

VIKTOR ANATOL'EVICH KOVARSKII — SCIENTIST AND PERSON

(dedicated to the 80th birthday)

For a scientist, the research work is primary;
everything else is secondary.

V.A. Kovarskii.



There are excellent scientists who are trying persons to deal with; there are easy going people being by no means scientists. The combination of a wonderful person and an excellent scientist is a rarity. As the phrase goes, such a man is marked by God. Viktor Anatol'evich Kovarskii indisputably falls into the galaxy of such people. I would like to tell of Viktor Anatol'evich not only as a scientist but also as a Person and a Teacher (with reference to him, these words should be undoubtedly written with capital letters).

The range of scientific interests Viktor Anatol'evich was wide; I will only mention some main directions.

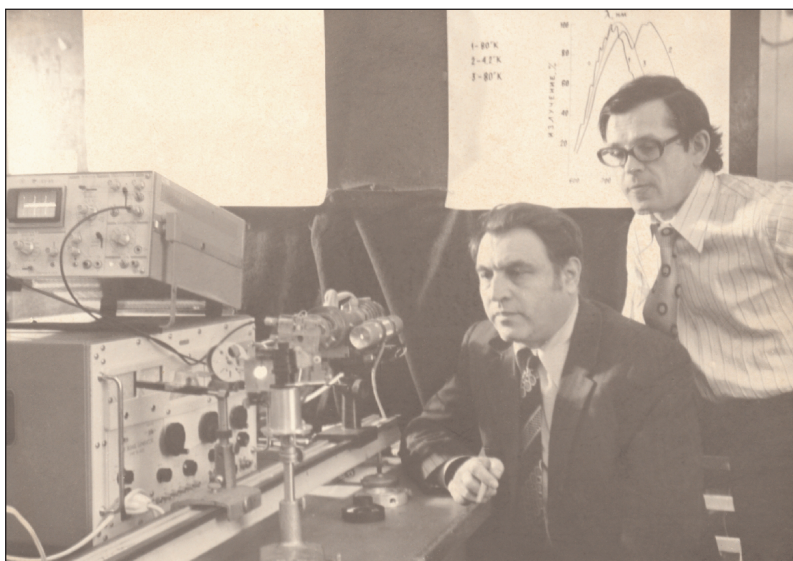
In the sixties of XX century, in the study of the recombination of carriers at the impurity states in semiconductors, the problem of “giant cross sections of capture” appeared. It consisted in the fact that the experimentally observed capture cross sections were higher by several orders than the ones predicted by theoretical models. V.A. Kovarskii with his disciples proved that nonradiative (multiphonon) processes of capture of minority carriers considered by theorists in the “Condon approximation” were inconsistent. It was Viktor Anatol'evich who went beyond the traditional Condon approximation, which he proposed to call the “non-Condon approximation”; the approach is now widely used in the world scientific literature. Using this approach, V.A. Kovarskii with his disciples succeeded to solve the problem of giant cross sections of capture, that is, to describe the numerous experimental data. A great number of references on the results of V.A. Kovarskii appeared in the foreign literature. Thus, a well-known

scientist Huang Kun appreciated and discussed these findings of Viktor Anatol'evich in one of his articles of those years.

The invention of lasers has led to the rapid development of multiphoton spectroscopy. This new trend in science has attracted the closest attention of V.A. Kovarskii. He discussed his theoretical research on multiphoton processes with such renowned scientists as L.V. Keldysh, Ya.B. Zel'dovich, R.V. Khokhlov, S.A. Akhmanov, and N.B. Delone; they appreciated the results of V.A. Kovarskii. He was the first who predicted the emergence of photonic satellites in the impurity centers of semiconductors; lately, they were found in the Laboratory of Physical kinetics of our institute by his disciple N.A. Ferdman and then repeatedly observed in some laboratories abroad. The effect of the statistical properties of laser radiation on the multiphoton processes in solids, first studied by Kovarskii, was found to be fundamentally important (the picture shows V.A. Kovarskii and S.L. Pyshkin).

Together with his disciples, he thoroughly studied the manifestation of the nonclassical properties of intense electromagnetic radiation in multiphoton spectroscopy. I would like to pay a particular attention to the unusually passionate love of Viktor Anatol'evich for biophysics. In his memoirs "The arrow of time in my life" (Chisinau, 1999, 196 p.), he wrote: "Biophysics is my love"; he perceived the solution of the problems of biophysics as "the God's revelation". This attitude to biophysics occurred to him naturally (he was born in a family of biologists), the secret of life excited his curiosity since his school years. However, Kovarskii understood fairly well that only applying physics and mathematics, chemistry and biochemistry, it is possible to work efficiently and fruitfully on the problem of the origin of life. The scientist persistently directed all his talent of physicist and institutor at solution of the problems of biophysics. He was one of the main organizers of the All-Union Conference on Synergetics (1986) and the first Republican conference on biophysics (1984) in Chisinau. The significance of these forums is proved by names of their participants: Yu.V. Gulyaev, A.S. Davydov, M.V. Vol'kenshtein, A.M. Zhabotinskii, V.L. Bonch-Bruevich, F.V. Bunkin, K.B. Tolpygo, A.A. Krasnovskii, S.P. Kurdyumov, B.B. Kadomtsev, Yu.L. Klimantovich, G.R. Ivanitskii, D.S. Chernavskii, Yu.M. Romanovskii, B.G. Zaslavskii, M.I. Shokman, E.G. Petrov, Yu.B. Gaididei, N.N. Rozanov, and other renowned scientists.

It was V.A. Kovarskii together with his disciples who constructed a model of the multiphonon enzymatic catalysis and successfully developed the trigger and self-oscillating models in biological systems on the basis of synergetic approaches. Since 1990, he was fascinated by



the problem of squeezed states of a quantum oscillator; meanwhile, he continued the cycle of studies on higher optical harmonics. V.A. Kovarskii concerned himself with biophysics as a professional rather than an amateur. In his later years, his dream, nevertheless, came true — he wrote a brilliant review on biophysics "Quantum processes in biological molecules. Enzyme catalysis" in the journal "Uspekhi

Fizicheskikh Nauk” (“Physics-Uspekhi”) (1999, vol. 169, no. 8, pp. 899-908). Truly, a researcher in biophysics must be a man of deep knowledge, who understands the beauty of contemporary theoretical physics and has an enchanted perception of the problem of life.

I am convinced that every man who met with V.A. Kovarskii took enjoyment in the communication, because everybody perceived a Person in Viktor Anatol’evich, and each of his disciples saw an excellent Teacher in him. It is very hard to win the respect and the favor a young man.

When we talk of the school of a scientist, we are well aware that it (if this is a School with a capital letter) does not originate from nothing. It is only natural that pupils grew in the School of Viktor Anatol’evich: at least 20 doctors of science, five of them are doctors habilitate (E.P. Sinyavskii, I.A. Chaikovskii, N.F. Perel’man, E.Yu. Perlin, and E.F. Kazantsev); however, the number of students is necessary but far from being sufficient!

A School means that the spirit and the main traditions of the School are kept alive by its students, wherever they are, throughout their entire scientific activities. The School has developed and expanded the topics of researches by virtue of both the ideas of Viktor Anatol’evich and the ideas of his pupils. He sought to teach young people to think independently, to challenge the “apparent” truth — it is this which makes one move on the way of unknown phenomena. Viktor Anatol’evich used to say: “If you make no headway, you drag behind!”

The main kitchen where the pupils of the School gulped their soup was the physical seminar of the Laboratory of physical kinetics founded by Viktor Anatol’evich 40 years ago, in May 1969. At these seminars, ideas (good and incomprehensible) were stated by the Laboratory’s researchers and actively discussed; new methods of theoretical physics were studied. In this sense, the physical seminar was like a living organism — self-organizing and self-optimizing.

It was Aleksandr Belousov who first drew attention of the Laboratory’s researchers to the methods of coherent states, the algebra of Bose-operators and helped to master them. These methods allowed Viktor Anatol’evich to formulate the idea of “hot” phonons, which subsequently led to the explanation of some interesting physical phenomena in molecular systems. It was Naum Perelman and Sergey Baranov who disclosed the secrets and great prospects of the “quasiclassical approximation” to the Laboratory’s researchers, which allowed V.A. Kovarskii and his students to study consistently the nonadiabatic transitions in a strong electromagnetic field. The spirit of scientific democracy at the seminars (all participants of the discussion of scientific ideas are equal — there is no “authoritative opinion”) rendered possible for Viktor Anatol’evich to come round free from pain if he was wrong!



The Laboratory of physical kinetics is five years old, 1974 (from left to right: Evgenii Perlin, Nikolai Ferdman, V.A. Kovarskii, Evgenii Popov, Elerlanzh Sinyavskii, Naum Perel’man, Evgenii Vitiu, V. Chebotar’, and V. Zenchenko; sitting: Eduard Kazatsev and Izyaslav Chaikovskii).

Some of his students continue to work in Moldova; many of them left for the CIS and abroad (Russia, Ukraine, Israel, United States, Canada); nevertheless, all of them are still disciples of Viktor Anatol'evich; they live with the spirit of the School of V.A. Kovarskii. I.Sh. Averbukh is a full professor of the Weizmann Institute in Israel; owing to his research on isotope separation (on the basis of earlier research in the Laboratory of Physical Kinetics), he was announced to be one of the best physicists of the country (1998). N.F. Perel'man was a full professor in New York; he was concerned with the problems of plasma. At present, I.A. Chaikovskii — full professor in Israel — advantageously deals with the problems of diabetes. E.Yu. Perlin — professor of St. Petersburg University — successfully develops the direction of multiquantum transitions and the effect of intense laser radiation on substances. E.F. Kazantsev is a professor, the Head of the Department of Applied Mathematics and Computer Science (Orel, Russia). Some of the researchers of the Laboratory became excellent programming specialists: at present, A. German, E. Safronov, A. Rusanov, and O. Keloglu work in the Moldovan company ADD (computer-aided technologies and scientific forecasting), which is well-known in the world.

What a range of scientific problems discussed at scientific seminars of the Laboratory! Indeed, a true scientist has worthwhile students!

Viktor Anatol'evich himself spoke of his disciples with good cheer, and they repaid an obligation. For example, he spoke with all his heart about Sasha Belousov: "My comrade-in-arms". In the closing stages of his life, V.A. Kovarskii was severely ill; however, the scientist continued working actively — neither invalid carriage nor loss of sight could break his spirit. During these years, Evgenii Kanarovskii as good as lived with Viktor Anatol'evich and exercised functions of a secretary. It was Kanarovskii who rendered possible for V.A. Kovarskii to write the brilliant review in the "Uspekhi Fizicheskikh Nauk"; he also helped to write and correct the works for the "Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki" ("Journal of Experimental and Theoretical Physics") and some other foreign scientific journals. Disciples of Viktor Anatol'evich I. Chaikovskii and I. Averbukh, as well as many his friends, facilitated his visit to Israel for medical treatment.

Viktor A. Kovarskii taught us to live and showed the amazing beauty of science; indeed, there was a brush in the hands of the great Scientist. I wish the young and promising scientists would have scientific schools in their future at least asymptotically approaching the School of V.A. Kovarskii.

And another thing — Viktor Anatol'evich wrote wonderful poems. It is his verse I would like to conclude addressing not only his scientific colleagues:

Let remain pines
And camomiles of little churches,
And the evening songs accompanied by the whisper of the river,
And the questions of a faraway wistful cuckoo,
And a good name —
They called me.

Prof., dr. hab., E.P. Sinyavskii