Sutherland's cyclic AMP work brings him 1971 Nobel Prize

Earl W. Sutherland Jr. of Vanderbilt University School of Medicine wasn't altogether surprised last week when he received news that he was this year's winner of the Nobel Prize for Physiology or Medicine. He and his colleagues had been aware for some time of the importance of his contributions to endocrinology. Fifteen years ago he isolated cyclic AMP (cyclic adenosine 3′,5′-monophosphate) and proposed a scheme for how it controls the action of hormones. He spent the subsequent decade conducting what many of his colleagues called "brilliantly designed and carefully controlled experiments," to convince them that his scheme was essentially correct.

As a result, cyclic AMP is now known as the body's second messenger system (SN: 12/12/70, p. 450), a regulator of virtually all hormone activity. Hormones, produced in various glands and sent out to act on target tissues, act as intercellular communicators, delivering messages from one part of the body to another. From there cyclic AMP takes up the communications function, acting within cells to alter membrane permeability and influence enzyme activity.

Vanderbilt Univ.

Sutherland: Found hormone regulator.

The Nobel award in economics went last week to Simon Kuznets, the Harvard University professor emeritus who in the 1930's helped originate the concept of the gross national product, the measurement of the output of goods and services in a nation's economy. □

Cancer researchers finally get Ft. Detrick

The Government has finally decided what to do with Ft. Detrick, the Army's almost-idle biological warfare research center. President Nixon announced this week that the facility, which once employed nearly 2,000 persons, would be devoted to cancer research. Ft. Detrick has been left hanging since November 1969, when Mr. Nixon decided that the United States would discontinue research and production of offensive biological weapons. Since then, its staff has been reduced to about 580, with some 150 still engaged in defensive bacteriological research.

Mr. Nixon said that seven of Detrick's buildings, with laboratory space of more than 500,000 square feet and a value of more than $70 million, would be made available for cancer research. "It is my hope that this specific conversion will help illustrate the general potential for using defense related facilities to meet pressing domestic challenges."

The National Cancer Institute, which is overseeing the conversion for the time being, has decided that the best way to utilize Ft. Detrick's facilities would be to arrange for a private contractor, not yet selected, to manage Detrick's cancer program. A private contractor, he noted, is usually in a better position to draw upon a wide range of public and private assistance. The National Aeronautics and Space Administration, the National Science Foundation and the Atomic Energy Commission all use private contractors to manage various laboratories around the country.

During the next 12 months, an estimated $6 million will be invested in cancer research at Detrick, with about 200 laboratory employes. When the facility reaches peak operation in two to five years, it will employ about 600 scientists and back-up workers, at a cost of about $20 million a year. An NCI spokesman said that about 70 percent of the research at Detrick will focus on cancer viruses, with the remainder devoted to study of chemical causes and treatment of the disease.

Detrick would eventually become a focal point in the Administration's cancer-cure program, under Mr. Nixon's proposed Conquest of Cancer Agency. The Senate has approved a bill creating such an agency, which would supersede the National Cancer Institute and be, in effect, independent of the National Institutes of Health, but last week a House subcommittee voted down the measure, substituting for it the considerably different House bill (SN: 10/9/71, p. 243) and ensuring more legislative battle.

Mercury in human tissues shows 50-year decline

If the public is confused about mercury pollution, well they might be. It is a confusing subject, and the number of unknowns by far exceeds the number of knowns. In this regard, the mercury question is much like questions surrounding other environmental pollutants, for instance, lead. But with lead, there seems to be little doubt that its levels in the environment and in organisms are increasing. With mercury, the case may be the opposite.

In what appears to be a very well controlled study, pathologists at Saratoga General Hospital in Detroit have shown that mercury levels in human organs have undergone significant declines during this century. The probable reason: Coal burning in the earlier part of the century was a major source of mercury, and coal burning has declined greatly.

Jack Kevorkian, the pathologist who headed up the Saratoga study, reports that mercury levels in human lung tissues declined from 34.5 parts per million in the 1913-1919 period to about 5.5 in the current period. The downward trend throughout the intervening period was general except for some relatively minor rises at various times. This general trend also held for brain and kidney tissues.

The tissues were obtained from the pathology department of the University of Michigan. Along with the tissues came often detailed clinical histories which precluded the possibility of the mercury's coming from some source other than the environment, says Kevorkian. For instance, one sample came from a patient who had died of trichinosis; his medical records showed no treatment with any mercury-containing medications.

Kevorkian says the researchers also excluded the possibility of mercury contamination having occurred after death. "They were sometimes fixing tissue samples in mercury compounds in some of those [earlier] years," Kevorkian said. So the Detroit researchers made a point of doing mercury analyses of some early mercury-fixed samples. "They showed values thousands of times higher than the ones we got from our other samples," he said. Thus it was easy to be certain the mercury-fixed samples did not pass accidentally as ones prepared in other ways.

Two commercial laboratories in Detroit did the same tissue analyses as the Saratoga pathologists, as a check. The actual values turned up in these tests—which used different analytical methods—were often strikingly different from the Saratoga findings. But the

downward trends during the century were confirmed by these tests.

The disparities in the test results illustrate the great confusion regarding mercury, says Kevorkian. Until there are clearly standardized tests, as well as a correlation of levels shown in these tests with not-now-available knowledge of sub-acute or even acute toxic levels of mercury, then much of the work of regulating mercury in foodstuffs is going to be a kind of shooting in the dark, he claims.

Another serious problem is the identification of mercury compounds in the environment, in living organisms or in tissue samples. It is known, for instance, that methyl mercury compounds are far more toxic than metallic mercury or inorganic mercury compounds. There are still few laboratories in the United States that can do more than gross analyses of mercury. The Saratoga researchers, however, sent some of their samples to be checked for methyl mercury levels; some showed significant levels of these highly toxic compounds. But there was nothing in the clinical records of the patients involved to indicate any toxic effects of mercury.

"The whole field is ignorance," says Kevorkian, adding that some recent research has turned up the possibility that mercury is a trace element essential to life. In view of the imprecise knowledge of toxic levels and the apparent imprecision of analytic techniques Kevorkian is critical of recent Food and Drug Administration actions to remove swordfish and other mercury-containing foodstuffs from the market when it exceeds the Federal guideline of 0.5 ppm.

On the other hand, he agrees that his findings do not justify any abatement of efforts to stop mercury pollution; toxic contamination could still occur in local situations.

There seems little doubt of the honesty of Kevorkian's work and the apparent validity of his findings, despite some allegations to the contrary in Detroit newspapers which charged his study was funded by self-interested industrialists. "We did the study entirely on our own, without any outside contributions," he says.

But it can be argued that exactly because so little is known of mercury, FDA is doing the right thing in taking no chances on foodstuffs. Kevorkian counters this argument by pointing to the essential meaninglessness of the 0.5 ppm limit in view of the imprecision of testing techniques. And the price is high, he says: the possible destruction of the swordfish and tuna industries, small enterprises without the political clout of, say, the tobacco industry the detrimental effects of which on health are well documented. □

Ocean-floor record links dinosaurs, plankton, climate

The Glomar Challenger has recently returned from its latest voyage—Leg 19 of the Deep Sea Drilling Project—this time with evidence supporting a new theory that helps explain the extinction of the dinosaurs. The expedition, led by David W. Scholl of the U.S. Geological Survey and Joe S. Creager of the University of Washington, drilled at 11 sites in the Bering Sea and North Pacific.

Durring the Mesozoic (230 million to 65 million years ago), extensive volcanic activity added large amounts of carbon dioxide to the atmosphere. This excess carbon dioxide created a warm, cloudy climate that encouraged the development of the huge land reptiles. About 160 million years ago, ocean plankton learned how to extract carbon dioxide from the atmosphere to manufacture their limestone shells. This constant drain of carbon dioxide, proposes Thomas R. Worsley of the University of Washington, a member of the expedition, caused the earth's climate to become more severe, making life difficult for the dinosaurs. Limestone deposits composed of plankton skelektons from this period have been found many places on land. What the Deep Sea Drilling Project, particularly Leg 19, has demonstrated is that the limestone, and therefore the climatic change, was worldwide. The amounts of limestone found, says Scholl, indicate that vast quantities of carbon dioxide must have been removed from the atmosphere. The earth's climate could have been "cooled off just enough to absolutely raise hell with the big reptiles."

Leg 19 cores also contain evidence that about 65 million years ago the plankton ate themselves out of carbon dioxide and died, interrupting the food cycle and causing thousands of extinctions. Leg 19 sediments, says Scholl, "contain a record that the earth went through a process during the Mesozoic of fooling around with the carbon dioxide budget." This record, he adds, serves as a gentle warning to man, who is presently doing the same thing.

The voyage also produced evidence that the northwestward motion of the Pacific Ocean floor has probably not exceeded 600 to 900 miles in the past 50 million years. This contradicts some previous studies that have suggested much greater movement—on the order of 2,000 miles. The scientists drilled into a sand deposit in the Gulf of Alaska that originated on the continent between 47 million and 25 million years ago. The distance of the sand—in time and miles—gave the rate of movement.