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# The Evolution of Science at the National Institutes of Health and the National Institute of Environmental Health Sciences

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NIH had its beginnings in a humble one-room hygienic laboratory on Staten Island 100 years ago. That laboratory was equipped with a modern Zeiss light microscope imported from Germany. The laboratory's primary function was to inspect cargo and persons coming into the United States from abroad for contagious disease.

In 1912, Congress changed the name of the organization that ran the laboratory from the Public Health and Marine Hospital Service to the Public Health Service. The change expanded the PHS role to include the diseases of man, pollution of navigable streams, sanitation, and sewage. Before there was an EPA and an NIEHS, pollution issues were handled by a variety of Public Health Service entities. In June 1958 the Bayne-Jones report recommended to Congress the establishment of an agency specifically oriented toward the conduct of biomedical research into the effects of environmental agents on human health. Afterwards, a coalition of social forces moved irrevocably toward the creation of a national center devoted to studying the effects environmental hazards on human health. These forces included increased public awareness of air and water pollution; the disastrous effects of thalidomide in Europe; the destruction of bird and aquatic life by pesticides; the inevitable Congressional desire to do something about the pollution problem; and the eagerness of the academic community to get into and explore a new and exciting, socially desirable field of research.

In November 1961, Dr. Paul Gross, professor of chemistry at Duke University, issued a similar call for creation of an institutional focus for environmental health research. The call was then taken up by a Study Group of the Public Health Service, which recommended an increased public role in environmental health research, a central laboratory. By 1962, the National Academy of Sciences/National Research Council endorsed the idea, extending the concept even further to include university involvement. This is today a reality in the form of NIEHS's 15 Environmental Health Centers at universities. A short time later, in 1966, the Surgeon General created the Division of Environmental Health Sciences, and 3 years after that, Department of Health, Education and Welfare Secretary Wilbur Cohen made the Division an Institute.

Once planted in the firmament, NIEHS grew. From a handful of employees back then, NIEHS has grown to a staff of 700. And, starting from a few temporary buildings on the South Campus, NIEHS now occupies this magnificent building with its state-of-the-art laboratories. This steady growth is a measure of the importance which society accords the Institute's role.

NIEHS holds two distinctions among the 12 NIH institutes. One is the location of the facility here in North Carolina rather than in Bethesda, MD. A second distinction of NIEHS is its noncategorical nature. Unlike most NIH institutes, including the institutes on aging, mental health, and general medical sciences, NIEHS is not limited to examining a specific disease or organ system. Instead, NIEHS has a very broad mandate.

The mission of NIEHS is to define the scientific parameters of questions concerning the mechanisms by which agents such as chemicals, light, or noise cause cancer, reproductive, neurological, immunological effects, or genetic damage. This mission includes questions about dose-response relationships, variations from species to species, extrapolations from high to low doses, the effects of mixtures and of low level exposures to agents, host defense and variations, biological markers . . . the list of appropriate areas of investigation is quite lengthy.

Within this century, man's ability to explore fundamental biological mechanisms has been enormously enhanced by amazing advances in technology, such as electron microscopes, CAT scanners, and nuclear magnetic resonance imagers. These instruments represent a quantum leap from the light microscopes that biologists had been using for the past 300 years. These new tools, and techniques such as biotechnology, have led to a scientific revolution, one that permits us to address fundamental questions about the nature of living organisms.

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There has been a coalescence in language and in the techniques and methodologies of biochemistry, genetics, virology, microbiology, physiology, and even anatomy. The once inviolable lines between the disciplines have been blurred. The common language is that of molecular biology of cell structure and function.

We may no longer know what to call these new scientists—molecular geneticists, molecular biologists, biochemists, or virologists—but it is clear that there is ample scientific opportunity for them to expand their spheres of interest. The era of science heralded by the discoveries in genetics in the 1950s and the 1960s provides the broad field of biology with a set of unifying principles and properties that can be tested in almost infinite variety.

NIEHS, like other NIH institutes, is experiencing this cross-fertilization of scientific disciplines. NIEHS scientists are involved in collaboration with those in other disciplines and at other institutions. Ongoing work with DNA adducts as biomarkers for assessing risk and with oncogene activation as a method of classifying carcinogens as genotoxic or promoting agents are two good examples of this process of mutual enrichment.

Although some scientific discoveries may result from serendipity, most are the product of years of teamwork that often includes researchers working together at several institutions. These teams also include graduate students and postdoctoral fellows. Such a collaboration of experienced scientists and relative newcomers is a kind of human cement that provides the historical continuity necessary to scientific progress.