The Noble Prizes in the new century

An interview with Ralf Pettersson, Director of the Stockholm Branch of the Ludwig Institute for Cancer Research, the Karolinska Institute, and former chairman of the Nobel Prize Committee for Physiology/Medicine

Ralf Pettersson (RP): I understand that you are interested in the actual procedures for awarding the prize.

EMBO reports (ER): I guess you have been asked these questions a million times before.

RP: Yes, of course the Nobel Prize Committee for Physiology/Medicine receives such questions frequently, but we are reluctant to discuss our work in public. Part of the Nobel Prize awarding system is to be discrete. And we certainly do not comment on people who have not received the prize. Of course, having been a member of the committee for many years, you gain a broad perspective of science, which, after all, is the most interesting part of the Nobel Prizes.

ER: I think this is definitely more interesting, because you might be able to see the direction in which science is moving, particularly the biomedical sciences.

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RP: The Nobel Prizes do not necessarily reflect the direction in which science will be moving in the future, because the present prizes are awarded for discoveries made between the 1950s and 1990s. Thus, the prizes are often given for discoveries made quite some time ago. Although the will of Alfred Nobel states that you have to award a discovery made in the previous year, we have only once or twice been able to live up to this. We want to be sure that the discovery is of sufficient importance and that it withstands the test of time. And that takes time. I guess the record is held by Peyton Rous who discovered the tumour-inducing sarcoma virus in about 1916 and got the prize in 1966!

ER: Half a century! So you really wait for the impact of the discovery.

RP: Yes, the criterion 'the previous year' is interpreted by the Nobel Assembly as the year when the full impact of the discovery has become evident. We often hear the comment that the prizes have been overdue. This may be so in many cases, but we cannot afford to make mistakes. And, physiology and medicine cover broad areas. Many discoveries compete for a prize. Since the prize can be shared by a maximum of three candidates each year, this means that some candidates may have to wait quite some time. Just to complete the list of criteria for awarding a Nobel Prize, the third criterion stated in the will is that the prize has to be given for a discovery 'that has conferred the greatest benefit to mankind'. The interpretation of this criterion is an ongoing point for discussion in the Nobel Assembly and Nobel Committee.

With regard to your question, in what direction is science moving today? I can only say that we live in an extremely exciting era. You just have to think of the cur-

rent explosion in molecular and cell biology, genetics and genomics, neurobiology, developmental biology, etc. The consequences and the impact on clinical medicine remain to be seen in the future, but expectations are certainly very high.

ER: So you think your successors in 10–20 years will have a more difficult job?

RP: I really don't think so. As in the past, awarding Nobel Prizes will always depend on discoveries that establish new concepts, open up new lines of research or, in some cases, develop a new powerful technology that changes the course of science. The essence of the Nobel Prize is—and not all people realize this—that we go up

the river to see where the river started. We want to award those people who really made the crucial, eye-opening discovery. We therefore strictly adhere to the main criterion of awarding the prize 'for a discovery' as stated in Alfred Nobel's will. Whether the new science, for instance genomics, transcriptomics and proteomics will lead to prize-worthy discoveries remains to be seen.

ER: Would you, for example, consider awarding a prize for the sequencing of the human genome?

RP: I can't answer that question. But the impact of the human genome project, as well as the sequencing of other organisms' genomes, will certainly be enormous. Clearly, through the establishment of databases, we will have new tools to address many questions related to higher order complexities. We will be able to study complicated molecular machines in completely new ways. We will be able to go from genes and proteins to complex systems, to functions at the organism level and to physiology. I'm very excited about this. It's like driving a fast sports car on a

interview

scenic road. The pace of science today may seem overwhelming, but I'm convinced that there will always be creative scientists to make new fundamental discoveries.

ER: The Nobel Prize given to Prusiner would be a perfect example.

RP: In a way, yes. Here is one man who pushed his ideas and fought for years against the establishment. There will always be individuals of this kind. So even if the way people do science today changes dramatically, perhaps more towards the way research is done in physics where you may have a staff of 100 and more people, you usually can identify the creative mind, the person who had the original idea and who orchestrated the whole thing.

ER: Do you think that you will ever run out of primary researchers?

RP: So far, we haven't seen any signs of that. As I said, there will always be creative individuals. And there are still many fundamental discoveries to be made.

ER: Could you imagine giving a Nobel Prize to a scientist from industry if he/she fulfilled the criteria you just mentioned?

RP: Yes, scientists from industry are by no means excluded. A recent example is the chemistry prize that went to Kary Mullis in 1993 for the discovery of PCR. This discovery was made while he worked at the Cetus Corporation. Another example is that of Godfrey Hounsfield who shared the med-

ical prize with Allan Cormack for the development of computer-assisted tomography. Hounsfield worked at the EMI Research Laboratories. So there is no reason why scientists working in industry could not be given a Nobel Prize. However, according to the statutes, we cannot give a prize to an institution or an organization, as the Peace Prize Committee is able to do.

ER: How many nominations do you get each year?

RP: Between 250 and 350. It varies quite a bit depending on where we send the invitation letters. Each year we send out some 2500 to 3000 letters, and we alternate between different academies and research institutes around the world.

ER: Given the advancements in the field of biology, could you imagine establish-

ing a new Nobel Prize for molecular biology or plant biology?

RP: We have given many prizes to molecular biology, and, in fact, occasionally also to plant genetics, for instance in 1983 to Barbara McClintock, who discovered 'jumping genes' in maize.

ER: But you do not have a separate official prize.

RP: No, molecular biology and genetics are well covered by the physiology/medicine prize. And the Nobel Foundation has no plans to establish new prize areas. The five existing prizes are defined in Alfred Nobel's will. However, there has been

maintained, in fact how a new cell is created and maintained.

ER: So when you consider a prize, do you deliberate with experts from many areas?

RP: Yes, we use a broad range of experts. The 50 members of the Nobel Assembly are all full professors at the Karolinska Institute, the medical university in Stockholm charged with the task of awarding the prize in physiology or medicine. They represent a very broad expertise in most areas of medical research. In addition, we always rely on reviews by external experts.

ER: The vast majority of Nobel Prizes, particularly in physiology/medicine and chemistry go to scientists in the USA. Given the way research and funding for research

have developed there over the last 10–20 years, do you think this will further shift towards the USA?

RP: No, I don't believe it will. I think science in Europe has developed very positively. Europe now has a fantastic chance if it could just focus its resources in a meaningful and effective way. However, Europe is not the USA, where 50 states adhere to the same peer review system. The European scene is more complex. Now, the way the EU decides how to distribute research money is absolutely critical for the future of science in Europe. There is currently a very active discussion about the content and principles of the Sixth Framework Programme. So how we use the money in Europe in the long-run will not only determine whether there will be more Nobel Prizes in Europe, but also how competitive Europe will be in comparison with the USA.

ER: Regarding the way the EU designed the draft of the Sixth Framework Programme, do you see a positive development?

RP: There are such signs. Let's hope that the EU can move from discussion to action. I also hope that all the organizations that are working hard to change and improve the funding policy can really co-ordinate their views and efforts. I am talking about ELSO, EMBO, ESF, FEBS, etc. But I trust that the European Life Sciences Forum (ELSF) will be able to do just that. I am very optimistic about science in Europe. There are great resources now, and excellent research groups and institutions in the life sciences area. EMBL and EMBO have played very important roles in training scientists and developing peer review systems. For

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one exception—the prize in economics, first awarded in 1969, which is not a true Nobel Prize, although in reality it has reached the status of a Nobel Prize. It was instituted by the Swedish government and the award was donated by the Bank of Sweden. There are indeed important areas, such as ecology and mathematics, which are not represented in the present prize categories. Physiology was originally meant to represent primarily human and animal physiology. But early on, physiology was defined much more broadly. Take, for instance, the prize awarded to Gunter Blobel. Although they have clear medical implications, Blobel's discoveries also have fundamental implications for how a cell is built and works, how the organelles are put together and

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instance, the review of molecular biology and biotechnology that EMBO conducted 4 years ago in Finland had a profound impact on the financial support to these areas. Both politicians and scientists really listened to what the reviewers said.

invest in technology and basic research. However, one valuable natural resource that Finland has in addition to its forests is its gene pool. Because of their history, the Finns represent an isolated genetic population, which is ideally suited for identifying

RP: I'm not sure this is true. Every time a Nobel laureate expresses an opinion, people listen. Nobel laureates are much used in the USA and they have a great impact. For instance, the American Society for Cell Biology has a very active public policy committee chaired by the Nobel laureate Paul Berg. When ASCB takes a stand on human stem cell technology, they mobilize 30–40 Nobel laureates to sign an appeal, which is sent to Congress or to the White House. I am sure that such lobbying has an impact. I think things should be done in the same way in Europe. ELSO, because it is largely modelled on the ASCB, has the potential to be an organization that can become a strong lobbying group. But as you point out, we still see too little of this today. Scientists are more concerned about their experiments and their funding. But there is a responsibility to speak with the public and scientists should reserve time for that.

ER: You never hear about the decision making of the prize committees and their members are reluctant to speak publicly or give interviews.

RP: All our work connected to the selection of Nobel laureates is strictly confidential. A leak may severely hurt a candidate, if he or she in the end is not awarded. We don't want to have rumours about the possibility of an award to a particular nominee. It is interesting that the 50 members of the Nobel Assembly and the many external referees have respected confidentiality so well for a whole century. This is also true for other awarding institutions. We all feel an enormous responsibility for the reputation of the Nobel Prizes. This year we will celebrate the centenary of the first Nobel Prizes. It is really amazing how well the procedures have worked over the past century.

ER: Do you think it will work in the new century too?

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ER: But Finland and Sweden both regard science and research as very important for their economies. Sweden spends nearly 4% of its GDP on R&D and Finland is close behind. Other European countries spend much less.

RP: Yes, this is true. In the European setting, what the countries do, how they invest in research on a national level and how much they are willing to put into the common EU pool, is a very interesting and complex issue. The reason why Sweden has such high funding is partly historical, since Sweden has a glorious scientific past. But one has to remember that today much of the research money is for R&D in industry. Then there are funds from the EU programs, and the Swedish Foundation for Strategic Research, both with clear components of applied research. So, although funding overall looks very good in Sweden, there have been substantial cut-backs of government support for basic research and infrastructure at the universities. Finland has also invested a lot into developing research capabilities over the last 10–15 years. As a consequence, presently the research climate in Finland is excellent, despite the fact that Finnish universities have experienced the same cut-backs as in Sweden.

ER: Finland has been very successful in creating a knowledge-based society!

RP: Yes, because it has systematically built up a science policy that to a large extent is based upon excellence. During the past two decades a network of biotechnology institutes has been established at the universities and medical schools. In addition, programmes funded by the Academy of Finland based on international peer review processes have been running for the last decade or so. In fact, many think that research groups are reviewed too frequently in Finland. But it has had the impact that the quality of science has increased. The politicians have realized that Finland, with no national resources other than its forests, has to

invest in technology and basic research. However, one valuable natural resource that Finland has in addition to its forests is its gene pool. Because of their history, the Finns represent an isolated genetic population, which is ideally suited for identifying

disease genes. Finnish genetic research has been extremely successful regarding studies on monogenic diseases. **ER:** There is this huge debate in Europe about GM foods and GM plants. Is the Nobel Committee in any way influenced by such discussions?

RP: No. As an awarding institution we do not take an active role in this discussion, although we follow it as individual scientists. I think scientists should actively take part in the public debate on GMOs and take an interest in educating the public. I think the fear that people have about GMOs is due to an absence of sufficient knowledge. When people in the street say, 'I don't want to eat DNA,' we should be concerned. Therefore, teachers at schools and scientists in general have an obligation to educate people.

ER: I could imagine that the awarding of the Nobel Prizes could be a perfect opportunity to educate.

RP: This is absolutely true. The time around the press conferences at which prizes are announced is a golden opportunity for us to inform the public of the wonders of science. For each prize, we have about 24–48 h to talk to the media. Now, we have the new Nobel Electronic Museum, which is a wonderful forum for disseminating information about science. We will certainly take greater advantage of this opportunity in the future. Because

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science is moving so fast there is an ever-growing gap between scientists and the community. We therefore have to do a lot of work to educate the public so that they understand what we are doing. The Nobel e-Museum is an important channel.

ER: The Nobel Prize laureates or even the Nobel Prize Committee are the ultimate authority. But you don't often see them speaking to the public.

RP: Yes, I think so, and I don't agree with those who criticize the Nobel Prize for being obsolete. We don't see any good reason to stop awarding Nobel Prizes.

ER: Professor Pettersson, thank you for the interview.

The interview was conducted by Holger Breithaupt.
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