



Connecting Indigenous
Knowledges to the classroom

Experiment Procedure

Traditional cooking methods

Physical sciences

Teacher notes (Year 5)



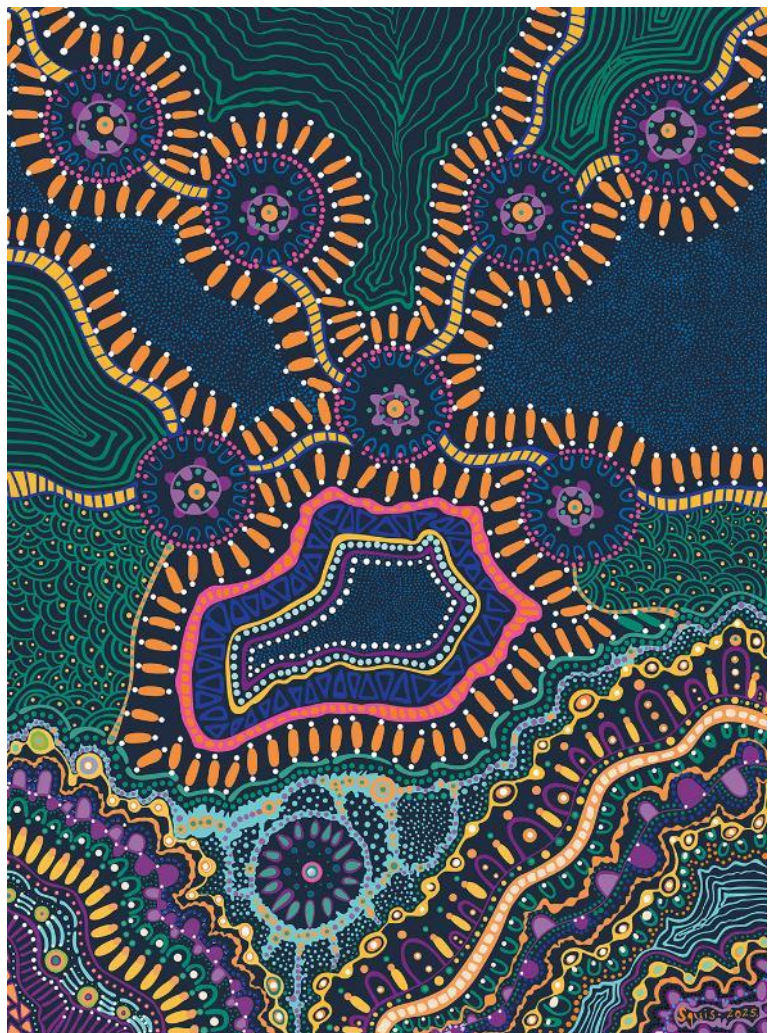
Acknowledgement of Country

CSIRO acknowledges the Traditional Owners of the lands, seas and waters of the area that we live and work on across Australia. We acknowledge all Aboriginal and Torres Strait Islander peoples and their continuing connection to their culture and pay our respects to Elders past and present. CSIRO is committed to reconciliation and recognises that Aboriginal and Torres Strait Islander peoples have made contributions to all aspects of Australian life including culture, economy and science.

Artwork

‘Meeting on Country, Shifting Sands’
by Aunty Sandra Angus
working with Saltwater People
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Aunty Sandra Angus is an acknowledged Elder and well respected Aboriginal leader in her community. She proudly identifies as an Australian ‘Saltwater Murri’ with ancestral roots that extend to the Wiradjuri and Wongaibon people in NSW, the Ngarrindjeri people in SA and the Gunggari and Jaggera people in QLD.



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Introduction: Underground oven

For thousands of years, Aboriginal and/or Torres Strait Islander Peoples have used underground earth ovens to cook food slowly using heated rocks, leaves, steam and soil. Vegetables and meat were often wrapped in leaves or paperbark and sprinkled with water before being covered with soil. As the water heated, it changed state from a liquid into steam. The trapped steam and heat helped cook the food slowly while keeping it moist and tender.



In this experiment, students will model an underground oven using a frying pan filled with heated sand. Aluminium foil will represent traditional leaf or paperbark wrapping, while only adding water to one of the wrapped potatoes will be used to experiment how steam production affects cooking.



Safety Note: This experiment involves fire, heat and steam. Ensure students keep a safe distance from the while it is operating and when the lid is being removed.

Notes:

- The frying pan and stove can be replaced with an electric frying pan with lid. Test before using in class.
- Electric frying pans don't always distribute heat evenly. A class discussion about the locations of the pieces of potato can be facilitated when discussing variables.
- Keep potato pieces the same size for a fair test, weighing them can help determine if they are similar size.
- The sand should be slightly damp or dry. It cannot be used wet.
- Measure and precut the foil to ensure the size of the foil piece is controlled.
- Keep the heat setting and cooking time the same for all samples.
- Optional: weigh the potatoes before and after cooking to measure moisture changes more accurately.

Experiment procedure

Does adding water affect the texture and moisture of a potato cooked in a model ground oven?

Equipment

For each group:

- Frying pan with lid
- Sand (enough to fill each pan to $\frac{3}{4}$ full)
- 2 x medium potatoes (of similar size and shape)
- Knife
- Cutting board
- Aluminium foil (foil)
- Permanent marker
- Measuring cylinder or cup (100mL)
- 50 mL tap water
- Metal tongs
- Timer
- Weighing scales
- Metal tablespoon
- Stove.

To see the full list of materials, refer to the *Traditional cooking methods equipment list and hazard management guide*.

For each student, copies of:

- Student experiment procedure and planner

Additional:

- Traditional cooking methods experiment PowerPoint.

Safety

- Do not touch the frying pan or anything in it once turned on. The heat produced can cause burns.
- The sand will be hot during and after the experiment. Do not touch.
- Wear safety glasses.
- Keep your working area clean. Flammable materials can catch on fire.
- Steam may escape when the lid is removed, open the lid away from you.
- Use tongs to remove potato pieces from hot sand.
- Leave pan and sand to cook before packing away.
- Students should keep a safe distance from the heat source and use tongs when handling materials.

Method

1. Fill pan to $\frac{3}{4}$ full of sand.
2. Heat on low-medium setting for approximately 5-10 mins. Stir every 30 seconds with the metal tablespoon to distribute the heat through the sand.
3. Cut each potato into equal sized pieces.

4. Using the permanent marker, label one piece of foil 'no water', label the other piece of foil 'water'.
5. Place each cut potato into their own piece of 30cm x 40cm of foil.
6. Measure 50 mL of water.



Figure 1 Illustration of step 6.

7. Cup the foil labelled 'water' in your hand.
8. Add potato pieces and water to the foil cup. Pull all the edges in and twist together to seal.
9. Wrap the other pieces of potato in the foil labelled 'no water'.
10. Bury the foil wrapped potato pieces in the heated sand and cover so that the top is only popping out.
11. Cover the pan with a lid.
12. Cook for 20 minutes on low-medium heat. Cooking time will depend on pan size, level of heat and heat distribution.
13. Turn off the pan.
14. Carefully remove the foil parcels from the pan using metal tongs.
15. Allow to foil parcels to cool.

16. Unwrap the potato pieces.
17. Observe and record the texture, softness and moisture.
18. Compare the potato cooked with water to the potato cooked without water.
19. If time and resources permit, complete two more repetitions of the experiment.
20. Write the answers in the *Student Experiment Planner*. Compare how the presence of water affected the cooking process.
21. Reflect and write conclusions in the *Experiment Planner*.

Results

- Students record their observations and results in the *Experiment Planner*.
- Students consider how to best represent their observations and data.

Analyse the results

Students use their data and observations to compare how the presence of water impacts how a potato cooks.

Drawing conclusions

Students connect their findings with their knowledge of traditional cooking methods and states of matter to explain how the added water affected the potato and why it is useful.

Teacher prompts

Aboriginal and Torres Strait Islander contexts and knowledges:

- How do Aboriginal and/or Torres Strait Islander Peoples traditionally use underground earth ovens to cook food?

- What role do the leaves or paperbark used to wrap food play in cooking it in an underground oven? Think about what other materials the food would be touching if it wasn't wrapped.
- How does adding water help cook the food?
- What happens to the water when it is heated in an underground oven?
- How does steam help keep food moist and tender?
- What does this experiment show about Aboriginal and/or Torres Strait Islander Peoples' understanding of heat transfer, steam and cooking processes?
- How is traditional underground oven knowledge connected to caring for Country and using natural resources sustainably?
- Why is understanding heat and steam important when learning about traditional underground cooking methods used by Aboriginal and/or Torres Strait Islander Peoples?

Working scientifically:

- How did adding water affect the texture and moisture of the potatoes after cooking?
- Why was foil used to wrap the vegetables?
- What happened to the water when it was heated?
- Where did the heat and steam come from?
- What did your group change and measure during the experiment?
- What variables did your group control to ensure a fair test?
- What data or observations were collected during the experiment?
- How was the data recorded?
- How does this experiment demonstrate a change in states of matter?



Take it further

We recommend teaching this topic after teaching the content and concepts from our *Traditional Fire-starting Techniques and Traditional Separation Techniques* topics.

Further experiment ideas

To increase student autonomy and critical thinking, provide students with the experiment idea only. Students brainstorm their own experiment question and procedure, actively considering whether their method will produce fair results.

Suggestions include:

1. Explore the effect of salt on boiling.
2. Explore the effect of salt on taste and texture.
3. Explore the effect of lid-on and lid-off boiling.
4. Explore the effect of wrapped and unwrapped food.

Local Indigenous Knowledge

The above experiments/activities ideally start with cultural Knowledge taught by a local Indigenous Knowledge Holder. Schools and Indigenous community members should take the time to learn from each other and plan activities together. Learning on Country and the local Indigenous language should be used whenever possible in the learning program. When connecting with a Knowledge Holder, it is important to listen actively to what they say and demonstrate respect for and value for their Knowledge systems and traditions.

Knowledge Holder links

Find Indigenous organisations such as Indigenous community garden or bushfood programs and ask local Knowledge Holders if they will share their knowledge of bushfoods and traditional cooking methods with students.

- What local foods were traditionally cooked in an underground oven? (Meats, vegetables)
- How do you make an underground oven? What local materials do you use?
- What local herbs do you use to season your foods?

- Which local material/s are best for wrapping food to go into a ground oven/on a fire/or in ashes?
- Are there any other traditional cooking methods unique to this area?

Assessment

Evidence that can assist teachers in making professional judgements about a student's progress and achievement of curriculum outcomes can be gathered in a variety of ways during the unit, including:

- Teacher-student discussions.
- Observing student participation in the experiment.
- Gathering student work samples including oral, written and multimedia.
- Assessing students' application and use of knowledge and skills.
- Strategic questioning.

In the experiments, students may be assessed on their ability to:

- Identify questions and problems that can be scientifically tested.
- Plan and conduct safe experiments.
- Identify variables to be changed, controlled and measured.
- Collect and record data, including appropriate use of digital technologies.
- Analyse data and information.
- Identify relationships and draw conclusions.
- Apply scientific understanding.

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