Dear Friends,

Most of the articles in this journal issue are dedicated to life sciences. This is quite natural: in the past decade, biology, which capitalizes on the progress in other sciences such as chemistry and physics, has turned from an outsider into a leader attracting more and more material and human resources. Biology is also fascinating to nonscientists as the basis of medicine and other applied fields, which play an increasingly important role in everyday life.

One of the milestones in biology was the discovery of the structure of nucleic acids—DNA and its close relative RNA. For decades, scientists believed that the latter only served as a mediator in the transfer of genetic information from genes to proteins. However, with the growing knowledge of these macromolecules, biology made a revolutionary breakthrough to rock the apparently unshakeable concepts. In particular, scientists discovered that the noncoding DNA, which makes up around 98% of our genome and has always been considered as "junk" DNA, serves as a "matrix" to synthesize a multitude of most diverse RNAs, which control the functions of individual genes and whole genetic ensembles and orchestrate the functioning of individual cells in multicellular organisms. Novosibirsk biologists are now engaged in research into the various informational properties of RNA and its targeted impact on living cells. Being guided by the Nobel Prize winner Sydney Altman, these studies hold great promise for the development of safe and effective diagnostic tools and medicines.

A multidisciplinary team of physicists, chemists, and biologists from Novosibirsk has designed new approaches to improve the sensitivity of NMR spectroscopy and medical MRI. These methods have traditionally focused on NMR signals from protons, which are abundant in the tissues of living organisms in the composition of water and fat. Lungs, however, have a low concentration of hydrogen atoms since a large part of their volume is air, which results in a very low sensitivity of the traditional MRI. The use of polarized propane as a contrasting agent to enhance the NMR signal has enabled researchers to obtain spatially resolved 3D NMR images of objects filled with gas, an accomplishment that has no counterparts in world practice.

Readers who fancy adventure might be interested in a thrilling and puzzling toxicological crime story exposing a plant-killer that has traditionally been used in folk medicine worldwide. This article discusses an important issue related to the interaction between environmental factors and heredity in the development of many diseases, especially cancers, since it is often challenging to identify a potential carcinogen or toxin and prove its involvement in the development of a disease.

Amid the growing public interest toward advances in medicine and engineering, there is a visible decrease in the number of people interested in physics and space research: the generation that grew up on Star Wars now prefers the virtual world to the real one. Judging by the polls, today about 10% of the population are not sure if the Earth revolves around the Sun, not vice versa, and only slightly more than a half of them know that the Universe formed because of a powerful burst. On the other hand, physicists have come close to understanding many of the celestial mysteries, e.g., the enigmatic dark matter and dark energy, which make 95% of mass of the Universe.

Novosibirsk physicists are now searching for the so-called cold dark matter. Having been slow at first, its particles have now accelerated in the Galaxy's gravitational field to one thousandth of the speed of light. Following the hypothesis that cold dark matter particles are two to ten times more massive than protons, the Siberian researchers have designed the prototype of a high-sensitivity dark-matter detector based on liquid argon. The use of this relatively inexpensive noble gas offers prospects of creating detectors of a larger volume and increases the chances of finding these elusive particles. Besides, the detector also has "terrestrial" applications; e.g., it can be used to control plutonium production at nuclear power plants or even for medical positron emission tomography.

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