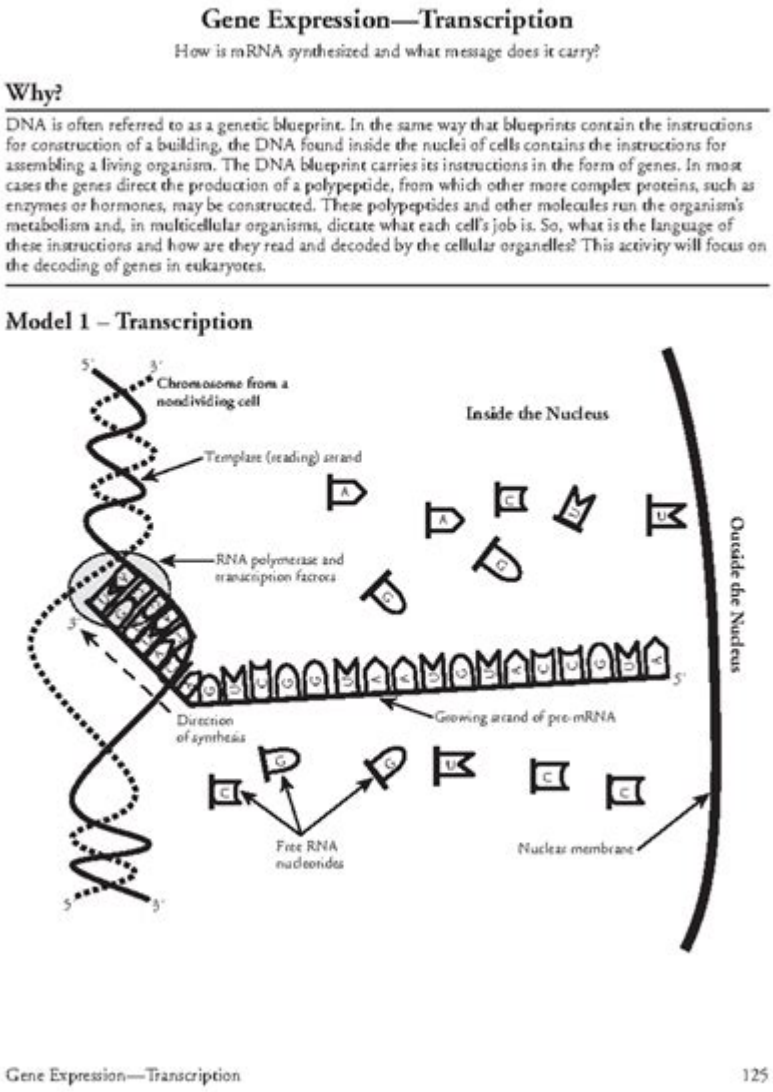
Gene Expression Transcription Pogil



Gene Expression—Transcription

How is mRNA synthesized and what message does it carry?

Why?

DNA is often referred to as a genetic blueprint. In the same way that blueprints contain the instructions for construction of a building, the DNA found inside the nuclei of cells contains the instructions for assembling a living organism. The DNA blueprint carries its instructions in the form of genes. In most cases the genes direct the production of a polypeptide, from which other more complex proteins, such as enzymes or hormones, may be constructed. These polypeptides and other molecules run the organism's metabolism and, in multicellular organisms, dictate what each cell's job is. So, what is the language of these instructions and how are they read and decoded by the cellular organelles? This activity will focus on the decoding of genes in eukaryotes.

Model 1 – Transcription

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Gene Expression Transcription POGIL: A Deep Dive into the Central Dogma

Unlocking the secrets of life hinges on understanding how genetic information flows from DNA to proteins. This intricate process, known as gene expression, is a fundamental concept in biology, and the POGIL activities (Process Oriented Guided Inquiry Learning) offer a powerful way to grasp its complexities. This comprehensive guide delves into the intricacies of gene expression, focusing specifically on transcription, the crucial first step. We'll explore the POGIL approach, dissect the key concepts, and provide you with the tools to master this vital biological process. Prepare to elevate your understanding of gene expression transcription POGIL!

What is Gene Expression Transcription?

Before diving into the POGIL methodology, let's establish a solid foundation. Gene expression is the process by which the information encoded in a gene's DNA sequence is used to synthesize a functional gene product, typically a protein. This process is not a single event but a multi-step cascade. Transcription, the first step, is the synthesis of an RNA molecule (messenger RNA or mRNA) that is complementary to a DNA sequence. This mRNA molecule then serves as a blueprint for protein synthesis in the subsequent process of translation.

The Players Involved in Transcription

Several key players orchestrate this intricate dance:

DNA: The template containing the genetic information.
RNA Polymerase: The enzyme responsible for synthesizing the mRNA molecule.
Promoter Region: A specific DNA sequence that signals the start of transcription.
Transcription Factors: Proteins that regulate the binding of RNA polymerase to the promoter and thus control the rate of transcription.
Terminator Sequence: A DNA sequence signaling the end of transcription.

Understanding the Transcription Process Step-by-Step

1. Initiation: RNA polymerase binds to the promoter region of the DNA, aided by transcription factors.
2. Elongation: RNA polymerase unwinds the DNA double helix and synthesizes a complementary mRNA molecule using ribonucleotides as building blocks.
3. Termination: RNA polymerase reaches the terminator sequence, causing it to detach from the DNA and release the newly synthesized mRNA molecule.

The Power of POGIL in Mastering Gene Expression Transcription

POGIL activities provide a student-centered, collaborative learning experience. Instead of passively receiving information, students actively participate in constructing their understanding through guided inquiry. This approach enhances critical thinking, problem-solving skills, and deepens comprehension of complex biological processes like gene expression transcription.

How POGIL Activities Enhance Learning

POGIL activities on gene expression transcription typically involve:

Collaborative Group Work: Students work together, discussing concepts and solving problems.
Guided Inquiry: The activities provide a framework for investigation, prompting students to analyze data and draw conclusions.
Model Building: Students often build models of the transcription process, visualizing the interaction of different molecules.
Critical Analysis: Students are encouraged to evaluate evidence and justify their reasoning.

Tackling Common Challenges in Understanding Gene Expression Transcription POGIL

Students often struggle with certain aspects of gene expression transcription. Common difficulties include:

Differentiating between DNA and RNA: Understanding the structural differences and the roles of each molecule is crucial.
Visualizing the Transcription Process: The dynamic nature of transcription can be difficult to grasp without visual aids.
Understanding the Role of Regulatory Elements: The influence of promoters, enhancers, and silencers on gene expression can be challenging.

Overcoming These Hurdles with Effective POGIL Strategies

POGIL's interactive nature directly addresses these challenges. Through guided discussions and model building, students can visualize the processes and gain a deeper understanding of the underlying principles. By working collaboratively, students can help each other overcome misunderstandings and solidify their grasp of the material.

Beyond the Basics: Advanced Concepts in Gene Expression Transcription

Once you have a solid grasp of the fundamentals, you can delve into more advanced concepts, such as:

RNA Processing: The modifications mRNA undergoes before translation, including splicing, capping, and polyadenylation.
Regulation of Gene Expression: The intricate mechanisms that control the rate of transcription, such as epigenetic modifications and the influence of signaling pathways.
Transcriptional Regulation in Different Organisms: Understanding how transcription is regulated in prokaryotes versus eukaryotes.

Conclusion

Mastering gene expression transcription is a cornerstone of understanding cellular biology. The POGIL approach, with its emphasis on active learning and collaborative inquiry, provides a powerful tool for navigating the complexities of this crucial process. By actively participating in POGIL activities, you can not only improve your comprehension of gene expression but also develop valuable problem-solving and critical thinking skills that will serve you well throughout your scientific journey.

FAQs

Q1: What is the difference between transcription and translation?

A1: Transcription is the synthesis of RNA from a DNA template, while translation is the synthesis of a protein from an mRNA template. Transcription occurs in the nucleus (in eukaryotes), while translation occurs in the cytoplasm.

Q2: What are some examples of transcription factors?

A2: There are many transcription factors, each with specific roles. Some examples include activators (e.g., SP1) that enhance transcription and repressors (e.g., CTCF) that inhibit transcription.

Q3: How does RNA polymerase recognize the promoter region?

A3: RNA polymerase recognizes specific DNA sequences within the promoter region, often with the help of transcription factors that bind to the DNA and interact with the polymerase.

Q4: What are the different types of RNA involved in gene expression?

A4: Besides mRNA, other types of RNA play critical roles, including tRNA (transfer RNA), rRNA (ribosomal RNA), and snRNA (small nuclear RNA), each with specific functions in protein synthesis and gene regulation.

Q5: How can I find more POGIL activities on gene expression transcription?

A5: Many educational resources and websites offer POGIL activities. Search online for "POGIL gene

expression" or "POGIL transcription" to find relevant materials. You can also check with your instructor or university library for access to these valuable learning tools.

Gene Expression: Transcription POGIL – A Deep Dive

Unlocking the secrets of life hinges on understanding how our genes function. This intricate process, known as gene expression, is a fundamental concept in biology. This post delves into the critical step of gene expression—transcription, using the popular POGIL (Process-Oriented Guided Inquiry Learning) approach to guide you through the complexities of this vital cellular mechanism. We'll explore the players involved, the step-by-step process, and the implications of errors along the way. Get ready to unravel the fascinating world of genetic information flow!

Understanding Gene Expression: The Central Dogma

Before we jump into the intricacies of transcription, let's establish a foundational understanding of gene expression. The central dogma of molecular biology describes the flow of genetic information: DNA → RNA → Protein. This process dictates how the information encoded within our DNA is translated into functional proteins that perform myriad tasks within the cell. Gene expression is the process by which this information is accessed and utilized. It's a tightly regulated process, ensuring the right proteins are made at the right time and in the right amounts.

The Two Main Stages: Transcription and Translation

Gene expression is broadly divided into two main stages:

Transcription: This is the process of creating an RNA copy of a DNA sequence. Think of it as making a working blueprint from the master plan (DNA). This RNA copy, specifically messenger RNA (mRNA), carries the genetic code to the ribosomes.
Translation: This stage involves the ribosomes "reading" the mRNA blueprint and assembling the corresponding amino acid sequence to build a functional protein. This protein then carries out its specific role in the cell.

Transcription: The POGIL Approach

POGIL activities encourage active learning and collaborative problem-solving. Let's explore the transcription process using a POGIL-inspired framework:

1. The Players Involved:

DNA: The template containing the genetic code. It's a double-stranded molecule, and only one strand serves as the template for transcription.
RNA Polymerase: The enzyme responsible for synthesizing the RNA molecule. It binds to specific regions of DNA called promoters.
Promoters: These are specific DNA sequences that signal the starting point of transcription. They act like "start" buttons for the RNA polymerase.
Transcription Factors: Proteins that bind to the DNA and regulate the activity of RNA polymerase. They can either enhance or repress transcription.
mRNA: The RNA molecule produced during transcription. It carries the genetic code to the ribosome for protein synthesis.

2. The Transcription Process Step-by-Step:

1. Initiation: RNA polymerase binds to the promoter region of the DNA. Transcription factors help regulate this binding.
2. Elongation: RNA polymerase unwinds the DNA double helix and begins synthesizing the mRNA molecule using the DNA template strand. It adds nucleotides complementary to the DNA sequence.
3. Termination: RNA polymerase reaches a termination signal on the DNA, indicating the end of the gene. The RNA polymerase detaches, and the newly synthesized mRNA is released.

3. Post-Transcriptional Modifications:

In eukaryotic cells (cells with a nucleus), the newly synthesized mRNA undergoes several modifications before it's ready for translation. This includes:

Capping: Adding a protective cap to the 5' end of the mRNA.
Splicing: Removing non-coding regions (introns) and joining the coding regions (exons).
Polyadenylation: Adding a tail of adenine nucleotides to the 3' end.

These modifications are crucial for mRNA stability, transport, and translation efficiency.

Errors in Transcription and their Consequences

Errors during transcription can have significant consequences. These errors can range from minor alterations in the mRNA sequence to complete failure of transcription. Such errors can lead to the production of non-functional or even harmful proteins, potentially contributing to genetic diseases or

other cellular malfunctions.

Conclusion

Understanding gene expression, particularly the intricacies of transcription, is paramount for grasping the fundamental principles of molecular biology. Utilizing a POGIL approach helps solidify this knowledge through active engagement and problem-solving. By understanding the steps involved, the key players, and the potential consequences of errors, we gain a deeper appreciation for the remarkable precision and regulation of this crucial cellular process. This knowledge forms the foundation for further explorations into advanced genetics, genomics, and biotechnology.

FAQs

1. What is the difference between DNA and RNA? DNA is a double-stranded molecule that stores genetic information, while RNA is a single-stranded molecule involved in gene expression. RNA has uracil (U) instead of thymine (T) found in DNA.

2. What are some examples of transcription factors? There are thousands of transcription factors, with examples including p53 (a tumor suppressor), CREB (involved in memory formation), and NF-κB (involved in inflammation).

3. How is transcription regulated? Transcription is regulated at multiple levels, including controlling the accessibility of the DNA, the activity of RNA polymerase, and the action of transcription factors.

4. What happens if there's an error in splicing? Incorrect splicing can lead to the production of non-functional proteins or proteins with altered functions. This can have significant consequences for the cell and the organism.

5. How can I learn more about gene expression? Numerous online resources, textbooks, and research articles provide extensive information on gene expression and transcription. Consider exploring online courses, university lectures, and scientific journals.

gene expression transcription pogil: Biology for AP ® Courses Julianne Zedalis, John Eggebrecht, 2017-10-16 Biology for AP® courses covers the scope and sequence requirements of a typical two-semester Advanced Placement® biology course. The text provides comprehensive coverage of foundational research and core biology concepts through an evolutionary lens. Biology for AP® Courses was designed to meet and exceed the requirements of the College Board's AP® Biology framework while allowing significant flexibility for instructors. Each section of the book includes an introduction based on the AP® curriculum and includes rich features that engage students in scientific practice and AP® test preparation; it also highlights careers and research opportunities in biological sciences.

gene expression transcription pogil: *Principles of Biology* Lisa Bartee, Walter Shiner, Catherine Creech, 2017 The Principles of Biology sequence (BI 211, 212 and 213) introduces biology as a scientific discipline for students planning to major in biology and other science disciplines. Laboratories and classroom activities introduce techniques used to study biological processes and provide opportunities for students to develop their ability to conduct research.

gene expression transcription pogil: Preparing for the Biology AP Exam Neil A. Campbell, Jane B. Reece, Fred W. Holtzclaw, Theresa Knapp Holtzclaw, 2009-11-03 Fred and Theresa Holtzclaw bring over 40 years of AP Biology teaching experience to this student manual. Drawing on their rich experience as readers and faculty consultants to the College Board and their participation on the AP Test Development Committee, the Holtzclaws have designed their resource to help your students prepare for the AP Exam. Completely revised to match the new 8th edition of Biology by Campbell and Reece. New Must Know sections in each chapter focus student attention on major concepts. Study tips, information organization ideas and misconception warnings are interwoven throughout. New section reviewing the 12 required AP labs. Sample practice exams. The secret to success on the AP Biology exam is to understand what you must know and these experienced AP teachers will guide your students toward top scores!

gene expression transcription pogil: *The Making of the Fittest: DNA and the Ultimate Forensic Record of Evolution* Sean B. Carroll, 2007-08-28 A geneticist discusses the role of DNA in the evolution of life on Earth, explaining how an analysis of DNA reveals a complete record of the events that have shaped each species and how it provides evidence of the validity of the theory of evolution.

gene expression transcription pogil: POGIL Activities for AP Biology , 2012-10

gene expression transcription pogil: Eukaryotic Gene Expression Ajit Kumar, 2013-03-09 The recent surge of interest in recombinant DNA research is understandable considering that biologists from all disciplines, using recently developed mo lecular techniques, can now study with great precision the structure and regulation of specific genes. As a discipline, molecular biology is no longer a mere subspeciality of biology or biochemistry: it is the new biology. Current approaches to the outstanding problems in virtually all the traditional disci plines in biology are now being explored using the recombinant DNA tech nology. In this atmosphere of rapid progress, the role of information exchange and swift publication becomes quite crucial. Consequently, there has been an equally rapid proliferation of symposia volumes and review articles, apart from the explosion in popular science magazines and news media, which are always ready to simplify and sensationalize the implications of recent dis coveries, often before the scientific community has had the opportunity to fully scrutinize the developments. Since many of the recent findings in this field have practical implications, quite often the symposia in molecular biology are sponsored by private industry and are of specialized interest and in any case quite expensive for students to participate in. Given that George Wash ington University is a teaching institution, our aim in sponsoring these Annual Spring Symposia is to provide, at cost, a forum for students and experts to discuss the latest developments in selected areas of great significance in biology. Additionally, since the University is located in Washington, D. C.

gene expression transcription pogil: *Teaching at Its Best* Linda B. Nilson, 2010-04-20 Teaching at Its Best This third edition of the best-selling handbook offers faculty at all levels an essential toolbox of hundreds of practical teaching techniques, formats, classroom activities, and exercises, all of which can be implemented immediately. This thoroughly revised edition includes the newest portrait of the Millennial student; current research from cognitive psychology; a focus on outcomes maps; the latest legal options on copyright issues; and how to best use new technology including wikis, blogs, podcasts, vodcasts, and clickers. Entirely new chapters include subjects such as matching teaching methods with learning outcomes, inquiry-guided learning, and using visuals to teach, and new sections address Felder and Silverman's Index of Learning Styles, SCALE-UP classrooms, multiple true-false test items, and much more. Praise for the Third Edition of Teaching at Its BestEveryone veterans as well as novices will profit from reading Teaching at Its Best, for it

provides both theory and practical suggestions for handling all of the problems one encounters in teaching classes varying in size, ability, and motivation. Wilbert McKeachie, Department of Psychology, University of Michigan, and coauthor, McKeachie's Teaching TipsThis new edition of Dr. Nilson's book, with its completely updated material and several new topics, is an even more powerful collection of ideas and tools than the last. What a great resource, especially for beginning teachers but also for us veterans! L. Dee Fink, author, Creating Significant Learning ExperiencesThis third edition of Teaching at Its Best is successful at weaving the latest research on teaching and learning into what was already a thorough exploration of each topic. New information on how we learn, how students develop, and innovations in instructional strategies complement the solid foundation established in the first two editions. Marilla D. Svinicki, Department of Psychology, The University of Texas, Austin, and coauthor, McKeachie's Teaching Tips

gene expression transcription pogil: Basic Concepts in Biochemistry: A Student's Survival Guide Hiram F. Gilbert, 2000 Basic Concepts in Biochemistry has just one goal: to review the toughest concepts in biochemistry in an accessible format so your understanding is through and complete.--BOOK JACKET.

gene expression transcription pogil: *Transcription and Splicing* B. D. Hames, David M. Glover, 1988 This book gives a co-ordinated review of our present knowledge of eukaryotic RNA synthesis.

gene expression transcription pogil: The Double Helix James D. Watson, 1969-02 Since its publication in 1968, The Double Helix has given countless readers a rare and exciting look at one highly significant piece of scientific research-Watson and Crick's race to discover the molecular structure of DNA.

gene expression transcription pogil: *The Operon* Jeffrey H. Miller, William S. Reznikoff, 1980

gene expression transcription pogil: Eukaryotic Transcription Factors David S. Latchman, 2010-07-28 Transcription, or the process by which DNA produces RNA, is a central aspect of gene expression. Transcription factors regulate transcription during development and in disease states. As such, it is critical for researchers to gain a good understanding of the relationship between the structure of various families of transcription factors and their function, as well as roles in human disease. Since publication of the Fourth Edition, there have been major advances, notably in the areas of chromatin remodeling and genome-scale analyses. This complete update includes all new coverage of the latest developments, from enabling genomic technologies to studies on the importance of post-translational modifications beyond phosphorylation events. - Potential of transcription factors as therapeutic targets in human disease - Importance of histone modifications - Use of genome-based sequence analysis and high-throughput methods - Applications of the chromatin immunoprecipitation (ChIP) assay - Transcriptional elongation - Regulation by post-translational modifications - Regulatory networks and bioinformatics

gene expression transcription pogil: Transcription Factors Joseph Locker, 2003-12-16 Transcription factors are important in regulating gene expression, and their analysis is of paramount interest to molecular biologists studying this area. This book looks at the basic machinery of the cell involved in transcription in eukaryotes and factors that control transcription in eukaryotic cells. It examines the regulatory systems that modulate gene expression in all cells,a s well as the more specialized systems that regulate localized gene expression throughout the mammalian organism. Transcription Factors updates classical knowledge with recent advances to provide a full and comprehensive coverage of the field for postgraduates and researchers in molecular biology involved in the study of gene regulation.

gene expression transcription pogil: *The Molecular Basis of Heredity* A.R. Peacocke, R.B. Drysdale, 2013-12-17

gene expression transcription pogil: Gene Regulation David S. Latchman, 1998 The previous editions of Gene Regulation have helped students in biological science and medicine gain a full understanding of the issues of gene regulation. In this edition, new material reflects the progress that has been made in the understanding of gene regulation. The most significant change is the

addition of an extra chapter describing the basic processes by which DNA is converted in RNA and then into protein. This important new chapter makes this edition complete as a textbook on gene expression and its regulation.

gene expression transcription pogil: Genetics Benjamin A. Pierce, 2013-12-27 With Genetics: A Conceptual Approach, Pierce brings a master teacher's experiences to the introductory genetics textbook, clarifying this complex subject by focusing on the big picture of genetics concepts. The new edition features an emphasis on problem-solving and relevant applications, while incorporating the latest trends in genetics research.

gene expression transcription pogil: *The Pancreatic Beta Cell* , 2014-02-20 First published in 1943, Vitamins and Hormones is the longest-running serial published by Academic Press. The Series provides up-to-date information on vitamin and hormone research spanning data from molecular biology to the clinic. A volume can focus on a single molecule or on a disease that is related to vitamins or hormones. A hormone is interpreted broadly so that related substances, such as transmitters, cytokines, growth factors and others can be reviewed. This volume focuses on the pancreatic beta cell. - Expertise of the contributors - Coverage of a vast array of subjects - In depth current information at the molecular to the clinical levels - Three-dimensional structures in color - Elaborate signaling pathways

gene expression transcription pogil: A Handbook of Transcription Factors Timothy R. Hughes, 2011-05-10 Transcription factors are the molecules that the cell uses to interpret the genome: they possess sequence-specific DNA-binding activity, and either directly or indirectly influence the transcription of genes. In aggregate, transcription factors control gene expression and genome organization, and play a pivotal role in many aspects of physiology and evolution. This book provides a reference for major aspects of transcription factor function, encompassing a general catalogue of known transcription factor classes, origins and evolution of specific transcription factor types, methods for studying transcription factor binding sites in vitro, in vivo, and in silico, and mechanisms of interaction with chromatin and RNA polymerase.

gene expression transcription pogil: Adapted Primary Literature Anat Yarden, Stephen P. Norris, Linda M. Phillips, 2015-03-16 This book specifies the foundation for Adapted Primary Literature (APL), a novel text genre that enables the learning and teaching of science using research articles that were adapted to the knowledge level of high-school students. More than 50 years ago, J.J. Schwab suggested that Primary Scientific Articles “afford the most authentic, unretouched specimens of enquiry that we can obtain” and raised for the first time the idea that such articles can be used for “enquiry into enquiry”. This book, the first to be published on this topic, presents the realization of this vision and shows how the reading and writing of scientific articles can be used for inquiry learning and teaching. It provides the origins and theory of APL and examines the concept and its importance. It outlines a detailed description of creating and using APL and provides examples for the use of the enactment of APL in classes, as well as descriptions of possible future prospects for the implementation of APL. Altogether, the book lays the foundations for the use of this authentic text genre for the learning and teaching of science in secondary schools.

gene expression transcription pogil: Gene Regulation in Eukaryotes Edgar Wingender, 1993 A much-needed guide through the overwhelming amount of literature in the field. Comprehensive and detailed, this book combines background information with the most recentinsights. It introduces current concepts, emphasizing the transcriptional control of genetic information. Moreover, it links data on the structure of regulatory proteins with basic cellular processes. Both advanced students and experts will find answers to such intriguing questions as: - How are programs of specific gene repertoires activated and controlled? - Which genes drive and control morphogenesis? - Which genes govern tissue-specific tasks? - How do hormones control gene expression in coordinating the activities of different tissues? An abundant number of clearly presented glossary terms facilitates understanding of the biological background. Speacial feature: over 2200 (!) literature references.

gene expression transcription pogil: Focus on Life Science California Michael J. Padilla, 2008

Provides many approaches to help students learn science: direct instruction from the teacher, textbooks and supplementary materials for reading, and laboratory investigations and experiments to perform. It also provides for the regular teaching and practice of reading and vocabulary skills students need to use a science textbook successfully.

gene expression transcription pogil: Control of Messenger RNA Stability Joel Belasco, Joel G. Belasco, George Brawerman, 1993-04-06 This is the first comprehensive review of mRNA stability and its implications for regulation of gene expression. Written by experts in the field, Control of Messenger RNA Stability serves both as a reference for specialists in regulation of mRNA stability and as a general introduction for a broader community of scientists. Provides perspectives from both prokaryotic and eukaryotic systems Offers a timely, comprehensive review of mRNA degradation, its regulation, and its significance in the control of gene expression Discusses the mechanisms, RNA structural determinants, and cellular factors that control mRNA degradation Evaluates experimental procedures for studying mRNA degradation

gene expression transcription pogil: *Cell-Free Gene Expression* Ashty S. Karim, Michael C. Jewett, 2022-01-06 This detailed volume explores perspectives and methods using cell-free expression (CFE) to enable next-generation synthetic biology applications. The first section focuses on tools for CFE systems, including a primer on DNA handling and reproducibility, as well as methods for cell extract preparation from diverse organisms and enabling high-throughput cell-free experimentation. The second section provides an array of applications for CFE systems, such as metabolic engineering, membrane-based and encapsulated CFE, cell-free sensing and detection, and educational kits. Written for the highly successful Methods in Molecular Biology series, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and practical, Cell-Free Gene Expression: Methods and Protocols serves as an ideal guide for researchers seeking technical methods to current aspects of CFE and related applications.

gene expression transcription pogil: The Hormonal Control of Gene Transcription P. Cohen, J.G. Foulkes, 2012-12-02 Over the past few years there have been considerable advances in our understanding of cellular control mechanisms, and current research is now linking areas of biology that were previously thought of as being quite separate. Molecular Aspects of Cellular Regulation is a series of occasional books on multidisciplinary topics which illustrate general principles of cellular regulation. Previous volumes described Recently Discovered Systems of Enzyme Regulation by Reversible Phosphorylation (Volumes 1 and 3), The Molecular Actions of Toxins and Viruses (Volume 2), Molecular Mechanisms of Transmembrane Signalling (Volume 4) and Calmodulin (Volume 5). This sixth volume, The Hormonal Control of Gene Transcription, has now been published to highlight recent important advances in our understanding of this topic which is linking two of the most active areas of current biochemical and molecular biological research (hormone action and gene transcription) and leading to the emergence of unifying concepts.

gene expression transcription pogil: Resistance of Pseudomonas Aeruginosa Michael Robert Withington Brown, 1975

gene expression transcription pogil: Photoperiodism in Plants Brian Thomas, Daphne Vince-Prue, 1996-10-17 Photoperiodism is the response to the length of the day that enables living organisms to adapt to seasonal changes in their environment as well as latitudinal variation. As such, it is one of the most significant andcomplex aspects of the interaction between plants and their environment and is a major factor controlling their growth and development. As the new and powerful technologies of molecular genetics are brought to bear on photoperiodism, it becomes particularly important to place new work in the context of the considerable amount of physiological information which already exists on the subject. This innovative book will be of interest to a wide range of plant scientists, from those interested in fundamental plant physiology and molecular biology to agronomists and crop physiologists. - Provides a self-sufficient account of all the important subjects and key literature references for photoperiodism - Includes research of the last twenty

years since the publication of the First Edition - Includes details of molecular genetic techniques brought to bear on photoperiodism

gene expression transcription pogil: Prokaryotic Gene Expression Simon Baumberg, 1999-05-27 Prokaryotic gene expression is not only of theoretical interest but also of highly practical significance. It has implications for other biological problems, such as developmental biology and cancer, brings insights into genetic engineering and expression systems, and has consequences for important aspects of applied research. For example, the molecular basis of bacterial pathogenicity has implications for new antibiotics and in crop development. Prokaryotic Gene Expression is a major review of the subject, providing up-to-date coverage as well as numerous insights by the prestigious authors. Topics covered include operons; protein recognition of sequence specific DNA- and RNA-binding sites; promoters; sigma factors, and variant tRNA polymerases; repressors and activators; post-transcriptional control and attenuation; ribonuclease activity, mRNA stability, and translational repression; prokaryotic DNA topology, topoisomerases, and gene expression; regulatory networks, regulatory cascades and signal transduction; phosphotransfer reactions; switch systems, transcriptional and translational modulation, methylation, and recombination mechanisms; pathogenicity, toxin regulation and virulence determinants; sporulation and genetic regulation of antibiotic production; origins of regulatory molecules, selective pressures and evolution of prokaryotic regulatory mechanisms systems. Over 1100 references to the primary literature are cited. Prokaryotic Gene Expression is a comprehensive and authoritative review of current knowledge and research in the area. It is essential reading for postgraduates and researchers in the field. Advanced undergraduates in biochemistry, molecular biology, and microbiology will also find this book useful.

gene expression transcription pogil: Concepts of Biology Samantha Fowler, Rebecca Roush, James Wise, 2023-05-12 Black & white print. Concepts of Biology is designed for the typical introductory biology course for nonmajors, covering standard scope and sequence requirements. The text includes interesting applications and conveys the major themes of biology, with content that is meaningful and easy to understand. The book is designed to demonstrate biology concepts and to promote scientific literacy.

gene expression transcription pogil: Transfer and Expression of Eukaryotic Genes H.S. Ginsberg, 2012-12-02 Transfer and Expression of Eukaryotic Genes documents the progress in our understanding of the transfer and expression of eukaryotic genes. This book covers topics organized around three themes: gene expression and its regulation; in vivo gene transfer and development; and viral gene and oncogene systems. This text is divided into three sections encompassing 25 chapters and begins with an overview of the molecular basis of gene expression, with emphasis on transcription complexes that account for transcription control in eukaryotic genes. It then turns to experiments that assess the in vitro stimulatory effect of the SV40 72-bp repeat on specific transcription from heterologous promoter elements using a HeLa whole cell extract. The reader is methodically introduced to the regulation signals and factors of histone gene transcription; transcriptional control of beta-globin and liver-specific genes in mouse cells; and gene transfer in Drosophila and the sea urchin Strongylocentrotus purpuratus. This book also considers the splicing of messenger RNA precursors and the regulation of thymidine kinase enzyme expression, and then concludes with a chapter that describes the activation of the myc oncogene by chromosomal translocation. This book will be of interest to students and researchers in fields ranging from molecular genetics to microbiology, biochemistry, pathology, and immunology.

gene expression transcription pogil: *Mechanisms of Hormone Action* P Karlson, 2013-10-22 Mechanisms of Hormone Action: A NATO Advanced Study Institute focuses on the action mechanisms of hormones, including regulation of proteins, hormone actions, and biosynthesis. The selection first offers information on hormone action at the cell membrane and a new approach to the structure of polypeptides and proteins in biological systems, such as the membranes of cells. Discussions focus on the cell membrane as a possible locus for the hormone receptor; gaps in understanding of the molecular organization of the cell membrane; and a possible model of hormone

action at the membrane level. The text also ponders on insulin and regulation of protein biosynthesis, including insulin and protein biosynthesis, insulin and nucleic acid metabolism, and proposal as to the mode of action of insulin in stimulating protein synthesis. The publication elaborates on the action of a neurohypophysial hormone in an elasmobranch fish; the effect of ecdysone on gene activity patterns in giant chromosomes; and action of ecdysone on RNA and protein metabolism in the blowfly, Calliphora erythrocephala. Topics include nature of the enzyme induction, ecdysone and RNA metabolism, and nature of the epidermis nuclear RNA fractions isolated by the Georgiev method. The selection is a valuable reference for readers interested in the mechanisms of hormone action.

gene expression transcription pogil: *Regulation of Transcription and Translation in Eukaryotes* Ekkehard K.F. Bautz, P. Karlson, H. Kersten, 2012-12-06 This volume represents the proceedings of the 24th Mos bach Colloquium on Regulation of Transcription and Trans lation in Eukaryotes which was held April 26-28, 1973, in Mosbach, Germany, under the auspices of the Gesellschaft fiir Biologische Chemie. To the three of us (H. KERSTEN, P. KARLSON and myself) who were commissioned with the invitation of speakers, it was a difficult decision as to whether we should attempt to cover with some twenty contributions as many aspects of this broad topic as possible, or to sacrifice the intellectually perhaps more pleasing but more specula tive concepts and to concentrate on a few aspects of gene expression in reasonable detail. We unanimously decided on the latter course, leaving such important and timely topics as for example, hormone action, cyclic AMP and reverse transcription to the proceedings of other symposia, and con centrating on the four questions which are most basic to an understanding of the mechanisms of transcription and trans lation and for which fragmentary but nonetheless reliable experimental results have become available within the last few years. These are the structure of chromatin, the syn thesis of messenger RNA, the structure of the active ribo some, and the role of initiation factors in protein synthesis.

gene expression transcription pogil: ACTH Action in the Adrenal Cortex: From Molecular Biology to Pathophysiology Nicole Gallo-Payet, Antoine Martinez, André Lacroix, 2017-07-27 By stimulating adrenal gland and corticosteroid synthesis, the adrenocorticotropic hormone (ACTH) plays a central role in response to stress. In this Research Topic, a particular attention has been given to the recent developments on adrenocortical zonation; the growth-promoting activities of ACTH; the various steps involved in acute and chronic regulation of steroid secretion by ACTH, including the effect of ACTH on circadian rhythms of glucocorticoid secretion. The Research Topic also reviews progress and challenges surrounding the properties of ACTH binding to the MC2 receptor (MC2R), including the importance of melanocortin-2 receptor accessory protein (MRAP) in MC2R expression and function, the various intracellular signaling cascades, which involve not only protein kinase A, the key mediator of ACTH action, but also phosphatases, phosphodiesterases, ion channels and the cytoskeleton. The importance of the proteins involved in the cell detoxification is also considered, in particular the effect that ACTH has on protection against reactive oxygen species generated during steroidogenesis. The impact of the cellular microenvironment, including local production of ACTH is discussed, both as an important factor in the maintenance of homeostasis, but also in pathological situations, such as severe inflammation. Finally, the Research Topic reviews the role that the pituitary-adrenal axis may have in the development of metabolic disorders. In addition to mutations or alterations of expression of genes encoding components of the steroidogenesis and signaling pathways, chronic stress and sleep disturbance are both associated with hyperactivity of the adrenal gland. A resulting effect is increased glucocorticoid secretion inducing food intake and weight gain, which, in turn, leads to insulin and leptin resistance. These aspects are described in detail in this Research Topic by key investigators in the field. Many of the aspects addressed in this Research Topic still represent a stimulus for future studies, their outcome aimed at providing evidence of the central position occupied by the adrenal cortex in many metabolic functions when its homeostasis is disrupted. An in-depth investigation of the mechanisms underlying these pathways will be invaluable in developing new therapeutic tools and strategies.

gene expression transcription pogil: Mechanisms Of Gene Expression: Structure, Function And Evolution Of The Basal Transcriptional Machine Robert O J Weinzierl, 1999-08-10 A detailed knowledge of the mechanisms underlying the transcriptional control of gene expression is of fundamental importance to many areas of contemporary biomedical research, ranging from understanding basic issues (such as control of embryonic development) to practical applications in industry and medicine. Although elementary concepts of gene expression are described in all general molecular biology textbooks, the depth of coverage is often rather limited and recent discoveries are sometimes not adequately taken into consideration.This book presents much of the current thinking concerning molecular mechanisms of transcriptional control in a form easily accessible to undergraduates with an understanding of basic molecular biology concepts. It contains detailed information about the various pro- and eukaryotic transcriptional machineries that has recently become available through the combined efforts of geneticists, biochemists and structural biologists. The book will thus not only serve as an undergraduate text but also offer something new and interesting to more advanced readers and professional scientists who want to keep up to date with rapid advances in this field.

gene expression transcription pogil: Interaction of Translational and Transcriptional Controls in the Regulation of Gene Expression Marianne Grunberg-Manago, 2012-12-02 Interaction of Translational and Transcriptional Controls in the Regulation of Gene Expression presents the proceedings of the Fogarty International Conference on Translational/Transcriptional Regulation of Gene Expression, held at the National Institutes of Health in Bethesda, Maryland, on April 7-9, 1982. Speakers discussed the molecular strategies at work during the modulation of gene expression following transcriptional initiation. They also discussed recent developments in a number of key areas in which transcriptional and translational components interact. Organized into five sections encompassing 36 chapters, this volume explores both prokaryotic and eukaryotic systems, as well as structure-function correlations. It begins with an overview of translational/transcriptional controls in prokaryotes, the regulation of gene expression by transcription termination and RNA processing, and the structure and expression of initiation factor genes. It then examines the effect of the codon context on translational fidelity, including mistranslation of messenger RNA; protein synthesis for the construction of cell architecture; regulation of initiation factor activity; and translational regulation in cells. This book is a valuable resource for Fogarty International Scholars who want to broaden their knowledge and contribute their expertise to the National Institutes of Health community.

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researchers and students in the field of molecular biology, clinical biology and bioinformatics, as well as physicians etc. Dr. Jiaqian Wu is assistant professor in the Vivian L. Smith Department of Neurosurgery and Center for Stem Cell and Regenerative Medicine, University of Texas Health Science Centre, Houston, TX, USA.

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