

# ACET Junior Academies'

## Scheme of Work for Science

### Big Idea – Living Things

#### Year 6 - Evolution



#### About this unit:

##### PoS – Animals, including humans

Evolution is an abstract topic, which can be difficult for students to grasp. The main facts – that living things have 'evolved' over time, that fossils provide evidence for this, and that we all come from common ancestors – are widely understood, but when we start looking at how and why evolution happened, things can get very confusing.

The essential facts, those which underpin real understanding of evolution, are that most living things are varied – we're not exactly the same. Some living things are better suited to their environments than others. Those that are 'best' (*adapted best to their environment*) will breed the most, and have offspring like them. This will continue over many generations, until there are no offspring with the features of the living things that had the 'worst' features.

We will break this down in this unit, ensuring that students understand about variation, that evolution or change happens over **many generations**, and that it is related to which living things have the variations that make them **best suited** to their environments. Students need to know that fossils provide evidence of how these changes have happened over time. At the end of this unit, students may not be able to relate what they have learnt directly to 'evolution' but this is a topic that is taught at KS3, KS4 and KS5, each time building layers of understanding of these facts. Understanding the key concepts of each lesson, and being able to complete the assessment criteria, will ensure that they have the understanding to move on and describe evolution in future.

#### Unit structure

This unit is structured around seven science enquiries:

1. How much variation is in our class?
2. How do you make a labradoodle?
3. What happened in the Galapagos Islands?
4. Are we suited to where we live?
5. Can you live in an extreme environment?
6. What are fossils?
7. What does the fossil record show us?

#### Links to previous and future National Curriculum units

Y3 – Rocks – students have considered fossils and how they are made  
Y4 – Classification – students will have considered features of living things, and looked at some animals which have unusual features

- KS3,4 & 5 Biology

Enquiry 1: How much variation is in our class?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y4 - Classification	EA – Identifying, grouping & classifying	<b>Can your children:</b> <ul style="list-style-type: none"><li>- Tell you about the variation that is in the class</li><li>- Tell you why they are drawing a scatter graph or bar chart</li></ul> <i>GD – choose their own scales, choose which graph to use</i>	<b>Horizontal:</b> Maths – data for graphs  <b>Vertical:</b> KS3&4 Biology
	Asking questions Making predictions <b>Recording data</b>		
	<b>Key concepts:</b>		
	Although humans share the same features, there is considerable variation in our class. Which graph we choose to draw depends on the data we're using – if the x axis contains data which is continuous, we should draw a scatter graph or line graph. If there are categories on the x axis, we should draw a bar chart.		
Key terms		Common misconceptions	
Features, variation, graph, continuous,		<i>Students often think that bar graphs are just 'easier' than line graphs. They should be taught that which graph you use <b>depends on the type of data you're using.</b></i>	
Suggested activities		Resources	Useful links
Gender, eye colour, hair colour, height (measure in m).  Graph work – bar charts for discontinuous data such as gender, eye colour, hair colour. Can be scatter graphs if the x axis has continuous data such as height.  Maths work. <i>GD – how precisely did you measure height? Do you need to group heights (e.g. 80-90cm, 90-100cm) in order to make a good graph?</i>  What can you conclude about variation in the class? Are there some features where you find more variation than others?  <i>Height is just a measure of distance! Should be measured in cm. Students should know that '4foot6' is an outdated method of stating height.</i>  Students should focus on plotting data and interpreting their graphs, <b>not</b> on drawing their own scale, if they find that difficult.		Graph paper or grid paper Measuring equipment – metre rulers, and shorter ones	

Enquiry 2: How do you make a labradoodle?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y5 – Lifecycles	EA – Problem solving  Asking questions <b>Making predictions</b>	<b>Can your children:</b> <ul style="list-style-type: none"><li>- State that the offspring of a pair of animals will be similar to them, but not identical</li><li>- Describe how to make a 'new' breed of dog</li></ul>	<b>Horizontal:</b>  <b>Vertical:</b> KS3&4 Biology
	<b>Key concepts:</b>		
	Living things produce offspring similar to themselves, but there is variation within offspring of the same family. Dog breeders keep picking features they want, over <b>many generations</b> , to make a 'new' breed of dog.		
Key terms		Common misconceptions	
Features, variation, best, healthiest, reproduce, offspring		The key point that students often miss is that breeding needs to happen over and over again, over <b>many generations</b> , before a significant change is seen.	
Suggested activities		Resources	Useful links
Breeding dogs activity – or any other activity which shows how selective breeding works. Humans choose the characteristics they want, and breed creatures with those characteristics together. Review Y5 lifecycles work about the need for 2 parents for reproduction  2 important points to discuss with students: Not all the offspring will have the characteristics we want – see previous lesson, and discuss siblings etc. The characteristics we want will not be obvious in one generation – we will need to do this repeatedly over many generations to get the results we want.  GD – review lifecycles (Y5) – some plants can reproduce asexually. This means they only have one parent, and that they are a clone, so the offspring are identical to each other and the parent. What are the advantages/disadvantages to this?		Y6 Dog breeding	<a href="https://www.bbc.co.uk/teach/class-clips-video/science-ks1-ks2-what-is-selective-breeding/z6cs382">https://www.bbc.co.uk/teach/class-clips-video/science-ks1-ks2-what-is-selective-breeding/z6cs382</a>

Enquiry 3: What happened in the Galapagos Islands?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y5 – Lifecycles	EA – Identifying, grouping & classifying	<b>Can your children:</b> <ul style="list-style-type: none"><li>- Suggest which birds are best suited to which islands</li><li>- Suggest advantages to being the best adapted</li></ul>	<b>Horizontal:</b>  <b>Vertical:</b> KS3&4 Biology
	Asking questions Making predictions		
	<b>Interpreting &amp; communicating data</b>		
	<b>Key concepts:</b> When there is VARIATION in a population, some living things will be better adapted to their environment than others. The best adapted living things will get most food – and be healthiest		
Key terms		Common misconceptions	
Features, variation, best, healthiest, reproduce, offspring, finch, beak, big, small, crack, catch, insect, nut, seed		<i>Organisms that are not very well adapted don't 'die out' – they just don't get much opportunity to breed. The best adapted ones will breed much more, so there will be more offspring like them.</i>	
Suggested activities		Resources	Useful links
Darwin's finches experiment  Charles Darwin visited the Galapagos Islands – lots of small islands off the coast of Equador. All the islands are slightly different, with different types of plants growing on them. Darwin studied small birds called finches. He noticed that although there was VARIATION in the populations on different islands, some birds were better adapted to their environment than others.  See the investigation – resources.  Combine information from today with last lesson – the best adapted ones will breed the most, and their characteristics (like the size of their beaks) will get passed on. The characteristics of birds that are not well adapted won't get passed on. This means that the characteristics will change over time, which leads to evolution.		Y6 – bird beaks investigation	<a href="https://www.nhm.ac.uk/schools/teaching-resources/galapagos-finches-show-beak-differences.html">https://www.nhm.ac.uk/schools/teaching-resources/galapagos-finches-show-beak-differences.html</a> Video showing the finches that Darwin caught (slightly disturbing – stuffed/eyeless) – illustrates the variation in their beaks

Enquiry 4: Are we suited to where we live?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y4 - Classification	EA – Problem solving  Asking questions <b>Making predictions</b>	<b>Can your children:</b>  - Match a feature of a plant to the habitat it's found in  - Describe how a particular feature enables an animal to be successful	<b>Horizontal:</b> Geography – study of specific countries  <b>Vertical:</b> KS3&4 Biology
	<b>Key concepts:</b>		
	Plants have different features according to their habitats. The features of animals enable them to survive successfully in their habitats.		
Key terms		Common misconceptions	
Variation, feature, adapted, specialised, habitat, food, shelter, camouflage, reproduce, attract			
Suggested activities		Resources	Useful links
<p><i>Opportunity to review work about habitats – Y4.</i> Link the adaptations of living things to the habitat in which they live.</p> <p>Discuss adaptations to different habitats – e.g. UK, Scandinavia, Amazon – see Geography. Make a study of how the habitats are different, and what is different about the <b>plants</b> that live there.</p> <p>Look at: Size of leaves (relate to how much sun there is); deciduous or evergreen; how tall they are; how quickly they grow; what they are used for by humans.</p> <p>Look at the habitats that are created for animals by the effects of climate and the plants that grow there.</p> <p>Students can 'design' an alien to live in a specific habitat. It's important that the features of the habitat are decided upon before they design their alien. <i>You can decide on using a known planet, or a planet with an environment like a place already studied, e.g. the Amazon,, or make one up entirely.</i> Students should consider where their alien will shelter, what food they will eat, and how they get it, how they hide from predators/protect themselves, and how they attract a mate.</p> <p>The students should be able to link the characteristics of their alien with features of the habitat.</p>		See Geography	

Enquiry 5: Can you live in an extreme environment?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y4 - Classification	EA - Research	<b>Can your children:</b>  - Link an aspect of climate change with a change in habitat  - Link the habitat change with an effect on a living thing	<b>Horizontal:</b> Geography  <b>Vertical:</b> KS3&4 Biology
	Asking questions Making predictions		
	<b>Interpreting &amp; communicating data</b>		
	<b>Key concepts:</b> Climate change is changing the habitats of living things. When a habitat changes, the 'best' features may not be the best any more.		
Key terms		Common misconceptions	
Climate, change, habitat, variation, adaptation, features		<i>Polar bears with thick fur won't 'die out' – but the ones with thinner fur are now better adapted, so there will be more offspring with thin fur. Students often confuse 'climate change' with 'global warming' and 'pollution'. Try and get them to be specific about what they mean.</i>	
Suggested activities		Resources	Useful links
Discuss camels and polar bears. How are they adapted to their extreme environments?  Climate change – how is the world changing? Will polar bears still be well adapted?  Think about what variation there is in polar bear populations – which polar bears will be at an advantage? <i>Thinner fur now becomes more of an advantage – but see misconception.</i>  Think about organisms in the UK – squirrels, earthworms – how are they adapted to their environments? Will they still be well adapted as the climate changes? <i>Bear in mind it's not just global 'warming', but increased flooding and changes in weather patterns.</i>  Link back to the work on selective breeding – adaptations don't happen overnight, but over many generations.  Students could present information about the adaptations of a camel or polar bear, linking them to the extreme environment they live in, or they could discuss some of the changes they <i>predict</i> may happen to camels and polar bears as the climate changes. They don't need to be 'correct' – as long as they are linking a change in habitat with a change in characteristics.			

Enquiry 6: What are fossils?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y3 - Rocks	EA – Pattern seeking	<b>Can your children:</b> <ul style="list-style-type: none"><li>- Relate the age of fossils to the formation of rocks</li><li>- Tell you that fossils are not actually bones</li></ul> GD – describe what fossils are	<b>Horizontal:</b> Geography  <b>Vertical:</b> KS3&4 Chemistry & Geography
	<b>Asking questions</b> Making predictions		
	<b>Key concepts:</b> Fossils show the remains of things that were alive while the rocks they are in were being formed. They are not actual bones, but imprints, or <i>minerals that have taken the place of bones as the rocks were forming.</i>		
Key terms		Common misconceptions	
Fossil, rocks, time, sedimentary,		Students often think that fossils are bones. They also think that fossils came from animals killed during mass extinctions, rather than ones which died naturally.	
Suggested activities		Resources	Useful links
What do the students know/recall from Y3 about fossils?  Link with Geography/Geology/History. Key point – fossils are only made under particular conditions. Do students understand the concept of millions of years ago? When does this fit into history?  Discuss Dinosaurs/Geology  Has anyone been to Filey?  Make fossils – layers in sand. They should learn about the relative ages of fossils. Make a cartoon strip to show how fossils are formed.  Use the link resources to engage the students. They should understand the key concepts, and be able to complete the assessment criteria.			<a href="http://www.sheppardsoftware.com/scienceforkids/dinosaurs/fossils.htm">http://www.sheppardsoftware.com/scienceforkids/dinosaurs/fossils.htm</a> - how fossils are made activity  <a href="http://www.oum.ox.ac.uk/thezone/fossils/intro/types.htm">http://www.oum.ox.ac.uk/thezone/fossils/intro/types.htm</a> Oxford uni - different types of fossil

Enquiry 7: What does the fossil record tell us?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
3 - Rocks	EA – Problem solving	<b>Can your children:</b> <ul style="list-style-type: none"><li>- Tell you why the fossil record is useful</li><li>- Describe how we know the age of a fossil</li></ul> <i>GD – tell you about similar fossils found in different places – relate back to the 'Classification' unit</i>	<b>Horizontal:</b> Geography Maths – timescales Classification  <b>Vertical:</b> KS3&4 Chemistry & Geography
	Asking questions Making predictions <b>Interpreting &amp; communicating data</b>		
	<b>Key concepts:</b> The fossil record tells us what was living on the Earth before humans evolved. The oldest fossils are found in the deepest layers of rocks.		
Key terms		Common misconceptions	
Fossil, rocks, time, sedimentary, age, layers, evidence, proof, features, similar, group		<i>Fossils are examples of animals/plants that lived at the time the rocks were being formed. That is a period of 10,000s of years. The fossils we find are not things that died suddenly as part of an extinction.</i>	
Suggested activities		Resources	Useful links
How can we use the fossil record - what has it shown us? See link.  Link the fossil record to work on adaptations – why did certain dinosaurs die out (perhaps the plants they lived on died out?). <i>MISCONCEPTION – becoming extinct is not linked to the death of individual dinosaurs found as fossils – they died of natural causes at some point)</i>			<a href="https://www.hamilton-trust.org.uk/ht-search/?query=fossils">https://www.hamilton-trust.org.uk/ht-search/?query=fossils</a> – different ways of exploring the fossil record and what it shows us