

- 6 Some species of whiptail lizards are unisexual, consisting entirely of females. They reproduce parthenogenetically (reproduction in the total absence of sperm cells). Individuals from one such species, *Cnemidophorus neomexicanus*, were captured and kept in captivity until seven generations of females had been produced from the original stock.

A series of investigations was conducted in which these lizards were compared with members of two bisexual species of whiptail lizard captured from the wild. (A bisexual species consists of male and female individuals.)

Investigation 1

The number of scales in a ring around the middle of each reptile's body was counted. The results are shown in the table.

Species	Unisexual/ Bisexual	Sample size	Mean number of scales per ring	Standard deviation
<i>C. neomexicanus</i>	Unisexual	116	79	± 0.85
<i>C. inanatus</i>	Bisexual	131	75	± 4.12
<i>C. tigris</i>	Bisexual	106	85	± 4.23

- (a) State **two** ways in which animals selected for this investigation should be similar, in order to allow valid comparisons to be made from the data.

- (i)
- (ii)

- (b) What do the differences in the standard deviation values show?

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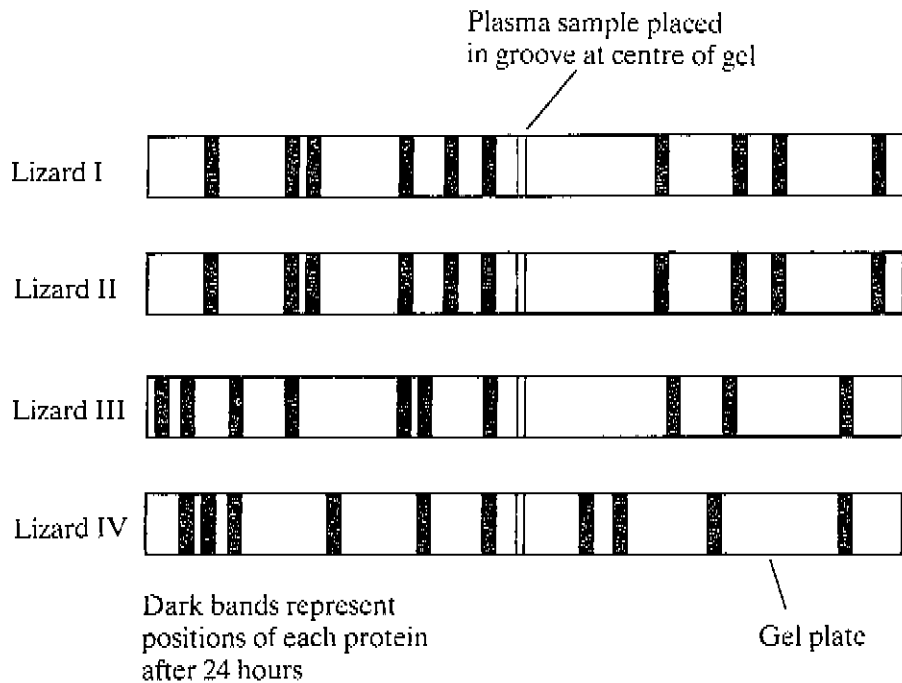
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Investigation 2

Samples of blood plasma were extracted from each of the following lizards.

- I One of the females from the original sample of unisexual *C. neomexicanus*.
- II One of the females from the seventh generation of unisexual *C. neomexicanus* bred in captivity.
- III One of the females from the bisexual species *C. tigris*.
- IV One of the female offspring from the *C. tigris* population kept in captivity, following the introduction of a mature male.

The plasma samples were placed on gel plates. An electric field was applied to each plate. This caused the proteins in each sample to move by different amounts, as shown in the diagram.



(c) How does the pattern of proteins seen in the gels compare,

(i) for the two *C. neomexicanus* lizards (I and II)?

(ii) for the two *C. tigris* lizards (III and IV)?

(i)

(ii)

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(d) Suggest how the results of Investigation 2 might be explained by the presence or absence of meiosis and fertilisation in the reproduction of whiptail lizards.

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Investigation 3

Skin grafts between all the lizards used in Investigation 2 were made.

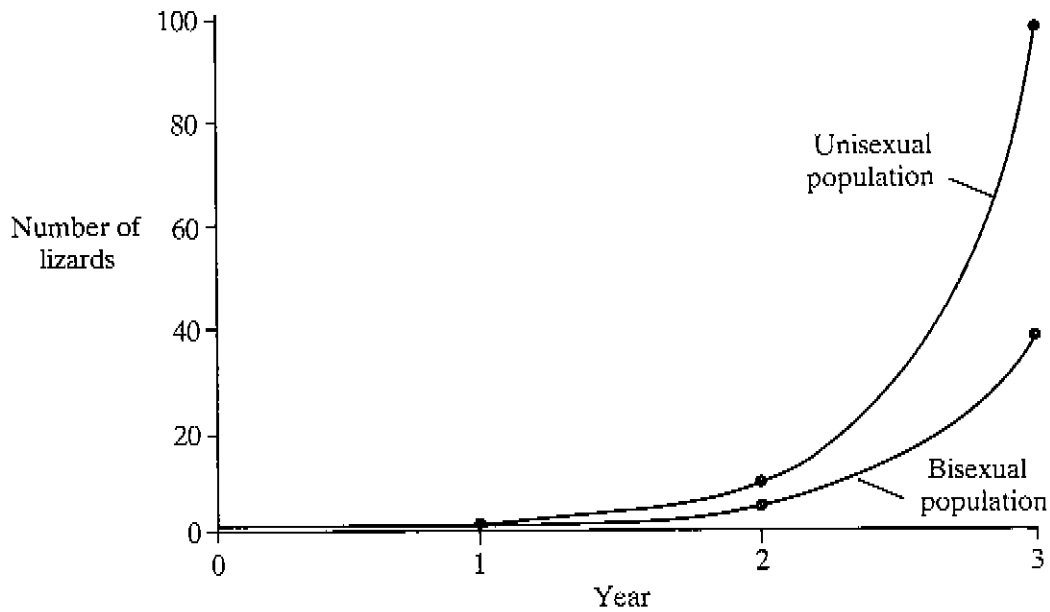
(c) Between which lizards would you expect the grafts to be successful? Explain your answer.

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Investigation 4

The graph shows the increase in laboratory populations of unisexual and bisexual whiptail lizard species over three years. Each population started from a single female animal. For the bisexual species, a mature male was introduced for mating during the first year and then removed.



- (f) Suggest a reason for the differences in population size after three years.

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- (g) Apart from increased rate of population growth, give **one** advantage which a unisexual species in the wild might gain by reproducing parthenogenetically.

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