

8.1 Genes and the genetic code

Gene: a section of DNA that contains the coded information for making polypeptides and functional learning

Locus: a gene located at a specific position on the DNA

Genetic code – there must be a minimum of three bases that code for each amino acid because:

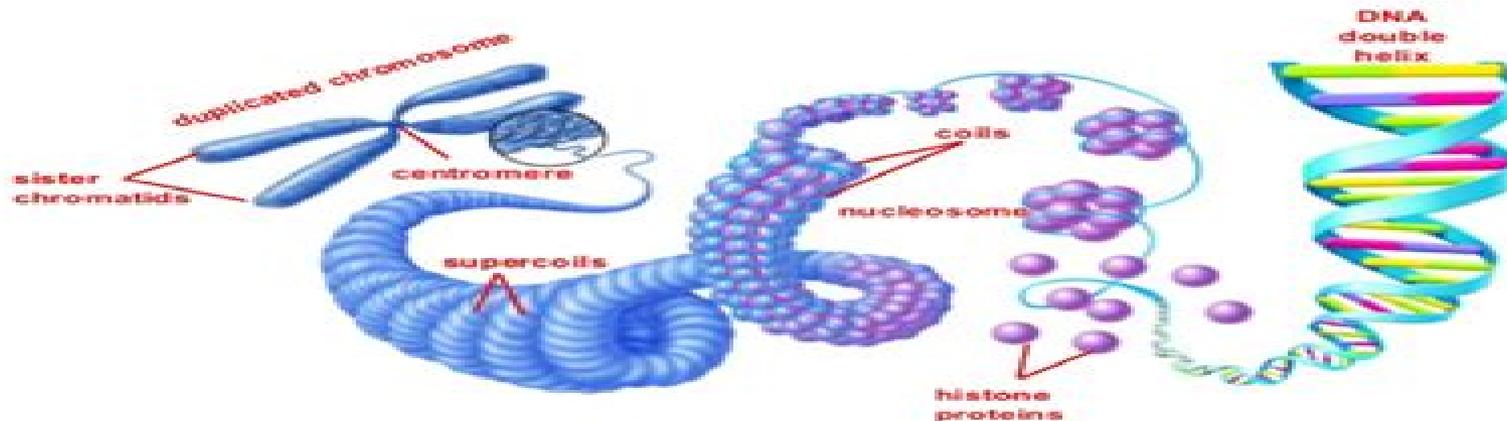
- Only 20 different amino acids regularly occur in proteins
- Each amino acid has its own code
- Only 4 different bases (TACG)
- Using one base only 4 amino acids will be created
- Using a pair of bases only 16 amino acids will be created
- Using three bases 64 amino acids will be created, which is enough to satisfy the 20 amino acids

Features of the genetic code:

- A few amino acids are only coded by a single triplet
- A degenerate code – as most amino acids are coded for by more than one triplet
- Start and stop triplets
- Code is non-overlapping meaning each base is read only once in the sequence
- Code is universal meaning each triplet code is for the same amino acid in all organisms (indirect evidence of evolution)

8.2 DNA and chromosomes

In eukaryotic cells, DNA is packaged into multiple chromosomes.



- **Prokaryotic cells:** Circular, shorter DNA which is not associated with proteins therefore they don't have chromosomes.
- **Eukaryotic cells:** linear, longer DNA which is associated with proteins called histones that form chromosomes. The mitochondria and chloroplasts of eukaryotic cells have shorter DNA and don't associate with proteins

Homologous chromosomes:

- Sexually produce organisms are the result of the fertilisation of a sperm and an egg cell.
- The maternal and paternal chromosomes contribute to a full set
 - o **Diploid** – total number of chromosomes
 - o **Haploid** – half the total number of chromosomes

Alleles: an alternative form of a gene that occurs at the same locus on homologous chromosomes

- Any changes in the base sequence of a gene causes a mutation (a new allele of that gene). This results in production of a different polypeptide which may or may not be functional
- Ex. if the mutated protein is an enzyme and it isn't complementary to the substrate it will cause a problem

8.3 Structure of ribonucleic acid

Transferring the coded information:

- Sections of DNA are transcribed onto mRNA
- mRNA is small enough to leave the nucleus into the cytoplasm where proteins are synthesised
- A codon: the sequence of three bases on mRNA that code for an amino acid

From Dna To Protein Synthesis Chapter 1lab

Richard Bailey



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Chapter Resource 10 How Proteins/Made Biology Holt Rinehart & Winston, Holt, Rinehart and Winston Staff, 2004

Molecular Genetics of Coronary Artery Disease A. J. Lusis, J. I. Rotter, R. S. Sparkes, 1992-09-28 Detailed reviews of structural biochemical genetic and interactive disease factors determining the development of atherosclerosis Well documented A survey for basic and clinical investigators in genetics cardiology and pathology who are concerned with these topics *Annals of Internal Medicine* **Schweizerische medizinische Wochenschrift**, 1975 *Vitamins and Minerals* Zina Kroner, 2011-04-08 Insightful objective and evidence based this overview of the most commonly used supplements dispels misinformation and provides facts from a qualified physician's point of view An endless array of vitamin and mineral supplements are available to health conscious consumers today and an increasing number of individuals have incorporated these supplements into their daily routines Unfortunately their use is often inspired by rumor rather than sound medical advice The results of clinical research on these supplements effectiveness are often inconclusive while some studies have even shown negative health effects from overuse Instead of relying on media hype and often conflicting word of mouth information people who take nutritional supplements need an authoritative evidence based reference text about self medication with vitamins and minerals Dr Zina Kroner has provided exactly that *Vitamins and Minerals* is an eye opening guide that separates truth from myth about dozens of today's common and popular supplements It covers the effects of the deficiency of each nutrient its primary uses dosages food sources potential side effects and mechanism of action helping readers make informed decisions about use of these under regulated over the counter nutraceuticals **Viral Cytopathology** Heinz Fraenkel-Conrat, Robert R. Wagner, 2012-12-06 The time seems ripe for a critical compendium of that segment of the biological universe we call viruses Virology as a science having passed only recently through its descriptive phase of naming and numbering has probably reached that stage at which relatively few new truly new viruses will be discovered Triggered by the intellectual probes and techniques of molecular biology genetics bio chemical cytology and high resolution microscopy and spectroscopy the field has experienced a genuine information explosion Few serious attempts have been made to chronicle these events This comprehensive series which will comprise some 6000 pages in a total of 19 volumes represents a commitment by a large group of active investigators to analyze digest and expostulate on the great mass of data relating to viruses much of which is now amorphous and disjointed and scattered throughout a wide literature In this way we hope to place the entire field in perspective and to develop an invaluable reference and sourcebook for researchers and students at all levels This series is designed as a continuum that can be entered any where but which also provides a logical progression of developing facts and integrated concepts *Essential Human Virology* Jennifer Louten, 2022-05-28 *Essential Human Virology* Second Edition focuses on the structure and classification of viruses virus transmission and virus replication strategies based upon type of viral nucleic acid Several chapters focus on notable and

recognizable viruses and the diseases caused by them including influenza HIV hepatitis viruses poliovirus herpesviruses and emerging and dangerous viruses Additionally how viruses cause disease pathogenesis is highlighted along with discussions on immune response to viruses vaccines anti viral drugs gene therapy the beneficial uses of viruses research laboratory assays and viral diagnosis assays Fully revised and updated with new chapters on coronaviruses nonliving infectious agents and notable non human viruses the book provides students with a solid foundation in virology Focuses on human diseases and the cellular pathology that viruses cause Highlights current and cutting edge technology and associated issues Presents real case studies and current news highlights in each chapter Features dynamic illustrations chapter assessment questions key terms and a summary of concepts as well as an instructor website with lecture slides a test bank and recommended activities Updated and revised with new chapters on coronaviruses nonliving infectious agents and notable non human viruses

Abstracts of the Annual Meeting of the American Society for Microbiology American Society for Microbiology. Annual Meeting,1975 **Comprehensive Virology** Heinz Fraenkel-Conrat,Robert R. Wagner,1974 **Cell Calcium** ,1985 **Abstracts** ,1993 **Society for Neuroscience Abstracts** Society for Neuroscience. Meeting,2000 **Science Citation Index** ,1994 Vols for 1964 have guides and journal lists **Federation Proceedings** Federation of American Societies for Experimental Biology,1972 **International Bibliography of Corn: Indexes : author index, subject index** ,1985 *Bulletin signalétique* ,1977 **DNA and Protein Synthesis (videorecording)**. Biochemical Society (United Kingdom), *Chemical Protein Synthesis* Xuechen Li,2022-06-27 This volume provides updated protocols for chemical protein synthesis Chapters guide readers through development methods strategies and applications of protein chemical synthesis Written in the format of the highly successful Methods in Molecular Biology series each chapter includes an introduction to the topic lists necessary materials and reagents includes tips on troubleshooting and known pitfalls and step by step readily reproducible protocols Authoritative and cutting edge Chemical Protein Synthesis aims to be a useful and practical guide to new researchers and experts looking to expand their knowledge **Structure of DNA & Protein Synthesis** ,2006 **Protein Expression** ,1999-05-20 Protein Expression A Practical Approach and its companion volume Post translational Modification A Practical Approach complete the mini series of Practical Approach books covering the synthesis and subsequent processing of proteins Protein Expression A Practical Approach details the expression of cloned DNA or RNA templates in all the major in vivo and in vitro systems The in vivo systems covered are cultured mammalian cells the yeasts *Saccharomyces cerevisiae* and *Pichia pastoris* baculovirus *Xenopus* oocytes and prokaryotic cells Cell free systems of both eukaryotes and prokaryotes are described including the prokaryotic systems that offer coupled transcription translation There is also a chapter on monitoring protein expression The post translational fate of proteins is covered in Post Translational Processing A Practical Approach **Cell-Free Protein Synthesis** Kirill Alexandrov,Wayne A. Johnston,2016-08-27 Cell free protein expression promises to narrow the technological gap between DNA and protein

technologies and provide a platform for broad application of synthetic biology principles in the Life Sciences. It is a rapid and high throughput methodology for the conversion of DNA encoded genetic information into protein mediated biochemical activities. *Cell Free Protein Synthesis Methods and Protocols* brings together the key opinion leaders of cell free technology development and provides case studies and detailed protocols for the application of cell free methodology. Chapters cover the main directions in the development of cell free technologies including several recently developed cell free systems as well as a number of applications of cell free systems ranging from discovery of biofuel enzymes to in vitro assembly of viruses. Written in the successful *Methods in Molecular Biology* series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step by step readily reproducible protocols, and notes on troubleshooting and avoiding known pitfalls. Authoritative and easily accessible, *Cell Free Protein Synthesis Methods and Protocols* seeks to serve a wide variety of scientists with its well honed methodologies.

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