

**Dr Isla Simmons**

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PhD in volcanology

E<sup>3</sup> DTP 2016-2021



What did I do?



The Quetrupillán Volcanic Complex, Chile:  
Holocene volcanism, magmatic plumbing system, and future hazards



# What do I do now?

Editorial Assistant at Futurum Careers

- Creating educational resources for schools based on academic research

## HELPING RESEARCHERS TO INSPIRE...

“Providing inspiration for young, aspiring scientists is such an important outreach activity and Futurum provides a great platform to achieve this. Working with Futurum has been nothing but a pleasure – knowledgeable, adaptable, efficient, helpful and enthusiastic. What a team!”

**PROFESSOR MARKUS BINDEMANN**  
Professor of Cognitive Psychology, University of Kent, UK



### LATEST RESOURCE



The great dying: unpicking the Permo-Triassic extinction event

### ASSOCIATES



“Science buskers has kindled passion, determination and scientific curiosity among young Africans.”

### ROLE MODELS



“I believe that the universe hears us and that words are very powerful.”

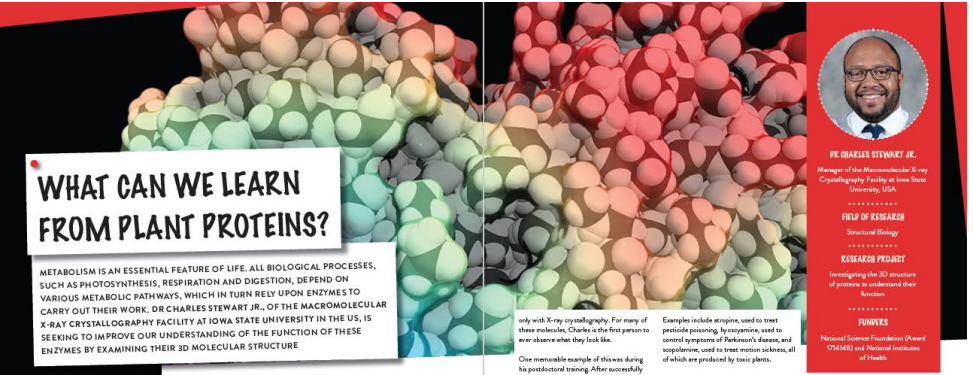
### BLOG



We are a Careers & Enterprise resource

Futurum Careers is a free online resource and magazine aimed at encouraging 14-19-year-olds worldwide to pursue careers in science, tech, engineering, maths, medicine (STEM) and social sciences, humanities and the arts for people and the economy (SHAPE).





# WHAT CAN WE LEARN FROM PLANT PROTEINS?

**METABOLISM IS AN ESSENTIAL FEATURE OF LIFE. ALL BIOLOGICAL PROCESSES, SUCH AS PHOTOSYNTHESIS, RESPIRATION AND DIGESTION, DEPEND ON VARIOUS METABOLIC PATHWAYS, WHICH IN TURN RELY UPON ENZYMES TO CARRY OUT THEIR WORK. DR CHARLES STEWART JR., OF THE MACROMOLECULAR X-RAY CRYSTALLOGRAPHY FACILITY AT IOWA STATE UNIVERSITY IN THE US, IS SEEKING TO IMPROVE OUR UNDERSTANDING OF THE FUNCTION OF THESE ENZYMES BY EXAMINING THEIR 3D MOLECULAR STRUCTURE.**

## TALK LIKE A STRUCTURAL BIOLOGIST

**CHEMISTS** – to create or accelerate a chemical reaction

**CRYSTALLOGRAPHY** – the physical principle for capturing all chemical reactions in a cell

**METABOLIC PATHWAY** – a series of linked chemical reactions within a cell

**METABOLISM** – all chemical reactions within a cell that are required to keep it alive

**PROTEIN** – biological molecules that combine to affect a certain biological function

**STRUCTURAL BIOLOGY** – the study of the 3D structure of biological molecules

**X-RAY CRYSTALLOGRAPHY** – the use of X-ray radiation to reveal the structure and arrangement of molecules inside a crystal

Proteins are the biological molecules that contribute to almost all activities in an organism. From molecules which fight viruses, to hormones which coordinate biological processes, and from antibodies which carry antigens in the blood, they could not function without proteins. Dr Charles Stewart Jr, of Iowa State University studies the proteins found in plants, specifically the enzymes responsible for protein metabolism. Protein molecules are too small to be measured by eye under a microscope so most are less than 10 nanometres in diameter (equivalent to 0.000001m). In comparison, the average human hair has a diameter of 0.1mm. This means that you could fit 10,000 protein molecules across the width of a single strand of hair.

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**DR CHARLES STEWART JR.**  
Manager of the Macromolecular X-ray Crystallography Facility at Iowa State University, USA  
**FIELD OF RESEARCH**  
Structural Biology  
**RESEARCH PROJECT**  
Investigating the 3D structure of proteins to understand their function  
**FUNDERS**  
National Science Foundation (Award 714840) and National Institutes of Health

only with X-ray crystallography. For many of these molecules, Charles is the first person to ever observe what they look like.

Examples include enzymes, used to treat pesticide poisoning, lysosomes, used to control symptoms of Parkinson's disease, and saponins, used to treat various infections, all of which are produced by plant cells.

However, there are some animal enzymes which the metabolic pathway that generates proteins allows that are still not understood. It also appears that these enzymes result in different proteins in different plants, but no one yet knows why this is the case.

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Due to their medicinal value, there is a huge amount of research in creating tropical plants for pharmaceuticals. The work undertaken by Charles and his colleagues will be the foundation for bioengineering these molecules, as well as potentially creating new, custom-made proteins that are specifically designed to target medical uses.

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**DR PETER GAMMON**  
Professor of Power Electronics, Durham University, UK  
**FIELD OF RESEARCH**  
Electronics Engineering, Electrical Engineering, Materials Science  
**RESEARCH PROJECT**  
Developing ultra-compact technology for power electronics  
**FUNDERS**  
Engineering and Physical Sciences Research Council  
**RESEARCH PROJECT**  
Developing ultra-compact technology for power electronics

As well as its use in electric vehicles, silicon carbide can be used in many other high-voltage electronic systems to reduce efficiency and so reduce electrical loss. This includes protecting data centres, or robotics used in the pharmaceuticals industry. This all depends on the efficiency of the silicon carbide used. There is particularly interest in the application of silicon carbide in the electronics contained on satellites.

There are a number of challenges when working with silicon carbide. The first is the extremely high temperature of the material, which is around 3,000°C. This means that the material must be able to withstand these temperatures. The second is the material's brittleness, which means that it must be handled with care. The third is the material's high thermal conductivity, which means that it must be cooled effectively.

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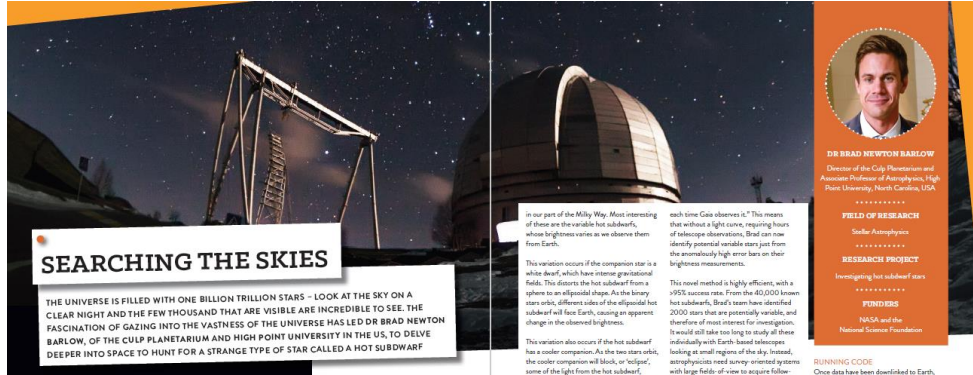
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# SEARCHING THE SKIES

**THE UNIVERSE IS FILLED WITH ONE BILLION TRILLION STARS – LOOK AT THE SKY ON A CLEAR NIGHT AND THE FEW THOUSAND THAT ARE VISIBLE ARE INCREDIBLE TO SEE. THE FASCINATION OF GAZING INTO THE VASTNESS OF THE UNIVERSE HAS LED DR BRAD NEWTON BARLOW, OF THE CULP PLANETARIUM AND HIGH POINT UNIVERSITY IN THE US, TO DEEPEER INTO SPACE TO HUNT FOR A STRANGE TYPE OF STAR CALLED A HOT SUBDWARF.**

## TALK LIKE AN ASTROPHYSICIST

**ASTRONOMY** – the study of the Universe

**ASTROPHYSICS** – a branch of astronomy which studies the physical processes and properties of the Universe

**BINARY STAR SYSTEM** – two stars which orbit each other

**COORINATE** – a branch of astronomy which studies the organised distribution of the Universe

**PYTHON** – a scripting language used in computer coding

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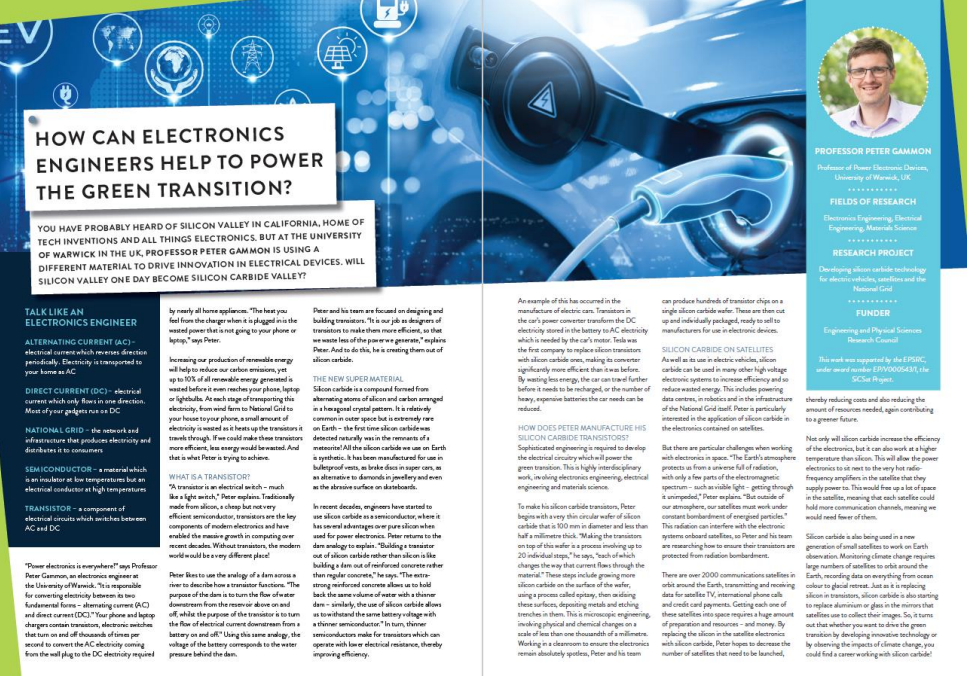
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Director of the Culp Planetarium and Assistant Professor of Astrophysics, High Point University, North Carolina, USA  
**FIELD OF RESEARCH**  
Solar Astrophysics  
**RESEARCH PROJECT**  
Investigating hot subdwarf stars  
**FUNDERS**  
NASA and the National Science Foundation

# Astrophysics



# HOW CAN ELECTRONICS ENGINEERS HELP TO POWER THE GREEN TRANSITION?

**YOU MAY PROBABLY HEAR OF SILICON VALLEY IN CALIFORNIA, HOME OF THE TECH INVENTIONS AND ALL THINGS ELECTRONIC, BUT AT THE UNIVERSITY OF WARWICK IN THE UK, PROFESSOR PETER GAMMON IS USING A DIFFERENT MATERIAL TO DRIVE INNOVATION IN ELECTRICAL DEVICES. WILL SILICON VALLEY ONE DAY BECOME SILICON CARBIDE VALLEY?**

## TALK LIKE AN ELECTRONICS ENGINEER

**ALTERNATING CURRENT (AC)** – electrical current which reverses direction periodically. Electricity is transported to your home as AC

**DIRECT CURRENT (DC)** – electrical current which flows in one direction. Most of your gadgets run on DC

**NATIONAL GRID** – the network of infrastructure that generates and distributes electricity to consumers

**SEMICONDUCTOR** – a material which is an insulator at low temperatures but an electrical conductor at high temperatures

**TRANSISTOR** – a component of electrical circuits which switches between AC and DC

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Electronics Engineering, Electrical Engineering, Materials Science  
**RESEARCH PROJECT**  
Developing ultra-compact technology for power electronics  
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# HOW DO COOKING AND CLEANING IMPACT THE AIR QUALITY IN OUR HOMES?

**WHEN WE CONSIDER OUR EXPOSURE TO POLLUTION, WE USUALLY THINK ABOUT VEHICLE EXHAUST FUMES OR INDUSTRIAL EMISSIONS. INDOOR AIR POLLUTION IS RARELY DISCUSSED. BUT WE SPEND MOST OF OUR LIVES INDOORS, WHERE CHEMICALS PRODUCED BY EVERYDAY TASKS SUCH AS COOKING AND CLEANING CAN HAVE HARMFUL EFFECTS ON OUR HEALTH. AT THE UNIVERSITY OF YORK, IN THE UK, PROFESSOR NICOLA CARSLAW IS STUDYING THE COMPLEX CHEMISTRY OF INDOOR AIR POLLUTION IN THE HOPE OF LIMITING OUR EXPOSURE TO POLLUTION INSIDE OUR HOMES, SCHOOLS AND WORKSPACES.**

## TALK LIKE AN AIR CHEMIST

**AIR POLLUTANT** – a substance in the atmosphere that is harmful to the health of humans, other animals, plants, materials or the climate

**CARCINOGEN** – a substance that has the ability to cause cancer

**COMBUSTION REACTION** – a chemical reaction caused by burning

**INDOOR AIR CHEMISTRY** – the study of chemical reactions that occur indoors

Dr Nicola Carslaw, Professor of Atmospheric Chemistry at the University of York, UK, explains Nicola, "As these two stars orbit each other, they are constantly exchanging energy. This means that the stars are constantly changing in size and brightness. This is why we can see them as a single point of light in the sky."

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Dr Nicola Carslaw, Professor of Atmospheric Chemistry

# Philosophy

## HOW DOES EMPATHY HELP US TO UNDERSTAND OTHERS?

PROFESSOR THOMAS SCHRAMME

## PHILOSOPHY WITH PROFESSOR THOMAS SCHRAMME

ACTIVITIES YOU CAN DO AT HOME OR IN THE CLASSROOM

TALKING POINTS

COMPREHENSION

1. What is the difference between empathy and sympathy?
2. Why might we struggle to understand someone who has had a completely different life experience to us?
3. What philosophical challenges have arisen from recent technological developments, and how as philosophers questioning 'new' ideas is not new thinking?

APPLICATION

4. Some people think that philosophy is a superficial activity, that if you have the facts for a debate, an answer is inevitable. To what extent do you agree with this statement? How will Thomas's work benefit your research?
5. How might Thomas's research change the way we discuss certain topics, such as politics or cultural debates?
6. List some specific examples where people may need to empathise with others. How would you empathise with someone in this situation?

ANALYSIS

7. What is the motivation for philosophers like Thomas to study empathy and interpersonal understanding?

SYNTHESIS

8. If you were a philosopher, what philosophical question would you address?

EVALUATION

9. Do you think it is useful to have shared life experiences with someone in order to empathise with them? Or is it possible to empathise with someone with whom you have nothing in common?
10. Do you think you're a good empathiser? What could you do to improve this?

MORE RESOURCES

Learn more about this research project from a video that's been conducted by Thomas and his colleagues: [www.youtube.com/watch?v=...](https://www.youtube.com/watch?v=...)

Can't read empathy with the authors of the texts they're researching? Don't Thomas's experts about the future surrounding the translation of Aristotle's concepts? [www.youtube.com/watch?v=...](https://www.youtube.com/watch?v=...)

Audio clips contain key points about ethical issues in the news: [www.youtube.com/watch?v=...](https://www.youtube.com/watch?v=...)

## WHAT HAPPENED WHEN HENRY VIII WENT ON TOUR?

PROFESSOR ANTHONY MUSSON AND DR JOHN COOPER

Royal Collection Trust © Her Majesty Queen Elizabeth II 2021

WHY ARE WE STILL SO FASCINATED BY THE TUDORS? Elizabeth I reigned until 1603, yet the Tudors continue to attract as an era 400 years later. Anthony believes there are many reasons for this. "The splendour and ceremony of the Tudor royal court, the love stories and intrigues surrounding Henry VIII's six wives, the 'big to do' ritual, tales of courtiers and their eventual fall from grace, and the revolutionary changes in religion, politics and culture all capture our imagination," he says.

Much of this intriguing history has on a large scale, but it's also on a smaller scale, which you can get to grips with in the form of a professional historian," says John. "Reading original manuscripts in the British Library, corresponding with scholars around the world, talking with visitors who are just as excited about the past as you are."

Both John and Anthony agree that the opportunity to spend time in historic locations is one of the best things about being a historian, allowing them to go behind the scenes and immerse themselves in the past. Anthony's latest at Hampton Court Palace, one of Henry VIII's favourite London residences, where he curates a variety of research projects with Historic Royal Palaces. "I've worked through the growth at Hampton Court when you can get to grips with the past, and I have to push myself that Henry VIII and all the many historical characters actually lived here!"

WHAT ARE THE HIGHLIGHTS OF BEING A TUDOR HISTORIAN? "There are lots of great things about being a professional historian," says John. "Reading original manuscripts in the British Library, corresponding with scholars around the world, talking with visitors who are just as excited about the past as you are."

How many days are you there for Anthony and John. Their work involves visiting historical sites, curating ancient manuscripts, paintings and artefacts, and establishing new research projects. Anthony also does not just collect with scholars, but with colleagues, cooks and gardeners, who study Tudor sources to make furniture, fairs and food that are as historically accurate as possible.

WHAT DO WE STILL NOT KNOW ABOUT THE TUDORS? As the Tudors lived over 400 years ago, the surviving information on them is scattered across many locations. Historians must piece together information from different sources to build a picture of Tudor life and society. They are constantly searching for new methods to understand the past. John points out that the historical records we read about, which often require us to interpret the historical sources from different points of view.

While Tudor culture is fascinating, it's also important to understand the lives of ordinary people. Those living outside the high palace and country estates (from labourers, teachers, hedges), were not considered worthy of being that well recorded. Anthony and John are hoping to uncover the hidden experience of the common people, allowing their stories to be studied and shared with the modern world.

EXPLORE A CAREER AS A TUDOR HISTORIAN

- If you live in the UK, there could be a lot of opportunities for you to explore the past. Historic Royal Palaces ([www.hrp.org.uk](https://www.hrp.org.uk)), English Heritage ([www.english-heritage.org.uk](https://www.english-heritage.org.uk)), and the National Trust ([www.nationaltrust.org.uk](https://www.nationaltrust.org.uk)) are all great places to start.
- There are many great books, TV shows and documentaries that explore the Tudors and other historical periods beyond your own history. Anthony and John recommend the *Historic Houses* series.
- Do you have a museum or historical site that you're interested in? You could contact them to see if there are any opportunities to work with them. Anthony and John are happy to help you with this.
- Getting to be a museum is competitive, but John believes that the dedication is worth the journey.

PATHWAY FROM SCHOOL TO TUDOR HISTORY

- Try to have an appreciation for all historical periods. Your school curriculum will only cover a tiny slice of the history of the world, so it's important to explore other time periods in other classes. Explore the subjects that interest you and that interest you.
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- Most universities offer History degrees. Look for courses that offer professional accreditation in the UK.

ANTHONY AND JOHN'S TOP TIPS

- 01 Visit museums and historical sites. They will provide fascinating insights into the past.
- 02 Reading both fiction and non-fiction is a great way of exploring the past. It can be difficult to appreciate historical lives, but some modern ones are great at capturing the essence of historical periods and bringing them alive.
- 03 Think critically about what you read. Historians don't automatically accept each other's opinions, and there's no reason that you should either.

# History

## ABOUT TUDOR HISTORY

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# Poetry

## CAN MENTORING HELP POETS THRIVE?

HOW IMPORTANT HAS MENTORING BEEN IN THE CREATIVE INDUSTRIES? THIS IS WHAT PROFESSOR WILL MAY FROM THE UNIVERSITY OF SOUTHAMPTON IN THE UK IS TRYING TO DETERMINE. HE HAS USED HIS FINDINGS TO ESTABLISH POETRY AMBASSADORS, A MENTORING PROGRAMME TO SUPPORT YOUNG POETS AND HELP THEM TO DEVELOP THEIR CREATIVE ABILITIES

TALK LIKE A LITERATURE RESEARCHER

ANTHOLOGY - a collection of poetry

CREATIVE INDUSTRIES - industries based in cultural creativity, skills and talents, such as art, writing, music, fashion, advertising, computer gaming, television and film

MENTOR - an advisor who helps to train and guide a more novice colleague

MENTEE - the recipient of a mentor's advice and guidance

The mentoring stage of the time spent is not the life of a poet, says Professor Will May of the University of Southampton, as writers and poets are supported by a network of mentors who devote time and energy to encourage each other in their creative endeavours. Will May uses the example of poet Marina Barker and Roger Robinson, who founded a writer's collective that met weekly in Marina's kitchen.

"I grew up originally, writing a poem for creative courses more dependent on market trends and means it has been able to develop sustained knowledge and expertise about mentoring that hasn't just started, so I've really appreciated the idea of the poetry community as an excellent case study for mentoring in the creative industries and a model for other artistic and literary communities."

WHAT NETWORKS HAVE SUPPORTED CONTEMPORARY BRITISH POETS? Contemporary British writers and poets have had links to both public and informal mentoring and support. The UK has nurtured literary expression through initiatives such as local libraries, community organisations, like Creative Writing in Schools, and formal schemes, like the Lady's Emerging Critics Programme. We also have the history of holding an award for the best poetry collection in the UK, the Forward Prize for Best Poetry Collection.

Will's research is more than just retrospective. He believes mentoring in poetry can act as a model for the creative industries. "People need to read, write and publish poetry to collect their lives rather than fill their

## PROFESSOR WILL MAY

Professor in Modern and Contemporary Literature, University of Southampton, UK

FIELD OF RESEARCH: Modern and Contemporary Poetry

RESEARCH PROJECT: Exploring the role of mentoring in the creative industries

FUNDERS: Arts and Humanities Research Council, Foyles Foundation

"I really like to go to find a field that's more assisted in my writer self, so to speak," says Will, who hopes for the Poetry Ambassadors. "Writing is a very isolated craft, especially when you're just starting, so I've really appreciated the idea of the poetry community as an excellent case study for mentoring in the creative industries and a model for other artistic and literary communities."

Evie's mentor, Romany, helps them with both the technical and psychological elements of the craft. "It's hard for anyone to believe they've got attached to words until you've got your hands into putting them in a certain order and suddenly you're giving them the cut feels like you're being them forward," Evie explains. "My mentoring partnership with Romany has helped me learn to be when I edit my poems."

Evie's experience is similar to Romany's. She herself was mentored in the past and knows what it's like to be taking the first steps to being a poet and how important it is to have a guide. "The poetry world is both big and small, but if you're just starting out, especially as a young person, there is an overwhelming and overwhelming," Romany explains. This can be especially true if it would be best to

mentors. "I don't come from a literary background," she says, "so I really appreciated having a mentor to begin my poetry journey. It really helped me to have someone to guide me. I want to support young poets like Evie, and I want to learn from the experience myself."

Poetry Ambassadors is building its first anthology of poetry with Broken Step Press in October 2023. Beyond helping mentees and mentors, the mentoring scheme has helped transform the organisations that run it, deepening the relationships between the University of Southampton, the Winchester Poetry Festival and the literature development organisation Arts4South. Will launched the Poetry Ambassadors scheme to connect experienced poets like Romany, Arnie with young poets like Evie. "I'm all about mentoring in poetry and seeing how it can help the mentees and mentors involved," says Will. Mentoring can build confidence in their ability and develop greater ambitions for their writing. Mentors in turn benefit from the opportunity to work with a younger generation of writers and contribute to the future of the literary community. This can be especially true if it would be best to

## ABOUT MEDICAL ANTHROPOLOGY

WHAT IS MEDICAL ANTHROPOLOGY? Medical anthropology is a branch of anthropology - the study of humans, and how humans live together in the world. Medical anthropologists study health, illness and medical systems. This includes the social processes, health and wellbeing, mental health, illness, and traditional medicine, different medical systems, and death and dying.

WHY DO WE NEED MEDICAL ANTHROPOLOGY? The health of people around the world continues to be challenging, with many infectious diseases that take a toll on people's lives - including drug resistant infections, ageing populations, urbanisation and migration lead to an increase in vulnerability, with multiple conditions combining to create ill health. Medical anthropologists have been critical in offering understanding of the conditions and drivers of both infectious and chronic diseases. It has been instrumental in devising prevention action as well as responding to epidemics and health care systems. The ability to link local, economic and political decisions to distributions, conditions and experiences of ill health is central to informing understanding and response. Anthropologists are now commonly involved in health planning, health systems and health response teams on both national and international stages.

WHAT DOES THE FUTURE HOLD FOR MEDICAL ANTHROPOLOGISTS? There is a growing interest in medical anthropology due to recent events like the COVID-19 and Ebola crises, the growth of the anti-vaccination movement and the threat of antimicrobial resistance. "This means anthropologists are having to find ways to communicate about their research more in the general public as well as with people working in decision making positions," says Clare. "Future generations will advance our methodological skills to address changes in anthropology and to enhance the ways that we come to know and communicate about topics of study."

EXPLORE A CAREER IN MEDICAL ANTHROPOLOGY

The Royal Anthropological Institute has great learning resources and offers people interested in a career in anthropology: [www.ran.ac.uk](https://www.ran.ac.uk)

Medical anthropologists may work in academic institutions conducting research, like Clare and Susan. There are also career opportunities in industry and the public sector, for example in health care, consumer health policy analysis or health systems research.

PATHWAY FROM SCHOOL TO MEDICAL ANTHROPOLOGIST

"At school and college, any of your subjects will help towards learning about anthropology," says Clare. "At university you can study anthropology, or with a biology or a human sciences. You'll also need to study anthropology and a science subject."

CLARE AND SUSAN'S TOP TIPS

CLARE: Follow your passions and make it count! Work hard, with focus, and forge your own path.

SUSAN: Work on your dream every day. With hard work and persistence, you can achieve it.

How did Clare become a medical anthropologist? I was interested in how people differ in different places. I was fortunate to spend time in West Africa as a child and was fascinated by the comparison between life in rural Sierra Leone compared with life in a cosmopolitan area of England. I was struck by the way that histories of different places meant that life, values, political positions and health could be so different depending on where you lived.

I didn't deliberately become a researcher - I didn't plan it, and I'm not surprised to find myself as a university professor! The way I think was inspired by my father, who was an engineer working on rural communication systems, and I liked his methodical approach to working out problems. I was more interested in people than technology and went on to study anthropology.

I was really proud to be awarded the Woodford Medal for my PhD. It is essential for me to continue to inspire!

I have mentees - I play video and enjoy singing.

How did Susan become a social scientist? I was proud to attend a PhD scholarship at the University of Southampton and to be part of research teams which helped to improve the lives of young people in the UK. I was particularly interested in social aspects of community health care. It was most exciting to get a job with a research research program after leaving university, which involved the beginning of my career as a social scientist.

I enjoy playing golf and spend most of my free time doing that.

My journey as a researcher started when

## HOW DID CLARE BECOME A MEDICAL ANTHROPOLOGIST?

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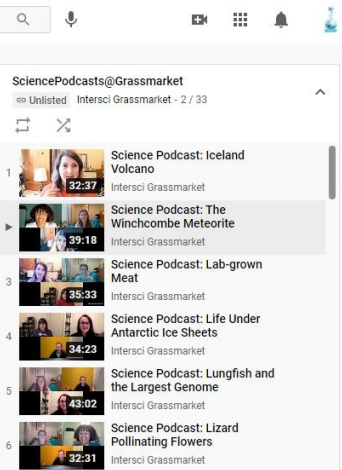
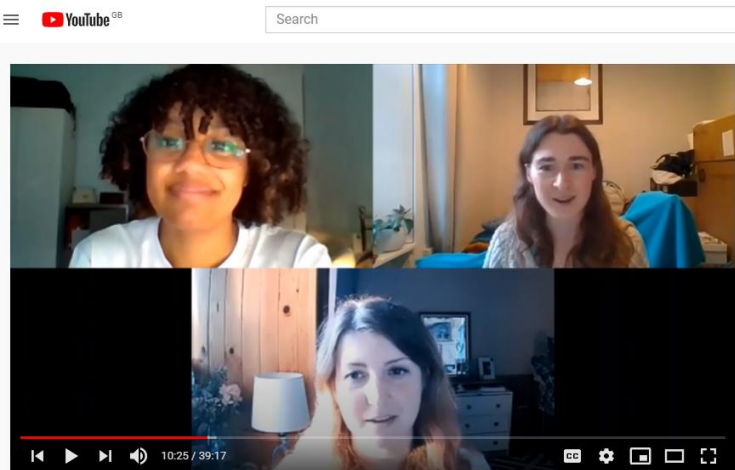
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# Medical anthropology



# Outreach

¿Cuándo tienes que tener cuidado en un volcán?

Amenaza	Descripción
Flujo Piroclástico	Una avalancha de rocas y gases de muy alta velocidad y muy altas temperaturas
Flujo de Lava	Flujo de roca tan caliente que es líquido
Caída de Ceniza	Caída de rocas volcánicas muy pequeñas, como polvo o arena
Lahar	Flujo de lodo. Formado cuando la lluvia se mezcla con depósitos de flujos piroclásticos o cenizas
Bombas Volcánicas	Rocas lanzadas desde el cráter durante una erupción (tamaño: más de 6.4 cm hasta algunos metros)

Mount Saint Helens

After Mount Saint Helens erupted

Before Mount Saint Helens erupted

57 died in the eruption

It erupted 18 May 1980

It erupted in Washington State

The ash that was high when it erupted

The eruption lasted 9 hours

Volcano name: Vesuvius

Country: Italy (draw the volcano on your map)

Date of eruption: August 79 AD

Which cities were destroyed? Pompeii and Herculaneum

What were the volcanic hazards? Pyroclastic flows and ash

How many people died? over 2,000 people died

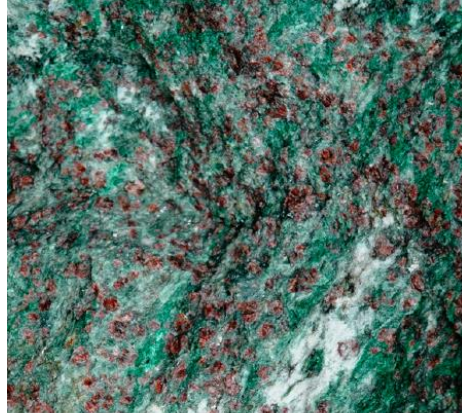
How did people die? clouds of ash & gas rained down and killing survivors still in Pompeii

Did people evacuate? \_\_\_\_\_

Why is the eruption of Vesuvius so important for historians? It had not erupted for 1,000 years

Can you find any other interesting information about the eruption? It shot molten rocks and debris 27 kilometers (17 miles) into the sky.





## Volcano Monitoring in Iceland

By Rachel Whitty and Isla Simmons

Iceland is of such geological interest that, to anyone studying for a degree in Earth Sciences in Edinburgh, the volcanic island just 750 miles to the north is a huge draw. During the summer of 2015, and following our 4<sup>th</sup> year of university, we were excited to finally get there, with some help from the Edinburgh Geological Society's Clough Fund.

We had arranged for a month's voluntary work with Veðurstofa Íslands (the Icelandic Meteorological Office) which, together with the University of Iceland, is responsible for monitoring Iceland's many active volcanoes. The methods used include studies of gas emissions and seismicity, with results analysed to determine whether or not a volcano shows signs of unrest. We were taken under the wing of Melissa Pfeiffer (a ge volcanologist) and our main task was to process gas emission data from Hekla, one of Iceland's most active volcanoes.

**Gas Processing**  
Gas emissions from Hekla are continuously measured by an automatic MultiGAS station located at the summit. This data is sent to the office in Reykjavik, where it is

processed to compare the emissions of different gas compositions. Processing the MultiGAS data was achieved using Ratio Calc 2.5, a software system allowing comparison of different gas emissions to find correlations. The Hekla MultiGAS station had a year's worth of data backlog and our first job was to process this data. With two of us working on the task, it took just over two weeks to clear the backlog, and collate the data from July 2014 through to July 2015 into a format that could be used for scientific research.

When we had finished processing the data from Hekla, there was then plenty of other unprocessed data for us to work on, from the numerous other volcanoes around the country. It felt good to know that our work had real scientific value – this wasn't just a course assignment for university, this was real data and processing it was of scientific importance. This was highlighted one afternoon when we were called in to a meeting with three visiting scientists from Italy who wanted to discuss our results. Fortunately for us the scientific language was English, although conversations often slipped into Icelandic or Italian.

18 |

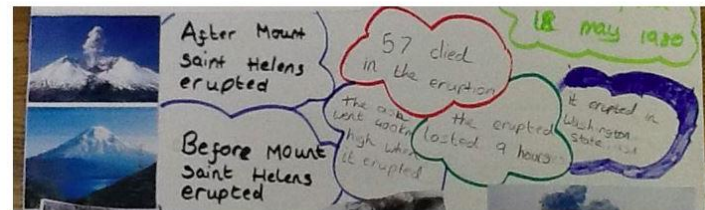
## Teaching Matters blog

Promoting, discussing and celebrating teaching at the University of Edinburgh

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17TH MARCH 2016

## Teaching volcanoes: the Geoscience Outreach and Engagement course



Taking the Geoscience Outreach and Engagement course has allowed me to combine my passion for volcanoes with my love of working with children. The essence of this course is that students choose any aspect of geoscience that interests them, and then design a project in

Contents lists available at ScienceDirect

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journal homepage: [www.elsevier.com/locate/jvolgeores](http://www.elsevier.com/locate/jvolgeores)

### Invited Research Article

## Tectonic constraints on a magmatic plumbing system: The Quetrupillán Volcanic Complex (39°30' S, 71°43' W), Southern Andes, Chile

Isla C. Simmons<sup>a,\*</sup>, Joaquín A. Cortés<sup>a,b</sup>, Dave McGarvie<sup>c</sup>, Eliza S. Calder<sup>a</sup>

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### ABSTRACT

The Quetrupillán Volcanic Complex is a composite system, active since the Pleistocene. We combine petrological and geochemical data from its erupted products with structural and geometrical constraints applied to the overall system and region. We conclude that a basaltic source melt is hindered on its ascent through the crust due to a compressional tectonic regime, influenced further by the structural control imposed by the Liquiñe-Ofqui Fault Zone. The stalled melt evolves by fractional crystallisation within the crust and undergoes a degree of crustal contamination, resulting in a network of trachytic melt pockets within a trachyandesitic magmatic system. Eruptions sourced from these pockets have generated numerous lava flows with trachytic compositions, which have occurred from the summit and flanks of Quetrupillán during the Holocene. Occasionally, some of the basaltic source melt has reached shallow levels within the plumbing system with minor interaction with the trachytic melt, resulting in the eruption of lavas with basalt, basaltic andesite and trachyandesite compositions. We propose a conceptual model for the magmatic system of Quetrupillán, in which the Liquiñe-Ofqui Fault Zone plays an important role in exerting a structural control on the crust on which Quetrupillán resides, influencing magma residence times and pathways to the surface.

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### 1. Introduction

Petrological and geochemical studies allow us to unravel the evolution of magmatic systems, by determining the processes that magmas underwent before eruption at the surface. The textures of volcanic rocks record their magmatic history (Hersum and Marsh, 2007) and this can provide us with a first-order understanding of the magmatic plumbing system beneath a volcano. Current thinking about volcanic

and Lara, 2009). We explore the application of this concept at the Quetrupillán Volcanic Complex (39°30' S, 71°43' W) in the Southern Andes of Chile (Stern et al., 2007) and propose a conceptual model for its plumbing system.

### 2. Geological background

**Living with volcanoes**  
 Science and society combine in the study of volcanoes,  
 says PhD student Isla Simmons

**IN DEPTH INTERDISCIPLINARY LEARNING**

and encouraged pupils to develop skills including forming and testing hypotheses, critical thinking, problem solving, and presenting knowledge visually and verbally. Pupils began by conducting hands-on experiments to model volcanic processes, making measurements and creating hypotheses about the outcomes. These fun experiments provide a fantastic visual aid, enabling the classic bicarbonate of soda and vinegar volcano experiment, pupils observed effervescent tablets in sealed latex balloons to see how pressure building up inside a volcano can cause it to erupt, and injected custard into jelly to observe how magma moves through the inside of a volcano.

**Classroom lessons**  
 You can access the resources I created with the help of Heather Carme Primary School in Inverclyde. Last year I had the opportunity to spend three months working with the national microalgae department in Guernsey, in addition to teaching

**Science and society**  
 The social impacts of a volcanic eruption were explored through storytelling and roleplay. Using the real life example of the 1973 eruption of Etna in Iceland, pupils imagined that they lived in the nearby town. Each pupil took on the role of a different member of the community and debated what action the townspeople should take to respond to the advancing lava flows, integrating their knowledge of volcanoes to bear on their decision-

**“Although volcanoes can cause great devastation, they also provide resources and tourism can develop around them”**

Using the theme of volcanoes, I designed and taught a series of four integrated lessons that included aspects of science, social subjects and literacy, covering how a volcanic eruption, volcanic hazards and the impact of an eruption on a local community. Learning was interactive, with hands-on activities, experiments, debating, research and outdoor learning. The diversity of activities enabled different types of learners to participate

**CLASS RESOURCES**  
 You can access the resources I created with the help of Heather Carme Primary School in Inverclyde. Last year I had the opportunity to spend three months working with the national microalgae department in Guernsey, in addition to teaching

**LESSONS FROM SCOTLAND**  
 You can access the resources I created with the help of Heather Carme Primary School in Inverclyde. Last year I had the opportunity to spend three months working with the national microalgae department in Guernsey, in addition to teaching

**MAKING THE MOST OF IT**  
 Pupils then explored the outdoor classroom of Inverclyde Park and our local volcano, Arthur's Seat, learning how to draw a field sketch, observing volcanic features and discussing and reconstructing what it might have been like as an active volcano millions of years ago. Pupils developed outdoor learning skills while consolidating everything they had learnt in previous lessons and applying this knowledge to a long extinct volcano

**ABOUT THE AUTHOR**  
 Isla Simmons is currently completing a PhD in Volcanology at the University of Edinburgh.

**18000 Mount St Helens eruption was the most destructive in US history**

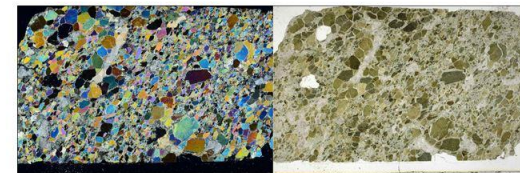
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## BGS thin sections: 150,000th image taken! by Isla Simmons

on December 13, 2012



BGS is currently running a programme to digitise the entire collection of rock thin sections. This consists of 100,000 thin sections in the Scottish Sliced Rock (S) Collection, 11,000 in the later Scotland and Northern England (N) Collection and 80,000 in the England and Wales (E) Collection. A number of minor collections will also be captured.



Sample numbers: B97865, Coarse-grained Metabasite Rock, Souris dyke suite, W side of Loch Claidh, Scotland





# How did my PhD help me get my job?

- Contacts
- Writing skills




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# How did my PhD help me get my job?

- Contacts
- Writing skills

# How does my PhD help me in my job?

- Liaise with academics
  - Understanding academics' point of view
- Ability to read complex texts and extract key information
  - Some are very complex e.g. structure of proteins
  - Some are very abstract e.g. philosophical theories
- Writing skills
  - Communicating complex ideas in an engaging way for a teenage audience
- Time management and organisation
  - Managing multiple clients at the same time, all at different stages of the editorial process
  - Keeping track of who is doing what and when



# General advice

- Say yes to opportunities
- Use your PhD as a time to develop skills e.g. outreach, writing, coding
- Talk to the people you interact with. Network and gain contacts
- A PhD isn't just about your individual niche research project. You can do anything after.

