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A Nobelist on Science in Times of Mistrust

In an interview with **Prof. Dariusz Jemielniak**, Vice-President of the Polish Academy of Sciences, **Prof. Harold Varmus** discusses why science is becoming a hostage of politics, how to confont the wave of disinformation, what the crisis of social trust threatens, and how new technologies – ranging from open access to artificial intelligence – may transform medicine.

Prof. Harold Varmus and Prof. Dariusz Jemielniak during the interview

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DARIUSZ JEMIELNIAK: **The Trump administration wanted to cut the budget of the National Institutes of Health by as much as 40%. What would that have meant?**
HAROLD VARMUS: A disaster. At the NIH, most grants are financed in annual tranches. Budget cuts on such a scale would have amounted to halting a huge number of studies, interrupting the work of thousands of research teams and wasting years of preparation. Fortunately, Congress stopped this plan, but the very fact of that speaks volumes about the political climate. It's not just about money – it sends a signal that the authorities are prepared to question the value of science itself.

In an era of global conflict, do we need to invest in science to strengthen defense?
History teaches us that wars can drive development. After World War II, the United States became a scientific power – from antibiotics to the space program, which was catalyzed by the Soviet launch of Sputnik. However, this should not be the primary justification for research. Science has value its own right – as a way of understanding the world and addressing major civilizational problems.

Is it possible to separate science from politics today?
In the United States, it's practically impossible. Discussions about climate change, nuclear energy, and vaccination have become subjects of intense political conflict. Many politicians privately support science but publicly fear voters and the loss of political backing. This undermines not only research funding but also public trust in science.

I have been studying anti-science movements for several years – from flat-earthers to anti-vaccination actiticists. In Poland, a strong interweaving of anti-institutional, anti-Ukrainian and pro-Russian attitudes is clearly visible.
We observe similar phenomena in the United States. In some regions, vaccination rates have fallen to 92–93%, which is already leading to outbreaks of measles and even isolated deaths. I am astonished that someone like Robert Kennedy Jr. is gaining real public support, and that Donald Trump is promoting him – despite Kennedy's background in a traditionally Democratic family.

Paradoxically, critical thinking itself can become a problem. People are learning to question everything – from GMOs to nuclear power – and instead of verifying information, they simply reject scientific knowledge.
That's true. And yet, mistakes are an inherent part of science. I often recall the example of Linus Pauling – a brilliant chemist who claimed that DNA has three strands. If today's funding criteria had existed at the time, he might have lost his grants. Meanwhile, such errors can be creative and propel research forward.

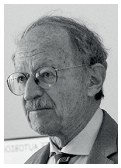
As I mentioned earlier, in Poland we see an overlap between anti-vaccination movements and anti-Ukrainian and pro-Russian sentiments. It appears to be a deliberate political strategy.
That is certainly a possibility. In the United States, we also see disinformation campaigns fueled by external support. The common denominator is the undermining of state institutions and the deliberate sowing of chaos. Some believe that this is an organized strategy aimed at weakening democratic societies.

It is often said that root of the problem lies in insufficient education.
In the United States, primary and secondary schools do not really teach scientific thinking as effectively as it is often done in Europe. At the university level, the situation improves, but learning begins in childhood. That said, simply improving the quality of education is not enough. Even in Europe, with its stronger educational traditions, skepticism towards GMOs or nuclear energy is on the rise.

So the key is not knowledge alone, but trust.
Exactly. We need to rebuild the belief that science works in the public interest. Without that trust, any information – even the most reliable – can be rejected.

In Poland, about 1% of GDP is spent on research and development – roughly half of the EU average. A newly hired assistant professor earns less than a cashier in a store.
This is a serious barrier. In the United States, the situation is becoming increasingly difficult as well. After a brief period of growth in the NIH budget, the system became hypercompetitive. You really have to love science – and often have a financial safety net. It is simply easier those who do.

I have a postdoctoral researcher from Iran and a doctoral student from Pakistan on my team. I have to make a real effort to provide them with decent conditions, because it is impossible to make a living on a standard academic salary alone in our country. This is how the Polish system works. There is also the argument that we have a war just across the border. Some say this is not the right time to invest in research that may yield results in 10 years – you should be investing in the military here and now. How do you respond to that?
Is this the reason why spending on education has fallen below 1% of GDP?



Prof. Harold Varmus
Nobel laureate in Physiology and Medicine, former Director of the U.S. National Institutes of Health (NIH) and the National Cancer Institute, co-founder of the PLOS open science movement. He came to Poznań to take part an international scientific congress.

Yes. Military expenditures are already approaching 5% of GDP, and public support for defense spending is high. The problem is that we mostly buy foreign technologies – ready-made solutions – instead of developing our own.
And how does Poland fare in competitions for European Research Council (ERC) grants?

Not very well, although it must be acknowledged that the Polish Academy of Sciences leads the country in this area. Our institutes achieve the highest success rate among Polish research units. But in general – especially in social sciences – Poland performs poorly and is definitely below average. I am not sure how we compare to the former USSR countries.
I used to work in Cyprus. That small country was doing exceptionally well. It just proves that with the right support, one can compete in Europe. Strategic investment in a few key centers is worthwhile – this convinces the public that science is necessary.

You are the co-founder of PLOS, a pioneering open-access publishing platform. How do you feel about open science today?
I still believe that all scientific publications should be publicly accessible. The administrations of Barack Obama and Joe Biden introduced policies requiring that publicly funded research be made available in open-access format. At PLOS, from the very beginning, we had this rule: if authors cannot afford the publication fees, we publish anyway. This is crucial for researchers from lower-income countries. Knowledge cannot be a privilege of the wealthy.

You also mentioned the need to publish peer review reports.
Yes. I would like reviews to be public and for authors and other researchers to be able to comment on them. This creates the opportunity for genuine dialogue, not just a one-off evaluation. Physicists tend to embrace this approach more than biologists, but the examples of *eLife* and PLOS show that it's possible. The COVID-19 pandemic also demonstrated the importance of preprints. Many key studies – from early analyses of SARS-CoV-2 to the first vaccine data – appeared as preprints before later being published in journals.

Do you believe that registering planned studies could help curb the replication crisis?
It is standard practice in clinical trials, but much harder to implement in laboratory experiments. Protocols can change overnight. What we really need is better training for young researchers – attention to sample quality, solid statistical methods, and the courage to publish even negative results. Preprints can make a significant difference here.

This system works, at least partially, in clinical trials. When I led the NCI, we tried to penalize underreporting, but many researchers were reluctant to publish negative results. We tried to make it easier – a short summary of conclusions was sufficient – but there was still a a lot of resistance.

In experimental laboratories, it would be even more difficult. Procedures are constantly evolving, so researchers would have to continually update entries in database. This would add to an already heavy regulatory burden, which often discourages people from pursuing scientific research.

In my opinion, more attention should be given to the training of young researchers: scientific integrity, quality control of reagents, and rigorous statistical analyses. The replication crisis is largely rooted in these issues.

The system rewards quantity rather than the significance of the work.
That's true. Counting citations and H-index scores encourages the production of numerous small publications. And yet, sometimes it is single breakthrough discovery – even if initially cited less frequently – that changes an entire field.

Should we take action before artificial intelligence floods the scientific world?
Yes, indeed. The term "artificial intelligence" is sometimes overused – people often refer to phenomena that are not a manifestation of intelligence at all – but nevertheless it remains extremely important. One of the latest WHO Science Council reports that I worked on focued on digital health. It addressed not just AI, but also practical tools that allow patients to access healthcare remotely, maintain electronic medical records that track treatment progress, and connect to information that genuinely helps. This is particularly important in areas with limited resources or a shortage of medical personnel.

In oncology – even though I don't practice it myself – the amount of data is already overwhelming. In my opinion, every cancer patient should have the tumor genome sequenced, and the results should be analyzed computationally to estimate prognosis and assess the suitability of immunotherapy or targeted therapy, rather than relying solely on standard chemotherapy. Radiotherapy is already largely guided by computational methods. Decisions about effectiveness and toxicity are far more accurate thanks to these calculations. Many clinicians cannot keep up with this pace, which is why the WHO report recommends creating positions for specialists with computational expertise

to assist in interpreting the growing volume of data. These developments will inevitably bring major changes in medical practice.

In an ideal world, we would also have a global, anonymized repository of patient data. Currently, even at the national level, systems rarely collect data on a scale that allows for serious computational analysis.

Availability and costs are obvious limitations, but there is also the issue of ancestry. One of my colleagues from the Memorial Sloan Kettering Cancer Center demonstrated that in South America, ethnicity strongly influences the likelihood of a common subtype of lung cancer with mutations in the EGFR gene. People with a significant admixture of Asian genes are more likely to develop this type of cancer than Native Americans. It could be said that testing for mutations at the time of diagnosis is sufficient to choose targeted therapy, but prior knowledge of elevated risk may shape screening strategies. Currently, lung cancer screening focuses mainly on smokers – and rightly so – but there are also non-smoker populations, often women with a specific genetic background, who are at higher risk. We do not yet know all the relevant markers, but we expect to discover them within the next few years. It is this type of problem that requires computational analysis of the DNA sequence – the patterns will not be the same everywhere, as they depend on the location of the research and the local context.

You carry out projects in Africa.

Cornell University, with which I am affiliated, has strong ties to Tanzania. In Mwanza, on Lake Victoria, we cooperate with a large Catholic hospital. We want to build an oncology unit there as part of a global health center. This is part of abroader shift: for decades, global health programs focused primarily on infectious diseases. Now, with people living longer, we also need to address cancer and chronic diseases.

Meanwhile, we are facing a sharp reduction in support from the U.S. government. The closure of USAID (United States Agency for International Development) and cuts to global research funding are mistakes. This is detrimental not only to developing countries but also to the international standing of the United States. The PEPFAR (U.S. President's Emergency Plan for AIDS Relief) program has played a major role in combating disease in Africa – withdrawal from such initiatives would harm millions of people.

International cooperation is therefore crucial.

Absolutely. In my field, at least a quarter of the members of the U.S. National Academy of Sciences are from abroad. Cooperation with China, India, or African countries is not philanthropy – it is a driving force of progress. Unfortunately, I increasingly hear from young scientists that they are considering leaving for Canada, Germany, or the United Kingdom, because they find the political climate in the U.S. discouraging.

ANETA KARWOWSKA, PAS

Prof. Harold Varmus in conversation with the President of the Polish Academy of Sciences, Prof. Marek Konarzewski, before a lecture at the Staszic Palace in Warsaw, devoted to research on cancer genes and modern anti-cancer therapies

In Poland, we have similar concerns. Some young researchers emigrate, and those who remain struggle with low salaries and job instability.

This is dangerous. A country that cannot retain talent risks losing generations of innovators.

In the U.S., competition with China is often used an argument for funding research.

It works for Congress but carries some risk. We don't want science confined within national borders. Cooperation – also with China – is more valuable than racing for the top. Still, in practice, to protect the budget, it is sometimes necessary to frame funding in terms of international competition.

Despite all your worries, you sound like an optimist.

Well, that's because science still offers fascinating challenges. Although I've shut down my own laboratory, I continue to teach, write, develop global health projects, and advise young researchers. Staying in contact with them is the best way to avoid going stale. When I see friends who have moved entirely into administration and surround themselves only with people of their own age, I do feel they age faster.

So, science is a way of life.

Exactly. It's not just a profession – it's a way of looking at the world. It's also a certain ethos: patience, a willingness to learn from mistakes, and trust in evidence.

Interviewed by **Dariusz Jemielniak**,
edited by **Wojciech Brzeziński**