

Evolution and Inheritance: Lesson 3

Conducting an experiment to extract DNA from fruit

Science KS2 Year 6



Evolution and Inheritance: Lesson 3

Science

Key Stage 2 Year 6

Learning Aims:

- to extract DNA from different fruits and see what it looks like. To make a hypothesis for our experiment. To make sure we carry out a fair test and decide how we will measure our results
- to record our results. To analyse our results and reach a conclusion

Curriculum Objectives:

This lesson builds on what we learnt in the last lesson. Recapping on what DNA is. In this lesson children will actually see what DNA looks like which will help create an image in their brain when talking about DNA. It will help with their understanding of what DNA is. Having an understanding of DNA helps them to understand the topics covered in “Evolution and Inheritance”. If they understand the mechanisms which drive these processes it will help them to understand it. In addition, carrying out the experiment in this lesson will encourage children to work and think scientifically.

Working Scientifically

- Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- Using test results to make predictions to set up further comparative and fair tests.
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
- Identifying scientific evidence that has been used to support or refute ideas or arguments.



Key Vocabulary

Deoxyribonucleic Acid (DNA). This was also in lesson 2.

Chromosomes. Hypothesis. Fair test. DNA extraction buffer. Precipitates.

These can also be found at the end of this PDF and can be placed on a learning wall as they are discussed in the presentation.

Reading Links:

These books and websites are a great way to further engage children and deepen their interest and understanding of DNA.

1. The “DNA Detectives – To Catch a Thief” is an exciting, page-turner of a story, where the characters in the book use DNA to catch the pet thief who has stolen their pet dog, Milly. In the story, the children break into their Mum’s laboratory and extract DNA from evidence they have collected. The story also recaps on what they have learnt in this lesson about DNA, cells and the nucleus. This book can be purchased via the following websites:
 - Primary Science – the DNA Detectives – Insight and Perspective.
<https://insightandperspective.co.uk/primary-science-the-dna-detectives>
 - The Little Story Telling Company: Books | Story telling and published author.
<https://www.thelittlestorytellingcompany.co.uk/>
2. “My DNA diary: All about you” by Lisa Mullan provides a great introduction to DNA for children. It also complements the information children have learnt in this lesson.
<https://www.goodreads.com/book/show/43602545-my-dna-diary>



Equipment

You will need:

- Lego kit from previous lesson (optional)
- two clear glasses/cups
- sealable plastic bag
- various fruit. include, if possible, those in the table on slide 4: strawberry, banana, blueberries, pears, oranges, kiwi fruit
- blunt knife and teaspoon
- plate/chopping board
- measuring jug
- either a colander/sieve/tea strainer
- either a coffee filter/dish cloth/paper towel
- black paper/card or black t-shirt/black jumper
- vodka/surgical spirit/rubbing alcohol (keep in freezer)
- 4 teaspoons salt
- 2 teaspoons washing up liquid
- warm water
- timer
- skewer



PowerPoint Presentation

The accompanying PowerPoint presentation has 21 slides with the following learning points. At intervals throughout the lesson, we suggest asking the children what questions they might have. These can be collected throughout the unit of learning and added to the slide at the end of the lesson.

- Slides 1 and 2 introduce this lesson.
- Slide 3 recaps on previous lesson and introduces the idea of chromosomes. You can use the Lego kit or craft book/video from the previous lesson here to encourage the children.
- Slide 4 encourages children to come up with a hypothesis on which fruit they think will have the most DNA. Will it be the one with the most chromosomes? They will need to test this.
- Slide 5 invites children to complete their worksheet, which you will find on pages 8, 9 and 10 of this PDF, and to record their hypothesis and the reason for this.
- Slide 6: class discussion on how the children will make this a fair test.
 - How do they make sure everyone treats their fruit the same way? E.g. starting with the same amount of fruit. Will they weigh the fruit?
 - Making sure everyone uses the same amount of chemicals.
 - Do they need to time the different stages? E.g. they must mash all their fruit for 10 minutes, etc.
 - Why is it important to carry out a fair test?
 - How are they going to measure the amount of DNA they get?
 - Will they look at it and compare everybody's results?
 - Will they weigh out the DNA?
 - How will they record the results: will they take pictures with an iPad, will they record it in a table, will they draw a bar graph?
 - How will they decide if their hypothesis was correct?
 - Will they compare the results of several groups who have extracted DNA from the same fruit?
 - Will they just take the result from the group which gets the most DNA?



- Slide 7 encourages children to write their thoughts on conducting a fair test: how they will measure the amount of DNA and how they will record the results on their worksheet.
- Slide 8: time to behave like real scientists! Children must read the lab rules, put all their equipment together and put the alcohol in the freezer so that it is ice cold.
- Slide 9 reminds children to put on their safety glasses. It is important to protect their eyes when working in a laboratory.
- Slide 10 asks the children to cut up the fruit and place it in a sealable bag. Children should be encouraged to gently squash the fruit so that the bag doesn't split.
- Slide 11: it's time to make the DNA extraction buffer! Using warm water here helps the salt to dissolve. Allow ten minutes.
- Slide 12: while the children are waiting, they can learn what is happening in their bag of mashed up fruit. What is the soap doing? What is the salt doing?
- Slide 13: time to filter our solution. Encourage the children to be patient at this stage. It takes time for the liquid to filter through. Patience is the sign of a good scientist!
- Slide 14: while the children are waiting for the liquid to filter through, they can find out what is happening to the DNA at this stage. Ask the children if they are ready to see some DNA!
- Slide 15: ask the children to make sure they have their safety glasses on. This is the exciting bit. As the teacher, you get to add the alcohol to their beakers. Make sure the beaker is on black paper as this makes it easier to see the DNA. Get the children to look at the top of the beaker. Slowly dribble the ice-cold alcohol down the side. You should see the white strands of the DNA appearing. Ask the children if they are excited as you do it. This bit is really magical!



- Slide 16: time to discuss what we saw and what is happening! Get the children to talk about what they saw. Was it exciting? What colour was the DNA? What did it look like?
- Slide 17: time to measure the amount of DNA each group obtained and to record the results in their worksheets. Was their hypothesis correct? Why did some groups get more DNA? Is it just because their fruit had more chromosomes? Did they dissolve their salt better, did they mash their fruit better or for longer? Did they add more soap? Had the alcohol warmed up by the time it got to their group?
- Slide 18: get the children to finish the final section of the worksheet. If they did the experiment again, would they do anything differently? How did they feel when they saw the DNA for the first time? Does it make them want to be a scientist?
- Slide 19: a fantastic weblink where children can extract DNA just like real scientists with tubes, pipettes and a centrifuge in a virtual laboratory. They can also read “The DNA Detectives – To Catch a Thief” where the characters in the story use DNA to solve a crime. They break into their Mum’s laboratory and extract DNA from their evidence, just like the children have today in their classroom laboratory.
- Slide 20: this slide is kept blank so that you can add the children’s questions, and carry them through this unit of learning.
- Slide 21: end of lesson.



Extracting DNA from fruit

Hypothesis

What is your hypothesis?

(which fruit do you think you will be able to extract the most DNA from?)

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Why do you think this fruit will give you the most DNA?

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A fair test

How will you make the experiment into a fair test?

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Measurement

How will you measure which fruit you were able to obtain the most DNA from?

(Will you weigh it? Photograph it? Compare them visually?)

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Results

How did you record your results?

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Can you display them here (i.e. picture, table, description)?

Analysis

Was your hypothesis correct?

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If not, why do you think that might be?

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Analysis

If you could do the experiment again, what would you do differently to try and get more DNA?

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Working like a scientist

People all around the world are working in laboratories extracting DNA, just like you did today. They might use smaller tubes and slightly different chemicals, but the process is the same. Breaking open the cells and precipitating the DNA with alcohol!

Did you have a "Wow" moment today? How did you feel when you saw the DNA?
- The instructions to make a banana! If you enjoyed working with DNA, maybe in the future you might become a scientist like me. It's the best job in the world!

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Evolution and Inheritance: Keywords Flashcards



**Deoxyribonucleic
Acid (DNA)**

Chromosomes

Hypothesis

Fair test

**DNA
extraction
buffer**

Precipitates



Chromosomes



Hypothesis



Fair test



DNA extraction buffer



Precipitates

