

LETTERS (continued from page 14)

cists will have much to say in biology and physics too.

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BNL Official Explains Sources and Handling of Tritium Leaks

As interim director of Brookhaven National Laboratory, I appreciate Irwin Goodwin's continuing coverage of BNL. His comprehensive and balanced articles have enabled the greater physics community to stay up-to-date on the issues involving the lab.

However, I must point out and correct three misperceptions contained in his October story, "Peña Vows to Speed Up Lab Reforms In Wake of Political Sharpshooting" (page 86).

First, the story includes a statement that "lab officials still don't know the source of elevated levels of tritium that were detected in groundwater." That is not true. After months of exhaustive analysis, we can say with near-100% certainty that the tritiated water is slowly leaking from the 68 000-gallon pool of spent fuel in the basement of the High Flux Beam Reactor (HFBR) building.

Second, I am perplexed by Goodwin's characterization of the sequence of events—specifically his claim that when the tritium leak was found in December 1996, "it was weeks before the leak was revealed to local authorities." Although the erroneous belief that we withheld information has plagued us since last January, I believe we acted in a manner that allowed us to verify the unexpected, and apparently contradictory, results before releasing them to other parties. There was no intent on BNL's part to keep information from the authorities then, and there is none now.

Here is what actually happened. On 17 October 1996, our environmental staff took samples for the first time from the two new groundwater monitoring wells that had recently been installed just south of the HFBR. The samples were sent to the BNL testing lab for routine analysis, and the results—received on 5 December—showed a tritium level that was unexpected but not extraordinary, given our knowledge of groundwater contamination at our site: 2520 picocuries per liter in one sample from one well. That result led our environ-

mental staff to take a new set of samples on 11 December to validate the result obtained the previous week. When the results from the new samples became available on 8 January, they showed a surprisingly high level of 44 700 pCi/L in the same well. That discovery led to an immediate resampling the next day, 9 January, and expedited overnight testing verified the high concentration of tritium. The next business day, 13 January, we notified the Department of Energy, BNL's most immediate regulatory agency. Subsequently, we notified other regulators and public officials on 16 January, BNL employees on 17 January and the news media on 18 January.

To sum up, we believe that our actions reflected a careful verification of scientifically determined results, not a deliberate delay on BNL's part, before the appropriate regulators were notified. Throughout the groundwater testing and other environmental initiatives of the past year, we have shared monitoring data with regulators and the public as soon after verification as has been feasible.

Third, I would like to correct the incorrect impression left by Goodwin's statement that our recent facilities review—initiated voluntarily by BNL—"turned up another tritium leak under a second, smaller reactor that is used for medical research." Although the proximity of this much lower level of tritium contamination to the Brookhaven Medical Research Reactor may seem to suggest that the tritium comes directly from the reactor, we have determined that neither the BMRR nor any of its systems is directly responsible. The source of the contamination appears to have been historical practices involving a portable tank and/or sump, both of which received low-level radioactive waste from medical research years ago. Currently we are monitoring this contamination further.

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Lev Shubnikov: Physics Pioneer, Landau Ally, Secret-Police Victim

PHYSICS TODAY has introduced a number of little-known or forgotten Russian physicists to Western readers in recent years (see, for example, the letters about Sergei Vavilov in your December 1995 and September 1996 issues), and I would like to

add yet one more: Lev Shubnikov, a pioneer in the field of low-temperature physics who was arrested by the NKVD (secret police) during Stalin's "Great Terror" and whose fate has only recently been revealed.

This gifted experimentalist started in the mid-1920s with crystal physics, and that is why Abram Ioffe (the founder and long-time director of the Leningrad Physico-Technical Institute) recommended him to Leiden University's Wander Johannes de Haas, who was looking for an expert in growing crystals.¹ In the fall of 1926, Shubnikov started working in de Haas's department at the Kamerlingh Onnes Laboratory. There, on the basis of the advances he made in growing extremely perfect monocrystals of bismuth, he discovered a subtle phenomenon that later came to be known as the Shubnikov-de Haas effect. The result was published in 1930.²

Right afterward, circumstances forced Shubnikov to leave The Netherlands and return to the Soviet Union. He joined the new Ukrainian Physico-Technical Institute (UPhTI) in Kharkov, and after a frustrating period of waiting to get started, he succeeded in developing the Soviet Union's first cryogenic laboratory. His lab at UPhTI quickly gained a reputation as a world-class facility for conducting low-temperature experiments. His pioneering work on superconducting alloys was later acknowledged in the term given to the mixed state of type II superconductors: the Shubnikov phase.

Together with Olga Trapeznikova, his wife and colleague, Shubnikov was the first to detect the transition into a new, antiferromagnetic phase, and, with Boris Lazarev, to directly measure the nuclear paramagnetism of solid hydrogen. When Lev Landau, who had headed the theoretical division of UPhTI since 1932, developed the theory of the layer structure of the intermediate state of a superconductor, Shubnikov was the first to experimentally test it. In return, it was Shubnikov's pioneering experiments in low-temperature physics, as well as his many discussions with Landau, that aroused Landau's interest in this field, especially in second-order phase transitions.

Theirs was a close friendship that endured in difficult situations. When Landau vigorously defended pure science against the threats of ignorant administrators and proposed splitting the institute into divisions for pure and applied research, his ally from the experimentalists' side was Shubnikov. In December 1936, Landau

was fired from his position as a professor at Kharkov State University. In protest, Shubnikov immediately withdrew from teaching at the university, where he had been a professor of physics since 1935 and had organized the Soviet Union's first laboratory course in low-temperature physics. Consequently, he and Landau were accused by the Soviet officials of being anti-Soviet, and the NKVD suspected both of them of belonging to a counterrevolutionary conspiracy. Landau then fled from Kharkov and moved to Moscow to join Pyotr Kapitsa's Institute of Physical Problems.

During the summer of 1937, while Stalin's regime of terror was in full force, Shubnikov took a vacation with Landau. On returning to Kharkov on 6 August, though, he was immediately arrested, along with two other UPhTI laboratory heads, and held at the local NKVD prison. Late on the night of 5 October, the NKVD confronted him with Alex Weissberg, an Austrian physicist who had worked at the institute and had been arrested in March.³ Shubnikov was forced to repeat his "confession"—extorted from him after two months of incessant interrogation and torture—that he had refused to be recruited by Weissberg as a German spy only because he was already a German spy. According to the same confession, his friend Landau was the head of a "counter-revolutionary organization."⁴

When Trapeznikova asked the NKVD about the fate of her husband, she was told that he had been sentenced on 28 October 1937 to "10 years imprisonment without right to correspondence."¹ For two decades, she appealed again and again to the Soviet authorities to review the sentence, but to no avail. Finally, during the Khrushchev era of political thawing, her request was granted: On 11 June 1957, Shubnikov's sentence was quashed by the Supreme Court of the Soviet Union as being unfounded, and Shubnikov was posthumously rehabilitated.⁵

The following month, Alexei Abrikosov presented his now-famous paper on type II superconductors at a meeting in Moscow, and he cited Shubnikov's achievements, becoming the first person to do so in two decades. Nevertheless, except for Shubnikov and Lazarev's observation of nuclear magnetism, Shubnikov's work went unmentioned in the review article "40 Years of Soviet Physics" that appeared in the November 1957 issue of *Uspekhi Fizicheskikh Nauk*, the scientific organ of the Soviet Academy of Sciences. Not until 1966 did the first Soviet acknowledgement of Shub-

nikov's great contributions appear in print.

What had happened to Shubnikov himself? In 1957, his widow had received a document declaring that he had died in prison on 8 November 1945 as a result of "heart failure"⁵ However, it was not until 1991, after she had appealed to the Politburo, the still-existing chief policymaking body of the Communist Party, that she finally learned what had happened to her husband—and when. According to the recently opened archives of the KGB (successor to the NKVD),⁵ Lev Shubnikov had been executed by a firing squad on 10 November 1937, three months after being arrested and twelve days after being sentenced to "10 years imprisonment without right to correspondence" (clearly an NKVD euphemism for the death penalty). When he died, he was 36 years old.

References

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Smithsonian Official Tells Why *Enola Gay* Exhibit Was Shot Down

In his review of Martin Harwit's account of the *Enola Gay* exhibition controversy (PHYSICS TODAY, June, page 79), my former colleague at the University of California, Berkeley, John Heilbron, regrets the decision I made to stop the exhibition that Harwit had planned for the National Air and Space Museum. That decision, which came after months of deliberation, was the toughest I have had to make since taking up my responsibilities as secretary of the Smithsonian Institution. Making it involved the recognition that I was no longer operating solely within the conditions of an academic environment.

It does not surprise me that Heilbron, who has stayed largely within the academy, finds it difficult to un-

derstand the particular circumstances and obligations of a public institution in the nation's capital. But I was surprised that Harwit, both as director and author, never understood how far the museums on the Mall are from being a university campus. For many Americans, the proposed exhibition had not only intellectual but also symbolic importance.

Naively handled as they were, Harwit's negotiations led to greater antagonism on all sides and therefore upped the political stakes. By the end, positions had hardened and trust had evaporated. The exhibition had lost much of its potential to inform rather than incite, and the well-being of the Smithsonian Institution itself was at risk. I made the decision I felt I had to make.

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Entrenched Teacher Ponders Sokal Hoax and Student Beliefs

My belated appreciation to Silvan Schweber for his reasoned discussion of the Alan Sokal matter (PHYSICS TODAY, March, page 73). Sokal's action was more than a hoax. It was a deeply damaging attack on the entire basis of intellectual publishing. That basis is the assumption that most of what we read is written for disclosed reasons. Sokal's deliberate breaking of trust should be punished, not celebrated. Steven Weinberg's defense of Sokal in the *New York Review of Books* (NYRB) was shocking, suggesting that the arrogance and ignorance of our spokespeople are profound.

Herewith a view from the science education trenches. Many of the students I teach come to my classes without any of the assumptions that Weinberg and Sokal hold self-evident. Some are fundamentalist Christians and some are Native Americans. Others are just ignorant. If I were to wait until all of my students abandoned their angels and demons, my classes would be canceled. Further, if I debated them, using my expensive East Coast education to humiliate them, again, I'd be out of a job. And rightly so. My job is to teach, not lecture. I am proud of the fact that I've taught radioactive age dating to fundamentalist Baptists. How did they reconcile "Rock of Ages" with the age of rocks? Who cares? They learned the material, and it's not my job, apart