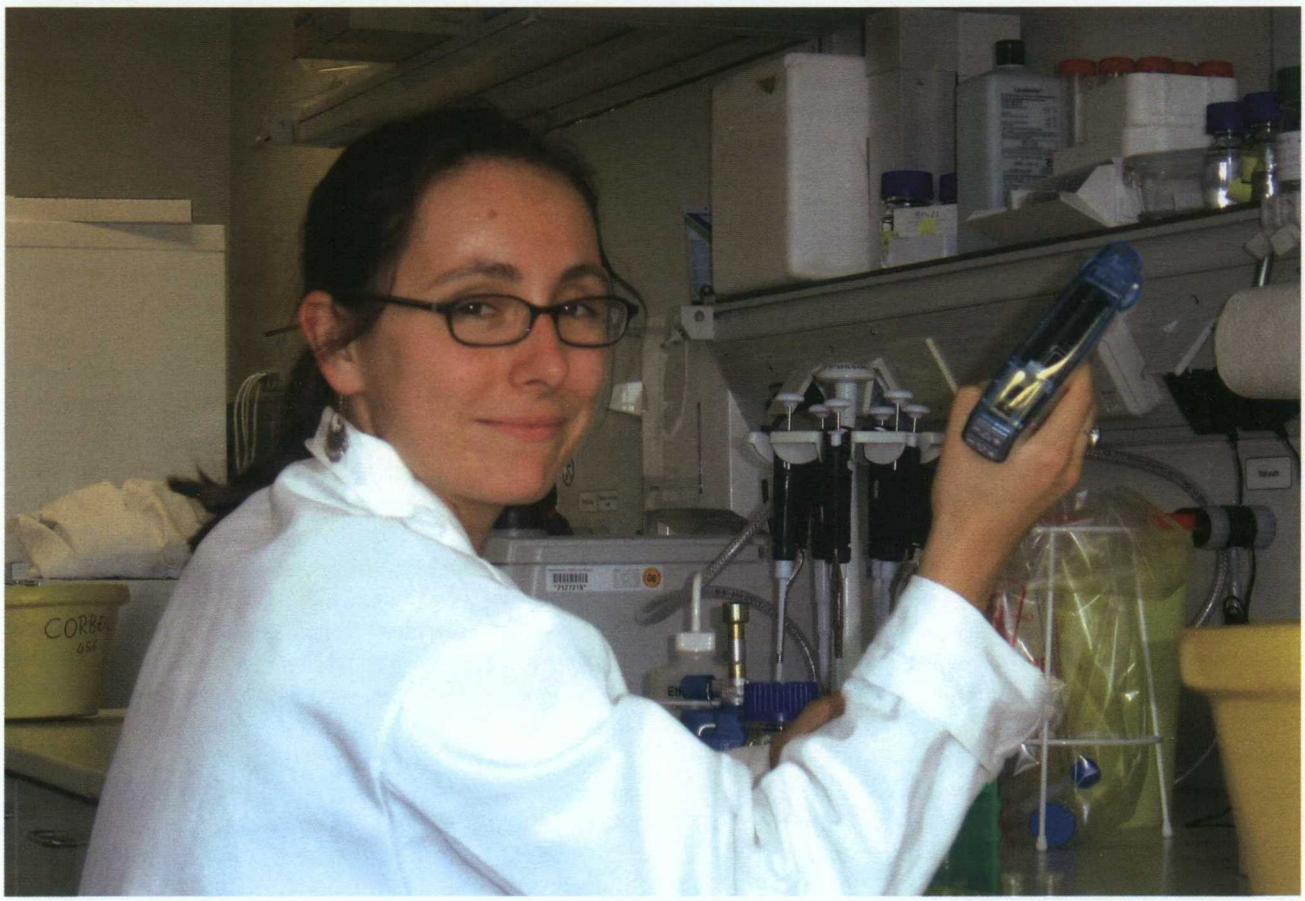
Science International



Ewa Paluch Archives

The work of dr Ewa Paluch brings together two science disciplines, biology and physics, and two institutes in two countries

Academia: You lead a joint research team affiliated with both the Polish Academy of Sciences and the Max Planck Society.

Dr E. Paluch: *Under an agreement signed by the Max Planck Society and the Polish Academy of Sciences several years ago, an exchange has been decided. A group financed by the Max Planck Institute has been in Warsaw for 5 years, while my situation is just the opposite: my group is financed entirely by Poland, by a contract granted to the International Institute of Molecular and Cell Biology (IIMCB) in Warsaw.*

You are a very young researcher, yet your career is advancing very rapidly. Do you have many peers among the team leaders at your research institution?

Not really. I suppose I am the youngest one here. Let's say two or three years younger than the others.

How did you come to lead a team at such a young age?

I think it was a combination of factors. One of them was that I am so "European" – I was born in Poland and speak Polish, but I have lived in France for 20 years, and so my background was evidently appealing. The selection commission said they liked the fact that at this age I already have the kind of projects and research vision they would expect from someone older.

How have you managed to do so much in such a short time? Is it perhaps luck?

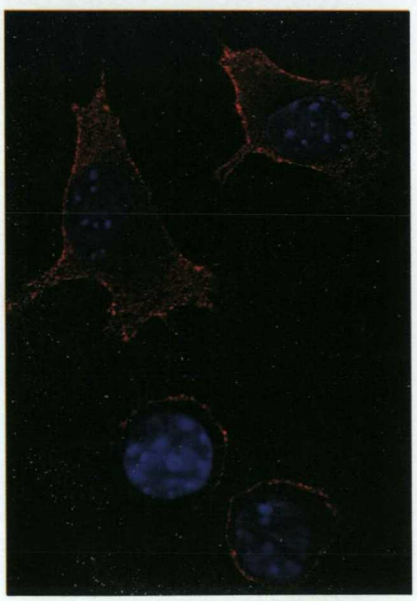
There definitely is a lot of luck involved, because you have to have a project that emerges at the right time and focuses on a good topic. My doctorate

definitely came out well, but it is not particularly extraordinary. I was also helped by the fact that I very much like to read articles. And perhaps also because I had a pretty difficult project for my doctorate; in the end I did read a bit more than people usually do and gained a better awareness of things. I guess I was also helped by the fact that I am a physicist by education. I got my master's in physics, but I did my doctorate in biophysics; I spent half of my time in the physics lab and half in the biology lab, so I essentially had two thesis advisors. One was a biologist, the other a physicist. That meant I had to be very independent, because neither of them fully understood the issues I was dealing with. But it was this that gave me a broader approach than someone working in only one field.

In this age of globalization, with such a mix of nationalities among researchers even within the same laboratory – here you are a good example – should we speak at all about science as pursued in a specific country, or about discoveries by researchers from a specific country?

That's really hard to say. Science is so very international because researchers come from different countries. However, we can definitely talk about the research that is pursued in a specific country when that country finances this research. I think that's where the difference lies: how a country chooses researchers and how it decides to finance them. That matters more than the nationality of the researchers themselves, because good researchers will work wherever they find good working conditions. That's what matters most. Working conditions of course mean financial prospects, but the atmosphere is likewise important. If someone senses they will not have the right to speak their mind until they are 50 years old, it is hard to speak of a good working atmosphere.

Ewa Paluch



Cells move and change shape by deforming their actin cytoskeleton

Do you believe that Asian countries like Japan or Korea can be attractive for European researchers?

That is a personal matter; it depends on the individual. If someone is prepared to travel so far, to a different culture, they will definitely find institutes offering good working conditions – but I am happy in Dresden at the moment.

The U.S. are considered the most attractive. Can European centers be competitive?

They can, but there are fewer of them. Things are so attractive in the US because there are so many more centers there. Recently, there was a competition for a team leader position at the IIMCB in Warsaw. There were Polish and foreign candidates in the running. Since foreigners were applying, that means Warsaw can be attractive to them, that the conditions are very good. Besides, the United States is now in a recession as far as research funding is concerned; only 10 percent of grant applicants receive funding, and so in such terms Europe is indeed becoming more attractive. Also note that there is a large group of Europeans who want to return to Europe, and will return if such an opportunity presents itself.

How did you come upon the topic of your research: the protein skeleton of the cell (cytoskeleton) and changes in cell shape?

It all started with my master's thesis, essentially already dealing with biophysics. I also took classes in physics and biology. For physicists, one of the most interesting issues in biology is that of how cells move around – because that directly leads to physical questions. When I was looking for an institute for my doctorate, I met a professor from the Curie Institute, who showed me many interesting things about changes in cell shape; how, under certain conditions, cells form a constriction ring that travels back and forth across the cell surface. For a biologist, this is interesting because it normally occurs only during cell division, but in this case it can be provoked at any time. It can also be done with cell fragments, not just with whole cells. For physicists, something moving in regular fashion, with a certain oscillation period, represents very interesting physical phenomenon. We want to know how this functions from both the biological and physical standpoints. That's how things got started. Most importantly, changes in cell shape are directly related to the cytoskeleton. That's why I got interested in it and then worked on actin through my whole doctorate.

So actin is the primary protein for movement within the cell?

Yes, because actin forms a network under the cell membrane – we might compare it to an elastic sock or stocking – extending all around the cell surface. This network has active properties, it can contract in one place, loosen up in another, enabling the cell to change shape.

I will ask you a question researchers usually don't like to be asked: what are the practical applications of such research?

In this case that's not particularly difficult. Cells move and divide chiefly in

Ewa Paluch Archives

Dr Ewa Paluch took science world by storm, becoming one of the youngest team leaders in Europe

two cases. Firstly, when an embryo is developing. When a new organism is emerging, its cells divide as well as move around. But they can also move when an individual is ill - here we have the very dangerous case of cells that divide and move out of control. Such cells lose the control mechanisms that prevent them from dividing or moving and start proliferating and migrating in a completely uncontrolled manner; these are cancer cells. Of course we are not seeking new medications directly, but trying to identify a means that would help halt metastasis, i.e. formation of secondary tumors consequent to uncontrolled migration of cells out of the initial tumor to other parts of the body. Metastasis involves cells that begin to divide in uncontrolled fashion and then change location, shifting from the arm to the brain, for example. To do so, a cell has to be capable of infinite divisions and independent movement, but that is not normal; most of normal adult cells do not move about and do not divide. That's why understanding how such cells become capable of it, holds the key to treatment. There is hope for success, but it will definitely take many years and involve many labs and pharmaceutical companies.

Can you imagine yourself potentially pursuing such research in Poland?

That depends on how Polish centers develop. I am not ruling anything out but now I have an appointment for 5 years, and so that is quite a distant prospect.

And what conditions would have to be met for you to be able to pursue your research in Poland, properly and at a good pace?

There is one problem: few institutions have the kind of financial potential as the Max Planck Institute, so buying lab equipment and consumables is more expensive. Buying a centrifuge here at the Institute in Germany, for example, costs half as much as in Warsaw. Not many centrifuges are sold in Poland, and so the producers can dictate prices. That is a problem. It can be solved by giving Polish science more funding. I hope this will indeed happen and that the technical conditions will be similar to those found elsewhere.

Anything besides that?

I definitely cannot see myself at an institution where people address each other as "professor." I'm not used to that at all. Here in Max Planck Institute, for example, it is customary for people working at the same institute to be on a first-name basis. The first name basis does not entail lack of respect; I think it is simply necessary for things to operate well, and to promote creativity and independence of young people.

Interviewed by
Piotr Kossobudzki
Warsaw, June 2006

Dr Ewa Paluch, a biophysicist, was appointed in 2006 as leader of a research team for the Max Planck Institute of Molecular Cell Biology and Genetics (MPI-CBG) in Dresden, jointly for the Polish Academy of Sciences, after only three months working at the institution. She earned her doctorate in biophysics from the Curie Institute in Paris in 2005. She studies the fundamental biochemical and physical mechanisms of cell motion and deformation.
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