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Q&A

Professor Maurice Moloney

Interviewed by Freddie Theodoulou (General Editor)

Professor Maurice Moloney is the new director and chief executive of Rothamsted Research. He has written more than 80 scientific papers and holds more than 300 patents in plant biotechnology worldwide. Professor Moloney is also a leading authority on plant cell biology, especially seed biology and its biotechnological applications in crop improvement. He is the 12th director of Rothamsted since 1843, succeeding Professor Ian Crute CBE, who retired from the institute in 2009.

How did you get into science?

In my family, science was always considered to be an important part of life. My parents weren't scientists, but they always had a great respect for science. My dad worked in the aerospace industry and my mother worked in a cotton mill, but both of them always believed that our future was paved with the achievements of science and so there was an atmosphere of respect for science in the house. When my sister read chemistry at university and came back at weekends and told me all about what she was doing, it got me really excited and that's how I ended up doing chemistry.

What makes you tick, scientifically? What gets you out of bed in the morning?

I have to be honest and say that virtually everything I've ever done in science has been done with the motivation of some kind of application at the end of it all. I have never really got involved in science that is either purely theoretical or purely driven by curiosity. I've always investigated problems that, if you could solve, would actually make a difference through their application. Going back to my early career, I worked for ICI, developing plant growth regulators, using a lot of basic chemistry and that has been a paradigm for my scientific motivation. So I still get excited about the idea of coming to work and working on projects or helping people work on projects that have an economic or sociological or environmental benefit.

Thinking about this and the influence of your parents, do you think impact of research plays an important role in how scientists are perceived in society?

Yes. I think scientists have a responsibility to report back to the people who have provided money to do research. The vast majority of money comes from the general taxpayer. It's hard, because what we have are specialists communicating with laypeople, and some people have more of a gift than others to get those messages from the lab back to the general public, but I think that it's very important that we do that. If we find scientists that are particularly gifted in this way, then we should encourage them, because it is really the way that people understand that expenditures on science are true investments in our future.

What do you consider to be your best research achievements?

An early example: at ICI, while I was still a teenager, we devised a number of new compounds that had very unusual effects on plant growth. In more recent years, the major thing that I'm known for is creating the first genetically modified crop plant (oilseed rape) at Calgene. We were competing with Monsanto: they transformed model plants – tobacco and petunia, but we were the first to transform real crops – oilseed rape and also tomato. You had a large company competing with a small company – David and Goliath, you might say! The impact on agriculture of developing the transformation systems has been enormous: for example, transgenic oilseed rape (canola) occupies 90 % of the acreage in Canada. That technology was immediately adopted by producers in Canada because it had such an impact on both yield and soil quality. And then, more recently, I have always looked upon a plant as simply a machine for converting carbon dioxide, water and nutrients into other chemicals, so with advent of genetic engineering, it's been possible to reprogramme a plant to make it a factory and I've been involved in the production of protein pharmaceuticals. We've gone as far as performing human clinical trials with plant-made insulin, which was a world first. Plants are just as good as *E. coli*!

A logical progression from GM is synthetic biology; where do you stand on that?

Obviously, my track record in GM technology is

writ large in the literature and so nobody would have any illusions... but seriously, as regards synthetic biology, I'm extremely interested in our ability though the successes of systems biology to actually consider the idea of constructing organisms for specific purposes. Obviously, it will be a long time before we could create a synthetic plant or any eukaryote, but the opportunities for making synthetic micro-organisms or possibly synthetic organelles has not escaped most scientists. Things that sounded like Isaac Asimov science fiction a few years ago are now on our list of visions for the next 10 years.

What did you make of the anti-GM lobby's response to your appointment?

The best headline that I saw was: "The BBSRC declares war on the natural food movement"! Nothing could be further from the truth: in matters of science, I'm a complete pacifist. We don't need to engage in war, but we do need to be realistic. If there is a reason why BBSRC took a risk in placing a scientist who has a long history in GM in the Directorship of the one of the world's great agricultural research institutes, it is because it is our long-term belief that we cannot solve the enormous problems that are on the horizon in agriculture, unless we use all the tools that are at our disposition. GM plants are not the only set of tools, but in order to do many of the things that we need to do in a timely manner, we will have to use whatever technologies enable us to get there fast enough. So my prediction is that the areas of response to climate change, bioenergy, food security, safety and quality, are going to have to enlist GM technologies as part of the future. These things take 5 to 10 years to move from the research base to commercialization and I think over this time period, we'll see this debate becoming more rational and less politicized.

Why did you decide to take the job as Institute Director?

To be offered the chance to take charge of one of the top agricultural research institutes that has ever existed is a wonderful opportunity. It's an offer that one could not refuse!

What do you consider makes research institutes distinct from universities?

It's a very important question, because a lot of people would think that the high quality of research that goes on in British universities

should be sufficient. But we need to commit ourselves to many strategic objectives in order to change the way we do things in agriculture and those objectives require long-term commitment and they also require a high degree of inter- and trans-disciplinary collaboration. Those things are most efficiently done under one roof. Very often, you see institutes or centres being created at universities to realize the economies of scale and intellectual synergy that come with having people collaborate closely.

And how about the distinction between Rothamsted and the John Innes Centre?

First and foremost, I'm a great fan of the John Innes. The relationship that I fully intend to foster between Rothamsted and the JIC is one of collaboration and complementation. One of the things that Rothamsted clearly needs to do, is to define itself and that definition will make it clear what we do that is distinct from the mandate of the JIC. We are entering into a strategic planning phase, but broadly, my view right now is that Rothamsted Research is perfectly placed to do incisive, translational, agricultural research and that can and will have just as much scientific impact as working on model systems. We're going to be responsible for developing systems that can be transferred to the user sector, whether they be novel germplasm, novel agricultural chemicals or new systems for creating bioenergy. The responsibilities of the JIC are not necessarily to have to develop systems that are sufficiently robust to be transferred to the user sector.

What do you think are the greatest challenges in the next few years? And the opportunities?

The immediate challenge is going to be ensuring financial sustainability of the Institute. This is not a problem that is unique to us; we have just emerged from a deep recession. We're not going to be immune to financial hardship and yet we still have to deliver science. So, our main priority is balancing high-impact science that is useful with budgets that are going to be limited, at least for a few years. Having said that, hardships can also be opportunities to really focus on the things that we believe that we are very good at or that have a very high probability of making a large impact.

Will you conduct/direct your own research?

Yes. I'm very excited about the fact that a director can put a group together and continue to do active research. There are areas at Rothamsted in which we have a world-class reputation which happen to be very close to my interests, so I am in a fortunate position! The areas in which I am most likely to work are oilseed biochemistry and molecular biology. Also what you might call 'bioproducts': harnessing the power of plants to replace substrates that we normally obtain from fossil fuels.

Any other priorities?

I really want to focus on the combination of outreach and communication and the training of young scientists so that we can accelerate their careers by creating an appropriate working environment. To some extent, this is going to be dependent on funding. I would like to see an increase in public-private partnerships in this area, as we could become one of the foremost training grounds for the agribusiness community. If we are to meet some of the challenges of food production, bioenergy and climate change worldwide, there are going to be a lot of jobs for agricultural scientists and we want to be one of the training grounds for those people. ■