

Ten talented youths win science awards

The solution to a mathematical puzzle Paul Chih Ning posed to himself won the Bronx High School of Science student a \$12,000 scholarship in the 42nd Annual Westinghouse Science Talent Search. At the final competition in Washington last weekend, Ning explained, "The first problem I picked turned out to have a nice solution so I went on to generalize it." Interested in the properties of positive integers, Ning, 16, chose two well-known theoretical functions and explored their relationship to each other. Sharpen your pencils and try to follow him.

"I'll start easy," Ning begins. The first function, called psi or $\psi(n)$, is defined as the number of positive integers less than n and having no common denominator (except 1) with n . (For example, $\psi(4) = 2$; 1 and 3 fit these criteria for 4.) Another function, tau, or $\tau(n)$, is defined as the number of positive-integer divisors of n . ($\tau(4) = 3$; 1, 2 and 4 are all divisors of 4.) To relate the two functions, Ning suspected—and then proved—that for all integers greater than 30 and all odd integers greater than 3, $\psi(n)$ is greater than $\tau(n)$. For the remaining integers, Ning calculated the functions' values. In only seven cases ($n = 1, 3, 8, 10, 18, 24$ and 30) are the functions equal, he found, and in just four cases ($n = 2, 4, 6$ and 12) is $\psi(n)$ less than $\tau(n)$. "I was not looking for any practical uses," the first place winner says.

Research in a more applied vein was recognized with second prize in the competition. Michael Irvin Hyman, 18, of Centennial High School in Ellicott City, Md., won a \$10,000 scholarship for his project devising software and hardware to present three-dimensional graphics on a standard microcomputer. In one of the most popular exhibits at the Washington display, viewers looked through glasses of filters polarizing light to supply the right and left eyes with somewhat different images. On the monitor, shapes, such as airplanes and cubes, appeared nearer or further away.

Study of a rat gene, employing the sophisticated approaches of modern molecular biology, won third place and a \$10,000 scholarship for Eric Akira Koide, 17, of Dobbs Ferry, N.Y. His research was performed in the laboratory of Jack Silver during a summer program for high school students at Michigan State University. Koide determined the nucleotide sequence of the gene for Thy-1, a component of the membrane for many cells. He then compared the nucleotide sequence of Thy-1 to that of a gene for immunoglobulin, a protein involved in the immune response. He reports 35 percent of the nucleotides are the same. "We are certain they come from a common [ancestral] gene," he says.

The next three students won \$7,500



Left to right: First place: Ning; second place: Hyman; third place: Koide.

scholarships. L. Gene Spears Jr., 18, placed fourth for his research on a system for storing solar energy to use as heat. The student from Cypress Creek High School in Houston, Tex., reports that using a reversible chemical reaction of salts can be more than three times as effective as a water system for storing energy.

Fifth prize went to Caroline Maria Gomez, 18, of Shaker High School in Latham, N.Y., for her discovery that in gerbils, unlike other species examined, brain structures called barrels, which handle stimuli from the whiskers, develop after the characteristic layers develop in the brain. The samples Gomez examined were supplied by Frank Rice of Albany Medical College.

A model wind turbine secured the sixth place for Elihu Hassell McMahon II, 17, of the Bronx High School of Science. His wind turbine substitutes a collapsible cloth sail for the conventional windmill blade. As the turbine rotates, one blade opens to catch the wind while the other blade folds

to shear through oncoming wind with maximum efficiency, McMahon explains.

The remaining four winners each received a \$5,000 scholarship. They are: Alexandra Kroeger, 17, of Shoreham-Wading River High School in Shoreham, N.Y., who analyzed crosslinked actin; Gina Rosalind Levy, 17, of New Rochelle H.S. in New Rochelle, N.Y., who examined how a membrane molecule mediates learning in a marine snail; Jeannie Pui Ching Lo, 17, of Stuyvesant H.S. in New York who developed an antibody method to identify portions of a mammalian protein made by genetically engineered bacteria; and Janet Lin Pan, 16, of Bronx High School of Science who did a number theory project examining divisibility of sums of powers of integers.

Announcement of the awards capped a five-day visit to Washington for the 40 contest finalists (SN: 1/29/83, p. 71). The competition is sponsored by Westinghouse Electric Corp. and conducted by Science Service, Inc. □

Computing a competitive advantage

Overseeing and organizing the participation of 10 rival computer companies in a new joint research and development venture called the Microelectronics and Computer Technology Corp. (MCC) (SN: 10/16/82, p. 247) was a challenge that Admiral Bobby R. Inman, former deputy director of the Central Intelligence Agency, couldn't resist. Inman, now MCC's president and chief executive officer, last week at a meeting of the Computer Society of the Institute of Electrical and Electronics Engineers, described his efforts in putting together this experiment in keeping the United States technologically competitive with Japan and other countries.

MCC teams have already defined specific research projects in four areas—integrated-circuit packaging, computer programming productivity, computer-assisted design and manufacturing and computer architectures. Companies that become MCC shareholders must provide a minimum of three years of funding for at least one of the projects. So far, the computer-assisted design program is the most popular project. Inman said he expects several other companies to join the venture within the next few months.

MCC will do the vast majority of its research in its own facilities and will thus hold the patent rights to any developments that occur, said Inman. Sharehold-

ers who fund a specific project will be allowed a three-year lead, under a license from MCC, in exploiting any useful research results.

Inman's immediate concerns are finding one or more locations for the laboratories to house the projects and the 275 scientists and technicians needed to do the research. Although many of the researchers will come from participating companies, Inman said, "I have a strong sense that we're going to have to attract a fair amount of talent from outside." Some university officials expressed concern that this would further drain away qualified faculty from university departments.

The Justice Department is also watching MCC closely. Last December, the department indicated that it did not object to the formation of MCC in principle, but it would monitor the specific research projects for possible antitrust law violations. However, recently several congressmen have proposed legislation that would free joint ventures like MCC from antitrust constraints. Inman said, "It will not be my primary purpose in the next several years to see that that legislation gets through, but it will get some share of my attention."

If MCC is successful, Inman said, the country's whole approach to industrial research and development may have to be rethought. —I. Peterson