

**SCIENCE
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Observation

Tools and Recording

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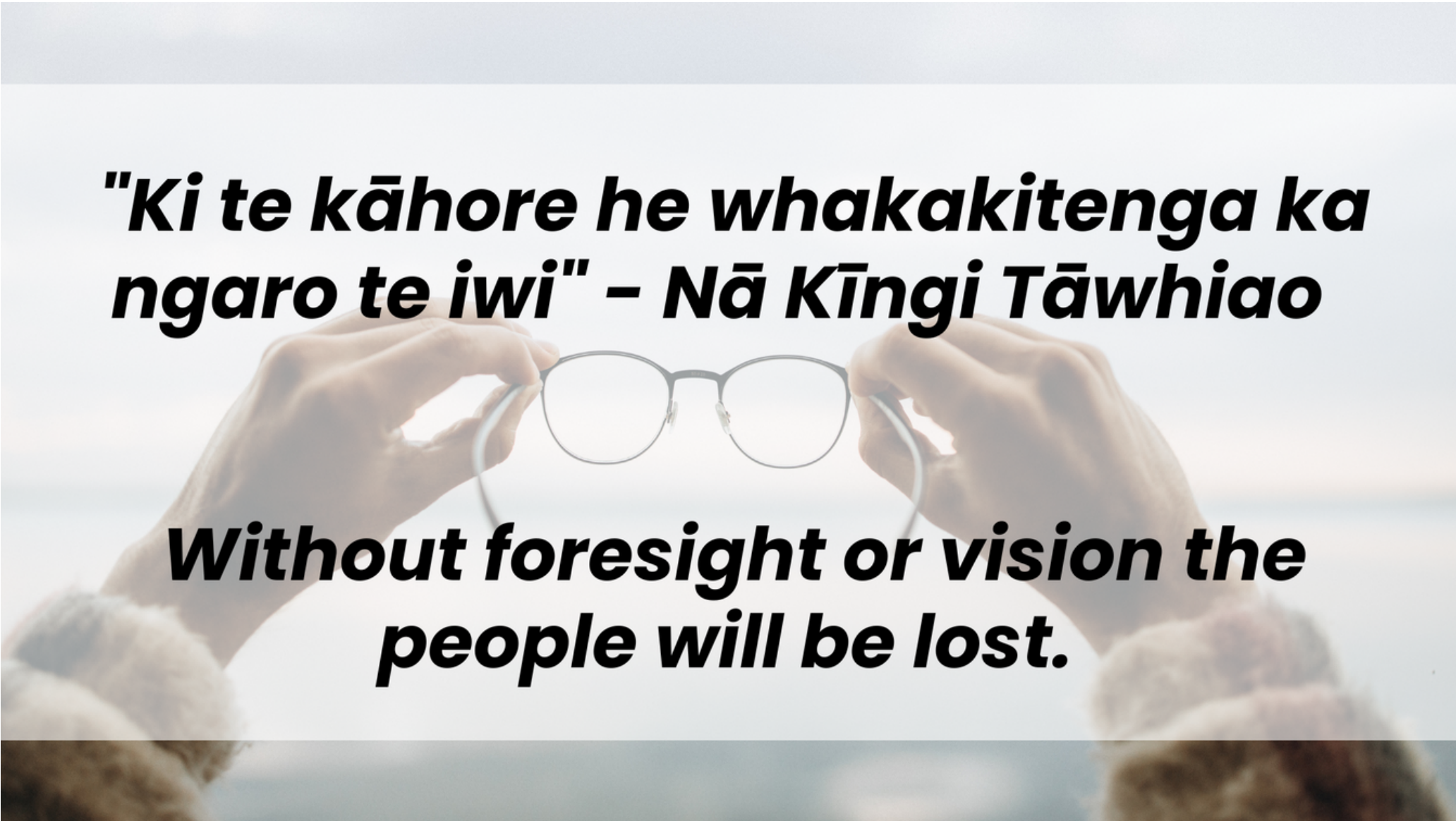
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Nau mai ki tēnei akoranga on Observation: Tools and Recording.

In this lesson we are learning to:

- List tools that help to improve scientific observations.
- Explain different methods used to record observations.



"Ki te kāhore he whakakitenga ka ngaro te iwi" – Nā Kīngi Tāwhiao

Without foresight or vision the people will be lost.

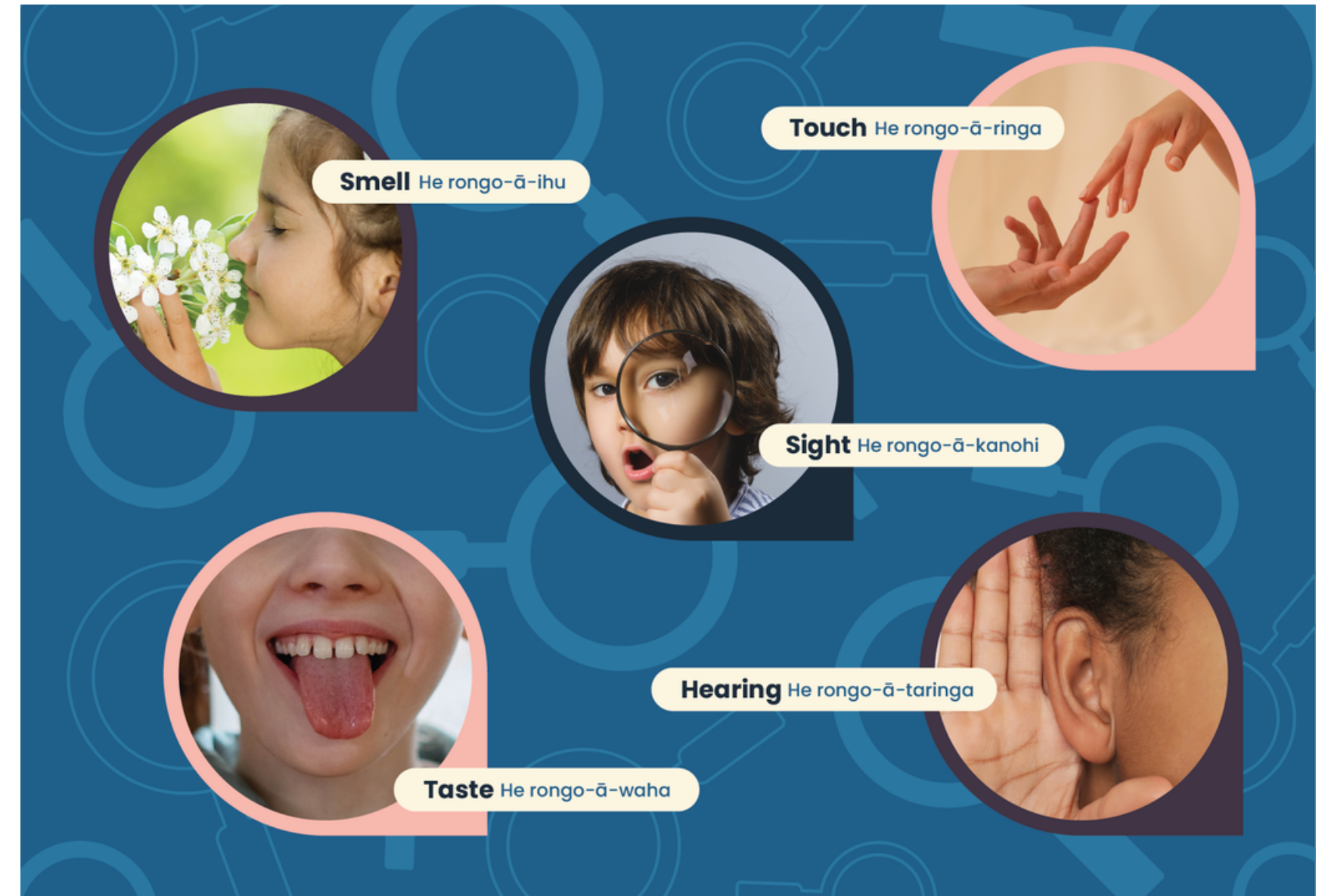
Observation is a key skill in science.

Observing is more than just looking – it's paying close attention, noticing changes, and asking pātai (questions) about the world around us.

Scientists use their five **senses** (rongo) – hearing, sight, touch, smell, and taste (when safe) – to gather information about objects, events, or changes in the environment.

Observing – The process of carefully noticing and gathering information using the senses or tools to understand the world.

Senses – Five ways we experience and gather information from the world through sight, hearing, touch, smell, and taste.



Careful observations help scientists collect accurate **data**, which they use to ask questions, test and **critique** ideas, and find patterns.

Without observations, many scientific discoveries would not be possible.

Before scientists record their observations, they often take time to think about what they've noticed.

They might compare what they saw to what they already know, talk with others, or ask more questions to help make sense of what they have observed.



Once scientists have made their observations, the next step is to record what they have noticed.

Data – Information that we collect and use to learn things.

Critique – A detailed evaluation of something, highlighting its strengths and weaknesses.

Scientists record their observations and share their findings so others can learn from them.

Recording observations is important because it helps scientists:

- Mahara (Remember): Helps scientists keep track of details – so they don't forget what they saw.
- Whakataurite (Compare): Lets scientists compare what they have noticed over time – to spot changes or patterns.
- Takoha (Gift to Others): Allows scientists to share their findings with others – so others can learn from them.
- Mātauranga (Knowledge and Wisdom): Help scientists to better understand the world – careful observations help them learn new things.

Imagine this...

If a scientist discovered a brand new insect but didn't record it properly – no data, recordings, notes, or photos – no one else would know about it!

By recording observations clearly, scientists make it possible for others to test the same ideas, repeat the investigation, and compare their own findings.

That's how science grows – by working together to build knowledge and make new discoveries!

Once scientists collect data through their observations, they need to record it in a way that helps them understand and share their findings.



There are different **methods** that scientists can choose from to record their observations.

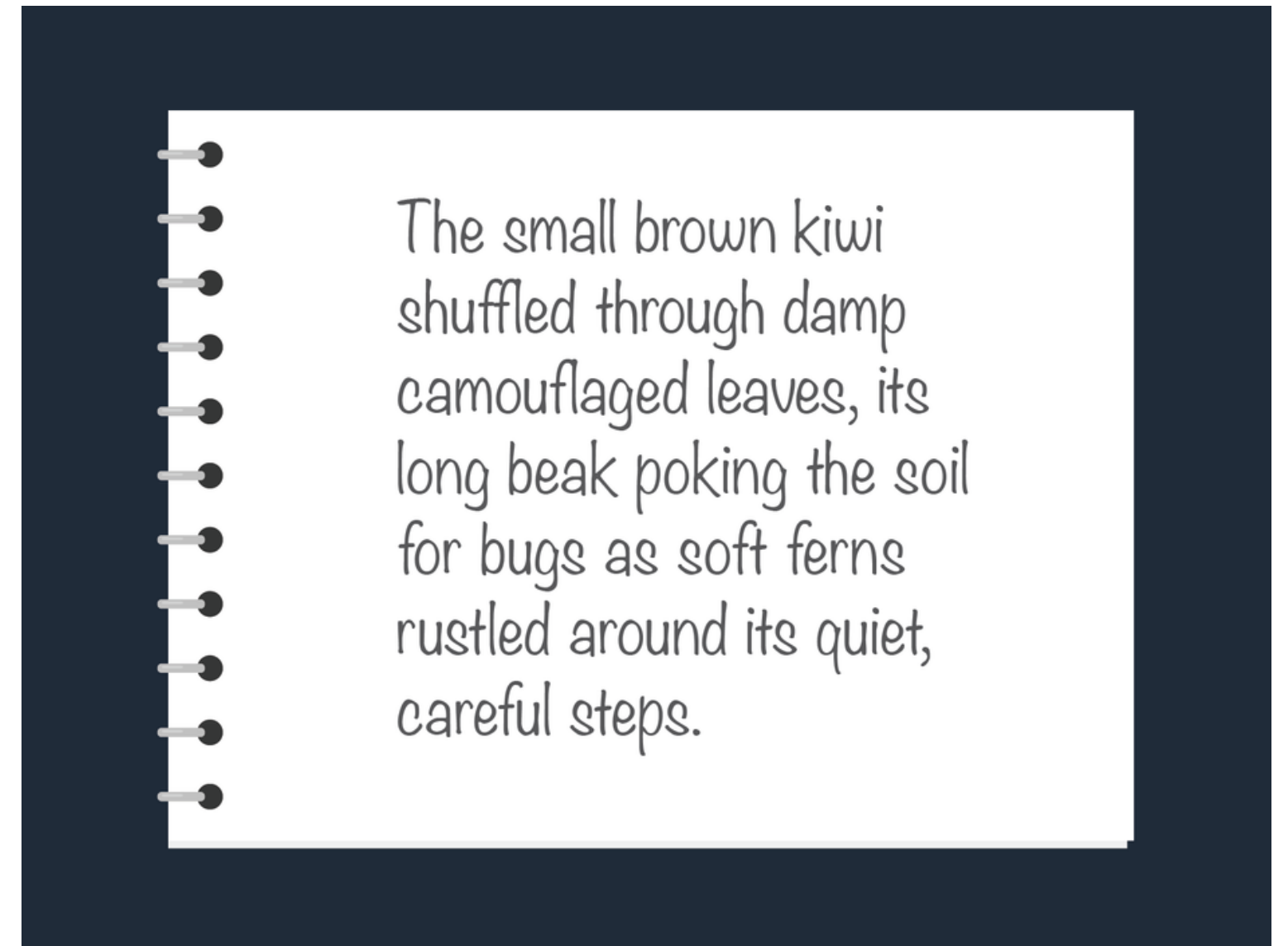
Writing Descriptions

Scientists write descriptions and detailed notes about what they see.

These descriptions must be clear and specific so others can fully understand what they have observed.

Example:

Instead of writing “The rock was big,” a scientist might write: “The rock was 15 cm wide, dark grey, and had a rough surface with tiny white specks.”



Some methods are better suited than others, based on what they are observing.

Methods – The specific ways or steps you use to do something or solve a problem.

Observation Tables

Scientists often use tables to organise their observations so they can compare objects and spot patterns or changes over time.

Example:

Anecdotal Notes – What was seen or heard during the observation – eg: Students actions, comments, and reactions.

Numerical Data – Measured or counted information – eg: How the temperature changes over time.



Changes Over Time (Numerical Data)

TIME	6:00am	7:00am	8:00am	9:00am	10:00am
TEMPERATURE (°C)	15°C	18°C	24°C	28°C	25°C

Object Comparison Table (Anecdotal Notes)

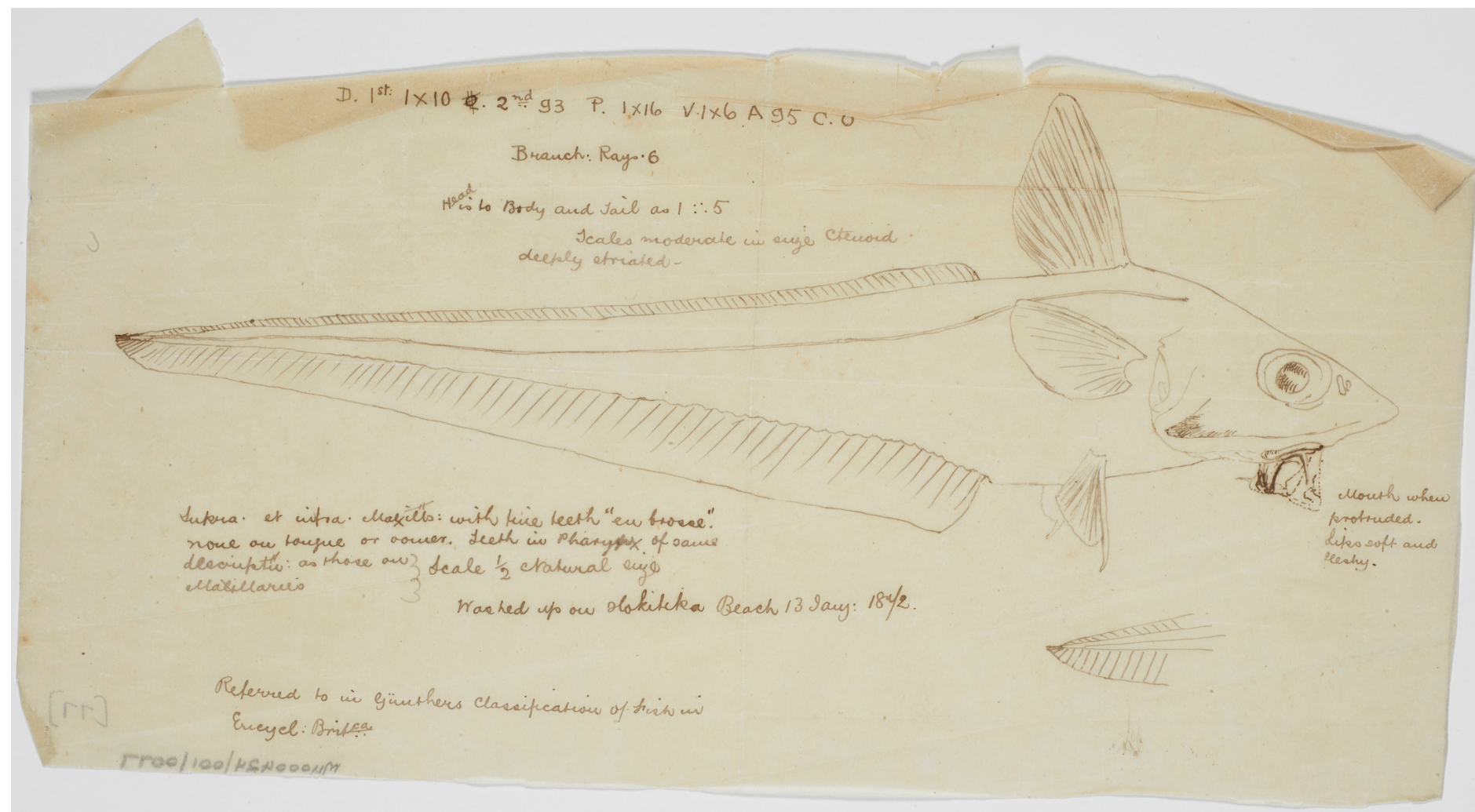
OBJECT	Leaf
SIZE	5cm
SHAPE	Oval
COLOUR	Green with brown spots
TEXTURE	Smooth
SMELL	No Smell

Before modern scientific tools were available, scientists didn't have the technology we use today.

Without modern tools like cameras, telescopes, or computers, scientists had to carefully observe and create detailed drawings to record what they saw.

Illustrations helped scientists share their findings with others and communicate their discoveries, as there were no advanced tools to capture or record data like we have now.

Check out these observational drawings from 1840 and 1872!



Today, scientists still often sketch what they observe!

Credit: (Left) Ctenoid, Supra et infra Maxilla, January 1872, maker unknown. Te Papa (MU000424/001/0077)
(Right) Pōpokotea/whitehead and pīpī/brown creeper, circa 1840, by David Mitchell. Gift of Vivienne Morrell, 2023. Te Papa (2023-0011-1)

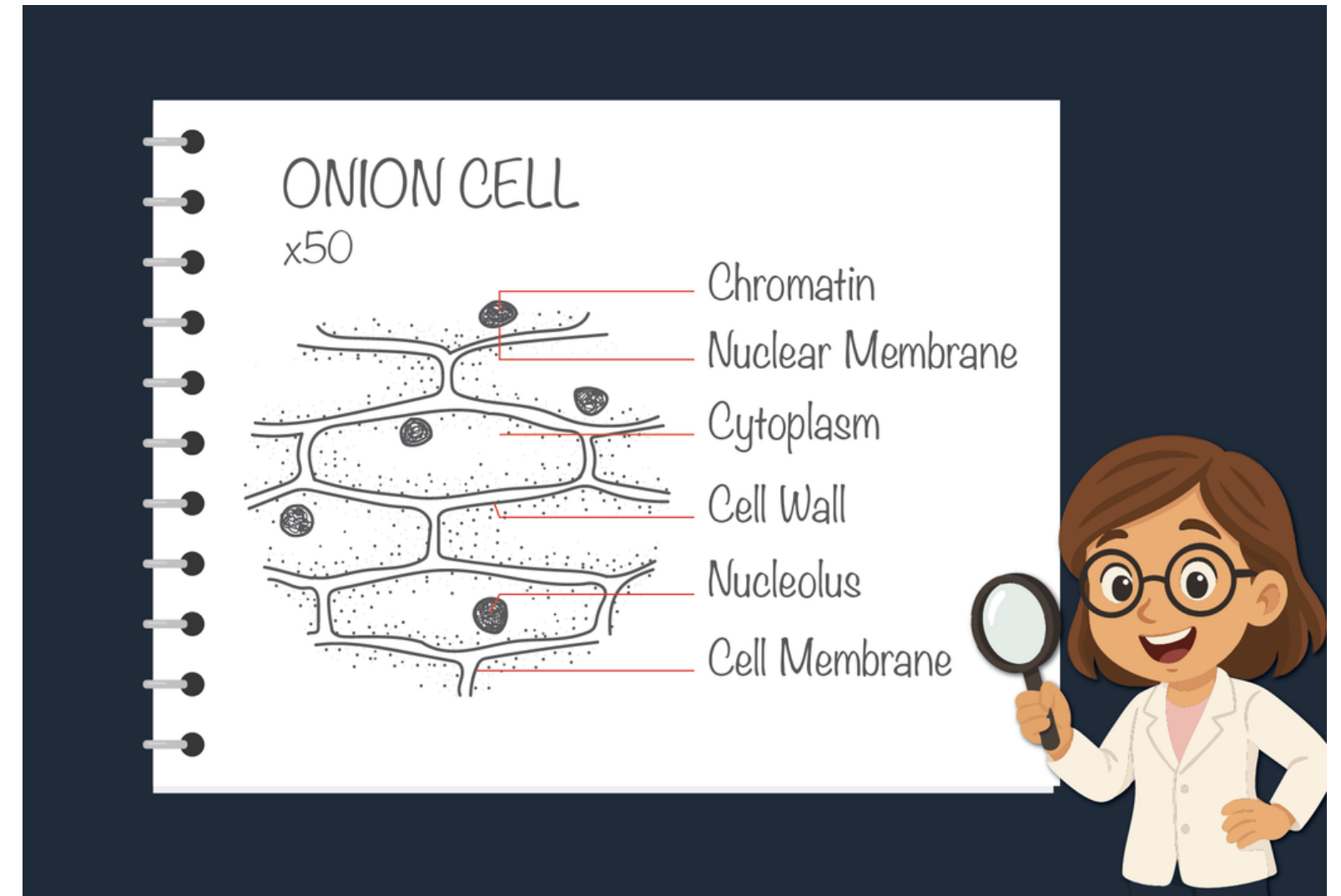
Drawing Observations

A drawing can capture details that might be hard to explain with kupu (words) alone.

Labels help to show important features, such as size, pattern, or colour.

If measuring size, scientists might use a ruler or **callipers** to be more accurate.

Now that we know why and how scientists observe, let's look at the different ways they can make observations.



Callipers - A tool used to measure the distance between two sides of an object, such as its width, thickness, or diameter, often with very precise results.

Scientists use direct and indirect observations to gather information.

Direct Observations

A direct observation is when you observe something using only your rongo (senses such as sight, hearing, touch, smell, and taste) in real time.

It gives you immediate information about the world around you.

For example:

Seeing a rainbow in the sky.

Hearing thunder during a storm.

Feeling the rough texture of tōtara bark.



Indirect Observations

An indirect observation is when you use information gathered by someone else or from past events, rather than directly seeing it happen yourself.

This means you use things like surveys, interviews or records to learn about and understand what has happened.

Since you do not witness or measure it yourself, the conclusions you make might not always be 100% accurate as they are based on other people's experience.

For example:

- Looking at results from a survey someone else conducted.
- Watching a video of an event or an experiment.
- Reading a book or article about a scientific discovery.
- Using past data from a weather station to understand climate change.



Direct and indirect observations give scientists the tools they need to explore and understand the world, from what they can sense to what they can measure.

You might be wondering – if scientists can use their senses to make observations, why do they need tools?

Scientists use tools and modern technology to enhance and extend their senses.

This makes observations even more **precise** and allows them to measure accurately and notice things beyond what the human eye or other rongo (senses) can detect.

These tools allow scientists to make accurate direct observations that give them more detailed information.

For example: Microscopes help scientists see tiny bacteria that are invisible to the **naked eye**, while telescopes allow them to study whetū (stars) and aorangi (planets).

Precise – Exact or accurate, so there is no room for confusion.

Naked eye – Observing something with your eyes without using tools, like a microscope or magnifying glass.

Learn about the different tools

- **Scales** – Used to measure the weight or mass of an object, helping to work out how heavy something is.
- **Calipers** – A tool used to precisely measure the distance between two sides of an object, including width, depth, or diameter.
- **Tweezers** – Used to pick up something fragile or small without damaging it.
- **Ruler** – Used to measure the exact size of an object, providing precise measurements of length or width.
- **Thermometer** – Used to measure temperature, helping scientists determine how hot or cold something is.
- **Camera** – Captures images to record and preserve details for future reference. It shows exactly how the object appeared in that moment in time.
- **Stopwatch** – Measures time accurately, allowing precise measurements of duration.
- **Magnifying Glass/ Telescope/ Microscope** – Each of these tools help scientists examine small details up close by making objects appear larger than they actually are, allowing them to see fine features more clearly.

Using tools helps scientists make their observations more reliable, which is important when conducting experiments or gathering data, as it leads to better conclusions.

Ka pai ākonga!

Here are a few things to take away from this akoranga:



- Observation is a key skill in science that uses the five senses (sight, smell, taste, touch, and hearing) to gather information about the world around us and helps scientists make accurate observations that lead to new discoveries.
- Recording observations is important as it helps scientists remember details, compare results over time, share their findings with others, and to build their knowledge.
- Scientists use different methods for recording observations, which can include writing descriptions, tables, and detailed drawings, photographs of diagrams.
- Scientists make direct observations using their senses with or without tools, and indirect observations using secondary data like video recordings or articles.

Glossary

Observation	The process of carefully noticing and gathering information using senses or tools, to understand the world.
Recording	Writing down, drawing, or otherwise documenting observations so that others can understand and learn from them, and so scientists can track their discoveries over time.
Direct Observation	Using your senses (sight, hearing, touch, smell, taste) to observe something in real time.
Indirect Observation	Using another source of data conducted by others to help create a clearer understanding. This could be an article or a photograph taken by someone else.
Tools	Instruments or devices like magnifying glasses, thermometers, and microscopes that help scientists see, measure, or collect more accurate data that their senses alone cannot detect.

He mihi (Acknowledgements)

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