

The Nobel Prize and beyond

An interview with Sir Paul Nurse, joint winner of the Nobel Prize for Physiology and Medicine 2001 and Director General of the former Imperial Cancer Research Fund, now Cancer Research UK

EMBO reports (ER): How did you hear that you had been awarded the Nobel Prize?

Paul Nurse (PN): I was at a meeting in another part of London about raising money for Mendel's monastery in Brno. Jim Watson was present and it was being chaired by Kim Nasmyth. Back at my office, the secretary of the Nobel Committee had been phoning but didn't say who he was. He kept ringing and they began wondering if this was important. So they unusually gave him my mobile number, but then realised that I wouldn't have it switched on because I never do. Someone at the meeting asked me to turn on my mobile, but the recorded message was somewhat distorted. I played it through and I wasn't quite sure what it had said; at first I thought he was perhaps a journalist and he was asking me to comment on the Nobel Prize. I couldn't quite grab it and then gradually I got excited because I thought it was possible that I had got the Nobel Prize. I went back into this meeting and said something really quite stupid like 'I've got to leave now because I *think* I've won the Nobel Prize' and rushed out.

ER: The work for which you received the Prize was based on a number of discoveries about the cell cycle, the isolation of the *wee* mutants defective in cell division, the identification of the *cdc2* gene, its homology to Hartwell's *cdc28* gene from budding yeast and so on. Was it only really when you identified the human homologue of *cdc2* that people realised the importance of this work?

PN: You're right. I did a lot of genetic work on cell cycle control in fission yeast that people really weren't interested in,

though it was published in reasonably good journals. In some ways that was good because I wasn't constantly pitched against competition all the time, I had a complete



clear run. Then my group translated this control into molecules and got well down that avenue before anybody was taking much interest. But the big shift was in

'The big shift was in 1987 when we cloned the human *cdc2* gene, and suddenly it all burst upon the world'

1987 when we cloned the human *cdc2* gene, and suddenly it all burst upon the world.

ER: Why did you choose to work on the fission yeast *Schizosaccharomyces pombe*

rather than the more common *Saccharomyces cerevisiae*?

PN: I wanted to take a genetic approach to the cell cycle, and yeast was the best organism to do that. I also needed to stay in the UK for domestic reasons. So the first reason was simply pragmatic—because in the UK, the best cell cycle laboratory was Murdoch Mitchison's, who worked with fission yeast. The second reason was that fission yeast divides by middle separation, which is more 'normal' than budding.

ER: But with *pombe* being a more unusual organism, wasn't it then difficult to convince others of the more general importance of your findings?

PN: It was difficult, not because it wasn't a good model but because there were relatively few people working on fission yeast. It wasn't a question of convincing people, it was more that the interested community was so small that you didn't have a natural springboard for the rest of the scientific world. The field of budding yeast was bigger so you naturally affected more people and then others were sucked in. We had to work quite a lot harder with fission yeast to be able to do that.

ER: Is there a particular reason why the cell cycle field was chosen by the Nobel Prize Committee in 2001? Has there been anything specific that has now made the full impact of your discoveries evident?

PN: No, but with the Physiology and Medicine prize in particular, where the science can be softer, they are cautious about making a decision too quickly. Biology is messier than physics and chemistry and they have to be really clear that it's absolutely right, and that takes

interview

some years. The cell cycle field has been around as a potential prize for some years, and why this year was chosen I don't know. But having said that, I was really pleased that it was, because the 100th Nobel Prize was actually a very nice ceremony to go to.

ER: Did you meet some of the scientists there whom you've admired, anyone in particular who served as an inspiration or a role model to you?

PN: I met lots of people that I've always respected. Around 50 winners of the Physiology and Medicine prize were there, so it was an extraordinary gathering.

ER: Do you think this award will inspire another generation of scientists so that you become a role model for other people?

PN: I hate thinking like that because it sounds as if I'm on my way out. I suppose it might, but I never look upon myself like that.

ER: What do you think we can do to attract more people into science as a career?

PN: There are several things. One is that we really do need to get out and show that science is an exciting activity. The problem is that science is really difficult to do well. I sometimes use a metaphor that science is like a foreign language. We would all like to read Tolstoy in Russian but to be able to really appreciate the beauty of the novel, you've first got to learn Russian and that requires a huge investment of your time and energy. And it's the same with science. You have to go through quite a lot of hard work, not all of it interesting, before you get to a point where you can truly appreciate the beauty

lot in this respect. There has been some improvement there, which is to be welcomed, but even so, scientific researchers have been undervalued by



our politicians in the past and this has to be reversed.

ER: The funding policy of the Imperial Cancer Research Fund (ICRF) is particularly attractive where you recruit scientists into 6-year tenure track positions and provide them with a well-equipped laboratory of four or five people.

General of the ICRF. Do you think that this will raise public awareness, not only about cancer and cancer research but also about the huge gap that exists between basic research and drug development?

PN: We always have to be cautious. The problem here is that the journalist wants to sell the story, and the story cannot be sold on the beauty of a scientific result or an interesting observation because this is lost unless you can read Russian, to continue the analogy. For the public, the interest of it is based on its application and then they always ask when are you going to cure a particular disease. And so we constantly have to draw back from that and say it will be 20 years or more before we can translate these discoveries into clinical benefits, and unfortunately that isn't such a good story. There's this constant pressure to make it sound more exciting.

ER: As a Nobel Prize winner, people will listen whenever you speak...

PN: Unfortunately yes. That's really scary.

ER: Is there any particular area in which you wish to use this influence?

PN: I am interested in 'Science and Society' issues. I think that there has been a divorce between science and

society for several reasons and I think this is unhealthy for both. So I would like to use the Prize as a way of getting a wider public debate going over these sort of issues.

ER: The noticeable aspect of your CV is that you haven't spent any time working in the United States, which is quite unusual. Can European research institutes compete with those in America?

PN: The better ones can, definitely.

ER: But just looking at the past Nobel Laureates, there has been a significant decline in European scientists receiving the award in the eighties and nineties. Are we investing enough funding into basic research to allow scientists to 'follow their nose' and do the sort of research that ultimately leads to Nobel Prizes?

PN: The US is certainly more generous in funding this type of research, and always has been. There are disadvantages, though, in the way their system operates. People are very nervous about getting and

'It's a great privilege to do research, actually, but people still have to be able to live and publicly funded academic science has suffered a lot in this respect'

of it. We've somehow got to communicate this beauty, the excitement of it, so that we can keep people interested while going through the difficult bits. The second is that it has got to be shown to be a decent career structure and we've got to reward people appropriately. It's a great privilege to do research, actually, but people still have to be able to live and publicly funded academic science has suffered a

PN: Yes, and I think it shows the advantages of having a decent funding policy and a good working environment. In fact, around 70% of our principal investigators are from outside the UK, so we're obviously competing effectively with the rest of the world.

ER: There's been considerable media coverage recently of your work on the cell cycle and the fact that you are Director

interview

keeping funding in the US, and I'm not sure that this atmosphere is good for encouraging long-term work. Even though the funding in the UK, and to some extent in the European environment, is less

PN: I've been a strong enthusiast of the merger for several reasons. One is that we will no longer compete for the same pot of money. And secondly, we can have a national policy and strategy on all sorts

that. But there are different sorts of things I could do. I could use my experience to run a scientific organisation, for fundraising and the media; I'm interested in Science and Society issues and in the communication of science. I'm not quite sure what—my lab plus 'something else'.

ER: Was it a complete surprise that you had been awarded the Nobel Prize or did you have your suspicions beforehand?

PN: The Lasker Award is often thought to be a good predictor—about half the people who receive the Lasker are awarded the Nobel Prize—and I'd also received a Gairdner Award, another predictor. So I knew it wasn't impossible, but when it actually came it was a real shock.

ER: And now—has it sunk in?

PN: It really didn't for quite some time, I'm not sure it has now. There is a difference, people want to talk to you now, whereas before they wouldn't take much notice. I've just been in India where I was mobbed and that certainly wouldn't have happened before October.

ER: I don't remember this much hype surrounding a Nobel Prize before.

PN: It's been extraordinary, for me at least. At the press conference I knew that they would ask me what I was going to spend the money on. I could've said I was going to pay off the mortgage, which is probably true but a bit boring. So I said I was going to buy a bigger motorbike. Of course, the press picked up on that because it's sort of normal but also slightly risqué. The next thing I know I've got *Motorcycle News* phoning me up and the *Daily Telegraph* getting me to test motorbikes 'for those with the male menopause returning to motorcycling'.

ER: Your life's never going to be the same again.

PN: No, it isn't.

ER: Sir Paul, thank you for the interview.

The interview was conducted by Susan R. Owens.

DOI: 10.1093/embo-reports/kvf060

'Science is done differently in the UK, Germany, France, the Mediterranean countries and Scandinavia, and we should value those cultural differences'

generous, you can work with more distant horizons. Is there enough funding for basic research in the UK? No, I don't think there is, but I'm sure that that is an issue of quality as much as quantity. We should be supporting our best people better, we need expansion, but we should only be expanding quality. We need to keep very high standards because that's what really matters. We should find good scientists and train them in Europe, because we should have a European dimension to science. I spent some very important time in Switzerland learning to work with fission yeast and some very useful time in Copenhagen too, so I've had closer links with continental Europe than the US.

ER: Do you think European research as a whole is too fragmented and should be more streamlined? Is there too much overlap between some of our research councils or what various countries within Europe are trying to achieve?

PN: The US has a great advantage in that it acts with common mechanisms throughout a population of 250 million, but in Europe, it's just never going to be like that. But we can gain in other ways because science is a wide activity and there is a real advantage in a range of cultures approaching scientific problems. Science is done differently in the UK, Germany, France, the Mediterranean countries and Scandinavia, and we should value those cultural differences. So I think yes, it is a bit fragmented and it is a bit anarchic but we may gain something from that diversity.

ER: The ICRF is currently merging with the other UK cancer organisation, the Cancer Research Campaign, presumably with the aim of streamlining research.

of things like recruitment, training and infrastructure support, which is difficult to do with two separate organisations. The third reason is that it will be more cost-efficient, so there should be more money available for research.

ER: Where will this leave you as Director General of the disbanded ICRF in the future?

PN: Well, the ICRF will stop existing as such in about 2 weeks time (end of January, 2002) and it will become part of Cancer Research UK together with the CRC. For me personally, I've been given the responsibility to merge the science and that's what I will do for about a year. After that it's not clear what my future will be.

ER: It must be a demanding task running your own research group and being the Director General of the ICRF.

PN: It's been really difficult and it's only the sympathy from my bosses, the non-executive trustees of the ICRF, that has made it possible. The ICRF identified that having an active scientist in charge was very important and so they protected my time. In theory at least, 50% of my time was for running my own lab and 50% for the organisation. It's fallen apart a bit recently with the increased workload of the merger and even more with the Nobel Prize, but I hope it will get better.

ER: You've already achieved so much with being knighted, the Lasker Award in 1998, now the Nobel Prize and heading the ICRF for the past 5 years. What's next?

PN: I don't know, that's a good question. I very much enjoy doing my own research. As long as in my judgement I still have something to contribute at the highest level, I really would like to continue to do