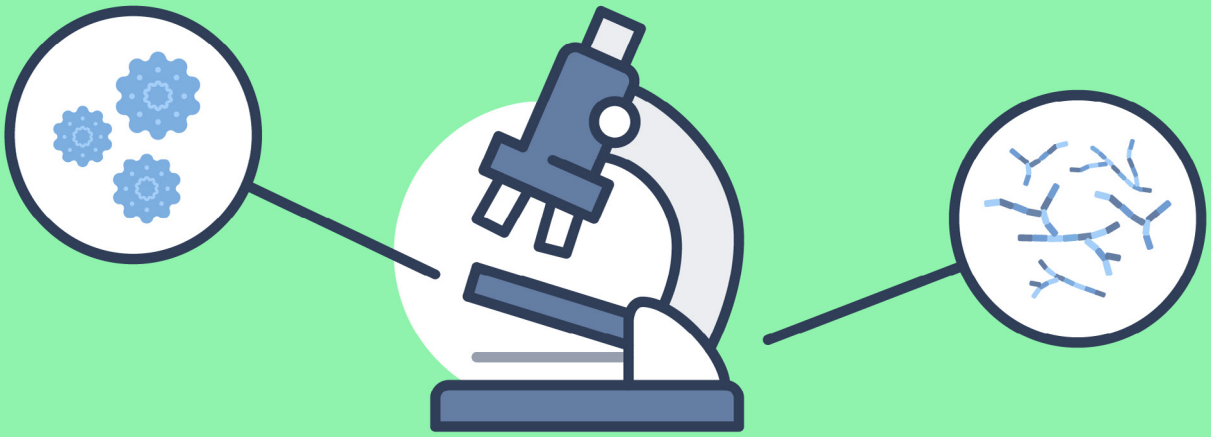

Uncovering the past – inside the life of a burgeoning student scientist

Written by **Jess McCoy,**
Full -time PhD student, ONE Planet, NERC, Northumbria and Newcastle University

Every scientist is different, but all have similar goals to push the boundaries of science and uncover exciting evidence and solutions within their field. Jess opens the door on her goal to uncover how the past can help provide solutions for the future.

Hi, I'm a Ph.D. student at Northumbria University, Newcastle, and I'm also a STEM ambassador, and I'm eager to give you all a glimpse into my life and let you know about the opportunities my work in palaeontology presents!

My research takes me on a blast to the past! I look at and identify tiny fossils, such as pollen and fungi, alongside other proxies, and they help me to reconstruct past environments! By understanding what causes change in past environments with qualities reflecting those of the present, I can make inferences about present-day climate change drivers.

I'm a full-time Ph.D. student working for both Northumbria and Newcastle University. Alongside academics leading in their fields, I will soon be able to enrich undergraduate lectures through demonstration. Using university facilities, I conduct my own research, collaborate with leading scientists on similar projects and I always aim to publish my own findings.

Tell us about yourself and why you chose a STEM related career:

Back in 2016, I applied for a STEM-based Nuffield Research Placement, not thinking my application would take me anywhere – but I snatched-up a place! Fast-forward 5 years and I'm working on and publishing palaeoecology papers alongside my ex-Nuffield supervisor, now my Ph.D. supervisor after finding my calling in palaeontology.

I look at and identify tiny fossils, such as pollen and fungi, alongside other proxies, and they help me to reconstruct past environments!

What did you want to be when you were younger?

One school trip to Hadrian's Wall had me ready to dig up my garden and as a kid, I always told stories and expressed my imagination through writing. Everything kicked off when I discovered that I could sandwich my love of writing AND finding archaic artefacts within the academic world.

What does your current job involve?

Alongside research, Ph.D. students have the potential to develop their skills through training courses, publishing material, demonstrative opportunities, and by attending international conferences. Each student has their own specialised topic. I'm reconstructing the Oligocene-Miocene (~33-5 million years ago!) palaeoenvironment of Western Europe. My supervisor and I embarked on this investigation following O'Brien et al. (2020), which highlighted Oligocene partial CO2 concentrations changed interestingly with corresponding warming thus, our research will help us better understand climate-CO2 interactions, amongst other drivers.

Tell us about the most exciting thing you have done at work.

Throwing new theories out into the world is super exciting! In 2021, my supervisor and I published a report, and the results totally revised a lot of what we knew about the age of onshore sediment in the UK – see Pound and McCoy (2021). Later that year, I presented those findings at the international Progressive Palaeontology conference, at which I revealed my latest exploits in a whole 12-minute presentation – I felt very grown-up.

How does your work impact the world around us?

Universities are one of many places from which new theories are birthed. Ph.D. students aim to publish new findings and new ideas, and their impact can influence policymaking, improving the lives of everyday people like you and me.

Reconstructing past environments has helped us to acknowledge present-day partial CO2 levels mirror those from the time period which I study, so better understanding main climate drivers unlocks key knowledge required for present-day climate models (O'Brien et al., 2020; Steinthorsdottir et al., 2021).

Ph.D students publish new findings and new ideas, and their impact can influence policymaking, improving the lives of everyday people like you and me.

What has been the biggest challenge and greatest achievement of your career to date?

Just getting here has been surreal! Even before getting a Ph.D. interview, there's a lot to prepare – and full-well knowing you're wrangling with other very capable candidates off the bat is rather nail-biting stuff!

My offer demanded I pass my MSc, and thesis-writing required patience, drive and determination to complete. Draft after draft and hour after hour after hour on the microscope – it was done!

The whole process was absolutely, amazingly worth it.

Who is the most inspiring person you have met or would like to meet?

Over the last few years, I've had the fortune of meeting several inspiring scientists.

However, with a time-machine and I'd grab a coffee with Robert Potonié. It'd be exciting meeting one of the first people who described "Tertiary"-age pollen; I'd gain insight on how the studied material was conceived.

Do you have any top tips for young people looking to work in a role similar to yours?

Honestly? Push yourself to get involved in everything you want and can – even if you believe the chances are against you, you'd really be surprised at the number of doors that will open for you as soon as you do. As we say in Newcastle: shy bairns get nowt!

Do science reports really have a big impact on pushing towards greener policymaking processes?

Of course! One of the most important documents to come out of collaborative climate studies includes the reports published by the Intergovernmental Panel on Climate Change (or IPCC, for short)! These reports are beautiful amalgamations of the latest results from recent climate studies, and it's written and reviewed by an extensive writing team of climate experts. IPCC reports are also written in a summarised way, and conclusions are then given to policymakers.

It's the writing of these reports which, I believe, encourage politicians to read through the main concerns of leading climate scientists.

Does it matter which journal you submit your work to?

All scientific journals have an "impact factor" attached to them, as far I'm aware! This basically allows for journals to be compared in terms of how "cutting-edge" the published research is! However, some journals might be looking for studies a bit different to the one you may submit, so initial rejections can be common. There's always that motivation to aim high, and it can look super impressive on your CV if you're published in a reputable journal, but a publication in a good journal is still a great publication.

How do you even begin a study?

I always pictured that the start of a report involved a group of mates getting together to write about a topic in common – and that's sort of the plot. Often sparks of ideas come from gaps in the literature, which you often find when writing literature reviews, the key points of which you pop into a research proposal – which can help to fund your study. From experience, one study often leads to another, and to another – quite like a trail of breadcrumbs. Sometimes, even just bumping into someone who studies similar topics can ignite a flame.

Should all scientists aim to be activists?

This is absolutely an argument that's been up for debate for some time in the community, and it's a very interesting topic to debate – see articles by Pielke and comments associated with their work. I can't speak for scientists from all disciplines, and don't have too much of an informed opinion, given my early career stage.

However – it's important that scientists are able to educate the public about certain topics and keep them up to date with recent findings available in open access journals – at least, from my standpoint! Therefore, outreach work with magazines, for example, is one of many great ways for scientists to share their recent discoveries.

How do you get your work noticed?

Conferences are fabulous ways to show off your hard work; posters give you that opportunity to get creative with figures, and presentations will always pique people's curiosity. Get inventive with titling your work – my supervisor always tries to pop a pun in his work every so often, and it works!

Getting work published in high-impact journals always ticks a box, and sending off articles to magazines helps the public get a better feel for what exactly scientists get involved in.

Even social media is great for waving your work about – Twitter and LinkedIn have a significant academic presence.

Glossary

Proxies – Preserved materials which provide inferences about (past) climates.

Palaeontology – Study of past flora/ fauna and its relationship with its past environment, often (but not always) aged older than 11,700 years (Holocene epoch).

MSc – Master's degree of science.

Ph.D – Doctor of philosophy.

About the author

Call me Jess! I'm a published Ph.D. student based in Newcastle-Upon-Tyne aiming to reconstruct the past environments of the British Isles using fossilised biota, e.g.: pollen/ fungi, and geochemical proxies. My work of analysing dominantly lignite seams takes me to the Late Paleogene-Neogene (~33.90-5.33 million years ago). Other interests include writing, solving puzzles and reading classic horror.

Find out more

O'Brien, C.L., Huber, M., Thomas, E., Pagani, M., Super, J.R., Elder, L.E. and Hull, P.M. (2020) The enigma of Oligocene climate and global surface temperature evolution. Proceedings of the National Academy of Sciences, 117(41): 25302-25309.

Pound, M.J. and McCoy, J. (2021) Palaeoclimate reconstruction and age assessment of the Miocene flora from the Trwyn y Parc solution pipe complex of Anglesey, Wales, UK. Palynology: 1-21.

Steinthorsdottir, M., Coxall, H.K., De Boer, A.M., Huber, M., Barbolini, N., Bradshaw, C.D., Burls, N.J., Feakins, S.J., Gasson, E., Henderiks, J. and Holbourn, A.E. (2021) The Miocene: The future of the past. Paleoceanography and Paleoclimatology, 36(4): e2020PA004037.

IPCC (2021) Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L.

Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.

Gibson, M.E., McCoy, J., O'Keefe, J.M.K., Nuñez-Otaño, N.B., Warny, S. and Pound, M.J. (2022) Reconstructing Terrestrial Paleoclimates: A Comparison of the Co-Existence Approach, Bayesian and Probability Reconstruction Techniques Using the UK Neogene, Palaeoceanography and Paleoclimatology, 37(2): e2021PA004358.

Pound, M.J. and Gibson, M.E. (2022) We reconstructed Britain of millions of years ago to see what climate breakdown will involve, The Conversation, theconversation.com/we-reconstructed-britain-of-millions-of-years-ago-to-see-what-climate-breakdown-will-involve-175949