

Institution: University of East Anglia
Unit of Assessment: 29 English Language and Literature
Title of case study: Enhancing Public Understandings of Science through Creative Writing
<p>1. Summary of the impact</p> <p>The present case study focuses on a group of creative writers at the University of East Anglia (UEA) whose work has had a significant impact on the public understanding of contemporary and historical science. These writers continue in a long British tradition of robust and informed literary investigation of science in public discourse, a tradition stretching from Mary Shelley to Ian McEwan. The works in question, which include prizewinning and best-selling fiction and non-fiction, interpret and stimulate engagement with specific areas and aspects of scientific practice, both past and present, further influencing international public debate through the involvement of the respective authors in the mainstream media and in related public events.</p>
<p>2. Underpinning research</p> <p>Creative non-fiction: Between 2004 and 2007, Professor Richard Holmes (UEA 2001-2007) investigated the complex relationships between writers and scientists in the Romantic period. Through an examination of the notebooks, letters and journals of the key scientists of this period – astronomers, chemists, botanists and explorers – alongside those of novelists and poets, he uncovered the allegiances, dialogues and disagreements that lead to important new ideas and discoveries, revealing the vital role of collaboration between literature and science. Between 2007 and 2011, Professor Rebecca Stott (UEA: 2007- present) researched the 2,200-year history of evolution before Darwin. Her research revealed for the first time the important role that poets, philosophers and playwrights played in the history of evolutionary thought, the extent of the danger associated with evolutionary speculation and the degree to which it was impeded by the church. The research also served to reconfigure Darwin’s <i>Origin</i> as part of a significantly expanded global history.</p> <p>Fiction: Between 2007 and 2008, Professor Giles Foden (UEA: 2007- present) undertook extensive research into the history of the D-Day landings and related weather science. He accessed declassified (1995) government documents on the circumstances of the D-day weather forecast; interviewed wartime meteorological officers; worked with a former Director of the Meteorological Office and unearthed rare proceedings of a 1982 conference attended by surviving D-day forecasters. Between 2007 and 2009, Stott researched the history of evolutionary ideas in the Paris Jardin des Plantes during the Napoleonic Wars to ascertain the complex institutional and ideological politics at work there particularly between Lamarck, Geoffroy and Cuvier. She also examined the digital archives that record details of the young European students who travelled across the world to study there, later taking controversial evolutionary ideas back to their own countries. During this time Stott also completed research on Darwin’s influence on nineteenth- and twentieth-century literary culture. Between 2006 and 2009 novelist and short story writer, Jean McNeil (UEA: 2006 - present) undertook extensive fieldwork into climate change, the Arctic and Antarctic as the Arts Council England/British Antarctic Survey Writer-in-Residence in the Antarctic (2005-2006), in the Falkland Islands (2008), in the Svalbard archipelago in the Norwegian Arctic (2007), and a NERC-funded residency aboard a scientific expedition to western Greenland (2009). She interviewed 30 experts: scientists and personnel at two British Antarctic Survey research bases aboard two scientific research ships, civil servants and government ministers at NERC, DEFRA and the DECC, and conducted archival research at the Scott Polar Research Institute in Cambridge.</p> <p>Drama: In 2011 playwright and critic Steve Waters (UEA: 2011-present), already internationally acclaimed for his diptych of plays on climate change, <i>The Contingency Plan</i> (2007), worked with the Institute of Astronomy at Cambridge University to examine the conflicts about cosmology</p>

Impact case study (REF3b)

between Fred Hoyle and Martin Ryle in the 1950s and 1960s. His aim was to investigate in detail how personal conflicts shape the development of scientific thinking. Waters interviewed astronomers and cosmologists and drew on rare archives in the IOA library, Churchill College and St Johns.

3. References to the research

- Richard Holmes. *Age of Wonder: How the Romantic Generation Discovered the Beauty and Wonder of Science*. Harper Press, 2008. Creative Non-Fiction.
- Foden, Giles. *Turbulence*. London: Faber and Faber, 2009. Novel.
- Stott, Rebecca. *The Coral Thief*. Novel. Weidenfeld and Nicolson, 2010; Random House, US, 2010; 10 other publishing houses in translation. Novel.
- Stott, Rebecca. *Darwin's Ghosts: In Search of the First Evolutionists*. Bloomsbury, 2012; Random House, 2012. Creative Non-Fiction.
- McNeil, Jean. *The Ice Lovers*. McArthur and Co, Toronto, 2009. Novel.
- Waters, Steve. *The Known Universe*. 2013. Play.

Key Grants

McNeil was granted the Arts Council England Grants to Individuals (2007-8), a grant for travel to the Falkland Islands, a creative residency, and for the writing-up of polar research; a Shackleton Scholarship Fund award for travel and research in the Falkland Islands (2008); and an AW Mellon Foundation Award for visiting scholars to South Africa, University of Cape Town (2010).

Waters received a grant for *The Known Universe* from the Institute of Astronomy, University of Cambridge for May-October 2011.

Evidence of Quality

Holmes' *Age of Wonder* received international review coverage and was featured on BBC Radio 4's *Book of the Week* (20-24 Oct 2008). It won the Royal Society Excellence in Science Award in 2009 and the National Book Critics Circle Award for General Nonfiction in the same year. It has sold 190,000 copies in the US and the UK and has been published in translation in Brazil, Korea, Netherlands, Portugal. In 2010 Holmes was invited to chair the panel of judges of the Royal Society Prize for Excellence in Science.

Published in many territories, including the United States, Germany and Japan, **Foden's** *Turbulence* is being developed as a feature film.

Stott's *Darwin's Ghosts: In Search of the First Evolutionists* was chosen as one of the hundred most notable books of 2012 by the *New York Times Review* and shortlisted for the 2013 Duff Cooper non-fiction prize. Stott was interviewed for BBC Radio Four's *Start the Week* in May 2012 and across radio stations in the US. Since its publication in May 2012, *Darwin's Ghosts* has sold 20,000 copies in the UK and 50,000 copies in the US. The *New York Times* reviewer praised it for helping 'us see the necessity of bold and ambitious thinking... Stott reminds us that even if evolution is currently fought over more brutally in the United States than elsewhere, this fight has a long and stubborn ancestry, one that is by no means peculiarly American or entirely modern.'

Stott's *The Coral Thief* has sold 45,000 copies to date across several territories, and has been published in translation in France, Spain, Holland, Germany and Italy. One reviewer claimed Stott had invented a new genre, the 'scientific historical romance thriller'.

McNeil was awarded the Prism International Award for creative non-fiction for *Ice Diaries*, a further development of her polar research (2012); her novel *Ice Lovers* led to an invitation to produce and curate 'Infinite' a series of theatre performances by young people aged 16-19 at the National Theatre, London. 'Temps Mort', a short story set in the Antarctic about a paleo-botanist, was shortlisted for the 2011 Bridport Prize for short fiction, UK. 'The Road to Digby Neck,' about landscape, geology and inspiration, was shortlisted for the 2011 Prism International Creative Non-Fiction Award, Canada. (Corroborating Evidence 5)

Impact case study (REF3b)

Waters' *The Known Universe* was given a public reading as part of the internationally-renowned Cambridge Science Festival in March 2012 at which Waters spoke about the genesis of the play. It will be staged at the Birmingham Repertory Theatre in Spring 2014 with a London co-producing theatre.

UEA creative writers act as judges for major literature and science competitions and as consultants. In 2010 **Holmes** chaired the panel of judges of the Royal Society Prize for Excellence in Science. **Waters** is regularly asked to participate in panel discussions about climate change alongside leading scientists; he was interviewed about theatre and climate change by the BBC World Service in January 2011. He writes regularly for the *Guardian* on the role of the theatre to effect change. In January 2012, Waters was commissioned to participate in a select policy-making workshop about science and scriptwriting for the BBC. Stott was chosen as arts consultant and organiser for the literature and science strand of the major Darwin 2009 Festival in Cambridge that drew 1,400 delegates from across the world.

4. Details of the impact

The research of this group of UEA writers has had demonstrable international economic and cultural impact in three ways. Firstly, by influencing and promoting the public discourse around specific aspects of scientific thinking. These aspects include the ethics of science, the cultural and social forces at play in the interpretation of scientific data, and the effects of scientific discoveries on individuals and communities, and, in broad historical terms, on ways of seeing (Corroborating Evidence 1, 2, 3, 4, and 6). Secondly, and beyond the influence on a wide readership of the works in question, in related public events, discussions and debates, both national and international (Corroborating Evidence 7, 8 and 9). Thirdly, through generating considerable economic impact in terms of book sales, festival and theatre tickets, and revenue from television and radio programmes.

McNeil's research on the polar ice, including her funded expeditions, resulted in two publications: a poetry collection, *The Ice Diaries*, and a novel, *The Ice Lovers*. This work led in turn to a commission from the National Theatre, London, to co-curate a series of performances in July 2011, called 'Infinite' and centred around *Greenland*, a commissioned National Theatre play. The project sought specifically to involve young people in the various aspects of the climate-change debate. 90 young people took part; 250 audience members attended the performances. Stott's novel *The Coral Thief* and her work of non-fiction *Darwin's Ghosts*, have brought the long pre-Darwin history of the idea evolution to a wider public for the first time, showing in particular how important poets, playwrights and novelists have been in exploring and disseminating the idea of species change. In 2007, Stott's research and writing on Darwin's influence on the literary world led to Sir Patrick Bateson, Professor of Ethology and chair of the Festival Committee to invite her to programme, co-ordinate and host the *Darwin and the Arts* strand of Cambridge University's international *Darwin 2009* festival. The festival took two years to plan and programme, drew 1,400 international delegates to a week's events and made a turnover of over a million pounds (Corroborating Evidence 9). The festival redefined Darwin's impact on ten key branches of contemporary thought. Stott's strand sought to redefine the understanding of Darwinian ideas in the arts and drew extensively on her research in this area. In 2012 Stott was co-producer, interviewee and consultant for a film called *Questioning Darwin* commissioned for US television that examined in film for the first time the creationism-versus-evolution debates in America (Corroborating Evidence 7).

Waters has long been engaged with the possibilities offered by the theatre as a space for the investigation of scientific ideas, most influentially in his diptych of plays on climate change, *The Contingency Plan* (a film adaptation has been commissioned by Cowboy Films and Film 4). His on-going work in this field led him to host an international festival on climate change in 2012, bringing together writers and scientists for the first time as part of the launch of the Writing and Science Project at UEA (Corroborating Evidence 8). The event was attended by 60 international delegates, key players in climate change science. It was supported by UEA's science fund, and juxtaposed commissioned short theatre by young playwrights with talks, debates and polemics to dramatise and investigate key questions at the heart of climate change science.

Impact case study (REF3b)

Foden's *Turbulence* has drawn public attention to the complex ways in which climate affects world history by focussing on the importance of climate science in the planning of the D-Day landings. He has developed these ideas not only in his novel but in a number of talks and interviews: to the Royal African Society (7.11.2007), the Arts Council (26.7.2007), interviews for the BBC2 D-Day anniversary coverage (6.6.2009), R4 *Start the Week* (25.5.2009) and articles in newspapers and journals including the *Sunday Times* (8.7.2007 and 7.6.2009) and the *Times* (30.5.2009). **Holmes** participated in numerous public debates about the long role that poets and writers have played in bringing science to a broad and engaged public: most significantly, at the New York Public Library (2009), the Smithsonian Institute (2010), the National Theatre, London (with Brian Cox, 2011) and the British Library (2011). In Athens in 2009 **Stott** spoke as a guest of the British Council to an audience of 800 people. Her subject was the numerous ways in which poets and novelists have extended Darwin's ideas. Stott gave her lecture 'Darwin in the Literary World' in the Cambridge Darwin Lecture series to an audience of 900 people in January 2009. The podcast of this lecture has been accessed 16,000 times. *The Coral Thief*, the result of extensive archival research into the complex political dimensions of early evolutionary speculation, was serialised as a BBC *Book at Bedtime* in January 2010, drawing an audience of 2.5-3 million. Stott was one of five Darwin scholars to contribute to a BBC4 documentary, *Darwin's Struggle*, which examined on film for the first time the turbulence of Darwin's personal struggle with his theory (screened 2.2.09; the YouTube version has been accessed over 15,000 times and the TV programme repeated several times). Stott appeared in a US documentary *Questioning Darwin* screened in 2013 (Corroborating Evidence 7) and was interviewed on BBC Radio Four's *Woman's Hour* about using science in fiction (2 million listeners). She toured Finland for four days in 2011 giving national newspaper, TV and radio interviews about the historic role of the church in censoring scientific research, and Spain in 2012 giving newspaper, radio and TV interviews about the historical and political dimensions of evolution. In April 2012 she appeared on BBC Radio Four's *Start the Week* with novelist Peter Carey to discuss science, curiosity and literature (2 million listeners).

5. Sources to corroborate the impact

1. Endorsement from major scientist, extracts from broadsheet reviews and from individual readers' reviews on UK Amazon for *Age of Wonder* <http://www.amazon.com/Age-Wonder-Romantic-Generation-Discovery/dp/1400031877>
2. Endorsements, extracts from broadsheet reviews and from readers' reviews on US Amazon for *Darwin's Ghosts* <http://www.amazon.com/Darwins-Ghosts-Secret-History-Evolution/dp/1400069378>
3. Extracts from broadsheet reviews and international readers' reviews of *The Coral Thief* from UK Amazon
4. Extracts from broadsheet reviews and from individual readers' reviews on UK Amazon of *Turbulence*
5. Review of *The Ice Lovers*: <http://www.theglobeandmail.com/arts/books-and-media/review-the-ice-lovers-by-jean-mcneil/article4291582/>
6. Letter from representative of the British Antarctic Survey regarding McNeil's novel, *The Ice-Lovers*.
7. Letter from international documentary film-maker on collaborating with Stott on major documentary for US HBO, 'Questioning Darwin.'
8. Feedback from delegates at the international Climate Change conference organised by Steve Waters for the UEA Writing and Science Project in June, 2013.
9. Video of the Darwin 2009 festival in Cambridge which was co-organised by Stott (<http://www.youtube.com/watch?v=6L6gtDaNEQM>), alongside extracts from the published report from the festival committee.