

Organisation: [REDACTED] Applicant: [REDACTED]  
Funding Sought: **£3,000.00**  
Funding Awarded: **£3,000.00**

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## **PG\S2\23\100073**

### **Can DNA sequencing help identify different daffodil cultivars?**

It will be made available for all pupils to participate, however due to time constraints of the pupils it will be mostly focused on the pupils taking Biology. If possible parts of the project will take place through the EcoCommittee, offering everyone a chance to participate.

# PG\S2\23\100073

Can DNA sequencing help identify different daffodil cultivars?

## Section 1 - Contact Details

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### PRIMARY APPLICANT DETAILS

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**Title** Mrs  
**Name** [REDACTED]  
**Surname** [REDACTED]

### COLLABORATOR DETAILS

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<b>Role</b>	<b>Head teacher or Principal</b>	<b>Role</b>	<b>STEM partner</b>
<b>Title</b>	Dr	<b>Title</b>	Dr
<b>Name</b>	[REDACTED]	<b>Name</b>	[REDACTED]
<b>Surname</b>	[REDACTED]	<b>Surname</b>	[REDACTED]

#### School contact details:

**Please enter your School Name**

[REDACTED]

**Please enter your school address**

[REDACTED]

**Please enter your school postcode**

[REDACTED]

**Please choose your role at school from the list below**

STEM teacher

**Please select your school level from the list below:**

Secondary

**In stage 2 we will require the name of a 2<sup>nd</sup> staff member who can support you with this project and take over as lead if required. Please tick to confirm this is being considered**

Checked

**Please select the type of school from the list below:**

Fee paying

**Is your school part of a multi-academy trust?**

No

**Will your project involve students with special educational needs and disabilities (SEND)?**

No

**How did you hear about the Partnership Grants scheme?**

Other

**Please provide some simple further details about how you heard about the scheme**

Synapse, Biology teacher forum

**Has your school applied for a partnership grant before?**

**Previous recipients of partnership grants may apply for further funding, as long as the new application is made one year or more after the previous application.**

**However, you must make sure that your new project is not a simple extension of your previous one.**

No

## Section 2 - STEM Partner Details

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**Please include the full name of your STEM partner here**

[REDACTED]

**Please include the job title of your STEM partner here**

Lecturer in genetics education

**STEM partner contact details:**

**Please enter the STEM partner's organisation name**

School of Biological Sciences, University of Edinburgh

**Please select the type of organisation from the list below:**

Higher Education Institution

**Please provide the highest level of education held by your STEM partner**

Doctorate

**Why is this individual a suitable partner for the project?**

[REDACTED] is a molecular biologist, that tackles complex problems using experimental and analytical approaches. The biological system he has used, that of plants, is of fundamental relevance for food security, ecology and climate regulation. In his current position, he supports and strengthens (plant) science education. He has keen interests in science communication to the wider public and in the application of fundamental science via industry.

All of the above makes [REDACTED] a great partner for the project. He is also connected to the team overseeing the project, and he is based close to our school in Edinburgh.

**Will your project involve working with any other STEM partners?**

No

**Has the STEM partner applied for a Partnership Grant before?**

No

**Has the STEM partner been previously funded by the Royal Society through other grant opportunities**

No

## Section 3 - Project Overview

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### Project question

Can DNA sequencing help identify different daffodil cultivars?

**Please select the main strand(s) that your project falls under from the list below (please choose a maximum of 3):**

- Biology
- Chemistry
- Computing
- Data science

**Please provide a short descriptive summary of your project, clearly explaining what the students will be investigating in this project (max 150 words).**

As part of the Daffodil DNA Project our students will be using cutting-edge technology to purify and sequence the DNA found within the chloroplasts of different daffodils. This will allow students to then use their own data to build up an understanding of phylogeny within an understudied taxon giving a true sense of being scientists. The students will gain experience in formulating and testing hypotheses, literature research, wet lab skills to isolate and sequence the chloroplast DNA, and bioinformatics for comparative analyses.

## Section 4 - Participants

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**Will there be a selection process to choose the students taking part in the project?**

Yes

**How will the selection process work?**

It will be made available for all pupils to participate, however due to time constraints of the pupils it will be mostly focused on the pupils taking Biology. If possible parts of the project will take place through the EcoCommittee, offering everyone a chance to participate.

**How will you consider diversity and inclusion when selecting your students?**

All pupils will hopefully get the chance to participate, meaning pupils from P5 up to S6x.

**Please select your school region from the list below.**

Scotland

**Please select which student year(s) will participate in your project from the list below:**

- Primary 5
- Primary 6
- Primary 7

- Secondary 1
- Secondary 2
- Secondary 3
- Secondary 4
- Secondary 5
- Secondary 6
- Secondary 7

**What is the total number of students at your school?**

80

**How many students will be impacted by the project?**

80

**How many of the students impacted by the project will be taking part in the core investigative work and regularly interacting with the STEM partner?**

80

**Please provide the name for a second member of staff from your school who will support you with the project and can take over the running of the project if under any circumstances you are no longer able to act as the lead on the project**

[REDACTED]

**Please provide the job title for this second member of staff**

Headteacher

**Will any other schools be involved?**

Yes

**Please provide some detail about how the other schools will be involved and when in the project.**

Through the University of Dundee other schools, like us, are keen to participate in this project. These have all gone through a selection process by their team lead by teacher Jon Hale.

## Section 5 - Planning

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**Please select the submission deadline you are aiming for?**

End of February 24

**Please select the term when you plan to start your project.**

Spring term (January 24 onwards)

**Please state how many terms you expect your project to run for.**

3.0

**If you will be working with additional STEM partners alongside your lead STEM partner, please provide some simple detail about who the additional STEM partners are.**

No other STEM partners as of now

**In the table below please provide details about your project plan. Please note, each project should have several investigations which all link together and help the students answer the overall project title.**

Project element description	Please provide some detail about what the students will be doing	Please detail what equipment will be needed for this element. If no equipment will be needed please state N/A.	Please clearly explain how the STEM partner(s) will be involved with this element and how they will engage with students. If the STEM partner(s) will not be involved please state N/A.
<b>Please select the project element</b>	Students will be planting the daffodils following the care instructions from Dundee University Botanic Gardens	Gardening equipment and peat-free compost	██████████ to assist via written instructions and online Teams call.
Project kick off meeting	University of Dundee to present project overview to students via Teams		All in attendance and introduced
<b>Please select the project element</b>	Developing the idea of variation (background): Students to be making phenological observations on the growth of their cultivars	Digital calipers, RHS colour chart and Narcissus classification guide	N/A
Background research session	Students to learn how to read scientific papers and present to peers (Journal Club)		
<b>Please select the project element</b>	Students to visit STEM partner workplace	Bus	STEM partner to lead
Careers talk from your STEM Partner	Students to meet STEM partner and discuss the project and careers		STEM partner shares journey

<b>Please select the project element</b>	Teacher and technician training day: Teachers and technicians to attend a training day in Dundee and meet the wider team, learn techniques and how to teach the techniques to novices	Micropipettes and flow cells (loaned from James Hutton Institute and University of Dundee)	Meeting teachers in person
<b>Please select the project element</b>	Wet-lab skills: Students to undertake a chloroplast isolation of daffodil leaves, view under microscopes and attempt to measure	Chloroplast Isolation Kit Microscopes Slides Microcentrifuge Microcentrifuge tubes Micropipettes Silica Micropestles	STEM partner to provide coaching, opportunity for further careers discussions
<b>Please select the project element</b>	Chloroplast isolation: Students to undertake a chloroplast isolation of daffodil leaves, view under microscopes and attempt to measure	Chloroplast Isolation Kit Microscopes Slides Microcentrifuge Microcentrifuge tubes Micropipettes Silica Micropestles	STEM partner to provide coaching, opportunity for further careers discussions
<b>Please select the project element</b>	Separating the photosynthetic pigments from a daffodil leaf: Students undertake thin layer chromatography to separate the photosynthetic pigments from the chloroplasts	TLC plates Chromatography jars Micropipettes Silica Micropestles	N/A
<b>Please select the project element</b>	Chloroplast isolation and DNA extraction: Students to undertake a chloroplast isolation of daffodil leaves, and isolate DNA	Chloroplast Isolation Kit Plant DNeasy Kit Waterbath Microcentrifuge Microcentrifuge tubes Micropipettes Silica Micropestles	STEM partner to provide coaching, opportunity for further careers discussions

<p><b>Please select the project element</b> Investigation</p>	<p>Semi-quantitatively analysis of DNA: Students run a gel against a ladder to see their DNA</p>	<p>BluGel electrophoresis tank TBE buffer Micropipettes 1kb DNA ladder SeeGreen agarose gel tablets</p>	<p>STEM partner to guide students</p>
<p><b>Please select the project element</b> Investigation</p>	<p>Chloroplast isolation, DNA extraction and sequencing – cultivar 2: Students to complete a full run through of leaf to sequencing</p>	<p>Chloroplast Isolation Kit Plant DNeasy Kit Waterbath Microcentrifuge Microcentrifuge tubes Micropipettes Silica Micropestles Thermocycler MinION sequencer Rapid DNA library consumables</p>	<p>STEM partner to guide students</p>
<p><b>Please select the project element</b> Investigation</p>	<p>Chloroplast isolation, DNA extraction and sequencing – cultivar 2: Students to complete a full run through of leaf to sequencing</p>	<p>Chloroplast Isolation Kit Plant DNeasy Kit Waterbath Microcentrifuge Microcentrifuge tubes Micropipettes Silica Micropestles Thermocycler MinION sequencer Rapid DNA library consumables</p>	<p>STEM partner to guide students</p>
<p><b>Please select the project element</b> Data handling and evaluation session</p>	<p>Basecalling and assembly: Students to perform some bioinformatics to basecall their data and assemble a draft chloroplast genome</p>	<p>PC</p>	<p>STEM partner to provide context</p>
<p><b>Please select the project element</b> Careers talk from your STEM Partner</p>	<p>Students attend a virtual “Christmas Lecture” describing the role of dry lab and non-traditional scientists</p>	<p>N/A</p>	<p>STEM partners from wider team</p>



<b>Please select the project element</b>	Students to prepare a scientific poster for presentation in the Autumn	PC	Tours around University and James Hutton Institute
	Project presentation		

**Please detail how you will share the work carried out through your project and what legacy it will have.**

The work carried out will be shared through the Daffodil project, as well as our own school social media and other communication. All the equipment will be re-used for Biology and Chemistry classes and any other projects we can do.

This will have a major legacy, as we currently don't have the equipment or expertise to run such a project. It will help pupils in the future to learn in more detail about the topics and will ensure everyone in the school has access to this.

## Section 6 - Project costs

Are you applying for a £1,500 or £3,000 grant?

£3,000

Budget heading		2023 - 2024	Total
		2023 - 2024	
<b>Project Item</b>			
Chloroplast Isolation Kit	Cost	£450.00	£450.00
	Latest Cost	£450.00	£450.00
MiniPCR Lab Starter Pack, including the Gyro Plus Microcentrifuge and 3 micropipettes	Cost	£1,250.00	£1,250.00
	Latest Cost	£1,250.00	£1,250.00
MinION Starter kit Rapid Sequencing Kit V14 SQK-RAD114, 1x Control Expansion Kit, 1x Flow Cell Wash Kit	Cost	£900.00	£900.00
	Latest Cost	£900.00	£900.00
Plant DNAeasy kit	Cost	£209.00	£209.00
	Latest Cost	£209.00	£209.00
Mini Vortexer	Cost	£191.00	£191.00
	Latest Cost	£191.00	£191.00
<b>Project Item Total</b>	<b>Cost</b>	<b>£3,000.00</b>	<b>£3,000.00</b>

Budget heading		2023 - 2024	Total
		2023 - 2024	
	<i>Latest Cost</i>	£3,000.00	£3,000.00
Grand Total	Cost	£3,000.00	£3,000.00
	Latest Cost	£3,000.00	£3,000.00

## Section 7 - Lead Applicant Declaration

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### Declaration

**I hereby declare that the information provided in this application is true and correct to the best of my knowledge.**

Checked

**I understand that all reports must be submitted in a timely manner otherwise the Royal Society retains the right to reclaim grant money. Details about the reporting requirements can be found [here](#).**

Checked

**I understand that if I have funding left at the end of my project it must be spent in one of the following ways:**

- To pay for teacher cover for the teachers involved in the project.
- To replace consumables so that the project can re-run.
- To purchase equipment to develop and extend the original project.
- To run a session or showcase the project work at a conference.
- To produce teaching resources or guidance documents about the project which could be shared with other schools to run a similar project.
- To pay for a school trip which relates to the work the students carried out through their project.
- To produce a video, blog or podcast about the project (and share with the Society).

Checked

Name and Surname

[REDACTED]

Date

27 November 2023

## Section 8 - Collaborating Applicant Declaration (STEM partner)

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### Declaration

**I hereby declare that the information provided in this application is true and correct to the best of my knowledge.**

Checked

Name and Surname

[REDACTED]

Date

28 November 2023

## Section 9 - Head Teacher/Principal Support

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Full name:

[REDACTED]

**I confirm that the school is aware of this grant application and gives their full support to the lead applicant to run the project.**

Checked

**I understand that the Royal Society retains the right to reclaim grant money if the lead applicant does not submit the required reports in a timely manner.**

Checked

### Supporting documents

**Please upload any documents (PDF), that you feel may support this application.**

*No Response*