NUCLEAR PHYSICS

Russian Atom Scientist

If the Soviets have an atomic bomb, it now seems certain it was not built by the world-famous Dr. Kapitza. He has been relegated to the Communist dog-house.

➤ IF Russia has the atomic bomb or is close to achieving it, it is not because of the work of the world-famous Dr. Peter Leonidovich Kapitza, British-trained physicist who once worked in the Cavendish laboratories of the late Lord Rutherford at Cambridge (*See SNL,* July 23, p. 54).

For Kapitza has been in virtual retirement, not of his own choosing, living for the past two years or so in a country house not far from Moscow. He was neither banished to Siberia, as some rumors had it, nor did he disappear to play an important part in Soviet atomic energy research.

He has been in the Communist dog-house, but it was because his plans for tripling the production of steel in the USSR through use of liquid oxygen did not work out as promised, although they were partially successful.

Information is that Kapitza is actually back in Moscow working rather obscurely in a laboratory much less important than the one that he headed for years before and during the war.

Until the spring of 1935, Kapitza had been working in England at Cambridge on low-temperature problems. The Mond laboratory had been dedicated there in 1932 with powerful magnets that for a fraction of a second could produce a magnetic field more than a million times as great as the earth's magnetic field. Kapitza was using such apparatus in an attack on the secrets of the atom and physical laws.

He went back to Russia for what he thought to be just a visit. His passport was cancelled, and it was announced that he was "detained." The Soviet authorities wanted Kapitza's researches to be done at home.

So the British decided that it was better for the world to have Kapitza using the special equipment provided for him at Cambridge than to have Kapitza and the apparatus both idle and unused. So they sold the electromagnets and other equipment to the Russian government and they were moved to Moscow.

Interestingly, the money obtained was used to purchase for England its first cyclotron, which proved so important in atomic search.

Kapitza in his Moscow Institute for Physical Problems was fruitful. He did pioneering research on the very low temperatures near absolute zero where metals show little or no electrical resistance. He discovered that liquid helium, for instance, exhibits zero viscosity.

An outgrowth of this work was the invention by Kapitza of a turbine for production of oxygen at a low cost. It was reported to be a sixth of the size of conventional installations and it operated at four atmospheres instead of 200 atmospheres. It also began to produce oxygen very quickly and, combined with a nitrogen removal system, was suitable for the industrial production of oxygen. When a party of American scientists went to Russia just after the fall of Germany in 1945, Dr. Irving Langmuir, the General Electric chemist and Nobelist, learned from Kapitza that Soviet oxygen liquefaction units were supposed to produce oxygen at one-thirtieth the cost of the best units used by the Germans during the war in rocket fuel production.

The cheap oxygen was to be used in new methods of steel production in the Donbas and Soviet Asia and $2,000,000,000 were supposed to be spent on this gigantic project, financially of the order of the USA atomic bomb Manhattan project, which of course at that time the Soviet did not know.

Despite the fact that in 1945 200 tons of steel daily was reported being made in a pilot plant at Kapitza's institute, at a cost of about 25% to 30% that of ordinary blast furnaces, evidently the process did not work out as expected or something else happened. In any event, Kapitza lost face and his job. Toward the end of 1946 it was rumored that he had been sent to Siberia, presumably because he wasn't working on atomic energy.

Even if the rosy prospects of cheaper Soviet steel, thanks to Kapitza's oxygen, have not been completely fulfilled, oxygen is beginning to aid steel production in the United States, England and elsewhere.

Most immediate use of oxygen contemplated in the steel industry is in the open hearth process, the enriched air being blown in at the junction of the metal and the slag to speed the removal of the unwanted elements from the steel being manufactured.

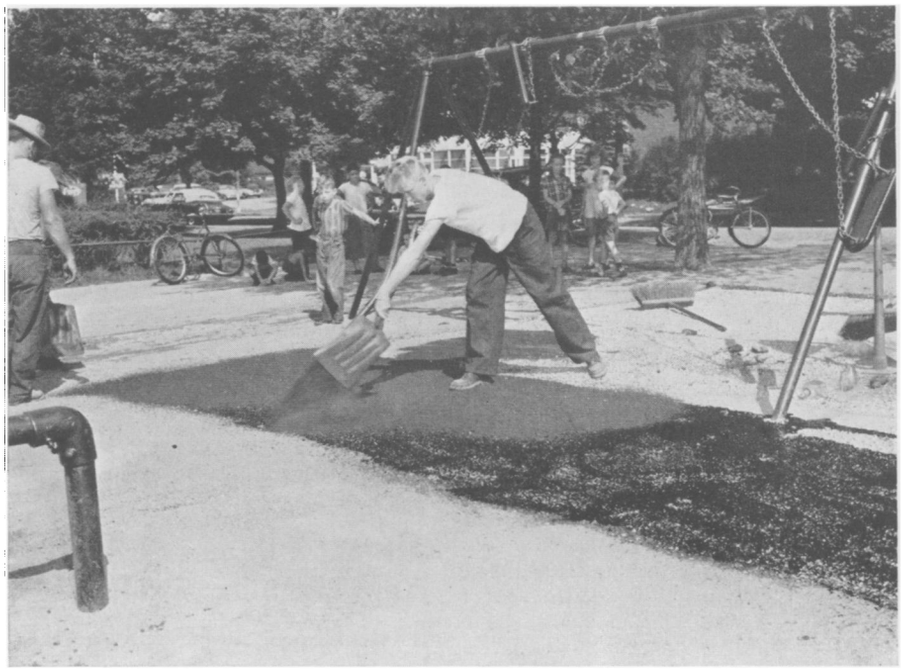
Several steel companies have pilot plants based on this process in actual operation, but none of them are going all out for the use of large amounts of oxygen in steel production, so far as can be learned. Oxygen can also be applied to the electric furnace, to steel-making converters and to a lesser extent the blast furnaces that produce pig iron primarily.

Science News Letter, September 3, 1949

ENGINEERING

Playgrounds with Rubber Surfaces Are Under Trial

➤ PLAYGROUND children may soon be bouncing around on a rubber surface, saving shoe leather, clothing and the danger of skinned arms, legs and faces. A test in-



RUBBER-SURFACED PLAYGROUND—Ground-up rubber was mixed in asphalt for this test-installation of a new surface. It will mean a saving in shoe leather and clothing and will prevent skinned arms, legs and faces in accidental falls.

stallation of a rubber-surfaced playground is now on trial in Akron, Ohio, at one of the city schools.

In this new surface, ground-up rubber replaces the conventional crushed slag in an asphalt mixture. Crushed stone is used as a foundation. Over this is spread a "hot-mix" asphalt. This base is then covered with a half-inch of ground rubber, which is rolled to impregnate the rubber particles into the asphalt.

The material is somewhat similar to that used on the so-called rubber roads installed in the Netherlands before the war, and later in England. Five test sections of such roads are now being laid in the United States. There is an important difference: the playground surface is entirely free of abrasive particles.

The rubber-surfaced playground installation was made by the Portage Bituminous Company. Goodyear Tire and Rubber Company supplied the rubber.

Science News Letter, September 3, 1949

PSYCHIATRY

Hormone for Mental Ill?

➤ PATIENTS with the serious mental disease, schizophrenia, may at some time in the future be among those who will benefit from the present search for new sources of cortisone, powerful new weapon against arthritis and rheumatic fever.

Latest search for bigger sources of this chemical include a U. S. Public Health Service-Department of Agriculture expedition to Switzerland and Africa to look into plant sources of a starting chemical for manufacture of cortisone.

Because the supply of cortisone is so very small at present, it undoubtedly will be a long time before schizophrenic patients generally will be treated with it. And it may not prove successful in this disease.

But the outer rind, or cortex, of the adrenal glands which is the body's normal source of the hormone is known to be involved in schizophrenia. The part of the body-mind mechanism which fails under stress, resulting in schizophrenia, is the mechanism whereby the adrenal gland cortex normally responds to stimulation by a hormone from the pituitary gland in the head. In schizophrenia this mechanism goes wrong and the adrenal cortex fails to respond. Drs. Hudson Hoagland and Gregory Pincus of the Worcester, Mass., Foundation for Experimental Biology have discovered.

They discovered this by giving injections of the pituitary gland hormone, called ACTH, to schizophrenic patients, normal persons and patients with less serious mental illness termed psychoneurosis. The schizophrenic patients did not respond to the pituitary hormone until they had been given three and four times the amount that brought response in normal and psychoneurotic persons.

Cortisone itself may or may not be effective in schizophrenia. But when larger supplies of it and other, related chemicals are available, the problem of this widespread mental disease may be much nearer to solution.

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ASTRONOMY

Pole Star Is "Temporary"

➤ POLARIS, our pole star, is only a "temporary" occupant of that position.

We call Polaris, or alpha Ursae Minoris, the pole star because the northern end of the earth's axis happens to point nearly towards it. But the earth's axis "wobbles" so that other stars have been and will be pole stars.

About 5000 years ago when the pyramids were built in Egypt, Thuban, a star in the constellation of Draco, the dragon, was the pole star.

Around the year 13,000 A. D., our pole star will be Vega, in the constellation of Lyra, the lyre.

The movement of the earth's axis, called "the precession of the equinoxes," takes about 25,800 years to trace out a circle. Polaris at present is about a degree away from the exact line of the axis, but is getting closer to it all the time. About the middle of the next century, it will be nearest, and then it will move out of line again.

We think of Polaris as a single star, but actually it is a small stellar family. To the naked eye, it is seen as one star. Through a good telescope, a faint companion star is seen, and the brighter one is revealed as a triple star.

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AERONAUTICS

All-Metal Planes Safe From Lightning Strokes

➤ LIGHTNING strokes are practically harmless to flying airplanes with all-metal "skins", while wooden or plastic planes might suffer damage by lightning penetrating the outside covering to reach engines and metal parts within, the American Institute of Electrical Engineers was told in San Francisco by Julius H. Hagenguth of General Electric.

The G. E. scientist is engineer in charge of the company's High Voltage Engineering Laboratory at Pittsfield, Mass., and he described results of experiments on lightning stroke damage to aircraft conducted through several years in collaboration with the National Advisory Committee for Aeronautics.

Lightning is not a serious hazard to properly protected planes, he indicated, but non-metallic planes, unless well shielded with a network of wires or other protective coating, are subject to damage from even minor lightning strokes of the order of 20,000 amperes, which may make the plane inoperable, he said.

Subjects investigated during the study were listed as the burning of holes in the skin and metallic parts of planes, damage to fuel tanks, breaking of safety glass in windshields, effect of current flow through ball bearings of the control systems, effect of lightning on the pilot's vision and other possible damages.

The principal effect to a metal plane's skin from a continuous stroke was found to be a small hole burned in the metal. Although the type of metal appears to have little influence on the effect, he said, the holes differ in physical appearance.

Concerning effects of lightning flashes on the vision of a pilot, he stated that the pilot must be looking at the exact channel of the stroke to be affected at all, and the probability of such an occurrence is very small. He reported on the results of an investigation with artificial lightning on observers' eyes protected with special goggles. From 29 to 47 seconds were required before sight was restored to the protected eyes. For others a longer time might be required. But, he added, the threat of blindness is not enough to advise pilots to wear goggles.

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BIOCHEMISTRY

New Chemical Weapon Tested Against Cancer

➤ A LONG-NAME chemical which has produced small but useful improvement in some cases of cancer was described to the First International Congress of Biochemistry held in Cambridge, England, by Prof. J. S. Mitchell of Cambridge University.

The chemical—tetrasodium 2-methyl 1,4-naphthohydroquinone diphosphate—was injected in large doses into the veins and muscles of 240 patients with various types of advanced malignant tumors. Some of the patients also received relieving doses of X-rays, but regression and degeneration in one type of cancer cells, adenocarcinoma, was produced using the chemical alone. Prof. Mitchell said that the chemical has low toxicity.

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