

# IB Biology SL

## Topical Past Paper Questions

### THEME A

#### UNIT & DIVERSITY

##### A1.1

##### Water

Medium of Life, Polarity, Hydrogen Bonding, Adhesion, Cohesion, Solvent Properties, Physical Properties, Consequences

P1  
P2

##### A1.2

##### Nucleic Acid

Nucleotides, Bases, RNA & DNA Structure, Antiparallel, Complementarity, Conservation of Code

P1  
P2

##### A2.2

##### Cell Structure

Prokaryote & Eukaryote Cell Structure, Functions of Life, Light & Electron Microscopy, Atypical Cells

P1  
P2

##### A3.1

##### Diversity of Organism

Variation, Species, Linnaeus, Binomial System, Speciation, Karyotyping, Genomes

P1  
P2

##### A4.1

##### Evolution & Speciation

# Biology Sl 2013 Past Paper

**Hongru Du**



## **Biology Sl 2013 Past Paper:**

**Biogeochemical Cycles** Katerina Dontsova, Zsuzsanna Balogh-Brunstad, Gaël Le Roux, 2020-04-14 Elements move through Earth's critical zone along interconnected pathways that are strongly influenced by fluctuations in water and energy. The biogeochemical cycling of elements is inextricably linked to changes in climate and ecological disturbances both natural and man-made. Biogeochemical Cycles: Ecological Drivers and Environmental Impact examines the influences and effects of biogeochemical elemental cycles in different ecosystems in the critical zone. Volume highlights include: Impact of global change on the biogeochemical functioning of diverse ecosystems; Biological drivers of soil rock and mineral weathering; Natural elemental sources for improving sustainability of ecosystems; Links between natural ecosystems and managed agricultural systems; Non-carbon elemental cycles affected by climate change; Subsystems particularly vulnerable to global change. The American Geophysical Union promotes discovery in Earth and space science for the benefit of humanity. Its publications disseminate scientific knowledge and provide resources for researchers, students, and professionals. Find out more about this book from this Q & A with the Author. Book Review: [http://www.elementsmagazine.org/archives/e16\\_6/e16\\_6\\_dep\\_bookreview.pdf](http://www.elementsmagazine.org/archives/e16_6/e16_6_dep_bookreview.pdf)

**My Pregnancy Guide** Attilio D'Alberto, 2021-01-01 My Pregnancy Guide is based on my 20 years clinical experience in helping women during pregnancy and the latest scientific evidence sourced from over 750 research studies. This self-help guide blends modern fact-based research together with the ancient theories of Chinese medicine to deliver a powerful and concise understanding of pregnancy and labour. My Pregnancy Guide explains what to expect in pregnancy, problems you may experience and what to do about them; the impact of COVID-19; an optimal pregnancy diet; supplements to take pregnancy for dads; and how to reduce your baby's chances of developing autism. It explains what tests you can have and the various dangers to your baby and how to avoid them from chemicals in the environment, in foods, cosmetics, and household products to pollution, plastics, heavy metals, and pharmaceutical drugs. Advice is given on how to minimise your baby miscarrying or developing any abnormalities and how you can enhance your health for optimal breast milk production and post-labour health. In-depth explanations are given on how to optimise your lifestyle from exercising, work, sleep, to clothing, footwear, and even baths versus showers, all based on the latest cutting-edge research together with the tried and tested theories of Chinese medicine. Week-by-week explanations on how your baby is growing are given along with advice on how to enhance your baby's development. A large range of supplements are listed to improve mother and baby's health. Based on the latest scientific research, My Pregnancy Guide also explains how to deal with various pregnancy problems that may develop from gestational diabetes, preeclampsia, to constipation and slow baby growth. Explanations are given on the stages of labour and how to prepare for each step. Fact-based research is given advising on going over 40 weeks and how to prepare for labour, treat a breech baby, pain relief options, and acupressure points to encourage labour and a reduction in labour pain. A large range of natural herbs are given to help reduce miscarriage and aid labour. Dr TCM Attilio D

Alberto has been supporting women in pregnancy and labour since 2004 from those who fell pregnant naturally to those that conceived with IVF This book is a treasure trove of information that is invaluable to all women who are pregnant I safely delivered a baby boy I defiantly feel he helped to reduce the pain too as I felt ready to give birth all over again the next day Dr TCM Attilio D Alberto Bachelor of Medicine Beijing BSc Hons TCM

**The Selection Process of Biomass Materials for the Production of Bio-Fuels and Co-firing** N. Altawell,2014-03-28 A functional discussion of the crop selection process for biomass energy The Selection Process of Biomass Materials for the Production of Bio fuels and Co firing provides a detailed examination and analysis for a number of energy crops and their use as a source for generating electricity and for the production of bio fuels Renowned renewable energy expert and consultant Dr Najib Altawell begins with the fundamentals of bio fuels and co firing and moves on to the main feature which is the methodology that assists energy scientists and engineers to arrive at the most suitable biomass materials tailored to each company s business and economic environments and objectives This methodology provides a framework whereby power generating companies can insert their own values for each factor whether business factor BF or scientific technical factors S T or both simultaneously The methodology provides a list of factors related to the biomass energy business The average values have been obtained from the survey method and laboratory tests These values are the standard values power companies can use if they need or wish to use them The Selection Process of Biomass Materials for the Production of Bio fuels and Co firing has been designed and compiled for the widest possible range of readers researchers businesspeople and economists who are connected to the renewable energy field in general and biomass energy in particular Because of its focus on practical data and applications the book is also accessible for general readers who may or may not have a technical or scientific background

*World Ocean Assessment* Alan Simcock,2017-04-17 This United Nations report examines the current state of knowledge of the world s oceans for policymakers and provides a reference for marine science courses

**Introduction to Paleobiology and the Fossil Record** Michael J. Benton,David A. T. Harper,2020-06-02 This book presents a comprehensive overview of the science of the history of life Paleobiologists bring many analytical tools to bear in interpreting the fossil record and the book introduces the latest techniques from multivariate investigations of biogeography and biostratigraphy to engineering analysis of dinosaur skulls and from homeobox genes to cladistics All the well known fossil groups are included including microfossils and invertebrates but an important feature is the thorough coverage of plants vertebrates and trace fossils together with discussion of the origins of both life and the metazoans All key related subjects are introduced such as systematics ecology evolution and development stratigraphy and their roles in understanding where life came from and how it evolved and diversified Unique features of the book are the numerous case studies from current research that lead students to the primary literature analytical and mathematical explanations and tools together with associated problem sets and practical schedules for instructors and students New to this edition The text and figures have been updated throughout

to reflect current opinion on all aspects New case studies illustrate the chapters drawn from a broad distribution internationally Chapters on Macroevolution Form and Function Mass extinctions Origin of Life and Origin of Metazoans have been entirely rewritten to reflect substantial advances in these topics There is a new focus on careers in paleobiology

*Women in IT in the New Social Era: A Critical Evidence-Based Review of Gender Inequality and the Potential for Change* Bernhardt, Sonja, 2014-03-31 Research and statistics support the view that current programs are failing to keep women in the ICT field Currently there exist very few solutions to this growing problem *Women in IT in the New Social Era A Critical Evidence Based Review of Gender Inequality and the Potential for Change* aims to bring this topic to the forefront of discussion about what can be done to correct this lopsided gender distribution This reference work will be an essential guide for government professionals students and researchers in the ICT field looking to develop a solution to equalize the retention rate of women in these related fields Vertebrate Palaeontology Michael J. Benton, 2014-10-20 Vertebrate palaeontology is a lively field with new discoveries reported every week and not only dinosaurs This new edition reflects the international scope of vertebrate palaeontology with a special focus on exciting new finds from China A key aim is to explain the science Gone are the days of guesswork Young researchers use impressive new numerical and imaging methods to explore the tree of life macroevolution global change and functional morphology The fourth edition is completely revised The cladistic framework is strengthened and new functional and developmental spreads are added Study aids include key questions research to be done and recommendations of further reading and web sites The book is designed for palaeontology courses in biology and geology departments It is also aimed at enthusiasts who want to experience the flavour of how the research is done The book is strongly phylogenetic and this makes it a source of current data on vertebrate evolution **Gender is Really Strange** Teddy G. Goetz, 2023-10-19 What does it mean to be trans Non Binary Gender Expansive What parts of gender come from society What parts come from within How much is biology and how much is socialization Part of the Really Strange series this science based graphic medicine comic addresses these questions and more revealing the inherent messiness of gender identity and sex A mysterious amalgam of biology and society inherently sensed yet societally defined the complexity of gender is revealed through examining neuroscience biology hormones mental health behaviour and how much of gender comes from society Exploring theories thinkers terminology history and gender cultures around the world and across different religions this easy to understand and engaging book will help you to question perceived norms and engage critically with your own gender identity Get ready to break down the binary B S and celebrate gender in all its messy glory **Specialised membrane domains of plasmodesmata, plant intercellular nanopores** Jens Tilsner, Emmanuelle Bayer, Sébastien MONGRAND, Lesley Torrance, 2014-12-17 Plasmodesmata PD are plant specific intercellular nanopores defined by specialised domains of the plasma membrane PM and the endoplasmic reticulum ER both of which contain unique proteins and probably different lipid compositions than the surrounding bulk membranes The PD membranes form concentric

tubules with a minimal outer diameter of only 50 nm and the central ER strand constricted to 10–15 nm representing one of the narrowest stable membrane tubules in nature. This unique membrane architecture poses many biophysical structural and functional questions. PM continuity across PD raises the question as to how a locally confined membrane site is established and maintained at PD. There is increasing evidence that the PM within PD may be enriched in membrane rafts or TET web domains. Lipid rafts often function as signalling platforms in line with the emerging view of PD as central players in plant defense responses. Lipid–lipid immiscibility could also provide a mechanism for membrane sub-compartmentalisation at PD. Intricate connections of the PM to the wall and the underlying cytoskeleton and ER may anchor the specialised domains locally. The ER within PD is even more strongly modified. Its extreme curvature suggests that it is stabilised by densely packed proteins, potentially members of the reticulon family that tubulate the cortical ER. The diameter of the constricted ER within PD is similar to membrane stalks in dynamin-mediated membrane fission during endocytosis and may need to be stabilised against spontaneous rupture. The function of this extreme membrane constriction and the reasons why the ER is connected between plant cells remain unknown. Whilst the technically challenging search for the protein components of PD is ongoing, there has been significant recent progress in research on biological membranes that could benefit our understanding of PD function. With this Research Topic we therefore aim to bring together researchers in the PD field and those in related areas such as membrane biophysics, membrane composition and fluidity, protein–lipid interactions, lateral membrane heterogeneity, lipid rafts, membrane curvature and membrane fusion/fission. We wish to address questions such as: What mechanisms restrict lateral mobility of proteins and lipids along the PD membranes? How can specific proteins be targeted to and turned over from membrane domains with restricted lateral access? What elements (lipids, proteins, membrane curvature, packing order, thickness, etc.) may contribute to the identity of PD membranes? How do the structural and functional features of PD compare to other ER–PM contact sites? How is the high curvature of the PD ER stabilised and what are possible functions of such a tightly constricted membrane tubule? Do PD need to be prevented from spontaneous collapse and sealing? What technologies are available to address these questions that can underpin PD research? We welcome interested individuals to contribute their expertise and develop new hypotheses on the particular biological and biophysical questions posed by PD. We are particularly looking for articles: Original Research Articles, Technical Advances and State of the Art reviews that would expand on or challenge current perceptions of PD and stimulate discussion.

**State of the Arctic Marine Biodiversity Report**, 2017. This is the first report of the Circumpolar Biodiversity Monitoring Program (CBMP) to summarize status and trends in biotic elements in the arctic marine environment. The effort has identified knowledge gaps in circumpolar biodiversity monitoring. CBMP is the cornerstone program of Conservation of Arctic Flora and Fauna (CAFF).

*New Frontiers in Mirror Neurons Research*. Pier Francesco Ferrari, Giacomo Rizzolatti, 2015-10-08. The discovery of mirror neurons caused a revolution in neuroscience and psychology. Nevertheless, because of their profound impact within life

sciences mirror neuron are still the subject of numerous debates concerning their origins and their functions With more than 20 years of research in this area it is timely to synthesise the expanding literature on this topic New frontiers in Mirror Neurons provides a comprehensive overview of the latest advances in mirror neurons research accessible both to experts and to non experts In the book leading scholars draw on the latest research to examine methodological approaches theoretical implications and the latest findings on mirror neurons research A broad range of topics are covered within the book basic findings and new concepts in action perception theory functional properties and evolution development and clinical implications In particular the last two sections of the book outline the importance of the plasticity and development of the mirror neuron system This knowledge will be key in future research for helping us understand possible disorders associated with impairments in the mirror neurons system as well as in helping us design new therapeutic tools for interventions within the field of neurodevelopmental disorders and in neurorehabilitation New Frontiers in Mirror Neurons is an exciting new work for neuroscientists psychologists and philosophers of mind

**The Last Elephants** ,2019-04-09 Amazing photographs of elephants accompany narratives from researchers scientists and conservationists celebrating elephants and calling for their preservation African savanna elephants among the most magnificent and beloved of our fellow mammals are an extraordinary social and intelligent species The Last Elephants an homage to these animals and a clarion call for their preservation is based upon a shocking finding savanna elephant populations across Africa are being decimated with two to three murdered every hour for their ivory Without action these elephants soon will vanish from our world They are a species in imminent danger of extinction and it is up to us to save them Featuring more than 250 full color photos of the breathtaking animals by some of the world s top wildlife photographers The Last Elephants was inspired by the devastating results of the continent wide Great Elephant Census of 2016 undertaken by Elephants without Borders in tandem with the world s most prominent conservation groups The book joins together the voices and vision of scientists lawmakers rangers conservationists and on the ground researchers to speak out against elephant killings to close loopholes in international law that allow the ivory trade to continue and to pay tribute to the thousands who work to protect the animals including African communities who have elected to preserve and protect their elephant neighbors Offering both profiles of preservation plans that work and hope for elephants future this is a must read for everyone concerned for the future of one of Earth s most captivating species

**Handbook of the Life Course** Michael J. Shanahan,Jeylan T. Mortimer,Monica Kirkpatrick Johnson,2015-10-26 Building on the success of the 2003 Handbook of the Life Course this second volume identifies future directions for life course research and policy The introductory essay and the chapters that make up the five sections of this book show consensus on strategic next steps in life course studies These next steps are explored in detail in each section Section I on life course theory provides fresh perspectives on well established topics including cohorts life stages and legal and regulatory contexts It challenges life course scholars to move beyond common individualistic paradigms Section II

highlights changes in major institutional and organizational contexts of the life course It draws on conceptual advances and recent empirical findings to identify promising avenues for research that illuminate the interplay between structure and agency It examines trends in family school and workplace as well as contexts that deserve heightened attention including the military the criminal justice system and natural and man made disaster The remaining three sections consider advances and suggest strategic opportunities in the study of health and development throughout the life course They explore methodological innovations including qualitative and three generational longitudinal research designs causal analysis growth curves and the study of place Finally they show ways to build bridges between life course research and public policy

**Single-Domain Antibodies: Biology, Engineering and Emerging Applications** Kevin A. Henry,C. Roger MacKenzie,2018-03-19 Single domain antibodies sdAbs represent the minimal antigen binding competent form of the immunoglobulin domain and have unique properties and applications SdAbs are naturally produced as the variable domains of the heavy chain only antibodies of camelid ruminants and cartilaginous fishes but can also be engineered synthetically from autonomous human or mouse VH or VL domains The scope of this research topic and associated e book covers current understanding and new developments in i the biology immunology and immunogenetics of sdAbs in camelids and cartilaginous fishes ii strategies for sdAb discovery iii protein engineering approaches to increase the solubility stability and antigen binding affinity of sdAbs and iv specialized applications of sdAbs in areas such diagnostics imaging and therapeutics

*New Trends in Table Olive Fermentation, 2nd Edition* Joaquín Bautista-Gallego,Francisco Noé Arroyo-López,Albert Bordons,Rufino Jiménez-Díaz,2020-03-27 Table olives are a traditional fermented vegetable with many centuries of history particularly in the Mediterranean basin where this food has had a great influence on the culture and diet of many countries Moreover this fermented food is prepared with fruits obtained from cultivated *Olea europaea* subsp *europaea* var *europaea* trees and has been expanded for many countries all over the world At present the table olive is one of the major fermented vegetables with an overall production above 2 500 000 tons year Thus the table olive industry is increasingly demanding new biotechnological approaches sensory characteristics and differentiation of the products So scientists have to focus on solving problems and providing new tools in this fermented food process In recent years there is an increased interest in different nutritional and microbial aspects related to table olives During the last five years new fields have been implemented or developed such us new probiotic strains to produce an enriched product study of pathogen survival NaCl content reduction microbial resistant to stress conditions microbial biofilms predictive microbiology use of NGS and metagenomics use of bioactive compounds derived from table olive processing and the treatment of effluents generated during olive processing The diversity of research displayed in this Research Topic demonstrates the important potential of this product and its impact on the fermented vegetables economy

**Microwave-Mediated Biofuel Production** Veera G. Gude,2017-08-22 This book focuses on chemical syntheses and processes for biofuel production mediated by microwave energy This is the first



contribution in this area serving as a resource and guidance manual for understanding the principles mechanisms design and applications of microwaves in biofuel process chemistry Green chemistry of microwave mediated biofuel reactions and thermodynamic potentials for the process biochemistry are the focus of this book Microwave generation wave propagation process design development and configurations and biofuel applications are discussed in detail **Sharks of the World**

David A. Ebert, Sarah Fowler, 2021-07-20 Fully revised and updated Back cover *Advancements in Algal Biofuels Research - Recent Evaluation of Algal Biomass Production and Conversion Methods of into Fuels and High Value Co-products*

Umakanta Jena, S. Kent Hoekman, 2017-05-18 Algae biomass has enormous potential to produce fuels and value added products Algae derived biofuels and bioproducts offer great promise in contributing to U S energy security and in mitigating the environmental concerns associated with conventional fuels Algae s ability to grow in low quality water wastewater and to accumulate lipids has encouraged scientists to investigate algae as a medium for wastewater treatment and a potential source of fuel and bioproducts There are growing demands for biomass based transportation fuels including biodiesel bio oil biomethane biohydrogen and other high value products nutraceuticals proteins omega 3 etc Algae can help address these needs The topic of algae energy includes the production and characterization of algae cultures conversion into fuel feedstocks and high value products and optimization of product isolation and use In view of the increasing efforts in algae biomass production and conversion into energy and high value products the current research topic covers important aspects of algal strain selection culture systems inorganic carbon utilization lipid metabolism and quality biomass harvesting extraction of lipids and proteins and thermochemical conversion of algal feedstocks into biocrude **Bio-Based Packaging**

Salit Mohd Sapuan, Rushdan Ahmad Ilyas, 2021-04-09 Bio Based Packaging Bio Based Packaging An authoritative and up to date review of sustainable packaging development and applications Bio Based Packaging explores using renewable and biodegradable materials as sustainable alternatives to non renewable petroleum based packaging This comprehensive volume surveys the properties of biopolymers the environmental and economic impact of bio based packaging and new and emerging technologies that are increasing the number of potential applications of green materials in the packaging industry Contributions address the advantages and challenges of bio based packaging discuss new materials to be used for food packaging and highlight cutting edge research on polymers such as starch protein polylactic acid PLA pectin nanocellulose and their nanocomposites In depth yet accessible chapters provide balanced coverage of a broad range of practical topics including life cycle assessment LCA of bio based packaging products consumer perceptions and preferences supply chains business strategies and markets in biodegradable food packaging manufacturing of bio based packaging materials and regulations for food packaging materials Detailed discussions provide valuable insight into the opportunities for biopolymers in end use sectors the barriers to biopolymer based concepts in the packaging market recent advances made in the field of biopolymeric composite materials the future of bio plastics in commercial food packaging and more This book Provides deep

coverage of the bio based packaging development characterization regulations and environmental and socio economic impact Contains real world case studies of bio based packaging applications Includes an overview of recent advances and emerging aspects of nanotechnology for development of sustainable composites for packaging Discusses renewable sources for packaging material and the reuse and recycling of bio based packaging products Bio Based Packaging is essential reading for academics researchers and industry professionals working in packaging materials renewable resources sustainability polymerization technology food technology material engineering and related fields For more information on the Wiley Series in Renewable Resources visit [www.wiley.com/go/rrs](http://www.wiley.com/go/rrs)

**Archaeologies of Animal Movement. Animals on the Move**

Anna-Kaisa Salmi, Sirpa Niinimäki, 2021-06-28 This book presents the state of the art in the analysis of animal movements in the past and its implications for human societies It also addresses the importance of animal activity and mobility for understanding past human societies and past human animal relationships through cases studies from different periods and areas It is the first book to focus on the archaeology of animal movement on different scales from fine tuned muscle movements of working animals to feeding behavior and to long distance movements across landscapes and regions With the recent development of fine tuned methodologies such as stable isotope analysis and physical activity assessment the potential to understand how animals moved about in the past has increased substantially While the chapters in the volume utilize a wide range of archaeological methods they are all united by an emphasis on understanding animal activity and mobility patterns as something that has a major impact on human societies and human animal relationships Chapters in this volume show that animal activity patterns provide information on multiple aspects of human animal relationships including analysis of animal management practices transhumance global and regional trade networks and animal domestication This volume is of interest to scholars working in zooarchaeology and early human societies

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