

A Winning Biologist

The Summers family of Jacksonville, Fla., spent one whole summer without baths—40 fiddler crabs were living in the tub.

As a result, Nevin M. Summers Jr., 17, was declared the country's top-ranking young scientist and given a \$7,500 scholarship in the 26th annual Science Talent Search, conducted by Science Service and financed by the Westinghouse Educational Foundation.

In a closely-judged competition, young Summers and six other teenagers were selected from a field of 40, themselves the cream of a total of 23,829 entrants.

Vice President Hubert H. Humphrey addressed the awards dinner, telling the youthful scientists that technology-rooted problems—air pollution, shortages of food, booming population and threats of nuclear war—cannot be solved by giving up technology. "No, the solution is not to stop thinking," the Vice President said. "It is to think even harder and more comprehensively."

"It is the opportunity of your generation," he added, "to insure that the world may never be subjected to the ultimate harm and destruction which lies within man's capacity."

Other winners include Steven R. Binder, a 17-year-old chemist from Glenview, Ill., a \$6,000 scholarship.

Daniel P. Weisser, 17, of Washington, D.C., won a \$5,000 scholarship for his work in mathematics.

Another mathematician, Frank A. Wilczek, 15, of Glen Oaks, N.Y., won \$4,000 in scholarship money. Fifth place, and \$3,000, went to Mark R. Cullen, 16, of Wyncote, Pa., a physicist

specializing in atomic defects in metal.

Two alternatives to the scholarships were named: Janice L. Petersen, 17, of Van Nuys, Calif., a biochemist; and Louis Baker, 16, a mathematician and physicist of Brooklyn, N.Y.

The top winner, Nevin Summers of Jacksonville, has experimented with fiddler crabs for five years, including the summer his family had to get by on showers because the bathtub was full of his living subjects. With a thousand or so crabs living in a spare bedroom, young Summers worked late into the night and early in the morning on school days, then borrowed the use of sophisticated scintillometers from the University of Florida—a 75-mile automobile trip—during the weekends.

His latest project involves the exact processes that enable the crab, after a molt, to harden its new shell. Next, he would like to inject atomically labeled hormones into living crabs and study their absorption in shell tissue.

Second place winner, Steven Binder, proved the existence of forms of sulfite complexes previously unknown. Daniel Weissner won for work with a series of numbers and their properties, and the theorems he was able to prove. The study of certain structures between mathematical groups and semi-groups won fourth place for Frank Wilczek.

Fifth place winner Mark Cullen worked with the effect of rapid temperature changes on the atomic defects, called vacancies, in gold. Alternate Janice Petersen developed a method of measuring a protein in the brain; alternate Baker devised a fast-loading compiler for his school's computer.

was besieged after lunch by winners interested in summer jobs at the Bureau. They would be laboratory assistants at a salary of about \$1,000 for the three months. Arrangements with the Civil Service Commission allow the Federal examination to be waived in the case of the STS winners, Bain said.

The ultramicroscope, Dr. Young explained to the group, works by using the object to be measured as the anode in an electric circuit. The cathode is an extremely fine needle point—so small as to be almost invisible on the working model he passed around. The gap between the needle and the subject of the experiment is bridged by electrons, their voltage being a function of the distance between the two.

The winners were also introduced to the 100 million electron volt linear particle accelerator set up 35 feet below ground at the Bureau. In a humming control room, flanked by electronics racks dotted with glowing lights and chattering computers, they heard Dr. J. E. Leiss, chief of the accelerator branch, describe the LINAC. An experiment was then underway, so the working parts of the powerful machine were too dangerous to go near.

A lighted diagram showed which rooms below were lethal, whether they had been checked for people remaining in them, and whether the 12-foot thick, 60-ton concrete doors had been properly closed before the experiment began.

The beams emitted are so powerful, Dr. Leiss said, and the technology so close to the edge of the known, that one constant danger is that the LINAC will melt its own equipment.

Biology and Physics

Earlier in their six-day stay in the Capital, the young scientists voyaged during one program from the interior of the heart of an unborn chicken into the immense regions of extra-galactic space.

After a day of private interviews with prominent Washington scientists in their respective fields, the 29 boys and 11 girls gathered in the Sheraton-Park Hotel to hear presentations in biology and physics.

Dr. James D. Ebert, director of the department of embryology of the Carnegie Institution of Washington, showed the group how a chicken's heart grows in the embryo, heart cells moving across a substratum to come together. If the substratum is cut in two, his films showed, two hearts are formed. If it is broken down chemically as many tiny hearts will form as there are pieces of substratum.

Winners See Frontiers During Lab Visits

The National Bureau of Standards last week unveiled to the youngsters a new device capable of measuring distances as small as one-thousandth of the diameter of an atom.

This ultramicroscope, invented by the Bureau's Dr. R. D. Young, can make accurate measurements down to a ten-millionth of a millionth of an inch without touching the thing measured. The Bureau expects it to be useful in several applications including gauging strain, profiling surfaces, checking expansion of materials under tiny amounts of heat, and sensing mechanical vibration.

During an all-day tour of the Bureau's new, sprawling plant in Gaithersburg, Md., the Science Talent Search winners lunched with the director, Dr.

A. V. Astin, his principal aides, and perhaps most importantly, the personnel officer.

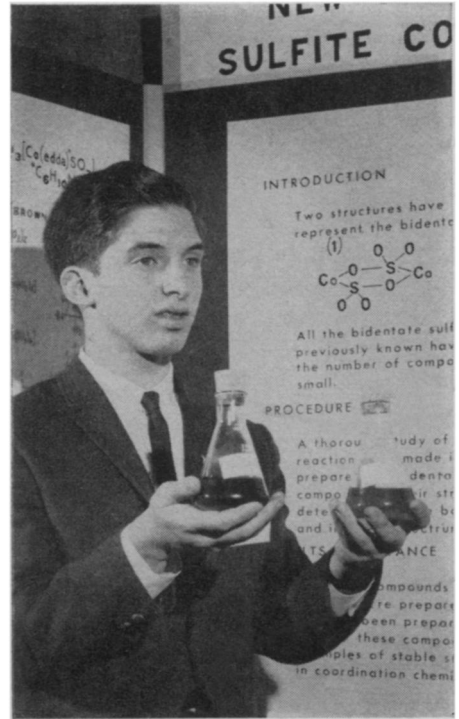
"I have been meeting with the winners of the Science Talent Search for 15 years," Dr. Astin said, "and I am always delighted to do so, because some of the most able young members of our staff come out of this program."

One of the earlier winners, K. E. Kloss of the applied mathematics division, spoke to the group about computers—the subject of his winning entry in the 1959 Talent Search. He took a summer job at the Bureau as a result, worked there every summer through college, then joined the staff full time. Another half dozen earlier winners now work at the Bureau.

The personnel officer, Robert Bain,



First Prize: Nevin Summers of Florida.



Second: Steven Binder of Illinois.

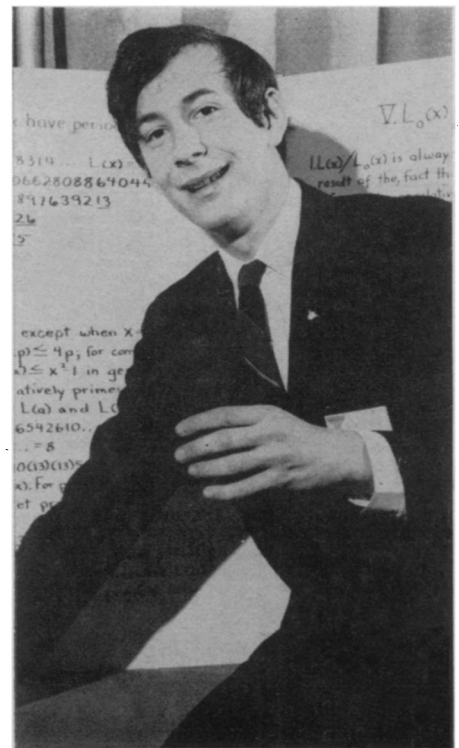
The Talent Search



Fifth: Mark Cullen, Pennsylvania.



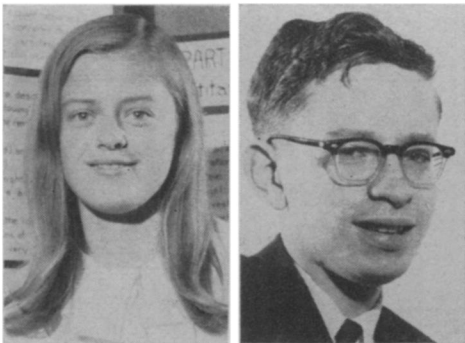
Fourth: Frank Wilczek, New York.



Third: Daniel Weisser, District of Columbia.



Time out for tourism: After lunching with members of Congress, the 40 finalists visited the Capitol dome.



Alternates Petersen and Baker.



Winner Weisser, captain of his chess team, ponders a move.



Mary Ruggers sets up her display.

Photos by
Fremont Davis



AEC Commissioner Seaborg confers with the group.

Cosmic rays, which zipped through the student's bodies every few seconds without them being aware of it (as they do through everybody on earth) were an admitted mystery to the Chief Scientist of the Cosmic Ray Branch of the Naval Research Laboratory.

Dr. Maurice M. Shapiro told the teenagers their source is unknown—although it is believed that most that strike earth originate within our home galaxy and wander in spiral paths through it, hitting the planet from every direction.

These stripped atomic nuclei may be born in the throes of novae or supernovae—giant exploding stars. Even stronger cosmic rays, he said, may come from outside the egg-shaped galaxy. These come in straighter lines, but also strike earth at random.

Dr. Shapiro said he hoped the Talent Search winners would someday help find the answers.

Winners Challenged

Both the executive and the legislative branches of Government challenged the high school seniors to solve the problems their elders now struggle with—and the ones they do not yet see.

Vice President Hubert H. Humphrey, speaking at the award dinner, declared, "the people of my generation have seen material progress unprecedented in earth's history for its rapidity.

"The people of my generation have also seen how the very tools of progress—misdirected—have also harmed and destroyed man and his environment.

"It is the opportunity of your generation to insure that the world may never be subjected to the ultimate harm and destruction which lies within man's capacity."

Urging the students to be individualistic, Mr. Humphrey declared, "I know that you, of all people, are determined not to be standardized or homogenized. For you have learned from your own early experience a basic truth. Governments don't have ideas. Companies don't have ideas. And—contrary to a popular myth—computers don't have ideas. People have ideas.

"And not people in the mass, but individual human beings."

At an earlier luncheon with members of Congress in the Capitol, the teenage scientists were challenged to tackle the problems of the 1970's—even the ones no one yet knows about.

Representative Melvin Price (D-Ill.) whose committee posts make him "Mr. Research and Development" in the House, asked for their help.

"I would hope that some of you

will at one time or another in your careers assist your Government by contributing your talents and efforts and advising us on how research and development can best be initiated, managed and funded."

Outlining some of the besetting problems of the day, the Congressman said, "complete solutions . . . are not at hand. We are depending on you for many of them. . . . We are also depending on you to recognize other problems—some of which we don't even know about now—before such problems overwhelm us."

Representative Price, who is chairman of the research and development subcommittees of both the Joint Committee on Atomic Energy and the House Armed Services Committee, suggested that some of the winners might work on the 200 billion electron volt particle accelerator planned for Weston, Ill. "Even if authorized this year its construction will not be completed before 1974," he noted.

"Whatever research is done with it will be done in part, and I believe a most significant part, by you and your contemporaries," Representative Price said. "Perhaps, somewhere in this room is the future discoverer of the 'quark,' the name given by Prof. Murray Gell-Mann to the 'basic particle'—the fundamental constituent, if it exists, of the not so elementary proton and neutron."

Touring the Exhibits

- A strange creature that is both plant and animal received new health by listening to the radio.

- A strain of malaria afflicting U.S. troops in Vietnam might be fought with chemicals ground out of bacteria.

- The growing season of plants might be shortened by timely application of gamma rays.

- A new method of separating strontium from rocks already is speeding up the radio-dating of geologic strata.

These are a few of the lessons taught by the exhibits mounted by the Talent Search winners in Washington's Sheraton-Park Hotel.

In a room full of bubbling test tubes, illustrated charts and mathematical formulae writ large, and dominated by the harsh shriek of a violin bow drawn across a square of sheet metal, the winners explained their projects to the public.

Martin Goodman, 16, of Brooklyn, N.Y., showed the automatic apparatus he converted from a Western Union message counter to prevent school hours from interfering with his studies of *Euglena gracilis*, a type of one-celled plant-animal. He found that regular beaming of radio waves through a "sick" culture seemed to revive the

creatures. Their chlorophyll production increased, as did their population.

Sandra Ann Schwartz, 17, of McLean, Va., was able to establish that toxins derived from the cell wall of the bacterium *E. coli* suppressed—at least in mice, the organism *Plasmodium berghei*, most virulent cause of malaria among Americans in Southeast Asia. "But it is a long jump from mice to men," he pointed out. Sandra did her research at the Walter Reed Army Medical Center in Washington.

Meanwhile, across the hall, Alan Weiss was showing what he had done to the same *E. coli*. Eighteen-year-old Alan, from Lincolnwood, Ill., infected the bacteria with two different strains of mutant viruses, and proved that the two combined inside the cell.

Using three different species of plants, Emily Bass, 17, of Croton-on-Hudson, N.Y., irradiated their seeds with gamma rays from a cobalt source. The treatment speeded germination in one plant, retarded it in another, and stimulated germination in the third only at a specific interval of irradiation. She suggests that, properly used, the gamma treatment might be a tool by which farmers could alter the growing season, perhaps allowing southern plants to be grown in colder climates.

One method of dating rocks, the rubidium-strontium system, is faster and more reliable today because of the work of Larry Grisham, 17, of Lufkin, Texas. His technique is in use at the University of Texas, where he developed it at a summer institute. Although simpler than older methods, it produces a large percentage of the strontium present, and fewer impurities.

Elwyn Loh, 16, of Blacksburg, Va., one of the quietest winners in the search, produced the most noise. His project involved the production of Chladni figures—patterns of lines and curves—by scraping a violin bow across the edge of aluminum squares. The vibrations caused grains of black sand scattered on the metal to bounce into the patterns. Elywn was at one point asked to desist for a time to allow a speaker in an adjoining room to be heard by his audience. (Elywn does not play the violin.)

Best represented area in the competition was Skokie, Ill., with no fewer than four winners—10 percent of the total.

Steven Binder, the second prize winner, said he felt the area's success was due to the intense competition in science between two high schools, Niles Township North, and Niles Township West. Students at the schools had hoped the Talent Search results might settle the question of which was better, but it didn't—each placed two finalists.