Dankesrede

von

Dr. James Poulet

anlässlich der Verleihung

des Paul Ehrlich- und Ludwig Darmstaedter-Nachwuchspreises

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Es gilt das gesprochene Wort.

Sehr geehrte Damen und Herren, verehrte Mitglieder des Komitees, zu allererst möchte ich Herrn Prof. Singer für seine freundlichen Worte danken. Ebenso danke ich der Auswahlkommission und dem Paul-Ehrlich-Stiftungsrat für seine Zeit und seine Anstrengungen im Auswahlverfahren. Insbesondere dankbar bin ich dem Max-Delbrück-Centrum für die Nominierung. Ich fühle mich äußerst geehrt, diesen Preis entgegennehmen zu dürfen. Jetzt möchte ich Ihnen mein Deutsch ersparen...so… the rest of my speech will be in English.

The brain controls how you feel, see, hear, move, and behave; it defines who we are. Its activity is incredibly complex, but usually takes place quietly in the background. When things go wrong the consequences can be devastating, affecting not only our behaviour but also our personalities. And unfortunately, things go wrong an awful lot. Brain diseases are often notoriously slow killers that rack up enormous health costs – something like a third of the entire European health budget. Paul Ehrlich talked about “magic bullets,” referring to drugs that act simply and directly to restore health. If such magic bullets were possible to develop for brain diseases, we need them desperately.

I believe that finding cures will require a profound understanding of the mechanisms that govern healthy brain functions. But in a brain with hundreds of different nuclei and billions of neurons and trillions of synaptic connections, I sometimes feel like I'm exploring a jungle using a 17th-century treasure map. Where's Google Earth when you need it? That's what we need to understand the brain, so, where should we start?

My own journey began in central London, where as a child I had few interests except playing cricket for England. That all changed when, as a teenager, I suffered from a series of epileptic seizures. Feeling my brain go haywire made me sit up and listen in my biology classes. During my Biology Degree at Bristol University I was introduced to experimental neuroscience by Prof. Alan Roberts. Here I learned the value of simple organisms with fewer neurons when it comes to studying brains that are far more complex. If you looked at the branches of a neuron under a microscope, you would have a tough time telling if they came from a cricket or a human. Many of the rules that govern complex brain function are most likely present in simple organisms as well.

As an undergraduate, my first experiments involved making recordings from motor neurons that control swimming behaviour in the spinal cords of tadpoles. Watching the activity of live neurons on a screen was tremendously exciting, even addictive. Tell your children: it’s better than any computer game. And I was fascinated by the fact that neuronal activity is directly linked to animal behaviour.

Throughout my career I have studied the neural control of movement and sensory perception in the behaviour of many organisms, from swimming tadpoles to singing crickets, from the twitches of mouse whiskers to the reaching movements of a mouse’s arm. At the Department of Zoology, University of Cambridge I joined the lab of Prof. Berthold Hedwig for my PhD. Here, too, the subject was a simpler brain – this time the singing cricket. We were able to identify the same individual neuron in different animals, which gave us real landmarks on the map. Prof. Hedwig was an excellent supervisor who gave me support during difficult experiments and the freedom to go down unexpected scientific paths. And he never complained that a great deal of my PhD was spent pursuing a different kind of cricket – the sport.

Crickets are LOUD, and after five years of listening to their songs I had become partially deaf. That was a bit ironic because I was working on principles of sensory perception – maybe it was time to have a look at a quieter animal. I turned to the mouse and began looking at the neocortex – the outer folder structure of our brain. This is our seat of conscious sensory perception and voluntary motor control. In mice it plays a role in touch perception transmitted by the animal's whiskers and paws. It was an attractive system – one of the few cases in mammals where scientists had worked out a partial brain map. Studying such things was also becoming much easier thanks to technical advances. You can now record the activity of single neurons at very high resolution, and intervene to change their activity at a time scale of milliseconds. And you can do all of that even while mice scurry about or perform learnt behavioural tasks. I began using these methods in an exciting, collaborative lab that had been established by my highly enthusiastic postdoctoral supervisor Prof. Carl Petersen at the École Polytechnique Fédéreal de Lausanne in Switzerland.

Independence came almost four years ago when I was invited to start my own lab at the Max Delbrück Center for Molecular Medicine in Berlin. I don't need to sell you on Berlin's many charms, even for a non-German speaker. But I was also attracted by the situation of science funding in Germany, which provided everything I needed to setup a lab. Neurobiology has been rapidly expanding in Berlin and at the MDC, making this an exciting and collaborative place to work. The excellence initiative “NeuroCure” was awarded to Berlin and has attracted more than 20 new neuroscience labs. So we are fast becoming one of the hotbeds for neuroscience in Germany and beyond.

The exciting research atmosphere here is nothing new; just think back a hundred years to the days when Paul Ehrlich and Robert Koch were revolutionizing research and treatments for disease. The cellular techniques that they developed are still in use today. I walk some of the same streets Ehrlich used to take when he treated prisoners at Moabit hospital – it is just around the corner from where I live. Ehrlich's work eradicated a number of lethal infectious diseases – can we do the same thing with neurological diseases? Surely we can, but doing so will require a deep understanding of healthy brain functions. The dramatic progress in neurobiological techniques in recent years will drive this understanding. These technologies often emerge from the most unlikely places. Who would have ever thought that a simple green algae found here in Frankfurt might lead to one of the most revolutionary techniques for studying the brain? But it did – this algae contains a protein that is activated by light, and now scientists have turned it into a tool by which light can be used to switch on or turn off neurons in behaving animals.

Such new techniques, known as optogenetics, may become the driving force behind a range of new medical applications. There is no telling where the next dramatic step forward will occur – or whether it will arise from a study of algae, crickets, or the paw of a mouse. Or indeed whether it will come from biology, chemistry, physics, medicine, or another discipline altogether. The best you can do is to create an environment that makes it more likely. You do that by assembling an interdisciplinary, motivated team like my lab, in a place with healthy levels of funding and strong support for basic research. Berlin was such a place in Paul Ehrlich's day, and it is such a place now.

Nochmals möchte ich Prof. Singer und dem Kommittee für den Preis danken. Natürlich muss ich an dieser Stelle meinen ehemaligen und meinen jetzigen Kollegen für die Zusammenarbeit danken. Und auch meiner Familie für alles. Ein letztes Wort zu mir und Berlin: Der Beweis dafür, wie verbunden ich mich mit der Stadt fühle, ist: wir haben ein Haus gebaut. Vielen Dank für Ihre Aufmerksamkeit.