SCIENCE AND SOCIETY

# The poetry of science

*Anne Osbourn*

Abstract | During the past year, I have taken part in an experiment in which I have been the experimental animal. I was awarded a fellowship that gave me the opportunity to take a sabbatical from science and spend a year in the School of Literature and Creative Writing at the University of East Anglia. The School of Literature and Creative Writing is internationally renowned, and past students include household names such as Ian McEwan, Kazuo Ishiguro, Trezza Azzopardi and Tracy Chevalier. I have a keen interest in creative writing and had written a few short stories. This was a formidable but thrilling challenge. During my adventure, I realized that, in many ways, I was coming home.

I am a product of the most extreme form of specialism. My father wrote a definitive article on *Marius the Epicurean*, one of the major works of the Victorian writer and critic Walter Pater. This article was published in the prestigious periodical *Essays in Criticism* in 1951 (REF. 1). *Marius the Epicurean* is an experiment, the quest of one man to find 'the right way of living'. The hero, Marius, is in fact Pater. My father was careful enough, astute enough, to realize that *Marius the Epicurean* was a cleverly disguised autobiography, whereas his contemporaries failed to see the point of Pater's somewhat impenetrable prose. These insights were of such significance that, half a century on, my father's name brings up reference to them on Google. My mother, a few years younger, fought tooth and nail for a university education and immersed herself in literature and the arts. Having completed her B.A. at the University of Manchester, she chose to study Walter Pater for her master's thesis. She went to an expert in the field who then became her tutor. The rest, as they say, is history (BOX 1).

I am also a specialist. I grew up in a house full of books on literature, history and art and enjoyed creative writing, but the constraints of the school curriculum forced me to make a choice and I became a scientist — a biologist to be precise. My interests are the function and synthesis of natural products and the evolution of metabolic diversity in plants. The study of natural products provides an opportunity to address important questions about small-molecule-mediated dialogues between plants and their environment, and also to learn about other fundamental aspects of biology such as chromosome structure and gene regulation, genome plasticity, diversification of function of enzymes, multi-component pathways and adaptive evolution. Natural products are a read-out that can be used to understand evolutionary innovation. The work from my research group has been published in a range of scientific journals[2–7] (BOX 2).

Box 1

**My Father**

A rakish man with brylcreemed hair,
eighteen, elfin face,
is cutting the grass in his shirt sleeves.
He sweats as he marches up and down
the expanse of lawn,
leaving a green-striped baize behind him.

*Germany is pushing back the eighth army.*
*Japanese troops have taken Manila.*

Pick them off like so many crows.

The silver underside of raspberry leaves.
Flitting cabbage whites.
The barges move silently
along the canal beyond the gate
at the bottom of the garden.

It is midsummer. Hot.

## Communication

Most scientists write primarily for other scientists within their field, and work written by biologists is not necessarily accessible to scientists that work in other disciplines such as chemistry or physics. Even articles in the popular-science magazines have a rather restricted audience. How many of you, for example, are excited by the title of our most recent *Nature* paper, 'The rice leaf blast pathogen undergoes developmental processes typical of root-infecting fungi'[7]? Perhaps you would respond more warmly to some of the other titles in the same edition — 'A laser–plasma accelerator producing monoenergetic electron beams'[8]? Or 'Excitation of Earth's continuous free oscillations by atmosphere–ocean–seafloor coupling'[9]? Specialism is evident, even among scientists. Scientific writing requires absolute clarity and depends on a specialized vocabulary. The hard-wiring of vocabularies within subgroups of individuals who perform different activities is essential for the effective communication and smooth running of the subgroup; however, it leads to the establishment of barriers, both between the specialists and other scientists and between the specialists and the outside world. Barriers between groups of specialists hinder progress. Crucially, more general breakdowns in communication have led to a climate in which the very society that depends on science for its survival has come to mistrust and misunderstand science and scientists. The flip side of this is that scientists have tended to develop a culture of being misunderstood (BOX 3).

The use of specialized jargon is by no means specific to science. The language and vocabularies of those from other walks of life can be equally impenetrable. Consider the following examples (adapted from REFS 10,11):

- Scientese — "We confirmed our hypothesis that expression of gene X is reduced in bowel cancer."
- Legalese — "The aforementioned gene X, to wit in respect of its nomenclature being referred to in the first instance as X, gene product of the X locus, excluding all genes of similar nomenclature to gene X…"

Box 2

**The Lido**

Acres of azure,
empty,
cold.
The fountain
fizzing,
in the middle.

A lone sunbather
sleeps
on the step.
Eighty-five.
Mahogany skin.

I am seven.

I
plunge
in.

- Business-speak — "We have sought to assess downturn trends in the X gene by outsourcing gene expression studies, which, in line with current predictive analysis, forecasts recapitulation of previous year-on-year data for bowel-focused cancer."
- Poetry —
"…being the wrong side of statistics;
the nature of sickness,
how it starts years
before you know."

It is tempting to say that we must break down barriers and open up communication channels to create a world without walls. But it is imperative to remember that science, the arts and other academic disciplines, trades and professions all function effectively because they are peopled by specialized subgroups of individuals who are experts in their fields. These mini-worlds and their standards must be protected and valued to sustain quality in individual areas. Without them, we would dissolve into a melee of substandard homogeneity in which we would be experts in nothing, and our society would disintegrate. On the other hand, there is a real need to encourage and enhance meaningful discourse so that specialist subgroups can increase interactions with each other to expand their creative and innovative potential. More crucially, there is an urgent need for science and society to learn to communicate more effectively with each other for mutual sustainability.

### Living in 'two worlds'

My interdisciplinary experiment began when I saw an advert in *Nature* for Dream Time Fellowships, funded by the UK-based National Endowment for Science, Technology and the Arts (NESTA, see Online links box). The advert read "Are you a high achiever with ten years' experience in the science and technology sector but looking for the space to develop your ideas away from the demands of your professional life?" I realized that this represented a perfect opportunity to explore my interests in creative writing and to see whether I could learn how to dissolve boundaries and meld worlds. Shortly after that, I became a NESTA-funded Dream Time Fellow in the School of Literature and Creative Writing at the University of East Anglia. My only remit was to find ways of bringing science into everyday lives and language through creative writing with the help of my mentor Professor Clive Scott, a leading authority on language and the visual arts.

Starting from nothing is a situation that scientists, artists and writers all face. I had envisaged writing an extended piece of prose that in some way merged scientific and non-scientific themes. Instead I turned to poetry. This took me very much by surprise because I had not previously regarded myself as a poet. Poems are potent capsules that, although usually brief, can hold a black hole's worth of communication. Poems, like DNA, have patterns, rhythm and motifs (BOX 4). Crystallizing the intangible onto a page in the form of a poem is a satisfying feeling. Reading a finished poem to an audience is even more satisfying. I chose to take an autobiographical approach to my project, and over the last year have been on an adventure that has taken me deep into my own life and scientific career through poetry. The result is a collection of 60 poems about journeys from origins, both personal and global, in which negotiations between scientific and non-scientific languages and points of view form a central theme. The poetry is accompanied by images, equations and other forms of visual communication, scientific and otherwise. This hybridization of poetry collection, science journal and photo album transgresses boundaries in a variety of different ways. I hope to publish the work in its entirety sometime within the next year or so. But polishing poems — buffing them to maturity — is a lengthy process that, like fermentation, cannot be rushed. To quote the poet Lavinia Greenlaw, "A poem is finished when a skin seals around it." That is, when you have the confidence to say, "It's a poem." Others might disagree, but that is for them to decide.

This process has taught me a lot. Although scientists and artists tend to go about things in different ways, there are many commonalities. Both science and the arts depend on the ability to define a problem, to note detail, to enquire, and to extract the essence of the problem at hand. This is the case regardless of whether the problem is how to make a river estuary come alive on the canvas or the page, or to establish whether the decline in seal populations in the estuary is due to pollution.

Box 3

**The Cobweb**

*The dewdrops sparkled on the cobweb.*

Cobweb. A fine network of threads spun by a spider from a liquid secreted by it, used to trap insects. A trap or insidious entanglement.

*The dewdrops sparkled.*

Dew. Atmospheric vapour condensing in small drops on cool surfaces at night. Was this night or day? If the dewdrops and the cobweb could be seen then presumably it was not dark. Unless the cobweb was illuminated by an artificial light source – a torch or a streetlight – or bathed in the light from a window.

*The dewdrops sparkled.*

Did the dewdrops sparkle or glisten? Sparkle, glitter, glisten. Glisten. Shine, like a wet object.

*The dewdrops sparkled on the cobweb.*

Box 4

**Changeling**

Science and the arts both involve a combination of creativity and technical competence. Although scientific advances build on pre-existing evidence and knowledge, this knowledge can shift. And scientists, like artists, are subjective. Both groups bring their pre-conceived ideas and perspectives to the problems that they tackle. The end results are translations of a situation and a state of mind. The ultimate objective for both is to pinpoint the truth and to communicate this clearly and succinctly to others for appraisal. Both schools use images and words to do this. To quote David Ingram, a leading botanist, horticulturalist and conservationist, "Scientists, artists and creative writers share a common purpose in their attempts to describe, interpret and ultimately to understand the world around them." The most complete and durable truth will be a composite that increases in resolution as more perspectives are assimilated into it.

Figure 1 | **Examples of art taken from *See Saw*, an anthology of artwork and poetry around science from children aged 4–12.** From top left to bottom right: 'Lightning' (Oliver Wakefield, Reception); 'Inside a Christmas rose leaf' (Ryan Smith, Year 1); 'Salt crystals under the microscope' (Amelia Rix, Year 4); 'Dust mite' (Andrew Crabb, Year 6); 'Nerve cells' (Max Allinson, Year 3); '*E. coli*' (Julia Mundy, Year 6), all from Rockland St Mary County Primary School, Norfolk; 'Sunflower pollen grain' (Andrew Parfitt and Joe Robson, Year 7); 'Reflections' (Danielle Palmer, Sarah Marrison and Claire Sugden, Year 7) from Framingham Earl High School, Norfolk; 'Eye' (Alex White, Year 3) from Rockland St Mary County Primary School. Images reproduced with permission from REF. 12.

## The young know no boundaries

Whereas adults might regard themselves as constrained by barriers, children (in particular those of primary school age) tend to have fewer inhibitions and have not yet been programmed into compartmentalized ways of thinking. Through my own personal explorations, I have learned that scientific images represent a meeting ground for engagement of all kinds. This led me to establish the Science, Art and Writing (SAW) concept, a cross-curricular initiative that uses science to fire imaginations. Images such as the earth from space, salt crystals under the microscope and thermograms of houses provide fascinating stimuli for use in schools. The children use the images as inspiration for creative writing and art, and through doing so are drawn into the science that is represented in the image and the concepts behind it. The images can also be 'themed' to allow connections to be made between the different components. Earlier this year, I ran a pilot project in two local schools using scientific images as inspiration for poetry and artwork, so encouraging children to explore and understand science. This project led to the publication of an anthology of the children's work called *See Saw*[12]. The initiative and book were celebrated at a launch event with poetry readings from the children and the poet Matthew Sweeney, along with a display of the children's artwork. The project brought together children, teachers, scientists, writers and the local community around science as a central theme. Since then, I have been inundated with requests from other schools, all wanting to run SAW projects. This led me to set up a charitable organization (the SAW Trust, see Online links box) to provide a mechanism for developing this initiative, with a view to rolling it out across schools in the UK and elsewhere. The development phase will involve working closely with other organizations with complementary interests, including NESTA, and will provide training opportunities for young scientists and writers to work together in school projects (FIG. 1).

## Re-entry

Now my Dream Time is over, and as I re-enter full-time research I have been reflecting on my year. My scientific training equipped me well for my sabbatical. I have determination, drive and focus. I can set myself targets from a seemingly intangible starting point and then use a combination of creativity, technical competence and self-evaluation to crystallize the bones of a project. I am accustomed to networking, seeking advice from others and then gauging this advice relative to my own assessment. I am also accustomed to communicating my work to an audience and to the ups and downs associated with peer review. Having said that, I have started from the beginning all over again by striving to learn about this strange thing that took me completely by surprise —poetry.

Although those in the arts tend to have rather different *modus operandi* when compared to scientists, the channels of communication can be just as direct and often far more powerful. As scientists, we need to learn how to convey the nuts and bolts of our interests to everyone, regardless of their age, background or occupation — not forgetting, of course, our fellow scientists.

You might recall that I exist because of a mutual interest that my parents shared in the misunderstood writer and critic, Walter Pater. My recent zeal for writing has encouraged my father to dust off and revise the draft of a book that he wrote on Walter Pater in the 1950s, in which he translates Pater's writings for a wider audience. This book has just been published[13]. During his quest, Marius the Epicurean progressed

Box 5

**Starbursts**

**Gone are the days**
**when lullabies are fireflies**
**and memories are now.**

**Now hard-wired neural networks**
**enforce left and right,**
**sound and sight;**

**playful-ness is playful-not,**
**wings of a butterfly pinned,**
**dead cold rhythm and metre.**

**So look to the skies**
**and let your senses soar,**
**confounded like starbursts in the ether.**

**Bloom bold in the rain**
**with your big brash flowers,**
**pearl-dropped petals unfurled**

**before the mint leaves freeze**
**in the water meadow,**
**and the winter rose glints white.**

from a socially isolated aesthete to a man of social concern and human sympathy, and he concluded that the right way of living was to make valuable contributions to society. My journey back to the roots of specialism has enabled me to re-orient myself relative to my family, society and science. We all need to touch base with the real world now and then to maintain our bearings (BOX 5).

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**Competing interests statement**
The author declares no competing financial interests.

**FURTHER INFORMATION**
**Anne Osbourn's homepage:**
http://www.jic.ac.uk/staff/anne-osbourn/index.htm
**National Endowment for Science, Technology and the Arts:**
http://www.nesta.org.uk
**The SAW Trust (website under development):**
http://www.sawtrust.org
**School of Literature and Creative Writing, University of East Anglia:** http://www.uea.ac.uk/eas/fellowships/nesta.shtml
**See Saw — an anthology of children's poetry and artwork around science:**
http://www.amazon.co.uk/exec/obidos/ASIN/0955018005/qid%3D1123685459/202-6457702-5307866
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