

02 | Barcoding basics



Aim Develop an understanding of the barcoding process and how it will be used in your investigation. Learn what bioinformatics is and use some barcodes from another project to identify the invertebrates sampled. Plan sample collection.

Activity outline To help us understand more about students' prior experience in bioscience before starting this project, we would be very grateful if students would complete the online questionnaire at the beginning of this session. For us to be able to use this information, students and their parents also need to complete the **declaration of consent form**.

An explanation of how barcoding works is followed by a bioinformatics exercise performing a BLAST (Basic Local Alignment Search Tool) activity using barcodes from another project to identify the invertebrates sampled. Students begin planning how they will obtain their samples.

Age range Key stage 4 and above (14 years and older)

Timing

- 10 min - completing the questionnaire
- 10 min - explanation of barcoding
- 20 min - bioinformatics and BLAST activity
- 20 min - starting to plan investigation: sampling

Venue Classroom with laptops or a computer room

Resources

- The **questionnaire** is in Google Forms. Each student can access and complete the form individually by following the link: bit.ly/B4B-PreQ
- The **declaration of consent form** needs to be completed by students and parents to give us permission to use the students' questionnaire responses anonymously to evaluate the success of the Barcoding for beginners project.
- Instructions for the bioinformatics and BLAST activity (with [additional online guide](#))
- Instructions for collecting and recording a sample for barcoding
- Sample information record sheet in Microsoft Word
- **Presentation:** 02_P_Barcoding-basics

Preparation

Before the session

Separately to this session, students and their parents need to be sent the link to the **declaration of consent form**, along with an explanation of what the Barcoding for beginners project is, why questionnaire data is being collected, and what the data will be used for.

Set up

During this session students will need to have a computer, enabling them to access:

- A questionnaire about their prior experience in bioscience, particularly molecular biology
- The bioinformatics and BLAST activity from the student instructions, completing the table to show their BLAST results
- The sample information record sheet, where they will record information about their sample

In addition, if you wish them to collect their samples during this session, students will need:

- Appropriate equipment for sample collection
- A ziplock bag and Sharpie marker for sample storage and labelling

Invertebrate samples should be stored in a -20°C freezer until students are ready to do DNA extraction (session 3).

Answers to questions

Identifying unknown organisms using DNA barcodes

Expected answers from the students' online bioinformatics work:

Barcode	Gene used	Binomial classification	Common name	E value	% identical
1	Cytochrome oxidase subunit 1	<i>Coccinella septempunctata</i>	7-spot ladybird	0.00	100%
2	Cytochrome oxidase subunit 1	<i>Oniscus asellus</i>	Common woodlouse	0.00	100%
3	Cytochrome oxidase subunit 1	<i>Agelena labyrinthica</i>	Labyrinth spider	0.00	100%
4	Cytochrome oxidase subunit 1	<i>Myzus persicae</i>	Green peach aphid	0.00	100%
5	Cytochrome oxidase subunit 1	<i>Gonepteryx rhamni</i>	Brimstone butterfly	0.00	100%