Vladimir Igorevich Arnold – an outstanding mathematician, the most cited Russian scientist in 2009, and a member of the Russian Academy – passed away in Paris on Thursday, June 3, 2010, on the 73rd year of his life. His former students Askold Khovanskii[1] and Yuli Ilyashenko[2] share their recollections of Arnold here.

The creative mathematical work of Vladimir Arnold began more than fifty years ago and has influenced the entire face of modern mathematics. He was a member of all major academies of the world and a winner of many national and international prizes. He created a brilliant mathematical school whose imprint both on mathematical research and education has been enormous and will be felt for many years.

It is difficult to list all of the mathematical discoveries of Arnold. In 1900, David Hilbert formulated a list of twenty-three problems which the nineteenth century bestowed upon the twentieth century. The slightest progress in any of these problems would henceforth attract the attention of the whole mathematical community.

At the age of 19, Arnold, together with his teacher Andrey Kolmogorov, solved the 13th Hilbert problem. Hilbert conjectured the impossibility of solving a generic equation of degree 7 in terms of functions depending only on two variables. Arnold and Kolmogorov disproved this conjecture.

Another work of Arnold done in his student years was his first contribution to the famous KAM (Kolmogorov-Arnold-Moser) theory. This theory, initiated by Kolmogorov, was meant to tackle classical problems of celestial mechanics – for example the stability of the Solar System. Within just four years, Arnold was able to complete this theory which then resolved problems that had been open for two hundred years.

Arnold was also one of the founders of singularity theory. This theory describes abrupt changes in the real life processes that occur as a result of slow, smooth variations of parameters characterizing the process. Such abrupt changes are sometimes called catastrophes, and the theory itself is called the theory of catastrophes. This theory has had applications not only in physics and chemistry, but also in biology and sociology.

One of the branches of the theory of catastrophes is the bifurcation theory which describes the qualitative changes in differential equations which occur at the moment when they lose their stability. Arnold and his students started a new stage in the development of this theory which continues to evolve today.

Another Hilbert problem is associated with the behavior of the level curves of polynomials in the plane. For Arnold, it served as a starting point of real algebraic geometry, a new mathematical theory. Arnold's work in this area not only led to great progress in solving Hilbert's 16th problem – it opened the door to a completely new area of research.

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Another branch of mathematics started by Arnold is symplectic topology. This unexpected fusion of geometry and classical mechanics arose from the famous Arnold Conjecture concerning the number of fixed points of area-preserving mappings of the torus.

Arnold always had a perception of Mathematics as a whole. For him, it was not a tower built of abstract notions, but rather a natural part of the beautiful world surrounding us. This feeling of harmony, of the beauty and unity in the world is characteristic of all works of Arnold. In this sense he can be called the Pushkin of mathematics. Perhaps it is no coincidence that Arnold was the one who resolved the mystery of the epigraph of "Eugene Onegin".

Vladimir Igorevich had an unusual creative method which he inherited from his teacher Andrey Kolmogorov. Whenever he got stuck on a problem, he would grabbed his skis and ski 40 kilometers or more wearing nothing but his swim-trunks. His colleagues often met him dressed like this in the piercing wind. According to him, this practice would always lead him to a new idea. He also made it a rule for himself to go swimming whenever he encountered open water. A frequent bather in wintertime, he has convinced many of his students to do the same.

Every Tuesday since the early sixties, Arnold held a seminar at the department of Mathematics and Mechanics of the Moscow State University. The seminar was not limited to any one narrow topic and covered a wide range of mathematics. Every semester, Arnold opened the seminar with a new list of problems. He had so many ideas that even he would not be able to execute them all himself. So, he formulated the ideas as problems and offered them to the participants of the seminar. In many cases, solving these problems gave rise to new domains and created bright new scientists in mathematics.

Arnold was always involved in various sorts of activities and whatever he did, he did with talent and passion. People who participated in his walking tours in Paris sometimes fainted of exhaustion. For hours Arnold would tell the history of his favorite city, moving from block to block, from century to century, switching from one language to another. People called him a Renaissance man.

He was a chief editor of the remarkable journal "Functional Analysis and its Applications" and had his own opinion of so many articles there, with such a clear vision of all of modern mathematics that it seemed almost physically impossible.

Arnold was an ardent fighter against disastrous reforms of education aimed at its debilitation. In his speech at the parliamentary hearings in the State Duma, Arnold lashed out at the reform plan which "[made] an overall impression of a training plan for slaves serving as a raw material appendage of their ruling masters." He himself believed in freedom of everything – of creativity, of teaching, of life – and he taught this freedom to everybody who was lucky enough to be influenced by him.