Meet the team who are writing I bet you didn't know…







In 2019, the Primary Science Teaching Trust (PSTT) established a team Fellows of the PSTT's College (winners of the Primary Science Teacher of the Year Award) and who have also been research scientists, having obtained Ph.D.'s in a science subject.

Each Fellow involved has visiting status to a U.K. university (Bristol University at the time of writing this article) and thus has access to the 'Web of Science' and can search the literature for recent research papers. The Fellows' previous research experience allows them to search and source papers that would be suitable for an ***I bet you didn't know…*** article. Periodically, the team meet (actually or virtually) and review papers being worked on to ensure clarity of the research and that appropriate connection to primary science curricula is made.

Dr Craig Early, Chemist

Craig attended Loughborough University, studying Medicinal & Pharmaceutical Chemistry, before embarking on his Ph.D. in Organic Chemistry. Following a short spell in Bournemouth as a Sales Executive, Craig moved into teaching, following a successful completion of the PGCE at the University of East Anglia. His first teaching job involved improving science teaching at a large 3 form entry primary school, taking the school through numerous awards, and being recognised as a “hub of science excellence” within the area during his 8 years there. He was awarded the Primary Science Teacher of the Year in 2015.

Craig has written numerous primary science materials for websites such as the BBC and Teachit Primary, as well as writing the supporting documents for 137 primary resources on the Royal Society of Chemistry’s “Learn Chemistry” platform, and articles for Association of Science Education publications.

Currently, Craig is the Head of an Academy at a school in Lincolnshire which is part of an 8 school Multi-Academy Trust. He leads the Science vision and implementation across the 7 primaries, and is involved in delivering training for ITT students, as well as being an SLE in Science Education for the Teaching School Alliance.

Craig continues to promote the importance of science teaching and learning within the primary sector, and has presented at numerous conferences, as well as delivering CPD through the STEM Learning network. He currently sits on the strategic vision group for the Science Learning Partnership in Lincolnshire, as well as being an elected member of the Education Division Council within the Royal Society of Chemistry.

Dr Rebecca Ellis, Biologist/Engineer

After achieving a 1st class B.Sc. (Hons) studying Biology at Bristol University, Rebecca had her first taste of research working at the Natural History Museum, London, for the Parasitic Worms Department.

She then moved to Cranfield University and began her four-year Engineering Doctorate (Eng.D.) on the 'Development of a Novel Medium to Improve the Performance of Biological Aerated Filters (BAFs)'. Generally used as a secondary sewage treatment process, BAFs provide a high rate, compact solution through maintaining a concentrated biomass in the form of a biofilm. The medium to support the biofilm also removes suspended solids by depth filtration and so regular backwashing is required. With industrial sponsorship from English China Clays International, Rebecca worked for 6 months 'in house' at St. Austell where she could engage with the clay foaming process directly and use Environmental Scanning Electron Microscopy to observe biofilm growth.

After leaving research, Rebecca gained a PGCE from Bath University. She taught for over 20 years at a junior school in Warwickshire and has two children.

Rebecca is now working for Explorify (https://explorify.uk/en/activities), creating new resources and supporting teachers.

Dr Julia Nash, Biochemist

Julia worked in science research for over 13 years. After completing her first degree in Pathobiology with subsidiary Chemistry at the University of Reading, she moved to the University of Kent to study for a PhD in biochemistry. Here she spent 3 years undertaking 'Studies of the Assembly of Mammalian Neurofilaments'. Neurofilaments are proteins that link together to form filaments in neuronal cells which maintain structural integrity and function. Julia's work suggests a model for the structure and make up of these neurofilaments.

In 2003 Julia joined the Chemorepulsion Lab, first based at University College London, as a research assistant. The lab then moved to The United Medical and Dental Schools Physiology Department at St Thomas's London and finally to the MRC Centre for Developmental Neurobiology (Guy's Campus, King's College London). For over ten years, she worked on neuronal development in the brain as well as isolating and identifying proteins responsible for neurotoxicity in the brain.

After leaving research, Julia gained her PGCE from Canterbury Christ Church University and has since taught for 12 years in Surrey. She has recently becoming a PSQM Hub leader and Specialist Leader in Education for the Tandridge Teaching Alliance.

Dr Katharine Pemberton, Marine biologist

Before teaching, Katharine worked as a researcher in aquatic science. She gained her first degree in Marine Biology at the University of Newcastle upon Tyne and then began her PhD research at Plymouth Marine Laboratory.

During her PhD, Katharine investigated different ways of measuring and estimating primary production in the marine environment. An understanding of primary production is really important to help scientists make predictions about levels of carbon dioxide in the atmosphere, to help understand climate change. The research showed that different measurement methods gave different estimates of primary production, which, when extrapolated to global scales, could lead to huge variations in climate change predictions.

After her PhD, Katharine took a post-doctoral research post in Canada. The aim of the project was to link in situ estimates of photosynthesis to water quality in the Laurentian Great Lake. The research showed that rates of photosynthesis could indicate the presence of particular species of phytoplankton. The presence of certain species of phytoplankton have a negative impact on water quality.

Having visited schools as a researcher, Katharine discovered how rewarding teaching could be. After having children, she moved back to the UK with her husband and retrained as a primary teacher. She has been teaching at Modbury Primary School in Devon for the last eight years.

Professor Dudley Shallcross, Atmospheric chemist

Dudley Shallcross has won several awards for his research in science (atmospheric chemistry) and contributions to science education and science engagement at primary, secondary and tertiary levels. He became Director of the Primary Science Teaching Trust in 2010 and established the Trust's College of excellent primary science teachers that aims to draw together the best primary science practitioners in the UK. He was CEO of the Primary Science Teaching Trust until 2022.

Having seen how outstanding primary school teachers were able to bring real-life science contexts to the classroom, he started the series of 'I bet you didn't know…' articles to introduce teachers and pupils to cutting-edge research. He brought together the PSTT Fellows in this group to continue this work.

Dr Alison Trew, Biochemist

Alison was a science researcher for nine years. After completing her first degree in Biochemistry at the University of Birmingham, she moved to the University of Leeds to study for a PhD. Here she spent 4 years researching 'The source, transport and concentration of vitamin C in the healthy and diseased human stomach', measuring levels of vitamin C in patients' saliva, blood, gastric juice, stomach wall and even the colon. Alison's work showed that high vitamin C intake could reduce the risk of gastric cancer.

Alison worked as a postdoctoral research assistant in the Department of Dermatology at the University of Newcastle upon Tyne where she investigated the loss of genetic material in different types of skin lesions including warts. She then joined a team at the University of Nottingham in the Department of Obstetrics and Gynaecology where she developed a procedure to culture 'trophoblast cells', specialised cells of the placenta that play an important role in embryo implantation in the uterus. It was hoped that this would enable scientists to investigate causes of complications of pregnancy such as pre-eclampsia. Alison returned to Leeds University and worked with a team trying to identify processes involved in producing protein plaques in the brain which are thought to cause Alzheimer's Disease.

After leaving research and having a family, Alison completed a PGCE with Somerset SCITT. She has taught in primary schools in Devon for nine years and she now works for the PSTT, working with teachers and developing new resources for the PSTT website. She is a co-author of PSTT's *Standing on the Shoulders of Giants* and has helped to write many of the resources on the PSTT website.

Dr Paul Tyler, Biochemist

Paul completed a degree in Biochemistry at the University of Leicester and then moved to work for a small pharmaceutical company in Hertford, purifying and studying Paclitaxel from yew trees to use as a cancer treatment.

He then moved back to Leicester to join PanTherix, a start-up biotech company pioneering structure-based antibiotic design. Paul specialized in enzyme purification and classification, crystallisation and structure determination.

Structure-based drug design is an attempt to move away from the scatter-gun approach of finding new antibiotics that big pharmaceutical companies have traditionally used. Enzyme targets are identified that are only found in bacteria, not humans. They are cloned and over expressed in E.coli . From there the target enzyme is purified and slowly crystallised. X-rays are used to determine the 3D structure of the enzyme. It is then possible to study how the enzyme binds to its substrates and find drug candidates that could mimic the substrate and stop the enzyme working, killing the bacteria.

During his time with PanTherix the company relocated to Glasgow and Paul continued to work on potential antibiotics with a variety of bacterial enzyme targets. Paul also became fascinated with Prions and was able to assist with some research into their structure with a group at the University of Glasgow. Paul completed his PhD shortly before PanTherix were bought out by AstraZeneca. Settled in Glasgow he changed career and spent 3 years working for Scottish Rugby before completing his PGDE in Primary Education.

Paul has been teaching for 11 years and leading science in his school for 7 years. He is part of a Local Authority science group helping promote and improve science across 26 primary schools. He is an active member of the ASE and a member of the BIG STEM Communicators Network; Paul regularly writes for TES and ASE publications and speaks at STEM conferences across the UK. He has written resources for the PSTT and consulted on several STEM projects worldwide.