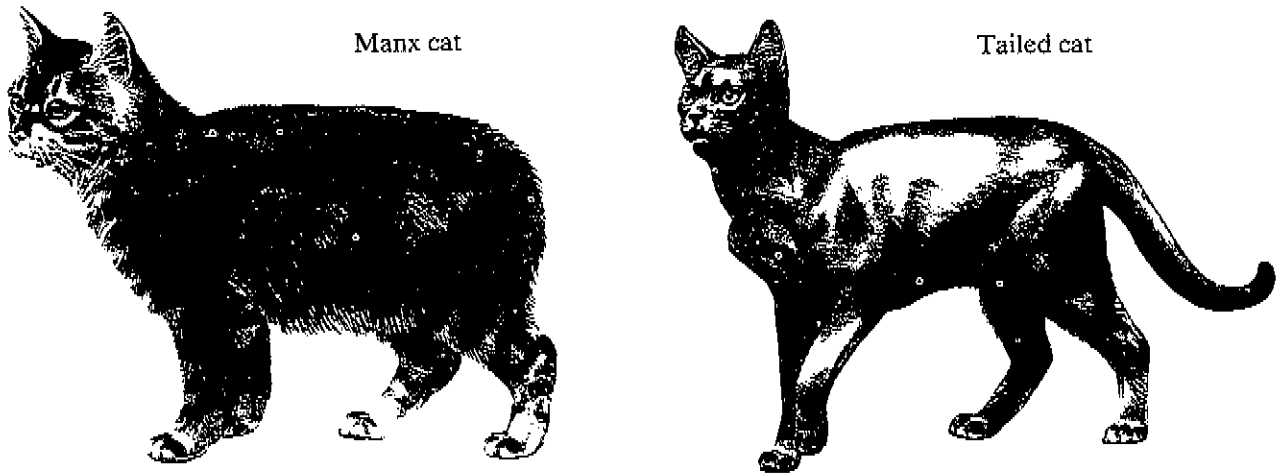


- 3 A Manx cat has no tail. A gene controlling tail development in cats has two alleles – Manx ( $M^0$ ) and tailed ( $M^1$ ). Combinations of these alleles can result in either a Manx or tailed kitten being born or the death of the embryo before birth.



The mating of two Manx cats produces both Manx and tailed kittens. The mating of two tailed cats produces only kittens with tails.

- (a) Using this information complete the table below.

Phenotype	Manx	Tailed	Embryos which die
Genotype			

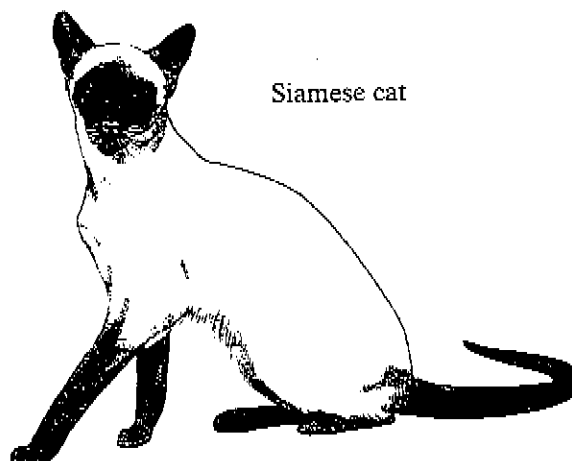
- (b) In crosses between Manx cats, what would be the expected proportion of zygotes which would have the genotype for tailed cats?

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- (c) In a series of matings between Manx cats, 60 *live* kittens were produced. How many embryos would be expected to have died because of the lethal allele combination?

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In Siamese cats, the expression of a gene for coat colour is strongly influenced by the environment. These cats have dark ears, faces, feet and tails. The dark colour is caused by the presence of pigment, the production of which is controlled by the enzyme tyrosinase.



- (d) Siamese kittens are all white at birth with the pigment developing only in the cooler extremities some days later.

Suggest an explanation for these observations.

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Another gene concerned with coat colour in cats has two alleles – black ( $c^b$ ) and ginger ( $c^s$ ). Different combinations of these alleles produce female cats of three types – ginger, black and tortoiseshell (a mixture of ginger and black fur) but only two types of male cat – ginger and black. In cats, the female is the homogametic sex.

Two crosses were carried out:

1. black female x ginger male
2. ginger female x black male

Kittens from cross 1 were either tortoiseshell females or black males. Kittens from cross 2 were either tortoiseshell females or ginger males.

- (e) Use genetic diagrams to explain the results of **either** cross 1 **or** cross 2.

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