tails hard to discern. Of course, such difficulties are not present in condensed phases. One can argue that the simplest condensed phase is a van der Waals dimer. The latest application of such species for the investigation of quasi-bimolecular dynamics was described for the reaction between H atoms and CO_2 (C. Wittig, University of Southern California). When HBr, bound in a van der Waals complex with CO_2, is photolysed and the H atom impelled into the CO_2, the delay time for appearance of the OH reaction product varies between 0.25 and 1.5 picoseconds. This delay, and its dependence on the energy imparted to the H atom in the photolysis step, indicate the role played in this reaction by short-lived HOCO species.

New and exciting results were also reported for systems on surfaces, in large clusters and in condensed phases. One such highlight was the study by femtosecond techniques of reorganization at the surface of the semiconductor GaAs (E. Mazur, Harvard University). A sequence of processes could be identified starting with the initial excitation of photons and consequent production of free electrons and changes in the semiconductor's electronic band structure. The resultant destabilization of covalent bonds brings about structural rearrangements on a timescale of 1–10 picoseconds, which under some circumstances can be followed by material leaving the surface.

The meeting was privileged to be given a historical perspective, as well as a view of biological applications of the latest techniques, by George Porter. He charted the progress of time-resolved photochemical methods, from the millisecond flash-photolysis experiments of the 1950s, which he helped pioneer, to the femtosecond pulses of the present day. His lecture posed and prompted the question of whether we have reached the end of a road — can we, need we, go faster?

To follow the motion of atoms in molecules it seems that the time resolution of current techniques may be sufficient, although the development of femtosecond electron diffraction (Zewail) should extend ultrafast measurements to molecules not observable by spectroscopy. The motions of electrons in molecules are characterized by sub-femtosecond timescales. However, light pulses that short will have energy spreads comparable to the strength of chemical bonds, and information that can be acquired is unlikely to throw light on chemical processes. □

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OBITUARY

Albert B. Sabin (1906–1993)

THE heroic era of poliomyelitis research started with the isolation of the polio virus in monkeys by Landsteiner and Popper in 1908, and culminated in the development of vaccines protecting against this paralytic disease in the 1950s. Albert Sabin, who died on 3 March, in Washington, was one of the heroes of this era. His interest in polio is said to have originated during the polio epidemic in New York City in 1931. This was the year Sabin got his MD degree from New York University Medical School.

Sabin's enthusiasm for virology went back to his postdoctoral years at The Rockefeller Institute where he was working under the tutelage of Peter K. Olitsky. Sabin isolated and characterized the herpes B virus which caused the death of scientists bitten by a virus-carrying monkey. With Olitsky, he also studied the factors involved in the neuroinvasiveness of viruses. During the Second World War, as a lieutenant colonel in the US Army, Sabin isolated the virus of sandfly fever and was successful in controlling the infection through the elimination of virus-carrying insects. During the war he was also instrumental in developing vaccines against dengue and Japanese B encephalitis. At one point in his career he became interested in toxoplasmosis and shortly thereafter developed a diagnostic dye test for the disease. These were significant scientific contributions. But, undoubtedly, Sabin's major achievements were in the field of vaccination against polio.

In March 1951, I reported the first immunization of children with live attenuated polio type II virus at a meeting of the National Foundation for Infantile Paralysis in Hershey, Pennsylvania. At that time, Jonas Salk was experimenting with the immunization of monkeys with vaccines made with killed polio virus. Sabin, on the other hand, agreed with me during our discussion at the meeting that a live oral vaccine is a preferable method of immunization against polio. When Sabin developed his attenuated strains of polio he energetically pursued his goal of making them widely accepted as vaccine strains. The most convincing evidence of the innocuousness of the strains and their effectiveness was the vaccination of millions of subjects in 1958 and 1959 in the Soviet Union. This episode, more than anything else, finally convinced the authorities to license a live polio vaccine for immunization in the United States.

Following worldwide use of the oral vaccine, Sabin's time was largely taken up in visiting various countries around the world and acting as an adviser to the polio vaccination programme. At one point he was involved in research on the possible viral aetiology of human cancer. But he soon became convinced that the herpes virus, which was thought for a while to be associated with cancer, had in reality nothing to do with the disease.

Sabin relentlessly pursued his interest in vaccines. He immunized children against measles by aerosol application, and wrote about the varicella-zoster vaccine. He was also concerned about influenza epidemics and studied the virus involved. He continued writing numerous papers about the oral polio vaccine, with particular emphasis on vaccination problems in Third World tropical countries, and in 1984 he published a description for "Strategies of elimination of poliomyelitis virus in different parts of the world with the use of oral polio virus vaccine". The last case of paralytic polio in the Western Hemisphere was reported earlier this year, from Peru from 1992, a testament to his work.

In the last years of his life, Sabin became interested in AIDS. He was convinced that HIV is transmitted only by mucosal route and doubted whether any vaccine that fails to convey mucosal immunity will protect against the disease. A letter on this topic, a response to some critics, appeared only last month (*Nature* 362, 212; 1993).

That his views on AIDS carried great weight was a result not only of his experience with research on vaccines, but also because he was so articulate and incisive. Sabin was a champion of the debating society at New York University where he graduated. This skill never left him. He was the most eloquent and persuasive participant at meetings and was hard to defeat in scientific argument — not least because he often interpreted data more correctly than the actual presenter.

At one time, Sabin and I became adversaries over the selection of polio virus strains to be used as oral vaccines. This did not affect our long-lasting friendship and mutual respect. In a letter to me written just a year ago, reviewing a paper speculating that AIDS started with polio vaccination in the Belgian Congo, Sabin expressed his opinion that this was "a most irresponsible and uncritical communication". Courageous and wise. This is how I see him. I will miss him sorely.

Hilary Koprowski

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