



As Greenpeace's Science Unit settles in to brand new laboratories at Exeter University, in the UK, Steve Erwood talks with the team who bring Greenpeace its scientific credibility. Come up to the lab, and see what's on the slab...

Exeter marks the spot

While putting the finishing touches to the last edition of *The Quarterly* towards the end of last year, I found myself talking with Paul Johnston, the head of Greenpeace International's Science Unit, about a completely unrelated topic when Paul suddenly said: 'You know what? You want to do a profile about the Science Unit in your magazine. People would like to read that, and since we're just moving from our old labs to brand new ones it's a good time to do it.'

I offered Paul my apologies – the 'Africa' issue of *The Quarterly* was more-or-less finalised, and besides which I wasn't entirely sure what I could write about the Science Unit. I mean – they're the guys in the white coats, right? They do all the weird and wonderful stuff involving test tubes and microscopes and Bunsen burners (I bet they don't get out much...) and I guess the new laboratories are just the same as the old ones (...actually, how would I know? The Unit's not based in Amsterdam, and I've never even seen the labs for myself). What's more, those guys have been doing their stuff for years already (now, how long exactly has Greenpeace had a Science Unit?), and it must all be pretty

boring... (even though they are all great people, and whenever I saw any of them, they're always telling me fantastic stories...).

It gradually dawned on me that – actually – I didn't know a great amount about the Science Unit or Paul and his colleagues' work. And if I knew so little about it, I could be pretty sure that a great many people wouldn't even realise that Greenpeace had a whole bunch of fully qualified scientists working for it – and highly regarded ones at that; in fact, Paul was named as one of the top 100 green campaigners of all time by the UK's Environmental Agency a couple of years ago. So, yes – Greenpeace does have some guys in white coats – and perhaps it's time to hear a little bit more about them, and why their work is so important to Greenpeace's success...



'Over the years, I have always felt unbelievably privileged on the occasions when I have sailed on the Greenpeace ships. I have always been a little in awe of the folk who crew these boats, get them from A to B, and their sheer commitment to what they do. So, it was a bit of a surprise, therefore, when – on a sampling trip using a small boat, crewed by no less than two Greenpeace ships' captains – we ran aground on a ruddy mudbank!'

Paul Johnston

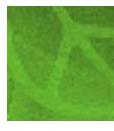


The 'Greenpeace Research Laboratories' are based at the University of Exeter in the UK. The Science Unit provides scientific advice and analytical support to Greenpeace offices worldwide and over a wide range of disciplines, including toxicology, organic and inorganic analytical chemistry, biochemistry and terrestrial and marine ecology. The laboratory facilities enable them to carry out research and analysis – particularly, analysis of contaminated materials - in-house. In addition to their research activities, the Greenpeace scientists also actively participate with the University of Exeter, running tutorial courses and supervising final year undergraduate projects within the School of Biosciences.

Having a dedicated Science Unit means that scientific analysis and research can be highly targeted to the specific requirements of Greenpeace campaigns, both in terms of what research is carried out and the speed with which it can be carried out when needed. And, with the move to their new laboratories at the University, the Science Unit staff are highly confident that the quality of their work will get better and better. The new laboratories

are equipped with modern facilities for sample-handling, enabling them to work more efficiently. At the same time, the state-of-the-art analytical equipment will help to strengthen the Science Unit's credibility in the scientific world, which in turn will bring many benefits for Greenpeace.

The move is especially welcomed by one of Paul's colleagues, David Santillo: 'It's an opportunity to work more comfortably on the many projects that are already lining up for 2009 and beyond, especially in support of the coming Water Project that will run in Argentina, Thailand, India, China and elsewhere. It's a chance to rationalise and consolidate our equipment and resources, and increase the extent to which we can provide science skillshares and training to our Greenpeace colleagues...and it gives us the possibility, at long last, for the Science Unit to seek formal accreditation for its methods, a development that has been prevented to date by the simple lack of a secure door between our equipment and that of the other researchers here at the University!'



people and places the greenpeace science unit

The precise origins of the Science Unit become clearer to me when I ask the guys what had brought them to Greenpeace in the first place. Paul's answer is typically straightforward: 'More correctly, what brought Greenpeace to me. It was 1987, and Greenpeace phoned the University of London to ask if there were any scientists available to take part in a 10-week project; I took that call!'

Following that project - an investigation of pipeline discharges that involved a complete circumnavigation of the UK - Paul continued to work with Greenpeace, and the Science Unit evolved from this relationship. It's a development he's understandably proud of: 'With the Science Unit, we've managed to gather together a really talented group of people, and I've watched them work and achieve positive changes all over the world. Over the last 20 years, the Science Unit has been involved in all of Greenpeace's key campaigns - it's so important to Greenpeace to be able to challenge scientific mindsets at the highest levels.'

Iryna Labunska, an environmental chemist and radiation safety advisor, also joined Greenpeace's growing scientific community in the very early days: 'I joined with a great enthusiasm, because the work allowed me to use my knowledge and expertise to help protect the environment from ongoing contamination. Also, the position gave me the possibility to present my findings independently and at all political levels.'

I ask Iryna which project she's worked on has made her the proudest. 'It's difficult for me to choose, really, because so many projects I've been involved with have made me proud and rewarded me in one way or another. But, one of the most recent projects that really touched my heart was the project on the 20th anniversary of the Chernobyl catastrophe.'

A veteran of 15 years service, David Santillo saw the Science Unit as an 'opportunity to use my scientific background and skills to the benefit of our environment, and the chance to get involved in a broad range of contemporary issues at the interface between science and policy. Rather than spending another three years staring down a microscope counting plankton, or spending six months a year working from a converted whaling station in South Georgia'. David, a marine and freshwater biologist and environmental chemist, has provided scientific advice and analytical support across many Greenpeace campaigns over the years, with a particular focus on the oceans and toxics campaigns, but increasingly on climate and energy issues.

'Science is one critical part of the way in which we understand the world around us and how it responds to the ever-growing impacts of human activities,' David explains. 'Having a dedicated Science Unit helps Greenpeace to engage at a technical level in a wide variety of debates, developments and policy discussions, to contribute unique data and critical analyses to those processes, and to underpin its campaign objectives and activities with compelling evidence. Scientific credibility is clearly important to Greenpeace, and ensuring the quality of scientific output from all levels of the organisation is a key function of the Science Unit.'



Paul Johnston

Paul set up the Greenpeace Research Laboratories at London's Queen Mary College in 1987, and has continued as the principal science since the group relocated to the University of Exeter in 1992. He obtained a PhD in 1984 from the University of London on selenium toxicity in aquatic invertebrates. Paul now has over twenty years' experience in providing scientific advice and expertise to Greenpeace offices all over the world.

Iryna Labunska

Iryna graduated from Kiev State University in 1980 with a Masters degree in chemistry. In 1991, following research into chemical reaction kinetics at the Ukrainian Academy of Science, Iryna began to work with the Kiev Laboratory of Greenpeace, which she managed from 1993 until joining the group at Exeter in 1995. The main focus of her work is to provide scientific advice and analytical support to the toxics and nuclear campaigns.

David Santillo

David obtained a degree in marine and freshwater biology in 1989 and a PhD in marine microbial ecology in 1993, both from the University of London, before continuing with postdoctoral research into nutrient pollution in the Adriatic Sea. A senior scientist, David joined the Greenpeace Research Laboratories in 1994 and now has more than 10 years' experience in organic analytical chemistry and development of policies for environmental protection.

With what he describes as 'a passion for science and a strong desire to work in a positive context', Kevin Brigden started out as a volunteer, then returned in 2000 (after a 2-year break) as a member of staff. With a background in chemistry, Kevin specialises in toxic chemicals, with a focus on heavy metals: 'That's mercury, lead, etc., not loud rock music,' he's quick to point out.

Kevin's proud of both the analytical work the Science Unit carries out, and the political aspects it involves. 'I've been involved in analytical research programmes that highlight the contamination of the environment by hazardous chemicals as a result of the inappropriate recycling and disposal of waste electronic equipment; we've been able to demonstrate these impacts in China, in Russia, in India, in Ghana. The research has had an influence on manufacturers and on national and regional regulations on the use of hazardous chemicals and the way in which electronic devices are dealt with at the end of their useful lives. I've personally been able to input on scientific and technical aspects of developing regulations – such as the recently agreed United Nations Environment Programme's international treaty on mercury.'

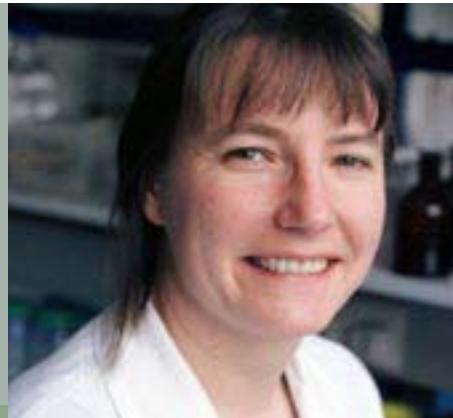


Kevin Brigden

Kevin gained a degree in chemistry from the University of Sheffield, followed by a PhD in synthetic organic chemistry from the University of Sydney in 1996. He worked as an analytical chemist and scientific advisor for a company supplying essential oils and conducted research into the feasibility of non-wood-based paper production before joining the Greenpeace Research Laboratories in 2000.

Janet Cotter trained for several years as an environmental scientist, but in 2000 was looking to apply her skills outside of academia. She'd already been a Greenpeace supporter for a number of years, occasionally being involved with UK local groups. When the Science Unit was looking for scientists to help with, among other things, the new challenges of genetically-engineered crops, Janet applied and the rest was history. 'I hadn't done a job like it before, and thought I would try it for a couple of years to see if I liked it. That was over 8 years ago, and I've never looked back. Every day is different, and you never know quite what to expect when you walk in the office in the morning. Our campaigners face many technical issues and need scientific explanations that non-scientists can understand but which remain accurate – for example, when they're explaining the dangers to wildlife of GE insect-resistant crops to a government minister or a journalist – now, that's a challenge!'

For Janet, one of her biggest successes was the case of GE papaya contamination in Thailand. Greenpeace had taken samples of papaya fruit – a mainstay of Thai cuisine – that tested positive for GE contamination by an independent lab. But, when Greenpeace took action against the contamination, our activists were arrested. 'The Thai authorities did not believe the results,' says Janet. 'I spent ten days in Thailand at various meetings of government officials and scientists. Eventually, they believed us enough to take their own samples, and all of these tested positive for GE contamination. The government acted to quickly test and destroy any papaya trees that were contaminated in order to contain the GE pollution, and the charges against our activists were dropped. Thai papaya was saved!'



Janet Cotter

Janet was awarded a degree in geology and geochemistry from Manchester University in 1987 and a PhD in soil science from Imperial College, University of London, in 1991. She worked as a NERC postdoctoral fellow at Manchester University and as a lecturer in plant and soil science at Aberdeen University before joining Greenpeace as a senior scientist to support the Ancient Forests and Genetic Engineering campaigns. Janet now has several years of experience in providing Greenpeace with scientific advice and technical support on genetically-modified organisms.

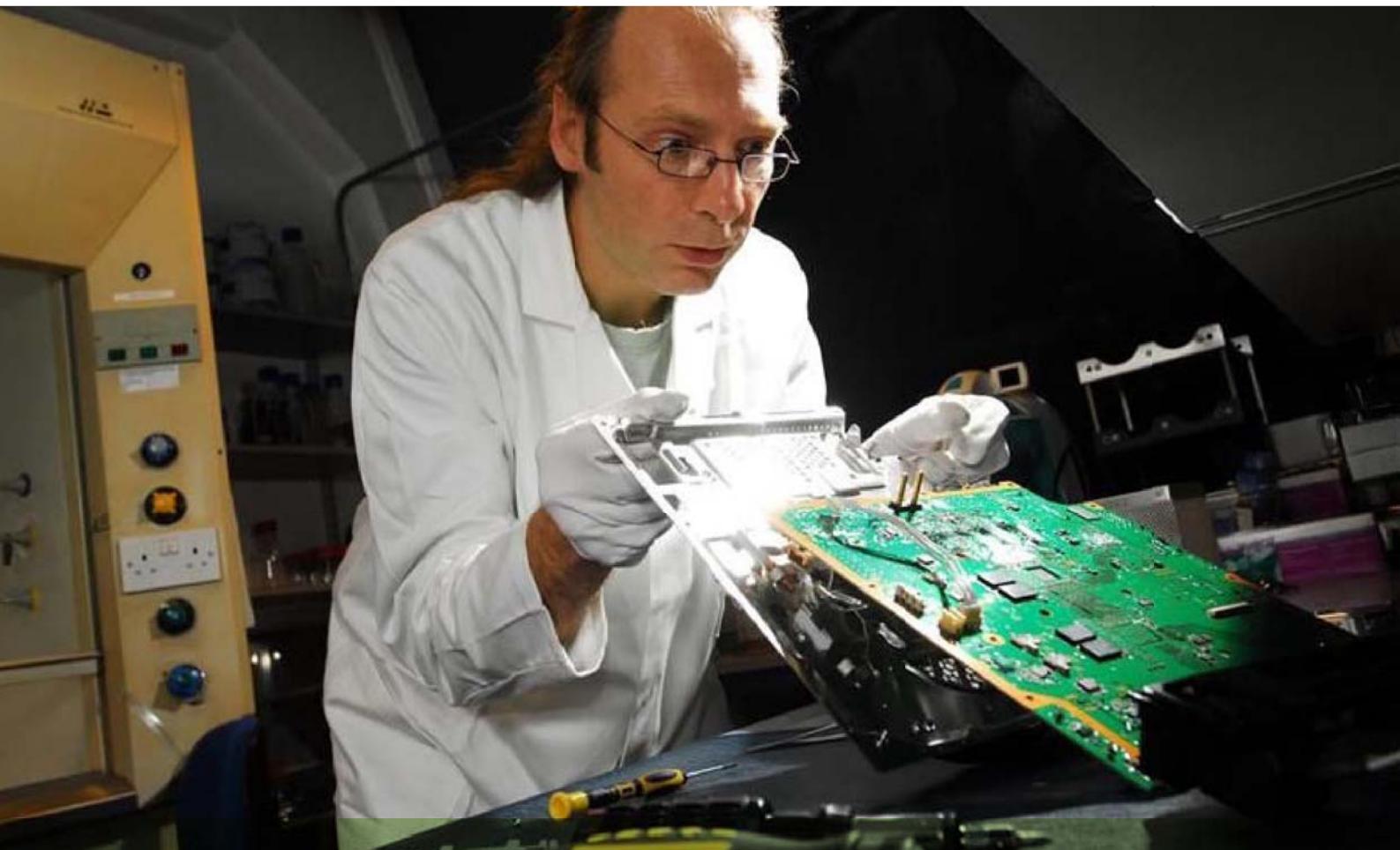
The newest addition to the team is Reyes Tirado, a plant ecologist working around agriculture issues, from water pollution from agrochemicals to how farming can help in the fight against climate change. The Science Unit was the first job Reyes ever applied for, and she sees it as a unique opportunity to combine her scientific background with environmental activism. 'A dedicated Science Unit is a sign of the importance that Greenpeace, as an environmental NGO, gives to scientific research,' says Reyes. 'It shows a vision of science working for the environment.'

Reyes is certainly enjoying her work, two-and-a-half years in. 'I love doing field work around the world, for example water sampling in Asia last year. I get to meet people in their daily life, like rice farmers in the Punjab in India, or in Thailand, who warmly open their homes for us and want us to learn about their work and life. It feels meaningful to me to work on issues that are perhaps viewed as passé by 'cutting-edge' science – such as water pollution from fertilisers – but that are still very relevant for people's lives in some places. And, working for the Science Unit gives me the opportunity to keep up-to-date with the cutting-edge science too; Greenpeace's work is so diverse, I'm always researching and learning about new issues, and that's what's so great about my job!'



Reyes Tirado

Reyes graduated from Seville University in 1997 and did her PhD research on plant ecology in the Estación Experimental de Zonas Áridas (CSIC) in Almería, Spain, getting her doctorate in 2003. She continued her research as a Fulbright postdoc at Stanford and Berkeley Universities in California from 2003 to 2006, studying fire and plant-plant interactions. She joined the Science Unit in 2006, where she is providing support in various projects concerning terrestrial ecosystems and helping to shape the Sustainable Agriculture campaign.



Weird Science

'I hope very much to see the end of the nuclear era, with immediate cessation of dangerous radiological waste build-up around the globe and the opening of broad opportunities for implementation of renewable energy sources and energy efficient technologies.'

Iryna Labunskaya

At this point, however, I must remember that I've also mentioned to Quarterly readers that my Science Unit colleagues have kept me entertained over the years with stories of their more amusing, risqué, offbeat and downright odd assignments. Some of these may not be entirely fit for public consumption, but what tidbits are our scientists willing to share?

For David, it's almost certainly the experience of providing scientific support to the Water Campaign run by Greenpeace in the mid-90s. 'A project that entailed not only explaining the complexities of pollution and algal blooms to large groups of schoolchildren on a pleasure-boat converted into a Greenpeace ship, but also engaging in the practicalities of pig-farming, negotiating a truce between the long-warring factions of trout and pike anglers,

fielding questions from island hermits about the ever-changing colours of the clouds and – of course – pushing a float in Limerick's St Patrick's Day parade.'

David says no more than that, and Kevin is equally oblique about his attempts to milk a cow living in a field next to a waste incinerator, in order to analyse its milk for hazardous chemicals. Paul, meanwhile, reminds me of an expedition to take smoke samples from the top of a factory chimney in the UK to prove that the owners were emitting radioactivity. To do this, Greenpeace had used a model helicopter that had previously seen service in one of the James Bond films, but the company owning the factory were unimpressed. Says Paul: 'They immediately tried to have us all arrested ... for stealing their smoke!!!'

The 'job' also brings with it moments of emotional confrontation and personal danger, however. For Kevin, visiting the site of the Bhopal disaster in India (where one of the world's worst chemical disasters to date took place at a Union Carbide factory in 1984), to demonstrate the extensive contamination remaining there 15 years later, was 'eerie and chilling'. And Iryna will never forget working in Argentina on the Riachuelo River project in the late 90s. She'd already been showered under the fallout of industrial wastewater and suffered from a terrible stomach bug when she was nearly killed by armed robbers while sampling in the poorer part of Buenos Aires; she owes her escape to the quick-thinking of her driver.



Mo Oram

Mo Oram has arguably the most important job of all in the Science Unit. She's the person who makes sure that things arrive on time, get delivered on time and that the bills get paid on time. She also makes valuable input to the practical work in the lab. In short, without her contribution the work of the Unit would quickly grind to a halt.

Mo has been central to the Science Unit's recent move, organising the space so that the office was ready to occupy straight away, and keeping a tight control on the expenditures on the new lab so that it was completed on time and on budget.

In what little spare time that she does have after work, Mo can often be found in local music venues - where her singing and song-writing talents complete her considerable array of skills - or in the university library, pursuing her degree studies.



Many of the global problems we face - like climate change, ozone depletion, and the spread of hormone disrupting chemicals - can only be detected and understood through science.

Greenpeace commissions many scientific research reports and investigations to support our campaigns, and we also use science to seek solutions and provide alternatives.

In recent years, the Science Unit has published the following discussion papers, technical briefings and reports:

- The report 'Oceans in Peril: Protecting Marine Biodiversity', exploring the various threats facing marine life and making the case for an ecosystem approach, including the establishment of marine reserves; a simplified version was published as a Worldwatch Institute Report;
- A major report on hazardous wastes discharged from factories manufacturing and assembling electronic components for computers in Thailand, China, Mexico and the Philippines;
- A landmark report on the status and hazards of nuclear technology development in the Middle East;

Scientific Consensus

They may have different reasons for coming to Greenpeace, and many different experiences thereafter, but there is one thing that truly unites the merry band in Exeter. And that's their hopes and aspirations – from the scientific perspective – for the future.

Their hope is that we will realise we live on a planet with finite resources and so develop our technology accordingly. 'In times of climate change there's an increasing risk that scientific complexity and uncertainty will be under-represented in order to justify wholly irresponsible schemes aimed at 'engineering' ecosystems to 'fix' the climate,'

warns David Santillo. 'False hopes start to appear, but these will do nothing to tackle greenhouse gas emissions at source and could even make matters worse.' What the Greenpeace Science Unit wants to see is that the understanding of science - especially science that considers people, uncertainties and ethics as part of the mainstream scientific process - continues to grow among the public and the decision-makers, and guides them in taking the necessary decisions and making the necessary changes to allow for a sustainable future for the human race and the planet on which we all depend.

It has also carried out research and provided in the following areas:

- A major sampling programme to study groundwater contamination from intensive agriculture in India, Thailand and the Phillipines; river and wastewater sampling in Spain for evidence of ongoing mercury contamination;
- Processing the many samples of floating plastic debris collected by the Esperanza during the global Defending Our Oceans tour;
- Analysing the presence of hazardous chemicals in laptop computers, revealing in some cases substantial quantities of a type of brominated flame retardant that would be overlooked by conventional testing;
- Advice to the European Food Standards Agency (EFSA) on GE potato crops;
- Consultation on the regulation of nanotechnology in Europe.