News of Science

Properties of Viruses

The October 1955 issue of the *Proceedings of the National Academy of Sciences* (U.S.) contains two interesting articles on the properties of viruses. A paper by Fraenkel-Conrat and Robley Williams deals with the reconstitution of active tobacco mosaic virus from its inactive protein and nucleic acid components. The virus protein was separated from the ribosenucleic acid either by dialysis at *p*H 10 or by treatment with the detergent dodecyl sulfate. Neither the protein nor the nucleic acid fraction was infectious for the tobacco plant, and neither fraction contained particles that resembled the virus in electron micrographs.

A solution containing 1 percent protein, 0.1 percent nucleic acid, and 3*M* buffer at *p*H 6 was kept in the cold for 24 hours. After this treatment, the mixture contained large numbers of particles that were indistinguishable from tobacco mosaic virus in the electron microscope and that were infectious for the tobacco plant. Brief treatment of the reconstituted virus with hot detergent permitted the demonstration in the electron microscope that the reconstituted virus particles contained a core of nucleic acid inside a cylinder of protein, just as in preparations of natural virus. Tobacco mosaic nucleic acid could not be replaced by other kinds of nucleic acid.

A paper by Stent and Jerne deals with the distribution of parental phosphorus atoms among bacteriophage progeny. When coliphage T4 is randomly labeled with phosphorus-32, there is a loss of infectivity as a result of radioactive decay. On the average, this "suicide" results from the disintegration of 10 atoms of phosphorus-32 per phage particle. When labeled phage particles are used to infect bacteria, some 40 to 50 percent of the label is transferred to the progeny.

Despite this efficient transfer, it was not possible to detect phosphorus-32 suicide among the progeny by loss of viability. This suggests that most of the parental phosphorus-32 is transferred to such a small minority of the progeny population that their suicide is not easily measurable. However, the inactivation of a fraction of a labeled phage population may be detected by another more sensitive technique. The phosphorus-32 suicide of a phage particle results in loss of ability to transfer phosphorus-32 to progeny phage because, under conditions of single infection, it has no progeny.

A preparation of hot phage T4 containing 260 atoms of phosphorus-32 per particle was used for infection. The first generation progeny contained 43 percent of the parental phosphorus-32. The ability of this first generation progeny to transfer phosphorus-32 to second generation progeny was determined at intervals. The rate of decrease of phosphorus-32 transferability indicated that each of the suiciding particles contained between 2 and 6 percent of the phosphorus of its parent.

This suggests that the 50 percent of the phosphorus of each parent appearing in the progeny is distributed over at least 8 phage particles. One may conclude that parental phage nucleic acid is not transferred in one piece to a single progeny particle or randomly distributed over all progeny particles. Instead, it appears to be distributed in relatively large fragments to a small fraction of the progeny phage particles. These two papers have important implications with regard to the function of nucleic acids.
—M.H.A.

Soviet Medicine

Major and Mrs. Paul W. Schafer of Washington, D.C., a doctor-nurse team, recently completed a month-long visit to the U.S.S.R. as guests of the Soviet Ministry of Health. Their invitation was arranged by B. V. Petrovsky, surgical clinic chief of the Second Moscow Hospital. Petrovsky met Schafer, chief of the Thoracic and Cardiovascular Service at Walter Reed Army Hospital, during the 1954 World Congress of Cardiology in Washington. The Schafers, the first Americans to be afforded the opportunity of such a tour in more than a decade, traveled thousands of miles in the U.S.S.R., where they visited 40 hospitals, clinics, research institutes, and sanitoria and talked with more than 200 Soviet physicians. Their itinerary included Leningrad, Moscow, and the North Shore of the Black Sea.

They found the Soviet medical and health system to be a highly centralized state organization that provides free care; doctors and nurses are paid by the state. Students get free medical education and then are assigned to work areas by the state. Some 20,000 physicians were graduated from the 75 Soviet medical schools last spring and 27,000 students matriculated this fall, 60 percent being women.

The Schafers do not feel that Soviet physicians are as adequately trained as Americans, and they also feel that physicians often are charged with responsibilities that could have been satisfactorily handled by nurses and technicians. The Soviets agreed that they had not placed sufficient emphasis on training programs for nurses and technicians and that they had thus been forced to produce larger numbers of doctors to implement their plan for medical care.

Generally, hospitals were found to be well run, clean, and efficient organizations in which patients appeared to be getting good medical care, although everywhere there was an apparent extravagance in the use of physicians. In Sochi each of the many sanatoria visited was found to have its own polyclinic with a staff of from 20 to 40 physicians caring solely for the medical needs of the institution's 200 to 300 patients, none of whom was acutely ill.

A similar situation was seen in general hospitals. For example, in 1954 the Bodkin Hospital in Moscow, which has 2400 beds, cared for 40,000 patients and performed 10,000 operations. There are approximately 500 doctors on the staff of this hospital—100 residents and 365 doctors in "postgraduate courses for rising qualifications." In addition, there is a teaching staff of 100.

Surgery is practiced extensively in the Soviet Union, despite the retarded development of anesthesiology. Using local anesthetic techniques, Soviet physicians perform essentially the same operations as are done in this country and appear to be having good results. All types of heart, lung, and esophageal operations are carried out under local anesthesia. Large volumes of ¼-percent procaine solution are administered after substantial premedication with pantopon or morphine.

Medical care closely follows the American pattern. Antibiotics are generally available but are used less frequently and in smaller dosages than in this country. Aside from an extensive BCG program, the medical management of tu-

berculosis, a major problem for the Soviets, is almost identical to ours. In contrast, tuberculosis surgery is not as adequate.

Infant and maternal mortality rates were found to have been sharply reduced during the past 5 years as the result of a nearly universal adoption of "natural childbirth" techniques. After a 1-month period of "psychoprophylactic orientation," 85 percent of Soviet mothers deliver without anesthesia.

Soviet psychiatrists reject Freud and do not use psychoanalysis. Instead they employ a "reflectory conditioning" program that consists primarily of a drugged sleep from which the patient is only gradually released. This procedure clearly reflects the work of Pavlov.

The Schafers were told of an impressive blood-transfusion program in which whole blood is preserved for as long as 100 days. In addition, they were shown bars made from dense red blood cell aggregates; these bars are used as intramedullary pegs in acute fractures of long bones and as onlay grafts for nonunions. The Schafers also saw an efficient burn dressing in the form of a pliable perforated film made from bovine serum.

Particularly impressive were the infirmaries at Soviet industrial plants. One Moscow factory provides 75 beds for workers who have been incapacitated and who probably would not have been able to return to work in this country. By living in the factory's "preventorium," the patients are able to put in a half-day's work.

The Schafers report that everywhere they were received in a very friendly and hospitable fashion. Soviet physicians repeatedly emphasized their desire to establish contact with their American colleagues. In a conversation at the conclusion of the visit, Deputy Minister of Health Kochergin summarized this attitude when he said that Soviet officials would respond "instantaneously and favorably" to conversations with the United States relating to the exchange of medical delegations, postgraduate students, original scientific medical manuscripts, published medical periodicals, and personal medical correspondence.

Marine Borer Chemists and Biologists

At this year's AAAS meeting in Atlanta, on Friday, 30 Dec., at 1:30 P.M., in Committee Room 1 of the Municipal Auditorium, there will be an organizational meeting of a proposed Society of Marine Borer Chemists and Biologists. All interested persons are invited to attend.

Since the inception of the AAAS, a great many scientific societies have been founded at annual meetings of the association. The Society of Systematic Zoology, organized at the annual meeting of the AAAS in Chicago, 1947, and the Socicty for the Advancement of General Systems Theory, organized at the Berkeley meeting, 1954—both of which are meeting with the AAAS this year—are but two instances—R.L.T.

News Briefs

■ The Swedish deep-sea expedition on the *Albatross* in 1947–48 studied meteoritic enclosures in deep sea sediments. The small magnetic spheres generally considered to be of meteoritic origin that are found in such sediments have now been investigated in much greater detail than before by H. Pettersson, who has reported his findings in *Naturwissenschaften* [**42**, 387 (1955)].

Heretofore these spheres, which are about 0.2 millimeter in diameter, had been thought to exist only in the amount of about 1 milligram per kilogram of sediment. However, by use of a strong electromagnetic extractor, it has been found that the occurrence of these iron spheres in the sediment of the Pacific Ocean is about 20 to 40 times greater than was previously reported.

Furthermore, it has been thought that the spheres exist only in the uppermost 2 to 4 centimeters of sediment, but Pettersson has found them at depths of at least 3 meters, which corresponds to a sedimentation time of 1.5 to 3 million years. Therefore a considerable number of meteorites fell on the earth during the Tertiary period.

Plans are now being made to compare the frequency of distribution of these magnetic spheres in sediments that have been taken from various parts of the ocean. Such a study will provide statistics on the frequency of meteorite falls during the past millions of years and also will contribute to knowledge of the geochronology of the ocean floor.

■ The developing shortage of scientists and engineers is meeting with increasing attention from all groups of scientists and educators. In the *American Scientist* [**43**, 385 (July 1955)] another strong voice is added to the chorus of warning. Joseph W. Barker, president of the Research Corporation of New York, and the new president of Sigma Xi, points out that "while the situation now is critical, a continuation of this trend for another 10 years could prove disastrous to the future welfare and defense of our country."

The crux of the problem, as many committees have realized, lies in the secondary schools. The salaries of high-school science teachers are so badly out of line with the salaries commanded by college graduates who have majored in the sciences, mathematics, or engineering and who go into industrial positions that virtually all of last June's graduates in these fields were preempted by industry.

Despite this, there was a shortage of 4000 even to replace the losses in industry resulting from death or retirement. Obviously, with the present demand, government and college positions cannot be filled, to say nothing of the need for teachers that will arise as the effect of the increased wartime birth rate makes itself felt at the college level. The crest of the growing population is just now entering the high schools, and the demand for science teachers, among others, will be most serious just when the supply is practically zero.

Sigma Xi is inaugurating a prize competition (first prize, $1000; second prize, $500; third prize, $100) to be awarded to those chapters, branches, or clubs whose plan for alleviating this situation is judged most promising. Some valuable suggestions may result.

Meanwhile, let us point out that since public education in the United States is a local responsibility, no effective remedy can be expected except on the local scene. School boards, town and city officials, and ultimately the individual taxpayer, must be alerted to the crisis and apprised of its national significance. Scientists must take time to assume this local responsibility of educating their own communities.—B.G.

■ A diagnostic test for rheumatoid arthritis is now available to the country's physicians through the Grace–New Haven Hospital in New Haven, Conn. This was announced on 9 Nov. by Ronald W. Lamont-Havers, associate medical director of the Arthritis and Rheumatism Foundation at 23 W. 45 St., New York.

Rheumatoid arthritis can be treated in 70 percent of the cases effectively enough to prevent pain and crippling if it is detected early. One diagnostic problem has been that the condition is difficult to differentiate from more benign forms of arthritis. Also, the disease is difficult to detect at all in the very early stages when therapy is most effective.

The new test is an outgrowth of an observation first made in 1947 at Columbia–Presbyterian Hospital, New York. At that time it was noted that the serum of blood from victims of rheumatoid arthritis causes solutions of sensitized sheep blood cells to clump together in a distinctive way. The reason for this effect of the rheumatoid arthritis serum is still