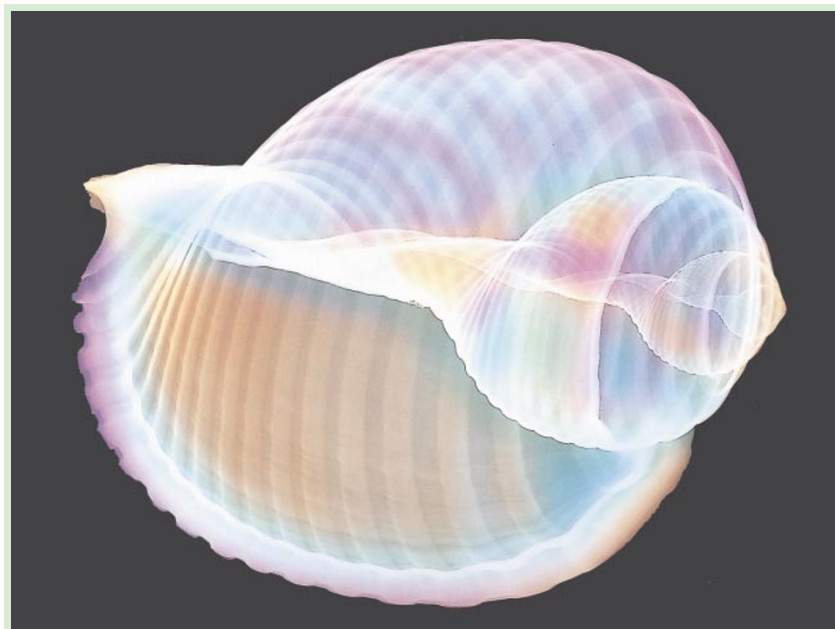


the inventor of television; Igor Sikorsky, the creator of the helicopter; and the composers Igor Stravinsky, Sergei Rachmaninov and Nikolai Metner. But the communist rulers did not recognize that these people were bringing glory not only to the countries that gave them shelter, but also to their motherland. The émigrés were slandered and declared to be traitors and enemies.

When, in the 1920s and 1930s, several leading scientists did not return to the USSR after travelling abroad, they began to be persecuted. The communists applied a harsh strategy to the most eminent scientists: elected members of the Russian (or Soviet) Academy of Sciences who emigrated were excluded from the list of members. This happened to the historian Mikhail Rostovtsev in 1927, and to the chemists Alexei E. Chichibabin and Vladimir N. Ipatiev later. Their names and those of the great majority of Russian émigrés were struck from the memory of Russians for nearly half a century.

However, a remarkable book has now been published in Russia on the lives and affairs of 20 of the most important Russian scientific émigrés who achieved worldwide renown not in their homeland, but in exile. Most of the protagonists of this book shared similar fates. They began in their new environments with difficulty, and none expected a warm reception. But possessing enormous creative potential and unusual strength of character, they made their way to the peak of the scientific Olympus in the West.

A number of Russian scientists went to America, among them the astronomer Otto Lyudvigovich Struve. Struve graduated from university in Russia in 1914. He fought in the White Army against the Bolsheviks but was seriously wounded and escaped to the West. His uncle, Paul Gutnik of the Babelsberg Observatory in Berlin, wrote to the director of the Yerkes Observatory at the University of Chicago, encouraging him to take his nephew



### The eye of the beholder

Much of the world around us cannot be seen by the naked eye — we need techniques such as scanning electron microscopy or satellite imaging. For instance, the fine detail shown here of the coiled shell of the tun (*Tonno galea*), a marine carnivore, was obtained using false-colour X-ray

techniques. In *Heaven & Earth: Unseen by the Naked Eye* (Phaidon, £29.95, \$49.95, 49.95 euros), David Malin has compiled a stunning collection of images, which without such techniques would be lost to us, of objects ranging in size from a tiny gold atom to galaxies billions of light years away.

on. Once there, Struve began to use spectral methods in astronomy, pioneering work in several directions, especially in stellar spectroscopy (using absorption lines). He also discovered interstellar calcium and hydrogen. He became director of the Yerkes Observatory before heading the new Leuschner Observatory in Berkeley, California.

The physicist Georgiy Antonovich Gamow became a well known and colourful figure in world science. Gamow contributed

to three fundamental scientific fields of the twentieth century: physics (he discovered the quantum nature of  $\alpha$ -decay), cosmology (he created the theory of a hot Universe, and on the basis of that he predicted the existence of the Big Bang) and genetics (he guessed the essential nature of the universal genetic code). Gamow and his wife were allowed to leave Russia for two weeks in 1933 to attend a Solvay Congress on physics, but never returned. At that time, failure to return to the USSR was regarded by the Soviet authorities as espionage, betrayal of the motherland, and conspiracy with the goal of seizing power. The death penalty was prescribed for such actions (this statute was removed in Russia only in 1995). Thus, Gamow would often tell acquaintances in America: "I am living under a sentence of death."

The physical chemist Georgiy Kistya-kovsky was a professor at Harvard University and also worked on the Manhattan Project to create the American atomic bomb. He became an important figure in the White House, advising President Eisenhower on issues of national security.

Other émigrés settled in Europe. Sergei N. Vinogradsky, considered to be the founder of modern soil microbiology, came to France in 1923. He organized a laboratory in the Pasteur Institute near Paris but stayed in contact with Soviet scientists and remained an honorary member of the Soviet Academy

NAUKA IZHIZN



Russian reunion: scientists gathered in Berlin for Russian Science Week in 1927 included the chemists Vladimir N. Ipatiev (standing, eighth from right) and Alexei E. Chichibabin (standing, fourth from right).