- A basement 14 meters high stops the diesel generators for the cooling systems.
- All coolant systems fail with the loss of battery back up.
- Water levels in the reactor rose far beyond safe limits and the core began melting.

Fukushima Daiichi nuclear power plant

### Atmospheric Layers

The atmosphere consists of layers around the Earth, each one defined by its way temperature changes within its limits.

The layer boundaries are:

- Troposphere
- Stratosphere
- Mesosphere

The outermost, the thermosphere, fits in nicely, being the area with no boundary.

### Convergent Plates

Plate attrition occurs at convergent boundaries marked by deep ocean trenches and subduction zones.

Labels in diagram: Convergent plate boundary, Subduction zone, Deep ocean trench, Plate attrition, Oceanic crust, Subducting plate, Continental crust, Mantle.

### Ozone Depletion

Chlorine oxide molecule

Free chlorine

Chlorine oxide reacts with ozone

Chlorine oxide reacts with oxygen

2 oxygen molecules

Ozone

Chlorofluorocarbon (CFC)

Chlorine molecule

Chlorine atom

Chlorine molecule

Chlorine oxide molecule

### Hydraulic Fracturing

Hydraulic fracturing involves drill wells into non-porous rock, using explosives to perforate the rock and pumping in water and chemicals to extend the well.

It is a controversial technique as many believe it has led to the contamination of groundwater.

1. A well is bored into the layer of rock containing the oil or gas.
2. The well is then drilled horizontally so as to follow the natural vein.
3. A perforation hole is formed and used as a path to the rock.
4. The well is filled with concrete and other materials.
5. Fracturing fluid is pumped into the well at high pressure.
6. The well is then closed up with a plugback to prevent oil and gas from flowing back to the surface.

Full conditions can be viewed at: [www.biozone.com.au/faqconditionsfuse/](http://www.biozone.com.au/faqconditionsfuse/)

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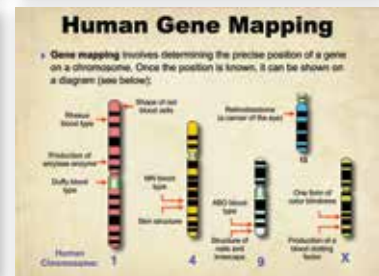
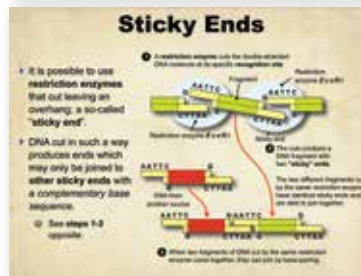
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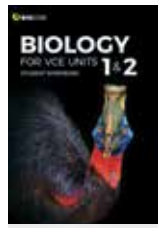
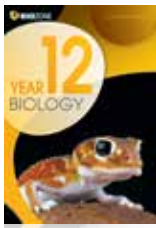
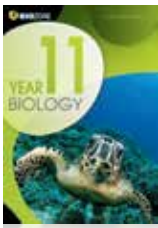
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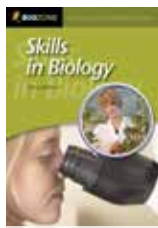
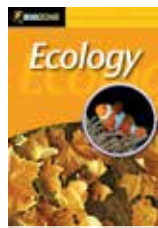
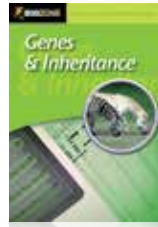
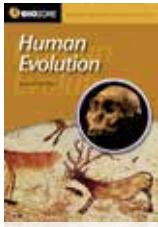
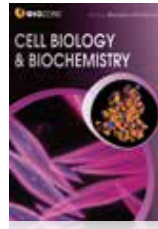
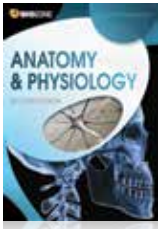
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