

SERGEI SOBOLEV, A GENIUS OF NATURAL SCIENCES

S. S. Kutateladze

This is a short tribute to Sergeĭ Sobolev on the occasion of the 105 years of his birth.

This year we celebrate the 105th anniversary of the birth of Sergei L'vovich Sobolev, one of the founding fathers of the Siberian Division of the Academy of Sciences of the USSR who was the organizer and the first director of the Institute of Mathematics of the Siberian Division of the Russian Academy of Sciences (now the Sobolev Institute of Mathematics).

Sobolev was an outstanding Soviet scientist, one of the top creators of the nuclear shield of the USSR, a staunch defender of sciences from the ideological obscurantists of the Soviet times. All these marvelous circumstances must never blur the most essential facts: Sobolev belongs to the unique Pleiades of geniuses who changed many views of humankind of the surrounding universe we live in.

The turnover of the twentieth century in the mentality and the mode of life of humankind happened so recently by the clocks of history that we still fail to completely understand the drastic changes it had brought about. The differential and integral calculus, the victorious banner of the Age of Enlightenment stemmed from the antique geometrical problems of calculating the area below a parabola and finding tangents to the curves of small order. Christianity and absolutism in Europe, the most profound ideas of progress at the turn of the Enlightenment, gave a powerful impetus to absolutism of the holy act of creation which is often called Laplacian, universal, causal, or mechanical determinism by the materialistic ideological tradition.

The conception of determinism had underlined the formulation of the Newton laws, the Leibniz idea of the best of all possible worlds and monadology, and the search for variational principles of mechanics. The honorable central place in mathematics had been occupied by the idea of a special role of the theorems of unique existence which was rather peripheral for the ancient geometry occupied with the conceptions of congruence and invariance under various motions. We still see the reflection of the idea of causal determinism in the Eulerian celebrated definition of function as an arbitrary correspondence that uniquely determines one magnitude given the other.

The twentieth century marked the failure of the ideas of absolutism, categoricity, and fatalism. Humankind has begun viewing itself as a free creator of its own future. Quantum mechanics drastically undermined Laplacian determinism. Physicists have freely used



functional correspondences that lie beyond the available mathematical formalisms, incarnated in the Eulerian idea of function. A rather banal conception of the Dirac delta-function lied far beyond the psychological frontiers of comprehension of the exceptional intellect of John von Neumann.

Sobolev enriched science with the principally new understanding of a mathematical magnitude that is determined from all its correlations with out test objects. Sobolev's generalized function can be given not in a deterministic manner but rather defined by all integral interactions with classical smooth observables. Sobolev's generalized functions have contained not only the classically impossible objects like delta-functions but also opened up limitless opportunities of universal applications of the operations of the classical differential and integral calculus. It turns out possible to differentiate and integrate generalized functions under no restrictions, compose classically unimaginable series, and write down explicit solutions of many equations of mathematical physics with constant coefficients. Mathematics has acquired the liberty it could never dream before, this providing an adequate rigorous apparatus for quantum mechanics.

Sobolev considered himself a "spoilt child of fortune" and was much discontented with that. He understood clearly that his election a full member of the Academy in his green years was slightly connected with proper commendation of his contribution to science since his ideas were too revolutionary for the majority of the electors. We know now that one of the important reasons for successes of his career was the benevolence of the top party officials who overestimated the affinity of Sobolev to their ranks. A communist by family's upbringing and own beliefs, Sobolev was absolutely alien to careerism and cannibalism. He was driven by his desire to serve humankind and, especially in his younger years, the idea of prevalence of collectivism over individualism. Sobolev timely drew due conclusions from the perversions and extremes of collectivism he had confronted in the Luzin case in Moscow which damaged his reputation alongside the reputation of his Muscovite friends. He saw the same during the ugly hunting of his teacher Günter by mathematical ignorants with party credentials in Leningrad.

Participation as a top official in the atomic project of the USSR enhanced the mentality of a free citizen in Sobolev. He viewed his voluntary transfer to Siberia not only as a duty of a noble service to his country but also as a liberation from the notorious responsibilities of a "meritorious scientist" at the back and call of the political leadership of the USSR. The famous anti-Lysenko joint report by Sobolev and Lyapunov, delivered by Sobolev under the hooting of obscurants, became an exemplar of personal conscience and freedom of a true scholar. Sobolev had demonstrated to his contemporaries that there was no need to hide oneself in the great list of signatures of your comrades when you must decisively and overtly call filth what is filth and call grime what is grime. Bravery and independence of Sobolev had dimmed the last years of his life. The careerists of the new wave never understood the noble reasons of Sobolev, trying to press him out by hook or by crook to the periphery of the scientific life of this country. Sobolev had left this world subjectively unhappy likewise many true heroes of humankind. But the treasure-trove of the world science will safe for ever his liberation of the concept of mathematical function from the blinds and constraints of mystical determinism.

Sobolev has entered the history of science as a coauthor of the mathematical apparatus of new physics, where he stands in the same row as Newton, Leibniz and Euler back to back with Dirac, Heisenberg, and Bohr.

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KUTATELADZE SEMEN SAMSONOVICH
Sobolev Institute of Mathematics, *senior staff scientist*
4 Koptyug Avenue, Novosibirsk, 630090, Russia
E-mail: sskut@member.ams.org

СЕРГЕЙ СОБОЛЕВ — ГЕНИЙ ЕСТЕСТВОЗНАНИЯ

Кутателадзе С. С.

Краткий обзор общенаучного значения нового понятия функции, предложенного С. Л. Соболевым (1908–1989) в связи со 105-летием со дня его рождения.