

EDITORIAL

SCIENCE AND PATRIOTISM

Matko Marusic

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Science belongs to the entire humankind and, at the first glance, has nothing to do with patriotism. Moreover, in an attempt to suppress national feelings, liberals often use the example of science to demonstrate that there should be no borders or restrictions among people, except those related to the quality of the work.

However, this is the standpoint of those who, for personal or some other insufficiently grounded reasons, do not realize that national framework is still a necessity that enables protection and progress for an individual. At the moment, it is not my intention to discuss the notions of state and nation, but to acknowledge that they exist and to point to the importance of science for them, regardless of the fact that, as already mentioned, every fragment of human knowledge belongs to all people, no matter how it was created or who uses it.

The relationship between science and national interests is even more complex when considered from the point of view of small nations and less developed countries. This is because science is an activity that yields discoveries, and these discoveries, in the process of innovation, through patents and the development of technology, are transformed into products that can improve not only the quality of our everyday life but increase political and military power. Now, we can ask – how can a small nation, an economically weak state, an undeveloped community, find its place in this race to which so much money, technology, and so many of the finest minds have been involved? What important discovery can they make, what do they have to offer to the world and to themselves, especially when compared to the large, the rich, and the developed? At first glance, it seems there is no place for them in science.

However, there are other functions and benefits of science that can be more useful in such communities than discoveries.

Basic Functions of Science

Science has four essential qualities: 1) it is the source of genuine human knowledge (discoveries), 2) it is one of the key components of the educational system, 3) it is a part of the culture of a particular people or community, and 4) it contributes to the general wellbeing and safety in everyday life.

Science as the Source of Knowledge

True knowledge is a product of scientific research. It is knowledge gained through scientific methods and is repeatedly being verified and synchronized at the international level. By the strictness of its methods, its strictly defined rules for conclusionmaking, and by accepting only those conclusions that have been internationally verified, it distinguishes itself from legends, story-telling, poetry, and everyday news. At the moment of discovery, one cannot know how important that discovery will be or what other issues it will solve when it is combined with the already existing knowledge or the discoveries that yet have to be made. Therefore, there is not a single piece of knowledge about Nature that could not be useful and applicable.

All the crucial, concrete, verifiable, and applicable knowledge about itself and the world, humankind has gained by means of scientific method. Scientific knowledge is further transformed into a concrete product which makes life longer and easier. The fulfillment of most of our everyday needs is allowed by scientific progress. Everywhere around us, in our every step, bite, and pressing of a switch, there are hidden scientific accomplishments which make the functioning of the world around us easier.

Educational Role of Science

In their education and work, scientists go through a very special school where they, besides gaining knowledge on their particular line of interest, learn the virtues of modesty and honesty. Scientific work is about postulating a concrete hypothesis and proving it.

First, the scientists have to prove their ideas to themselves, and only after they are themselves confident in the importance and authenticity of their results, do they try to persuade the world public by making their work (their hypothesis, results, and conclusions) known to as many experts as possible. When a work is in the process of being published, all its parts are subject to strict and objective judgment, and when it goes through the reviewing process and is made public, it is being analyzed, repeated, and criticized by scientists from all over the world. At

this stage, the authors cannot hide the shortcomings of their work. Those who persist realize how good, original, and hardworking they are, but also learn to accept well-founded criticism and other people's opinions. This process, no matter how difficult and painful it may be, brings out honesty and modesty in scientists: honesty because the system makes cheating impossible and modesty because others discover the mistakes and imperfections they failed to see.

Good teachers can be produced only by scientific work; they are guided only by the results of their work, and are willing to continuously assess the quality of their work and teach their students scientific principles and a scientific way of thinking. Science produces teachers who do not feed their students with dogmas and empty phrases, metaphysics, mysticism, and slogans. A teacher scientist knows the exact limits and the accuracy of what he/she is teaching, knows when to replace old and obsolete material and accept the new.

University teachers have to be scientists, since it is presumed that they are internationally recognized experts and therefore the best possible teachers. Work at the university distinguishes itself from the work in the same profession outside the university because scientific methods are used at the university. At the university, there is no difference between science and profession; they cannot exist without one another and they naturally complement each other. What they have in common is internationally recognized excellence. International criteria of excellence are inevitable because knowledge is the property of the entire humankind.

A scientific way of thinking and the application of scientific methods require integrity, a freedom-loving spirit, honesty, self-criticism, and openness. Scientific work teaches us to discuss on the basis of arguments, to provide evidence for our claims, to accept criticism and other people's opinion, and to revise our ideas if they have been proven wrong. We use our imagination, but in a different way than artists do; scientific results provide us with a feedback which reveals the true greatness, ingenuity, and real capabilities of our imagination.

Cultural Role of Science

Culture encompasses everything material and spiritual that people have created, and science significantly contributes to both of these spheres. Scientific work increases the scientist's knowledge and abilities. The scientists invest their knowledge in the pool of spiritual wealth of the whole of humankind. In this way they both increase that pool and have the knowledge of other scientists at their disposal. Therefore, scientists are those who can, in the fastest and most effective way, include their community in the international distribution of knowledge and work.

Scientists receive and exchange information indispensable for the technological and cultural (and therefore political) development of their

community. Scientists' knowledge and a scientific way of thinking are necessary for decision-making in every sphere of the state's interest.

Science as a Source of Prosperity and Security

Although sometimes even a half century may pass between a discovery and its implementation, all discoveries sooner or later enter into everyday use. The range of activities between the basic research and implementation of a new product is called the innovation chain. It comprises three phases: basic research – development research – new product. In medicine, the phases of innovation chain are less visible than in other fields, in the first place because of the longer timelag between the discovery and its implementation, since not only the efficiency but also harmlessness of the product needs to be examined.

Science in a Small Country

Although it is almost certain that scientists from a small and less developed country will not make any significant discovery, supporting science in such countries is almost equally if not more important than in the large and developed ones.

Development and Progress

For small nations, the fastest route to advancement, progress, and joining the integrations of the developed countries is precisely through the development of science. Scientists are those who can most easily receive knowledge from the more developed countries and pass it on to the younger generations. In other words, scientists are the best students and the best teachers. And there is no progress without learning.

International Reputation

In less developed countries, it is often thought that reputation is most easily achieved in the world of sports and show business. This opinion is not only incorrect but dangerous, because it draws the attention away from what is truly important. There are many countries that have achieved considerable sporting successes but this has not changed their image in the world. Poor and undeveloped countries remain such, regardless of all the medals and records won by their sportsmen and sportswomen at international contests. True progress and reputation can only be achieved by true values, that is, products of human mind and hands. Spiritual and material progress can only be achieved through knowledge and the basis of knowledge is science.

Objectively and in the long-term, a good scientific article published in a respectable journal can earn more reputation for a country than any gold medal.

Since traveling and communication with other countries is in the nature of their job, scientists are those who can best indicate, as well as work towards establishing, their country's international reputation. Scientific articles are read by scientists from all over the world, so every local contribution to the world's science increases the reputation of the country of its origin. It also increases the reputation of the scientists themselves, who should be those who set the standards for evaluation in their community. Reputation gained in this way lasts for years rather than days, as is the case in sport and entertainment. The problem arises since the broad public, including journalists, is not aware that real news, that worthy of attention, cannot be found in daily newspapers but in scientific journals (this ignorance is the reason why the public admires sportsmen and entertainers more than scientists and artists).

Integrity, Hard Work, and Honesty

Since the quality and quantity of scientific work is assessed on the international level, cheating is rendered impossible, which means that science by itself is an activity that fosters and maintains integrity and honesty. Since there are no results without real and hard work, science develops working habits, orderliness, punctuality, and other virtues indispensable for personal and national progress.

How to Catch Up with the More Developed?

At the moment, I will not go into all the possible mechanisms that a less developed country has at its disposal when trying to catch up with the more developed. I will mention only two things, which, although most important, are often forgotten.

Maintain, Value, and Promote Science

As I already said, science is of vital interest for a nation, and there is no national progress or development without it.

Each community, each country must, precisely because of its national interests, include maintaining and promoting science among its highest priorities. There fore, it is of utmost importance for a country to raise awareness about the national significance of science in as many people as possible, and include that awareness in the culture and way of thinking. Promotion of science has to be founded, first of all, on pride and self-respect of the scientists themselves, on understanding of its national importance on the political level, and finally on all available measures and methods that make science understandable to the general public.

People and Education Rather than Money and Reputation

For the promotion of national science it is necessary to understand that people and education are more important than money and reputation.

Lack of financial resources is often an excuse for scientists and politicians (even laymen) to justify the bad position of science in their country. It is true that scientific work has to be supported with considerable financial means, especially since a great deal of research is highly expensive. It is no less important that scientists are well paid, if for no other reason but for their self-respect (otherwise they are in danger of indulging in self-pity), so that they would not have to leave science, or spend their time on searching for part-time jobs. Investing in science is also important for the sake of attracting the best young intellectuals.

However, lack of money is not the main obstacle to the development of science! Scientists in a small country do not have to engage in expensive research. In every branch of science there are issues and areas where research is not that expensive. What has to be remembered is that it is not important which issues scientists from a small country deal with, but that they do it well and in accordance with international standards. It is not important what scientists do but that they do it well! The value of scientists does not lie in the branch of science they have chosen, but in the quality of their results.

The problem is not the lack of money but the quality of the scientists. Small and undeveloped communities simply cannot create good scientists, since there is no need for them, there is nobody who could teach and appreciate them (even they themselves don't). This vicious circle cannot be broken with money inflow, but with patriotism and understanding of the true importance of science for a nation!

The vicious circle of low quality has to be broken with clear policy targeted at science. This means strict and uncompromising respect for scientific principles, an adequate recruitment policy, adopting, and applying international quality criteria, and adopting various accelerated programs for teaching top scientists. The latter implies education of the finest young scientists in research centers of the developed countries.

Another problem in the promotion of science in less developed countries is that people who bear titles and hold positions, even if they are not scientists, are treated as such. The fact that somebody has the title of a university professor or academician should not satisfy the true patriots, since abilities required to obtain these positions are quite often different from those needed for quality research.

The only criterion for real scientific quality is publishing on the international level. Those who do not have any papers published in interna-

tionally recognized journals are not scientists, regardless of their title, executive position, or the amount of money they procure for their institution. This equally applies to all professions, countries, and individuals. One cannot ask to be admitted into the national football team if one plays excellent badminton. In the same way, one can be recognized as a scientist only through internationally visible scientific articles.

Home-loving policies should keep that in mind. Those who want to protect national science by keeping it within its borders are not only wrong but, I am confident, wrong in a deadly manner.

Address Contact:

Matko Marusic
Editor-in-Chief
Croatian Medical Journal
Zagreb University School of Medicine
Salata 3, 10000 Zagreb, Croatia
Phone: + 385 1 4566 782;
fax: ++ 4590 222

mmarusic@mef.hr
www.cmj.hr