



LIFE SCIENCES

REVISION BOOKLET 2023 TERMS 3 and 4

Grade 10

This revision program is designed to assist you in revising the critical content and skills that you have covered during the 3rd and 4th terms. The purpose is to prepare you to understand the key concepts and to provide you with an opportunity to establish the required standard and the application of the knowledge necessary to succeed in the examination.

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2014 Life Sciences June Paper Structure

**Andre Balogh, Andrei Bykov, Jonathan
Eastwood, Jelle Kaastra**



2014 Life Sciences June Paper Structure:

Selected Papers from the 3rd International Symposium on Life Science Valentin A. Stonik, 2020-12-10 This book contains information for specialists in various fields of science From the point of view of pharmacology data are reported regarding the effect of echinochrome A and related metabolites from sea urchins on the survival and functional properties of stem cells which can facilitate ex vivo application of this compound in medicine For scientists who isolate and establish structures of marine natural compounds an article devoted to the proof of the microbial origin of a typical metabolite earlier found exclusively from marine invertebrates 6 epi monancherin may also be of interest A range of new marine metabolites was discovered from the both marine invertebrates and marine microorganisms particularly in marine isolates of fungi Some marine natural products could be applied to treat such diseases as Parkinson's disease ischemic stroke viral infections and so on Magnificamide a new peptide from sea anemones inhibits porcine and human saliva amylases showing its probable antidiabetic properties Application of the genomic approach was discussed in studies on various marine bacteria producing marine enzymes with unusual specificity The lectins capable of recognizing glycoforms of different substrates demonstrate the possibility to be used to elaborate new medical diagnostics

Dual-use life science research and biosecurity in the 21st Century: Social, Technical, Policy, and Ethical Challenges Jonathan E. Suk, Kathleen M. Vogel, Amanda Jane Ozin, 2015-06-04 In September 2011 scientists announced new experimental findings that would not only threaten the conduct and publication of influenza research but would have significant policy and intelligence implications The findings presented a modified variant of the H5N1 avian influenza virus hereafter referred to as the H5N1 virus that was transmissible via aerosol between ferrets These results suggested a worrisome possibility the existence of a new airborne and highly lethal H5N1 virus that could cause a deadly global pandemic In response a series of international discussions on the nature of dual use life science arose These discussions addressed the complex social technical political security and ethical issues related to dual use research This Research Topic will be devoted to contributions that explore this matrix of issues from a variety of case study and international perspectives

Quantum Structures in Cognitive and Social Science Diederik Aerts, Jan Broekaert, Liane Gabora, Sandro Sozzo, 2016-06-26 Traditional approaches to cognitive psychology correspond with a classical view of logic and probability theory More specifically one typically assumes that cognitive processes of human thought are founded on the Boolean structures of classical logic while the probabilistic aspects of these processes are based on the Kolmogorovian structures of classical probability theory However growing experimental evidence indicates that the models founded on classical structures systematically fail when human decisions are at stake These experimental deviations from classical behavior have been called paradoxes fallacies effects or contradictions depending on the specific situation where they appear But they involve a broad spectrum of cognitive and social science domains ranging from conceptual combination to decision making under uncertainty behavioral economics and linguistics

This situation has constituted a serious drawback to the development of various disciplines like cognitive science linguistics artificial intelligence economic modeling and behavioral finance A different approach to cognitive psychology initiated two decades ago has meanwhile matured into a new domain of research called quantum cognition Its main feature is the use of the mathematical formalism of quantum theory as modeling tool for these cognitive situations where traditional classically based approaches fail Quantum cognition has recently attracted the interest of important journals and editing houses academic and funding institutions popular science and media Specifically within a quantum cognition approach one assumes that human decisions do not necessarily obey the rules of Boolean logic and Kolmogorovian probability and can on the contrary be modeled by the quantum mechanical formalism Different concrete quantum theoretic models have meanwhile been developed that successfully represent the cognitive situations that are classically problematical by explaining observed deviations from classicality in terms of genuine quantum effects such as contextuality emergence interference superposition entanglement and indistinguishability In addition the validity of these quantum models is convincingly confirmed by new experimental tests We also stress that since the use of a quantum theoretic framework is mainly for modeling purposes the identification of quantum structures in cognitive processes does not presuppose without being incompatible with it the existence of microscopic quantum processes in the human brain In this Research Topic we review the major achievements that have been obtained in quantum cognition by providing an accurate picture of the state of the art of this emerging discipline Our overview does not pretend to be either complete or exhaustive But we aim to introduce psychologists and social scientists to this challenging new research area encouraging them at the same time to consider its promising results It is our opinion that if continuous progress in this domain can be realized quantum cognition can constitute an important breakthrough in cognitive psychology and potentially open the way towards a new scientific paradigm in social science

Handbook of Healthcare Management Myron D. Fottler, Donna Malvey, Donna J. Slovensky, 2015-09-25 The Handbook of Healthcare Management is a comprehensive examination of key management practices for global healthcare organizations arguing that insight into and implementation of these practices is essential for success and sustainability

Biomacromolecules Mohamed Elzagheid, 2024-12-30 The second edition of the Macromolecular Chemistry broadens into two areas biomacromolecules Volume 1 and polymers Volume 2 Biomacromolecules covers carbohydrates lipids proteins nucleic acids their classifications and properties The first chapter looks at the structural formulas and cyclic forms of monosaccharides as well as their synthesis and breakdown Cyclization enolization isomerization tautomerization mutarotation and epimerization are all briefly described Examples of disaccharides and polysaccharides are also presented The second chapter covers triglycerides steroids vitamins and their constituents The third chapter examines the primary structure of proteins including amino acid properties peptide bond formation and peptide synthesis It also addresses secondary tertiary and quaternary structures The book concludes with a chapter on nucleic acids which covers the chemistry

of nucleosides and oligonucleotides as well as topics such as genetic code DNA secret code Polymerase Chain Reaction and DNA fingerprinting Multi-scale Structure Formation and Dynamics in Cosmic Plasmas Andre Balogh, Andrei Bykov, Jonathan Eastwood, Jelle Kaastra, 2016-02-02 This book offers eleven coordinated reviews on multi scale structure formation in cosmic plasmas in the Universe Observations and theories of plasma structures are presented in all relevant astrophysical contexts from the Earth's magnetosphere through heliospheric and galactic scales to clusters of galaxies and the large scale structure of the Universe Basic processes in cosmic plasmas starting from electric currents and the helicity concept governing the dynamics of magnetic structures in planet magnetospheres stellar winds and relativistic plasma outflows like pulsar wind nebulae and Active Galactic Nuclei jets are covered The multi wavelength view from the radio to gamma rays with modern high resolution telescopes discussed in the book reveals a beautiful and highly informative picture of both coherent and chaotic plasma structures tightly connected by strong mutual influence The authors are all leading scientists in their fields making this book an authoritative up to date and enduring contribution to astrophysics

Dependency Structures from Syntax to Discourse Hongxin Zhang, 2023-09-28 Based on the large corpora of journalistic English this title examines dependency relations and related properties at both syntactic and discourse levels seeking to unravel the language patterns of real life usage With a focus on rank frequency distribution the author investigates the distribution of linguistic properties units from the perspectives of properties motifs and sequencings At the syntactic level the book analyses the following three dimensions various combinations of a complete dependency structure valency and dependency distance At the discourse level it proves that the elements can also form dependency relations by exploring 1 the rank frequency distribution of Rhetorical Structure Theory relations their motifs discourse valency and discourse dependency distance 2 whether there is top down organisation or an inverted pyramid structure at all the three discourse levels and 3 whether discourse dependency distances and valencies are lawfully distributed following the same distribution patterns as those at the syntactic level This book will be of great value for scholars and students of quantitative linguistics and computational linguistics and its practical insights will also benefit professionals of language teaching and journalistic writing Vibrant Architecture Rachel Armstrong, 2015-08-17 This book sets out the conditions under which the need for a new approach to the production of architecture in the twenty first century is established where our homes and cities are facing increasing pressures from environmental challenges that are compromising our lives and well being Vibrant architecture embodies a new kind of architectural design practice that explores how lively materials or vibrant matter may be incorporated into our buildings to confer on them some of the properties of living things such as movement growth sensitivity and self repair The theoretical and practical implications of how this may occur are explored through the application of a new group of materials Characteristically these substances possess some of the properties of living systems but may not have the full status of being truly alive They include forms of chemical artificial life such as dynamic droplets or

synthetically produced soils As complex systems they are able to communicate directly with the natural world using a shared language of chemistry and so negotiate their continued survival in a restless world Vibrant architecture may create new opportunities for architectural design practice that venture beyond top down form finding programs by enabling architects to co design in partnership with human and nonhuman collectives which result from the production of post natural landscapes Ultimately vibrant architecture may operate as an ecological platform for human development that augments the liveliness of our planet rather than diminishes it

Paradigms in Computing David Jason Gerber, Mariana Ibanez, 2015-01-01 Paradigms in Computing Making Machines and Models for Design Agency in Architecture brings together critical theoretical and practical research and design that illustrates the plurality of computing approaches within the broad spectrum of design and mediated practices It is an interrogation of our primary field of architecture through the lens of computing and yet one that realizes a productive expanding of our m tier s definition and boundaries It is a compilation that purposefully promotes architecture s disciplinary reach and incorporations beyond the design and construction of buildings and cities The book offers a glimpse into the wide range of positions and experiences that are shaping practice and discourse today The work included in Paradigms in Computing is evidence that models for enquiry are many and proliferating As digitalization and computation continue to infuse our processes with new tools and new design environments some of the trends collected in this book will continue to be central to the production and speculation of architecture and others will in retrospect be recognized as the seeds of new or perhaps multiple paradigms Included are essays and projects from Alisa Andrasek Rachel Armstrong Philip Beesley Tom Bessai Shajay Bhooshan Brad Cantrel Matias Del Campo Pablo Eiroa Marc Fornes David Jason Gerber Maria Paz Gutierrez Alvin Huang Jason Kelly Johnson Simon Kim Neil Leach Greg Lynn Elena and Anna Maria Manferdini Alex McDowell Phillippe Morel Nick Puckett Casey Reas Alex Robinson Jenny Sabin Jose Sanchez Patrik Schumacher Kyle Steinfeld Satoru Sugihara Orkan Telhan Kathy Velikov and Geoffrey Thun Tom Verebes Leire Asensio Villoria and David Mah Jenny Wu Eric Howeler and Meejin Yoon and Zaha Hadid Architects

22 Topic-wise CTET Paper 2 Mathematics& Science Previous Year Solved Papers (2024 - 2011) Class 6 - 8 Teachers | Child Development & Pedagogy, English & Hindi Language Disha Experts, 2024-10-22 The First edition of the book 22 TOPIC WISE CTET Paper 2 Mathematics Science Solved Papers 2024 2011 English Edition contains detailed Solutions to the Past 22 Solved Papers of the CTET exam from 2011 to 2024 The past 22 CTET Solved papers included are June 2011 Jan Section II mathematics has 15 Topics Section III Science has 16 Topics Section IV English 11 Topics Section V Hindi has 10 Topics The detailed solutions are provided immediately after each topic Solutions are provided for each question The languages covered in the tests are English 1st language and Hindi 2nd language The book is 100% useful for UPTET HTET MPTET CGTET UKTET HPTET BTET PTET and other STET Exam

A Comparative Survey of the RF-amide Peptide Superfamily Karine Rousseau, Sylvie Dufour, Hubert Vaudry, 2015-12-16 The discovery twelve years ago that the RF amide peptide kisspeptin acting via GPR54 is

essential for the onset of puberty and reproduction has been a major breakthrough in reproductive physiology. It has also put in front of the spotlights RF amide peptides and allowed to revive research on this superfamily. The first member of this family to be characterized in 1977 was the cardioexcitatory peptide FMRFamide isolated from the ganglia of the clam *Macrocallista nimbosa*. Since then a large number of these peptides designated after their C terminal arginine R and amidated phenylalaline F residues have been identified in representative species of all major phyla. By means of phylogenetic analyses the superfamily of RFamide peptides has been divided into five families in vertebrates: kisspeptin, QFRP including 26RFa, LPXRFa including GnIH and RFRP, PQRFa including NPFF and PrRP. Recent data reveal that SIFamide type neuropeptides in protostomian invertebrates and SALMFamide type neuropeptides in deuterostomian invertebrates share a common evolutionary origin with vertebrate LPXRFa and PQRFa. Interestingly in invertebrates as in vertebrates multiple genes as well as multiple mature peptides are often present in a single species questioning the need for such diversity in term of function. Comparative studies on non mammalian vertebrates and invertebrates allow major advances in the knowledge of the evolutionary history of the RF amide peptide superfamily. Such phylogenetical studies also contribute to improve classification and nomenclature of both peptides and receptors. RF amide peptides from different families have major evolutionary conserved roles in the control of reproduction but also of food intake, metabolism, energy expenditure, cardiovascular function, nociception and stress. They are also involved in the integration of environmental signals notably the photoperiod to regulate reproduction. For instance in most vertebrate species and especially in seasonal mammals kisspeptin and GnIH/RFRP have complementary but opposite effects in the control of reproductive function. In addition recent data show cross activities between the members of the RF amide peptide superfamily and their receptors. For example PrRP, kisspeptin and 26RFa are able to modulate nociception via NPFF receptors. Comparative studies have the potential to reveal novel regulatory mechanisms that could give a better comprehension of physiological functions and lead to new therapeutic treatments for related human pathologies. Thus kisspeptin antagonists have been developed as novel tools for treatment of hormone dependent disorders of reproduction such as precocious puberty and endometriosis or kisspeptin agonists for treatment of infertility in humans. Studies on lower vertebrate models can also contribute to the discovery of new roles of these peptides as seen recently with kisspeptin being involved in the early development of the medaka. This research topic will aim at gathering major advances achieved through comparative studies in mammalian and non mammalian vertebrates and invertebrates in the knowledge of RF amide peptides in term of evolutionary history and physiological roles.

DNA polymerases in Biotechnology Zvi Kelman, Andrew F Gardner, 2015-03-18 DNA polymerases are core tools for molecular biology including PCR, whole genome amplification, DNA sequencing and genotyping. Research has focused on discovery of novel DNA polymerases, characterization of DNA polymerase biochemistry and development of new replication assays. These studies have accelerated DNA polymerase engineering for biotechnology. For example DNA polymerases have been

engineered for increased speed and fidelity in PCR while lowering amplification sequence bias Inhibitor resistant DNA polymerase variants enable PCR directly from tissue i e blood Design of DNA polymerases that efficiently incorporate modified nucleotide have been critical for development of next generation DNA sequencing synthetic biology and other labeling and detection technologies The Frontiers in Microbiology Research Topic on DNA polymerases in Biotechnology aims to capture current research on DNA polymerases and their use in emerging technologies *Intra- and inter-species interactions in microbial communities* Luis Raul Comolli, Birgit Luef, Manfred Auer, 2015-03-03 Recent developments in various OMICs fields have revolutionized our understanding of the vast diversity and ubiquity of microbes in the biosphere However most of the current paradigms of microbial cell biology and our view of how microbes live and what they are capable of are derived from in vitro experiments on isolated strains Even the co culturing of mixed species to interrogate community behavior is relatively new But the majority of microorganisms lives in complex communities in natural environments under varying conditions and often cannot be cultivated Unless we obtain a detailed understanding of the near native 3D ultrastructure of individual community members the 3D spatial community organization their metabolic interdependences coordinated gene expression and the spatial organization of their macromolecular machines inventories as well as their communication strategies we won t be able to truly understand microbial community life How spatial and also temporal organization in cell cell interactions are achieved remains largely elusive For example a key question in microbial ecology is what mechanisms microbes employ to respond when faced with prey competitors or predators and changes in external factors Specifically to what degree do bacterial cells in biofilms act individually or with coordinated responses What are the spatial extent and coherence of coordinated responses In addition networks linking organisms across a dynamic range of physical constraints and connections should provide the basis for linked evolutionary changes under pressure from a changing environment Therefore we need to investigate microbial responses to altered or adverse environmental conditions including phages predators and competitors and their macromolecular metabolic responses according to their spatial organization We envision a diverse set of tools including optical spectroscopical chemical and ultrastructural imaging techniques that will be utilized to address questions regarding e g intra and inter organism interactions linked to ultrastructure and correlated adaptive responses in gene expression physiological and metabolic states as a consequence of the alterations of their environment Clearly strategies for co evolution and in general the display of adaptive strategies of a microbial network as a response to the altered environment are of high interest While a special focus will be placed on terrestrial sole species or mixed biofilms we are also interested in aquatic systems biofilms in general and microbes living in symbiosis In this Research Topic we wish to summarize and review results investigating interactions and possibly networks between microbes of the same or different species their co occurrence as well as spatiotemporal patterns of distribution Our goal is to include a broad spectrum of experimental and theoretical contributions from research and review articles to

hypothesis and theory aiming at understanding microbial interactions at a systems level **Introduction to Development Engineering** Temina Madon,Ashok J. Gadgil,Richard Anderson,Lorenzo Casaburi,Kenneth Lee,Arman Rezaee,2022-09-08 This open access textbook introduces the emerging field of Development Engineering and its constituent theories methods and applications It is both a teaching text for students and a resource for researchers and practitioners engaged in the design and scaling of technologies for low resource communities The scope is broad ranging from the development of mobile applications for low literacy users to hardware and software solutions for providing electricity and water in remote settings It is also highly interdisciplinary drawing on methods and theory from the social sciences as well as engineering and the natural sciences The opening section reviews the history of technology for development research and presents a framework that formalizes this body of work and begins its transformation into an academic discipline It identifies common challenges in development and explains the book s iterative approach of innovation implementation evaluation adaptation Each of the next six thematic sections focuses on a different sector energy and environment market performance education and labor water sanitation and health digital governance and connectivity These thematic sections contain case studies from landmark research that directly integrates engineering innovation with technically rigorous methods from the social sciences Each case study describes the design evaluation and or scaling of a technology in the field and follows a single form with common elements and discussion questions to create continuity and pedagogical consistency Together they highlight successful solutions to development challenges while also analyzing the rarely discussed failures The book concludes by reiterating the core principles of development engineering illustrated in the case studies highlighting common challenges that engineers and scientists will face in designing technology interventions that sustainably accelerate economic development Development Engineering provides for the first time a coherent intellectual framework for attacking the challenges of poverty and global climate change through the design of better technologies It offers the rigorous discipline needed to channel the energy of a new generation of scientists and engineers toward advancing social justice and improved living conditions in low resource communities around the world **Minerals Yearbook** Mines Bureau,Geological Survey,Interior Department,2017-03-06 The region of Europe and Central Eurasia defined in this volume encompasses territory that extends from the Atlantic Coast of Europe to the Pacific Coast of the Russian Federation It includes the British Isles Iceland and Greenland a self governing part of the Kingdom of Denmark Included are mineral commodity outlook tables plus global overview research for particularly commodities within a specific regions countries are presented throughout the text Manufacturers of these metals and commodities along with trade brokers that may specialize in imports and exports political scientists and economists may also be interested in this volume Students pursuing research on specific metals and mineral commodities for world economy courses may be interested in this volume Related products Other print volumes in the Minerals Yearbook series can be found here https://bookstore.gpo.gov/catalog/science/technology/minerals/metals/minerals_yearbook Minerals and Metals resources

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The unfolded protein response in virus infections. Shiu-Wan Chan, 2015-03-05 Unfolded protein response UPR is a cellular adaptive response for restoring endoplasmic reticulum ER homeostasis in response to ER stress. Perturbation of the UPR and failure to restore ER homeostasis inevitably leads to diseases. It has now become evident that perturbation of the UPR is the cause of many important human diseases such as neurodegenerative diseases, cystic fibrosis, diabetes, and cancer. It has recently emerged that virus infections can trigger the UPR, but the relationship between virus infections and host UPR is intriguing. On one hand, UPR is harmful to the virus, and virus has developed means to subvert the UPR. On the other hand, virus exploits the host UPR to assist in its own infection, gene expression, establishment of persistence, reactivation from latency, and to evade the immune response. When this delicate balance of virus-host UPR interaction is broken down, it may cause diseases. This is particularly challenging for viruses that establish a chronic infection to maintain this balance. Each virus interacts with the host UPR in a different way to suit their life style, and how the virus interacts with the host UPR can define the characteristic of a particular virus infection. Understanding how a particular virus interacts with the host UPR may pave the way to the design of a new class of anti-viral that targets this particular pathway to skew the response towards anti-virus. This knowledge can also be translated into the clinics to help re-design oncolytic virotherapy and gene therapy. In this research topic, we aimed to compile a collection of focused review articles, original research articles, commentary, opinion, hypothesis, and methods to highlight the current advances in this burgeoning area of research in an attempt to provide an in-depth understanding of how viruses interact with the host UPR, which may be beneficial to the future combat of viral and human diseases.

Highly Mutable Animal RNA Viruses: Adaptation and Evolution Akio Adachi, Masako Nomaguchi, 2017-11-30 Viruses are widely present in nature, and numerous viral species with a variety of unique characteristics have been identified so far. Even now, new emerging or re-emerging viruses are being found or re-found as novel viral classes or as quasi-species. Indeed, viruses are everywhere. Of note, viruses are pivotal as targets and tools of basic and applied sciences. On one hand, portions of the viruses are infectious for animals, including humans, and cause various diseases in infected hosts by distinct mechanisms and at a different level of severity. While many of viruses are known to co-exist quietly with their hosts, pathogenic viruses certainly affect and threaten our society as well as individuals to provoke serious medical or economic attention. We should act against certain dreadful and highly infectious viruses as a global problem. Animal RNA viruses can readily mutate to adapt themselves in their hostile environments for their survival. Resultant viruses may sometimes show essentially altered phenotypes from the original parental strains. This fundamental and general property of animal RNA viruses represents major extensive issues of scientific, medical, and/or economic importance. In this Research Topic, we have focused on the high mutability of animal RNA viruses and selected relevant articles on animal viruses of broad ranges such as primate lentiviruses, influenza viruses, paramyxoviruses, flaviviruses, rabies virus, norovirus.

picornaviruses and picobirnavirus Each article has taken up intriguing aspects of the subject viruses We are sure that readers acquire important information on virus mutation adaptation diversification and evolution and hope that researchers in the field related to virology gain some solid hints from the reported articles for further virological and or medical studies Finally we thank all the contributing researchers in this Research Topic entitled Highly Mutable Animal RNA Viruses

Adaptation and Evolution for their elegant and interesting works **Manifest Your Magnificence** Joan E.

Walmsley,2015-10-22 This book describes the synthesis currently occurring between science and metaphysics that reveals the energetic nature of all life and the amazing truth behind physical reality It discusses the relationship between energy and consciousness and how management of your own energy signature can change your reality and even your physical body It demonstrates how you can connect to the immense energy available at the higher frequencies of your own being to manifest abundance love and peace for yourself your family your business your community and your world This book brings together energetic science and universal spiritual intelligence in a way that is understandable and practical If you are ready to take responsibility for your life and manifest your own magnificence this is for you Susan T Howson MA CPCC PCC CHBC founder of Magnificent Creations Limitee and Kids Coaching Connection A very current description of where science is in relation to the deeper wisdom of spiritual writings and teachings It is a book for the 21st century Catherine Nelson MA PhD founder of Rocky Mountain Pathwork The practical exercises give us a chance to feel the energy surging through us and around us I hope many people get a chance to read this David Newby MBA director of InTouch Insight Systems Exceptionally well written organized and presented Manifest Your Magnificence The Energetics of Being is an inherently thoughtful and thought provoking read that might well provide a life changing experience and is very highly recommended for both community and academic library collections It should be noted for personal self help self improvement reading lists that Manifest Your Magnificence is also available in a paperback edition 9781504341035 24 99 Susan Bethany Reviewer Midwest Book Review Curriculum Applications In Microbiology: Bioinformatics In The Classroom Mel Crystal Melendrez,Brad W.

Goodner,Christopher Kvaal,C. Titus Brown,Sophie Shaw,2021-09-08

Morphological Plant Modeling: Unleashing Geometric and Topological Potential within the Plant Sciences Alexander Bucksch,Dan Chitwood,2017-10-13 An increasing population faces the growing demand for agricultural products and accurate global climate models that account for individual plant morphologies to predict favorable human habitat Both demands are rooted in an improved understanding of the mechanistic origins of plant development Such understanding requires geometric and topological descriptors to characterize the phenotype of plants and its link to genotypes However the current plant phenotyping framework relies on simple length and diameter measurements which fail to capture the exquisite architecture of plants The Research Topic Morphological Plant Modeling Unleashing Geometric and Topological Potential within the Plant Sciences is the result of a workshop held at National Institute for Mathematical and Biological Synthesis NIMBioS in Knoxville Tennessee From 2 4

September 2015 over 40 scientists from mathematics computer science engineering physics and biology came together to set new frontiers in combining plant phenotyping with recent results from shape theory at the interface of geometry and topology In doing so the Research Topic synthesizes the views from multiple disciplines to reveal the potential of new mathematical concepts to analyze and quantify the relationship between morphological plant features As such the Research Topic bundles examples of new mathematical techniques including persistent homology graph theory and shape statistics to tackle questions in crop breeding developmental biology and vegetation modeling The challenge to model plant morphology under field conditions is a central theme of the included papers to address the problems of climate change and food security that require the integration of plant biology and mathematics from geometry and topology research applied to imaging and simulation techniques The introductory white paper written by the workshop participants identifies future directions in research education and policy making to integrate biological and mathematical approaches and to strengthen research at the interface of both disciplines

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