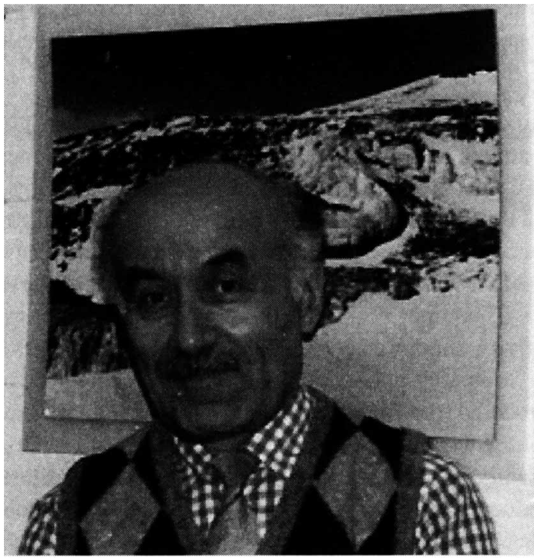

(Photo credit: Prof. Gisela Dreschoff, University of Kansas)

GRANT KOCHAROV
(21 Sept 1932–24 Nov 2007)

Grant Kocharov was a man whose life mirrored all the complexity and controversy of the fate of Russia in the second part of the 20th century. Kocharov was a bright, colorful, and ambitious person. He was born in Georgia, and his childhood and youth were not sunny and cloudless. His father died early and it was very difficult for his mother to feed their large family.

After Kocharov left school in Georgia, he moved to Moscow to further his education, and then to Leningrad (now St. Petersburg) where he joined the Polytechnical Institute. "For the first time I was able to eat enough to fill me up when I became a student," he once remembered. The hard conditions of childhood and youth affected Kocharov's character. He understood that he had to be best.

When Kocharov became a student he studied diligently and simultaneously learned the difficult Russian language. He was extremely demanding of himself and was able to work very hard. These features he retained throughout his life and when he became a famous scientist he thoroughly prepared and analyzed every statement he made. He liked to be the first at the institute early in the morning, surprising the Russian guards and shocking collaborators from foreign countries.

Talented, hard-working students like Kocharov were recognized and thus he became a collaborator of the A.F. Ioffe Physical-Technical Institute in 1956. In Soviet science, this was a time of prosperity and exhilarating successes. Kocharov contributed to important scientific results obtained within the framework of the Lunokhod project. He headed the research dealing with the chemical composition of lunar soil collected from the Moon's surface by the automatic stations Lunokhod-I and Lunokhod-II. The monograph *Nuclear-Physics Studies of the Moon and Planets*, published in 1981 with coauthors S V Viktorov and V I Chesnokov, was a result of this work.

Already at school, Kocharov showed a particular ability to administrate and organize work. That led him very early to become head of the Communist Party at the A.F. Ioffe Institute. On the one hand, this official duty took a lot of time and energy, but on the other hand, it allowed Kocharov the chance

https://doi.org/10.1017/S0033822200043320 Published online by Cambridge University Press

to travel abroad and organize large conferences in the USSR. All this, as well as the opportunities to involve talented collaborators, made it possible for Kocharov to become an influential and famous Soviet scientist.

Kocharov's role in organizing the Soviet program for research of past astrophysical phenomena using data obtained from annual tree rings should be particularly noted, including his ability to organize conferences devoted to this problem. In 1965, Kocharov was able to provide proof to B P Konstantinov, the head of PhTI, that annual tree rings contain important information about past natural events and that this information could be deciphered. The famous article "Astrophysical Events and Radiocarbon" in *Reports of the Academy of Science* was the result of these discussions (Konstantinov and Kocharov 1965). The paper described the opportunity to investigate many astrophysical phenomena, like solar activity, supernovae, etc., based on the determination of ^{14}C concentration in precisely dated tree rings. Soon after publication of the article, a scientific program was initiated that included collecting dendrodated tree-ring samples and experimental measurements of their ^{14}C content. Konstantinov committed Kocharov to discuss the problem with representatives of different scientific institutions. Following Kocharov's visits to the Botanical Institute of Lithuania Academy, research began to be conducted in dendrochronology and dendroclimatology, headed by the great T T Bitvinskas.

The first Whole-Union Congress on the problem of ^{14}C investigations was held in Moscow in 1966. Many theoretical and experimental aspects of ^{14}C and dendrochronological research were discussed here. The next meeting within the framework of ^{14}C investigation took part in Tartu (Estonia) in April 1968. The Tartu conference was mainly concerned with the analysis of specific problems arising from the necessity to obtain high-precision (tenths of a percent) ^{14}C measurements. A conference on dendrochronology and dendroclimatology held in Vilnius (Lithuania), 7–9 June 1968, discussed the interrelationship among different fields of science and the importance of a complex approach to this research.

Kocharov had a talent for organizing conferences in different places of the Soviet Union. That, of course, facilitated the development of science in these places, attracting attention to ^{14}C studies among young scientists everywhere, but also on a local level. The latter was important for financial support of the research.

Starting in 1968, ^{14}C laboratories began to be established in Soviet scientific institutes after the complex program "Astrophysical Phenomena and Radiocarbon" was initiated by the Presidium of the Soviet Academy of Science. These labs were able to obtain samples for analysis and results were reported more frequently. Conferences devoted to the issue of "Astrophysical Phenomena and Radiocarbon" became regular. The third meeting in this series took place from 25–27 November 1969 at Tbilisi State University. Conferences in 1973 and 1976 were also held in Tbilisi. Scientists then began reporting the results of their investigations at international conferences on ^{14}C and cosmic rays.

Despite these applications, Kocharov always considered himself an experimentalist. His circle of scientific interests included complicated theoretical questions such as solar neutrino, rich solar flares, etc. Kocharov's wide interest and activity resulted in more than 300 publications.

Kocharov organized uninterrupted input of talented young students to Ioffe PhTI while serving as the head of cosmic research at the Polytechnical Institute. As a result, 49 PhD dissertations were defended under the supervision of Grant Kocharov.

We, the scholars listed below, remember Grant Kocharov.

Prof. Valentin Dergachev, Ioffe Physico-Technical Institute of the Russian Academy of Sciences, St. Petersburg, Russia.

Prof. Valery Ostrykov, St. Petersburg State Polytechnical University, St. Petersburg, Russia.

Dr. Olga Gladysheva, Ioffe Physico-Technical Institute of the Russian Academy of Sciences, St. Petersburg, Russia.

Dr. Igor Koudriavtsev, Ioffe Physico-Technical Institute of the Russian Academy of Sciences, St. Petersburg, Russia.

Dr. Maxim Ogurtsov, Ioffe Physico-Technical Institute of the Russian Academy of Sciences, St. Petersburg, Russia.

Grant Kocharov maintained numerous international contacts, building close working relationships with scientists in the fields of Paleo-Astrophysics, more specifically ^{14}C and cosmic rays. In fact, his international contacts extended from Finland and the Radiocarbon Dating Laboratory at the University of Helsinki, to Japan, where he worked for nearly a year at Nagoya University. His close contacts in the United States included Paul Damon at the University of Arizona and colleagues at the University of Kansas.

His inquisitive mind encouraged discussions of unsolved problems in space physics, concentrating on the natural archives of cosmogenic radionuclides, such as long-term ^{14}C variations. One example of interest was problems associated with cosmic ray modulation during deep minima of solar activity.

Another of his main scientific concerns was the acceleration process of solar charged particles and the question of maximum energy transfer from the solar magnetic field. As he stated many times, available experimental data show that the higher the total energy of solar cosmic rays, the lower the observational probability. For this reason, he was searching for long-timescale, high-precision and high-resolution measurements, which included ^{14}C abundance in natural archives of cosmic rays. In addition, he recognized that nitrate concentrations in polar ice cores measured at very high resolution could provide a new window in investigations of acceleration processes associated with individual solar proton events.

During the time of the first results of the solar neutrino flux as measured by the radiochemical chlorine detector at Homestake, showing a) the anti-correlation of the count rates with the monthly average sun spot number, and b) the average flux of neutrinos from the Sun being too low compared with the predictions of the standard solar model for the ^{8}B neutrino rates, Kocharov continued to work on the earlier suggestion that a case for an astrophysical solution could be made, by not ruling out the time variation of the neutrino flux due to the variation of the ^{7}Be abundance in the central core of the Sun. However, he stressed the fact that the next generation of neutrino detectors would ultimately solve the so-called solar neutrino problem. He very carefully followed these developments, recognizing that new experimental results and their interpretation based on neutrino oscillations were the solution to the solar neutrino problem or could actually account for the neutrino deficit.

It is impossible not to mention the far-reaching implications of these types of discussions on the development of new ideas for effective neutrino detectors. We feel that they contributed to the original suggestion of using the entire Antarctic ice sheet as a neutrino detector. This proposal by the

Radiation Physics Laboratory of the University of Kansas ultimately led to the Amanda neutrino project at the South Pole.

Gisela Dreschoff (University of Kansas) and *Högne Jungner* (University of Helsinki)

REFERENCES

Kocharov GE, Viktorov SV, Chesnokov VI. 1981. *Nuclear-Physics Studies of the Moon and Planets*. Moscow: Energoizdat. 184 p. In Russian.

Konstantinov BP, Kocharov GE. 1965. Astrophysical events and radiocarbon. NASA technical report NASA-CR-77812; ST-CMG-AC-10430. (Translated from the original Russian article in *Reports of the Academy of Science* 165(1):63–4.)