Enquire with Darwin: Key Stage 3

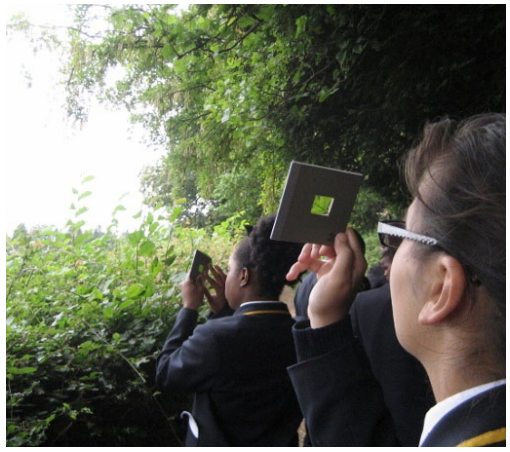
Module Topics

Module 1: Bees To convince others of evolution through natural selection, Darwin showed that comb building had evolved in small steps over long stretches of time. He worked with beekeepers to share knowledge and to develop his big idea, that it is the instinct of bees and not guidance from a deity that prompts bees to use wax very efficiently. They build wax into spheres at set distances to produce hexagonal cells with interlocking bases for strength and capacity.

Module 2: Artificial Selection Central to Darwin's theory of evolution was that species could change over time. A significant line of evidence came from his work with rabbits as both wild and pet rabbits were plentiful. Darwin saw artificial selection by breeders, to produce specific characteristics, as analogous to natural selection.

Module 3: Hedgerows Darwin planted his hedge in 1846. His initial list of plants became a baseline when 20 years later he recorded the disappearance of some species and new plant arrivals. He understood the consequent changes to the ecology of this hedge. Darwin theorised from evidence derived from simple, small-scale experiments to formulate laws of nature that apply to present-day scientific understanding.

Module 4: Sustainability and Extinction Darwin visited the Galapagos Islands in 1835. Students are introduced to the effects of human activity on vulnerable habitats as they examine the connections between the Galapagos wildlife Darwin would have seen and the recent impact of humans. Students consider the reasons why isolated populations are most likely to become endangered or extinct and the ways in which conservation might overcome some of the threats.



Above: Students using a digital camera to capture bees in the observation hive at Down House.

Below: Students using leaf slides to encourage close observation of leaves.

Using these modules

Each module is self-contained, but together these Darwin Inspired resources might challenge students to think differently about science or the environment in off-timetable events.

Darwin was writing for an audience that had a certain level of understanding of natural history. Students may not share a similar understanding; accordingly, the resources revolve around a visit to a local garden, nature reserve or park to give all a shared experience of the natural world. Images have been used extensively so that plants and animals Darwin would have seen become familiar.

Each Module includes a:

Lesson plan:

Containing an overview of Darwin's work on the topic, a pertinent quotation, potential lesson outcomes, broad curriculum links, key words, and basic resources needed to complete the activities suggested. Each student will need a Darwin notebook for these lessons.

Lesson sequence:

There are 3 lessons in each unit.

Pre-visit lesson:

This sets Darwin's work in context in conjunction with the PowerPoint presentation. Starter and main activities are followed by a plenary that encourages students to raise questions they will answer on the visit. The extension activities suggested can be differentiated.

Visit:

Being out-of-doors and having time to think were pivotal to Darwin's work, and both offer models for stimulating scientific questioning and thinking. Students needs to know where to look, observe closely and learn to interpret what they see. On their visit, students collect evidence and data in different ways.

Above: Students walk the Sandwalk, Darwin's Thinking Path, at Down House.

Below: Student and teacher use a Field Studies Council identification chart.

Using these resources

Notes for teachers:
Background information is provided for each part of each lesson.
Links are given for relevant websites throughout

Resource materials:
These are provided in the lesson text and on the PowerPoint to make them available for whiteboard use.

Teachers who encourage enquiry-based learning prompt students to gain knowledge and develop a broad understanding of the many concepts, principles, models and theories Charles Darwin initiated in the field of natural science. Students are expected to work like him so that they begin to understand the nature of science; making observations, asking questions, experimenting to investigate the natural world, collaborating with others, reading and researching. The resources are a starting point for evidence gathering and making good arguments that students explain to others.

It is important that Darwin's scientific work is linked with the decisions that students make now and in the future. There are opportunities for everyone to express an opinion. Group work is encouraged both indoors and out-of-doors. How teachers achieve the most effective grouping is a strategic choice, but all activities, however short, should have clear outcomes and a specified time limit.

Student writing in his Darwin notebook during a school visit.

Darwin Inspired learning

When assessing student progression, teachers might consider whether Darwin Inspired learning criteria have been fulfilled and students have:

- developed a sense of place through direct engagement with the natural world using their own local environments (or perhaps those places where Darwin worked);
- developed active learning through seeking experiences, asking questions, solving problems, and learning through dialogue between teachers/ experts and students and between peers;
- used their imagination and thoughtful hands-on enquiry as well as learning high quality engaging content;
- engaged in critical, creative thinking about how we know what we know and how scientists work;
- engaged in interdisciplinary studies, with Darwin as the context, linking science with literature, writing and expression, history, religious studies, geography, horticulture, dance and drama, design and technology, mathematics, music and art.

Health and safety

Teachers need to read the appropriate local authority and school guidelines. Before making a visit they should carry out a risk assessment and a preliminary visit. Where a specific issue has been anticipated it is highlighted in the Notes for teachers.

Above: Student showing the correct usage of a hand lens.

Below: Student holding a fancy pigeon in the potting shed at Down House. Darwin studied fancy pigeons when he was working out his ideas about artificial and natural selection.

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