

STS: So You Want to be a Scientist

Forty young scientists compete for the 'Nobel prize for high school students'

BY SUSAN WEST

The Top Ten

Michael Stephen Briggs, 17, Adelphi, Md., \$10,000 scholarship winner. Project: A method for approximating the value of infinite games.

Joseph Peter Tanzi, 17, Cranston, R.I., \$8,000 scholarship winner. Project: Two-memory computer system, total cost: \$700.

Philip George King, 18, Rumson, N.J., \$8,000 scholarship winner. Project: Eight-error corrector for digital transmission system.

Samuel Aaron Weinberger, 15, New Rochelle, N.Y., \$6,000 scholarship winner. Project: Examination of fixed point theory.

Judith Lee Bender, 17, Honolulu, Hawaii, \$6,000 scholarship winner. Project: Study of enzyme that controls energy storage from food.

Michael Perelman Mattis, 17, Scarsdale, N.Y., \$6,000 scholarship winner. Project: Technique to improve the accuracy of numerical differentiation.

Lawrence Russell Bergman, 16, Bayside, N.Y., \$4,000 scholarship winner. Project: Role of wing vibrations in *Drosophila* fly courtship.

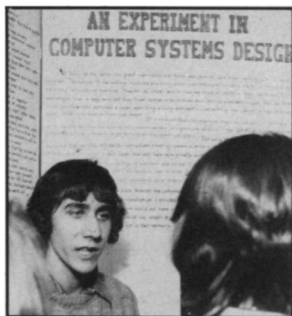
Daniel Soleyman Rokhsar, 17, Staten Island, N.Y., \$4,000 scholarship winner. Project: Theory of the Leidenfrost phenomenon which occurs when a drop of liquid bounces as it hits a hot surface.

Ann Theresa Piening, 18, Bethalto, Ill., \$4,000 scholarship winner. Project: Classification of variable stars.

Jay Bennett Stallman, 16, Forest Hills, N.Y., \$4,000 scholarship winner. Project: Replication of viroids in plant tissue culture.



First place:
Michael
Stephen
Briggs



Second
place:
Joseph
Peter
Tanzi



Third place:
Philip
George
King

Photos: Westinghouse

Scientific genius is always rewarded with acclaim and honor; youthful genius is rewarded with awe and respect. Combined, they provoke the kind of excitement that surrounded the 40 winners of the 37th annual Science Talent Search (SN: 2/4/78, p. 70). And as Michael Stephen Briggs, first place winner of the \$10,000 Westinghouse scholarship, found out, the result is often sudden celebrity status.

As if the scholarship were not enough, Briggs's accomplishment was reported in the *New York Times* and *Washington Post* and will be included in *Science Year* and *Family Weekly*, a syndicated newspaper supplement. An appearance on NBC's "Today" show with \$4,000 scholarship winner Lawrence R. Bergman and offers of summer jobs at the National Bureau of Standards and Operations Research, Inc., topped off a week of meetings with science and government leaders (including President Carter), intense grilling by judges and two days of exhibits at the National Academy of Sciences. The 40 winners were in Washington from March 2 through March 6.

Seventeen-year-old Briggs of Adelphi, Md., won the "Nobel Prize for high school students" (as one participant called it) for his method for approximating the value (the least chance of winning) of infinite games. For example, in a game where two players are approaching each other with guns, Briggs's method can determine which player has the advantage. Briggs's idea is original work in the field of game theory, according to the judges.

Why all the fuss over these high school seniors? Because, to the judges and sponsors of the STS, Briggs and the other finalists represent the "innovative, imaginative, creative scientists" of the future. The top 10 winners, who were named at an awards banquet on March 6, "show a breadth of knowledge and understanding of their work that is exceptional," said Glenn T. Seaborg, 1951 Nobel laureate and one of the judges. To their elders, the students show outstanding motivation and potential. "As science becomes more sophisticated, free entry becomes more difficult," National Academy of Sciences president Philip Handler said. "These students are coming up right behind; many are working at the leading edges of science." A nuclear engineer viewing the exhibits at the NAS put it more simply: "It's almost deflating to see 40 of them together."

Chosen from 967 qualified entrants from across the country, the 10 young women and 30 young men met in Washington to be judged for \$67,500 in Westinghouse scholarships and awards. The top 10 winners (see box) received scholarships ranging from \$4,000 to \$10,000. During their expense-paid visit, they visited with scientists such as Julius Alexrod, 1970 Nobel laureate, at area research institutes and laboratories, and met with and heard talks by Seaborg and Rosalyn S. Yalow, 1977 Nobel prize winner in physiology or medicine. The climax, however, was a meeting with top government scientists and President Carter.

The 37 generations of STS finalists form an impressive family tree. Among the ranks joined by the class of '78 are two Nobel laureates and two winners of the Field Medal in Mathematics: Leon Cooper (STS '47), Nobel Prize in physics, 1972; Ben R. Mottelson (STS '44), Nobel Prize in physics, 1975; Paul J. Cohen (STS '50), Field Medal, 1966 and David B. Mumford (STS '53), Field Medal, 1974. As George Mechlin, vice president of research and development at Westinghouse, pointed out, 70 percent of past STS winners have earned Ph.D. or M.D. degrees; 99 percent have received a B.S. or higher.

The Science Talent Search is administered by Science Service and supported by Westinghouse. It is the oldest and most prestigious competition of its sort and the only scholarship program solely for science and engineering. No other corporation-supported program, save Texaco's Metropolitan Opera program, has existed as long. There have been few changes in the last 37 years. Students are judged on the basis of their independent research projects and their answers to questions by the eight judges, two of whom, Russell Johnson and James Hummel, were STS winners in 1946. In the last fifteen or twenty years, Seaborg observed, the project topics have turned from biology and chemistry to environment and computers. But the students haven't changed, Handler

noted. "They are always refreshingly bright," he said. "All have read in the primary literature and know what's going on in their field."

Briggs typifies the winners of the STS. Encouraged by his fourth grade teacher and his father, a mechanical engineer, Briggs began early reading science books and magazines. He attributes his broad knowledge of science to reading magazines such as SCIENCE NEWS and SCIENTIFIC AMERICAN. In fact, his project grew from a SCIENCE NEWS article on computer chess. Briggs is a member of his high school mathematics club and president of the computer club. He began working in game theory while in the tenth grade, continuing through the summers, and completed his project on infinite games last December. The hardest part, he said, was finding the appropriate books—he finally persuaded his father to get a library card

for the University of Maryland.

All the finalists show remarkable independence and motivation. Joseph Tanzi, \$8,000 scholarship winner, began building cars from tinker toys at age six and moved on to creating vending machines and pinball machines. His STS project, two years in the making, is his "ultimate toy." It is a computer with two memories—most have only one.

Tanzi and several others based their work on a single article or concept and worked "from the ground up," as one said, often without consulting teachers or other literature. A little unorthodox perhaps ("audacious," one man put it), but some had no access to current literature or were working in a field where little had been written. And as Michael Mattis, Scafsdale, N.Y., pointed out, "The sophistication of some of the reading can be confusing and depressing. It's better to work in the dark

and check afterward. You learn that way."

Some students claim as their mentors past scientists such as Da Vinci and Einstein, but more often the scientific seed was planted by a teacher, counselor or parent. Mary E. Kroening from San Diego was encouraged to develop a computer system for her high school by her counselor, a firm believer in women in science. Jonathan T. Kaplan, whose hobby is building robots, said his father showed him an electromagnet when he was four years old and he's been "making things move on their own" ever since.

Another hallmark of a budding scientist, the judges felt, is up-to-date knowledge in a variety of fields—a characteristic that more established scientists sometimes lose. At least one student chalked up his wide and current knowledge to reading SCIENCE NEWS. Tanzi, the second place winner, successfully fielded judges' questions about a new neutrino theory after reading SCIENCE NEWS (SN: 2/4/78, p. 68), and one-upped a local physicist who knew nothing of the recent work.

All research and no humanities makes STS candidates dull scientists, say the judges. So it follows that the 40 winners are also successes in writing, sports, art and music. They may represent a rebirth of the Renaissance man (and woman). Imagine Roger E. Mosesson of New York, N.Y., in 10 years: physician, juggler and italic calligrapher. Or envision Barbara C. Shutt, returning home after a hard day as an astrophysicist to play the flute and check her home-grown poultry stock.

Though they may be bound by a love of science, the diverging paths of theoretician and pragmatist are already worn by these young scientists. Many, like Briggs, tend toward creative thought and theory for its own sake. Many feel like Donna Pickrell of Zanesville, Ohio, who examined chromium and iron uptake in plants: "I like the feeling of doing research that makes a real contribution."

For all, science is a way of life:

"Science is what's going to get us through the future. I want to know why we're here, what made the universe."

"Philosophy, mathematics and theoretical physics—at the highest level, they become beautiful thought."

"Science and art are the two ways of getting at one's being."

Perhaps most significant is their realization of their own promise as scientists. The most-repeated comment about the competition by the winners was the excitement of meeting students and scientists who share their interest.

"I wish there was more seeking out and recognition of young scientists," said Philip King of Rumson, N.J., "It's hard to find motivation in a nonscholastic atmosphere. If I hadn't gone and met the people—the students and scientists—I couldn't have found the motivation I need. Now I see a purpose; it made me feel people like us are needed." □



Carter Greets the "Best and the Brightest"

President Jimmy Carter provided one of the highlights of the STS winners' trip to Washington by taking time to greet them and to congratulate them on their achievements. Carter's meeting with the winners came during a trip to the White House, where they were addressed by senior government officials in the areas of science and technology. The meeting was arranged by Frank Press, Science and Technology Adviser to the President.

Press told the winners that the Carter administration is truly concerned about the state of science and is interested in encouraging development of young scientists. We want to see "the best and the brightest" go into science, he said. As evidence of the administration's concern, Press cited the Carter budget's emphasis on basic research. The other government officials present echoed the administration's concern and pointed out problems and basic research questions that will be faced (and possibly solved) by the upcoming generation of scientists—represented by the STS winners.

Carter told the winners that he was honored to meet them and envious of their future careers in science. "Compared with today's troubles," he said, "I look back on my days in science fondly." (Only moments before meeting the winners, he had announced that he would invoke the Taft-Hartley Act.)

Speaking of basic research, Carter said, "I think in recent years we have let this potential in our country suffer." The quality of research has been deteriorating, he said, to the extent that we must recommit ourselves to the type of intelligence represented by the STS winners. "I am grateful for what you mean to us," he said. "And on behalf of the people of our country, I thank you."

Present at the White House meeting, in addition to Carter, Press and the STS winners, were: Robert A. Frosch, Administrator of the National Aeronautics and Space Administration; John M. Deutch, Director of the Office of Energy Research; Richard C. Atkinson, Director of the National Science Foundation; Donald S. Fredrickson, Director of the National Institutes of Health; and William J. Perry, Director of Defense Research and Energy.