World War II, however, when nuclear reactors and more modern electronic equipment became available, did interest in the technique develop rapidly.

Activation analysis has also become useful in many fields other than crime study.

The chemical and petroleum industries are making widespread use of this technique to test for catalyst poisons in feedstocks, detect traces of impurities in plastics and synthetic rubber and measure the efficiency of chemical operations.

Coal Industry Adopts Technique

The coal industry is adopting the technique for the rapid determination of the carbon and ash contents of coal.

Farm products are being analyzed to detect pesticide residues on crops. Using this technique, agricultural scientists can look for traces of bromine and chlorine that are left on foods even after processing.

In medicine, activation analysis is being used to measure concentrations of magnesium, copper, zinc and other elements in human blood. Small amounts of various elements appear to be essential to the human body, but little is known about their actual biological role. Activation analysis is helping biologists solve this problem.

An unmanned device, equipped to perform activation analysis tests, has been developed to travel aboard a future "Surveyor" mission to the moon. The device will automatically perform tests on the minerals on the moon's surface and send the data back to earth.

Neutron activation analysis, a product of the atomic age, is indeed becoming an important tool for modern man.

• Science News Letter, 87:314 May 15, 1965

GENERAL SCIENCE

Population Growth Seen As Sparking Nuclear War

➤ THE MOST IMPORTANT and challenging problem facing mankind is the "extraordinary, continuing increase in world population," Dr. Albert B. Sabin of the University of Cincinnati said in Turin, Italy. This growth in depressed areas can itself provide the spark for nuclear warfare, he warned.

"It is the competition of the nuclear powers of differing ideologies among the hungry and miserable peoples of the world that carries with it the greatest danger of ultimate catastrophe," he said.

The noted virologist emphasized that he did not regard birth control as the most important or even the most realistic approach to the population problem, however.

If medical science can be held responsible for the tremendous increase in population (by lowering the death rate), "the great achievements of science and technology have also provided the means for conquering hunger and poverty," he said.

Men must learn to stop fighting about the best way to utilize this knowledge for the benefit of all peoples, he advised.

The vicious disease of mutual distrust and suspicion is greater than all the diseases that can be investigated by medical science, he said, adding that the great powers should develop a new philosophy of international relations based on the concept that neither capitalism nor communism will conquer the world.

An all-inclusive reorganized United Nations could help the weak nations become strong and help the great powers to stop their competition, he stated.

Dr. Sabin will give the same address in Milan, Naples and Rome for the Italian Cultural Association. He was one of 32 scientists who participated in the international symposium on specific tumor antigens at Sukhumi on the Black Sea. The symposium was sponsored by the International Union Against Cancer and by the USSR Academy of Medical Sciences. His topic was "Medical Science in the Service of Mankind—the Challenge for Survival in the Remaining Years of the 20th Century."

He himself has contributed to man's good health with his live-virus oral polio vaccine, as well as with vaccines against Japanese B encephalitis, sandfly fever and dengue fever.

• Science News Letter, 87:315 May 15, 1965

MILITARY SCIENCE

Wide Range of Chemicals Available for Gas War

➤ THE PROBLEM of whether or when to use chemical agents to control human behavior was recently the focus of controversy in Viet Nam and later was a question in the Dominican Republic, where rebels reportedly seized the country's entire stock of tear and vomiting gas.

A wide variety of drugs that influence either the mind or body of man are now known. Many of them are stockpiled by both the large and powerful countries and by smaller ones.

These chemicals range from those that can kill to what has been termed a "two-minute casualty" in riot control, compounds that cause copious tears, vomiting or both. When the short-term "incapacitating" chemicals are used, neither hospitalization nor medical aid is necessary for recovery.

Riot control chemicals that cause tears or nausea have been available and used for a long time, first during World War I. Three typical agents of this kind are bromobenzylcyanide, chloroacetophenone and adamsite.

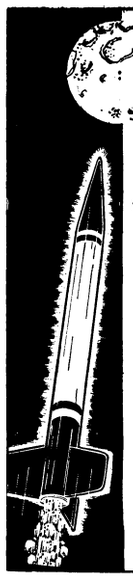
Bromobenzylcyanide is a tear-producing chemical developed by the French, and one of the most powerful known. Chloroacetophenone, also a lacrimatory chemical, and the vomiting compound, adamsite, were developed in the U.S. although not used during World War I.

Within one minute, adamsite causes the following symptoms in progressive order: irritation of the eyes and mucous membranes, discharge from the nose, sneezing, coughing, severe headache, acute pains and tightness of chest, nausea and vomiting.

Chemically, adamsite is diphenylaminechloroarsine. It is a yellow to green solid, with no odor.

Chloroacetophenone is also a solid. However, it does have the odor of apple blossoms.

• Science News Letter, 87:315 May 15, 1965



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