

- 1 Myriapods are a group of arthropods that are commonly found in soil habitats in many parts of the world. Many myriapods are very small and not easy to identify.

Fig. 6.1 shows four species of myriapod, not drawn to the same scale.

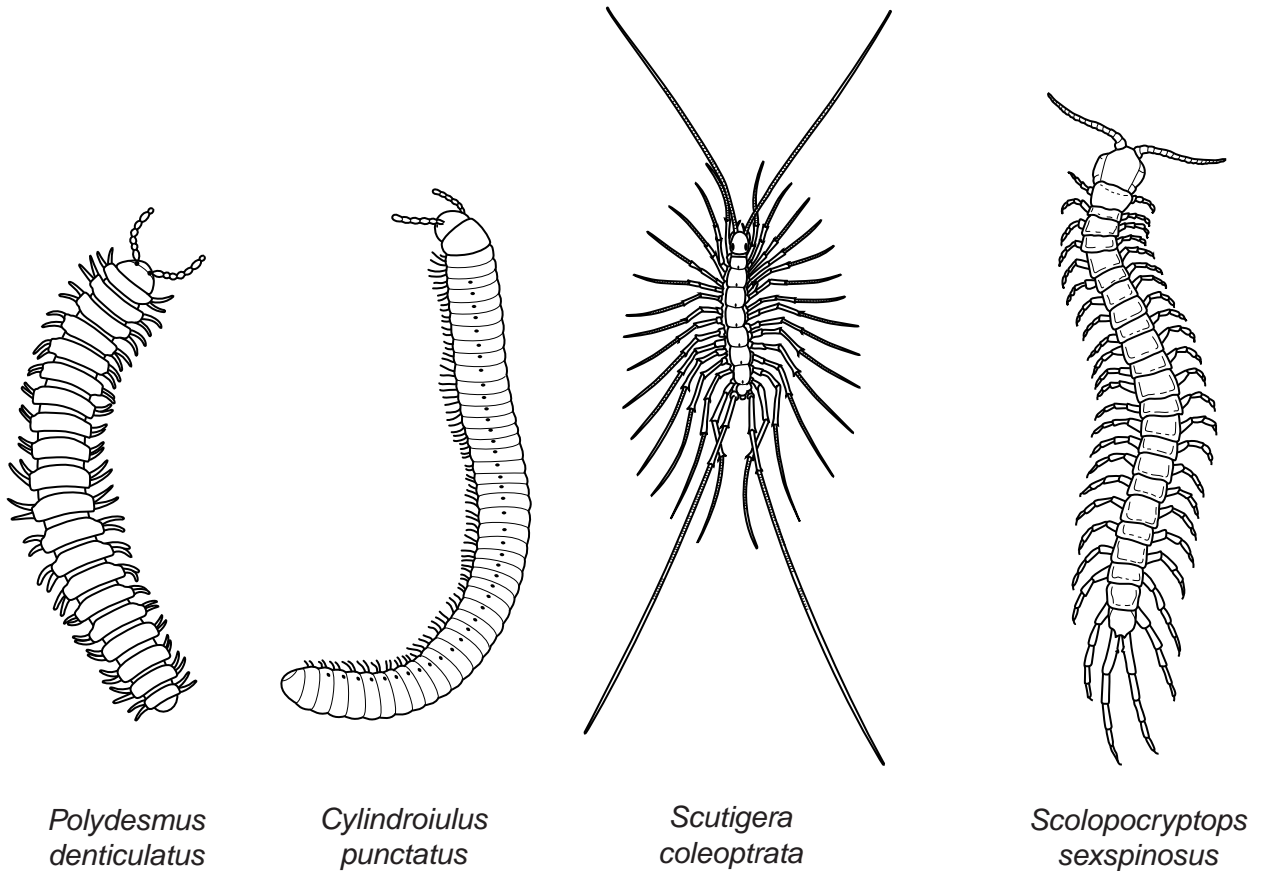


Fig. 6.1

(a) State **three** features of **all** myriapods that are visible in Fig. 6.1.

- 1
- 2
- 3
- [3]

(b) Describe **three** features of myriapods that could be used to make a dichotomous key to distinguish between the four species in Fig. 6.1.

- 1
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- 2
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- 3
- [3]

(c) Mitochondria are cell structures that contain a small quantity of DNA.

Scientists are sequencing the DNA of one particular gene in mitochondria to help identify different species of many animals including myriapods. The sequences that they find are called 'barcodes'.

(i) State the part of the cell that contains most of the DNA.
..... [1]

(ii) Suggest how DNA barcoding might be useful in the conservation of animals, such as myriapods.
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..... [2]

(iii) State the function of DNA in cells.
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..... [2]

(d) A student found the following information about the feeding relationships between some organisms in a soil habitat.

Dead organic matter, such as leaves, provides food for bacteria and soil fungi.

Earthworms eat dead leaves.

Many millipedes feed on dead plant matter and also on soil fungi.

Nematodes feed on bacteria and are eaten by springtails.

Centipedes are predators that feed on earthworms, millipedes and springtails.

(i) Draw a food web to show the feeding relationships described above.

[4]

(ii) Describe the roles of the soil organisms in the **carbon** cycle.

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..... [2]

[Total: 17]

- 2 Some pollutants are not broken down easily and remain in the environment for a long time. These are described as persistent pollutants.

PCBs are a waste material from the manufacturing of electrical insulation. PCBs are one of the most persistent pollutants in the environment.

Between 1947 and 1976, factories dumped large quantities of PCBs into the Hudson River in the USA. Studies measured the concentrations of PCBs in the tissues of organisms in a food chain in the sea near the Hudson River, as shown in Fig. 6.1.

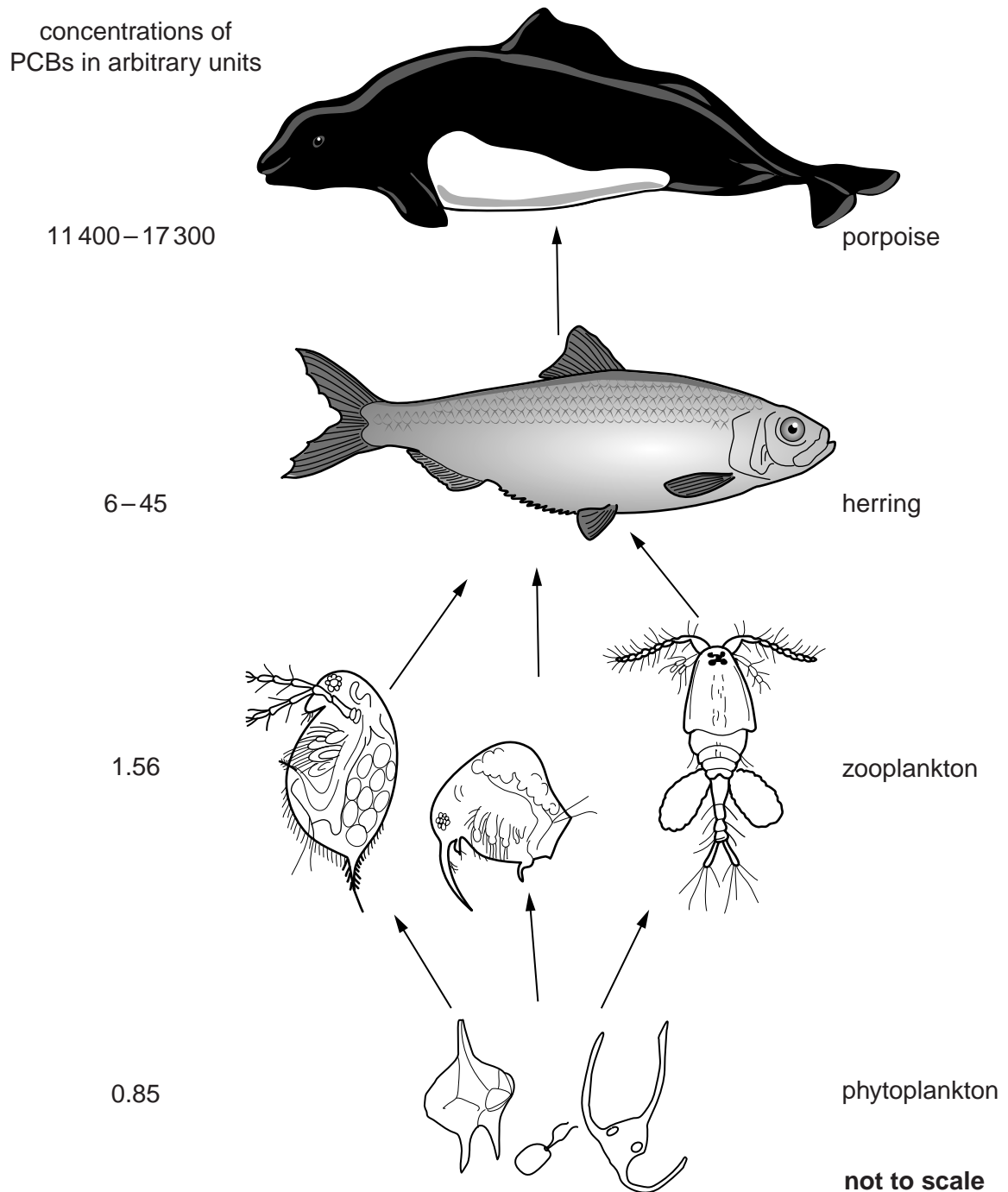


Fig. 6.1

(a) (i) Describe the results shown in Fig. 6.1.

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.....[3]

(ii) Suggest an explanation for the different concentrations of PCBs in the organisms of the food chain.

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(c) Describe the problems caused by non-biodegradable plastics in the environment.

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[3]

[Total: 16]

- 3 Fig. 6.1 shows Soay sheep on St. Kilda, a group of small remote islands off the coast of Scotland. These islands experience extreme conditions of cold, wind and rain.

Sheep were introduced to the islands thousands of years ago and the Soay sheep are descended from them.

The islands of St. Kilda have been uninhabited by people since 1930. The sheep are now left unfarmed and in their natural state.



Fig. 6.1

- (a)** The populations of Soay sheep on St. Kilda show much more variation in their phenotype than modern breeds of sheep.

Explain, by using an example from Fig. 6.1, what is meant by variation in their phenotype.

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..... [2]

- (b) Scientists have recorded the numbers of Soay sheep and lambs on St. Kilda for many years.

Each year between 1985 and 1996, the lambs (young sheep) were caught, marked and weighed. In some years, the total number of sheep on St. Kilda was lower than in other years.

Fig. 6.2 shows the frequency of lambs of different body mass in years when the total number of sheep was low and years when the total number was high.

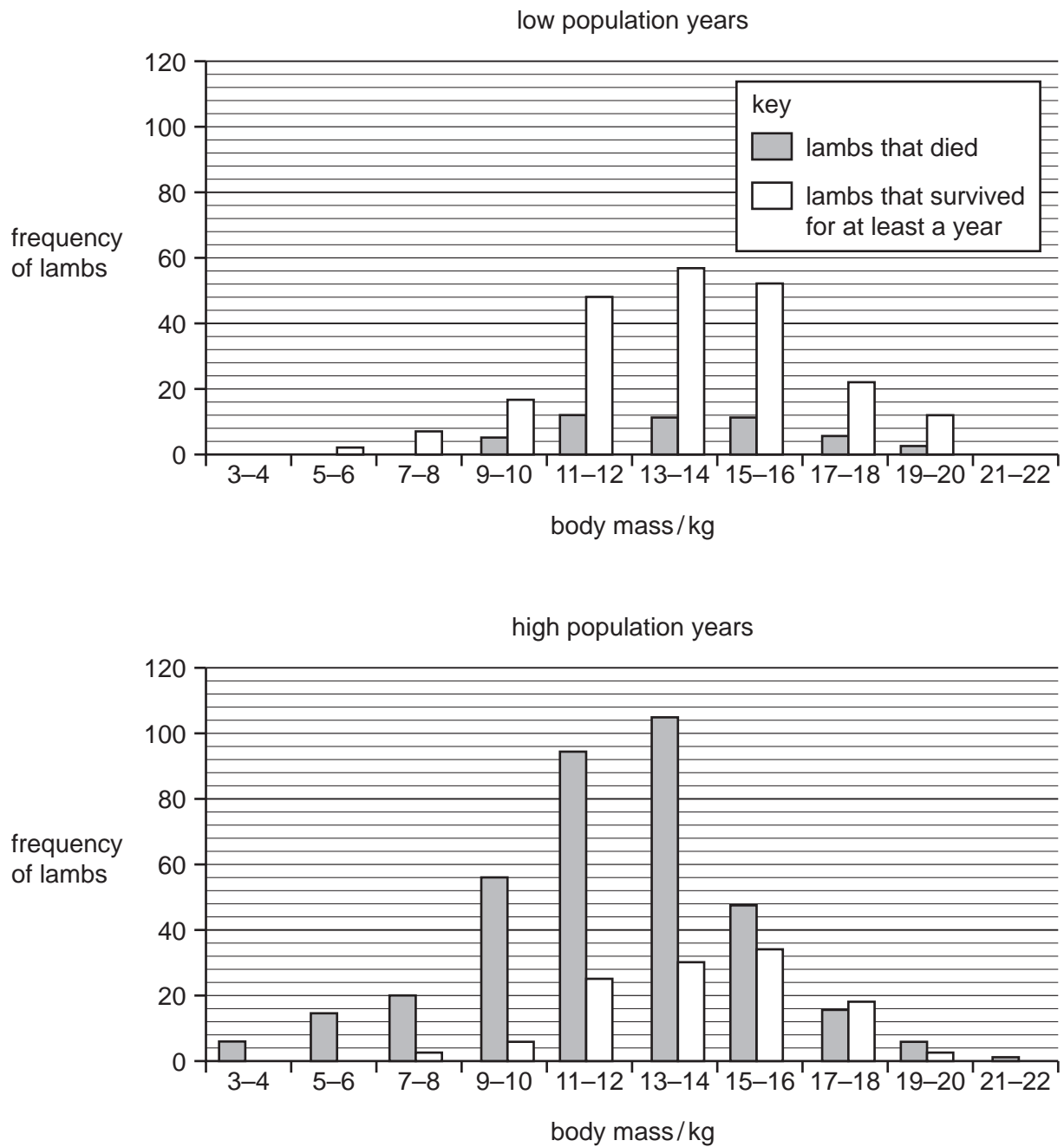


Fig. 6.2

(i) Population size has a great effect on the survival of lambs on St. Kilda.

Describe the evidence from Fig. 6.2 that supports this statement.

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(ii) Suggest an explanation for the effect that you have described.

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(c) Soay sheep are adapted to the extreme conditions experienced on St. Kilda.

Explain how natural selection could account for the adaptive features of Soay sheep.

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..... [4]

[Total: 11]