**Unit plan: The properties of honey**

**Overview**

Students investigate the physical and chemical properties of various honeys to design a way to distinguish Mānuka honey from other types of honey.

**Purpose**

Students develop their knowledge of physical and chemical properties of a substance and skills of observation and problem solving to design a test to distinguish Mānuka honey from other honey types.

## Background

### Suggestions for a scenario

Mānuka honey has unique antibacterial properties, making it a useful treatment for cuts, burns, ulcers and sores. This makes it more valuable than honey from other sources. You work for Comvita and suspect a beekeeper has sent you some honey that is not actually made from Mānuka. The owner of the processing plant has asked you to come up with a way of deciding if the honey is Mānuka honey before you process it.

### Where's the Biotechnology?

Mānuka honey is produced by bees from the nectar of Mānuka flowers and is useful to humans for treating wounds.

## Curriculum focus

### Technology

Students will:

* investigate the properties of honey to develop a feasible way to identify Mānuka honey from other honey types
* understand how the technological systems in honey processing employ controls to ensure the quality of their inputs is high.

### Science

Students will:

* ask questions, find evidence and carry out appropriate investigations to observe and measure the chemical and physical properties of various honey types
* relate the observed chemical and physical properties of honey to its uses.

### Focus of skill & strategy

Students will develop:

* skills with scientific laboratory equipment
* the ability to select and discard information according to its usefulness
* the ability to recognise the importance of science and technology in the things encountered in everyday life
* communication and organisation skills.

|  |  |  |
| --- | --- | --- |
| UNIT PLAN: THE PROPERTIES OF HONEY | | |
| **Suggested learning intentions** | Suggested learning experiences *The following learning experiences will provide you with starting points for an exploration of this topic. You may decide to narrow your focus to one component, or include most of the ideas in a unit that incorporates science and/or technology themes.* | Possible teaching/assessment activities |
| **Introduction**  Learn how honey is made.  Observe the properties of different types of honey. | **Introduction**  Bees collect nectar from flowers and take it back to their hive where worker bees mix it with enzymes. The bees then seal the mixture into the honeycomb with a wax cap and leave it to ripen. During ripening, the nectar is converted into a variety of sugar molecules. The resulting honey is used as food for the bees or may be harvested by beekeepers for us to eat.  Understand that there are differences between various types of honey depending on the source of the nectar and the way that it is processed. | **Introduction**  In summer, students could watch bees collecting nectar from plants. Alternatively, use pictures of honey/bees/hives/plants and flowers to introduce honey.  Students describe different honeys, for example Manuka, clover, liquid honey, etc. |
| **Introduce the scenario**  Students are to investigate the physical and chemical properties of honeys in order to find a way to distinguish Manuka honey from other types of honey. | **Introduce the scenario**   * Brainstorm what we need to find out before we can identify Manuka honey from other honeys, i.e. the properties of Manuka honey compared to the properties of other honeys. * Students investigate why the properties of Manuka honey make it so valuable in the [Honey to heal](https://www.sciencelearn.org.nz/resources/1700-honey-to-heal-introduction) resources. | **Introduce the scenario**  Teach students about physical and chemical properties, including colour, viscosity, thixotropic nature, pH, water content, antibacterial activity, etc. |
| **Developing expertise**  Students investigate the physical and chemical properties of honeys. | **Developing expertise**  Carry out experiments on:   * [The osmotic effect of honey](https://www.sciencelearn.org.nz/resources/1716-the-osmotic-effect-of-honey-experiment) * [The thixotropic nature of Manuka honey](https://www.sciencelearn.org.nz/resources/1718-the-thixotropic-nature-of-manuka-honey-experiment) * [The viscosity of honey](https://www.sciencelearn.org.nz/resources/1720-the-viscosity-of-honey-experiment) * [How much water is in honey?](https://www.sciencelearn.org.nz/resources/1714-how-much-water-is-in-honey-experiment) * [Making honey crystals](https://www.sciencelearn.org.nz/resources/1715-making-honey-crystals-experiment) * [Antibacterial effects of honey](https://www.sciencelearn.org.nz/resources/1713-antibacterial-effects-of-honey-experiment) | **Developing expertise**  Students should keep thorough notes of their observations from these experiments so that they have a good grounding from which to develop their method for identifying Manuka honey. |
| **Plan of action** | **Plan of action**  Students design, test and fine-tune a method for identifying Manuka honey from other types of honey. | **Plan of action**  In groups of three, students spend one lesson discussing their results and making a rough plan. They identify the equipment they will need. Teachers may want to put a limit on the amount of equipment students can use. |
| **Assessment** | **Assessment**  Students are asked to describe the same honey samples, as they were at the start of the unit. | **Assessment**  Students use their method to identify Manuka honey from a group of unknown honey samples. |
| **Extra for experts**  Can their method for identifying Manuka honey be modified to measure the proportion of a honey that is Manuka? | **Extra for experts**  Students are given honey samples that are a mixture of Manuka and another honey and carry out their experiment (with any modifications they think of) to see if they can gauge the Manuka component from observing the properties of the honey. | **Extra for experts**  The difficulty of this experiment can be altered according to the ability of the class by careful selection of the honeys for mixing. The more similar the two honeys, the more difficult the experiment will be. |