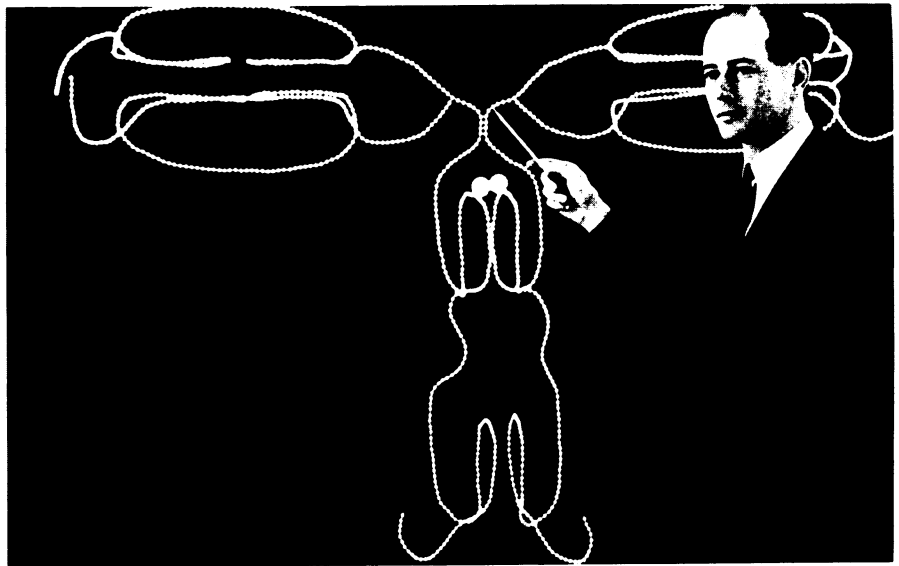


Honoring the decipherers of gamma globulin



Rockefeller Univ.

Edelman with his model of the 1,320-amino-acid molecule of gamma globulin.

One of the most intriguing puzzles of modern biology is the immune system by which the body recognizes and wards off bacteria, viruses and foreign tissues. A major aspect of this system is humoral response, by which antibodies (proteins) combine specifically with these foreign materials. Last week, the 1972 Nobel Prize for Physiology or Medicine was awarded to two scientists who have made outstanding contributions to antibody research. They are Gerald M. Edelman of Rockefeller University and Rodney R. Porter of Oxford University.

The American and British scientists are sharing the Prize largely for their unraveling of the complete chemical structure of gamma globulin, a key molecule in humoral immunity. Their work was reported in 1969 (SN: 4/26/69, p. 401). They analyzed material from a tumor known as a myeloma. Myeloma tumors produce pure immunoglobulin proteins, so that complete analysis of a gamma globulin molecule from this material was possible. Edelman and Porter worked separately, yet complementarily with this material. They used different techniques, for example, to cleave the two heavy peptide chains and the two light peptide chains from the gamma globulin molecule. Subsequently both determined the complete amino acid sequence of all four peptide chains, and showed how the chains were connected.

The final product, as they determined it, contained 1,320 amino acids, 19,996 atoms and had a molecular weight of 150,000. Total sequencing of such a molecule was a gargantuan feat.

This achievement, coupled with other immunological research by Edelman and Porter, the Nobel Prize Committee declared, "incited a fervent research activity in the whole world in all fields of

immunological science, yielding results and practical value for clinical diagnostics and therapy." For a century investigators have known that antibodies play a crucial role in the body's defense against infection, and in skin graft and organ transplant rejections. In the 1950's doctors could measure the amounts of antibodies in the blood. But it was not until Edelman's and Porter's

accomplishments that scientists really learned the structure of these large protein molecules.

After receiving the award, Edelman said, "We [Porter and I] both shared the same point of view—the only way to understand how the antibody molecule could recognize foreign substances was to determine something about its chemical structure." □

Ten Chinese physicians on tour of U.S.

The first visit to the United States in 22 years by physicians from China began last weekend with a busy three-day stay in Washington that took them to the National Institutes of Health, the White House, the National Academy of Sciences and the Smithsonian Institution. Before the month is out, the 10 doctors, including two women, will have visited New York, Boston, Chicago, Kansas City and San Francisco, where they will depart for home Nov. 1.

The visit is in response to an invitation to the China Medical Association on behalf of the NAS Institute of Medicine, the American Medical Association and the four American physicians who visited China in September 1971.

The visit is as much a symbol of the thaw in relations between the United States and China as it is a chance to exchange medical information. The Chinese doctors have been educated and trained essentially in modern Western medicine, as opposed to traditional Chinese medical techniques such as acupuncture.

On their first day in Washington, the doctors toured cancer wards and

laboratories at NIH and discussed treatment methods. The next day they met President Nixon in an informal 15-minute session, attended a seminar on heart disease at NIH, and were guests of honor at a banquet in the Great Hall of the Academy building. American physicians expressed admiration for the visitors' knowledge and understanding. "Their questions were right on the mark," said cardiologist E. Grey Dimond of the University of Missouri School of Health Sciences. Dimond was one of the four U.S. physicians who visited China last year, and he was instrumental in setting up this tour.

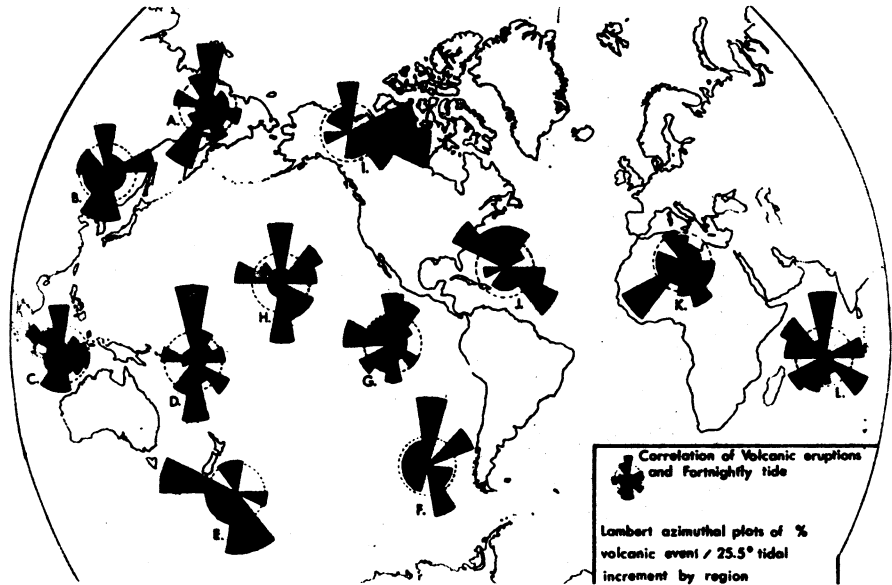
The third day the Chinese made two separate visits to the Smithsonian and conducted their first press conference. The press conference produced little substantive new information. (Leading causes of death in China: cardiovascular diseases and cancer. On alcoholism: "Not a problem in China. You are not apt to meet a single drunken man in the street." On birth control: "We have had certain success, but the problem has not been totally solved. . . . Our birth-control measures are free of

A link between earth tides and volcano eruptions

Earth tides are motions of the land surface in response to tidal forces of the moon and the sun. They are analogous to ocean tides, but their amplitude is small in comparison. Nevertheless they can be measured and their cycles recorded. Two researchers from the University of Michigan, M. J. S. Johnston and F. J. Mauk, have found correlations between volcanic eruptions and earth tides.

The work is presented in two papers. The first appears in the Sept. 29 NATURE; the other has been submitted to the JOURNAL OF GEOPHYSICAL RESEARCH. The NATURE paper deals with a single volcano, Stromboli. The other presents a study of volcanoes all over the world.

Johnston and Mauk chose Stromboli first because volcanologists take it as a kind of model volcano. They compared eruptions of Stromboli with the earth tides at the volcano's location. Earth tides come in cycles of 12 hours, 24 hours and 14.7 days. Johnston and Mauk found a correlation with the fortnightly cycle: Stromboli tends to erupt when the amplitude of the fortnightly tide cycle is near its minimum.



The circles are plots of eruptions versus phase of the earth tide. Each wedge is a day in the 14-day cycle. Time of tide maximum is up; minimum down.

Johnston and Mauk then set out to compare eruption times since 1900 of all the world's nonsubmarine volcanoes with the phase of the earth tides at their locations. There were 680 eruptions altogether. For the whole set a correlation with earth tides was found, but the relationship is not simple. Dif-

ferent classes of volcanoes tend to erupt at different points in the fortnightly tide cycle.

"The probability of eruptions is greatest at times of maximum tidal amplitude," Mauk and Johnston conclude, although eruption probability for individual volcanoes may peak significantly at times other than the 14-day maximum.

The time of maximum probability of eruption was found to differ according to the kind of lava put out by the volcano, whether andesitic or basaltic. Both kinds showed eruption maxima at times of maximum amplitude of the fortnightly tide, but basaltic eruptions also showed a maximum at tidal minimum. These results also seem to correlate with the locations of the volcanoes, but that appears to be because geographical location tends to determine whether eruptions are andesitic or basaltic.

Johnston and Mauk did a detailed study of 18 volcanoes in the neighborhood of Japan. They found that volcanoes that prefer to erupt at or near the tidal minimum tend to be located in areas having a large crustal thickness and a small rate of horizontal deformation of the crust. Volcanoes in areas with a thinner crust and a rate of horizontal deformation greater than 3.0 centimeters per year tend to erupt at or near the time of the fortnightly tidal maximum.

The explanation of these results must necessarily be vague, Johnston and Mauk point out, because of a virtually complete lack of understanding of volcano mechanisms and what earth tides do to them. "It is easy to think of mechanisms," says Johnston, "but I would not like to specify one." □



Kendrick Frazier

The Chinese physicians at their first U.S. press conference in Washington.

charge.") But it did show the Chinese doctors' enthusiasm, humor, ready understanding of English (while nevertheless preferring to speak in Chinese), and pride in the demonstrated ability of China to deliver health care to its 800 million people. It also produced a dispute over the fact that the Chinese answered only questions that had been submitted in writing before a certain deadline. It was not clear whether the same restriction would hold later in the tour. The Chinese apologized, noting the long period of separation between the people of China and the U.S. "I suggest we understand each other step by step . . ."

The Chinese health-care system drew glowing remarks from Dimond. "They made a decision that getting care to the people was more important than research. They have come through with a way of taking care of all those people in their hospitals and communes that is warm. . . . Medicine is a service, and unless you treat it as a service rather than a product to sell, it will never be what it is supposed to be."

The doctors' tour is to be followed in November by a visit of Chinese scientists. A group of seven physical scientists, plus three other persons, is due to arrive in Washington about Nov. 20.