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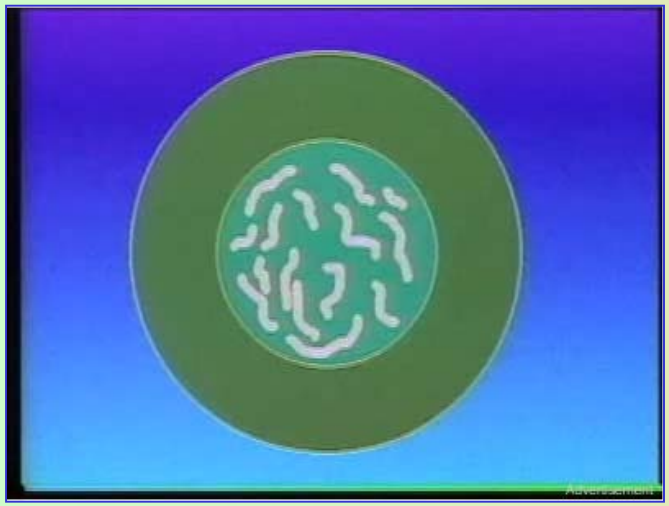
Chromosomes, genes and DNA



If we could remove a single cell from one of the pea plants that Mendel used in his experiments and then examine in detail...

... an "A" chromosome where the gene controlling the plant's height is located we would discover three basic facts:

•first, that the chromosome is constructed of large quantities of DNA

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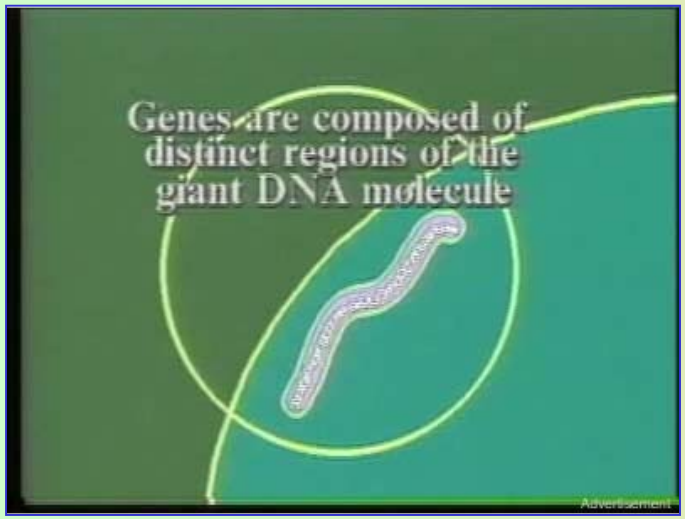
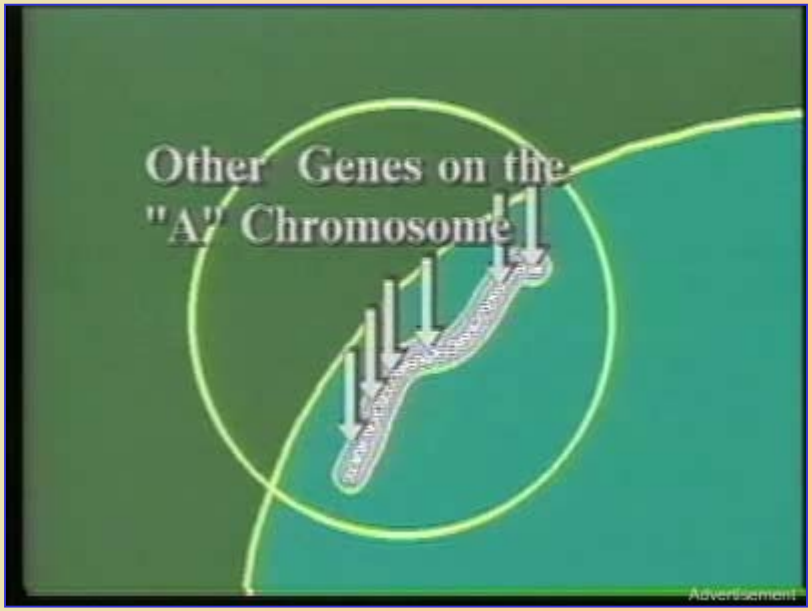


- second, that genes are composed of distinct regions of the giant DNA molecule, and so the gene controlling plant height is always found in exactly the same location on the chromosome and...

•third, we would discover that many other genes are also found in different but always predictable locations on the same chromosome.



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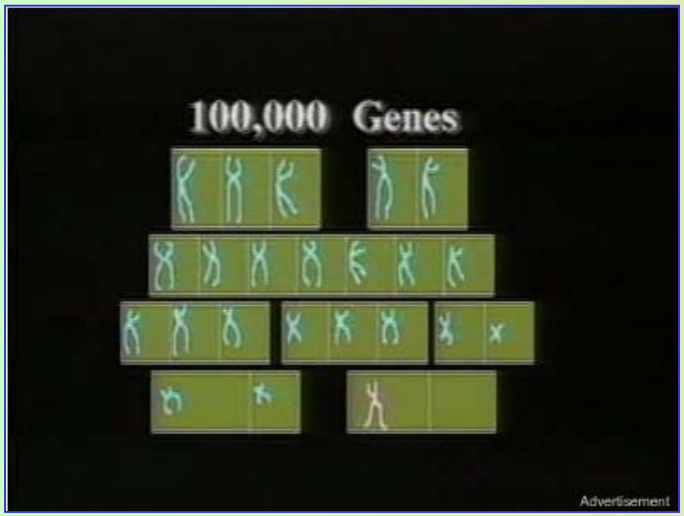
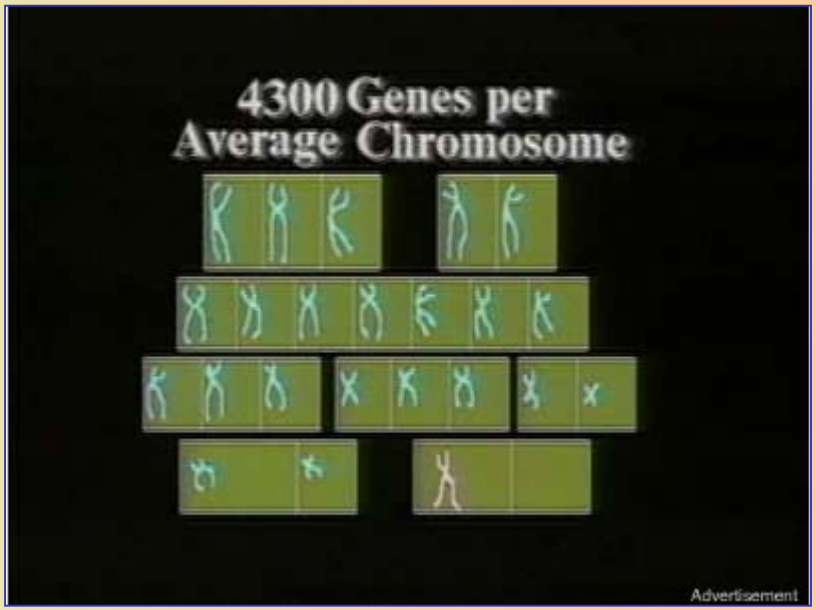


Today scientists estimate that in human beings, for example, there is around 100,000 genes located on 23 different chromosomes.

It means that the average human chromosome would contain around 4,300 different genes.

Many decades of research have proved that virtually all genes have just one basic function...



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...that is, to store the instructions for building proteins.

It is now believed that there is a different gene for each different type of protein found within all living cells.

Proteins are essential components of living things. Some help create structures such as fibers and membranes; others transport oxygen in the blood; but the vast majority of proteins function as enzimes

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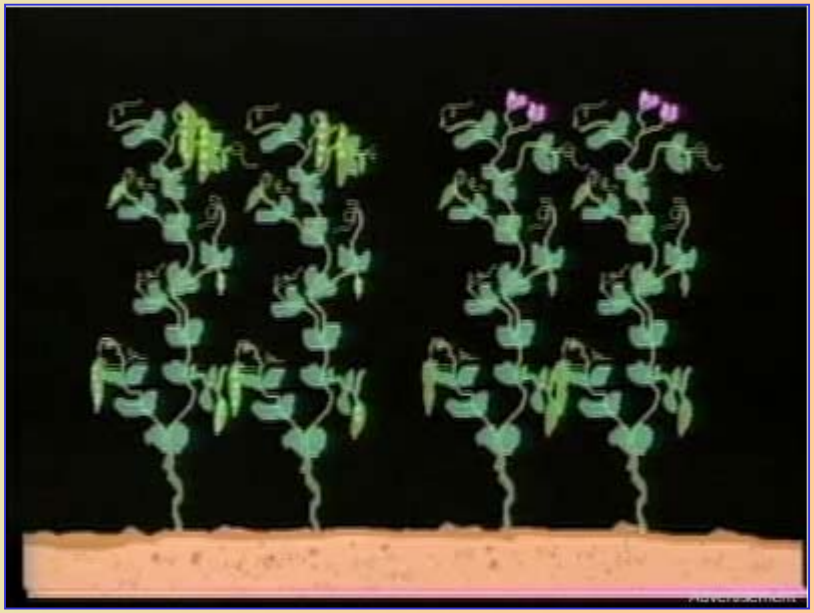
To be able to understand how genes control physical traits or how they can be dominant or recessive, it is very important to understand the role of enzymes inside the cell.

To learn one typical way the enzymes work we would use an imaginary biochemical system in pea plants as an example.

Let us imagine that, in order for pea plants to grow tall, a certain chemical growth factor "K" must be present inside their cells.



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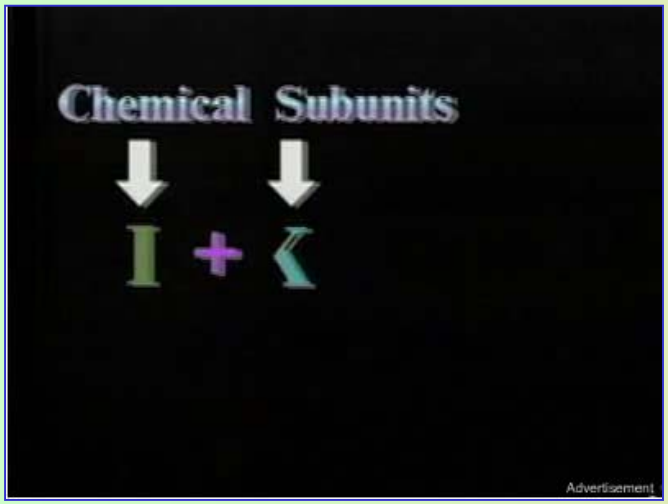
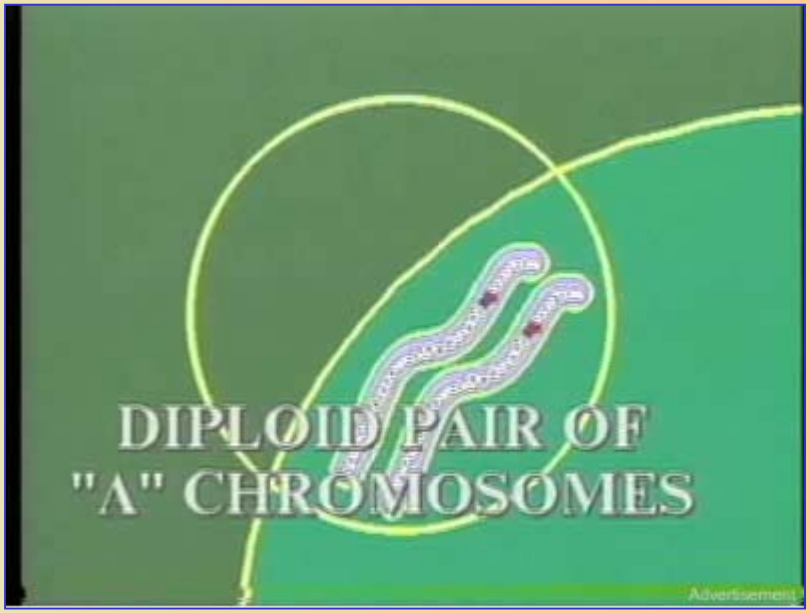


This growth factor is formed when two chemical subunits combine with one another.

However, these chemical subunits will only combine if the "T" enzyme is present to join them together.

Otherwise, they will nearly float around aimlessly inside the cell.

The instructions for building the "T" enzyme are found in a small region in the DNA and each in the diploid "A" chromosomes.



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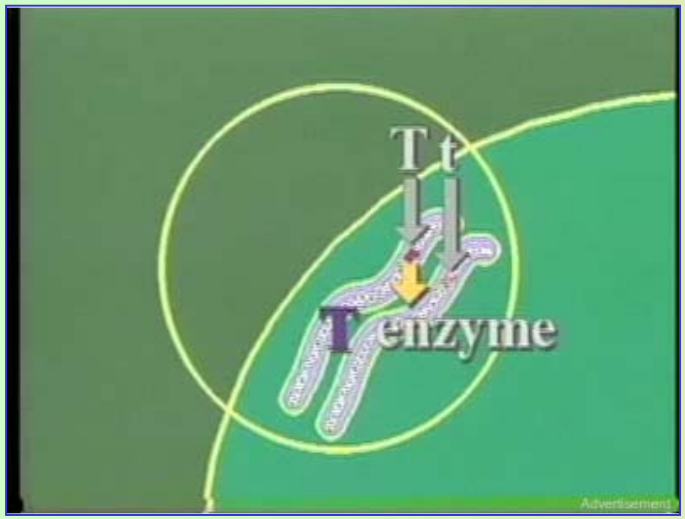

We can now see that the reason tha "T" is dominant is that it can direct the formation of th "T" enzyme, that allows the two chemical subunits to combine to form the growth factor...

... even if the instructions are only present on only one of the two "A" chromosomes

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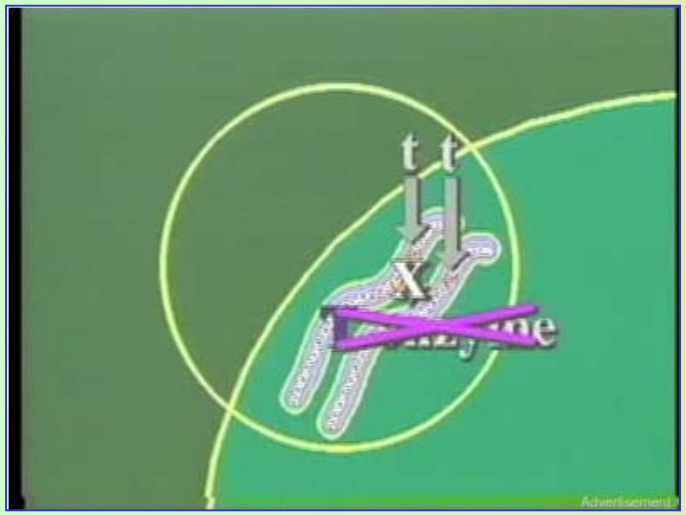

In contrast, if only the recessive "t" genes are present on each "A" chromosome, the cell does not posses the correct instructions to make the "T" enzyme. As a result, the subunits remain uncombined and no growth factor is created and, hence, in this imaginary example the plant will remain short.

Video

http://videos.howstuffworks.com/hsw/6020-chromosomes-genes-and-dna-video.htm