

High school students honored for research

When silver prices are too high, photographs can be printed on geranium leaves. And tests with a device made of scrap wood, metal and the motor from a toy car indicate that the curved-arm stroke of freestyle swimming is faster and more efficient than the straight-arm stroke. These novel projects, as well as research with the same goals as those of leading scientific laboratories, are among the work by high school students honored by the 42nd annual Science Talent Search.

Among the projects of the 40 winners, aged 16 to 18 years, are such practical matters as how to handle oil spills and how to limit the damage of grain elevator explosions. There are also abstract works, such as creation of an original type of number series, complete with theorems, lemmas, corollaries, claims, conjectures and proofs. Topics of study range from the black nightshade plant to stellar nurseries, the major sites of star formation. The high school students used such sophisticated research techniques as recombinant DNA methods, spectroscopy, electrochemical detection and a new electron spin resonance technique. Some of the students performed their research in university laboratories, others worked on their own.

The winners, 18 girls and 22 boys, were selected from 824 completed entries. They

represent 33 schools in 16 states and Puerto Rico. The winners are invited to Washington to attend a five-day all-expenses-paid session of the Science Talent Institute beginning March 3. There they will compete for \$89,500 of Westinghouse Science Scholarships and Awards. The competition, administered by Science Service, is designed to "discover and develop scientific and engineering ability among high school seniors."

This year's winners are:

ALABAMA: *Laura Leigh Huckabee*, Huntsville H.S., Huntsville.

FLORIDA: *Terri Lynn Stanford*, Coral Springs H.S., Coral Springs; *Judith Seline Simms*, Wolfson Sr. H.S., Jacksonville; *James Marion Boyd III*, Melbourne H.S., Melbourne; *Shari-Lynn Umlas*, North Miami Beach H.S., North Miami Beach.

ILLINOIS: *Carol Ann Podlasek*, Lourdes H.S., Chicago.

INDIANA: *Celeste Aline Ewalt*, Central Catholic H.S., Lafayette.

KANSAS: *Zoher Ghogawala*, Shawnee Mission West H.S., Shawnee Mission.

MARYLAND: *Michael Irvin Hyman*, Centennial H.S., Ellicott City.

MASSACHUSETTS: *Arthur Tung Tak Leung Jr.*, Dover-Sherborn H.S., Dover.

MICHIGAN: *William Joseph Evans*, Huron H.S., Ann Arbor; *Sean Frederick*

Rynne, Detroit Country Day School, Birmingham.

MINNESOTA: *Silva Kristine Leonard*, Mayo H.S., Rochester.

NEBRASKA: *Michael Fritz Webb*, Northwest H.S., Omaha.

NEW MEXICO: *Michael Francis De-Freitas*, Moriarty H.S., Moriarty.

NEW YORK: *Howard Allen Lazoff* and *Victoria Giselle Romani*, Benjamin N. Cardozo H.S., Bayside; *Eric Akira Koide*, Dobbs Ferry H.S., Dobbs Ferry; *Michelle Helene Schiffer*, Hastings H.S., Hastings-on-Hudson; *Hon-Keung Li*, Hillcrest H.S., Jamaica; *Caroline Maria Gomez*, Shaker H.S., Latham; *Amy Miok Murray*, Mexico Academy and Central School, Mexico; *Gina Rosalind Levy*, New Rochelle H.S., New Rochelle; *Ling Ping Chen*, *William Chiang*, *Elihu Hassell McMahon II*, *Paul Chih Ning*, *Thomas Gie Oei* and *Janet Lin Pan*, Bronx H.S. of Science, New York; *Jeannie Pui Ching Lo* and *Wieslaw Czeslaw Topolski*, Stuyvesant H.S., New York; *Anthony Torres*, Grover Cleveland H.S., Ridgewood; *Alexandra Kroeger*, Shoreham-Wading River H.S., Shoreham; *David Fox*, W.T. Clarke H.S., Westbury.

TENNESSEE: *Wayne Chung*, Alcoa H.S., Alcoa.

TEXAS: *Patricia Kay Zoch*, Lyndon B. Johnson H.S., Austin; *Larry Gene Spears Jr.*, Cypress Creek H.S., Houston.

VIRGINIA: *Douglas Stephen Morgan*, McLean H.S., McLean.

WISCONSIN: *Ekaterina Scherb*, James Madison Memorial H.S., Madison.

PUERTO RICO: *Marcelo Colon*, Antonio S. Pedreira H.S., Caguas. □

Efficient solar water-splitter reported

It happened up on the rooftops of Bell Laboratories in Murray Hill, N.J. There, sunlight was used to split water into hydrogen and oxygen in the most efficient solar energy-assisted electrodes-in-solution system ever designed. The research does not bring the photochemistry field any closer to developing a large-scale, economically feasible commercial procedure for using solar energy to extract hydrogen fuel from water, says one of the new system's designers, Adam Heller. However, he adds, it does provide the first real proof that high solar-to-chemical energy conversion efficiencies can be achieved in such a manner.

The new system is described by Heller and E. Aharon-Shalom in the December JOURNAL OF THE ELECTROCHEMICAL SOCIETY. Their water-splitting method consists of two wire-connected electrodes immersed in a solution of water plus perchloric acid (HClO₄). One electrode is merely a standard anode, such as titanium coated with ruthenium dioxide, where a molecule is oxidized (loses electrons). The other electrode — the cathode, or place where a species in solution can pick up electrons — is an indium-phosphide electrode coated with a very thin layer, averaging only 10 Angstroms thick, of the metal rhodium.

In order to split water with this system,

an external voltage must be applied. Then, water molecules lose electrons at the anode: $\text{H}_2\text{O} \rightarrow 2\text{H}^+ + \frac{1}{2}\text{O}_2 + 2\text{e}^-$. And, at the cathode: $2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$ (hydrogen gas). Electrons from the anode flow to the cathode via an outer circuit.

When such a system is exposed to sunlight, less external voltage need be applied to make the hydrogen and oxygen. So one way to calculate the efficiency of the system is to divide the amount of energy saved in making those chemicals (the watt-hours conserved due to using sunlight as well as applied voltage) by the total amount of solar energy striking the surface of one of the electrodes. In 1981, using this calculation, Heller reported achieving 12 percent solar energy-converting efficiency with his system.

Then he tried something new. He ran the system in a way that kept the rhodium that coats the cathode saturated with the resulting hydrogen. Some of that hydrogen dissolved into the rhodium metal to form an alloy, which in turn caused a flow of electrons from the rhodium to the indium-phosphide material below it. The resulting electric field across the cathode further reduced the external voltage needed to split water. In fact, using this hydrogen-saturating technique, Heller has achieved a solar energy-converting efficiency of 16.2 percent. —L. Garmon

ECT ban banned

A California judge has issued a preliminary injunction barring the city of Berkeley, Calif., from enforcing its controversial prohibition of electroconvulsive therapy, or ECT. The ban on ECT, commonly known as electroshock therapy, was overwhelmingly approved by Berkeley voters last November (SN: 11/13/82, p. 309), but Judge Donald P. McCullum decided last week that the law's constitutionality must first be established in court.

The injunction was requested by the Northern California Psychiatric Society and other medical societies, who claimed that the law, by prohibiting patients' freedom of choice, violated their constitutional right to privacy; they also claimed that the local ban illegally contradicted state law. McCullum ruled in their favor, but according to deputy city attorney Manuela Scott, the government will take the case to trial. The case may provide focus for the ongoing scientific debate about ECT, because, Scott told SCIENCE NEWS, the city is planning a case that will put ECT itself on trial; it is not unconstitutional, Scott will argue, for a government to scrutinize and ban procedures that are unsafe or ineffective. —W. Herbert