DECADE OF THE BRAIN*

by

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It is a special pleasure for me to join you today and to extend personal greetings from Dr. Allan Bromley, the President's Science Adviser. Regrettably, he is out of town this week or he would have been with you.

You are embarked in what most certainly promises to be decade of excitement and discovery, conceivably unprecedented in biomedical science, and just possibly in science itself. The fact that our own decade of the brain initiative is being echoed by other nations clearly indicates a universal recognition that significant breakthroughs are not only possible, but likely provided we invest in broadly coordinated effort.

Due recognition for this initiative, as you know, goes to the prescience of Silvio Conte who in 1985 saw that the neuroscience held the critical key to significant

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medical progress. He introduced a bill that year which proposed to designate the 1990s as the Decade of the Brain. It was an idea somewhat ahead of its time, but only by four years. Sil was a man of passion and of vision. He fought tirelessly to improve the lives of his fellow citizens, and he made the biomedical sciences his top priority when he was ranking member of the House Appropriations Committee. At the time of his untimely death, work in the Decade of the Brain was just getting underway. But even before his untimely death, he accomplished some of his major goals. He bolstered support for the National Institutes of Health and for the National Institute of Mental Health. He fought for over a decade to build the child neuroscience building at NIH, which will now proudly bear his name. He laid the foundations for new programs in learning and teaching, to improve the cognitive sciences so that more young people could learn.

He is no longer with us, but Sil catalyzed a movement that will be a lasting legacy. the health of the next generation will owe a great debt to Sil's foresight and hard work.

You all have received the handsome report issued by the Office of Science and Technology Policy entitled: "Maximizing Human Potential: Decade of the Brain 1990-2000." It highlights the most promising areas of research in the neurosciences and behavioral sciences being carried out and supported by the Federal Government. By citing examples and clearly laying out a vision for the future, it demonstrates the scope, vitality, and strength of federal programs in brain research.

The report was put together by the Subcommittee on Brain and Behavioral Sciences, under the very able leadership of Dr. Roger Porter, Deputy Director of the National Institute of Neurological Disorders and Stroke. All told, the subcommittee includes representatives from 22 separate Federal agencies and institutes, all of which have a substantial stake in the brain and behavioral sciences.

The Subcommittee is part of the Committee on Life Sciences and Health, which is chaired by Dr. Jim Mason, the Assistant Secretary for Health at the Department of Health and Human Services. That Committee, in turn, has been established under the auspices of the Federal Coordinating Council for Science, Engineering, and Technology, or FCCSET. FCCSET is an interagency body that was created to coordinate federal activities in science and technology that cut across the missions of more than one federal agency, and in this respect brain research is a prototypical candidate for coordination. Brain research is inherently interdisciplinary, drawing on insights and techniques that range far beyond neurology, including epidemiology, computational science, nuclear science, certain of the social sciences, and even aspects of theoretical physics. Researchers from many disciplines, as well as from both the public and private sectors, are working together in new ways to ensure progress on some of the most important and difficult challenges facing us today.

The involvement of computational science is particularly interesting. A fairly straightforward extrapolation of current trends indicates that in about 50 years, it will

be possible to pack the storage and processing capacity of the human brain into an electronic package no larger than the brain's size. As Dr. Bromley has wryly observed, the day you wake up to discover that your toaster is smarter than you are will mark social change with a vengeance.

The report identifies nine research areas that constitute the basis for an integrated research program. They are: (1) human behavior and mental disorders; (2) drugs and addiction; (3) aging; (4) the development of the brain; (5) learning and memory; (6) communication and sensory disorders; (7) environmental impacts; (8) brain and spinal cord damage; and (9) restoration of function.

In each of these areas, the report emphasizes recent accomplishments, highlights the most promising opportunities, and lays out future plans and potential benefits. In this way, it identifies a framework for different groups to coordinate their research and to speed the development of advanced, high-priority technologies.

The report points out that three broad trends are converging to make that the goals of the Decade of the Brain possible.

First, the basic science needed to understand the brain has matured dramatically. We have learned more about the brain and the nervous system in the past 10 years than we have learned in all of prior history. Basic scientific advances

are being turned into medical treatments faster than ever before. At the same time, clinical observations are opening new avenues for basic research.

The second broad trend is represented by advances in technology, particularly sophisticated imaging techniques and computer analysis and simulation. These technological advances have dramatically boosted scientists' capacity to understand how the brain functions both normally and when it is disordered. They are also stimulating vital new industrial sectors in such areas as biotechnology, the design of advanced silicon microchips, and massively parallel computing architectures.

The third broad trend is represented by the growing international cooperation in the sciences. Science is unquestionably the most truly international of human activities, and the devastation of brain disorders and diseases knows no boundaries.

We must work to ensure that the social sciences and humanities are fully involved in the dramatic revolution going on in the brain and behavioral sciences. Developments in the neurosciences will pose unprecedented challenges to our wisdom and to our foresight, and in many cases fundamental human values will be involved in determining the use of new knowledge and applications. An obvious example involves medical care. With rapidly improving technology, we can keep people alive with serious brain injury for virtually their full expected life span -- persons who, just a few years ago, would have died from the initial injury. However, questions of quality of life and the cost of doing so pose vexing dilemmas.

These are all issues for which the Federal government is going to require a high degree of interaction and input from the private sector, and the Government will be looking to your National Foundation for guidance. The Decade of the Brain has the potential to be a cornerstone of federal efforts in the life sciences, but it will become so only if we are successful in involving both the public and private sectors in this activity. Just as the Subcommittee has sought to forge a partnership among the Federal agencies it represents, so the overall effort must seek a cooperative working arrangement with the private sector.

To further strengthen activities over the coming decade, a more detailed blue print is foreseen as a next step and Dr. Porter's Committee is hard at work in its development. The OSTP looks forward to publishing it within the next twelve months.

As Dr. Bromley has noted, we know much more about the first microsecond of the existence of our universe, or about the constituents of an atom, or about the interior of the sun, than we do about the three pounds of tissue inside our own heads. That is certain to change as neurosciences research challenges one of the last great frontier areas. In doing so, its promises enormous practical payoffs in treatment and in prevention.

In many ways, we stand at a new threshold in the history of science, a threshold as significant as the one crossed in the 17th century, when scientists turned their newly invented telescopes toward the stars. They found not only a new universe,

and a new place for Earth within that universe; they also found a new world here on Earth.

We are about to turn our telescopes inward, toward the fundamental questions of life and humanity and how we can best achieve human potential. The changes that we can expect from this new voyage of discovery unquestionably will be as dramatic as those of the past three centuries.