MODULE 5. HEREDITY AND MOLECULAR GENETICS pdf

1: Heredity - Expression of the genetic code: transcription and translation | www.enganchecubano.com

Module 5 in Old Textbook Module 6 in New Textbook Learn with flashcards, games, and more â€" for free.

Expression of the genetic code: It contains instructions in a coded sequence of nucleotides, and this sequence interacts with the environment to produce formâ€"the living organism with all of its complex structures and functions. The form of an organism is largely determined by protein. A large proportion of what we see when we observe the various parts of an organism is protein; for example, hair , muscle , and skin are made up largely of protein. Other chemical compounds that make up the human body , such as carbohydrates, fats, and more-complex chemicals, are either synthesized by catalytic proteins enzymes or are deposited at specific times and in specific tissues under the influence of proteins. For example, the black-brown skin pigment melanin is synthesized by enzymes and deposited in special skin cells called melanocytes. Genes exert their effect mainly by determining the structure and function of the many thousands of different proteins, which in turn determine the characteristics of an organism. Generally, it is true to say that each protein is coded for by one gene, bearing in mind that the production of some proteins requires the cooperation of several genes. Proteins are polymeric molecules; that is, they are made up of chains of monomeric elements, as is DNA. In proteins, the monomers are amino acids. Organisms generally contain 20 different types of amino acids, and the distinguishing factors that make one protein different from another are its length and specific amino acid sequence, which are determined by the number and sequence of nucleotide pairs in DNA. In other words, there is a colinearity i. Hence, genetic information flows from DNA into protein. However, this is not a single-step process. First, the nucleotide sequence of DNA is copied into the nucleotide sequence of single-stranded RNA in a process called transcription. Transcription of any one gene takes place at the chromosomal location of that gene. Whereas the unit of replication is a whole chromosome, the transcriptional unit is a relatively short segment of the chromosome, the gene. The active transcription of a gene depends on the need for the activity of that particular gene in a specific tissue or at a given time. DNA in the cell nucleus carries a genetic code, which consists of sequences of adenine A , thymine T , guanine G , and cytosine C Figure 1. RNA, which contains uracil U instead of thymine, carries the code to protein-making sites in the cell. Finally, the synthesized protein is released to perform its task in the cell or elsewhere in the body. The uracil in RNA has exactly the same hydrogen-bonding properties as thymine, so there are no changes at the information level. For most RNA molecules, the nucleotide sequence is converted into an amino acid sequence, a process called translation. In prokaryotes , translation begins during the transcription process, before the full RNA transcript is made. In eukaryote s, transcription finishes, and the RNA molecule passes from the nucleus into the cytoplasm , where translation takes place. The synthesis of DNA is catalyzed by the enzyme reverse transcriptase. The existence of reverse transcriptase shows that genetic information is capable of flowing from RNA to DNA in exceptional cases. Since it is believed that life arose in an RNA world, it is likely that the evolution of reverse transcriptase was an important step in the transition to the present DNA world. Transcription A gene is a functional region of a chromosome that is capable of making a transcript in response to appropriate regulatory signals. Therefore, a gene must not only be composed of the DNA sequence that is actually transcribed, but it must also include an adjacent regulatory, or control, region that is necessary for the transcript to be made in the correct developmental context. The polymerization of ribonucleotides during transcription is catalyzed by the enzyme RNA polymerase. The RNA strand is extruded from the transcription complex like a tail , which grows longer as the transcription process advances. The process is repeated, and multiple RNA transcripts are produced from one gene. Prokaryotes possess only one type of RNA polymerase, but in eukaryotes there are several different types. The types of RNA transcribed by these two polymerases are never translated into protein. RNA polymerase II transcribes the major type of genes, those genes that code for proteins. Transcription of these genes is considered in detail below. Transcription of protein-coding genes results in a type of RNA called messenger RNA mRNA , so named because it carries a genetic message from the gene on a nuclear chromosome into the cytoplasm , where it is acted upon by the protein-synthesizing apparatus. The transcription machinery contains many items in addition to the RNA

polymerase. The region of the gene upstream from the region to be transcribed contains specific DNA sequences that are essential for the binding of transcription factors and a region called the promoter , to which the RNA polymerase binds. These sequences must be a specific distance from the transcriptional start site for successful operation. Various short base sequences in this regulatory region physically bind specific transcription factors by virtue of a lock-and-key fit between the DNA and the protein. As might be expected, a protein binds with the centre of the DNA molecule, which contains the sequence specificity, and not with the outside of the molecule, which is merely a uniform repetition of sugar and phosphate groups. If this sequence is changed or moved, the rate of transcription drops drastically. Together, RNA polymerase and the transcription factors constitute the transcription complex. The RNA polymerase is directed by the transcription complex to begin transcription at the proper site. It then moves along the template, synthesizing mRNA as it goes. At some position past the coding region, the transcription process stops. Bacteria have well-characterized specific termination sequences; however, in eukaryotes, termination signals are less well understood, and the transcription process stops at variable positions past the end of the coding sequence. Noncoding nucleotide sequences called introns are excised from the RNA at this stage in a process called intron splicing. Molecular complexes called spliceosomes, which are composed of proteins and RNA, have RNA sequences that are complementary to the junction between introns and adjacent coding regions called exons. The intron is twisted into a loop and excised, and the exons are linked together. The resulting capped, tailed, and intron-free molecule is now mature mRNA. The genetic code Hereditary information is contained in the nucleotide sequence of DNA in a kind of code. The coded information is copied faithfully into RNA and translated into chains of amino acids. Amino acid chains are folded into helices, zigzags, and other shapes and are sometimes associated with other amino acid chains. These three-letter words are called codons. Each codon stands for a specific amino acid, so if the message in mRNA is nucleotides long, which corresponds to codons, it will be translated into a chain of amino acids. Each of the three letters in a codon can be filled by any one of the four nucleotides; therefore, there are 43, or 64, possible codons. Each one of these 64 words in the codon dictionary has meaning. Most codons code for one of the 20 possible amino acids. The other 18 amino acids are coded for by two to six codons; for example, either of the codons UUU or UUC will cause the insertion of the amino acid phenylalanine into the growing amino acid chain. The first amino acid in an amino acid chain is methionine, encoded by an AUG codon. However, AUG codons are found throughout the coding sequence and are translated into methionines. One of the surprising findings about the genetic codon dictionary is that, with a few exceptions, it is the same in all organisms. One exception is mitochondrial DNA, which exhibits several differences from the standard genetic code and also between organisms. The uniformity of the genetic code has been interpreted as an indication of the evolutionary relatedness of all organisms. For the purpose of genetic research, codon uniformity is convenient because any type of DNA can be translated in any organism. Translation The process of translation requires the interaction not only of large numbers of proteinaceous translational factors but also of specific membranes and organelles of the cell. In both prokaryotes and eukaryotes, translation takes place on cytoplasmic organelles called ribosomes. They can be thought of as cellular anvils on which the links of an amino acid chain are forged. A ribosome is a generic protein-making machine that can be recycled and used to synthesize many different types of proteins. Any one mRNA is translated many times by several ribosomes along its length, each one at a different stage of translation. In eukaryotes, ribosomes that produce proteins to be used in the same cell are not associated with membranes. However, proteins that must be exported to another location in the organism are synthesized on ribosomes located on the outside of flattened membranous chambers called the endoplasmic reticulum ER. A completed amino acid chain is extruded into the inner cavity of the ER. Subsequently, the ER transports the proteins via small vesicles to another cytoplasmic organelle called the Golgi apparatus , which in turn buds off more vesicles that eventually fuse with the cell membrane. The protein is then released from the cell. The function of any one tRNA molecule is to bind to a designated amino acid and carry it to a ribosome, where the amino acid is added to the growing amino acid chain. Each amino acid has its own set of tRNA molecules that will bind only to that specific amino acid. A tRNA molecule is a single nucleotide chain with several helical regions and a loop containing three unpaired nucleotides, called an anticodon. Thus, any mRNA codon that

happens to be on the ribosome at any one time will solicit the binding only of the tRNA with the appropriate anticodon, which will align the correct amino acid for addition to the chain. A tRNA molecule and its attached amino acid must bind to the ribosome as well as to the codon during this amino acid chain-elongation process. A ribosome has two tRNA binding sites; at the first site, one tRNA attaches to the amino acid chain, and at the second site, another tRNA carrying the next amino acid is attached. After attachment, the first tRNA departs and recycles, whereas the second tRNA is now left holding the amino acid chain. At this time the ribosome moves to the next codon, and the whole process is successively repeated along the length of the mRNA until a stop codon is reached, at which time the completed amino acid chain is released from the ribosome. The amino acid chain then spontaneously folds to generate the three-dimensional shape necessary for its function. Each amino acid has its own special shape and pattern of electrical charges on its surface, and ultimately these are what determine the overall shape of the protein. In some proteins, strong covalent bridges are formed between two cysteines at different sites in the chain. If the protein is composed of two or more amino acid chains, these also associate spontaneously and take on their most stable three-dimensional shape. For enzymes, shape determines the ability to bind to its specific substrate i. For structural proteins, the amino acid sequence determines whether it will be a filament, a sheet, a globule, or another shape. Gene mutation Given the complexity of DNA and the vast number of cell divisions that take place within the lifetime of a multicellular organism , copying errors are likely to occur. If unrepaired, such errors will change the sequence of the DNA bases and alter the genetic code. Mutation is the random process whereby genes change from one allelic form to another. Scientists who study mutation use the most common genotype found in natural populations, called the wild type, as the standard against which to compare a mutant allele. Mutation can occur in two directions; mutation from wild type to mutant is called a forward mutation, and mutation from mutant to wild type is called a back mutation or reversion. Mechanisms of mutation Mutations arise from changes to the DNA of a gene. These changes can be quite small, affecting only one nucleotide pair, or they can be relatively large, affecting hundreds or thousands of nucleotides.

MODULE 5. HEREDITY AND MOLECULAR GENETICS pdf

2: Reproduction and Heredity â€¢ A* Biology

GENETICS Module II by Diane Shakes, Penny Sadler and Stan Hoegerman genetics is not just for peas! In this module, we will use worms, a unit of heredity that.

Chromosomal aberrations The chromosome set of a species remains relatively stable over long periods of time. However, within populations there can be found abnormalities involving the structure or number of chromosomes. These alterations arise spontaneously from errors in the normal processes of the cell. Their consequences are usually deleterious , giving rise to individuals who are unhealthy or sterile, though in rare cases alterations provide new adaptive opportunities that allow evolutionary change to occur. In fact, the discovery of visible chromosomal differences between species has given rise to the belief that radical restructuring of chromosome architecture has been an important force in evolution. Changes in chromosome structure Two important principles dictate the properties of a large proportion of structural chromosomal changes. The first principle is that any deviation from the normal ratio of genetic material in the genome results in genetic imbalance and abnormal function. In the normal nuclei of both diploid and haploid cells, the ratio of the individual chromosomes to one another is 1: Any deviation from this ratio by addition or subtraction of either whole chromosomes or parts of chromosomes results in genomic imbalance. The second principle is that homologous chromosomes go to great lengths to pair at meiosis. The tightly paired homologous regions are joined by a ladderlike longitudinal structure called the synaptonemal complex. Homologous regions seem to be able to find each other and form a synaptonemal complex whether or not they are part of normal chromosomes. Therefore, when structural changes occur, not only are the resulting pairing formations highly characteristic of that type of structural change but they also dictate the packaging of normal and abnormal chromosomes into the gametes and subsequently into the progeny. Deletions The simplest, but perhaps most damaging, structural change is a deletionâ€”the complete loss of a part of one chromosome. In a haploid cell this is lethal, because part of the essential genome is lost. However, even in diploid cells deletions are generally lethal or have other serious consequences. In a diploid a heterozygous deletion results in a cell that has one normal chromosome set and another set that contains a truncated chromosome. Such cells show genomic imbalance, which increases in severity with the size of the deletion. Another potential source of damage is that any recessive , deleterious, or lethal allele s that are in the normal counterpart of the deleted region will be expressed in the phenotype. In humans, cri-du-chat syndrome is caused by a heterozygous deletion at the tip of the short arm of chromosome 5. Infants are born with this condition as the result of a deletion arising in parental germinal tissues or even in sex cells. Duplications A heterozygous duplication an extra copy of some chromosome region also results in a genomic imbalance with deleterious consequences. Small duplications within a gene can arise spontaneously. Larger duplications can be caused by crossovers following asymmetrical chromosome pairing or by meiotic irregularities resulting from other types of altered chromosome structures. If a duplication becomes homozygous, it can provide the organism with an opportunity to acquire new genetic functions through mutations within the duplicate copy. If the inverted segment contains the centromere i. Inversions do not result in a gain or loss of genetic material, and they have deleterious effects only if one of the chromosomal breaks occurs within an essential gene or if the function of a gene is altered by its relocation to a new chromosomal neighbourhood called the position effect. However, individuals who are heterozygous for inversions produce aberrant meiotic products along with normal products. The only way uninverted and inverted segments can pair is by forming an inversion loop. If no crossovers occur in the loop, half of the gametes will be normal and the other half will contain an inverted chromosome. If a crossover does occur within the loop of a paracentric inversion, a chromosome bridge and an acentric chromosome i. In a pericentric inversion, a crossover within the loop does not result in a bridge or an acentric chromosome, but inviable products are produced carrying a duplication and a deletion. Translocations If a chromosome break occurs in each of two nonhomologous chromosomes and the two breaks rejoin in a new arrangement, the new segment is called a translocation. A cell bearing a heterozygous translocation has a full set of genes and will be viable unless one of the breaks causes damage within a gene or

if there is a position effect on gene function. However, once again the pairing properties of the chromosomes at meiosis result in aberrant meiotic products. Specifically, half of the products are deleted for one of the chromosome regions that changed positions and half of the products are duplicated for the other. Changes in chromosome number Two types of changes in chromosome numbers can be distinguished: Polyploids An individual with additional chromosome sets is called a polyploid. Individuals with three sets of chromosomes triploids, 3n or four sets of chromosomes tetraploids, 4n are polyploid derivatives of the basic diploid 2n constitution. Polyploids with odd numbers of sets e. It is for this reason that triploid watermelons are seedless. However, polyploids with even numbers of chromosome sets can be fertile if orderly two-by-two chromosome pairing occurs. Though two organisms from closely related species frequently hybridize, the chromosomes of the fusing partners are different enough that the two sets do not pair at meiosis, resulting in sterile offspring. However, if by chance the number of chromosome sets in the hybrid accidentally duplicates, a pairing partner for each chromosome will be produced, and the hybrid will be fertile. These chromosomally doubled hybrids are called allotetraploids. Bread wheat, which is hexaploid 6n due to several natural spontaneous hybridizations, is an example of an allotetraploid. Some polyploid plant s are able to produce seeds through an asexual type of reproduction called apomixis ; in such cases, all progeny are identical to the parent. Polyploidy does arise spontaneously in humans, but all polyploids either abort in utero or die shortly after birth. Aneuploids Some cells have an abnormal number of chromosomes that is not a whole multiple of the haploid number. This condition is called aneuploidy. Most aneuploids arise by nondisjunction, a failure of homologous chromosomes to separate at meiosis. When a gamete of this type is fertilized by a normal gamete, the zygotes formed will have an unequal distribution of chromosomes. Such genomic imbalance results in severe abnormalities or death. Only aneuploids involving small chromosomes tend to survive and even then only with an aberrant phenotype. The most common form of aneuploidy in humans results in Down syndrome , a suite of specific disorders in individuals possessing an extra chromosome 21 trisomy The symptoms of Down syndrome include intellectual disability, severe disorders of internal organs such as the heart and kidneys, up-slanted eyes, an enlarged tongue, and abnormal dermal ridge patterns on the fingers, palms, and soles. Other forms of aneuploidy in humans result from abnormal numbers of sex chromosomes. Turner syndrome is a condition in which females have only one X chromosome. Symptoms may include short stature, webbed neck, kidney or heart malformations, underdeveloped sex characteristics, or sterility. Klinefelter syndrome is a condition in which males have one extra female sex chromosome , resulting in an XXY pattern. Symptoms of Klinefelter syndrome may include sterility, a tall physique, lack of secondary sex characteristics, breast development , and learning disabilities. Molecular genetics The data accumulated by scientists of the early 20th century provided compelling evidence that chromosomes are the carriers of genes. But the nature of the genes themselves remained a mystery, as did the mechanism by which they exert their influence. Molecular geneticsâ€”the study of the structure and function of genes at the molecular levelâ€”provided answers to these fundamental questions. DNA as the agent of heredity In Swiss chemist Johann Friedrich Miescher extracted a substance containing nitrogen and phosphorus from cell nuclei. The substance was originally called nuclein, but it is now known as deoxyribonucleic acid , or DNA. DNA is the chemical component of the chromosomes that is chiefly responsible for their staining properties in microscopic preparations. Since the chromosomes of eukaryotes contain a variety of proteins in addition to DNA, the question naturally arose whether the nucleic acids or the proteins , or both together, were the carriers of the genetic information. Until the early s most biologists were inclined to believe that the proteins were the chief carriers of heredity. Nucleic acids contain only four different unitary building blocks, but proteins are made up of 20 different amino acids. Proteins therefore appeared to have a greater diversity of structure, and the diversity of the genes seemed at first likely to rest on the diversity of the proteins. Evidence that DNA acts as the carrier of the genetic information was first firmly demonstrated by exquisitely simple microbiological studies. In English bacteriologist Frederick Griffith was studying two strains of the bacterium Streptococcus pneumoniae ; one strain was lethal to mice virulent and the other was harmless avirulent. Griffith found that mice inoculated with either the heat-killed virulent bacteria or the living avirulent bacteria remained free of infection, but mice inoculated with a mixture of both became infected and died. In American bacteriologist

MODULE 5. HEREDITY AND MOLECULAR GENETICS pdf

Oswald T. Avery and his coworkers found that the transforming factor was DNA. Avery and his research team obtained mixtures from heat-killed virulent bacteria and inactivated either the proteins, polysaccharides sugar subunits , lipids , DNA, or RNA ribonucleic acid , a close chemical relative of DNA and added each type of preparation individually to avirulent cells. The only molecular class whose inactivation prevented transformation to virulence was DNA. Therefore, it seemed that DNA, because it could transform, must be the hereditary material. A similar conclusion was reached from the study of bacteriophages , viruses that attack and kill bacterial cells. From a host cell infected by one bacteriophage, hundreds of bacteriophage progeny are produced. In American biologists Alfred D. Hershey and Martha Chase prepared two populations of bacteriophage particles. In one population, the outer protein coat of the bacteriophage was labeled with a radioactive isotope; in the other, the DNA was labeled. After allowing both populations to attack bacteria, Hershey and Chase found that only when DNA was labeled did the progeny bacteriophage contain radioactivity. Therefore, they concluded that DNA is injected into the bacterial cell, where it directs the synthesis of numerous complete bacteriophages at the expense of the host. In other words, in bacteriophages DNA is the hereditary material responsible for the fundamental characteristics of the virus. Today the genetic makeup of most organisms can be transformed using externally applied DNA, in a manner similar to that used by Avery for bacteria. Transforming DNA is able to pass through cellular and nuclear membranes and then integrate into the chromosomal DNA of the recipient cell. Furthermore, using modern DNA technology, it is possible to isolate the section of chromosomal DNA that constitutes an individual gene, manipulate its structure, and reintroduce it into a cell to cause changes that show beyond doubt that the DNA is responsible for a large part of the overall characteristics of an organism. For reasons such as these, it is now accepted that, in all living organisms, with the exception of some viruses, genes are composed of DNA.

MODULE 5. HEREDITY AND MOLECULAR GENETICS pdf

3: Module A : Cells and Heredity : Chapter DNA and Modern Genetics

Since all cells carry the same genetic information, eukaryotic regulation involves controlling which genes are expressed. List the different types of chromosome mutations and define each one. Degradation of a eukaryotic mRNA is generally preceded by shortening of the _____.

Number students taking module anticipated Description - summary of the module content Module description Genetics is fundamental to understanding life sciences. In this module you will gain an understanding of how information is stored and inherited in living organisms. You will consider genetics from the perspectives of DNA structure, gene expression, genome replication, heredity, genes in populations, and evolution. Modern techniques in DNA sequencing and the exploration of gene diversity will be introduced, with examples from humans and other organisms. In laboratory practicals you will prepare and analyse your own DNA, testing the Out-of-Africa hypothesis of human evolution. Module aims - intentions of the module This module introduces core concepts in genetics. Genetics will be approached from the perspective of molecules, cells, individuals and populations. Genetics is fundamental to any understanding of the biosciences and underpins any degree in the subject. In particular, this module aims to provide you with knowledge and understanding that will enable you to take second and final year modules in genetics, molecular biology, genomics and evolution. This module will develop your team work skills through group practical work and problem-solving. Explain how information is stored and expressed in cells 2. Summarise the molecular basis of variation and mutation, of inheritance of genes and characteristics, of genetic recombination, and the tools of genetic analysis 3. Describe the behaviour of genes in populations and how this contributes to adaptation in an evolutionary context 4. Solve genetics problems On successfully completing the module you will be able to Demonstrate knowledge of essential facts and theory in a sub-discipline of the biosciences 6. Describe and begin to evaluate aspects of genetics and research articles 7. With some guidance, deploy established techniques of analysis, practical investigation and enquiry within the biosciences ILO: Personal and key skills On successfully completing the module you will be able to Communicate ideas effectively by written means 9. Show skills for independent study With some guidance, select and properly manage information drawn from books, journals and the internet Genome organisation and replication. Control of gene expression. Recombinant DNA and genetic engineering. The differences between phenotype and genotype, and the way in which phenotype is affected by both genetic and environmental effects. The analysis of major genetic differences in eukaryotes, including linkage, sex linkage and epistasis. The statistical analysis of segregation ratios. Practical sessions will reinforce concepts covered in lectures, emphasising the nature of scientific enquiry. Learning and teaching Learning activities and teaching methods given in hours of study time Scheduled Learning and Teaching Activities Guided independent study.

MODULE 5. HEREDITY AND MOLECULAR GENETICS pdf

4: Unit 3 / Module 6 MOLECULAR BASIS OF HEREDITY DNA Fantastic! Song. - [PPT Powerpoint]

Module 6: Molecular Basis of Heredity controlled heredity and are made of DNA and proteins. b. Then, scientists determined DNA was the chemical that.

Growth of armpit and pubic hair. Cervix dilates to allow the baby to pass through. The muscles of the uterus contract strongly and rupture the amnion, allowing the amniotic liquid to escapee. This is called the water break. After the birth the uterus continues to contract to push out the placenta and the amnion. This is called the afterbirth. Perfect food for healthy growth of baby. Contains antibodies which protect the baby against infection diseases. Forms an emotional bond between the mother and the baby. Hormonal â€" oral contraceptive pill such as the combined pill oestrogen and progesterone or the mini pill progesterone. The mini pill creates a thickening of the mucus in the cervix which acts as the barrier and the combined pill prevents the production of FSH and LH, preventing menstruation. Its advantage is that it has a low failure rate however it must be taken everyday and at a certain time. Barrier â€" uses a barrier to prevent sperm from reaching the ovum. Examples include the condom and femidom. The advantages are that they are easy to obtain and use and that they also protect against STI. However, they may slip off during intercourse. Inter-uterine â€" an IUD inter-uterine device or coil is inserted through the cervix into the uterus. It is a piece of plastic or copper that prevents a fertilised egg from implanting in the uterus. Sterilization â€" a surgical process that prevents sperm from passing to the penis or eggs from passing to the uterus. In men it is called a vasectomy and is where the sperm ducts are cut and tied under general anaesthetic. In woman a similar process occurs on the fallopian tubes and is called tubal ligations. Its advantage is that it has a very low failure rate while its disadvantages are that it is non-reversible and that it has to be performs by a doctor. The nucleus of a cell contains chromosomes which contain DNA. A small section of DNA that determines a particular feature by instructing cells to produce a particular protein are called genes. In humans, the diploid number of chromosomes is 46 and the haploid number is ABO blood groups are determined by multiple alleles more than two alleles with each allele determining which antigens are on red blood cells. To show patterns of inheritance we often s a genetic diagram called a pedigree. The sex of a person is determined by a pair of chromosomes, XY in a male and XX in a female. The overall ratio of male and female births is 1: There are certain diseases which are sex linked. This means that they exist on the X chromosome and means that often boys are more susceptible to them. An example of this is a blood disorder called haemophilia. It is only found in the X chromosome. A woman with the gene XHXh would not have haemophilia but would be a carrier. Another example of a sex linked disease is red-green colour blindness. The offspring formed through intercourse vary genetically because of the huge variation in sex cells. It is also because of the random nature of fertilisation where over a billion different sperms can fertilise one of thousands of ova Variation can be produced both through genes and through the environment. Mutations are rare, random genetic changes to the genetic material that can be inherited. An example of this is in bacteria that have mutated to be resistant to antibiotics. These bacteria live for longer and can therefore multiple more. The chances of mutations can be increased through mutagens. Examples of these are ionising radiation such as ultraviolet light, X-rays and gamma rays and many different chemicals, both natural and man made e.

MODULE 5. HEREDITY AND MOLECULAR GENETICS pdf

5: Draft:Genetics - Wikiversity

Genetics Module B, Anchor 3 Key Concepts: An individual's characteristics are determines by factors that are passed from one parental generation to the next.

What is the source of genetic variation if, after Meiosis I, a chromosome is different than the original? What two processes are shown in 14? A cell has 4 chromosomes. What kind of sugar is found in a nucleotide? Name the four nitrogen bases shown in Model 1. What part of the nucleotide makes up the rungs of the ladder? What are the complementary bases on the stand listed in 9. Meiosis DRAW both of the following diagrams. Fill in the correct number of chromosomes for each cell. Write out the following statement and fill in the blanks: That is next Friday. It is up to YOU to make arrangements to complete your work. Even if you miss one or two sessions, there are still incentives available! It is one of two nucleic acids found in the cell. DNA is the blueprint for life. Every living thing uses DNA as a code for making proteins which determine traits. For example, DNA contains the instructions for making the proteins called pigments which give your eyes color. My eyes are green Because of DNA? DNA is packaged into chromosomes. Each chromosome is composed of one continuous DNA molecule. The DNA molecule is wrapped around proteins and coiled tightly for protection. Remember, chromosomes are found in the nucleus of eukaryotic cells. Prokaryotic cells have a single chromosome free-floating in the cytoplasm. Discovery of DNA structure Many scientists worked to determine the source of heredity. Heredity is the passing of traits from parent to offspring. But how are those traits passed? First, scientists determined that chromosomes controlled heredity and are made of DNA and proteins. Then, scientists determined DNA was the chemical that controlled characteristics traits of the organisms. Then, the race was on to reveal the structure of the DNA molecule. Curly hair Is an example Of heredity 1. The double helix looks like a twisted ladder. The building blocks of DNA are called nucleotides. A nucleotide consists of three parts: A sugar named deoxyribose A phosphate group One of four nitrogen bases. The four possible nitrogen bases in a DNA molecule are named: There are two strands of nucleotides in every DNA molecule held together by weak hydrogen bonds between the nitrogen bases. The nitrogen bases bond in a specific way. Adenine bonds with thymine Aâ€”T. Guanine bonds with cytosine G-C. This pattern is called complementary base pairing. Name the 3 parts of a nucleotide: Which series is arranged in order from largest to smallest? Chromosomes, nucleus, cell, DNA, nucleotide B. Cell, nucleus, chromosome, DNA, nucleotide C. Nucleus, chromosome, cell, nucleotide, DNA D. All missing work including tests and quizzes are due by 2: Please try and attend! DNA Candy Lab 1. Complete Cell Reproduction Short Answer 2. Do all my cells have the same DNA? Process of DNA replication An enzyme breaks the weak hydrogen bonds between the paired nitrogen bases. The newly unpaired nucleotides are paired A-T and G-C with extra nucleotides present in the nucleus. This process is catalyzed by another enzyme. Enzymes then link the nucleotides along the newly constructed side of the DNA ladder by bonding sugar to phosphate. The DNA is proofread by enzymes for any errors. Each copy of DNA is packaged as a chromatid on a doubled chromosome. After mitosis, each daughter cell will receive one of the two identical copies of DNA. This happens when the doubled chromosome is split, each new chromosome going to a new daughter cell. How can DNA be used by the cell to make a protein? Importance of protein synthesis Every inherited trait is controlled by one or more proteins. Protein synthesis is the process that makes those proteins. Each cell must produce different proteins, based on the function of that cell. For example, only blood cells need to produce the protein hemoglobin. Central Dogma of Biology â€” the central axis around which all other biological concepts rotate DNA structure controls the production of proteins. A section of DNA which is used as the blueprint or code for the production of a protein is a gene. Each gene is composed of a specific sequence of nucleotides. This sequence can be represented by writing the order of nitrogen bases. A codon is like a single word in a sentence. Only by putting the words codons in the correct order can you create a meaningful sentence protein. Proteins are made of amino acids. Each codon directs the cell to place a specific amino acid in a particular position as the protein is built. If this codon was the third codon in a gene, valine would be the third amino acid in the protein. Thus, it must send the instructions using RNA. One gene makes one protein. All RNA has a different sugar ribose which cannot

bond to thymine. Thus, RNA must use a different nitrogen base uracil as a substitute for thymine T. The DNA rezips the gene. Translation uses the mRNA to build a protein In the cytoplasm of the cell, translation occurs at the ribosome. The ribosome holds mRNA in place and helps link amino acids together to make a protein. The string of amino acids folds and coils to shape the protein. Result of protein synthesis Cells respond to their environments by producing different types and amounts of protein. The cell produces proteins that are structural forming part of the cell materials or functional such as enzymes, hormones, or chemicals for cell chemistry. Multicellular organisms begin as undifferentiated masses of cells. Variation in DNA activity determines cell types. Different types of cells expressing different genes leads to differentiation. Only specific parts of the DNA are activated in those cells. Once a cell differentiates, the process cannot be reversed. For example, we have muscle cells, nerve cells, and others. Gene regulation is the process which determines which genes will be expressed used to make a protein. Proteins may be overproduced, underproduced or produced at incorrect times. Injury repair and cancer III. Each individual in a sexually reproducing population has slightly differing sequences of nucleotides in DNA when compared to other organisms of the same specie. The different sequences lead to different proteins, which produce different traits i. For example, two humans with different eye color. Whth appen swhe nprotei nsynthesi sgoe swrong? A mutation is a change in the original DNA sequence, which may lead to a change in the amino acid sequence. A mutation occurs when the original DNA sequence is not copied properly during replication or protein synthesis. The result of a mutation is a change in the amino acid sequence. The necessary protein may not be made or is defective.

MODULE 5. HEREDITY AND MOLECULAR GENETICS pdf

6: RGU: RGU Module: Biomedical Genetics (AS)

Start studying Module 5: Genetics, Evolutionary Psychology, and Behavior. Learn vocabulary, terms, and more with flashcards, games, and other study tools.

Genetics seeks to identify which features are inherited, and explain how these features are passed from generation to generation. In genetics, a feature of an organism is called a " trait ". There are many other trait types, and these range from aspects of behavior to resistance to disease. Traits are often inherited, for example tall and thin people tend to have tall and thin children. Other traits come from the interaction between inherited features and the environment. For example a child might inherit the tendency to be tall, but if little food is available and the child is poorly nourished, it will still be short. The way genetics and environment interact to produce a trait can be complicated: Genetic information is carried by a long molecule called DNA which is copied and inherited across generations. Traits are carried in DNA as instructions for constructing and operating an organism. These instructions are contained in segments of DNA called genes. DNA is made of a sequence of simple units, with the order of these units spelling out instructions in the genetic code. This is similar to the order of letters spelling out words. The organism "reads" the sequence of these units and decodes the instruction. Not all the genes for a particular instruction are exactly the same. Different forms of one type of gene are called different alleles of that gene. As an example, one allele of a gene for hair color could carry the instruction to produce a lot of the pigment in black hair, while a different allele could give a garbled version of this instruction, so that no pigment is produced and the hair is white. Mutations are random events that change the sequence of a gene and therefore create a new allele. Mutations can produce a new trait, such as turning an allele for black hair into an allele for white hair. The appearance of new traits is important in evolution. Theory of genetics[edit] This guinea pig has gorgeous long hair and was a prize winner at the Puyallup, WA fair.

7: Heredity - Chromosomal aberrations | www.enganchecubano.com

5. In peas the trait for tall plants is dominant (T) and the trait for short plants is recessive (t). The trait for yellow seed color is dominant (Y) and the trait for green seed color is recessive.

MODULE 5. HEREDITY AND MOLECULAR GENETICS pdf

The Recollections Of A Virginia Newspaper Man The works of Jonathan Swift Settings approach to health promotion Dirichlets principle Treasure Island (Young Reading CD Packs) Thirty seconds over tokyo book Alchemy The Third Column Of Medicine An address given at Auschwitz on May 28, 2006 Pope Benedict XVI Joseph Bottum Paul Fortunato Philip Jenki Ultrasonography in Urology Investment in education and social choice Christianity opposed to the death penalty Sources of occupational information for counselors, teachers, school librarians and students. Dungeon master 4th edition for dummies Pt. I. Before moonrise. Et jaynes probability theory the logic of science 101 things to do before you die book Low cholesterol diet meal plan Ielts academic ing test papers with answers Owners manual oldsle delta 88 Maharajas palaces An Overview of Exploration Geophysics in China, 1988 (Geophysical References, Vol 3) Tales of the White Mountains Screen printing with a drawing fluid resist Constructing the Egyptian past Probability and statistical inference 9th torrent Budget imbalance and the external influences: A study for the Legislative Budget Board of Texas Hoko River archaeological site complex Light of the Morning 8. Helping your publisher to help you 13. Jack Johnson: World Heavyweight Champion mark Scott Dynamics of bacterial carriage and disease: lessons from the meningococcus. Performance of distributed and parallel systems Child of Twilight Monsters Tea Party Saint Philip Howard, Earl of Arundel Surrey The Plays of Georgia Douglas Johnson Ecr suspension application form Dell studio xps 8000 manual Loops and other groups; The winds of unsung foresters of yore