Interview with Professor Grzegorz Węgrzyn

What It Takes to Really Compete

Dominik Sadowski/Agencja Gazeta

I long for the funding situation in Poland to improve; then we will really be able to compete well

Academia: What did you want to become when you were 5 years old?

Professor Grzegorz Węgrzyn: A traveler. That has partially come true, because I do travel a lot – though because I have to, not because I want to. I also took a longstanding interest in biology.

How do you manage to shift so easily between fundamental research and work on practical applications?

Firstly, I lead a large research team (now 30 individuals), so it is relatively easy to move from one topic to the next. Secondly, I refuse to give up on fundamental research, as a kind of solid basis. If an interesting topic arises while continuing our existing research, we test out the new avenue. Several times marginal topics have developed into projects with not only interesting merit but also application potential. Of course, they do often turn out to be dead-ends or artifacts.

What would you consider your most important applied discovery?

We were the first in the world to propose a treatment for Sanfilippo syndrome, which had none. This is a tragic genetic disease that affects children – patients do not live to adult age. The first stage of clinical tests is now ending, and the results are encouraging. The diseased cells accumulate glycosaminoglycans because they lack an enzyme to break it down. Sanfilippo syndrome chiefly affects the brain, so administering the enzyme intravenously doesn't help since it can't cross the blood-brain barrier. We have tested a substance that blocks glycosaminoglycan synthesis, restoring balance to the system, and patients are evidencing a lower level of glycosaminoglycans after it is applied. We are also very pleased at the positive results seen in specialized psychological tests. Without therapy, sick children first develop normally, then stagnate before dramatically regressing in their mental development. Most

of our patients were at the regression or stagnation stage. A comparison of pre- and post-therapy tests has shown that all of the children studied improved their condition; we not only halted the pathological changes, we also achieved an improvement in their mental abilities – a sensational result for this disease! The substance used, genistein, is cheap, being produced from soya extract. Unfortunately that fact poses a problem in finding pharmaceutical companies interested in investing in clinical research and producing a drug.

What are the prospects for gene therapy?

15 years ago such therapy was said to be five years off; the same thing is being said now. The prospects are excellent, working well in animals. The main problem lies not in introducing genes to cells, but in maintaining their activity. Cells which accept the gene become handicapped in some way and lose out to rival cells. That means that the gene's activity eventually expires, usually lasting a year or a year and a half, after which the therapy needs to be repeated. Each time the vector virus has to be changed, and since there are only four main types of them there is not much room to maneuver. A new possibility has also appeared, whenever switching off a gene might be an approach to therapy: gene silencing using what is called RNAi. Although RNA molecules are unstable, they are easier to administer than whole genes, and can be administered repeatedly. Still, doing so is very expensive for the time being.

You also take an interest in the genetics of marine microorganisms. That has led to a method for gauging seawater pollution.

The most standard test for the presence of mutagens, the Ames test, is based on mutated Salmonella *bacteria, which cannot be used to test seawater since* Salmonella *quickly die in such water. We decided to try using* Vibrio harveyi *bacteria, which occur in all the seas. The species is not pathogenic to humans (as* Salmonella *is) so working with it is safer, and it is also more sensitive to harmful substances. The test itself is similar to the Ames test: we measure the frequency with which antibiotic-resistant mutants occur. A variant of the test takes advantage of* V. harveyi*'s natural bioluminescence. We possess a mutant strain of the bacteria that emits weaker light. If we add mutagens to their food, strongly luminescent "revertants," or bacteria that have reverted to their natural type, occur with a certain frequency. The more mutagens – of course within a reasonable dosage range – the brighter the luminescence. Our biological test is good for making a preliminary check as to whether a sample is polluted or not. Luminescence attests to the presence of some mutagen, then chemical methods must be used to identify it.*

You have supervised 21 doctorate students. What is your method for helping young scientists grow independent?

At the outset we discuss every project and experiment. I meet with every doctorate student at least once a week. With time they gain proficiency, trying to resolve their own problems and conduct their own experiments. Later, it is crucial to have a system: my first doctorate students have stayed on with the department and are now assistant professors, passing on some of their own experience to doctorate students. This system is therefore somewhat hierarchical: doctorate students arrange the main tenets and stages of their research with me, later my role is taken over by these assistant professors.

It is standard for molecular biology researchers to do a stint working abroad. How can they be encouraged to return to Poland?

Researchers returning from post-docs abroad say that working at my lab is essentially no worse than at Western institutions, which don't in fact have better equipment or offer better possibilities. Of course, they do see a difference in terms of science funding. As for salaries – here we unfortunately cannot do much. But grant amounts themselves are also significantly smaller. Unfortunately, after coming back their work is not organized in

Wojciech Jakubowski/KFP/Fotorzepa

I got involved in research work due to my contact with Prof. Karol Taylor as an undergraduate. A lot was going on at the Department of Molecular Biology, and once I got sucked into the atmosphere of the lab, that was it

an encouraging way: assistant professors have so many non-research-related duties, that it is hard for them to concentrate on research. Fighting for every order can be overwhelming. Of course, this can be done by a secretary or a special department, but that either takes forever or get something other than you actually wanted. Still, we do manage to arrange working conditions that encourage my people to come back.

What do you feel is the main problem of science in Poland?

Terrible funding. With the current level, practically only a few labs are capable of working on a good level. Hardware is growing old and will go to pieces in several years' time. If no radical improvement comes, people will start moving abroad even more.

The mood is quite somber; is there a chance it will change?

There should be. Our country will be held to account by the EU: research funding is supposed to account for a minimum of 3% of the GDP by 2010. If we cannot count on political goodwill, we should hope that Poland will be forced into it.

What you think of Europe's competitiveness with respect to the United States?

Honestly? It's shabby. Although the money for research from the EU is not bad, one could write books about the EU bureaucracy. Filling out tables and writing justifications – where the substantive material takes up half a page and such things 20 pages – take so much time that if I instead spent it thinking about planning research, the money would be utilized 3 times better. The value of research is not even a secondary issue, in both the awarding and evaluation of EU grants. It's as if the purpose of awarding a grant were to spend money according to a precise plan, while what the money is used for is less important. The principles of the Sixth Framework Programme made for pleasant reading, and were supposed to be a method for closing the gap behind the US. But if someone from the US read these volumes of cost-reporting rules, they would probably die laughing. The notion of European science integration is excellent but instead of looking at the results, attention is paid to bizarre things. For example: if I purchase a pipette using an EU grant, I have to prove that I use it only for the European project. It should be kept locked in a special closet. If I do use it for other grants, I have to keep a note-

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Many of Prof. Węgrzyn's former doctorate students stay on at the department after earning their degrees. Dr. Marcin Łoś, winner of this year's stipend from the Foundation for Polish Science, returned to Poland after serving a foreign internship and is now an assistant professor at the Department of Molecular Biology, University of Gdańsk

At the PAN Institute of Oceanology, Prof. Węgrzyn directs research on the genetics of marine bacteria and methods for detecting mutagenic substances polluting sea water

book on how much time it was used for which projects. Then the time percentage is summed up and I can only use EU money to cover that percentage of the pipette's cost. The same story for clearing every little cost, which takes a lot of time and energy.

What do you think about the legal regulations on genetically modified organisms (GMOs)?

The latest EU report is very positive, explicitly stating that no side effects of using GMOs have been noted. The Polish law on GMOs is very restrictive and in fact runs counter to EU directives and law. Our country could face very big problems – and here's hoping we do, since such legislation is awful for us. Just modifying an organism does not render it harmful. Genetically modified plants are much safer than varieties obtained by traditional methods. They pass through so many selection stages, with such precise knowledge about which gene was altered or introduced, that we know much more about them than about varieties obtained by traditional methods. Yet Polish law prohibits GM plants from being sown. Even worse, two years from now a ban will be imposed on importing foodstuffs and animal feeds containing GMOs. Poland's cheap, good-quality meat products are currently in great demand, but we mainly import feeds based on GM soya. Once such imports are banned we will have to import significantly more costly feeds based on "normal" soya, making these products more expensive and no longer competitive. That is a very realistic threat faced by our meat farmers; market conditions could completely collapse.

What is it you dream for?

I would like to continue doing what I do. I long for the funding situation in Poland to improve; then we will really be able to compete well. If we are now coping somehow with such vestigial funding, things will be good when the situation improves! I also hope for better legislation, for the Public Procurement Act to be altered at least as applied to institutes and universities, or at least grants. To buy a computer you have to go through tendering procedures and you end up with one a year later – it's agonizing. The result is that we buy worse equipment, at more cost and with greater delay. Of course, public procurement regulations were not enacted just to make scientists' life difficult. But a university is not like one big enterprise; each grant project is completely different. Thirdly, I long for our EU to wake up and start paying attention to the research value of projects. Those are my dreams.

Here's an opinion found written on an Internet forum: "I had Grzegorz Węgrzyn as a lecturer; he's an amazing person and scientist. I hope he fulfils his dreams." I'd like to wish you the same.

Interviewed by:
Marta Fikus-Kryńska
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Prof. Grzegorz Węgrzyn (b. 1963) is one of Poland's most eminent molecular biologists. He earned his Ph.D. (1991) and D.Sc. (*habilitation*) degrees (1995) at the University of Gdańsk, becoming a professor at the age of 35. He is head of the Department of Molecular Biology and dean of the Faculty of Biology, Geography and Oceanology at the University of Gdańsk; head of the Molecular Biology and Marine Biotechnology Laboratory at the PAN Institute of Oceanology; and patron of the Laboratory of Molecular Biology, Institute of Biochemistry and Biophysics (affiliated with the University of Gdańsk). A member of the PAN Scientific Committee on Oceanic Research, deputy chairman of the PAN Committee on Biochemistry and Biophysics, chairman of the Polish Genetics Society. The author of more than 160 articles in international research journals plus several books. He has supervised 21 doctorate students. In 2003 he won the Hevelius Research Award in the pure and natural sciences. He edits the international journals *Plasmid*, *FEMS Microbiology Reviews*, and *Microbial Cell Factories*. While his research chiefly concerns gene function and the copying of genetic material, Prof. Węgrzyn also works on the biology of bacterial viruses, the mechanisms of human genetic disorders, bacteria resistance to antibiotics, new diagnostic techniques, environmental pollution and bioluminescence.