

# DNA

## The building blocks of life

Download the teacher notes,  
technician notes and student workbook  
that accompany this resource at  
[rsc.li/3RDNTaW](https://www.rsc.li/3RDNTaW).

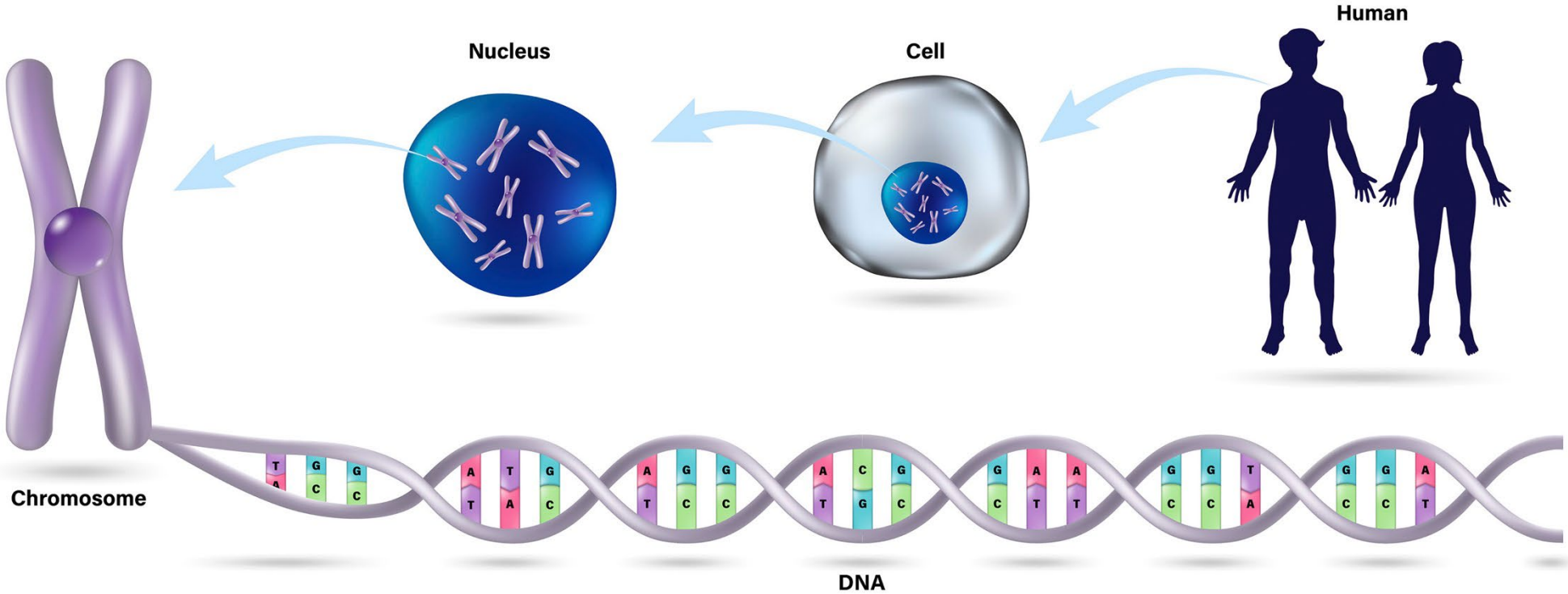
# Learning objectives

By the end of this session, you will be able to:

- Describe the role of DNA in living things.
- Describe the main processes involved in extracting DNA from plant cells.



# What is DNA?



# History of DNA

Discovered in 1869.

Structure was determined by Dr James Watson and Francis Crick in 1953.

Watson and Crick were helped by research done by Rosalind Franklin (who took an X-ray photo of DNA's structure) and Maurice Wilkins.



# Why is DNA important?

DNA is the genetic code in all living organisms.

It carries all the vital instructions for cells.

It is passed from parents to children, which explains why we may have some of our parents' features.



## Senior director of chip research

Meet Jason, a senior director of chip research at Oxford Nanopore Technologies.

He works with other scientists to sequence DNA during viral outbreaks or during the discoveries of new species.

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Senior director of chip research



# Extracting DNA

DNA can be extracted from the cells of living organisms.

Today we are going to be trying to extract DNA from strawberries and kiwi fruit.

These fruit have six different sets of chromosomes, which is three times the material in human DNA.

As there is a larger number of chromosomes, the fruit's DNA can be visible to the naked eye.



## Demonstration: extracting DNA from strawberries

- Add the strawberries to a zip-lock bag and 'squish' to form a mush.
- Add extraction solution and the 'squishing' process continues until there are no more large pieces of fruit.
- The extraction solution used contains detergent, water and salt.
- Filter the solution formed and then transfer into a boiling tube.





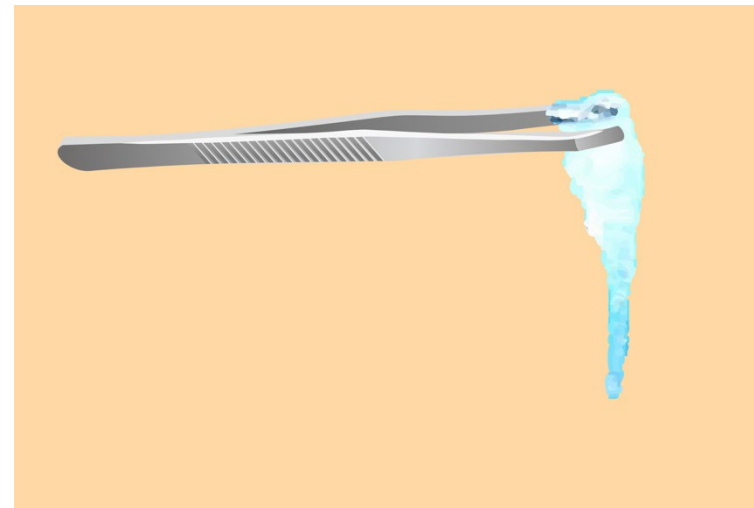
## Demonstration: extracting DNA from strawberries

- Add pineapple juice and stir the solution. The pineapple juice helps to break down the cell membrane so that more DNA can be released.
- Tilt the tube, then slowly add chilled ethanol down the side of the tube, so it forms a separate layer on top of the strawberry solution.



## Demonstration: extracting DNA from strawberries

- The fruit DNA starts to form at the boundary between the two layers and floats up into the colourless upper layer, where it can be seen as long strands.
- The long strands of DNA can be collected from the tube using a wire hook.



## Executive editor, scientific publishing

Meet Katie, an executive editor in scientific publishing, who works with scientists around the world to publish and promote their findings in leading scientific journals.

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in scientific publishing





## Activity 1

# Extracting DNA from kiwi fruit

▶ See student workbook

# Extracting DNA from kiwi fruit

You will now try to extract DNA from kiwi fruit.

You will try the method in two different ways – one that includes the use of pineapple juice and one that does not.

During the experiment remember to wear eye protection and follow the instructions in your student workbook carefully.



## Questions

- (a) Why is it important that the fruit is 'squished' at the start of the experiment?
- (b) How did the amount of DNA extracted from the kiwi fruit compare with the amount extracted from the strawberries? Why do you think this was?
- (c) How did the amount of DNA extracted from the kiwi fruit when pineapple juice was used compare with the amount of DNA extracted from the kiwi fruit when pineapple juice was not used? Why do you think this was?
- (d) Explain the purpose of including each of the following: detergent, salt and ethanol.



## Answers

- (a) The process of 'squishing' the fruit separates the cells and allows the DNA to move out of the cell nucleus.
- (b) The amount of DNA extracted varies between different plants.
- (c) There was a greater amount of visible DNA produced when pineapple juice was used compared with the amount produced when pineapple juice was not used. The pineapple juice helps to break down the cell membrane so that more DNA can be released.
- (d) The detergent breaks down the fatty cell membrane so the DNA can be released. The salt makes the strands of DNA bind together so they become visible. As DNA does not dissolve in ethanol, it forms a jelly-like substance so becomes more visible.



# Acknowledgements

This resource was originally developed by the University of Reading to support outreach work delivered as part of the Chemistry for All project.

To find out more about the project, and get more resources to help widen participation, visit our Outreach resources hub: [rsc.li/3CJX7M3](https://rsc.li/3CJX7M3).

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