1 Introducing biology

1.1 What is biology?

1 **Biology** (生物學) is the scientific study of **organisms** (生物).

2 The **characteristics** of organisms are:

- **reproduction** (生殖) and **growth** (生長).
- **obtainment of food (nutrition** (營養)) and **respiration** (呼吸作用).
- detection and response to **stimuli** (刺激), and **movement** (運動).
- **excretion** (排泄) to maintain a relatively constant internal environment.

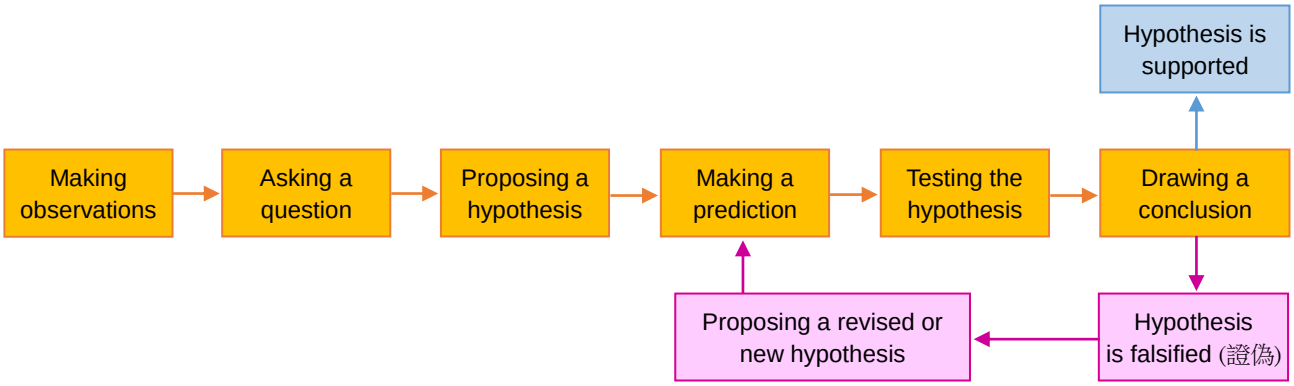
3 Studying biology helps us:

- develop **appreciation** of and **respect** for organisms and the environment.
- develop the ability to **think and solve problems scientifically**.
- better **understand health issues**, **environmental issues** and **social issues**.

1.2 How can we study biology?

1 Scientists study the natural world using the **scientific method** (科學方法).

2 There is no single scientific method, but it usually involves a few basic steps:



3 A **hypothesis** (假說) is a reasonable answer which tries to explain what is observed.

- The hypothesis must be **testable**.
- Hypotheses are **not needed** in investigations which do **not require explanations of observations**.

4 **Variables** (變量) in a fair test:

Independent variable (自變量)	Dependent variable (因變量)	Controlled variable (控制變量)
The factor **to be purposely changed**	The factor that may change with the independent variable; it is the factor **to be measured**	The factor that is **kept the same**

5 The **control** (對照) **group** is **identical** to the experimental group, **except** that the **factor under investigation is absent**. It aims to ensure the result of the experiment is due only to that factor.

6 A **conclusion** is drawn to summarize whether the hypothesis is supported or falsified.

- If the results **match** the prediction, the hypothesis is **supported**.
- If the results do **not match** the prediction, the hypothesis is **falsified** (or **rejected**). Scientists may need to propose a revised or new hypothesis for testing again.

1.3 Nature of science

1 Understanding the **nature of science** (科學本質) (**what science is** and **how science works**) is important for learning biology.

2 Below are some aspects of the nature of science:

- Science advances through reasonable skepticism.
- Doing science requires creativity and imagination.
- A good scientific experiment must include carefully designed controls.
- Science is a process of ongoing inquiries.
- Scientists have to explore different techniques and methods to find out a good solution to a problem.
- Scientists build on the work of other scientists.