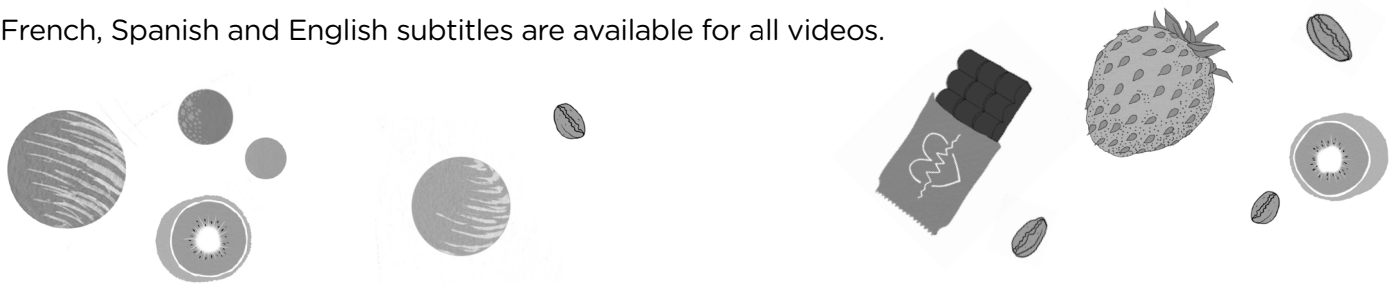


Meet the Scientists

The videos in this section introduce students to real researchers from across Europe who are currently in the early stages of their careers. Showing these videos to your students should help to de-mystify what it is like to be a scientist and maybe even challenge some stereotypes!

The videos are in two parts, each around 2 minutes long. The first part *Meet The Scientist* introduces a researcher, reveals their reasons for going into their field of science and what it is like to be a scientist. This section will be helpful in supporting your class to explore careers in science and life as a scientist. The second part *The Bigger Picture* introduces some broader concerns linking their scientific topic to our lives as citizens, including some ethical dilemmas associated with their research. This part will be helpful for initiating discussion on science and society.

French, Spanish and English subtitles are available for all videos.



Meet Valentina in this video [Click here >](#)

Research Area:

Valentina works in the field of *biophysics*, developing new biophysical tools that can help to improve the quality of information about the cells in our body.



Valentina's Research:

Valentina looks specifically at muscle cells and moving cells in our body (i.e. cells in our blood). Actin and myosin are both involved in the contraction mechanism that helps muscles to contract and cells to move. So studying actin and myosin cells can enhance our understanding of how the contraction mechanism operates. To do this she uses fluorescent microscopy, which involves adding a fluorescent marker to our cell sample. This fluorescent marker can be attached to different molecules in the cell and Valentina can then study this fluorescent molecule under the microscope.

The Bigger Picture:

Valentina is working to create a tool that will help us understand more about how muscles contract and cells move around the body. This tool could be adapted to investigate cancer cells, to help us learn more about them and how they move around the body. If we can learn more about cancer cells and how they move around the body, this could help us get better at diagnosing cancers.

Questions:

- Valentina's research could one day potentially be used to help diagnose cancers. However it is still in the very early stages, so we cannot know for certain if it will. Do you think her research is worth spending public money on?
- What do you think you might find challenging about being a scientist? What might you enjoy about the kind of research Valentina is involved with?
- Why does Valentina think diversity in the science community is important? Do you agree?

Resources:

Concise summary about fluorescent microscopy: goo.gl/nUEwHa

Animation about fluorescent microscopy: youtu.be/uOCR-a0giS4

Meet Grace in this video [Click here >](#)



Research Area:

Grace works in a field called *genome engineering*, where she uses a tool which allows us to understand, and even edit, DNA. By trying to change this tool it can help us understand, and maybe even cure, a class of diseases called mitochondrial diseases.

Grace's Research:

Grace works with a technique for editing DNA which is called CRISPR. She is trying to modify the CRISPR tool to understand mitochondrial DNA better.

The Bigger Picture:

Grace's research is working towards creating a tool that should allow other scientists to understand mitochondria better. Mitochondria are found in all multicellular life (plants, animals, humans) and so understanding them better help us understand all life better.

Questions:

- How do you think people could mis-use genome editing?
- What fake or sensationalist news could people make up about Grace's research?
- What would happen if Grace's research didn't go ahead? Do you think it should be funded?

Resources:

Video on genome Engineering: youtu.be/jAhjPd4uNFY

Video on mitochondrial diseases: youtu.be/66Tjk8wtJYY

Meet Dani in this video [Click here >](#)



Research Area:

Dani works with *Swarm robotics*, which takes inspiration from swarms of animals like ants, bees, fish or birds. These animals work together in very large numbers and only communicate with their neighbouring peers. What defines a swarm is their ability to work collectively on tasks that they could not perform individually. Swarm robotics takes inspiration from swarm behaviours seen in nature and applies them to a large number of simple robots.

Dani's Research:

Dani specifically looks at self-organised shape formation. He designs computer systems for a swarm of 1000 robots so that they can grow a shape by themselves, without any map or human input.

The Bigger Picture:

In the future this research could be developed for search and rescue applications to help firefighters, but also to anyone who needs to be rescued in a dangerous situation. This technology could help firefighters find victims faster – 1000 robots could potentially explore the environment much quicker than several humans could.

Questions:

- Why do you think the public is wary of robots?
- Can you think of any ways in which the Swarm Robots could be mis-used?
- How do you think firefighters might feel about this type of research?

Resources:

Talk about how animal swarms and behaviour has led to swarm robotics: youtu.be/aIH3yc6tX98

Video about how maths can explain patterns found in nature: youtu.be/F1hX_nzTlgU

Meet Joanna in this video [Click here >](#)



Research Area:

Joanna works in the area of *organic biochemistry*. She chemically synthesizes biomolecules which researchers are not able to manipulate by current techniques, for their use in fundamental cell biology research.

Joanna's Research:

Joanna is specifically researching glycolipids. Glycolipids have a really important role in maintaining the stability of a cell membrane and facilitating cell recognition: they help cells connect to one another to form tissue in our bodies. There is still a lot we don't know about them; their exact role, how they operate and how they interact with other cells. Scientists do have many techniques for synthetically creating DNA, but they do not yet know how to synthetically create glycolipids. Joanna is developing techniques to help us study these glycolipids in the lab. She will manipulate these glycolipids to do chemical reactions, outside the body in cell culture.

The Bigger Picture:

This research can help us study glycolipids; their activity and role in the cell membrane and as receptors. This will help us understand how glycolipids can be used in fundamental cell biology. The more we know about them, the more we understand about how the cells in our body work.

Questions:

- Joanna's research processes are costly and time consuming. Should we continue with research even if we are not sure whether there will be a beneficial outcome?
- Why might researchers overestimate the impact of their research?

Resources:

Concise summary about cell culture: goo.gl/Sgqd6N

Video on Cell membranes: goo.gl/jJ5Mjf

Meet Marina in this video [Click here >](#)



Research Area:

Marina's research area is in *astrophysics*, studying stars and searching for planets orbiting them, which we call exoplanets.

Marina's Research:

Marina looks at stars which are small and cold and studies how the light they emit changes with time. These changes could be due to a planet orbiting the star, so studying changes in the light emitted by stars could help find many more exoplanets.

The Bigger Picture:

By looking at other stars with planets, we can learn about how our own solar system formed and how it might evolve in the future. We know that in the future, many years from now, our sun will stop shining and life on Earth as we know it will not be possible, so humans may have to find another planet in order to survive.

Questions:

- Why do we want to know about exoplanets and where they are in the universe?
- Do you think if we find a planet that is perfect for human life we have a right to move there?
- What do you think about space tourism?

Resources:

How to find an exoplanet: youtu.be/cvET91EYoyc

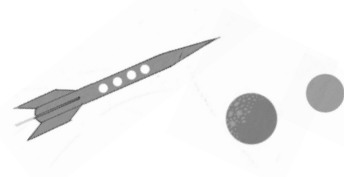
How a star's light changes when a planet is orbiting it: youtu.be/-BuWtMygxU

How to use the videos in your classroom:

Suggested activities to do *before* watching the video

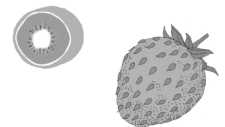
Interview a scientist

- Choose a video and before watching, briefly introduce students to the research topic i.e. exoplanets or swarm robotics. For more information on each video see information on each researcher supplied in this document.
- Students should create a list of all the questions they have on this topic. After watching the video, get the students to discuss whether the video offered answers to their questions.



Challenge the stereotype

- Pause the video on any freeze frame of the researcher.
- Ask students to write down what job they think this person does and why?
- Watch first half of the video and get students to reflect on what they wrote.
 - What job does this person have? What does their daily routine look like? Did anyone guess their job correctly?
 - What surprised you in the video? Why.
 - What did they want to be when they were growing up? When did they decide they wanted to go into science? And why did they decide this? Does anyone feel the same?



Word association

- Before watching a video ask the class to write down three words that they associate with being a scientist.
- After watching the 'Meet the Scientist' part of the video, get them to rewrite these three words again. Then reflect on the following questions together
 - Did your words change at all? Did they change in a positive/negative way?
 - What kind of equipment/technology did they seem to use every day? What did their work environment look like? Was anything dangerous? Have you used any of the same equipment or processes?
 - Did anything surprise, excite or sound boring to you?

Draw a scientist

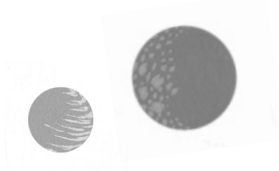
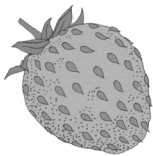
- Ask students to draw what they think a scientist looks like. You could even be specific and get them to draw an Astrophysicist or Robot Engineer.
- As well as drawing, ask students to create a list of typical characteristics of a Scientist.
 - What they look like?
 - What their work environment 'office' might look like?
 - What are their motives for doing what they do?
 - Describe what a day at work might look like
- Students drawings and lists can be shared with the class in a discussion to reflect on what their perceptions/misconceptions of science/scientist might be. Are they different from each other? Did everyone think the same? Where might this intrinsic stereotype come from.

How to use the videos in your classroom:

Suggested activities to do *after* watching the video

Debate the topic

- After watching the video, recap to make sure the class is clear on the research topic in question. Split the class into two, one group is for the research, the other group is against the research. Ask them to debate whether this research should receive more funding or not.



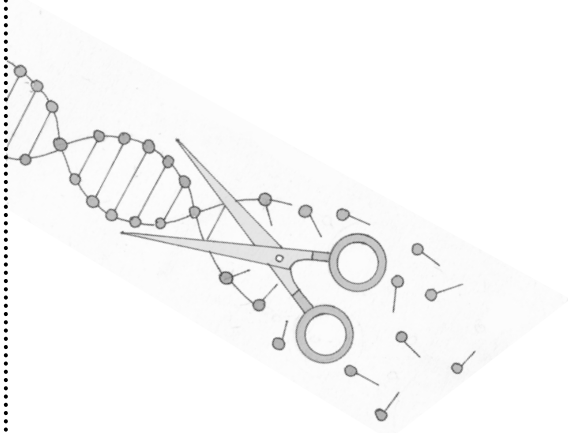
Write to a researcher

- Write a letter/email/message etc. to the researcher telling them what they like about their research or what concerns them about the research. Ask them to include two things they want to know about the research in the form of questions.



Pitch your research

- Show 2 of the videos and run an activity in which groups of students have to pitch the research presented in each video to funders for development.



Lights, camera, role play

- Ask students to imagine they were a science researcher. Ask them to decide which area of science they would research and write a script for a video like this, or even record an interview on camera !



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