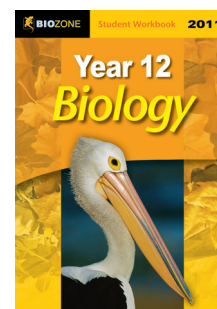


What's New in Year 12 Biology 2011

Thank you for purchasing the 2011 edition of *Year 12 Biology Student Workbook*. Biozone is committed to providing an up-to-date resource that caters for the requirements of students and teachers in Australia. The current edition of this workbook expands on the material developed in earlier editions. This summary provides a record of changes since the previous edition.



Organisational and general changes

Year 12 Biology 2011 builds on the successful features of previous editions, while focusing on scientific literacy and learning within relevant contexts. Much of the content has been substantially revised to improve its relevance, accessibility, and usability by students and educators. These changes include:

- ▶ A contextual approach. We encourage students to become thinkers by applying their knowledge within appropriate contexts. Some chapters include an account examining a 'biological story' related to the theme of the chapter. This approach provides a context for the material and an opportunity to focus on comprehension and the synthesis of ideas.
- ▶ Easy-to-use chapter introductions comprising succinct learning objectives, a list of key terms, and a short summary of key concepts. The learning objectives are based on the learning outcomes provided by Australian curricula, without being specific to any single state's specification. Teachers may choose the objectives appropriate to their course in each case. Each chapter introduction provides an indicator as to which part of the state curriculum that chapter applies. For HSC, an asterisk indicates the chapter includes material for both core and option topics.
- ▶ There is an emphasis on acquiring skills in scientific literacy. Each chapter includes a comprehension and/or literacy activity, and the appendix (a new feature) includes references for articles of interest cited throughout the text.
- ▶ Web links and Related Activities support the material provided on each activity page. We have provided an enhanced list of **web links** for activities accessed through www.biozone.com.au/weblink/AU12-2719.html. Each link provides a video clip or animation of relevance to the activity page on which it is indicated. Note that this resource is distinct from the Biolinks, which have long been a feature of BIOZONE's website.
- ▶ This workbook will be regularly updated to keep abreast of new developments in biology and to reflect changes to curricula. BIOZONE continues to be committed to providing up-to-date, relevant, interesting, and accurate information.
- ▶ Model Answers: In response to popular request, the model answers are now also provided as a show-hide feature on the non-printable PDF version of the workbook on the Teacher Resource CD-ROM (for separate purchase, conditions apply).
- ▶ Removed activities: Some activities have been removed. An activity is generally removed because (1) its content has been incorporated into a new activity (2) it is peripheral to all curricula or is more appropriate on the Teacher's Resource CD-ROM as part of the collection of resources for support and extension.
- ▶ All activities pertaining to calculation of confidence intervals and statistical tests (chi-squared, student's t test, regression, and ANOVA activities) are now provided in a separate unit *Statistical Activities* in the folder SPREADSHEETS AND STATISTICS on the Teacher's Resource CD-ROM together with supporting worked examples in *Excel*. This makes them accessible to both Year 11 and Year 12 students and teachers as appropriate. Use the Statistics Read Me provided on the TRC for information on how to use this package.

☆ New activities in this edition

Literacy activities:

Key Terms: Word Find

A little different from traditional word finds, students must first solve the clue before they can find the word!

Key Terms: Crossword

Crosswords help student literacy in the selected topic. Students will need to know their key terms to solve it.

Key Terms: Mix and Match

Match each key term from the topic with its definition.

On the Teacher's Resource CD-ROM

The following class activities are also provided on the Teacher's Resource CD-ROM

Key Terms: Memory Card Game

An enjoyable way to help students remember words and definitions, with a competitive edge.

Key Terms: What am I?

A game requiring students to work in teams to help a team mate correctly determine their unknown word. Flexible format makes it suitable for any size class.

Key Terms: I Have, Who Has

A deductive game based on literacy and understanding to be played as a class.

Concept map:

A concept map introduces the course. Students can refer to the concept map to review the connections between topics and to place their material in context.

Page Activity and description

- 13 The Role of Water**
A revision of content, which previously included inorganic ions. This activity now focuses entirely on the structure and role of water in biological systems.
- 25 Monosaccharides and Disaccharides**
The material previously covering carbohydrate structure and function has been substantially revised. This activity focuses on the structure, role, and properties of monosaccharides and disaccharides.
- 26 Carbohydrate Chemistry**
This activity focuses solely on the basic biochemistry of simple sugars: isomerism and the role of condensation and hydrolysis in forming and breaking down disaccharides respectively.
- 27 Polysaccharides**
The structure and function of four biologically important polysaccharides: cellulose, starch, glycogen, and chitin.
- 28 Biochemical Tests**
This activity no longer covers chromatography, but provides an example of colorimetric analysis to produce a calibration curve for glucose from a series of standards. The questions have been revised.
- 36 How Enzymes Work**
A revision of material previously covered in enzymes. The focus here is on the models for enzyme action and how enzymes work by lowering E_a .
- 38 Enzyme Cofactors**
The focus of this activity is on the structure and function of various types of enzyme cofactors. Some



examples are provided and questions focus on student understanding of how cofactors work.

- 39 Enzyme Inhibitors**
This material has been substantially revised as a separate activity and now examines in more detail the role of allostery in the regulation of metabolic pathways, the differences between competitive and non-competitive inhibition and how these can be tested empirically, and the action of irreversible inhibitors as poisons and antimicrobial drugs.
- 71 Hypothermia**
The causes and features of hypothermia; a contextual study within which to consider thermoregulation.
- 123 Replication in HIV**
Mechanisms of replication in a retrovirus, including the role of reverse transcriptase and the adaptiveness of the latent infection.
- 124 The Impact of HIV/AIDS in Africa**
A contextual case study examining the biological and socioeconomic impact of AIDS in subSaharan Africa.
- 135 New Medicines**
A contextual activity covering the sources of new medicines from the botanical and microbial world it includes a step-by-step illustrative description of how new antimicrobial compounds are isolated and tested.
- 151 Vaccines and Vaccination**
This revision of two activities (under a new name) now focuses less on schedules of vaccination and vaccines themselves and more on the features of vaccination programmes that are associated with control or eradication of disease. Whooping cough and smallpox are the case studies described.
- 158 Autoimmune Diseases**
Although this is not a new activity it is newly included in this chapter, where it applies to a greater number of state curricula.
- 165 Smoking and the Lungs**
A revision of "*Diseases caused by Smoking*" under a different name and now including reference only to the effects of smoking on the lungs and the incidence of lung diseases. An exercise in interpreting correlative data is provided.
- 168 Atherosclerosis**
The step-wise progression of atherosclerosis. Questions focus on the causes and consequences of the physiological changes associated with the disease.
- 169 Risk Factors for CVD**
An examination of the risk factors for cardiovascular diseases and, particularly, the impact of multiple risk factors on the development of disease. Second hand data are presented for evaluation and questions focus on the interpretation of these data.
- 170 Diagnosing Heart Problems**
An examination of the use of ECG in diagnosing CVD. Students are asked to interpret the ECG data documenting changes in heart activity.
- 199 Gene Expression in Prokaryotes**
A revision of what was 'Gene Expression', now focussing on the prokaryote model of gene expression and contrasting it with the new view of gene expression in eukaryotes.
- 201 Post Transcriptional Modification**
An overview of how post transcriptional modification in eukaryotes accounts for the many different gene products obtained from a smaller number of genes. Block diagrams are used to demonstrate how sections of DNA can be shuffled to produce different outcomes.
- 205 Review of DNA Replication**
A summary activity covering the basic principles of DNA replication; a test of student understanding.
- 206 Meselson and Stahl's Experiment**
An account of the Meselson-Stahl experiment that proved the nature of DNA replication.

- 207 Does DNA Really Carry the Code?**
A reading and comprehension activity describing the methods used to confirm DNA as an information storage molecule and the unit of inheritance. Students are asked to explain why certain methods were used and what the outcome of those methods were.
- 228 Amazing Organisms, Amazing Enzymes**
A concept story explaining how one of biotechnology's most important techniques, PCR, was successfully developed after isolation of a thermophilic enzyme.
- 246 Amazing Organisms, Amazing Enzymes**
A concept story explaining how one of biotechnology's most important techniques, PCR, was successfully developed after isolation of a thermophilic enzyme.
- 256 Changes to the DNA Sequence**
An overview of the role of mutations as a source of variation. The main example is the mutation causing one form of genetic hearing loss.
- 271 Sources of Variation**
The nature of continuous and discontinuous variation and the role of both the environment and genotype in determining phenotype. An overview of the fundamentals of genes and inheritance.
- 317 Selection for Skin Colour in Humans**
This activity provides a high interest exploration of natural selection operating in human populations, in this case, in the determination of skin colour. Students are asked to consider their preconceptions of race.
- 338 DNA Homologies**
A revision of the material on DNA hybridisation to acknowledge the use of newer sequencing technology in making DNA comparisons. The continued use of DNA hybridisation for identifying bacteria is acknowledged.
- 339 Protein Homologies**
A revision of older material to update information regarding both the technique and application of protein homologies to phylogenetic systematics. Molecular clocks are covered in more detail than previously, using cytochrome *c* as the example.
- 385 *Ardipithecus ramidus***
This activity describes the latest information on one of our earliest ancestors and describes new evidence for the development of bipedalism.

△ Existing material upgraded in this edition



Activities revised in order to clarify ideas and improve the stimulus material, questions, format, or general content:

Page Activity and description

Objectives and Key Concepts in all topics

The introduction to each chapter is now a single page synopsis of the material to be covered in the chapter. The objectives are still provided as numbered points, but the emphasis is on key competencies and students should now be able to more easily identify knowledge requirements. Key concepts for the chapter introduce the learning objectives, and a list of key terms provides a focus for competency in literacy. A teacher's version of the learning objectives, containing more explanatory detail, is provided in the Teacher's Guide (free with orders) for each chapter.

- 12 The Biochemical Nature of the Cell**
A revision to include inorganic ions and de-emphasise the properties and roles of water, which are now covered in a separate activity. The questions have been revised accordingly.
- 23 Lipids**
The diagram work in this activity has been revised to improve clarity and accuracy in representation. More focus has been placed in the structure of phospholipids in relation to function and the role of cholesterol (especially in cellular membranes). The questions have been revised accordingly.
- 35 Enzymes**
This activity has been revised, with much of the material now covered in separate activities. This activity focuses only on the role of enzymes as biological catalysts in endergonic and exergonic metabolic reactions.
- 48 Photosynthesis**
This activity now includes a TEM and the questions have been revised.
- 49 The Biochemistry of Photosynthesis**
The artwork now provides a more diagrammatic (and less artistic) view of the photosystems located in the thylakoid membranes. The generation of ATP and NADPH by non-cyclic phosphorylation and their flow on to the Calvin cycle is more clearly indicated, and the role of cyclic phosphorylation is explained so that students can answer the questions more easily.
- 102 The Structure of the Eye**
The material on correcting visual defects has been removed from this activity, which now covers only eye structure and accommodation.
- 115 Cholera**
An extensive revision to include not only details of the disease and the role of ORS but a diagrammatic explanation of how the cholera toxin creates diarrhoea and how ORS rehydrate in the event of infection. The questions have been revised accordingly.
- 118 Protozoan Diseases**
This revision now focuses on only three representatives of the pathogenic protozoans: *Plasmodium*, *Giardia*, and parasitic amoebae. Questions focus on life cycle adaptations of parasitic protozoans and issues of public health concern.
- 119 Malaria**
Questions now focus on the biological factors in the global occurrence of malaria, rather than symptoms.
- 120 Viral Diseases**
A revision to one page focussing just on the nature of viruses and their role in human disease.
- 121 HIV and AIDS**
The information on treatment and prevention has been updated with more emphasis on general preventative methods and treatment and less on the naming of specific drugs. The questions are unchanged.
- 125 Epidemiology of AIDS**

The data for the AIDS epidemic have been updated. The questions are unchanged.

- 127 Emerging Diseases**
The information on the current status of emerging diseases has been updated and resistant TB has been included as an example rather than Niaph virus. The questions have been revised with a focus on the biological reasons for the emergence of new viral strains and zoonoses.
- 133 Antimicrobial Drugs**
This activity has been considerably revised to include the bactericidal and bacteriostatic actions of antibiotics and the implications of antibiotic resistance. Interpretation of an antibiotic plating experiment is part of the exercise.
- 143 The Body's Defences**
This activity now includes more information on the role of the skin and ciliated epithelia as barriers to infection. The questions have been revised accordingly.
- 149 Acquired Immunity**
This activity has been substantially revised and now includes coverage of the primary and secondary responses to pathogens, the role of vaccination programmes in public health, and the principle of herd immunity. The questions have been revised.
- 155 Antibodies**
The questions have been revised to include a question on antibody structure and the nature of antibody specificity through the variable region.
- 159 Allergies and Hypersensitivity**
This activity has been revised to provide more room for answers. The intent of the activity is unchanged.
- 163 Health vs Disease**
Revision includes some minor changes to terminology.
- 167 Cardiovascular Disease**
This activity has been reframed as an introduction to CVD without examining the related issues of atherosclerosis and diagnosis. These are now covered separately. The questions focus on discussing general aspects of CVD.
- 179 Cancer**
This activity has been revised to one page and provides an introduction to the nature of cancer, without emphasising specific symptoms.
- 189 Human Karyotype Exercise**
The unknown karyotype is now trisomy 18 (female).
- 213 Plant Tissue Culture**
This activity has been revised using a more systematic presentation in which the concepts involved are presented and the techniques and outcomes are laid out beside the diagram for easy understanding. There is one new question.
- 217 Cloning by Nuclear Transfer**
This activity has been revised using a more systematic presentation as described above. The questions are unchanged.
- 241 Production of Insulin**
This activity had been revised using the new systematic approach as described above. Methods for producing human insulin using GE bacteria and yeast are compared. The questions have been revised.
- 246 Genome Projects**
The information on currently completed genome sequencing projects, including the Neanderthal Genome Project, has been updated.
- 274 Mendel's Laws of Inheritance**
The artwork has been revised and there have been some minor changes to the text to clarify some points, but the questions are unchanged.
- 295 Gene-Environment Interactions**
A substantial reorganisation of material to include information on colour pointing and the chemical



effects on phenotype (as required to answer questions). The questions have had minor revisions.

- 297 Interactions Between Genes**
This activity has been expanded and revised to provide clearer explanation of epistasis. There is also a note on random X inactivation and its effect on phenotype in the inheritance of coat colour. The questions have been revised accordingly.
- 305 Polygenes**
This activity now looks at polygeny using the inheritance of skin colour involving three (rather than two) alleles. It is slightly more difficult, being less simplistic, but more accurate.
- 316 Natural Selection**
This activity has been reformatted and the questions have been revised.
- 319 The Evolution of Darwin's Finches**
This activity provides more information on resource partitioning in related finch species and the questions have been revised accordingly.
- 341 Oceanic Island Colonisers**
This activity has been revised to include material from "Biogeographical Evidence" and information (from 2009) on the new species of land iguana. There is new material on factors affecting island biota and the questions have been revised accordingly.
- 347 The Species Concept**
A thorough revision of an earlier activity, updating the data for canid populations and examining the *Ensatina* species complex in the Pacific North-West of the USA.
- 374 Hominin Evolution**
The timeline for this activity has been updated to include the new find of *Australopithecus sediba*. The questions are unchanged.
- 377 The Emerging View**
The timeline for this activity has been updated to include the new find of *Australopithecus sediba*. The questions are unchanged.
- 382 Bipedalism and Nakedness**
This page has been revised in light of the new analyses of *Ardipithecus* and it now emphasises the role of provisioning in the development of bipedalism. The introduction has been revised and a question is now included to involve the student in the information.

*We hope that you enjoy using Year 12 Biology this year.
We welcome comments and constructive criticism and will
endeavour to implement suggestions wherever possible
... the staff at BIOZONE.*

!! **ERRATA Workbook**

373 General Primate Characteristics

Identifying primates was given as a Related Activity in error. This activity is a weblink (downloadable PDF).

