

# SCIENCE NEWS of the week

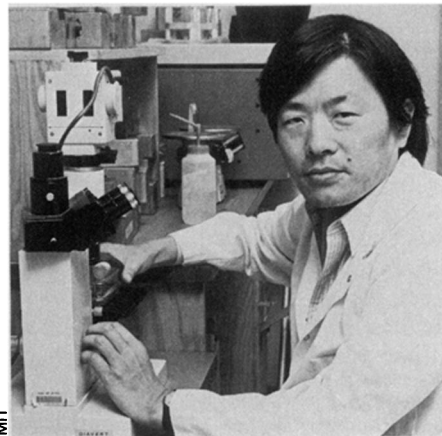
## Medicine, Chemistry, Physics Nobels Announced

At 6:30 on Monday morning, Oct. 12, a phone call from a Japanese journalist awakened Susumu Tonegawa at his Newton, Mass., home. The Massachusetts Institute of Technology biologist had just received the Nobel Prize in Physiology or Medicine, the reporter said. Tonegawa didn't believe him.

"I thought it must have been a mistake. Journalists are known to make mistakes," Tonegawa told SCIENCE NEWS.

A few minutes later, his father, a retired businessman living in Japan, phoned. Soon, reporters and photographers were at his doorstep. And a few hours later, he was giving a news conference at MIT, where he has been a professor of biology since 1981.

Also receiving Nobel Prizes this week were Georg Bednorz of West Germany and K. Alex Mueller of Switzerland in physics, and Jean-Marie Lehn of France and two U.S. researchers, Charles J. Pedersen and Donald J. Cram, in chemistry.



Tonegawa

The Karolinska Institute in Stockholm, Sweden, cited Tonegawa, 48, for discovering how a limited number of genes produce the immense diversity of antibodies that immobilize foreign substances, such as viruses and toxins.

"People used to think we needed a large number of genes, and some people thought the body didn't have the right number of genes," Tonegawa says. But he discovered how about 1,000 pieces of genes recombine to form 10 million to 1 billion antibodies, each specific for a foreign substance, or antigen. When an antibody attaches to an antigen, the body's immune system is summoned to attack.

Antibodies consist of identical pairs of long and short chains of proteins. Together, the chains form a Y-shaped molecule. In humans, there are five types of long chains, thus forming the five classes of antibodies, and two types of short chains. While the stem of each class has a

similar sequence of amino acids, which are the building blocks of proteins, the outer ends of the two arms show significant differences in their amino acid sequence.

Genes in the body's B-lymphocyte-type white cells dictate the manufacture of antibodies. To explain how this was done, some researchers proposed that a separate gene in the B cell was responsible for each protein chain. But this was impossible, some said, because not enough genes were available for the number of antibodies.

Tonegawa then discovered a mechanism, which he described in a series of articles published between 1976 and 1978. He showed how bunches of genes coding for the arms' outer ends shuffle around and recombine to form different genetic sequences in B cells, eventually leading to a large diversity of antibodies.

Said the Nobel Committee: "Tonegawa's discoveries have increased our knowledge about [the] structure of our

immune defense. They also open up possibilities to increase the immune response against pathogenic microorganism through vaccination—and also to improve inhibition of unwanted immune reactions."

Physics winners Bednorz, 37, and Mueller, 60, both of the IBM Zurich Research Laboratory, were cited for last year's discovery of superconductivity in an oxide material 12°C higher than previously known (SN: 8/15/87, p. 106). Superconductivity occurs when materials conduct electricity without losing current to resistance.

Lehn, 48, of the College de France in Paris, Pedersen, 83, a former Dupont researcher, and Cram, 68, of UCLA, share the chemistry award for making uncomplicated molecules that perform the same functions as natural proteins (SN: 8/8/87, p. 90). The research could be used to trap ions such as calcium and eventually to extract gold or uranium from seawater.

— S. Eisenberg

### Depression and cancer: A fatal link

The second-century Greek physician Galen attributed cancer to a melancholy disposition. Modern researchers who have tracked a large sample of men for the past 20 years now say that depression does appear to be a risk factor for dying from cancer, although it was not found to be a factor, statistically, in cancer's onset.

It is "biologically plausible" that depression promotes the spread of cancer by weakening the ability of the immune system to reject malignant cells, thus increasing the likelihood of death, report Victoria W. Persky and her colleagues in the September/October *PSYCHOSOMATIC MEDICINE*. Other researchers have found that depression and bereavement are related to lowered immunity in a complex way (SN: 5/23/87, p. 328).

Persky and her co-workers used a depression scale from a standard psychological test, the Minnesota Multiphasic Personality Inventory (MMPI). This taps into a number of symptoms, such as apathy, denial of personal worth and sleep disturbance. But elevated MMPI depression scores do not necessarily mean an individual meets psychiatric criteria for severe depression.

The entire MMPI, as well as a complete physical examination, was administered in 1957 and 1958 to a random sample of 2,018 white male employees at the Western Electric Co. near Chicago. A

variety of occupations were represented, including managers, skilled craftsmen and service workers.

As of 1979, there was an increased rate of cancer deaths among subjects who had had significantly elevated depression scores 20 years previously. This association remained after the researchers had statistically controlled for age, number of cigarettes smoked, alcohol intake, occupation, family history of cancer and blood cholesterol. The association did not appear to be stronger for any particular type of cancer, they say, but the number of individual cancers is too small at this time to detect site-specific differences.

"The finding that depression was associated more strongly with cancer mortality than with cancer incidence suggests that it may promote, rather than initiate, the disease process," says Persky.

A separate, 30-year study of former medical students has found that those with a distant, emotionally withdrawn approach to others or a poorly balanced mix of extreme emotions in relationships were more likely to develop cancer (SN: 2/21/87, p. 120). The Western Electric study found no evidence, however, that the tendency to repress or deny emotions, at least as measured by the MMPI, is related to the subsequent appearance of cancer or death from cancer.

— B. Bower