The rewards of student research

Chang

Wilmer

Wong

The knack of asking good questions brought scholarships and awards this week to a group of high school students in the 46th annual Westinghouse Science Talent Search. Topping the list was Louise Chia Chang, a senior at the University of Chicago Laboratory Schools H.S., who investigated the genetic basis for cancer by asking which genes appear to be more active in malignant than in normal cells. Her research led to the isolation of two genes that are expressed at higher levels in transformed, cancerous cells. One of the genes seems to control production of a protein-destroying enzyme that may contribute to the pathological behavior of malignant cells. Chang won a $20,000 scholarship.

Second place went to Elizabeth Lee Wilmer of Stuyvesant H.S. in New York City for her work on the three-color problem in mathematics. Her task was to determine which arrangements of countries or regions on a map could be colored with exactly three colors so that no bordering regions had the same color. Wilmer examined the properties of graphs — ways of representing maps in terms of networks of points connected by lines. She discovered several characteristics that a graph may possess if it is "three-colorable." The awards to Chang and Wilmer mark the first time in the history of the Science Talent Search that female students have won the top two prizes.

A computer model of how a neural network may work to recognize patterns brought third place to Albert Jun-Wei Wong of Oak Ridge (Tenn.) H.S. Wong modified the equations for a "Hopfield network" to come up with a scheme that learns and recognizes a wider range of patterns than the original formulation of the network. Both Wilmer and Wong received $15,000 scholarships.

The winners of fourth through sixth places garnered $10,000 each. Fourth-place Joseph Chen-Yu Wang of Forest H.S. in Ocala, Fla., investigated radio waves emitted by the planet Jupiter. In fifth place, Daniel Julius Bernstein, a student at Bellport H.S. in Brookhaven, N.Y., worked out new procedures for computing various numbers, including pi and e (the base of natural logarithms), to a large number of digits. A computer simulation of an "optical molasses" of atoms slowed by laser beams brought sixth place to Stephen Alexander Racunas of Valley H.S. in New Kensington, Pa. His program may have potential as a way of predicting the behavior of devices designed to produce and confine "cooled" atoms.

The remaining students in the top 10 received $7,500 scholarships. For seventh place, Maxwell V. Meng, a student at Centennial H.S. in Ellicott City, Md., studied an inherited disorder that may lead to heart disease. In eighth place, Todd Alan Waldman of Walt Whitman H.S. in Bethesda, Md., investigated one aspect of the rapid degradation of certain proteins within cells. Both Meng and Waldman worked on their projects at the National Institutes of Health in Bethesda. Ninth place went to Maria Jose Silveira, a student at the Bronx (N.Y.) H.S. of Science. She studied a parasite that causes severe neurological damage. Michael Paul Mossey, in tenth place, refined a computer algorithm for finding sets of numbers in which no two pairs of numbers have the same difference. Mossey attends Greenhills H.S. in Cincinnati.

The other 30 national finalists each were given $1,000 awards. Selected as first and second alternates were Gur Hoshen of Naperville (Ill.) Central H.S. and Mason Ng of the Bronx H.S. of Science. The competition is conducted by Science Service, Inc.

In his address at the awards banquet, chemist and Nobel laureate Dudley R. Herschbach of Harvard University emphasized that the essence of scientific research is "falling in love with some idea and being reckless enough to pursue it." In the end, that kind of spirit is enormously productive, he says, because it opens up new ways of solving problems and answering questions about nature. That's also the kind of spirit evident among the finalists in this year's Science Talent Search. Says Herschbach, "The answers are waiting for you." □

AIDS researchers debate danger of HIV-2

A worldwide search to understand the HIV-1 virus responsible for AIDS has left a broad trail for scientists to follow in their study of another virus that also may cause AIDS. First described about a year ago, the so-called HIV-2 virus was discussed this week by an international group of AIDS researchers at the DNA/Hybridoma Congresses in San Francisco.

According to Luc Montagnier of the Institut Pasteur in Paris — who reported the first isolation of an AIDS-related virus (SN: 5/21/83, p.324) — at least two types of AIDS virus do exist. He reports that his group has just completed mapping the entire genome, or genetic material, of an HIV-2 virus, and that they found the HIV-1 and the HIV-2 viruses to be structurally and functionally different. Both, however, are closely related members of the retrovirus class of viruses.

After studying patients from West Africa with HIV-2 infections, Montagnier does not agree with some researchers that HIV-2 is essentially harmless in humans. "Clearly, this virus is also pathogenic in man," he says. Although found almost exclusively in West Africa, the virus has begun to spread elsewhere. "It could be just a matter of time [before there is an HIV-2 epidemic]," warns Montagnier.

The HIV-1 virus is found among people living in Central Africa, yet it is rare in West Africa. Scientists are mystified as to why two geographic areas so close together harbor different viruses.

If HIV-2 does spread, some scientists say they are not certain it would pose a real health threat. Robert C. Gallo of the National Institutes of Health, who also isolated an AIDS-related virus, cautions that HIV-2 virus as a cause of AIDS "ought to be looked at a little more carefully."

Whether or not the HIV-2 virus proves to be a cause of AIDS, researchers have begun studying it in parallel with the HIV-1 virus. Robin Weiss of London's Chester Beatty Cancer Research Institute recently evaluated reactivity between the viruses and antibodies against them. Although his data are preliminary, he says antibodies against HIV-2 apparently neutralize the HIV-1, whereas antibodies against HIV-1 do not similarly affect HIV-2. Weiss told SCIENCE NEWS that this cross-neutralization offers hope that broad-spectrum drugs may be effective against the changeable HIV-1 virus, which, like the influenza virus, is notorious for its rapid mutation rate (SN: 6/28/86, p.410). — *D.D. Edwards*