

TOBACCO RESEARCH THROUGH DIFFERENT LENSES: REFLECTIONS ON THE INFLUENCES OF ART IN SCIENCE

by Cathy Moore, Kathrin Göritzer & Julian Ma

The opportunity to discuss one's scientific research with someone outside of the field of science is a privilege that should never be missed and is rarely without value. Being able to describe your work, your motivation, and your goals clearly and understandably is a skill that is overlooked too commonly, but it is just as important to accept the feedback, identify areas in which you have not made yourself clear, and to view your passion from someone else's perspective. Some scientists are good at 'public engagement in science', but no one has nothing left to learn, because the 'public' is almost infinite in its experience and diversity, and every engagement is different.

In this chapter, we first describe the overall view held by research group lead, Prof. Julian Ma, and then provide insights from two early career researchers Dr. Kathrin Göritzer and Dr. Cathy Moore, who worked with Karel Doing during his residency on a day-to-day basis.

Overview by Prof. Julian Ma

When the opportunity arose to host an artist-in-residence, I registered my interest immediately. As a Professor of Molecular Immunology at St. George's, University of London, I lead a research group of around 15 scientists at different stages of their career, from post-graduate students to early and mid-career researchers. We run a variety of public engagement in science events, from school visits to informal talks to the University of the 3rd Age¹,

[1] It is an organization that allows local groups to form for people no longer in work to meet and invite speakers. For more info, you can visit: <https://www.u3a.org.uk/>.

from a monthly science club in our local prison to workshops for young students in Bangkok. However, the opportunity to host an artist-in-residence was something quite different and was too good an opportunity to miss. Having an artist working alongside us for an extended period of time, and integrating themselves into the research group, would give us an unprecedented opportunity to share our world and to see our work from completely new angles. Our research group has little or no artistic experience. A couple of us are enthusiastic amateur musicians and one has a background in interpretive dance, but no one has expertise in the visual arts.

An additional motivation was that our area of research has skated the edge of controversy for many years, and our research community's previous failures to engage pro-actively with the public has resulted in a loss of trust and a stalling of our work's progress. We work in plant biotechnology and use genetic modification (GM) and gene engineering. In our case, our goal is to use plants to manufacture modern medicines – antibodies and vaccines – against infectious diseases, particularly those common in lower- and middle-income countries. Since the start of the millennium, though, our research has been entangled with a public fear of GM, as well as our use of tobacco as our plant of choice as a manufacturing platform. The EU-funded *Newcotiana* project, which provided the opportunity for Karel Doing to work with us, is actually a multi-national project designed to illustrate the potential benefits of plant biotechnology, and our role in that project was to develop better plants for making medicines and to provide examples of the kinds of drug products that plant biotechnology might enable.

Karel joined the laboratory at an advanced stage of the *Newcotiana* project, when we had already made some important advances and were at the stage of trying to show examples of the benefits that our work with plants could deliver. It was also at the point at which we were only just able to open up our laboratories, following COVID-19 lockdown, during which time our research had, out of necessity, pivoted almost entirely to COVID-19 research. We agreed, however, that we would not necessarily focus on particular medicinal products in our discussions with Karel, but would instead concentrate on the bigger picture, the concept of molecular pharming (using plants for manufacturing modern medicines), and on our relationship with plants.

The residency itself was scheduled around COVID-19 restrictions and travel difficulties between Karel's home in Oxford and St. George's, which is in South-West London. The key achievement was to have Karel spend an extended period working alongside and shadowing members of the laboratory, particularly two experienced postdoctoral scientists, Kathrin Göritzer

and Cathy Moore. One of the highlights for me was the genuine interest and fascination that Karel showed for the scientific techniques that we use, many of which, are routine and of no great novelty for us. It was a revelation to observe an adult's reaction to science in action. Not afraid of asking questions, Karel explored both complex and fundamental issues, which challenged all of us to find ways to explain concepts that we usually take for granted.

Due to the COVID-19 restrictions, the residency did not progress as planned; there was an element of stop-start to our working together, but that was actually beneficial in retrospect and it gave Karel a chance to digest information, and the research team a chance to re-evaluate how we engaged with him. There were no significant lows, except for one important learning point. Towards the end of the residency, when Karel sent us his draft output, we were all disoriented by the abstract nature of his images and descriptions. Unlike any output that we were familiar with from the scientific world, our immediate reaction was that we had not explained our work adequately or conveyed our passion for our scientific objectives, and we were surprised and perhaps a little disappointed that Karel had focused on what, to us, appeared to be more mundane everyday matters of process. It was only with time that we realized that this represents one of the project's most important outcomes.

It is easy to talk in lofty terms about public engagement in science – why it is needed and what the benefits are. We also discuss the importance of feedback and spend much effort designing approaches to retrieving relevant feedback. A major limitation of conventional feedback, though, is that its nature is largely determined by the questions asked. In this project, Karel's photo essay is the most original, non-directed type of feedback that I have received. It has made me re-think the nature and objective of engagement in science. Why should a scientist expect a member of the public to find the same areas to be fascinating in the same manner as those who are working in the field? Perhaps it is even presumptuous to overlook that scientists approach their work in a particular way, that others may find more interesting things or elements than the work itself. The procedures that we perform day-to-day become routine, but they are amazing to those who are not familiar with laboratory science. This, of course, speaks to the essence of engagement, that of a two-way process, in which engagers learn equally from the process as engagees.

An appreciation of the visual arts perhaps works similarly. When we visit an art gallery, we are not usually inundated with descriptions of the background, the methodology, the interpretation, or the significance of the art.

Instead, there is usually a paucity of information, and we are left to identify what we individually find most appealing and memorable.

Karel's perspective on our use of plants as tools is both new and revelatory. His vocabulary is different and the insight he gained into our world was unexpected. This residency has not just established new friendships, but it has also changed my future approach to public engagement in science.

Insights by Dr. Kathrin Göritzer and Dr. Cathy Moore **New perspectives**

Scientists are famously myopic and struggle to see the forest for the trees. Having an artist-in-residence pushed us to step back and to view what we do from a fresh perspective. Initially, trying to explain concepts that we take for granted that the bubble around us already know was frustrating; however, it helped us to remove ourselves from this strict mindset and we learned how to explain our work to a layperson, which is an important skill for scientists pursuing public engagement. Beyond merely taking a step back from our own work, we were forced to view our work from the artist's viewpoint which was challenging, but we needed to do it in order to understand the concept of free interpretation. So constrained are we to the idea that accuracy is everything that it was quite jarring to adjust to the idea of artistically interpreting our work such that aesthetics and emotions, rather than accuracy and facts, take precedence.

Ultimately, it was quite satisfying to induce such enthusiasm for our work from a layperson. We are generally a link in a long chain, from bench science to healthcare application, as research scientists and we rarely get to see any appreciation for the work that we do. As such, it gave us a sense of pride to see a member of the public so enamored with our day-to-day efforts.

In several instances, we were analyzing our results from an experiment, or using a routine piece of equipment, and this would spark a reaction from the artist that surprised us. Our mindset in science trains us to see no value in an experiment's background noise and we barely acknowledge the tools by which we perform our experiments. Familiarity and failure are both instruments of neglect. Imagine our surprise, then, when the artist wanted to take pictures of a plate-washer, or a failed experiment, for no other reason than the objective aesthetic of it. For him there was no sense of either failure or familiarity. Therefore, he could see the beauty of it and, through him, we could too.

Out of the comfort zone

The collaboration was initially quite laborious as we were almost having to think aloud, explaining everything we were doing. Normally, when we have people shadow us in the lab, they are science students who have a general understanding of the core underlying principles of what we are doing. In this case, the artist had no scientific background at all and this made explaining our actions more difficult. However, it turned out to be very instructive. It gave us the opportunity to learn how to articulate our work to the general public and highlighted the sort of scientific language that puts the public ill at ease about our field. It was satisfying to see the recognition of not only the process, but the ultimate purpose and what it achieves.

Along these same lines, it was very interesting to learn how differently scientists and artists approach things. It could be said that scientists pursue quite a binary approach: did it work, yes or no? Is the equipment fit for my purposes, yes or no? From the artists' perspective, everything had some aesthetic value and the constraints for value were not a hard border, but rather a spectrum.

Another unusual aspect to having an artist in the lab was being on camera, rather than being obscured behind the work itself. In science, the work itself is always the focus, be it a research paper or a new device or treatment, but the scientist is usually in the background. For the most part, scientists are quite comfortable with this arrangement, as we are stereotypically a reticent bunch, so suddenly findings ourselves in the spotlight pulled us out of our comfort zone.

Learnings

As scientists we, of course, liked the way Karel used plant juices to develop photos of the plant. Our group already uses tobacco in a non-conservative way by having them produce medicines, rather than causing harm; we are trying to make them a global healer, instead of a global killer. The idea that these plants could even be used for something as benign as a photography developing agent is very much within our scope.

Furthermore, it was eye-opening to appreciate the aesthetics of objects that we see every day, but not that many people take the time to appreciate these objects. Both the process of residency and the artwork that came out of it brought us many new learnings. We learned about the juxtaposition

between science and art, despite the societally accepted friction. The experience was very helpful for us in training us how to explain our work to lay-people. It also ignited our own excitement about our work and our medium by seeing it through fresh eyes. As scientists, it is not our main purpose to provoke an emotional response, but rather to disseminate knowledge; however, through this experience we learned that such emotional responses should not be dismissed entirely and could even be valuable.

In other words, we learned that there is a place for art in science.

