A GLOWING ACHIEVEMENT Flow cytometry was developed at Los Alamos in the late sixties as a means of sorting single cells according to some selected criterion. The technology is now found in thousands of clinical laboratories, and as shown here, is being explored as a way of sequencing DNA. By attaching a distinctive fluorescent dye to each of DNA's four kinds of nucleotides, then detaching them one by one, it might be possible to read the DNA sequence simply by looking for the nucleotides' telltale "colors." The yellow spot in the center of the photograph is the laser-excited fluorescence from about a thousand molecules of one such dye.

For the freshly chartered AEC, perhaps the most fundamental health research issue was the risk posed by the newly unleashed power of the atom. World War II had added tragic testimony to the short-term effects of intense radiation. But a more abiding concern was the less visible, long-term consequences of much lower radiation doses. Leukemia had already claimed the life of Marie Curie, and in the twenties, working with fruit flies, Hermann Joseph Muller had shown x-rays to be powerful agents of mutation. A new era of radioactive isotopes, nuclear reactors, and atomic bombs demanded the most thoroughgoing stewardship. Today, rigorous standards born of research launched by the AEC safeguard radiation workers and the common citizen alike: Regulations guide the medical use of x-rays and radionuclides, set limits on radioactivity in consumer products, and define permissible doses for everyone touched by radiation. But the road to such regulations has been a long one; it stretches back to the early days of the century, and it is sure to take us even further in the quest to fully understand the health effects of radiation.

THE PROPER STUDY OF MANKIND

One of the giant steps on this road was creation of the Atomic Bomb Casualty Commission, established in 1946 to follow the long-term consequences of radiation on the survivors of the Hiroshima and Nagasaki bombs. Today, the work continues within the renamed Radiation Effects Research Foundation, jointly funded by the U.S. and Japan. This definitive effort has, for a half-century, traced the medical histories of more than 86,000 survivors and tens of thousands of their descendants. It remains the most ambitious study ever carried out on the effects of a toxic agent on human beings. From it we have learned that the major long-term effect of radiation is an increased risk of leukemia and solid cancers. Between 1950 and 1990, bomb survivors suffered 7827 cancer deaths, about 420 more than would be expected in an unexposed population. Attempts have also been made to identify genetic effects in the survivors' children, so far without success—an outcome that prompted early thinking about today's Human Genome Project (see page 15).

Other early epidemiological studies were likewise products of circumstance, in a time of routine above-ground nuclear weapons tests. South Pacific Islanders exposed to fallout from a 1954 atmospheric test and, decades later, residents returning to face residual radioactivity on Bikini and Eniwetok were carefully monitored for many years, both to provide for their own health and to enhance what we know about radiation and its effects.

Today, with atmospheric nuclear tests largely a relic of the past, concerns about radiation have different sources—but the concerns endure. Furthermore, such studies as that of the atomic bomb survivors can tell us little about the potential effects of prolonged exposure to very low doses. For more than thirty years, then, OHER and its predecessors continued long-term health studies of naval shipyard workers,