PROTEIN SYNTHESIS

LEVEL II

INTRODUCTION

Protein synthesis is the process by which individual cells construct proteins. Both deoxyribonucleic acid (DNA) and all types of ribonucleic acid (RNA) are involved in this process. Enzymes in the cell's nucleus begin the process of synthesizing protein by unwinding the needed section of DNA, so that RNA can be made. The RNA forms as a copy of one side of the DNA strand, and is sent to other areas of the cell to aid in the bringing together of different amino acids that form proteins. Protein synthesis is so called because proteins are "synthesized" through mechanical and chemical processes in the cell.

WHAT IS IT?

As the mRNA binds to the ribosome sub-unit, it triggers the approach of another strand of RNA, called transfer RNA (tRNA). The tRNA strand looks for the proper place to bind to the mRNA, and when it finds it, it attaches to the mRNA, while holding an amino acid on one end. When this occurs, the other sub-unit of the ribosome arrives to form a complete structure. As the ribosome surrounds the strands of RNA, another strand of tRNA approaches. This strand is carrying another amino acid, and is different from the first. Again, the tRNA looks for the proper place to bind to the mRNA.

TO LEARN MORE SCAN THE QR-CODE

WEBSITE

VIDEO

FUTURE APPLICATIONS

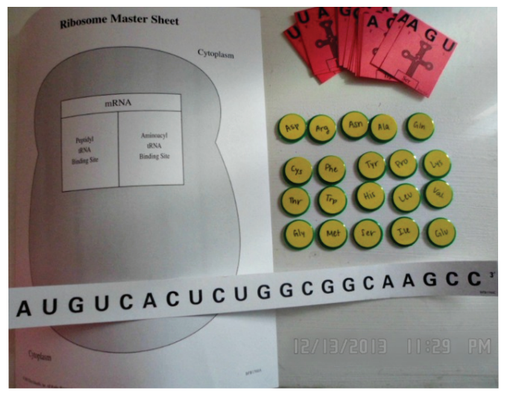
Cell-free protein synthesis has emerged as a powerful technology platform to help satisfy the growing demand for simple and efficient protein production. While used for decades as a foundational research tool for understanding transcription and translation, recent advances have made possible cost-effective microscale to manufacturing scale synthesis of complex proteins. Protein yields exceed grams protein produced per liter reaction volume, batch reactions last for multiple hours, costs have been reduced orders of magnitude, and reaction scale has reached the 100-liter milestone. These advances have inspired new applications in the synthesis of protein libraries for functional genomics and structural biology, the production of personalized medicines, and the expression of virus-like particles,' among others. In the coming years, cell-free protein synthesis promises new industrial processes where short protein production timelines are crucial as well as innovative approaches to a wide range of applications.

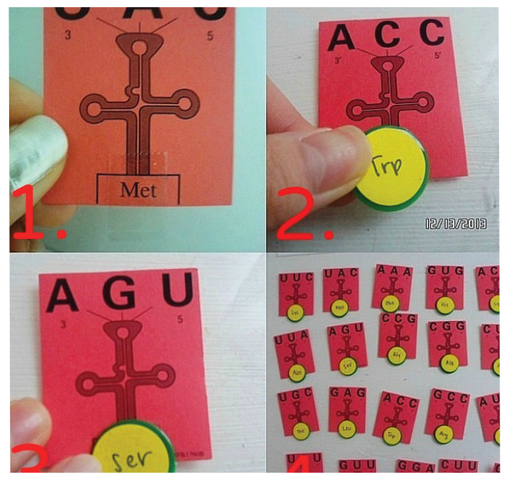
TO SEE MORE SCAN THE QR-CODE

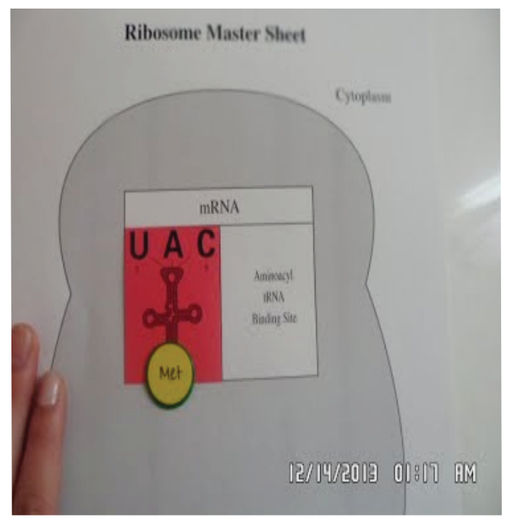
HISTORY OF PROTEIN SYNTHESIS

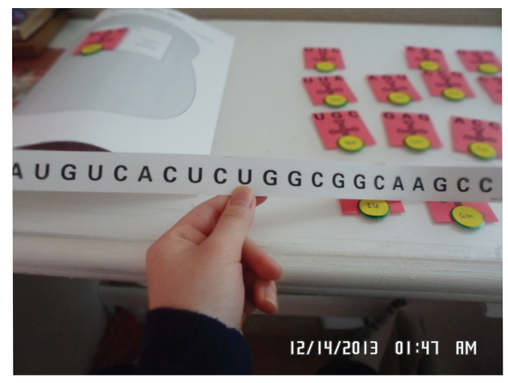
Gerardus Johannes Mulder, a chemist, was the first to really describe proteins, but was named by his associate Jöns Jakob Berzelius in 1838. While analyzing common proteins, he discovered one similarity: the empirical formula $C_{400}H_{620}N_{100}O_{120}P_1S_1$. He concluded that their origin was one big molecule. Finally, Mulder's associate, Berzelius, proposed the word protein to Mulder, helping Mulder's studies expand even further about proteins. Berzelius used it to express his discoveries of large organic compounds.

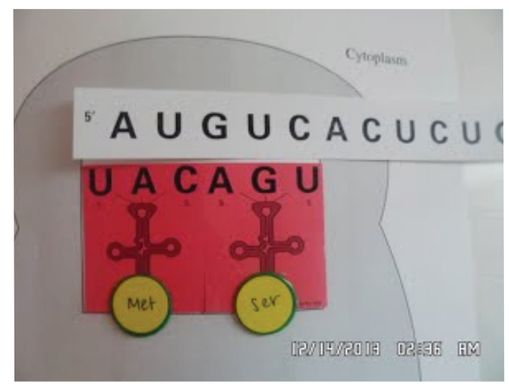
TO SEE MORE SCAN THE QR-CODE

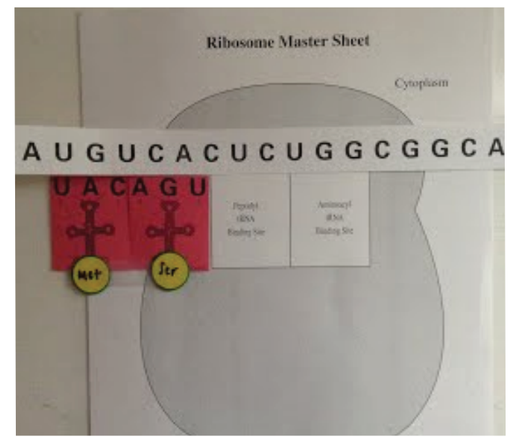


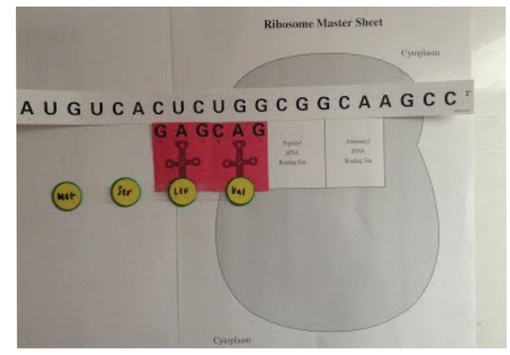












HARMONY PUBLIC SCHOOLS

STEM SOS™ MODEL
STEM Students on the Stage (SOS)™
A practice based Model of STEM Teaching