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Find your way

Among the key areas of economic activity that are increasingly shaping the overall development vector of modern civilization are those associated with science and new knowledge. One such sphere, biotechnology, defines the production of a wide range of products directly affecting the quality of life, most notably preparations designed to increase the productivity of food and pharmaceuticals. In addition to its impressive range of applications, biotechnology is extremely dynamic. The latter is based not only on the growth in production and the range of compounds and products produced, but also on the growing volume of investment in research, development and training.

A huge range of products, a wide variety of different local raw materials, unique competencies resulting from the development of the chemical and biological industry in previous years – these and many other factors and circumstances now form the space that one or another country occupies in the modern world of biotechnology. Each of them strives to find its niche and determine its way in this diversity of opportunities, which, of course, requires consolidated efforts of the state, business and the scientific and expert community.

The complexity and multifaceted nature of this task is clearly visible through the example of the formation of the raw material base of the biotechnology industry, the core of which are sugars obtained by processing organic matter (in Russia this is primarily grain). It is difficult to overestimate the importance of raw material self-sufficiency – up to 60% of the cost of biosynthesis products is the cost of raw materials.

The results of Russian agricultural production in recent years create a very strong basis for directing more and more significant volumes of grain to deep processing. According to experts, processing the surplus harvest into gluten (protein part) and glucose syrups – can be much more profitable than export.

Unfortunately, the biochemical industry in Russia was practically destroyed in the 1990s due to both erroneous political decisions and the associated privatization, and the destructive influence of transnational corporations using GMO technology (in particular, Monsanto). Many biochemical plants were liquidated, and unique equipment was sold at the price of scrap metal.

The seriousness of the problem of development of the biotechnology industry in the context of production and processing of sugars is illustrated by a study carried out in the mid-2000s under the auspices of the U. S. Department of Energy. According to its results, 12 main chemical compounds that can be obtained from plant raw materials through biological or chemical transformations and reactions and have a high potential for transformation into new useful compounds and substances were identified as a priority.

The initial list of viable products at the initial stage of the study included more than 300 items, then the list was narrowed down to three dozen, from which a dozen of the most promising ones were identified. The choice was based on the characteristics and properties of the products themselves, as well as market analysis and experience of their use in various fields of activity.

As a result, recommendations on further deepening of research and development of technological processes of biomass processing and formation of a line of products,

first of all based on aromatic compounds, polysaccharides and oils were formed.

In the 1960's-1970's the USSR was a world leader in industrial biotechnology, and in the 1970's-1980's it was the largest manufacturer of large-tonnage microbiological products. And we are convinced that the ambitions of Russia to revive the biochemical industry (already at the modern level) are quite justified. First of all – relying on deep processing of grain and further effective conversion of glucose into organic chemistry products and then into a wide range of different compounds.

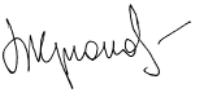
A great number of scientific and educational organizations of our country – from universities to academic and branch institutes, including the Siberian Branch of RAS, as well as a number of specialized organizations (State Scientific Center of Virology and Biotechnology «Vector», PO «Sibiopharm», etc.) have the necessary scientific and technical potential to implement such projects (see the papers by E. Sh. Veselova, as well as A. O. Baranov, P. K. Kutsenogo and T. S. Novikova).

As discussion of these problems at the round table organized under the aegis of «ECO» showed, Western and Central Siberia (Novosibirsk and Omsk regions, Altai and Krasnoyarsk Territory) have more than sufficient raw material base, powerful scientific potential, as well as favorable in terms of logistic flows geographical location.

What prevents this from happening? In our opinion, the main obstacle is the lack of vision and understanding of the space in which biotechnology exists and develops in Russia. Only by deeply understanding its peculiarities can an effective policy for the development of the domestic biotechnology industry be formed and implemented. The solution to this problem must be approached from the perspective of the full project cycle. This means not only a focus on the production of this or that type of product, but also the formation of domestic demand for it, as well as the

availability of continuous scientific and technological support for the development of the industry.

In modern conditions, one cannot fail to note the critically important role of biotechnology in ensuring the sustainable functioning of the country's economy and its social sphere. We can no longer afford the results of hasty and politically opportunistic «incorporation» into global value-added chains, and we simply do not have the right to do so in the face of both current and future generations of Russians.

Editor in chief of 'ECO'  V.A. Kryukov