Year 7

# Conceptual narrative Science: Diversity and evolution

In the Biological Sciences strand, there are three main conceptual threads being developed from Foundation through to Year 10. They are the concepts of diversity and evolution, form and function and interdependence and ecosystems.

## Big ideas

Classification enables us to organise the diversity of life on Earth.

### What concepts do I want my students to understand?

- There is a wide diversity of living things on earth.
- Living things can be grouped according to their similarities.
- Hierarchical grouping systems have more similarities at lower levels.
- There is a classification system agreed upon by scientists which makes it easier to communicate about living things.

Appendix 1 shows how the three interwoven strands, Science Understanding, Science as a Human Endeavour and Science Inquiry Skills, work together to build the sophistication and complexity of the science concepts from Foundation to Year 10.

This conceptual narrative illustrates one of the nine science concepts from the Australian Curriculum: Science Content structure. It tells the story of the concept in isolation of the eight others. However, there are situations when it is advisable to teach the concepts (diversity and evolution, form and function, interdependence and ecosystems) together, because they complement each other.

Note: Not all concepts are specifically addressed in each year level.

## Introduction

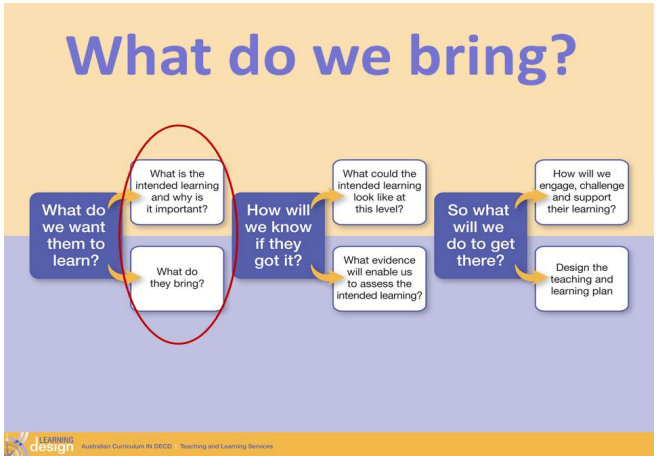
### What might my students already know about this concept?

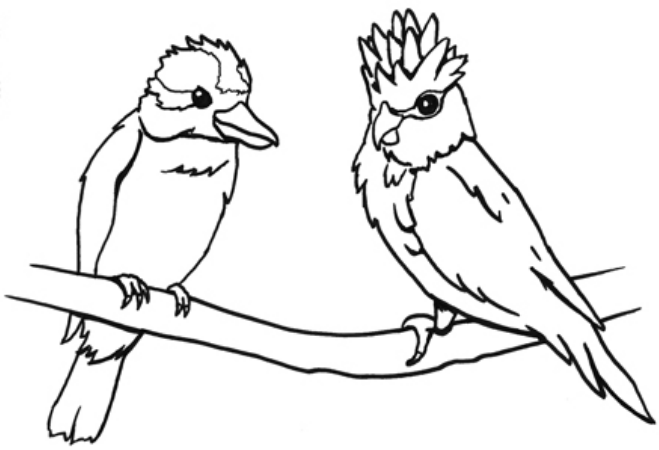
Living things have external features. Living things differ from non-living things in that they grow, use energy, reproduce and respond to the environment. They can be grouped in a variety of ways.

### What content could I use to explore this concept?

There are many ways to investigate this concept. We could ask students to use/produce a key to identify local plants, to classify zoo animals using phylum, class, order, etc, or to investigate how systems have changed over time.

Now to bring the essence of scientific understanding to life, let's think about this concept through the six questions from the Bringing it to Life tool (BitL).



In Year 7, we want our students to understand how classification enables them to organise and order the diversity of life on Earth.

# Year 7 example

In this example, I will ask students to use the zoo website to classify the animals that can be seen at the zoo.

## What do you observe?

### How can I help my students make observations?

Using the BitL questions, I could ask:

- *What do you observe?*

At Year 7, I want my students to observe differences within, and between groups of animals. Questions I would ask my students are:

- *What groups are the animals on the website organised into?*
- *What is the same about the animals in each group?*
- *What are the key differences between groups?*
- *Which groups are most/least like each other?*
- *Which groups are better represented in the zoo?*


## What patterns and relationships can you see?

### How I help students to see patterns and relationships? What questions might my students ask?

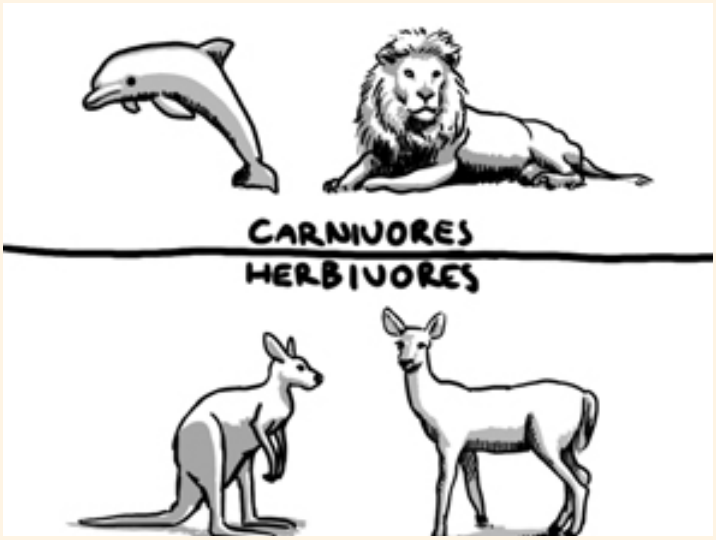
Student's curiosity leads them to ask questions. These questions help students to order their findings into a pattern to be able to make comparisons or find relationships. These questions support students to be more precise and foster analysis and classification of the observations.

Using the BitL questions, I could ask:

- *What patterns and relationships can you see?*

At Year 7, I want students to consider how the organisms within the system relate to each other. Questions I could ask are:

- *How could you group the mammals?*
- *Would the groups be even sizes?*
- *Would the same system works for birds? Why? Why not?*
- *What questions do you have about grouping and classification of animals?*
- *Why are some groups better represented in the zoo than others?*
- *Is an insect an animal? Why? Why not?*



## What do you predict will happen?

**How can I help students to identify and formulate investigable questions?**

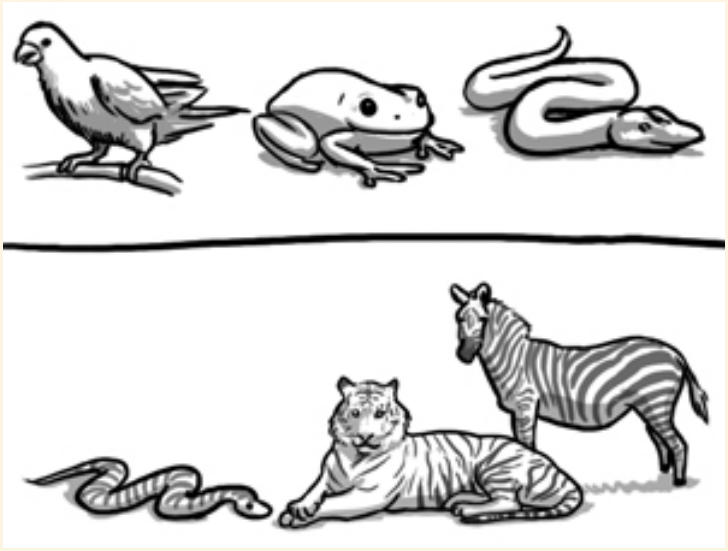
Students ask testable questions that help them to narrow the focus of the inquiry. These questions provide opportunities for students to make predictions.

Using the BitL questions, I could ask:

- *What do you predict will happen?*

At Year 7, I want my students to make predictions based on scientific knowledge. I could ask my students:

- *What would happen if I grouped the animals based on external colour?*
- *When would this be useful? Not useful?*
- *If you were told something was a vertebrate, what would you already know about it? if you then knew it was a reptile, what else would that tell you?*



## What investigations could you design?

These questions support students to develop science inquiry skills and problem solve.

*Using the BitL questions, I could ask:*

- *What investigations could you design?*

At Year 7, I want my students to plan and carry out a safe and fair test, using accurate measurements and controlling the variables. Questions I could ask my students are:

- *What variables are often used in classification?*
- *What would you need to know about an animal to classify it?*
- *How will you classify the animals on the school grounds?*
- *What safety and ethical considerations are there?*
- *What technology might help you do this?*

## How can you review and communicate?

**How can I help students share their observations and questions?**

These questions stimulate student's reasoning and help them analyse, draw conclusions and make generalisations about the concepts.

Using the BitL questions, I could ask:

- *How can you review and communicate?*

Questions I might ask:

- *How could you represent your findings about the different kinds of animals on the school grounds, so that others could use it?*
- *What would happen if someone discovers a different animal?*
- *How could your investigation be improved?*

## So what? What next?

**How can I help students apply the concepts in a range of authentic contexts?**

These questions support student's reasoning, to expand or change their ideas from their experience and evidence and generalise to new contexts.

Using the BitL questions, I could ask:

- *So what? What next?*

In Year 7, I want my students to be able to respond to social and environmental problems, from a scientifically informed position.

- *Who might use your classification? How?*
- *How could this change the way we communicate about the animals on our school ground?*
- *What else might you like to find out now?*
- *What is the next investigation that links to this one?*


# Concluding comments

**What concepts might students develop through working with the BitL questions in this way?**

By exploring this science understanding through these questions, we can help our students to think, work and process scientifically. Students can connect science to their world, and consider why they need to learn about the identification and classification process used for living organisms.

# Appendix 1

Appendix 1 shows how the Science as a Human Endeavour strand develops in sophistication and complexity across Foundation to Year 10.

This conceptual narrative illustrates one of the nine science concepts from the Australian Curriculum: Science Content structure. These concepts develop in depth and breadth of understanding from Foundation to Year 10. This conceptual narrative tells the story of the concept in isolation of the eight others. However, there are situations when it is advisable to teach the concepts (diversity and evolution, form and function and interdependence and ecosystems) together, because they complement each other.
Note: Not all concepts are specifically addressed in each year level.

## Biological sciences

In the biological sciences sub-strand, there are three main conceptual threads being developed from Foundation to Year 10. They are the concepts of diversity and evolution, form and function and interdependence and ecosystems.

## Let's look at the diversity and evolution concept

### Year 2

This concept starts in Year 2 with familiar examples of how living things grow, change and reproduce. Students might look at changes from birth to maturity of different animals and plants, such as chicken eggs or sunflower seeds, comparing the adult with the offspring.

### Year 3

In Year 3, the focus is on what distinguishes living things from nonliving things so students might explain why they would classify a range of items from the school environment (e.g. stones, sticks, feathers, insects, and parts of plants) as living or nonliving. Students notice that living things have a variety of external features which can help to group them.

### Year 4

In Year 4, the idea that living things grow and reproduce is continued by looking at life cycles, such as when the plant grows, flowers and produces seeds, or the tadpoles change as they mature and become adult frogs.

### Year 5

In Year 5, students learn that adaptations help an organism survive in its environment. For example, students might consider how arctic animals have adapted to survive in extreme cold.

### Year 7

In Year 7, students discover that there are differences within and between groups of organisms, and use classification further, to enable them to organise and communicate about this diversity. For example. sorting and classifying different species of birds from the local environment.

### Year 10

In Year 10, the theory of evolution combines these ideas with the role of genes and DNA, in passing on features or heritable characteristics from one generation to the next. This explains the past and present diversity of life on earth and offers a means to predict possible futures. Students at Year 10 level, are increasingly taking on a global perspective and so consider the relationship of biodiversity, natural selection and evolution.

So, from Year 2 to Year 10, students develop their understanding of evolution and diversity, by building on from their thinking about life cycles, to consider adaptation and survival of familiar objects, and then understand how this supports the theory of evolution by natural selection.