

## President gives National Medal of Science to 11

President Nixon commended 11 winners of the National Medal of Science last week for contributing "so much to a goal that all Americans so deeply feel, of using the great talents that we can develop in the field of science for peace rather than war." In presenting the medals to the recipients in ceremonies at the White House, the President took note of "the singular fact that for the first time in which these awards are being made, all of them are in the field of what I would call peaceful activities."

The National Medal of Science, established by an act of Congress in 1959, recognizes persons "who make outstanding contributions in the physical, biological, mathematical and engineering sciences."

Nixon pointed out that four of the eleven award winners are naturalized Americans, "which shows how fortunate we are in this nation to draw from all the brains of the world in creating our scientific leadership."

"A great new peaceful challenge to the men and women of science," he said, is to make the United States self-sufficient in energy. He called for greater research efforts in developing coal as a clean source of energy and in "the peaceful use of nuclear power, the fast breeder reactor, the possibility of leapfrogging that and going to fusion." The next day, Nixon announced plans to add \$115 million to the current fiscal year's budget for energy research and development.

## Monkey heads transplanted in brain-study project

The heads of monkeys have been successfully transplanted to other monkey bodies, retaining the ability to see, hear, smell and react to outside events. The work is that of Robert J. White, chief neurosurgeon at Cleveland Metropolitan General Hospital, who in earlier stages of his research was able to keep isolated brains alive by machinery alone, as well as to transplant a second brain—living, though without control functions—into a host animal.

This is not a project leading to human head transplants, but rather part of an effort, already a decade long, to understand the role of the brain that extends far beyond just control of the nervous system. Research by White and others has indicated that the brain has a role in hormone production, for example, that was formerly believed to be confined to various glands. The isolation of the brain was therefore necessary to eliminate the possible effects of other organs.



*The winners of the 1973 National Medal of Science and their areas of achievement:*

Earl W. Sutherland Jr., Miami University. Discovery of relationship between hormones and cyclic AMP, the body's "second" chemical messenger.

Daniel I. Arnon, University of California at Berkeley. Photosynthesis and plant nutrition.

Harold E. Edgerton, Massachusetts Institute of Technology. Pioneer in field of stroboscopic photography and ocean-bottom cameras.

Richard T. Whitcomb, NASA. Discoveries and inventions in aerodynamics.

John W. Tukey, Princeton. Mathematical and theoretical statistics.

Carl Djerassi, Stanford. Chemistry of steroid hormones and application to oral contraceptives and medicinal chemistry.

W. Maurice Ewing, University of Texas. Geology and geophysics of the ocean floor.

Vladimir Haensel, Universal Oil Products Co. Research in the catalytic reforming of hydrocarbons.

Frederick Seitz, Rockefeller University. Modern quantum theory of the solid state of matter.

Arie Jan Haagen-Smit, California Institute of Technology. Discovery of the chemical nature and source of smog and for successful efforts in smog abatement.

Robert R. Wilson, National Accelerator Laboratory. Design and construction of the world's most powerful particle accelerator and design of experiments to explore fundamental particles of matter.

"In the past," White told SCIENCE NEWS, "people said 'it's the salivary glands' or 'it's the mouth' or what-have-you that's producing the changes." With the isolated brain, however, "there is no other organ in the circuit. . . . This gives you sort of a hormonal computer," he said. "Basically, you put certain information in—in this case you put in certain chemicals—and if those chemicals are linked together and converted into hormones, then by simply measuring the circulation on the other side . . . you can determine what hormones are produced, and indeed what substances are utilized in the process."

It is difficult to tell, however, whether the isolated brain is "truly awake," says White, so the head transplant offers an advantage, since the spinal cord and central nervous system still do not grow back together.

The four-to-five-hour operation is arduous, and the 15-person staff required to keep the animal alive after-

ward amounts to having an entire intensive care unit for a single monkey. White has made 10 successful head transplants, of which the hardest lived for 36 hours. (The longest a completely isolated brain has survived, he says, is a bit under eight hours, although "second-brain" transplants have been sustained up to five days, and then were removed only to save the host animal.)

An interesting aspect of brain transplants, White says, is that, perhaps due to the strength of the blood-brain barrier and the lack of a lymphatic system in the brain, there are no signs of tissue rejection of the brain. □

## When bones wither: Ailment of aging

Fractured ribs and hips, pain in the lower spine and hip joints, a loss of several inches in height—these are common occurrences in later life, and their cause is often osteoporosis. Osteoporosis is a gradual loss in bone mass over a long period of time. Eleven million Americans have the ailment.

Postmenopausal women often receive estrogens to counter osteoporosis, and the fractures and pain that accompany it. The results have been disputed. Osteoporitic patients have also received large doses of calcium, with or without vitamin D and fluoride. Again the results have been equivocal. Two new studies now offer further insight into the complexities of osteoporosis and possible approaches to treatment.

It is not the amount of calcium in the body per se, but the ratio of calcium to phosphorus that may set the stage for osteoporosis, Jenifer O. M. Jowsey of the Mayo Clinic reported at a recent nutrition seminar in Washington. If the calcium-to-phosphorus ratio in the diet is more than one, bone is lost, Jowsey and her orthopedic colleagues have found in animals. Increasing phosphorus in the diet may have value in treating osteoporosis, she suggests. Milk and cheese are among the few foods that have more phosphorus than calcium in them.

Growth hormone treatments can lay down new bone mass in osteoporitic patients, John Aloia of the Nassau County (N.Y.) Medical Center reported last week at a growth hormone conference in Baltimore. Aloia used the facilities of the Brookhaven National Laboratory to measure the total skeletal mass of patients receiving growth hormone, but he stresses that his results are preliminary. He also admits that a dearth of growth hormone would keep growth hormone from being widely available for treating osteoporosis (see article on p. 245). □