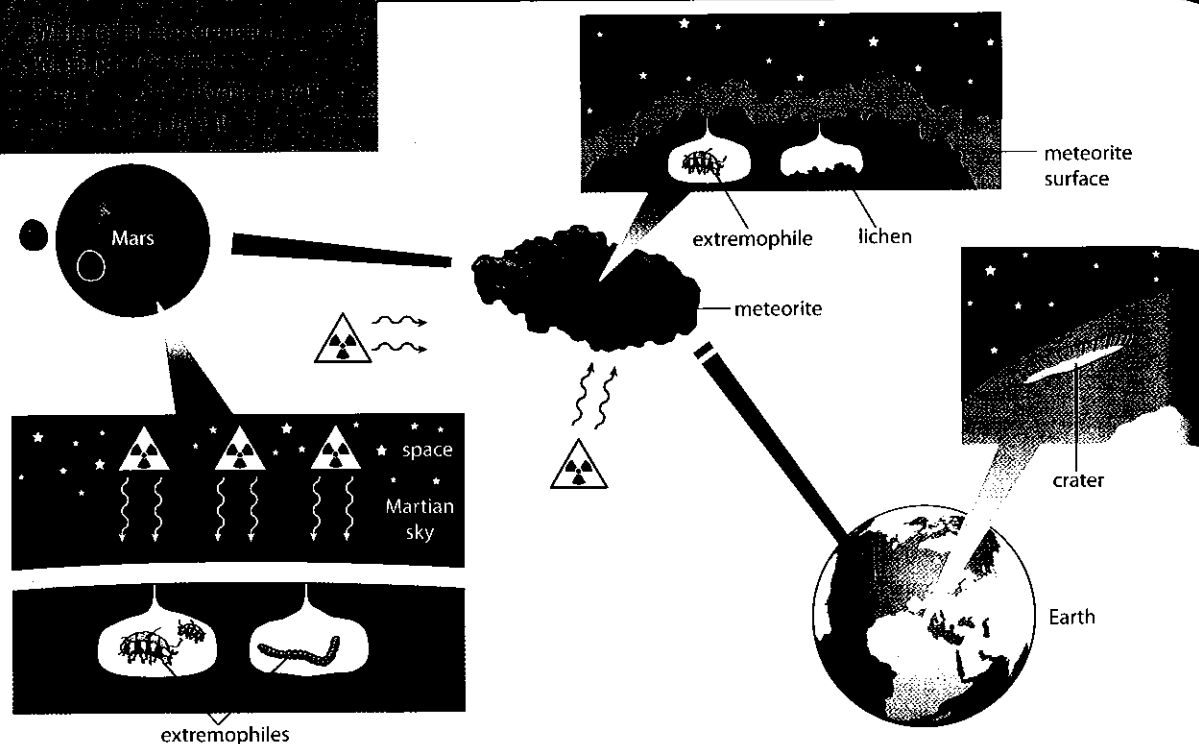


# Writing up research 4: introduction and abstract



## Writing the introduction

**1 a** Mya is doing research into the panspermia hypothesis as part of a Master's degree in astrobiology. In pairs, use the diagram and the words in the box below to help you answer questions 1–3. Then compare your ideas with the Answer key on page 114.

- 1 What do you think the panspermia hypothesis is?
- 2 How credible do you think the hypothesis is?
- 3 What kind of evidence would support this hypothesis?

deep space lichen seeds of life extremophile meteorite UV radiation  
harsh conditions protective layer vehicle

**b** Mya has been investigating whether it is possible for bacteria and microorganisms to survive in an environment as harsh as the surface of Mars. He has been advised to organise the text of his introduction around five key questions. Match the beginnings to the endings of the questions.

What was I	approach the problem?
Why was it	expect to know after doing the research?
What was already	important?
What did I	investigating?
How did I	known about the subject of my research?

**c** Read five extracts from the introduction to Mya's paper, ignoring the highlighted words for now. Which question from Exercise 1b is each extract answering? Write the questions above the extracts.

1 \_\_\_\_\_

Such an extreme environment was thought to be uninhabitable, but microbial ecology studies reported the presence of microorganisms (Amaral-Zettler *et al.*, 2002). Could the surface composition of Mars protect life against radiation?

2 \_\_\_\_\_

A number of studies have investigated different extreme Martian surface conditions on terrestrial microorganisms. Nicholson and Schuerger (2005) reported that the spores of *Bacillus subtilis* were able to survive for 19 days under Mars atmospheric pressure and composition. Saffary *et al.* (2002), however, found that survival decreased due to ...

3 \_\_\_\_\_

Potential habitability in the subsurface would increase if the overlying material did play a protective role.

4 \_\_\_\_\_

For many years now, scientists have speculated about the possibility of life on Mars (Klein *et al.*, 1976; McKay, 1997). The discovery of liquid water on Mars would increase its habitability ...

5 \_\_\_\_\_

We report here on our studies of protection by Río Tinto Basin iron oxides and hydroxides on two microorganisms, *Acidithiobacillus ferrooxidans* and *Deinococcus radiodurans*, under simulated Mars surface conditions.

**2 a** A well-written introduction usually presents general information about the topic first before specific information about the research. What do you think is the best order for the extracts in Exercise 1c?

**b** Answer the following questions about the extracts in Exercise 1c.

1 Write down the highlighted words and phrases which describe:

a a hypothesis / hypothetical situation

b current research or knowledge on a particular topic

c general statements about past research

d the results or conclusions taken from specific past research

2 What form or tense are the words and phrases in a–d above?

- 3 a** Read an extract from the introduction of a paper about the ability of lichens and microbes to survive in deep space. Ignoring the gaps, how many of the questions in Exercise 1b can you answer?

Recent advances in space technology (1) \_\_\_\_\_ (provide) the possibility of studying the survival of different microorganisms in the harsh environment of space (Demets *et al.*, 2005; Baglioni *et al.*, 2007). So far, lichens (2) \_\_\_\_\_ (be) the only organisms able to survive exposure to such extreme conditions (Sancho *et al.*, 2007; de los Rios *et al.*, 2010).

It is believed that, if sufficiently protected by meteorite-like material, microorganisms may also survive the journey through space. However, Brandstätter *et al.* (2008) (3) \_\_\_\_\_ (report) that microorganisms embedded in 2 cm thick rocks on the outer surface of a re-entry capsule, simulating the entry of a meteorite, (4) \_\_\_\_\_ (not survive).

The aim of this work (5) \_\_\_\_\_ (be) to obtain further information on the resistance of rock-colonising microbial communities and lichens to outer space conditions, during the Biopan-6 flight of ESA on board a Russian Foton satellite.

- b** Complete the extract by writing the verbs in brackets in the correct tense.

- 4 a** Read two sentences which present the same information in different ways. In pairs, try to decide what the main difference is between the two sentences. Then compare your ideas with the Answer key on page 115.

- a Amaral-Zettler *et al.* (2002) reported the presence of microorganisms.  
b Microbial ecology studies detected the presence of microorganisms (Amaral-Zettler *et al.*, 2002).

- b** Complete the following sentences with phrases a–d below.

- 1 We usually use an author-prominent citation when \_\_\_\_\_ and when \_\_\_\_\_.  
2 An information-prominent citation is usually used when \_\_\_\_\_ and when \_\_\_\_\_.

- a dealing with ideas we wish to explore in a paper  
b dealing with information which is not controversial  
c comparing ideas from a variety of sources  
d supporting a particular point

- c** A number of different reporting verbs can be used in author-prominent citations. Complete the definitions using the reporting verbs in the box.

conclude demonstrate discover hypothesise observe prove suggest

(1) \_\_\_\_\_ or (2) \_\_\_\_\_ : to use an experiment to show that something is true

(3) \_\_\_\_\_ : to carefully watch the way something happens, then record it

(4) \_\_\_\_\_ and (5) \_\_\_\_\_ : to give a possible explanation for something which has not been proved

(6) \_\_\_\_\_ : to decide something after thinking about it carefully

(7) \_\_\_\_\_ : to find or learn information, especially something new

- 5 a** In pairs, take turns to ask and answer the questions in Exercise 1b about a piece of research you know well. Make a note of your answers.

- b** Use the notes you made in Exercise 5a to write a short introduction to your research. Remember to include author-prominent and information-prominent references in your introduction.