

Simulating Protein Synthesis

Pre-Lab Discussion

Genes are the units that determine inherited characteristics, such as hair color and blood type. Genes are lengths of DNA molecules that determine the structure of polypeptides (the building blocks of proteins) that our cells make. The sequence of nucleotides in DNA determines the sequence of amino acids in polypeptides, and thus the structure of proteins.

In a process called *transcription*, which takes place in the nucleus of the cell, messenger RNA (mRNA) reads and copies the DNA's nucleotide sequences in the form of a complementary RNA molecule. Then the mRNA carries this information in the form of a code to the ribosomes, where protein synthesis takes place. The code, in DNA or mRNA, specifies the order in which the amino acids are joined together to form a polypeptide. The code words in mRNA, however, are not directly recognized by the corresponding amino acids. Another type of RNA called transfer RNA (tRNA) is needed to bring the mRNA and amino acids together. As the code carried by mRNA is "read" on a ribosome, the proper tRNAs arrive in turn and give up the amino acids they carry to the growing polypeptide chain. The process by which the information from DNA is transferred into the language of proteins is known as *translation*.

In this investigation, you will simulate the mechanism of protein synthesis and thereby determine the traits inherited by fictitious organisms called CHNOPS. CHNOPS, whose cells contain only one chromosome, are members of the kingdom Animalia. A CHNOPS chromosome is made up of six genes (A, B, C, D, E, and F), each of which is responsible for a certain trait.

Problem

How can the traits on a particular chromosome be determined? How can these traits determine the characteristics of an organism?

Materials (per student)

Blue pencil
Orange pencil

Procedure

1. To determine the trait for Gene A of your CHNOPS, fill in the information in the box labeled Gene A in the Data Table. Notice the sequence of nucleotides in DNA. On the line provided, write the sequence of nucleotides of mRNA that are complementary to DNA. Then, on the line provided, write the sequence of nucleotides of tRNA that are complementary to mRNA.
2. In order to determine the sequence of amino acids, match each tRNA triplet with the specific amino acid in Figure 1. Using a - (hyphen) to separate each amino acid number, record this information in the appropriate place in the Data Table.
3. Using Figure 2, find the trait that matches the amino acid sequence. Record this information in the appropriate place in the Data Table.

Simulating Protein Synthesis Answers

Yarden Katz



Simulating Protein Synthesis Answers:

Carolina Science and Math Carolina Biological Supply Company, 2003

Resources for Teaching Middle School

Science Smithsonian Institution, National Academy of Engineering, National Science Resources Center of the National Academy of Sciences, Institute of Medicine, 1998-04-30 With age appropriate inquiry centered curriculum materials and sound teaching practices middle school science can capture the interest and energy of adolescent students and expand their understanding of the world around them Resources for Teaching Middle School Science developed by the National Science Resources Center NSRC is a valuable tool for identifying and selecting effective science curriculum materials that will engage students in grades 6 through 8 The volume describes more than 400 curriculum titles that are aligned with the National Science Education Standards This completely new guide follows on the success of Resources for Teaching Elementary School Science the first in the NSRC series of annotated guides to hands on inquiry centered curriculum materials and other resources for science teachers The curriculum materials in the new guide are grouped in five chapters by scientific area Physical Science Life Science Environmental Science Earth and Space Science and Multidisciplinary and Applied Science They are also grouped by type core materials supplementary units and science activity books Each annotation of curriculum material includes a recommended grade level a description of the activities involved and of what students can be expected to learn a list of accompanying materials a reading level and ordering information The curriculum materials included in this book were selected by panels of teachers and scientists using evaluation criteria developed for the guide The criteria reflect and incorporate goals and principles of the National Science Education Standards The annotations designate the specific content standards on which these curriculum pieces focus In addition to the curriculum chapters the guide contains six chapters of diverse resources that are directly relevant to middle school science Among these is a chapter on educational software and multimedia programs chapters on books about science and teaching directories and guides to science trade books and periodicals for teachers and students Another section features institutional resources One chapter lists about 600 science centers museums and zoos where teachers can take middle school students for interactive science experiences Another chapter describes nearly 140 professional associations and U S government agencies that offer resources and assistance Authoritative extensive and thoroughly indexed and the only guide of its kind Resources for Teaching Middle School Science will be the most used book on the shelf for science teachers school administrators teacher trainers science curriculum specialists advocates of hands on science teaching and concerned parents

Transactions on Computational Systems Biology VI Gordon Plotkin, 2006-11-27 The 5th Transactions on Computational Systems Biology volume edited by Gordon Plotkin features carefully selected and enhanced contributions initially presented at the 2005 IEEE International Conference on Granular Computing The 9 papers selected for this special issue discuss various aspects of computational methods algorithm and techniques in bioinformatics such as gene expression analysis biomedical literature

mining and natural language processing protein structure prediction biological database management and biomedical information retrieval The Second Aizu International Symposium on Parallel Algorithms/Architecture Synthesis N. N. Mirenkov,1997 Proceedings Parallel Computing *Biology/science Materials* Carolina Biological Supply Company,1991

The Software Encyclopedia 2000 Bowker Editorial Staff,2000-05 Maxwell's Demon 2 Entropy, Classical and Quantum Information, Computing Harvey Leff,Andrew F. Rex,2002-12-13 Over 130 years ago James Clerk Maxwell introduced his hypothetical demon as a challenge to the scope of the second law of thermodynamics Fascination with the demon persisted throughout the development of statistical and quantum physics information theory and computer science and links have been established between Maxwell s demon and each of Bibliography of Agriculture with Subject Index ,1993-10 **Chemical Engineering Progress** ,2005 **Aerospace Medicine and Biology** ,1989 A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in Scientific and technical aerospace reports STAR and International aerospace abstracts IAA **Maxwell's Demon** Harvey S. Leff,Andrew F. Rex,2014-07-14 About 120 years ago James Clerk Maxwell introduced his now legendary hypothetical demon as a challenge to the integrity of the second law of thermodynamics Fascination with the demon persisted throughout the development of statistical and quantum physics information theory and computer science and linkages have been established between Maxwell s demon and each of these disciplines The demon s seductive quality makes it appealing to physical scientists engineers computer scientists biologists psychologists and historians and philosophers of science Until now its important source material has been scattered throughout diverse journals This book brings under one cover twenty five reprints including seminal works by Maxwell and William Thomson historical reviews by Martin Klein Edward Daub and Peter Heimann information theoretic contributions by Leo Szilard Leon Brillouin Dennis Gabor and Jerome Rothstein and innovations by Rolf Landauer and Charles Bennett illustrating linkages with the limits of computation An introductory chapter summarizes the demon s life from Maxwell s illustration of the second law s statistical nature to the most recent exorcism of the demon based on a need periodically to erase its memory An annotated chronological bibliography is included Originally published in 1990 The Princeton Legacy Library uses the latest print on demand technology to again make available previously out of print books from the distinguished backlist of Princeton University Press These editions preserve the original texts of these important books while presenting them in durable paperback and hardcover editions The goal of the Princeton Legacy Library is to vastly increase access to the rich scholarly heritage found in the thousands of books published by Princeton University Press since its founding in 1905 **Artificial Whiteness** Yarden Katz,2020-11-17 Dramatic statements about the promise and peril of artificial intelligence for humanity abound as an industry of experts claims that AI is poised to reshape nearly every sphere of life Who profits from the idea that the age of AI has arrived Why do ideas of AI s transformative potential keep reappearing in social and political discourse and

how are they linked to broader political agendas Yarden Katz reveals the ideology embedded in the concept of artificial intelligence contending that it both serves and mimics the logic of white supremacy He demonstrates that understandings of AI as a field and a technology have shifted dramatically over time based on the needs of its funders and the professional class that formed around it From its origins in the Cold War military industrial complex through its present day Silicon Valley proselytizers and eager policy analysts AI has never been simply a technical project enabled by larger data and better computing Drawing on intimate familiarity with the field and its practices Katz instead asks us to see how AI reinforces models of knowledge that assume white male superiority and an imperialist worldview Only by seeing the connection between artificial intelligence and whiteness can we prioritize alternatives to the conception of AI as an all encompassing technological force Bringing together theories of whiteness and race in the humanities and social sciences with a deep understanding of the history and practice of science and computing Artificial Whiteness is an incisive urgent critique of the uses of AI as a political tool to uphold social hierarchies *Dissertation Abstracts International* ,2006 **Current Index to Journals in Education** ,1995 Proceedings ,1964 **A Short Guide to Writing about Science** David Porush,1995 Advanced advice for students who want to read write and learn about science in preparation for a career in that field

Mitochondrial Encephalomyopathies Takeshi Sato,Salvatore DiMauro,1991 Presents molecular and genetic studies that shed light on the pathogenesis of diseases of the muscles and central nervous system caused by defects in mitochondrial function The book also describes therapeutic trials with CoQ10 for mitochondrial myopathies **Reviewing the Living Environment Biology** Rick Hallman,Woody,2004-04-19 This review book provides a complete review of a one year biology course that meets the NYS Living Environment Core Curriculum Includes four recent Regents exams **Sm Lab Exer Anat Physio Cat Di** Gerard J. Tortora,1999-11 Computer & Control Abstracts ,1996

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