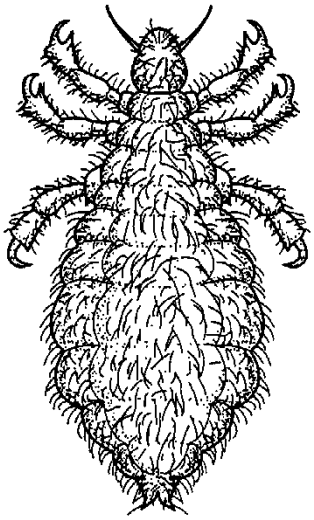
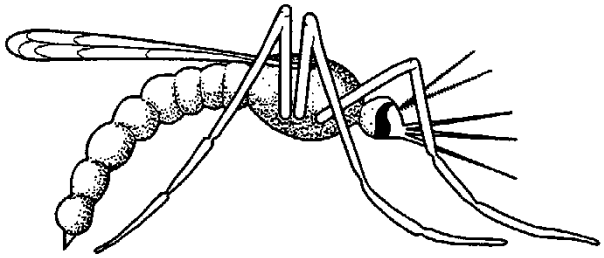
Core 1

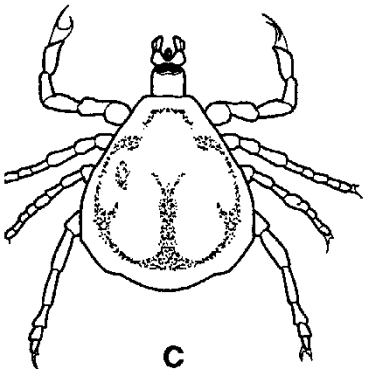
Fig. 1 shows five arthropods, each of which could carry disease organisms.



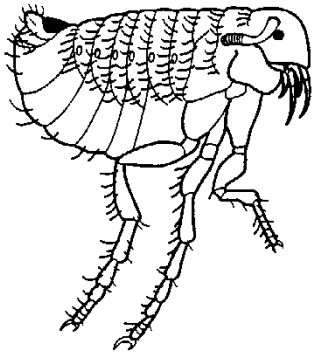
A



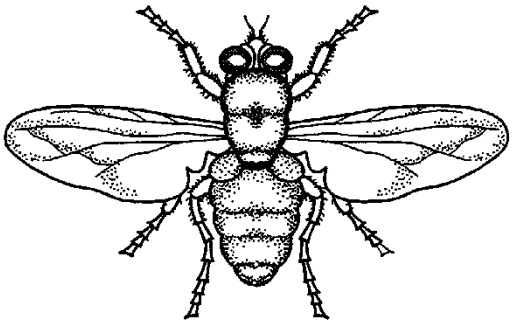
B



C



D



E

Fig. 1

Core 1

Use the key to identify each of the animals. Complete Table 1 to show your identifications.

KEY

1 Wings present ..... Go to 2
Wings absent ..... Go to 3

2 Wings longer than the abdomen ..... *Musca*
Wings shorter than the abdomen ..... *Anopheles*

3 Has three pairs of legs ..... Go to 4
Has four pairs of legs ..... *Ornithodorus*

4 All pairs of legs of similar length ..... *Pediculus*
One pair of legs shorter than the other two pairs ..... *Pulex*

Table 1

Name of arthropod	Letter
Anopheles	
Musca	
Ornithodorus	
Pediculus	
Pulex	

[4]

[Total : 4]

Core 2

Fig. 2 shows single leaves from each of six different trees.

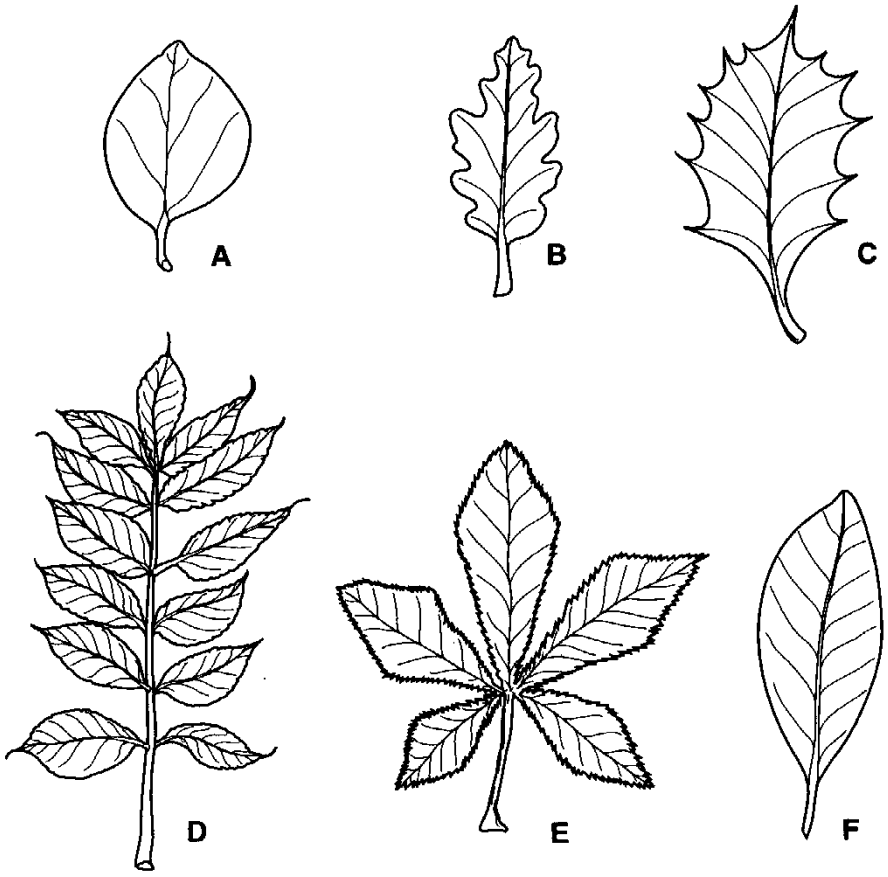


Fig. 2

Use the key below to identify from which tree each leaf comes. Write the name of each tree in the correct box of Table 2 . As you work through the key, tick the boxes in Table 2 to show how you identified each leaf. Leaf A has been identified for you as an example.

Key

		Name of tree
1	(a) Leaf with a smooth outline	2
	(b) Leaf with a jagged outline	3
2	(a) Leaf about the same length as width	*Cydonia*
	(b) Leaf about twice as long as it is wide	*Magnolia*
3	(a) Leaf divided into more than two distinct parts	4
	(b) Leaf not divided into more than two distinct parts	5
4	(a) Leaf divided into five parts	*Aesculus*
	(b) Leaf divided into ten or more parts	*Fraxinus*
5	(a) Leaf with pointed spines along its edge	*Ilex*
	(b) Leaf with rounded lobes along its edge	*Quercus*

Table 2

Leaf	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	Name of tree
A	✓		✓								*Cydonia*
B											
C											
D											
E											
F											

[4]

[Total : 4]

Fig. 3 shows a nitrogen cycle for open grassland.

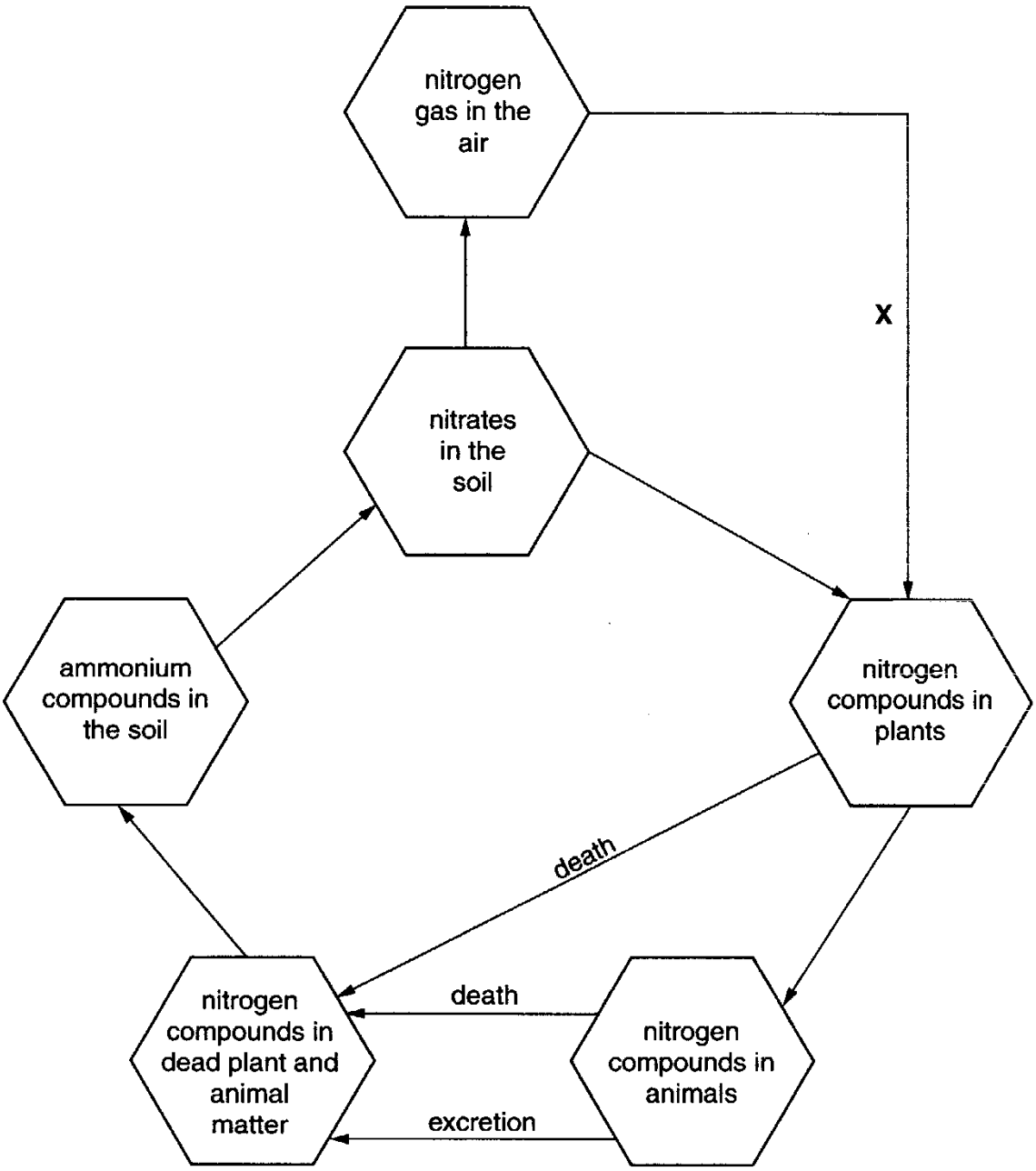


Fig. 3

(a) (i) Name **one** nitrogen compound found in plants.

.....[1]

(ii) Name an example of a nitrogen compound which is excreted by mammals.

.....[1]

(iii) Process **X** can only occur in certain plants. Which group of organisms carry out this process and where in a plant are they found?

Organism .....

Where found .....[2]

(b) The grassland is ploughed up and turned into farmland. Crops of maize are grown on it year after year.

(i) Predict and explain the effect of this change on the nitrogen cycle and on the crop yield.

Effect on the nitrogen cycle .....

.....

.....

Effect on crop yield .....

.....

.....[4]

(ii) Suggest **one** way in which the farmer could prevent the effect on crop yield.

.....

.....[1]

[Total : 9]

Alternative to Practical 1

Fig. 4 shows a food web for a freshwater pond.

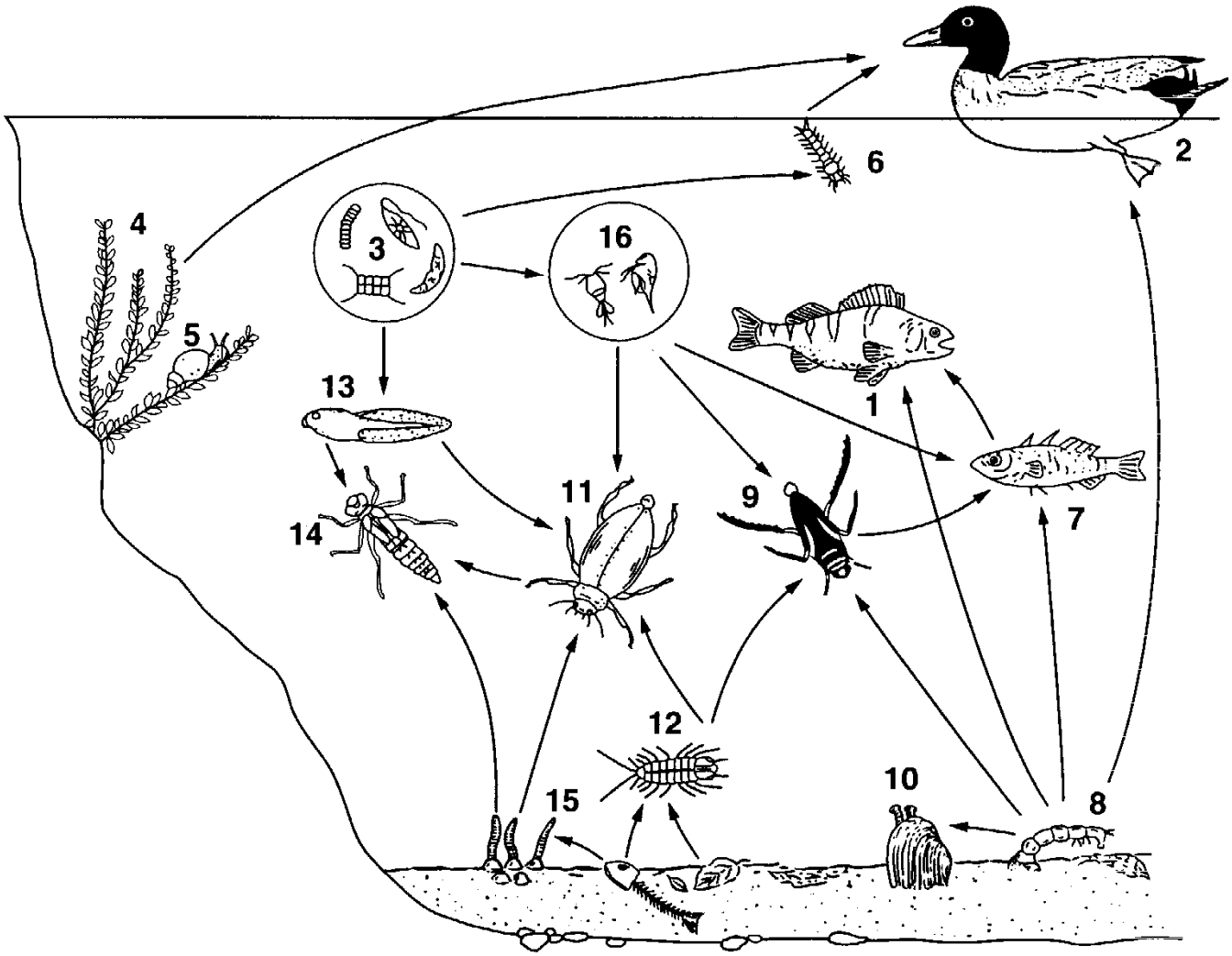


Fig. 4

(organisms 3 and 16 are greatly enlarged)

(a) Two trophic levels are listed below. For each level, state **two** examples from Fig. 4 Identify them by their **numbers**.

(i) *Primary consumers (herbivores)* ..... and .....

(ii) *Secondary consumers (carnivores)* ..... and .....

[2]

(b) Using only the numbers in Fig. 4 construct a simple food chain with **five** stages.

.....[2]

(c) Suggest how you could collect large numbers of the microscopic organisms numbered **3** in Fig. 4.

.....

.....[2]

[Total : 6]

Extension 1

(a) Distinguish between the following groups of organisms:

(i) viruses and bacteria;

(ii) arachnids and crustacea;

(iii) monocotyledons and dicotyledons. [12]

(b) Using an example, explain the term *binomial system.* [3]

[Total: 15]

Extension 2

Fig. 5 shows the proportion of all known species in each of the main groups of organisms.

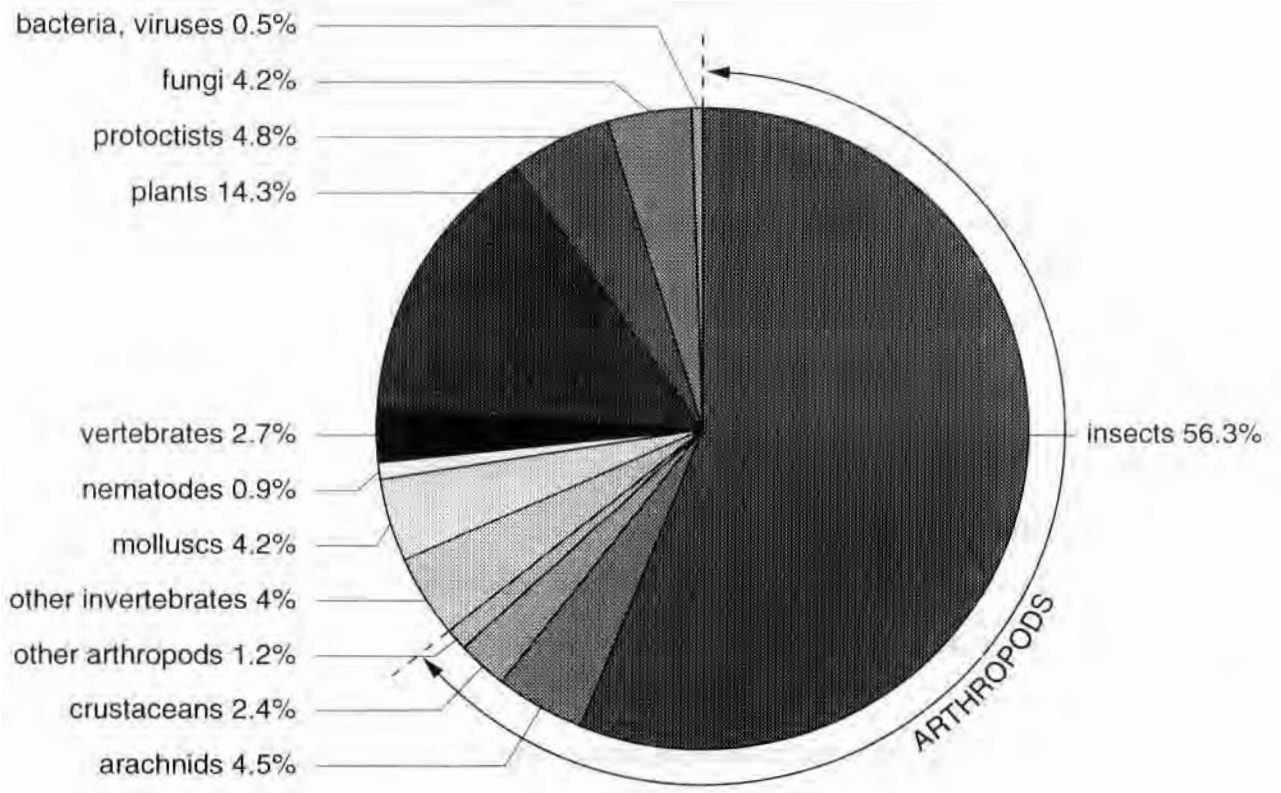


Fig. 5

(a) (i) Apart from insects, which group of organisms in Fig. 5 has the most known species?

.....[1]

(ii) Fungi are shown as a separate group of organisms. State **two** reasons why fungi are **not** classified as plants.

1. .....

2. .....[2]

(b) (i) Use information from the pie chart to calculate what percentage of the arthropods are insects. Show your working.

.....% [2]

(ii) State **one** feature of insects which contributes to their success and explain how this feature is beneficial to the group.

Feature .....

Explanation .....

.....

.....[3]

(c) 2.7% of all known species are vertebrates. Birds is one class of vertebrates.

(i) State **one** feature which distinguishes this class from all the other vertebrate classes.

.....[1]

(ii) State **one** external feature which birds have in common with fish.

.....[1]

(d) It is estimated that 1.7 million species of organisms have been named. Use data from the pie chart to calculate the total number of plant species known. Show your working.

Total ..... [2]

[Total: 12]

Core 1

Name of arthropod	Letter
Anopheles	B
Musca	E
Ornithodorus	C
Pediculus	A
Pulex	D

Core 2

The table shows the correct answers, up to four correct gain credit.
Check carefully that no extra ticks are added.

Leaf	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	Name of tree
A											
B		x				x				x	Quercus
C		x				x			x		Ilex
D		x			x			x			Fraxinus
E		x			x		x				Aesculus
F	x			x							Magnolia

Core 3

a(i) any one of these
amino acid
protein
enzyme
named plant protein
enzyme

(ii) urea

(iii) nitrogen fixing bacteria
in root nodules or roots of leguminous plants or a named example

b(i) <u>nitrogen cycle</u>

plant or crop material removed from field, less material to decay
less nitrates released or formed

<u>crop yield</u>

would gradually decrease over a period of years
less nitrates to form protein or new cells

(ii) add fertilisers or manure
use of leguminous crops or named example

Alternative to Practical 1

a(i) two from 16, 6, 13, 5, 2

(ii) two from 14, 11, 10, 9, 7, 1

b 3 → 16 → 9 → 7 → 1 Links must carry arrows.

c any two from these
- using a fine net / centrifuge / filter / sieve
- detail of how the apparatus is used
- sample soil from the river bed
- details of how this could be sorted
- shine light
- to attract organisms

Extension 1

a(i) any four from

BACTERIA	VIRUSES
have a cell wall	have a protein coat
have DNA (strand)	have RNA or DNA
are larger	are smaller
have a slime capsule	have no slime capsule
have a membrane	have no membrane
have cytoplasm	have no cytoplasm
can reproduce outside cells	can only reproduce inside living cells
show all life processes	only show reproduction
can have flagellum	no flagellum

(ii) any four from

ARACHNIDS	CRUSTACEA
have 4 pairs of legs / 8 legs	have 5 pairs of legs / 10 legs or more
have no antennae	have antennae / have two pairs
have simple eyes	have compound eyes
have chelicerae / poison fangs	have no chelicerae / poison fangs
have a cephalothorax	poorly defined cephalothorax
have thin / no carapace	have thick carapace
breathe with gill / lung books	have gills

(iii) any four from

MONOCOTS	DICOTS
have one cotyledon / food store / seed leaves	have two cotyledons / food stores / seed leaves
have strap-shaped leaves	have broader leaves
flower parts are grouped into threes	flower parts are grouped in 4's / 5's / larger numbers
have fibrous roots	have tap roots
have stomata evenly distributed on both leaf surfaces	have stomata unevenly distributed on leaf surfaces
have vascular bundles scattered	vascular bundles arranged in ring

b three of the following points

named example using genus and species
reference to two names for the organism
reference to genus and species
reference to use in classification

Extension 2

a(i) plants

(ii) any two from
reference to method of nutrition or no chlorophyll
no cellulose cell walls or reference to chitin present
hyphae present or reference to mycelium

b(i) $\frac{56.3}{64.4} \times 100$
= 87.4%

(ii) Possible features
wings / impermeable cuticle or exoskeleton / antennae / 3 pairs of legs / compound eyes / small size / large numbers formed through reproduction

Possible explanations linked to named features
Wings: reference to flying, to find food, to escape from predators, to find a mate

Cuticle: to reduce water loss, to survive in hot or dry places, muscle attachment, protection from predators, protection of internal organs

Antennae: to sense food, early warning of predators, to sense a mate

Small size: easy to hide from predators, only small amounts of food or water needed to survive

Large numbers: some will survive to breed, reference to variation

Spiracles: for ventilation, control of ventilation

Reproduce in large numbers: so some will survive, increases chances of variation to cope with environmental change

c(i) Presence of feathers/beak

(ii) refernce to scales/eyes/tail/mouth/anus

d(I) $\frac{1700000}{100} \times 14.3$
= 243100