

Snail Space

Teachers' notes

What's it all about

As part of the Darwin 200 celebrations, ASE's Primary upd8 team www.primaryupd8.org.uk has been working with the Open University's *EvolutionMegalab* to provide activities for school pupils.

This activity introduces pupils to Darwin's ideas on evolution by looking at variation, adaptation and distribution of banded snails (*Cepaea* snails – pronounced 'see-pee-ah'). In this activity children use the correct vocabulary to describe habitats and different banded snails. Pupils take part in practical science, collecting snails and collating data and are shown how this information relates to, and can be included on, the *EvolutionMegalab* website www.evolutionmegalab.org which encourages children to accurately record their snail finds on a giant database to find out if and how the snail population is changing.

In this activity the children determine which snails are found in which habitats, have a better understanding of evolution and adaptation, and appreciate the benefits of collecting large quantities of information.

EvolutionMegalab involves members of the public contributing to a Europe-wide survey of banded snails in gardens and public open spaces. The project *EvolutionMegalab* involves a data gathering study of snail habitats, their shell colour and pattern of banding. Over many years snails have been adapting to their environment. This may be as a result of climate change and changes in other animals and plants around them. Pupils can conduct their own snail hunt and record their findings via the *EvolutionMegalab* website, and will receive personalised interpretations of their observations. Comparing these samples with historical data, the *EvolutionMegalab* team will examine evolutionary changes over the last 50 years, along with the impact on the banded snails of the changing thrush numbers (thrushes eat banded snails) and of climate change.

Where it fits

Science:

QCA Unit 6A: Interdependence and adaptation

- to use keys to identify animals and plants in a local habitat
- how animals and plants in a local habitat are suited to their environment

QCA Unit 4B: Habitats

- to identify different types of habitat
- that different animals are found in different habitats
- to make predictions of organisms that will be found in a habitat
- to observe the conditions in a local habitat and make a record of the animals found
- that animals are suited to the environment in which they are found to group organisms according to observable features
- to use keys to identify local plants or animals

QCA Unit 5/6H: Enquiry in environmental and technological

- to collect and record data appropriately
- to identify and describe patterns in data
- to look critically at data collected

Scientific enquiry

- make simple comparisons [for example, hand span, shoe size] and identify simple patterns or associations

What children will learn:

- the significance of the discoveries of Charles Darwin and their impact upon our understanding of the world

Children will demonstrate this by completing the task on page 1 successfully.

- that animals and plants are constantly changing and adapting to their environment

Children will demonstrate this by completing the task on page 2 and 3 successfully.

- that they can carry out genuine scientific research and contribute data to a real investigation

Children will demonstrate this by completing the task on page 5 or 6 successfully.

What you need to do

Introducing the activity

- Display **Page 1** through a data projector or as an OHT. Explain to the children that in 2009, we are celebrating the 200th Anniversary of the birth of Charles Darwin who was born in 1809. Explain that he went on a 5-year voyage on a ship named *HMS Beagle* (as long as some of them have been alive!) which is shown on the image. Darwin visited different islands all over the world. He found different animals and plants on different islands and noticed that they had adapted to the island where they lived and the food available (e.g. finches with different beaks to eat different seeds etc.).
- **Page 1** shows a cartoon image of the ship HMS Beagle and the route of the voyage ((1831-1836). He discovered that there were different animals and birds on different islands, adapted to the island where they lived and what the food they ate (e.g. finches with different beaks to eat different seeds etc.).

This may be an opportunity to discuss Darwin's finches and/or the voyage of the HMS Beagle:

- *How are the finches different?*
- *Why are they different?*
- *Do you think they changed quickly or slowly (over days, months, a few years, longer?)*
- *What would happen to the finches that did not adapt?*
- *What do you think Darwin discovered from looking at these finches?*

Talk to the children about the slow process of evolution and the concept of survival of the fittest.

Look at the different snail shells on the right hand side of **Page 1**. The four photos in the middle of the image show snail shells (the snails may be hidden inside the shell or maybe the shell is empty). The snails on the right hand side show the animal and its shell. The children may notice whether the snail shells have one band, many bands or no band and look for the brown lip or white lip along the bottom of the shell (where the snail's head pops out). Only the snail on the bottom right has a white lip, the others have a brown lip. The banding and the colours of the shells are different. The colours of the (empty) snail shells in the middle photos are different: the top and the third down are

yellow; the second snail is pink and the snail at the bottom has a brown shell. The snail on the top right has a brown shell, single band and brown lip. The snail on the bottom right is yellow, has many bands and a white lip.

- *What might the young boy be thinking?*
- *Why might the snails be different?*
- *What other animals have bands or stripes? They might think of the zebra - the stripes are for camouflage.*

- Ask the children to work with a partner or group and decide which snail would be most likely to live in which habitat. They must give reasons. Encourage the children to give scientific reasons based on factual information. Discuss camouflage and why it is important to snails. Do not worry too much about correct answers reward children who have argued a good **scientific** case.
 - *Why does a snail need to blend into its environment?*
 - *How does camouflage protect the snail?*
 - *Do you know of other animals that use camouflage to protect themselves?*
 - *What would happen to a snail that did not have good camouflage? (Reiterate the concept of survival of the fittest.)*
 - *Why do you think some snails would survive better in different habitats? Talk about camouflage from predators, protection from overheating or getting too cold (darker shells heat up more quickly than lighter coloured shells) etc.*

It would be useful to have a collection of 'empty' snails shells to complement the photos. These could be collected by the teacher beforehand or maybe the children could be asked to look in their gardens or on the way to school etc. for any empty snail shells (possibly with parental guidance). Ensure that health and safety measures are taken into account and children wash their hands on arrival at school if they have been collecting snails. See www.evolutionmegalab.org for further guidance on collecting and identifying snails.

Leading the main activity

- Display **Page 2** through a data projector or on an OHT. Explain that Darwin's own great great great grandson is taking his own son, Sam (a snail fan) on a trip around Europe to visit different countries (some in the cooler north, some in the warmer south) to find out if there are differences in the snails they find there. There are different snails throughout Europe. Before setting off, Sam contacts pen pals in the different countries to ask them to send postcards of the snails that have been found in their countries. Note that for this activity, the data in the postcards is real data taken from the EvolutionMegalab website www.evolutionmegalab.org
 - *How are these habitats different?*
 - *Discuss the habitats using appropriate vocabulary.*
 - *Which differences would affect the life of a snail? Try to talk about temperature, food, predators, landscape etc.*
 - *Describe the snails shown on the different postcards.*
 - *Ideally, pupils will use the same terminology that scientists use – sorting/classifying/describing the snails by their shell colour, number of bands and the colour of the lip (the edge of the snail shell by the hole into which the animal can retract).*

 - *Scientists separate the snails depending on the colour of the lip and give each a Latin name. All the snails are banded snails *Cepaea* (pronounced 'see pee ah'). Scientists sort them into two sorts - *Cepaea hortensis* (white lipped) and *Cepaea nemoralis* (brown lipped). These are then further divided depending on shell colour and number of bands (no bands, single band or many bands).*

- Discuss what the circle on the map shows.
- The circle gives a visual representation of the different coloured shells of the snails found at the localities on the map. The proportion of the circle that is coloured shows the percentage of snails of a particular shell colour found at the locality, for example the data circle for the locality in Spain is completely yellow as 100% of the *Cepaea* snails found there had a yellow shell.

- Display **Page 3** through a data projector or on an OHT. Print off copies for the children as appropriate. The four postcards on **Page 3** are the backs of the postcards shown on **Page 2** and give the actual data collected for each of the places from which the postcards were sent. These data records were taken from the *EvolutionMegalab* website, by clicking on the circles (shown in **Page 2**) on the Google Map facility on the website.

Use **Page 3** to establish that the pupils understand how data is collected and how it is recorded by scientists. They will be using the same recording system. The graphs show both colour and number of bands. Each snail may be either *Cepaea hortensis* (white lipped) or *Cepaea nemoralis* (brown lipped), have a pink, yellow or brown shell and have no bands, one band or many bands.

- Ask children to match the snails (a – f) to the correct postcards **Page 3**. Children may find different methods to do this, some may need guidance and the easiest method may be to begin by looking back at the postcards on Page 2 and describing the snails on the photographs, then matching with the correct bar on the bar chart (graph) and looking for the snail photo which matches the description and the graph.
- Answers:
 - Postcard 1 from North Scotland
 - *Cepaea hortensis* - white lipped, brown, many bands - snail photo d (shown on the right end of the graph, makes up 50% of snails found at that locality). Graph also shows snail f and 2 other sorts of snail which are not shown in the photos (a – f).
 - Postcard 2 from Spain
 - *Cepaea nemoralis* - brown lipped, yellow, many bands - snail photo c (shown as 100% on the graph).
 - Postcard 3 from Germany
 - *Cepaea nemoralis* - brown lipped, pink, no bands - snail photo a (shown on the left end of the graph, 18 snails were found at that locality). In addition 4 specimens of snail e were found and 1 specimen of snail f. Graph also shows 5 other specimens with pink shells (2 with one band, 3 with many bands) which are not shown in the photos (a – f).
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 - Postcard 4 from Italy
 - *Cepaea nemoralis* - brown lipped, yellow, no bands - snail photo b shown on the graph makes up 50% of snails found at that locality. Graph also shows brown lipped, pink, one band snails which make up the remaining 50% of snails found at that locality which are not shown in the photos (a – f).
- Snail photographs shown on **Page 3**
 - Snail a – *Cepaea nemoralis* - brown lipped, pink, no bands
 - Snail b – *Cepaea nemoralis* - brown lipped, yellow, no bands
 - Snail c – *Cepaea nemoralis* - brown lipped, yellow, many bands
 - Snail d – *Cepaea hortensis* - white lipped, brown, many bands
 - Snail e – *Cepaea nemoralis* - brown lipped, yellow, one band
 - Snail f – *Cepaea hortensis* - white lipped, yellow, many bands

Plenary activity

- Display **Page 4** through a data projector or on an OHT.

Discuss with the class how data is collected and added to the website and prepare children for *Cepaea*, banded snail hunt(s).

- How would you describe the habitat in your school grounds?
- Looking at the *EvolutionMegalab* information. What kind of snails would you expect to find in your local habitat and why?

Explain to the children that they can use the website to identify their own snails in their habitats and that they can add to a genuine investigation by adding their own data to the site.

The Snail Hunt

Go outside and explore the playground or plan to go further afield (check beforehand that there are snails for the children to find). Use record sheets (downloaded from the *EvolutionMegalab* website or designed by the children) on a clipboard if possible. If there is a possibility of very few snails in the playground then print out and laminate examples from the record sheet and put them in the correct area as a trial hunt for the children.

The snail hunt can be used as a regular event within the school (checking information to see whether there are any changes depending on season, time of day etc.) possibly with snail hunts taking place before the summer holidays and again after the holidays. Children could be encouraged to look for snails at home after school or during the holidays, or while on holiday. They can record what they find or bring specimens back to the classroom to show to the class.

Notes for adding data to the *EvolutionMegalab* website www.evolutionmegalab.org (see the website for further teacher guidance etc.)

- Can more than one class in a school add their data to the *EvolutionMegalab* database separately?

If each class wants to look at their data they would have to give have a unique username. During data input you are asked to give the Hunt (i.e. a set of data collected at a particular place and time) a name. You can produce as many hunts as you like, so each student, or each group of students in the class can have their own. When you download the data, sort it by username and all the class results will be grouped together

- What if people living near the school also add data – does it matter that they live close to the school and may have the same postcode?

Postcode/address does not matter in the *EvolutionMegalab*. Snail hunt locations are identified using Google maps and the unique identifier for each hunt is the name that is given to it. It therefore depends on how the class/school wants to use the data i.e. look at it by class or school or both.

Extension Ideas . . . Cross Curricular Links

My Snail Space (Literacy)

Write a personal profile for a dating agency including appearance, where I hang out, likes and dislikes

Snail top trumps (Literacy)

Write down your vital statistics as a snail in the form of a top trump card with a score for camouflage, adaptation, survival potential

Design a snail (Art/DT)

Design a snail that has adapted to fit into a modern environment e.g. rubbish dump. Concrete buildings, urban designs from magazines etc.

Produce a bar chart (Numeracy)

Use graphs on page 3 to work out percentages, work with pie charts etc.
After your own snail hunt produce a bar chart to show your findings.

Assessment for Learning: Smart Grid

Thumbs Up	We were great at the task because...	We could explain how snails have adapted to suit their environment	Next time we will...
Thumbs Sideways	We were good at the task because...		
		We could describe how snails in two habitats are suited to the conditions	
Thumbs Down	We were OK at the task because...		
		We found out that different snails live in different habitats	

smart
grid
Assessment
for Learning

Smart Grids were devised by the Centre for Science Education

Science at your fingertips

What is evolution?

It is generally accepted that the astonishing diversity of life on our planet is the result of a process called **evolution**, which drives organisms to **change gradually over time**.

<http://www.nhm.ac.uk/nature-online/evolution/>

What does survival of the fittest mean?

This is another way of describing natural selection which is a natural process resulting in the evolution of organisms best adapted to the environment.

The phrase was originally applied by Herbert Spencer in his Principles of Biology of 1864, Spencer drew parallels to his ideas of economics with Charles Darwin's theories of evolution by what Darwin termed natural selection.

What are banded snails?

Banded snails come in assorted colours. Their shells are various shades from yellow through pink to brown. They can have one band round the middle like a karate black belt, up to 5 bands like a T-shirt or even no band at all. Banded snails are a favourite food of the song thrush and their various shell colours and patterns camouflage them against different backgrounds. Shell colour also affects how sensitive a snail is to temperature. Have shell colours changed with our warming climate?

<http://www.evolutionmegalab.org/>

What is the background to the project?

Scientists have been studying the banded snail for many years and have found that the darker shell types tend to be more common in woodland where the background colour is brown, while in grass the banded snails tend to be lighter-coloured, yellow and have more stripes. This camouflage is an example of adaptation. However scientists now want to find out whether this pattern can still be found, because there has been a big decrease in the numbers of song thrushes in some places over the last 30 years. If there are fewer song thrushes about, you would expect the different snails to be less faithful to their particular habitats than they used to be. There is also a geographical pattern in the colour of shells that may have changed in response to the warming of the climate over the last 30 years. Darker shells used to be more common in the north than in the south. Scientists think this was because darker shells warm up more quickly in sunlight, enabling the animals to be more active than light-coloured snails in colder areas. The aim of this project is to find out whether lighter coloured shells are more common further north than they used to be, now that the climate has become warmer.

<http://www.evolutionmegalab.org/en/information/viewBackground>

Web links

Evolution MegaLab

<http://www.evolutionmegalab.org/en/information/viewBackground>

The site promoting the project, including the recording sheet

Channel 4

<http://www.channel4.com/science/microsites/F/famelab/>

Clips and information about Charles Darwin

Wikipedia

http://en.wikipedia.org/wiki/Charles_Darwin

Information on Charles Darwin- will need to be re-worded for key stage 1

http://en.wikipedia.org/wiki/Charles_Darwin#Journey_of_the_Beagle

The journey of The Beagle story with a map that shows the route

Acknowledgements

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