

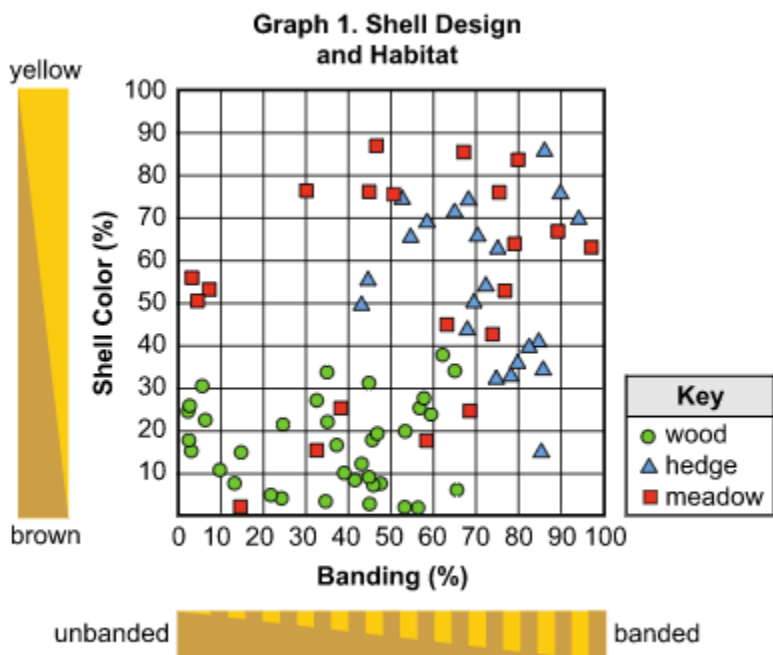
Banded Snails

Banded snails, found in Central Europe, are small- to medium-sized snails that are members of the *Helicidae* family. Their shells are found in a range of colors and patterns, from yellow to dark brown and from no bands (or stripes) to five bands. Image 1 shows an example of a banded snail with five bands.

Image 1. Banded Snail with Five Bands



Banded snails are prey to several bird species, including the song thrush. The color and pattern of the bands are based on genetics and heredity, and follow the Mendelian rules of inheritance. In addition, snails with lighter-colored shells have a lower body temperature than those with darker-colored shells. In some areas, snails with many different colors and band patterns are found. In other areas, certain shell colors or patterns are more common. Graph 1 shows the percentages of snails with different shell colors and band patterns found in different habitats.



Source: Robert Nordsieck.

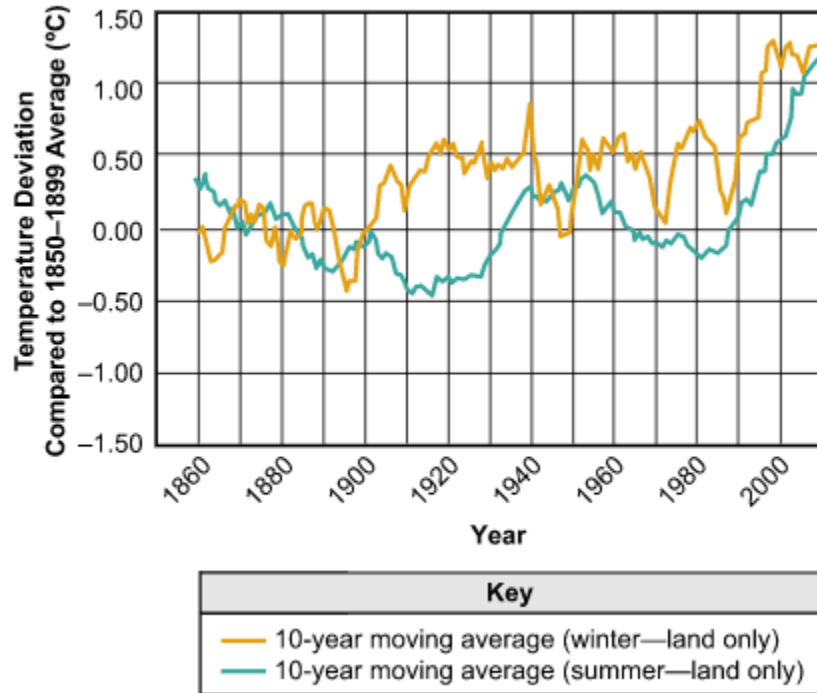
Climate can play a significant role in the survival advantages of each color and banding pattern. Snails with darker-colored shells tend to be found living farther north than those with lighter-colored shells.

Scientists have observed that the climate in Central Europe is changing faster than in other areas. This impacts not only the local organisms, but migratory species of birds and animals as well.

Graph 2 shows how the average winter and summer temperature deviations in Central Europe have changed over time.

LEAP 2025 Biology Practice Test Extended-Response Task

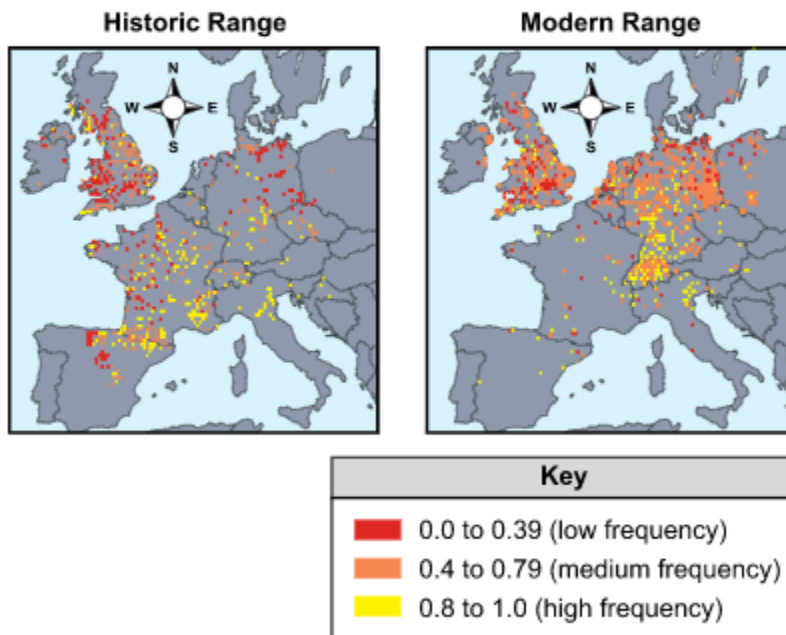
Graph 2. Average Winter and Summer Temperature Deviations, 1860–2010



Source: European Environment Agency.

The effect of climate on the population of yellow-banded snails is shown in Figure 1.

Figure 1. Effect of Climate on Yellow-Banded Snails (Frequency)



Source: PLoS ONE.

LEAP 2025 Biology Practice Test Extended-Response Task

16.

Which claim is supported by evidence from Graph 1?

- (a) Snails with yellow shells live in all three habitats, but those with banding have a survival advantage in hedge habitats.
- (b) Snails with yellow shells and banding are less able to survive in wood habitats.
- (c) Snails with brown shells live in all three habitats, but they have a survival advantage in meadow habitats.
- (d) Snails with brown shells and no banding are most often found in meadow habitats.

17.

Use Graph 2 and Figure 1 to answer the question.

Part A

Which statement **best** predicts how yellow-banded snails will be affected if the trends shown in Graph 2 continue?

- (a) Yellow-banded snails will migrate from higher elevations to lower elevations.
- (b) Yellow-banded snails will migrate from northern regions to southern regions.
- (c) Yellow-banded snails will become more common in areas that have historically cooler temperatures.
- (d) Yellow-banded snails will be found in a much wider range than the region in which they were historically found.

Part B

Which statement supports your prediction from Part A?

- (a) Yellow-banded snails are able to live in all environments, but predation rates were historically higher in certain areas prior to climate change.
- (b) Yellow-banded snails in cooler areas will become extinct because they are unable to adapt to changing conditions.
- (c) Yellow-banded snails will move to areas where there are fewer migratory predators.
- (d) Yellow-banded snails are better suited to live in warmer climates than snails with other-colored shells.

18.

Select the correct answer from **each** drop-down menu to complete the sentence.

As the climate in northern regions changes, the population of snails with darker-colored shells will likely because they have than snails with lighter-colored shells.

better camouflage
higher body temperatures
lower rates of predation
smaller body sizes

increase
decrease
remain unaffected

19.

Use Graph 1, Figure 1, and the information about banded snails to answer the question.

Drag the correct statement into **each** box to show an effect that each cause is likely to have on a snail population with a high degree of genetic diversity.

Not all statements will be used.

?

Dark-colored banded snails become more common than yellow-colored banded snails.

Only snails with a lighter shell color and banding are able to survive in the new environment.

Snails with a darker shell color are less likely to survive and reproduce to pass traits on to offspring.

Snails of any color with the most banding survive better than snails with any color and no banding.

Cause	Effect
Regions begin experiencing cooler-than-average winter climates.	
A new species of predator is able to detect darker colors better than song thrushes can.	
Warmer temperatures cause wood environments to change into hedge environments.	

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Part A

Based on the information in Graph 1, explain the relationships between shell color, presence of banding, and habitat. Use the evidence from the graph to support your answer.

Part B

The characteristics of two snail populations are shown.

- Population 1: high degree of genetic variation among snails living in a wood environment at higher elevations
- Population 2: all snails have the same traits specialized for a hedge environment that is found in warmer locations

Explain how **each** snail population will likely be affected if the trend shown in Graph 2 continues. Use evidence from Graph 1, Graph 2, and Figure 1 to support your explanation.

Part C

Describe the snail color that will offer the **greatest** selective advantage if the trends shown in Graph 2 continue. Use evidence from the information on banded snails to support your claim.