Evolution and Inheritance

Explorify planning support

Curriculum statements	Explorify activities	Suggested use/taking it further
FOSSILS		
Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago *England* **Change over time KS2 How some materials change and decay whilst others do not such as fossil formation** *Northern Ireland* **I can identify and classify examples of living things, past and present, to help me appreciate their diversity. I can relate physical and behavioural characteristics**	Animal fossils OOO	When looking at the photographs, children can be encouraged to think about what the fossils tell us about the original animal. Ask them: Why are some bones thick and others thin? What do the skulls and teeth tell us? Do the fossils remind them of any animal which is alive today? These are the kinds of questions palaeontologists (scientists who study fossils) use to work out what these animals might have been like when they were alive. Follow up with PSTT's 'I bet you didn't know… The fossilised secrets of the rhino and the beetle.' This pack includes a resource for children to match fossils to artist's impressions of animals. There is also an article about recent fossil discoveries and a teaching PowerPoint which includes an activity which asks children to predict what animals would look like using plaster cast 'fossils'. Find out more about the scientists who work with fossils here with 'A scientist just like me.'
	How old is that chicken? OOO	Compare an Archaeopteryx, a Tyrannosaurus, and a chicken. Explain the role of fossils to demonstrate many of the stages of evolution of dinosaurs into birds. The video from the NHM explains why scientists believe that birds evolved from dinosaurs.
	Brilliant brain case OOO	Compare a modern Homo sapiens skull with fossils for a Homo erectus and a *Australopithecus (*group of extinct primates). Great for observation skills.

to their survival or extinction I can identify and classify examples of living things, past and present, to help me appreciate their diversity. I can relate physical and behavioural characteristics to their survival or extinction *Scotland* **Progression step 3: I can describe the features of organisms and recognise how they allow them to live, grow and reproduce for survival in their environment.** *Wales*	Star-shaped survivor **ZIZO**	Examines an unusual marine animal, the crinoid, which fossil records show lived in the Jurassic and can still be found today. Take your class on a Jurassic Scavenger hunt using this spotters guide to look for living things that would have been around in the Jurassic with the dinosaurs.
	A hinge in the rocks **ZIZO**	The perfect starter if you are hunting for, or looking at, fossils. The background science explores why marine fossils are the most common type found. Use this advice if you are planning a fossil hunt. Find where to go and when with an interactive regional map of UK. Before you go, find out what geological era the rocks beneath your feet are from (Clicking on your nearest City will show you the fossils found in your area). There is also a free app from the Natural History Museum which lets you do this whilst carrying out fieldwork. Found something you can't identify? Why not get your class to write formal letters to the Museum of Natural History in Oxford who offer an identification service (your local museum may do the same). There's an art and craft task here from the Eden Project. Loan boxes (or virtual loan boxes) of fossils are available from: ○ https://www.birmingham.ac.uk/facilities/lapworth-museum/learning/primary.aspx ○ https://www.birmingham.ac.uk/documents/college-les/gees/lapworth-museum/activities-to-try-at-home/virtual-fossils-loan-box-introduction.pdf ○ http://www.sedgwickmuseum.org/index.php?page=loan-boxes ○ https://www.bristolmuseums.org.uk/bristol-museum-and-art-gallery/learning/school-loan-box-dinosaurs-and-prehistoric-life/ ○ https://www.nhm.ac.uk/visit/tring/school-visits-at-tring/loans-service.html ○ https://www.stokemuseums.org.uk/pmag/schools/school-loans-box-service/

		○ https://www.nms.ac.uk/collections-research/collections-departments/natural-sciences/ http://education.down2earth.eu/content/down-earth
	Black Stripes **ZIZO**	When conditions are perfect, plants can form fossils like this one of a fern..
	What if Fossils didn't exist? **WI**	Excellent for getting children thinking about importance of fossils and understanding how important they have been in enabling us to understand evolution. This film could follow.
	Who is… Mary Anning? **WHO**	Learn about a woman scientist often called 'The greatest fossil hunter ever' with the help of this activity.
	Collection of Ammonites **SWA**	Examining these drawings, children will notice the similarities, but also the difference, between this selection of ammonites.
VARIATION		
Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents *England* **By exploring the characteristics offspring inherit when living things reproduce, I can distinguish between inherited and non-inherited characteristics** *Scotland*	Have you ever been told you look like your parents or another relative? **HYE**	Begin a discussion about variation by focussing on variation within families.
	Blackbird Variation **OOO**	Learn about Leucistic animals as an example of natural variation caused by a mutation (think of it like a spelling mistake) in an animal or human DNA. A creative way to show this is to try getting all the children to copy a single drawing and compare the diversity in their results. Follow up by investigating how variation works with natural selection to drive evolution by trying this Natural History Museum Peppered Moth game. This video is helpful too: Book link: *Moth* by Isabel Thomas ISBN: 9781526610553 Has lots of photos of how teachers have used the book in their classrooms.
	Perfect Pinchers **OOO**	Compare the variety in the form and function of bird beaks across a range of species Use the OOO to explore why the beaks of bird species are so variable and how variation can drive evolution. To demonstrate, try this bird beak investigation from the Linnean Society. It is fairly easy to adapt slightly to suit your class or the equipment you have. Would link well to learning about Charles Darwin.

	Half and Half	OOO	Meet the zeedonk and two other hybrid animals. Examining their features is a brilliant way to introduce inheritance from parents. Follow up by finding out about selective breeding in dog breeds (all one species). This is a helpful film.
	Members of the pack	OOO	Compare similar species: a dog, fox and wolf. Follow up by learning more about how dogs evolved from wolves with this short BBC clip. Children will love using this dog selection tool. They can make a note of their requirements and then explain why the particular dog breed suggested by the site will suit them.
	It's a small world	OOO	Meet the miniature horse and the micropig which have been bred down in size over generations by selective breeding. This BBC film with Michaela Strachan is a great introduction to selective breeding.
	All humans looks the same	WI	PMI and draw out the positive message about everyone's unique qualities :)
	How much variation is there in how we look?	TBQ	This activity is designed to explore just how different we are and how amazing this is considering we are all the same species. You could gather data to prove/disprove a hypothesis. See our recorded session for an example of this.
	Three breeds of cow	OOO	Compare three breeds of cow, the characteristics of which have been changed through selective breeding.
ADAPTATION			
Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution *England* **Interdependence and Place KS1 How animals use colour to adapt to their environment**	Fantastic Foxes	OOO	This activity gives the opportunity to compare the arctic fox in its summer and winter coats and is the perfect springboard for children carrying out secondary research on the adaptations of this species. This film will help too.
	The drinks menu	OOO	Learn about the adaptations that allow fog basking beetle to harvest water vapour from the air and why Bactrian camels are one of the only animals adapted to eat snow. Watch this BBC clip to see it in action and this short BBC video explaining how and why humans might try to copy the fog basking beetles. Already the design of the dew bank bottle has been inspired by the amazing insects. At the other extreme, watch the Bactrian camel eating snow with a David Attenborough commentary here.

Some living things that are now extinct *Northern Ireland* **I can identify and classify examples of living things, past and present, to help me appreciate their diversity. I can relate physical and behavioural characteristics to their survival or extinction** *Scotland* **I can describe the features of organisms and recognise how they allow them to live, grow and reproduce for survival in their environment** *Wales*	Adapted to eat ants **OOO**	Discuss how an aardvark, a pangolin, and a giant anteater have evolved similar behaviours and features while living in separate places. This is called 'convergent evolution'. Can the children think of other examples?
	In a flap **OOO**	Discuss the convergent evolution of flight in a bat, pterodactyl and dragonfly.
	Amazing adaptations **OOO**	This compares three animals with amazing camouflage. Play these fantastic citizen science games to see for yourself how camouflage would help you survive predation.
	What's in a handshake **OOO**	Compare the hands of humans, chimps and robots. Links include finding out more about how chimps use their hands with this BBC video or create your own robot hand with this fun activity from NASA.
	Terrific tree dwellers **OOO**	Explore how the tree frog, sloth and the crimson sunbird have adapted to live in trees.
	If you see me now **OOO**	A translucent octopus, transparent glass catfish, and the opaque but colourfully-camouflaged clown fish have all adapted to avoid being predated upon.
	Prickly plants **OOO** Orange and waxy **ZIZO**	Discuss why plants might have self-defence adaptations.
	Pitcher **ZIZO**	This activity zooms in on a climbing, carnivorous pitcher plant. Learn how carnivorous plants do photosynthesise but use the insects they catch to supplement the nutrients lacking in the soil where they grow. Research further facts about carnivorous plants using this information from the Eden Project's site.
	Gardens blades **OOO**	Nice starter about grass adaptations.
	Takeaway dinner **WGO**	The bearded vulture has evolved a method of eating bone. Watch this in action.

	On thin ice	WGO	This could be a good springboard into researching the adaptations of polar bears. **Children are likely to need time to talk about climate change and be given agency to take positive action after watching this hard-hitting film.**
	Extremophile snottites	WGO	Brian Cox examines a living organism which is adapted to metabolise hydrogen sulphide.
	Super seeds	WGO	We see the seed pods of the Himalayan Balsam exploding. This special adaptation means that the plant can spread its seeds much farther than other plants and, because it grows so quickly, can quickly take over (colonise) an area.
	Penguins could fly	WI	Why would a bird evolve to be flightless? There must be a benefit that led to increased reproductive success for penguins to have evolved this trait. Discuss what it could be with your class.
	We could bring back the woolly mammoth	WI	Suggest positive, minus, interesting outcomes if we were to be able to bring back the woolly mammoth. Children could choose an animal (Dodo or Sabre-tooth tiger, for example) which has become extinct and research their adaptations, how they lived, and why they became extinct.
	Human had never lived on Earth	WI	Discuss how humans may have affected the evolution of other species and the 'chain' effect when other species evolve differently.
	What if humans didn't have thumbs	WI	Learn about the important adaptation of the human thumb.
	How is the poinsettia different to other flowering plants?	TBQ	Could stimulate a great Christmas investigation: dissecting the flower and comparing how it is different to other flowers.
	How does your garden grow?	MS	A creative task to design a perfectly-adapted plant.
	A sudden downpour	WGO	Adaptation in plants: the desert sunflower found in Death Valley, U.S.A., is adapted so it will only flower if there is significant rainfall.

	Light Makers	OOO	Firefly, jellyfish and fungi each create and radiate light, known as bioluminescence, to attract prey or for self-defence. Consider other ways living things attract and repel other living things. See Blackbirds Variation above.
	Seeds	MS	Seed dispersal. Explore methods used by plants then create a far-flying seed of your own.
	Alien shapes	WGO	The enormous *Titan arum* flower is shown but, thankfully, we don't smell it as it stinks of rotten meat to attract pollinating flies and beetles. Follow up with the BBC's Terrific Scientific tongue investigation.
	Puddle pals	OOO	Discuss how the sea anemone, limpet and crab are differently adapted to survive in the same environment: a rock pool. You might go on to investigate what happens to salt in seawater as water evaporates?
	Groovy gizmos	MB	Can children spot what all the objects in the mystery bag (preparation required) have in common? They're all objects used by animals as tools. This might link to learning how and why humans use simple machines (wheel and axle, pulley, inclined plane, screw, wedge and lever).
	What if there were no deserts?	WI	Consider how deserts are formed, where they're found and how animals are adapted to live there. Follow up by researching deserts, and compare the temperature difference in your own setting between day and night using data loggers.
	Tricky living	OOO	Compare a salt flat, a sandy desert and a polar region. Follow up by measuring rainfall in your environment, or the evaporation of a pond if you're lucky enough to have one.

ABBREVIATIONS AND DESCRIPTIONS OF THE DIFFERENT EXPLORIFY ACTIVITY TYPES		
ZIZO	Zoom In, Zoom Out	Visually engaging close-up photos
OOO	Odd One Out	Find similarities and differences
WGO	What's Going On?	Short, distraction-free videos
HYE	Have You Ever?	Activities linked to everyday experiences
WI	What If?	Explore ideas in new contexts
TBQ	The Big Question	Plan an investigation
PS	Problem Solvers	Think critically and creatively
MS	Mission Survive	Fun, imaginative hands-on challenges
MB	Mystery Bag	Use senses to work out contents in a bag
LWCYH	Listen What Can You Hear?	Recordings of familiar sounds
SWA	Start With Art	Using artworks to prompt science discussion
WJH	What Just Happened?	Observing changes over time
WHO	Who Is?	Learn about a diverse range of scientists

Other recommended resources to support planning:

PLAN primary science assessment resources (planassessment.com)

Assessment (TAPS) - Curriculum Materials | Primary Science Teaching Trust (pstt.org.uk)

The Great Science Share - see videos on Scientific Enquiry under the tab "Great Science Skills".

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