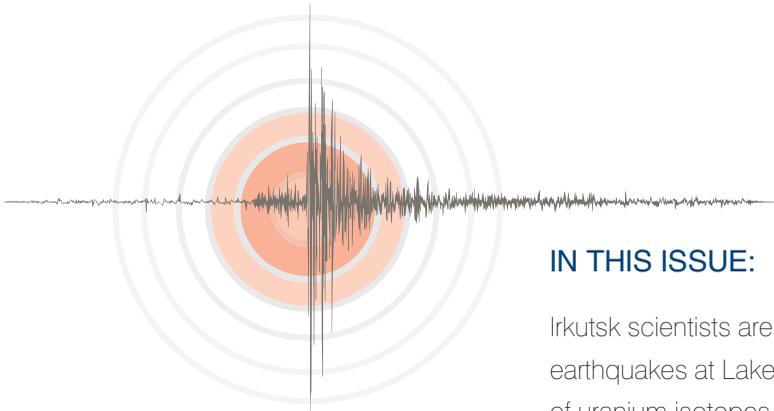


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SCIENCE

First Hand



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Irkutsk scientists are developing a model for predicting earthquakes at Lake Baikal by monitoring the ratio of uranium isotopes in groundwater

The discoveries of dark matter and neutron stars were predicted back in the early 1930s by the method of directed intuition, which was invented by the astrophysicist Fritz Zwicky

Plants warn their relatives about an attack and call for help “the enemies of their enemies” with volatile oxylipins – the universal language of chemical communication

For as long as a year, a network of seismic stations on the Paramushir Island of the Kuril Islands group recorded the “pulse” of the active Ebeko volcano in order to understand its inner workings and predict possible eruptions

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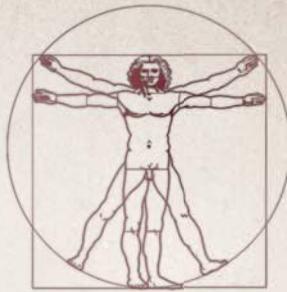
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*“The natural desire
of good men is knowledge”*

Leonardo da Vinci

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Dear friends!

Man has always sought to predict future events; hence the great success that clairvoyants and soothsayers have always enjoyed in society from olden times to this day. Curiously enough, their “metaphysical” predictions are usually believed to be a priori accurate whereas scientific predictions are always probabilistic. Nevertheless, the history of science presents many examples of very accurate “hits on the target”.

Scientific forecasts rely on objective data; however, they all essentially fall into two categories: “practical” and “theoretical”. For instance, one of the problems that scientists from different countries are struggling with today concerns the possibility of prediction of earthquakes. A big breakthrough in this area is the results achieved by Irkutsk scientists, who have been monitoring for many years the response of the activity ratio of two uranium isotopes in circulating groundwater at Lake Baikal. As shown by the last earthquake in Baikal, which happened in 2021, the scientists have come close to predicting seismic scenarios in this region.

In the new issue of our journal, readers will find a heroic epic story of Novosibirsk geophysicists who planted a network of 21 seismic stations on the active Ebeko volcano. Recently, ashes of this volcano revealed traces of magmatic material, which indicate the possibility of a catastrophic explosive eruption. The data obtained will help to build a tomographic model and determine the geometry and other characteristics of the magma chamber that are necessary for earthquake prediction.

The value of the work to predict natural disasters cannot be overestimated because such events not only cause material damage but also often claim human lives. But is it possible to predict genuine scientific discoveries? It turns out – contrary to popular belief – that yes, it is.

In the article by Pavel Annuel, a famous writer, scientist and popularizer of science, the reader will find a ranking of outstanding discoveries in physics and astronomy since the end of the 19th century, clearly showing that most of them were not only possible but even necessary to predict. Although no theory exists yet about how to predict discoveries, researchers can apply some methodological approaches to foresee, to some extent, the outcome of their experimental or theoretical work. One such approach is the method of directed intuition, developed back in the early 1930s. Its author, the Swiss–American astronomer Fritz Zwicky, used this method to predict the existence of neutron stars and dark matter.

Speaking about more “earthly” discoveries, not long ago scientists found another bridge connecting us, humans, with the seemingly evolutionarily distant kingdom of microbes. This bridge is oxylipins, i.e., signal molecules released by our damaged cells as a distress signal. However, unicellular organisms, including bacteria, fungi and protozoa, also use similar chemical compounds in their intercellular communication. But why do they synthesize them? Find out in the new issue of SCIENCE First Hand!

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