

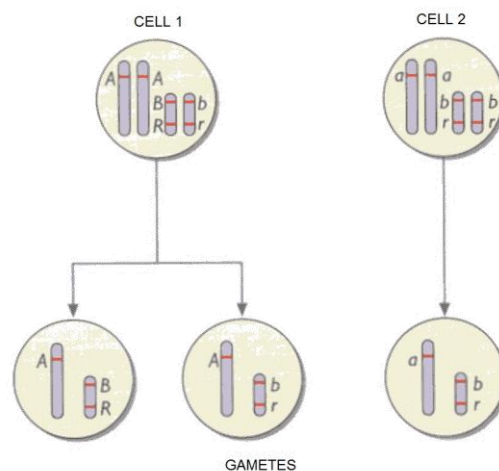


## CONSOLIDATION ACTIVITIES

### “SIENCIAS FOR THE CONTEMPORARY WORLD” (1<sup>st</sup> Bachillerato)

#### Unit 4: The genetic revolution

- 1.1. Indicate which genotypes could be possible for a trait in a trait determined by a gene with two different alleles (A and a).
- 1.2. Is it possible that two individuals have different phenotype and the same genotype?  
And different genotype and the same phenotype? Give reasons for your answers.
- 1.3. Gametes are the specialised cell of sexual reproduction. They form during a special cellular division called *meiosis*. During this process the number of chromosomes is reduced at a half (one set). In this way when male and female gametes fuse to form a new individual, it will have the species' typical number of chromosomes (two sets). How many different kinds of gametes can form an individual of genotype AA? And other of genotype Aa?
- 1.4. Indicate the expected genotypic and phenotypic proportion of a crossing between black mice and brown mice. Black is the dominant allele for the colour of hair and both individuals are homozygous. What is the probability to find brown individuals if we cross the descendants of the previous crossing among them?
- 1.5. What is the probability to obtain di-heterozygous individuals from two progenitors which genotypes are *AARR* y *aarr*? Knowing that the allele *A* determines *tall stem* and the allele *R*, *red colour*, is there any possibility to find descendants of *short stem* and *white colour* in  $F_2$ ?
- 1.6. What is the probability to obtain di-heterozygous individuals from two progenitors which genotypes are *AARR* y *aarr*? Knowing that the allele *A* determines *tall stem* and the allele *R*, *red colour*, is there any possibility to find descendants of *short stem* and *white colour* in  $F_2$ ?
- 1.7. The following sketch shows two cells, each one with four chromosomes, from which gametes are formed. In the picture, the chromosomes are shown and the position on them, of the alleles *A*, *a*, *B*, *b* and *R*, *r*. (*A* determines *dark hair*, and *a*, *blonde hair*, *B* determines *straight hair* and *b*, *curly hair*; *R* determines *dark skin* and *r*, *fair skin*)



- a) If we cross these individuals, which will be the genotype of the offspring?
- b) Which of these genes are inherited independently? And linked?
- c) Why do linked genes not inherit independently?

- 2.1. How could we distinguish in the laboratory if a fragment of nucleic acid is RNA or DNA?
- 2.2. Indicate the complementary sequence of this DNA strand: T T G C C T A C G T A T G.
- 2.3. Why is necessary to duplicate the genetic material before the cellular division?
- 2.4. What is a codon?
- 2.5. Give an example demonstrating that the genetic code is degenerated. Use the chart.
- 2.6. How can be explain from the evolutionary point of view, that all living beings have the same genetic code?
- 2.7. This is the sequence of a piece of a strand of DNA: ...T T C G T A T C G G C A T T G C A A ...
  - a. Write down its correspondent mRNA.
  - b. Which amino acid corresponds to each codon?
- 3.1. Why is necessary use the same restriction enzyme to obtain the two DNA fragments that we want to recombine?
- 3.2. What is bacterial transformation? Why is it useful for genetic engineering?
- 3.3. How is the genetic fingerprint of an individual obtained? What is its usefulness?
- 3.4. DNA probes are used to gene location. What characteristic of DNA does it make possible?
- 3.5. What natural process is imitated in the PCR technique?
- 3.6. Animals and plants genetically modified are called transgenic. Why?
- 3.7. What problem can the transgenic crops represent from the ecological point of view?
- 3.8. What type of investigation uses knockout animals?
- 3.9. What risks does prenatal analyse have?
- 3.10. What is the difference between in vivo and ex vivo techniques used in somatic genetic therapy?
- 3.11. What is the difference between adult stem cells and embryonic stem cells?
- 3.12. Why is the technique used in cloning called "nuclear transfer"?
- 3.13. Why is important knowing the location and sequence of a gene?