

- 2 *Exserohilum turcicum* is a fungal pathogen. The growth of the mycelium of the fungus damages the leaves of maize plants, *Zea mays*. Leaf damage reduces crop yield.
- (a) (i) Complete Table 2.1 to show **one** structural difference and **one** functional difference between *E. turcicum* and *Z. mays*.

Table 2.1

	<i>E. turcicum</i>	<i>Z. mays</i>
structural difference		
functional difference		

[2]

- (ii) Describe the principles by which organisms such as *E. turcicum* and *Z. mays* are classified in the taxonomic hierarchy.

[4]

- (b) Two inbred varieties of maize, SKV50 and CML153, were crossed. The resulting F1 hybrids were self-crossed to produce F2 offspring. The F2 plants were grown, and the percentage area of leaf damage caused by *E. turcicum* was measured.

Fig. 2.1 shows the results for the F2 generation. The arrows show the mean percentage area of leaf damage for the two parent varieties.

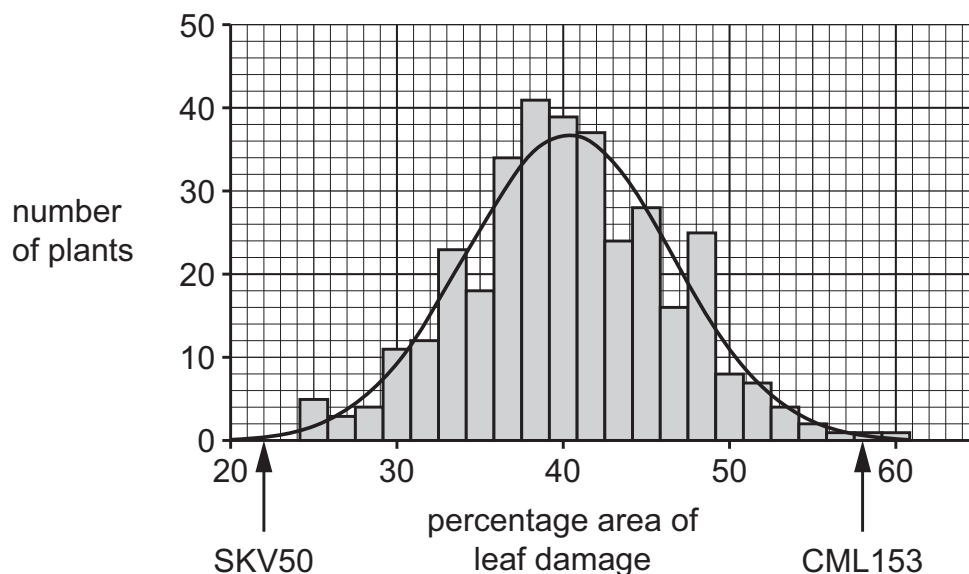


Fig. 2.1

- (i) Explain how Fig. 2.1 can be used to determine which parent maize variety shows the greatest resistance to infection by *E. turcicum*.

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..... [2]

- (ii) State the name of the type of variation shown by the maize F2 generation in Fig. 2.1.

..... [1]

- (iii) Explain the **genetic** basis of the type of variation shown by the maize F2 generation.

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..... [4]

7 The kakapo, *Strigops habroptila*, is a species of large, nocturnal (active at night) parrot and is found only in New Zealand. The bird does not fly and lives on the ground.

The kakapo is classified as critically endangered on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species™.

Fig. 7.1 shows a kakapo.



Fig. 7.1

(a) Complete Table 7.1 to show the classification of the kakapo.

Table 7.1

taxonomic group	name
domain	Eukarya
kingdom	Animalia
.....	Chordata
class	Aves
.....	Psittaciformes
family	Strigopidae
genus	

- (b) The kakapo was widely distributed before humans arrived in New Zealand. The Kakapo Recovery Programme started in 1995. Birds were moved to protected areas. In 2024 they were only found in these protected areas.

This is shown in Fig. 7.2.

key



kakapo distribution before humans arrived in New Zealand



protected areas 2024

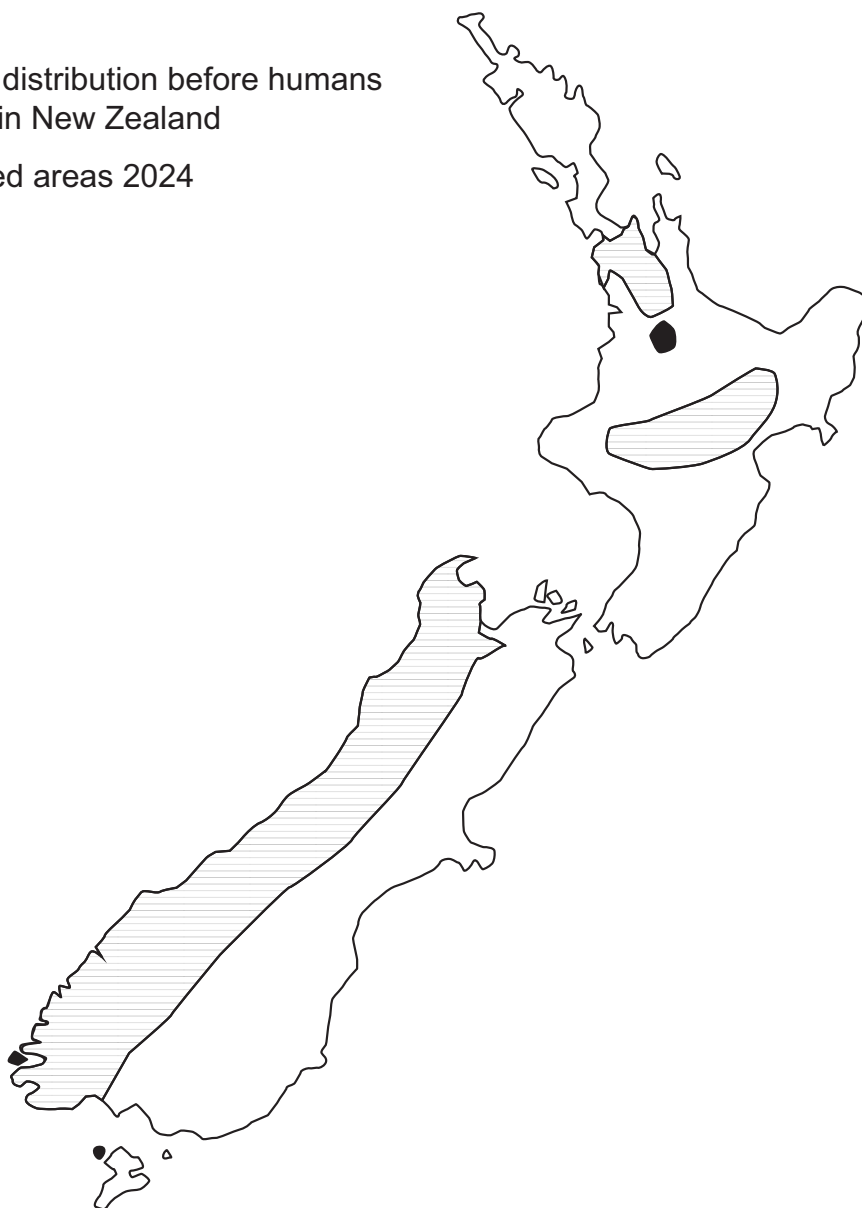


Fig. 7.2

Suggest the ideal features of a protected area for the kakapo.

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(c) DNA has shown that the kakapo population may have gone through one or more genetic bottlenecks after the arrival of humans in New Zealand.

Suggest the consequences of a genetic bottleneck to the kakapo population in New Zealand.

[4]

[Total: 10]

9 A species is classified into one of three domains.

(a) Two of the domains contain only prokaryotic species.

With reference to the two prokaryotic domains, describe the features used to classify prokaryotic species into two different domains.

[3]

(b) Tigers are large mammals that live in many parts of Asia.

Fig. 9.1 shows a tiger, *Panthera tigris*.



Fig. 9.1

Complete Table 9.1 by writing the domain, kingdom and genus in which tigers are classified.

Table 9.1

taxon	name
domain	
kingdom	
phylum	Chordata
class	Mammalia
order	Carnivora
family	Felidae
genus	

[3]

[Total: 6]