



Overview

In “Saffron’s Skeleton”, osteologist George demonstrates to ten-year-old Bruno the processes he uses to clean and preserve the bones of Saffron, a recently deceased chicken. The whole experience, including George’s enthusiastic and knowledgeable approach to his work, provides Bruno with a sense of wonder and curiosity and a greater understanding of skeletons and evolutionary relationships.

Curriculum context

SCIENCE

LIVING WORLD

Life processes; evolution

Achievement objectives

L3: Students will recognise that there are life processes common to all living things and that these occur in different ways.

L3: Students will explore how the groups of living things we have in the world have changed over long periods of time and appreciate that some living things in New Zealand are quite different from living things in other areas of the world.

Key ideas

- The jointed internal skeletons of vertebrate animals provide a structural framework that helps the animals to move, breathe, eat, reproduce, feed, and excrete – processes needed for survival.
- The skeleton gives the body shape and protects the parts of the body that are inside it. The skeleton is made from cartilage or bone or combinations of the two.

- The different bones of the skeleton are held in place by muscles. The muscles and bones work together to enable the body of the animal to move.

Learning goals (to be shared with your students)

In this activity, we are learning:

- to understand how the structure of a living organism assists it to carry out the processes it requires to survive
- to explain the roles that bones and muscles play in enabling vertebrates to move
- to identify and explain the different functions of individual and groups of bones
- to explore and identify the different ways bones are connected.

NATURE OF SCIENCE

Investigating in science; participating and contributing

Achievement objectives

L3: Students will ask questions, find evidence, explore simple models, and carry out appropriate investigations to develop simple explanations.

L3: Students will use their growing science knowledge when considering issues of concern to them.

ENGLISH

READING

Processes and strategies

Achievement objective

L3: Students will integrate sources of information, processes, and strategies with developing confidence to identify, form, and express ideas.

Indicator

- Integrates sources of information and prior knowledge with developing confidence to make sense of increasingly varied and complex texts.

Ideas

Achievement objective

L3: Students will show a developing understanding of ideas within, across, and beyond texts.

Indicator

Starts to make connections by thinking about underlying ideas in and between texts.

The Literacy Learning Progressions

The relevant knowledge, skills, and attitudes for students at this level are described in the [The Literacy Learning Progressions](#).

Suggestions for providing literacy support for the key ideas

The following strategies will support students to engage with the ideas and information as they use the text for particular curriculum purposes.

The *Connected* series includes a range of texts that provide opportunities for students to locate, evaluate, integrate, and synthesise information and ideas.

It is expected that students will read across the range of texts in this *Connected* to develop their literacy skills and their understanding of the topic.

Text characteristics

- Mixed text type – a procedural text that includes a personal account and explanations
- A significant amount of vocabulary that is unfamiliar to the students (including academic and context-specific words and phrases), which is generally explained in the text by words or illustrations
- Sentences that vary in length and in structure
- Some information that is irrelevant to the identified purpose for reading.

1. FINDING THE MAIN IDEAS

This article describes the process of preparing a chicken skeleton for display. The setting of the article (the osteologist's workshop) and the preparation of the skeleton are used as opportunities to include information about skeletons in general and about some skeletons in particular.

The main ideas in the text include:

- Scientists have developed technological processes to strip skeletons clean of flesh, fats, and oils.
- Scientists study skeletons to find out how different animals function.
- Scientists study skeletons to discover how animals are related to each other.

MODEL ways in which students can track in sequence and summarise the processes used to prepare the skeleton.

Let's use a graphic organiser to record the processes George uses to prepare the skeleton. We can include some information about why he uses each process.

Process	Purpose
The body is put in very hot water.	To remove the feathers
The feathers, muscle, and fat are taken off.	To expose the skeleton

RECORDING the purpose for each process will support students' comprehension as they work through the article.

MODEL the process of thinking about the clues that help you locate the key information.

I'm finding interesting facts about skeletons in George's comments. The speech marks show me where he's talking, so I can find this information quite quickly.

PROMPT by asking *Why do you think a lot of the information comes from George?* to draw out the understanding that George is an expert and that Bruno is learning from him.

2. MAKING CONNECTIONS

ASK QUESTIONS to stimulate readers' interest and **PROMPT** them to make connections between their experiences and knowledge and the information in the text.

How would you feel if the skeleton of your pet was on display? Where do you most often come into contact with animal bones? Have you had a look at any of your own bones? How did you see them?

Have the students share with a partner how making connections to the information and ideas in a text can help to deepen their understanding. Alternatively, this could be a group discussion.

3. DEALING WITH UNFAMILIAR VOCABULARY

IDENTIFY the topic-specific words students will encounter in this article. Record them in two groups – the names of animals that may be unfamiliar to some students, for example, "flounder", "stingrays", "maggots" – and scientific vocabulary, for example, "preserved", "hydrogen peroxide".

PROMPT the students to read on to reach a definition or to use context cues to infer explanations of the unfamiliar vocabulary.

Exploring the science

The following activities and suggestions are designed as a guide for supporting students to develop scientific explanations of natural phenomena.

Key ideas

- The jointed internal skeletons of vertebrate animals provide a structural framework that helps the animals to move, breathe, eat, reproduce, feed, and excrete – processes needed for survival.
- The skeleton gives the body shape and protects parts of the body that are inside it. The skeleton is made from cartilage or bone or combinations of the two.
- The different bones of the skeleton are held in place by muscles. The muscles and bones work together to enable the body of the animal to move.

Activity 1: Identifying similarities in the bones of different animals

Provide groups or individual students with photographs or diagrams of a human skeleton, a chicken skeleton, and a dinosaur skeleton.

Ask the students to identify any bones that look similar in each of the skeletons.

Prompt the students to consider and discuss the role that these similar bones may have in helping the animals to survive. They can also discuss the sizes and shapes of the similar bones and whether they are solid or hollow. Students can present their findings about the bones and their roles in a simple classification chart (either prepared by the teacher or prepared by the students with teacher assistance).

After the students have shared their ideas, establish with the class that skeletons:

- give bodies their shape
- protect the internal parts of the body – the ribs protect the heart and lungs and the skull protects the brain
- support the body and enable it to move and carry loads.

Activity 2: Investigating joints and muscles

Using the photographs or diagrams studied in Activity 1, ask the students to identify where the bones are joined together and consider how the joints enable the animals to move.

During this discussion, establish with the students that scientists believe there are three types of joints between bones:

- ball-and-socket joints – in the shoulders and hips
- hinge joints – in the fingers, elbows, and knees
- slipping joints – in the wrists and ankles.

Explain the link between muscles and bones and the connective tissues that join them when movement occurs around the jointed bones.

The students can then explore their own muscles at work. They can open and close their fingers; or clench their fists and raise their lower arms to feel the skeletal muscles (biceps) in their upper arms or raise their legs to feel the biceps in their thighs.

They can find the large breastbone in the chicken's skeleton. Tell them that the breastbone is attached to the large breast muscles that birds use when they fly.

Activity 3: Finding out what bones are made of

The human skeleton is made of cartilage or bone or a combination of the two. When we are very young, much of our bone is made of cartilage, and as we grow older, this cartilage turns into bone. This process of hardening is known as ossification. It is usually completed by the age of 25. Our bones change from being quite pliable like the stuff that makes up our outer ear to being stiff and hard like the leg bones of a chicken. This hardening is caused when two salts, calcium phosphate and calcium carbonate, are absorbed into the body from the food we eat and stored in our bones.

Have the students soak a clean chicken bone in vinegar for two to three weeks, changing the vinegar every two days. The vinegar dissolves the minerals salts leaving the bone as bendy cartilage.

MINISTRY OF EDUCATION RESOURCES

The following activities from Ministry of Education science resources make suitable exploratory experiences that can be used to further the students' understanding about skeletons and their role in assisting living things to survive.

- *Making Better Sense of the Living World* (2001): Why Do Animals Need Skeletons?, activity 8, page 60; The Human Skeleton, activity 9, page 61
- Building Science Concepts (BSC) series: Book 3, *Birds* (2000), page 15, Bones; Book 51, *Standing Up* (2003), page 8, Looking at Bones
- *Connected* series and related teacher support material: *Connected 3* 2000, "Bendy Bones"; *Connected 1* 2009, "Monsters of the Deep"