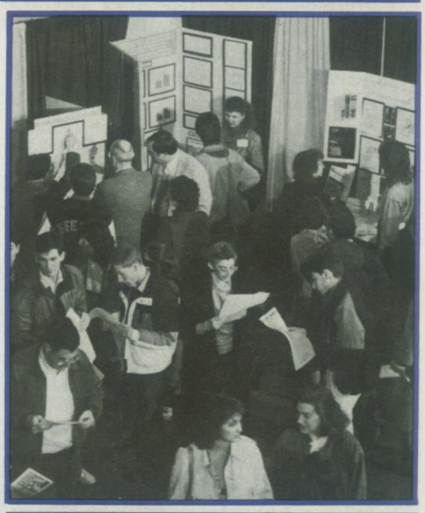

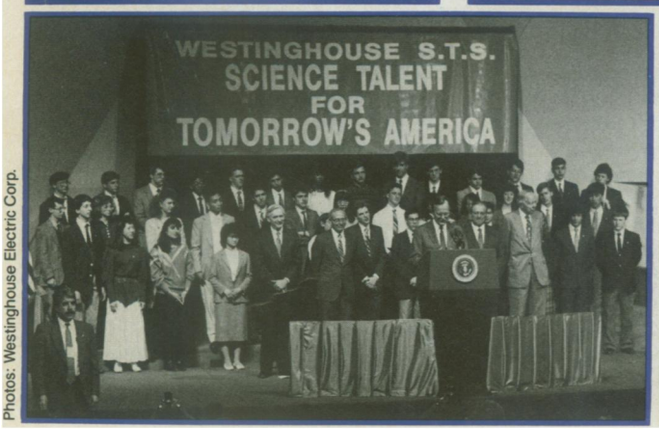

Photos: Westinghouse Electric Corp.

Clockwise from top: President Truman greets talent search finalists in 1952; 1989 winners display their projects to the public; 1991 judging panel; Sister Mary Lauretta Bishop, a science teacher who helped produce a surge of winners from 1955 to 1962; President Bush addresses 1989 finalists; Watson Davis of Science Service autographs the programs of the top two winners of 1942 — the competition's inaugural year.

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Looking back on five decades of the Science Talent Search

By RON COWEN

Clifford Lee Wang loves tennis and plays the piano with polish. Jeremy Randall Riddell toots the trumpet, backpacks and raises chickens. Susan Elaine Criss has earned seven varsity letters in track and soccer and has twice captained her high school soccer team.

Not exactly your description of bookworms.

These students and their fellow finalists in the 50th Westinghouse Science Talent Search form an eclectic group of teenagers: They're as exuberant about DNA as dancing, as likely to talk about betacarotene as baseball.

Next week, the 40 finalists will follow in the footsteps of 1,960 previous Westinghouse award winners since the 1940s, traveling to Washington, D.C., to exhibit their work to the public and compete for scholarships awarded at a black tie, grand finale banquet.

And if they engage in a few youthful pranks on the side, such as a late-night climb into the lap of the Lincoln Memorial statue, they'll only be echoing some of the antics of their predecessors.

The talent search (minus the visits to Lincoln's lap) originated with two ex-reporters who, in the late 1930s, sought to identify and encourage budding science talent among high school students. One was Watson Davis, the first radio reporter to specialize in science, who in 1933 became director of Science Service, Inc. — a nonprofit foun-

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dation dedicated to improving public understanding of science and which publishes SCIENCE NEWS.

The other was G. Edward Pendray, a former science editor for the New York Herald Tribune, who joined the Westinghouse Electric Corp. in 1936 as special assistant to its president. He and Davis met in New York City at the 1939 World's Fair, where, thanks to Pendray's efforts, Westinghouse displayed the winning entries of a science fair open to New York City high school students.

The World's Fair of '39, boasting such marvels as the first television sets and a shimmering fountain of dancing water plumes, reflected the new optimism of a nation recovering from the Great Depression. It was there that Pendray and Davis decided science education in the high schools could no longer be left to languish.

At the time, fewer than 1,000 of the nation's 25,000 high schools employed trained science teachers or even offered rudimentary science courses. Often, a meager curriculum labeled as "science" was relegated to the athletic coach.

"Watson and I agreed that science was too important for the nation and the coming generation to be neglected in the high schools," Pendray later recalled. So they devised a plan to publicize the importance of science education by encouraging teenagers to design and perform their own experiments. The promise of college scholarship money would provide a financial incentive for the students, they reasoned, and science teachers could earn recognition through their students' awards.

"Having the competition gives the teachers a tangible target for students to shoot for," says G. Reynolds Clark, president of the Westinghouse Foundation. Westinghouse has provided more than $2.8 million in scholarships and cash awards to talent search winners over the past 50 years.

"Watson Davis always said, 'Kids should get their hands dirty and their minds disturbed,'" says Dorothy Reynolds Schriver, who became Davis' personal secretary in 1941 and who directed the talent search from 1958 to 1986. Since 1986, Carol Luszcz of Science Service has administered the program.

The first Westinghouse Science Talent Search began early in 1942, just months after the attack on Pearl Harbor drew the nation into World War II. The program's organizers contacted every U.S. high school directly while also spreading the word through a national organization of high school science clubs, headquartered at Science Service. That year's competition drew some 3,000 applications but did not involve student research projects. Instead, all candidates took a special exam and wrote essays on a timely topic: how science could help win the war.

"I believe that, because their ingenuity has always had unlimited exercise in the field of free thought, the scientific men of the United Nations and particularly of America will ultimately outstrip the regimented researchers of the Axis powers in the development of those processes and inventions that will enable the fighters for freedom to emerge victorious!" wrote 18-year-old Paul Erhard Teschan in an essay outlining "five avenues of [scientific] attack." Submissions from other students echoed his sentiment.

Evaluating boys and girls separately (a practice that would continue until 1948), the three judges whittled down the list of applicants to 300 semifinalists and then selected the top 40 to come to Washington in June to compete for scholarship money. (That basic selection process continues today. From a field of about 1,500 entries, eight judges select the 300 semifinalists and 40 finalists. Based on interviews with each finalist, the judges then award scholarship prizes. This year the top 10 winners will share a total of $175,000; the remaining 30 finalists will each receive a $1,000 scholarship.)

Eleanor Roosevelt greeted the 1942 finalists at the White House, serving them tea on the South Portico. The two top winners that year were Marina Prajmovsky, of Farmingdale, N.Y., and Teschan, of Shorewood, Wis.

"It came as a total surprise, really, that I even should have been among the 40 finalists," Teschan recalls. "At the banquet, when they awarded me one of the two top scholarships, I was floored." For Teschan, the scholarship meant attending Carleton College without taking on a full-time job to pay for tuition. But there was a more fundamental benefit, he says: "It affirmed that I had some of the ingredients necessary for success in science."

"It was fine to get high marks and do well in high school," he adds, "but the idea that I could compete successfully in a field of top students from all over the United States provided an assurance that I was on the right track. It told me: 'Go for it, kid!'"

Teschan went on to medical school and a 21-year research career in the Army. He now studies kidney disease at the Vanderbilt University School of Medicine in Nashville.

By the 1950s, science-minded teenagers had begun to associate "top 40" with something other than pop tunes. A generation of young Jewish Americans – the children of refugees from Europe – captured many of the top talent search scholarships during that era. Many studied at one of two New York City schools that continue to specialize in science education today: Stuyvesant High School and the Bronx High School of Science.

Among those students was Roald Hoffmann, a young immigrant from Poland. When Hoffmann was 6, his father smuggled him and his mother out of a Nazi labor camp. Mother and child hid in the attic of a Polish schoolhouse; the Nazis killed Hoffmann's father. After the war, Hoffmann and his mother lived in refugee camps, where he read biographies of Marie Curie and George Washington Carver.

He and his mother emigrated to the United States in 1949, where the 11-year-old learned English – his sixth language. And in 1955, Hoffmann – then a senior at Stuyvesant – entered the talent search with a project analyzing the tracks of cosmic rays. His winning study earned him his first trip to Washington, where he posed for a photograph with President Eisenhower along with other boys sporting crewcuts and girls in crinolines.

But perhaps the most significant event of that trip, he says, was the chance to meet with a scientist from the National Bureau of Standards. The researcher encouraged Hoffmann to apply for a summer job at the bureau, and he got the

position. That summer's experience — rare for a high school student — sparked a lifelong interest in chemistry.

"I came into chemistry through a sequence of events that began with the Westinghouse Science Talent Search," he says. Now a professor of chemistry at Cornell University, Hoffmann has also written two books of poetry. In 1981, he won the Nobel prize in chemistry for applying the laws of quantum mechanics to chemical reactions and structure.

Four other Westinghouse winners have gone on to become Nobel laureates: chemist Walter Gilbert and physicists Sheldon L. Glashow, Leon N. Cooper and Ben R. Mottelson. Cooper credits the student competition with his acceptance into Columbia University in 1948 — a time, he says, when the university took few applicants from New York. Two talent search alumni have been honored with the Fields Medal — known informally as the Nobel prize of mathematics — and eight have received McArthur Foundation fellowships, nicknamed "the genius awards."

The search has undergone several changes over the years. Beginning in 1948, the judges evaluated males and females as a single group, and in 1972, Nina Tabachnik Schor became the first female to capture first place among finalists of both sexes — an event noted in newspapers around the country.

In the early 1960s, the judges dropped the written examinations, which had been part of the competition since its inception. That move, notes Science Service President E.G. Sherburne Jr., reaffirmed a fundamental precept of the talent search: that the creativity embodied in a research project may serve as the best predictor of future success in science.

In the decades that followed, the research projects became increasingly complex and sophisticated. Whereas earlier students made do with simple laboratory equipment or homemade devices and tackled topics such as the chemistry of making vinegar, the 1970s and '80s brought new challenges such as quantum field theory, DNA cloning and computers. More and more applicants began conducting their research in the laboratories of professional scientists, using such resources as electron microscopes and cyclotrons. And a new wave of immigrants came to the fore: Asian Americans.

As the talent search evolves, at least one fundamental ingredient remains constant: the support and encouragement students receive from their science teachers.

Consider, for instance, the efforts of biology instructor Richard Plass. In the 1970s, he set out to create an honors science program at New York City's Grover Cleveland High that would challenge the school's brightest students — and make them and their parents think twice before opting for a better-known school such as Stuyvesant or Bronx Science.

Working with a committee of science teachers and students, Plass developed a research program based on the study of primitive critters such as euglena, paramecia and simple bacteria. The school's program, dubbed Creature Features, attracted students as early as the ninth grade. Twenty of these youths became talent search semifinalists, and in 1981, a Grover Cleveland senior was a top-40 winner, drawing national recognition to a school not widely known for its academic excellence.

Plass himself was lured to Stuyvesant in 1982 for the position of assistant principal of biology. Today, he and a team of Stuyvesant teachers oversee a series of courses known as Research for Westinghouse. The program, inspired by Creature Features, encourages freshmen and sophomores with an appetite for research to take double periods of biology or physics. Students give presentations on classroom research and critique each other's work.

"They're doing library work, making a hypothesis, as if it were a regular [talent search] project," says Plass. "But they're doing it in a ninth grade class, using the biology they're learning." By the time they enter their junior year, he says, some talented students are "ready to take on the big one — the real contest."

Often, that means knocking on the door of a professional research laboratory. And often, an older Stuyvesant student is already working there, willing to help train the newcomer. "We have kids teaching kids," says Arnold Bellush, a physics teacher who helps run the Stuyvesant program.

While teacher teamwork proved successful at Stuyvesant and Grover Cleveland, in other cases a school's success may trace to a single instructor. In the mid-1950s, for example, a small school in a semirural region began producing talent search winners. Students from Columbus High School in Marshfield, Wis., reached the top 40 in seven of the eight years from 1955 to 1962.

"The judges were completely flabbergasted that this little town had so many kids who could perform this way," says Schriver.

She and the judges soon found the key that had unlocked so much talent: a physics and chemistry teacher named Sister Mary Lauretta Bishop.

Before Sister Mary Lauretta joined Columbus High in 1952, becoming its first science teacher, she had taught in a Milwaukee school and had tried, without success, to produce a talent search winner.

"But when I got to Marshfield," she says, "I tried again. And I certainly was blessed with some wonderful students." One was Ronald E. Gates, who decided to study the chemistry of making vinegar, using some 20 natural products as different sources for the acidic compound.

The school had limited laboratory resources, and Gates collected his materials as best he could. He picked dandelions from the school's front lawn; for cattails, he visited the pond of a local farm. His teacher went with him to gather apples from a nearby orchard. Sister Mary Lauretta remembers the vivid rouge of Gates' cranberry vinegar, "as beautiful as a red wine."

Just before Christmas in 1958, Gates told her he would have to abandon the project because he wanted to earn some extra money for the holidays. A few weeks

Westinghouse Electric Corp.

Winners of 1989 talent search during their visit to Washington.

later, prodded by his father, he went back and announced he would like to continue after all. He recalls her response: "'I want you to know, I've fed your cultures, they're still going,' she told me."

"I would have had to start all over again if she hadn't done that," he says.

The project earned Gates a place in the winner's circle. "I can remember riding up on the train to Washington – all that pomp and circumstance, the telegram saying you won, the whole senior class seeing you off at the train depot. You begin to feel 'I really am special, I really am something.' Then you get there and you meet the other students, and you feel very humble."

In 1959, Sister Mary Lauretta supervised another student, Virginia Perner Fischer, who worked steadily after school for three months on a research project with which she seemed to need little help. "Then one day," says Sister Mary Lauretta, "she came in with all her paraphernalia, dumped it on the floor in front of me and said, 'I'm through.' 'Why?' I asked. 'Because you're never around,' Virginia replied. 'Is that what you need?' I asked. 'Yes,' said Virginia."

"From then on," says Sister Mary Lauretta, "I made it a point to show my face every day. And that's what she needed." Fischer became a Westinghouse winner in 1960.

"Virginia taught me a lesson that I revered because it came so spontaneously, so compellingly from the heart: If you're not there with the students, guiding them in some way, even if it's only the wink of an eye, you might as well close the book. The teacher is the vital point; the teacher's presence alone is enough to stimulate," Sister Mary Lauretta says.

Last year, Ronald Gates sent a letter to his high school helper, now 90 and a resident of Notre Dame Infirmary in Elm Grove, Wis. He wrote that he had decided to give up his career as a biochemist and become a high school science teacher.

"If I can be a teacher half as good as she is, it will be terrific," he told SCIENCE NEWS.

The talent search has its critics, notes Science Service's Sherburne. "We're often accused of being elitist," he says.

That's the view taken by Bill G. Aldridge, executive director of the National Science Teacher's Association. "I feel that [the search] simply provides advantage to the advantaged," he says. "The last time I went to one of the Westinghouse award dinners . . . I sat there with a young woman who won her award in chemistry. Her mother has a Ph.D. in chemistry; her father has a Ph.D. in chemistry; her uncle got a Nobel prize in the field in which she did her work. I come away from something like that saying, 'Oh, come on.'"

He adds: "Some of them are going to become outstanding scientists – that doesn't surprise me, they probably would anyway. But you're not even touching the science education in this country."

> ***'It fueled the fire already inside me.'***
>
> **— Nina Tabachnik Schor, 1972 talent search winner**

Sherburne disagrees. While many people believe that a "genius" will thrive without any special encouragement, studies tell a different story, he argues. He cites a 1982 report by Benjamin S. Bloom, an education specialist now retired from the University of Chicago and Northwestern University. Bloom examined the processes by which 25 individuals reached the highest levels of accomplishment in their fields, including mathematics, neurology, swimming and tennis.

Bloom writes in *Developing Talent in Young People* (1985, Ballantine Books): "No matter what the initial characteristics (or gifts) of the individuals, unless there is a long and intensive process of encouragement, nurturance, education, and training, the individuals will not attain extreme levels of capability in these particular fields."

For student scientists, Sherburne maintains, the talent search has become an essential part of such nurturance and encouragement. Nina Schor, who won first place in the 1972 competition and who now studies the biology of children's cancer at the University of Pittsburgh, agrees: "At that stage of the game, at that level, the approval and go-ahead of senior scientists was very encouraging. It gave me a sense of 'Yes, I could do it; yes, I could measure up to their standards.' It fueled the fire already inside me."

"The contest may not make people who have no initial interest in science suddenly think about it as a career," Schor says. "But for people who have an interest but who have some doubt in the back of their mind as to whether they are good enough, this program says, 'Go ahead.'"

Adds Nobelist Hoffmann: "I think it encourages kids – like any competition – to do things well, to do the things they would not have thought themselves capable of doing. I think that was how it was for me. . . . Kids in high school are so keyed in on courses, on performance, on examination – but by focusing on a research project, you turn toward more of the reality of what science is about."

Aldridge suggests modifying the talent search, using a rating system that takes into account the socioeconomic hurdles a student may have had to endure or overcome in doing the project. "Right now, it's as if you have a race, and you're taking some kids and putting them up 20 yards from the finish line, and you're putting the other kids back 200 yards behind them. Then you have the race, and you congratulate the people who only ran 20 yards."

All students should have access to the same resources, Aldridge says. He suggests, for instance, that giving everyone the same electromagnetic or mechanical kit with instructions to build a creative device in a given amount of time might provide a fairer "hands-on" research project.

Sherburne calls such a kit "contrived," arguing that it has little to do with the way real research is conducted.

While the debate continues, student scientists keep striving. In the end, the talent search is about the young and their drive to create, discover and achieve. It's about teenagers like Julie Yui Tu, who decided four years ago that her father's New Jersey junkyard was the perfect place to test an archaeological theory about the Incas. These ancient Peruvians moved massive stones in order to build their famed masonry walls. Noting that her dad's crushed junkyard cars were about the same size and weight as those stones, the 17-year-old Tu lugged the wrecks up crude, homemade ramps and built rough sledges, wooden rollers, pulleys and other tools resembling those the Incas might have used. The experiment led her to conclude that the Incas might have used beds of mud, leaves or other lubricants to ease the stone-dragging chore.

In 1987, Tu won a talent search award for her labors. At the moment, she's in China on an anthropological expedition, but she says she'll be back in Washington for the gala awards dinner on March 4.

"At the banquets, you can just see their minds dancing, and the sparkle in their eyes," says Clark of the Westinghouse Foundation. "It's fun to be part of that, to sense that kinetic energy flying around the room."

This year, hundreds of talent search alumni will share in that exuberance as they return to Washington to celebrate the competition's 50th year. □