A Matter of Taste
Investigating Our Genome

I CONGRESO CIENTÍFICO INTERNATIONAL “EUROCIENCIA JOVEN”
5. & 6. de Mayo de 2025 Córdoba

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01

Introduction

Genetics in a Nutshell

DNA

What is DNA?

- Deoxyribonucleic acid
- Genetic material composed of 4 nucleotide bases

Where can we find DNA

- In the nucleus

What are the structural components of DNA

- Chromosome
- Chromatin
- Chromatid
- Centromere

Chromosome

- Strands of DNA, encoded with genes and contain genetic information of the individual

Chromatin

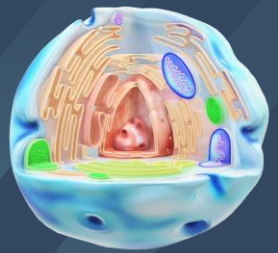
- Mass of genetic material
- Composed of DNA
- Condenses during cell division

Chromatid

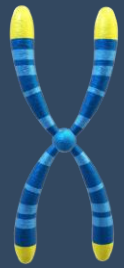
- One half of two identical copies of a replicated chromosome, which are joined together during cell division by centromere

Order of genetic material

Cell



Nucleus



Chromosome

DNA

Gene

Nucleotide

Adenine
Cytosine
Guanine
Thymine

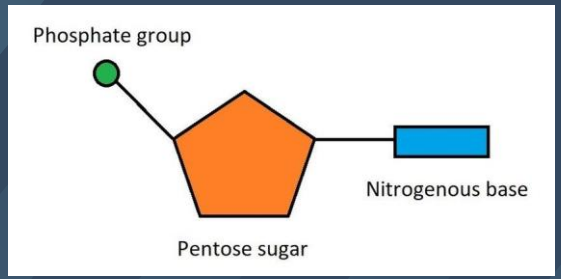


Fig: Nucleotide

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02

•Candy DNA Model•

02 Candy DNA Model

Fig.1: The final DNA candy model

Fig.2: Materials

Materials:

- Soft candy in 4 colours (gummy bears, gum drops, or mini marshmallows)
- Rope like candy (Twizzlers)
- Toothpicks
- Paper & pen (or marker)
- Paper towel

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03

•Experiment Nr. 1•

Extracting DNA from Different Types of Fruits

03 Extraction of DNA

Research question:
Can DNA be extracted from a kiwi?

Hypothesis:
Our prediction is that it will be possible to extract the DNA from the kiwi as well as to see it through the microscope.

Materials:

- Half of a kiwi or banana
- 4 tsp. 91% isopropyl alcohol – chilled
- ½ tsp. of salt
- 2 tsp. washing – up liquid
- 100ml of water
- Teaspoon
- Freezer ziplock bag
- 1 plastic cup
- 1 coffee filter
- Small glass

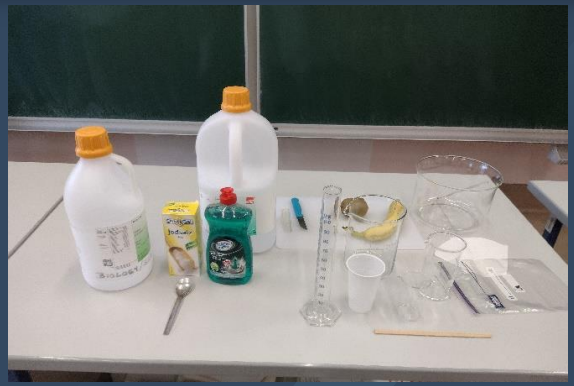

Fig.3: Materials Experiment Nr. 1

03 Extraction of DNA

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Observation:

- Pouring mixture into the beaker, seeds were separating from liquid
- DNA separated from the rest of liquid while adding alcohol

Fig.4: Kiwi DNA structures under the microscope

Fig.5: Separated DNA

Conclusion:

- The experiment confirms that kiwis contain DNA, which can be easily extracted.
- DNA becomes visible when many strands group together.
- The protective membranes must be broken to release the DNA.
- Alcohol makes DNA visible because it is not soluble in it.
- Such experiments aid genetic research on traits and heredity.

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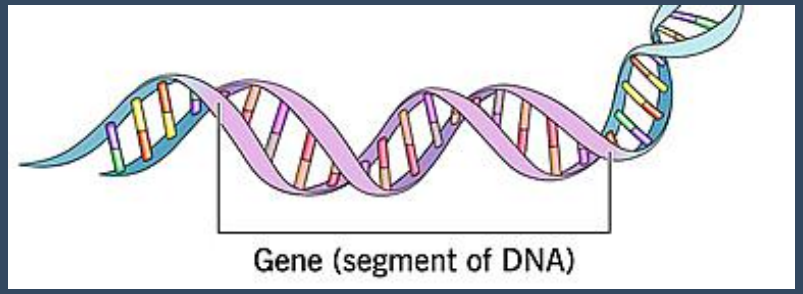
04

•Experiment Nr.2•

A Matter of Taste
Investigating Our Genome

04 Investigating our Genome - Theory

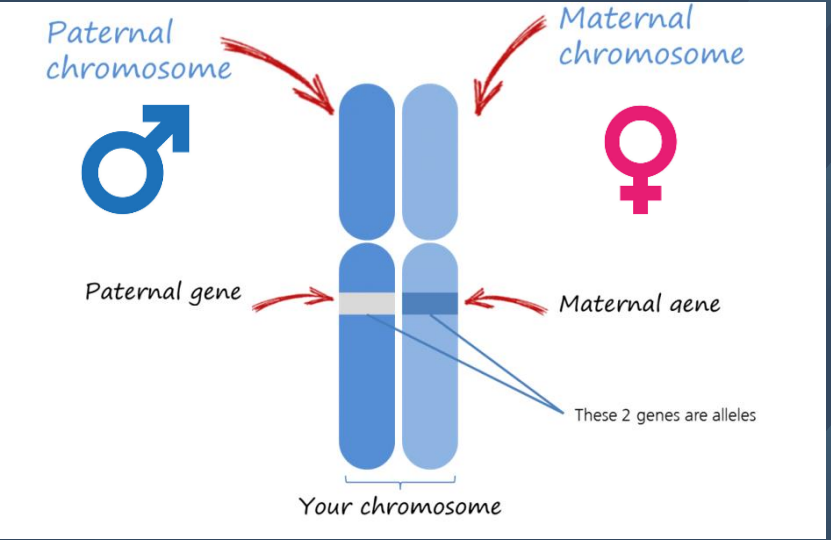


SNPs can lead to different versions of genes (alleles) that affect how proteins function.

- Taste is influenced by genetics, not just personal preference.
- 99% of DNA is identical; the 1% difference makes us unique.
- SNPs (Single Nucleotide Polymorphisms) affect traits like taste.
- The TAS2R38 gene determines sensitivity to PTC, a bitter compound in broccoli, kale, and Brussels sprouts

04 Inheritance of Genetic Information

Phenotype	Genotype		
Phenylthiocarbamide (PTC)	***TAS2R38 gene** present in following form*		
strong taster	**T/T**	*two dominant traits inherited from parents (maternal allele T and paternal allele T)*	***Homozygote dominant***
mild taster	**T/t**	*Each parent passes a different gene (dominant trait T and recessive trait t) to the offspring*	***Heterozygote***
non-taster	**t/t**	*two recessive traits inherited from parents (maternal and paternal allele t)*	***Homozygote recessive***



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<u>Research question:</u>
Is the personal taste perception linked to the genome?

<u>Hypothesis</u>:
According to the test person´s perception of not liking broccoli that much and that it tastes bitter to them, we predict that the test person's genotype is heterozygote (Tt; mild taster) (e.g. Group 2)

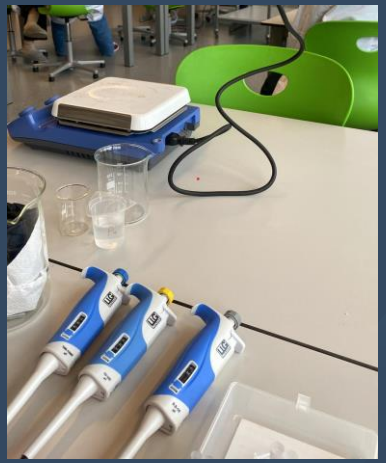

Fig.6: Materials used in the experiment

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Materials (Reagents) :

- Extraction Buffer I: 50 µL
- Extraction Buffer II: 50 µL
- Hot-Start Mastermix: 12.5 µL
- PTC Primer: 12.5 µL
- BtsCI Restriction Enzyme: 0.5 µL
- CutSmart Buffer: 2.5 µL
- Gel-Loading Dye (6X): 2 µL
- 100 bp DNA Ladder: 10 µL per gel
- SYBR Green I (10,000x): 2 µL per gel
- Agarose: 0.4 g per gel
- TBE Buffer: 20 g

Equipment:
-Thermocycler
-Gel electrophoresis equipment
-Transilluminator
-Microwave
-Centrifuge

Consumables:
-PCR tubes (1 mL and 0.2 ml)
-Syringes (1 mL)
-Pipette tips (2-200 µL)
-Plastic shot glasses (40 cl)
-Gloves
-Saline solution
-Distilled water

Micropipettes and Pipette Tip Boxes:

-2-20 µL micropipettes
-Pipette tip boxes (2-200 µL)
-20-200 µL micropipettes

Other:
-Permanent markers
-Plastic racks
-Styrofoam box with ice
-Cups (for disposing of pipette tips)
-Safety goggles

Fig.7: Materials used in the experiment

Fig.8:Thermocycler

Fig.9: Centrifuge

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Conclusion:

- The hypothesis was confirmed as true.
- The test person is a heterozygote (mild taster).
- DNA extraction and PCR help analyze genetics.
- DNA fragmentation and electrophoresis confirm differences.
- Taste perception varies based on genotype.
- Inherited genetic material influences taste sensitivity.

Fig.10: Gel electrophoresis equipment

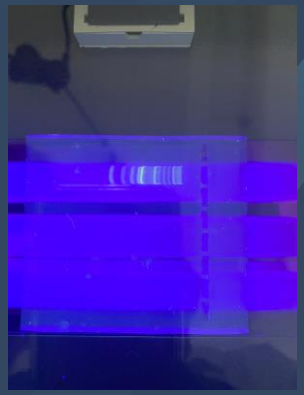

Fig.11: Gel Electrophoresis

04 Results

Experiment

Sample	Outcome	
	HYP.	RES.
Group 1	TT	Tt
Group 2	Tt	Tt

Experiment

Sample	Outcome	
	HYP.	RES.
Group 3	tt	?
Group 4	TT	TT

TT = homozygote dominant (strong taster)
Tt = heterozygote (mild taster)
Tt = homozygote recessive (non – taster)

05

•Summary•

Long Story Short

05 Summary

Candy DNA Model

Visualisation of the DNA double helix – it´s structure and components

Experiment Nr. 1

Learning a way of collecting genetic material out of different fruits and gathering the knowledge that fruits have genetic material as well

Experiment Nr. 2

TASTE IS INFLUENCED BY GENETICS, which can be scientifically proved. But additionally there is the posibility that taste is influenced by culture and enviroment / sourrounding

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Thank you for your attention!

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