

Talent search selects student researchers

They're from here and there, having done this and that very well. The word "diversity" aptly describes the winners of the 47th Annual Science Talent Search — 40 U.S. high school seniors whose projects range from robotics to plant disease, particle physics to embryonic development in endangered turtles.

Among the winning projects, chosen from 1,339 entries, are several studies of number theories and of the rearrangement of genetic material during aging and leukemia. Other students took a more product-oriented approach: designing a gauge to measure the velocity of raindrops, building a portable device to detect carbon monoxide and using a household back massager to produce vibrations that repel termites. There also were projects that combined a favorite nonacademic interest with science: A prize-winning sailor found that using an air-bubble machine can reduce drag on the bottom of certain marine craft, and a musician created a model of the sound fields generated by a violin.

Some students went to distant sites to conduct their research; others stayed in the laboratory or near a computer. For example, there were field studies on Panamanian tamarin monkeys and on the glacial valleys of northwestern Montana, as well as a study of the effect of magnetic fields on particle density in hot gases. There were experiments on the very large, like the star 27 Cygnus, and the very small. Biology-based projects peered into the molecular-level world of antibody production in AIDS patients and the measurement of herbicide residues on food.

The 24 boys and 16 girls will participate in this year's session of the five-day Science Talent Institute, beginning Feb. 25 in Washington, D.C. The students will compete for \$140,000 in scholarships and awards provided by Westinghouse Electric Corporation and the Westinghouse Foundation. Science Service, Inc., of Washington, D.C., administers the competition, an annual event designed to identify and encourage talented students with scientific or engineering interests. There will be a public exhibit of the 40 projects Feb. 27 and 28 at the National Academy of Sciences in Washington, D.C.

This year's winners, aged 16 to 18, are:

ALABAMA: Terry Kay Moore, Mobile County H.S., Grand Bay.

CALIFORNIA: Christine Cha Ming Tsou, Alhambra H.S., Alhambra; Scott William Ryder, Edison H.S., Fresno; Hong B. Huynh, Hoover H.S., San Diego.

FLORIDA: Elizabeth Ann Deibler, Choc-tawhatchee H.S., Fort Walton Beach; Stacey Ellen Beaulieu, Palm Beach Gardens H.S., Palm Beach Gardens; Scott David Zucker, South Plantation H.S., Plan-

tation.

GEORGIA: Brian Casey Hooker, Benjamin E. Mays H.S., Atlanta.

ILLINOIS: Benjamin S. Abella, University of Chicago Laboratory Schools H.S., Chicago; Meredith Ann Albrecht, Evanston Township H.S., Evanston.

IOWA: Todd Lucas Duncan, Bettendorf H.S., Bettendorf.

MASSACHUSETTS: Michele Gilbert, North Andover H.S., North Andover; Leonardo Hsu, Dartmouth H.S., North Dartmouth.

MICHIGAN: Keith David Matthews, Huron H.S., Ann Arbor.

NEW JERSEY: David Aaron Cooke, Midland Park H.S., Midland Park.

NEW YORK: Mina Choi, Benjamin N. Cardozo H.S., Bayside; Hsin-Chao Liao, Brooklyn Technical H.S., Brooklyn; James Paul Mancuso, Lawrence H.S., Cedarhurst; Brian David Conrad, Centereach H.S., Centereach; Dana Susan Levine, Townsend Harris H.S., Flushing;

Ali Reza Alaie and Eduardo Martin Chumbes, William C. Bryant H.S., Long Island City; Sally Joanne Kim, Sheeyun Park and Weiva Yu Sieh, Bronx H.S. of Science, New York; Brian Lee Zuckerman, Ramaz Upper School, New York; Mohamad Shahan Ali, Aurika Wanda Checinska, Meivile Chen, Chetan Nayak and Janet Tseng, Stuyvesant H.S., New York.

OHIO: Nabeel Shirazi, Beaver Creek H.S., Xenia.

OKLAHOMA: Richard Mark LeGrand, Edmond Memorial H.S., Edmond.

PENNSYLVANIA: Kurt Marshall Cuffey, State College Area Senior H.S., State College.

TEXAS: Karl Andrew Rodriguez, John Marshall H.S., San Antonio.

UTAH: Shu-Ming Chang, Clearfield H.S., Clearfield.

VIRGINIA: Jason Christopher Reed, Kecoughtan H.S., Hampton; Lucy Erin O'Brien and Vijay Satyanand Pande, Langley H.S., McLean.

WISCONSIN: Aileen Louise Green, James Madison Memorial H.S., Madison.

Study sheds light on TB resistance

Vitamin D, the only vitamin that is photosynthesized in humans, may be important in boosting resistance to tuberculosis (TB), new research suggests. The findings might explain the age-old observation that exposure to sunlight seems to help cure the disease.

Alfred J. Crowle and his colleagues performed the research at the University of Colorado Health Sciences Center in Denver — not far from the mountains where tuberculosis patients once sought the benefits of high altitude, fresh air and bright, sunny days. What those consumptive patients didn't know was that, thus exposed to the sun, they were actively photosynthesizing vitamin D, which was then being converted by their livers into 1,25-dihydroxy-vitamin D₃ (1,25D).

To test the antituberculosis potency of 1,25D, Crowle cultured human macrophages, the white blood cells most active in fighting tuberculosis, and exposed them to tuberculosis-causing bacteria in the presence of varying amounts of the vitamin D metabolite. As reported in the December *INFECTION AND IMMUNITY*, he found that higher concentrations of 1,25D enabled the macrophages to slow or stop bacterial replication.

"It's very thought-provoking research," says Michael Iseman, chief of the mycobacteriology disease service at the National Jewish Hospital in Denver. "For centuries people went up into the mountains to cure tuberculosis. It would certainly be fascinating in retrospect to prove that, like a lot of folk medicine, there may have been a germinal center of truth in what they were doing."

The amount of 1,25D needed to enhance macrophage antibacterial activity is higher than that normally found in circulating blood. However, Crowle says, white cells can themselves synthesize 1,25D from a precursor that is 1,000 times more concentrated in the blood than is vitamin D. "When properly stimulated, perhaps by a disease-causing organism," he says, "they can make as much as 500 times the normal amounts of 1,25D."

In addition, he says, there is an intriguing possibility that blacks and Asians, who have a higher susceptibility to TB, may prove to have naturally lower levels of circulating vitamin D. If that correlation is found to be true, he says, then the incidence of tuberculosis in much of the developing world may be decreased by improving diets or by providing vitamin D supplements. In the United States, vitamin D is added routinely to milk.

But other factors may be responsible for the higher rate of infection in dark-skinned people. "Poverty, crowded housing, poor nutrition, high levels of stress all could explain it," says Iseman. "And even if you correct for those, I think other genetic differences in susceptibility may be critical."

Worldwide, 8 million to 10 million people contract TB each year, according to the World Health Organization. In the United States, nearly 23,000 new cases of tuberculosis were reported in 1986, a 2.6 percent increase over the previous year. Much of that increase, according to the Centers for Disease Control in Atlanta, is related to the immune-suppressing AIDS epidemic. — R. Weiss