



# WELCOME TO THE BOFFIN BANK

The brain drain has finally been plugged. Young scientists like these are staying in Britain, fired up with breathtaking new ideas and inspired by a Nobel prize. By Amy Turner. Portraits: Loubie-Lou





◀ **PAUL WILLIAMS, 33, WEATHER AND CLIMATE, READING UNIVERSITY**

My inbox and filing cabinet have folders marked "hate mail". I keep a record of all the climate sceptics' threats, partly to provide a list of suspects if I ever disappear, but mainly because it's funny to read how many times someone can call you a "caulkhead". It's a strange insult: it means someone for whom three generations of parents have lived on the Isle of Wight.

The climate-change debate is especially vociferous because everyone feels they know the weather. Climate scientists are the first to admit that the prediction models we use aren't perfect, which makes the sceptics jump up and down with delight.

My greatest idea for improving climate modelling came to me when I was walking along a beach in California. A model is millions of lines of computer code containing the laws of physics applied to the atmosphere, ocean and ice. In real life, as we know, time flows

continuously, but in computer models, time has to be divided into discreet chunks. The model makes predictions by "leapfrogging" rhythmically from one chunk to the next, a process that's inherently unstable, but I've found a way to stabilise the leapfrogging which is being tested around the world.

Within 10 years, I think we'll see a model that predicts the weather and climate change exactly — it's the only way to resolve the debate.

You get a bit desensitised to your own gloomy predictions. It's true the oceans and the atmosphere are getting hotter. If we do nothing and it gets more than two degrees warmer than before the industrial revolution, ice will melt and we'll be in big trouble. We're basically conducting a massive experiment with our planet. But humanity is enormously impressive. We're quite capable of averting disaster. It's a question of whether we choose to.

What really bothers me is flying to conferences. I've been told you can't micromanage these things, so I fly all over the world for my career, despite the irony of it.

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▶ **HOLLY BRIDGE, 37, BRAIN IMAGING, OXFORD UNIVERSITY**

I have an image of my own brain on my computer I love to look at. It would be fun to scan it again in 10 years and see what's changed. I imagine my cortex getting thinner year by year. But no, it doesn't bother me in the slightest.

Just as people recognise faces, I recognise brains. I could pick my own brain out of a line-up. It's particularly small, but size has nothing to do with intelligence: it's proportional to body size.

I study brain plasticity — how the brain adapts as a result of its experiences. My particular area of expertise is the visual system. I

use an MRI scanner to look at how the brain reacts to different images. Faces, houses, objects — each has a different area in the brain. I study two groups of people: those who have lost their vision from stroke or brain damage, and people with anophthalmia, a rare condition, who were born with no eyes. Even in the womb, small levels of light infiltrate and there will be some visual activity, but anophthalmics never experience vision at all. It's like trying to think of a colour you've never seen — inconceivable.

They even dream in other sensory systems: touch or sound. We're finding the visual area of their brain responds to language instead. We tell them, "Think of the noise a dog makes," and the



visual cortex lights up. It's quite amazing. The brain has somehow chosen language, rather than other senses, to process. We're trying to discover why. Has reprogramming taken place at the auditory level and gone on to process language, or have the language areas at the front of the brain projected back onto the visual cortex?

It's theoretically possible to clone a brain, but the connections that make us what we are will never be identical, as they're created by experience. Fortunately, we're not even close to growing a brain in vitro. It might take 30 years. My dream would be to find a way of replacing brain function lost because of brain damage, but we're a long way from that yet.

