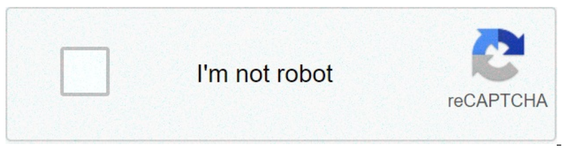

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Genetics parents to offspring

Genetics is the study of how different qualities, called traits, are passed down from parents to child. Genetics helps explain what makes you unique, why family members look alike, and why some diseases run in families. When we trace the paths of these qualities, we are following packages of information called genes. How Do Genes Work? Your body is made up of trillions of tiny cells. Almost every cell in your body has a nucleus, a sort of headquarters that contains your genes. Your mix of genes is unique to you—even your full brothers or sisters have a slightly different mix. Genes are instructions for building the parts of your body and doing the work that keeps you alive, from carrying oxygen to digesting to food and everything else we do. The genes are grouped into collections called chromosomes. Most humans have 23 pairs of chromosomes. Where Did You Get Your Genes? You got all your genes from your parents. For each pair of their chromosomes, you get one chromosome from your mother and one from your father. When the egg and sperm cells come together, they create the full set of 46 chromosomes or 23 pairs. So why aren't your genes exactly the same as your siblings? Like you, your parents each have two copies of their chromosomes, which they got from their parents. When sperm and eggs are created, pairs of chromosomes separate independently and sort themselves at random into two eggs cells in your mom or two sperm cells in your dad. You might get one chromosome in one pair from your mom, and your sister might get the other chromosome from that pair. This means that there are 8,388,608 possible variations of egg and sperm. It's really a wonder we look like our parents at all! Genetic inheritance is a basic principle of genetics and explains how characteristics are passed from one generation to the next.Genetic inheritance occurs due to genetic material, in the form of DNA, being passed from parents to their offspring. When organisms reproduce, all the information for growth, survival, and reproduction for the next generation is found in the DNA passed down from the parent generation.Much of our understanding of inheritance began with the work of a monk by the name of Gregor Mendel. His experiments and 'Laws of Inheritance' provide the foundations for modern genetics.In sexual reproduction, the genetic material of two parents is combined and passed on to one individual. Although the offspring receives a combination of genetic material from two parents, certain genes from each parent will dominate the expression of different traits.Gregor Mendel Gregor Mendel was a monk and scientist and he is commonly referred to as the father of modern genetics. He completed a series of experiments looking at the inheritance of a number of characteristics in pea plants. Mendel published his work in 1865 (24 years before the word 'gene' was ever used) and the significance of his research was not appreciated until 1900, 16 years after his death.Mendel is accredited as the first person to correctly understand the process of how characteristics are inherited by offspring from parents. Before Mendel, many other incorrect hypotheses attempted to explain how characteristics and traits were passed from generation to generation. The most commonly accepted theory was the 'blending theory' which proposed that the traits of parents were blended together and an intermediate trait was expressed in the offspring. Mendel's work on the common pea plant proved that was not the case.Mendel's experimentsMendel performed a series of rigorous experiments that looked at 7 different characteristics (e.g. flower color, seed color and seed shape), each with 2 different traits (e.g. purple flower and white flowers).He established true-breeding lines for each characteristic. For example, one line of plants would produce only purple flowers and another only white. He then crossed individuals with two different traits to see the resulting trait of the offspring over three generations.In his observations, Mendel found that in the first generation of offspring only one of the traits was ever expressed (e.g. purple flowers). After crossing the first generation of offspring with each other, Mendel found that approximately 75% of the second generation inherited the same trait as their parents (i.e. the purple flowers of the first generation of offspring). The remaining 25% expressed the second trait of the original parents (e.g. white flowers), the trait that appeared to be lost in the first generation of offspring.Mendel's conclusionsFollowing three generations of cross-breeding Mendel produced three significant conclusions regarding genetic inheritance. His first conclusion was that each trait is passed on unchanged to offspring via 'units of inheritance'. These units are now known as 'alleles'.Mendel's second conclusion, offspring inherit one allele from each parent for each characteristic. His third and final conclusion was that some alleles may not be expressed in an individual but can still be passed on to the next generation.Mendel's Laws of InheritanceLaw of Segregation – The alleles for each character segregate during gamete production so that each gamete will only have one of the two alleles for each gene.Law of Independent Assortment – Pairs of alleles for each characteristic/gene segregate independently of each other.Mendel's work has been heavily built upon over the past 150 years and the field of genetics has come a long way since his pea experiments. His work set the foundation for our understanding of genetic inheritance in animals, plants and other complex organisms.The process of inheritance is hugely important for understanding the complexity of life on Earth, in particular for its role in sexual reproduction and evolution. For this, Mendel's contributions to science, biology and genetics are still widely recognized and applauded within the scientific community.Alleles, genotype & phenotypeAlleles and genotypes are important foundations of genetics. An allele is a particular form of a gene and they are passed from parents to their offspring. A genotype is the combination of two alleles, one received from each parent.The physical expression of a genotype is called the phenotype. The specific combination of the two alleles (the genotype) influences the physical expression (the phenotype) of the physical trait that the alleles carry information for. The phenotype can also be influenced by the environmentAllelesAn allele is a particular form of one specific gene. When Gregor Mendel completed his experiments on peas he was crossing different traits of one characteristic, such as flower color.Genetically, the variation in traits, e.g. purple flowers or white flowers, is caused by different alleles. In most cases in the plant and animal world, individuals have two alleles for each gene; one allele is inherited from their father and the second from their mother.Depending on which alleles an individual has received will determine how their genes are expressed. For example, if two parents have blue eyes and pass the blue-eyed alleles onto their children, their children will also possess the alleles for blue eyes.Certain alleles have the ability to dominate the expression of a particular gene. For example, if a child has received a blue-eye allele from their father and a brown-eye allele from their mother, the child will have brown eyes because the brown-eye allele is dominant over the blue eye allele. In this case, the brown-eye allele is known as the 'dominant' allele and the blue-eye allele is known as the 'recessive' allele.GenotypeThe genotype is the genetic combination of two alleles. If, for example, a child has received one brown-eye allele – represented by 'B' – and one blue-eye allele – represented by 'b' – then their genotype would be 'Bb'. If, however, the child received two brown-eye alleles their genotype would be 'BB', and a child with two blue-eye alleles 'bb'.As previously mentioned, the brown-eye allele is dominant over the blue-eye allele so a child with the genotype 'Bb' would, in theory, have brown eyes, rather than blue or a mix between the two. Genotypes with two alleles that are the same, i.e. 'BB' and 'bb', are known as homozygous genotypes and genotypes with two different alleles are known as heterozygous genotypes.PhenotypeThe physical appearance of the genotype is called the phenotype. For example, children with the genotypes 'BB' and 'Bb' have brown-eye phenotypes, whereas a child with two blue-eye alleles and the genotype 'bb' has blue eyes and a blue-eye phenotype. The phenotype can also be influenced by the environment and sometimes certain alleles will be expressed in some environments but not in others. Therefore two individuals with the same genotype can sometimes have different phenotypes in they live in different environments.Gene – a section of DNA that contains the genetic material for one characteristicAllele – a particular form of a gene. One allele is received from each parentGenotype – the combination of the two alleles that are received from an individual's parentsPhenotype – the physical expression of the gene which is determined by both the genotype and the environmentHeterozygous – a genotype with two different allelesHomozygous – a genotype with two of the same allelesPunnet SquaresPunnet squares are used to identify the possible genotypes and phenotypes of offspring of two adults. They are a useful tool for recognizing the chance of offspring expressing certain traits. The punnet square to the right shows the potential genotypes of offspring when a homozygous dominant (BB) adult breeds with a homozygous recessive (bb) adult. In this instance all the offspring will heterozygous (Bb) for this characteristic and only the dominant trait will be expressed. In terms of genotypes and phenotypes, if the 'BB' genotype coded for the dominant brown eye trait and the 'bb' genotype coded for recessive blue eye trait, all the offspring will have the genotype 'Bb' and the expressed phenotype will be the dominant brown eye trait.Last edited: 31 August 2020Want to learn more? Enter your details to get access to our FREE 6-week introduction to biology email course.Learn about animals, plants, evolution, the tree of life, ecology, cells, genetics, fields of biology and more.Success! A confirmation email has been sent to the email address that you just provided. Check your emails and make sure you click the link to get started on our 6-week course.

genetics is the study of how traits are passed from parents to offspring. what did mendel conclude about genetics from parents to offspring. transfer of characteristics from parents to offspring is called genetics. are genes passed from parents to offspring. what carries genes from parents to offspring

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