Science for the small and the tall, the young and the old

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ABSTRACT
Public engagement becomes increasingly important for scientists. One reason is the demand of the taxpayer to know what her or his money is being spent on, and why. The other one is that in a world that increasingly relies on technology, student engagement even at a very young age becomes a target to assure the needed supply of well-educated and especially motivated scientists for the decades to come. And it falls on the older generation of current researchers to leave the comfort of their lab once in a while, to awaken the interest for science among the population. Many people may know that there is a ‘liquid crystal’ in their mobile (cell) phone display, but when prompted, no one really knows what that liquid crystal actually is, let alone how the display they use many times every day, actually works in principle. It is part of our job to change this. In this contribution Valentina Domenici and Ingo Dierking would like to report on two recent Science Festival events in which they took part, one held in Genoa, Italy, and the other in Manchester, UK.

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The ‘Festival della Scienza di Genova’

On 5 November 2017, the 15th Science Festival ‘Festival della Scienza di Genova’ (http://www.festivalscienza.it/site/home.html), which is the most prominent in Italy, ended, having been a great success for visitors and school students coming from all different areas of Italy (Figure 1) (http://www.festivalscienza.it/site/home.html and https://people.unipi.it/valentina_domenici/due-laboratori-didattici-sulla-chimica-al-festival-della-scienza-di-genova/). Every festival has an overarching, global theme; this year, 2017, it was ‘CONTACT’. This word offered scientists and science communicators to explore many different topics ranging from physics to medicine, geology, chemistry and also science in connection with art, history and philosophy.

The role of science in the society and the relationship of science with different aspects of everyday life is the central issue of science festivals and it is at the origin of the success in generating the interest among the public. On this occasion, we had the possibility to present two didactic activities developed within the framework of a course on ‘Chemical Education’ at the University of Pisa (Professor Valentina Domenici). The first didactic laboratory was about visible absorption spectroscopy (Figure 2), ‘Doing Chemistry with Light’ (or with its original Italian name: FARE CHIMICA CON LA LUCE) (https://www.unipi.it/index.php/news/item/11379-chemobia-cos-e-e-come-si-cura). It was an introduction to spectroscopy for high school students: they could do simple experiments in a very interactive environment, playing with real optical devices and performing measurements on coloured solutions by using a portable spectrophotometer developed in our group for educational purposes (http://www.chemasrl.it/index.php/prodotti/spettrofotometria). The second activity was designed for kids, but also students (Figure 3) from high schools attended and were very interested. This laboratory was about a special kind of lyotropic liquid crystalline material: soap! The activity (‘How does soap work?’, from the Italian: COME FUNZIONA IL SAPONE?) aimed to help visitors to find an answer to the basic question: Why is soap able to remove oil and fat? (http://www.musrosi.org/?p=362).

Kids could play with water, oil and soap, making experiments, built paper models of dispersions and soap, carried out interactive activities about the history of soap (Figure 4) and, finally, prepared their own soap with perfume and dyes, which was appreciated the most. All in all, kids and teens were really engaged with the topics presented, asked lots of questions and had ideas for doing similar experiments at home. They had a really good time learning the basics of some everyday scientific phenomena, leaving a team of slightly exhausted, but very satisfied demonstrators to think of something new to present next year.
The Manchester Science Festival

Also the Manchester Science Festival is an annually recurring event, which took place from 19–29 October 2017 all over the city of Manchester, with lots of different events ranging from playful science demonstrations, hands-on engagement, workshops and performances all the way to the involvement of arts. It is England’s largest science festival, a ‘creative, playful and surprising celebration of science, produced by the Museum of Science and Industry’, as the organisers put it (https://www.manchestersciencefestival.com/). Having done some very large science festival event in the past, Ingo decided to use a somewhat different approach this time, focusing on the part of the population that were arts enthusiasts, trying to engage artists and other creative minds with science, via an exhibition called ‘Liquid Crystals: Science meets Art’. We have thematised this before, but after all, the colourful world of liquid crystal textures with their defects and structures, ideally lends itself to attract the attention of the visitors. The exhibition was part of an overarching arts show called ‘A Grand Exposition’, an innuendo to the Great Exhibition of 1851, which was the first international exhibition to showcase technical and creative innovation through manufactured products (https://en.wikipedia.org/wiki/The_Great_Exhibition and http://www.vam.ac.uk/page/g/great-exhibition/). It was thus not quite sufficient to simply put up a few texture microphotographs, but also posters explaining the science were added to engage visitors with the beauty of science by relating this to their own everyday world (Figure 5).

The art show was organised by Cornbrook Creatives, a group of artists, designers, creative technologists, media producers and curators, and held at Talbot Mill, one of Manchester’s oldest textile mills dating back to 1855, and playing a key role in the city’s industrial boom (http://www.manchestereveningnews.co.uk/business/business-news/video-captures-historic-footage-life-12780467). Thirteen artists and groups of artists had been invited to present their work, which in some way or the other had to reflect on the interplay between science and art. Already at the opening of the exhibition, more than 300 people attended, with many more to follow over the following days and at the weekend. The interest in all subjects was large (Figure 6), not only from the exhibition visitors, but also among the presenting artists. One idea that I particularly liked was the creating of images via bacteria colony growth collected from everyday objects that we all carry around with us, like keys, coins, phones or wristwatches.

In conclusion, we may say that even with very simple means like Valentina’s soaps and Ingo’s texture microphotographs, one can initiate a lively interest and discussion with the general public about science and research, fascinate kids and stimulate them to ask questions about the world around them, and motivate teens to have a look at the technology they are using on a daily basis and ask themselves how it actually works. Eventually, we feel that everybody went away in the feeling of having learned something new and having had new experiences, visitors as well as demonstrators and exhibitors. And that is the most important part.

Disclosure statement

No potential conflict of interest was reported by the authors.
Figure 2. One of the two laboratories, ‘Doing Chemistry with Light’, with our portable spectrometer, coloured solutions and a paperboard didactic model (pictured Valentina in the middle, with her two collaborators, Giada, left and Leonardo, right).
Figure 3. The laboratory ‘Chemistry of Soap’, with a group of high school students and our two animators from the Festival della Scienza (Xhuliana and Sonia).

Figure 4. The animator Susanna with a class of primary school students playing a game about the history of soap.

Figure 5. Ingo explaining the history of liquid crystals, the operation principles of an LCD, different liquid crystal phases, thermotropic and lyotropic matter.
Figure 6. Visitors at the exhibition ‘Liquid Crystals: Science Meets Art’.