Polish Science Is Afraid to Demand Excellence

Scientific excellence is, by its nature, selective. You cannot fund everything and everyone equally, says **Prof. Anetta Undas** of the Jagiellonian University Medical College, a physician, researcher, and member of the Council of Poland's National Science Centre from 2016 to 2024, serving as its chair in 2024. In an interview with *Academia*, she explains why Poland needs centres of excellence, stronger international collaboration, and the courage to set higher expectations.

Looking at Polish science today, where do you think its greatest strengths lie?

ANETTA UNDAS: During my eight years on the Council of the National Science Centre, I had the opportunity to see the best research projects being developed in Poland, assess grant applications, and observe what is actually happening across different scientific disciplines.

Without question, the strongest areas of Polish science remain the natural sciences, particularly physics, astronomy, and chemistry. If we talk about research at what might be called a Nobel level—not in the sense of winning the prize itself, but in terms of work that changes how a field understands itself—those are the disciplines in which Poland is currently most visible. Astronomy stands out in particular. Chemistry is also exceptionally strong. Biology is a more complex picture, but there, too, we have some outstanding research groups.

You can see this in publications in top-tier journals, citation rates, and the presence of Polish scientists within the global scientific community. Whatever reservations people may have about bibliometric indicators, they still tell us a great deal about the quality and influence of research.

If I had to point to specific institutions, I would mention the Institute of Organic Chemistry of the Polish Academy of Sciences, the Astronomical Observatory of the University of Warsaw together with its collaborating centres, as well as the Nencki Institute of Experimental Biology and the International Institute of Molecular and Cell Biology in Warsaw.

That said, it is not really institutions that matter most. Science is ultimately created by people. The finest building and the most advanced equipment will never produce groundbreaking discoveries on their own.

Sometimes the impact of a single individual is remarkable. An exceptional scientific leader emerges, talented doctoral students and young researchers begin to gather around them, grants follow, international collaborations develop, and suddenly the entire group becomes visible on the global stage. When that person retires or leaves for another institution, the centre often weakens surprisingly quickly. It is a reminder that science remains fundamentally a human endeavour, built on relationships, intellectual exchange, and a particular culture of inquiry.

So people are what distinguish the strongest institutions.

Above all else, yes. Infrastructure matters, of course. In biology, medicine, and chemistry, modern equipment is absolutely essential. Yet many institutions today are reasonably well equipped, and that alone does not automatically translate into world-class discoveries.

What truly makes a difference is a community of people who are eager to pursue ambitious projects and

who have the ability to build creative, hardworking, and resilient teams around them. Such individuals attract other talented researchers. They know how to collaborate, exchange ideas, and create an atmosphere of intense intellectual engagement.

Openness is equally important. The strongest research groups tend to operate internationally. Researchers come from abroad, leave for fellowships elsewhere, and new collaborators are constantly entering the picture. Fresh ideas circulate continuously. In contrast, when an academic environment becomes too inward-looking and everyone has known one another for thirty years, it becomes much harder for genuinely original ideas to emerge.

Institutional support also matters, and in Poland it remains relatively weak, although this is not uniquely a Polish problem. Researchers across Europe complain about excessive bureaucracy, legal constraints, difficulties in hiring staff, and obstacles to organising their work efficiently.

The United States operates according to a very different philosophy.

There is much greater mobility and a stronger willingness to take risks. European welfare states place more emphasis on stability. On the one hand, that provides security, particularly in terms of employment. On the other hand, it does not necessarily encourage the rapid development of science. Sometimes I feel that European science, despite its many strengths, is losing ground precisely because it spends too much effort protecting existing structures and too little supporting its most dynamic research groups.

There is also growing concern about the number of young people entering science. Doctoral enrolment is falling, and more researchers are leaving the country. Are we facing a generational gap?

Absolutely. A scientific career is no longer particularly attractive, either financially or in terms of social prestige. Nor does it offer young people a sense of stability or the prospect of a comfortable life. It is essentially a profession for people who are deeply passionate about research, and there have never been many such people.

What worries me is that even exceptionally talented young researchers increasingly ask themselves whether the effort is worthwhile. They see older colleagues moving from one grant to another while carrying a heavy administrative burden. Industry, especially in the natural sciences, offers attractive salaries very early in a career. The same is true in biomedicine. Among younger generations, physician-scientists are becoming increasingly rare.

That is hardly an incentive to remain at a university.

More and more talented people see little reason to build their future within the Polish academic system. They leave for undergraduate studies or doctoral programmes abroad and often never return. It is difficult to blame them. Life is simply easier elsewhere.

And this is not just about salaries or the size of grants. It is about the broader working environment: greater opportunities, greater flexibility, and a culture of mobility that is deeply embedded in the American system. It is also about the sense that science genuinely

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matters to the state, something reflected, among other things, in levels of investment in research and development relative to GDP.

In Poland, science is still too often treated as a passion project rather than as a strategic investment in the country's future. I consider that a serious systemic problem. To be honest, I do not yet see enough determination within the ministry to address it in a meaningful way, even at a time of growing geopolitical uncertainty. Delaying decisions and postponing reforms is not a viable strategy.

The consequences of neglect are rarely visible immediately. They emerge years later. If we lose an entire generation of young researchers now, rebuilding that capacity fifteen or twenty years from today will be extraordinarily difficult. Scientific excellence cannot be developed overnight.

In many conversations with researchers, one recurring theme is a system that operates from one grant to the next. Doesn't that constant uncertainty damage science?

Of course, grant funding introduces a degree of instability. But it is important to remember that this is not a uniquely Polish problem. The American system also relies heavily on grants, and securing major funding there is extraordinarily difficult.

At the same time, I believe a certain level of uncertainty is healthy. Researchers should feel that they need to keep proving themselves. It should not be enough to obtain a professorship and then comfortably wait for retirement.

Unfortunately, that is often what happens in Poland. Once someone reaches a senior academic position, the system places few demands on their future research activity. There are, of course, many scholars who remain productive throughout their careers, but everyone can think of examples of people who become far less active after the age of fifty or sixty.

The American system works differently. Competition is real. Knowing that someone from outside could take over your position or your research group is a powerful source of motivation.

Without that ongoing pressure, it is very difficult to maintain science at the highest international level. That does not mean creating an atmosphere of permanent insecurity. Science cannot be driven solely by fear of losing one's job. At the same time, research is inherently competitive. When competition disappears, dynamism tends to disappear with it.

Sometimes I feel that the Polish scientific system is simply too reluctant to set demanding standards and enforce them. We want to protect everyone, avoid upsetting anyone, and avoid expecting too much. The problem is that science capable of producing major discoveries and influential publications does not work that way.

So the problem is not instability itself, but rather the fact that the system does not reward sustained excellence throughout an entire career?

Science itself is uncertain by nature. One day you have an exciting result; the next, new data or a better method of measurement may show that your hypothesis was wrong. Uncertainty is built into the process.

What an effective research system should reward is productivity, creativity, and a willingness to keep developing. In Poland, however, the system often rewards something else: endurance. Survival. You can see it in the way research groups are built and maintained.

You built your own research team. How difficult is it today to create a new research group in Poland more or less from scratch?

Very difficult. The first obstacle is that positions funded solely through grants are simply too risky for many people. Most researchers want a degree of financial stability. On top of that, universities and many research institutes still operate in a highly traditional way. In practice, a great deal depends on existing structures, established relationships, and institutional hierarchies.

In medicine, long-term research teams are usually built around existing academic units. Conditions are somewhat more flexible in some institutes of the Polish Academy of Sciences and specialised research centres. Large grants can make it easier to establish new groups there.

But the administrative burden remains substantial. Many formal procedures take a very long time. Hiring staff, securing approvals, navigating regulations that are interpreted differently by different offices—it can all take weeks, with no guarantee of success. Modern science increasingly depends on speed, yet the system often moves at a completely different pace.

If you want to recruit an excellent researcher from abroad, establish a new laboratory, or quickly purchase reagents and equipment needed for an experiment, the process is often far slower than it should be.

Sometimes I have the impression that researchers devote more energy to working around administrative obstacles than to research itself, despite the fact that administrative support has improved considerably in recent years.

I often say that doing high-quality science in Poland still requires a certain degree of heroism. This is one of the reasons why.

If you could change one thing immediately to increase Poland's chances of producing truly world-class research, what would it be?

What we need is a deep reform of the entire research system. Above all, Poland needs a genuine long-term

strategy for science. At the moment, we lack a serious vision of what publicly funded research is supposed to achieve over the coming decades and where the country's priorities should lie. We need to identify the areas in which we are genuinely excellent and focus our support there.

Scientific excellence is, by definition, selective. It is impossible to support every field equally. For years, Polish policy has been guided by the idea that funding should be distributed as broadly and as fairly as possible. But science is not about fairness. If we have world-class astronomy, exceptionally strong chemistry, or leading centres in cell biology, those are precisely the areas that should receive the greatest financial support and the strongest organisational backing.

And I am not talking only about funding. I also mean legislation and administrative solutions. If the state can create special legal frameworks for strategic infrastructure projects or military investments, why should it not be able to do the same for its most important scientific institutions?

We should be building centres of excellence similar to those that exist in countries such as Spain. Places governed with the participation of international scientific advisory boards, where decisions concerning recruitment, expansion, procurement, and investment can be made quickly and efficiently, while scientific performance is evaluated rigorously and transparently.

There are successful models we could learn from. We do not have to invent everything from scratch.

If Poland eventually produces a Nobel Prize winner, it is unlikely to be someone who spent their entire career working exclusively in Poland, is it?

To be honest, I do not think so. If a scientist with Polish citizenship wins a Nobel Prize in the next ten or twenty years, my guess is that it will be someone who was born and educated in Poland but spent a substantial part of their career abroad.

Such a person may still maintain a Polish affiliation, collaborate closely with Polish research groups, and perhaps attract young Polish researchers to their laboratories. But I doubt it will be someone who spent virtually their entire scientific career working only in Poland. This is not simply a question of money or equipment.

A Nobel Prize is also connected to a complex international system of visibility and recognition. Researchers need to be part of the global scientific conversation. Publishing in leading journals is essential, but it is not enough on its own. That is why I believe the strongest candidates are likely to be people who operate simultaneously within the Polish research system and within leading institutions abroad. In my view, astronomy and organic chemistry are the fields where we already have researchers working in exactly that way.

So success in science today requires not only talent but also networking skills and a certain degree of self-promotion?

Fortunately, science is still largely judged by the quality of publications. A strong paper in a major journal remains enormously important. But producing excellent research is not always enough by itself. You need to attend conferences, participate in discussions, build collaborations, and make your work visible. There are many potential Nobel candidates, and not every outstanding discovery—or every scientist responsible for one—will ultimately be recognised.

There are certainly exceptional researchers who are not particularly outgoing, media-savvy, or self-promotional and who nevertheless achieve remarkable success. Those cases exist. But even then, your work has to reach the world. As a scientific community, Poles are still learning how to operate in that environment, particularly among the older generations of researchers.

And in the end, it all comes down to hard work, doesn't it?

Yes, although I would say that the most important thing is the idea itself. A truly good researcher with a genuinely original idea will usually find a place where that idea can be developed.

One of the biggest changes of the last thirty years is that the world has opened up to Polish scientists in ways that were previously unimaginable. Today it is possible to move abroad, win international grants, and work in the best laboratories in the world. That is far easier than it used to be. After that, however, what matters most is perseverance.

A good scientist needs a thick skin. They have to cope with criticism, failed experiments, rejected grant applications, and long periods of uncertainty. At the same time, they must remain open to constructive feedback and willing to revise their thinking when the evidence demands it.

To me, that combination of resilience and openness is one of the defining characteristics of researchers who go on to achieve truly significant things. Most discoveries do not happen the way they do in films. More often, science advances through a long and gradual process. One answer leads to new questions, those questions generate new experiments, and only years later does it become clear that something genuinely important has emerged.

Many highly talented people simply become discouraged too quickly. They may be intellectually brilliant, but they struggle more with failure, criticism, or prolonged uncertainty. And science is full of all three. It rarely rewards people quickly. And it certainly does not hand out Nobel Prizes overnight. ■