Royal
Botanic Garden
Edinburgh

Expedition Botanics – explore the World of Plants like never before!

Dates: Monday 8th – Friday 12th August 2022
Times: 9.30am – 4.00pm (1.00pm on Friday)
Suitable for: S5 & S6
Price: £195 per person

Based in the heart of RBGE's main research buildings, and out and about in the world-renowned plant collections, this 5-day summer school gives us a chance to delve into the wonders of plants – Earth's most important organisms. Experience how real science works and how it can help humanity face up to the challenges of the future such as climate change and food security.

Throughout the week, we'll work as a team to uncover some of the mysteries of the botanical world and work out how plants sit at the heart of almost all life on Earth. You'll pick up careers advice, learn about experimental design and develop your lab and communication skills.

Through the 5 days, you'll keep a researcher's logbook detailing your time in the garden and the lab. We will also work in small groups to create a poster, presentation, podcast, video, game, manga or whatever you'd like for our mini-conference at the end of the day.

Day 1 | Putting Down Roots

Today we'll welcome you to the Botanic Garden where you can meet the Team and each other. You'll get a feel for the huge range of work that goes on in this amazing place and the many career opportunities working with plants.

In the morning, after we've all met each other, we'll meet some of the plants that make the Botanics such a special place. We'll visit the herbarium to see some the 3 million plant specimens from across the globe, and discuss the historical, modern and future issues around these priceless collections. We'll also introduce your group challenge for the week.

In the afternoon we'll get out in some of the wild areas of the garden to learn a fundamental skill - plant identification. Can you tell an ash from an oak, or a mint from a monkeyflower? And why do we need to? Lastly, we'll prepare ourselves for our 'expedition' the following day.

***Skills, knowledge and questions*:**

- What makes plants *the* most important organisms in the world?
- What does a Botanic Garden do?
- Plant Identification 1

Day 2 | Investigating Biodiversity 1: Expedition and Lab Day 1

We'll kick off the day with a trip to the garden to find out all about fieldwork. Our focus will be the many plants that support humankind, but we'll pick up lots about the lore and ecology of these plants along the way, and even make our own beautiful herbarium specimens. We'll also take DNA samples for our lab. session in the afternoon.

In the afternoon, we'll do one of the most important techniques in biology today - DNA extraction. Using the samples we've collected in the field, we'll start out lab investigation of one of the most incredible partnerships in the living world, between peas and beans, and *Rhizobium* bacteria.

Skills, knowledge and questions:

- Plant identification 2
- GPS and data-collection
- Lab confidence and DNA extraction

Day 3 | People and Plants

Today we'll delve into the library and archive to see some of the treasures as an introduction to the many ways people think about plants. In everything from medicine, to religion, to food. We'll also take a look at the diversity of people who have worked in/with the garden through the years.

We'll see some of the treasures of the library and archive – looking at how plants have inspired people to produce amazing works of art then we'll get out into the garden to learn more of the fascinating anthropology of plants, understanding how people have perceived plants in many different ways, and take a biochemical sensory tour – so get your sniffing nose on!

In the afternoon, we'll look at the applied side of plant lore, ways in which people are using plants nowadays in all kinds of innovative products and have a chance to make our own botanical product to take home with us.

Skills and knowledge:

- Understanding plants and people – plant use and plant lore from magic to medicine
- Plant biochemistry
- Making things – the botanical business

Day 4 | Lab Day 2

Today is part 2 of our DNA lab. – we'll use PCR to investigate the plant and bacterial partnership to see if we can detect the nitrogen-capturing *Rhizobium* bacteria in various plant parts. This partnership offers huge potential for the future of food security, as well as a very real opportunity to drastically reduce CO_2 and nitrogen pollution worldwide.

While the PCR runs, we'll get out into the garden and look at another important symbiosis – plants and pollinators. You can design a field experiment to help us understand this fascinating relationship.

In the afternoon, we'll learn our next lab technique – microscopy, while we explore the microscopic world of pollen. It isn't just there to give us hayfever, but is essential to the survival of almost every flowering plant. The architecture of these beautiful pollen grains is perfectly adapted to each plant's pollinator, so we'll investigate some of the mysteries of evolution and adaptation, as well as learning how pollen can help us delve into the deep past.

Skills and knowledge:

- Field techniques – pollinator observation and experimental design
- Lab techniques – PCR
- Lab techniques – microscopy and pollen identification

Day 5 | Conference Day

We'll have a mini-conference day, with a chance for each group to finish and present your botanical-themed poster, presentation, manga, podcast, video or similar, and finish up with a botanical picnic.

*This is a draft timetable and is subject to change.