Minority Survivors Tell Their Tales

Pathbreakers succeeded with help from parents, mentors, and scholarships.

In the course of reporting this first special section, *Science* encountered several dozen seasoned veterans of the science education wars. Today, in their forties and fifties, these individuals would stand out anywhere, at any time, for their intelligence, persistence, and just plain guts. But back on the reservations and in their segregated neighborhoods, they left behind siblings and friends who might have become scientists, too, given the right combination of circumstances. The stories that follow are meant not only to celebrate those who succeeded, but also to remind us of the scientists who might have been.

Of the survivors, many got help from strong families who sent an equally strong message that education was the route to a better life. Schools, even in poor neighborhoods, were relatively free of crime and drugs. Mentors—mostly white—gave advice and encouragement. And although affirmative action programs had not yet begun, virtually everyone who succeeded had the aid of scholarships. In general, these support structures helped this generation—small in number though it is—to succeed. But the complex reasons for any individual's success lie within his or her own story.

BREAKING GROUND

We start with Hopi Indian Frank Dukepoo, born on an Arizona reservation in 1943. His mother had a seventh grade education, his father was a high school dropout, and many of his 12 siblings struggled with alcoholism. But from the age of 4, Dukepoo was "fascinated with reproduction" and spent long hours watching animals around the reservation. A born geneticist, you might guess—but as one of the few Indians in his public school in Phoenix, his childhood was "a constant battle" to prove himself. Beating up the first-grade bully was a pivotal event, he says. He went on to prove he could beat everyone in academic subjects as well, earning five scholarships upon graduation from high school. But Dukepoo had some rocky years, made worse by a heavy drinking habit. He quit while still in his teens but "goofed off" at Arizona State University, losing all his scholarships by his sophomore year.

School was "a constant battle" to prove himself—but "I got discipline and determination from my dad."
—Frank Dukepoo

Dukepoo says he eventually got on the right track when, in college, he took to heart the Hopi teachings learned from his father. Says he: "I turned my life over to the Great Spirit." Hopi teachings say that for every adversity there are equal or greater benefits. And one of those benefits came along in the form of biologist Charles M. Wolf, who met Dukepoo during his senior year, when he was squeaking through with a 2.0 grade point average. Dukepoo says Wolf told him that "he believed in me" and proposed that he do a summer project on Hopi albinism. That work led to a master's degree—now a "classic paper in genetics"—and, in 1973, a doctorate in *Drosophila* genetics.

Today, Dukepoo is not merely the first of his family to to get a Ph.D., he's the first Hopi to get a doctorate. Now associate professor of genetics at Northern Arizona University, he believes he is the only American Indian geneticist in the country.

Dukepoo is a rarity among rarities. Like many of the scientists mentioned here, his talent appeared early. But what can be done to give encouragement to those potential scientists who are diamonds in the rough, their sparkle hidden by their surroundings? The stories of these pathbreakers provide some clues: strong families, competent teachers, enthusiastic mentors, and scholarships.

SUPER MOMS AND DADS

Most minority scientists started life just like other scientists: intrigued by the natural world around them. Radiation biologist Leo Gomez, 52, of Sandia Labs remembers being captivated by the science fiction movie *Them*, about giant radioactive ants from the Carlsbad test site. There were a lot of ants where he grew up in Albuquerque, so "I would try to concoct a potion to see if I could make them grow bigger." Other scientists interviewed by *Science* recall fixing a chicken with a broken back, building model planes, testing medicinal herbs, or—particularly common—a precocious fondness for math. So the interest was there, but what allowed them to beat the odds?

High expectations, for one thing. Emory University biochemist George Jones, 50, is typical of many in the following respect: The son of a postman in Muskegee, Oklahoma, he says, "I never had a conversation with my parents about whether I was going to college. It was never if, but where." Some parents turned even menial jobs to good account for their children. Chemist Leo Davis' mother was a cleaning lady who brought home customers' cast-off books and magazines. Davis, 59, now associate vice president at the Univerity of Iowa, "read everything she brought home, especially the *National Geographic* and anything to do with science."

Fathers appear to have been particularly important for women scientists. "My father taught in engineering school so I went to engineering school," says Michelle Hoyte, 39, a biomedical engineer at the

Food and Drug Administration. Cell biologist Sandra Murray, 44, who does research on cell-cell communication at the University of Pittsburgh, worked in her father's moving business as a child. "I didn't even know women didn't fix trucks," she says. "I certainly didn't know they didn't become scientists."

SUPPORT SYSTEMS

Not all successful minority scientists had parents who were determined to get their kids through college: Developmental biologist Clifton Poodry, chair of the biology department at the University of California, Santa Cruz, never knew his father, and his mother, a Seneca Indian, worked off the reservation on factory jobs in Rochester, New York. "Nobody cared if I did homework," he says. But, he had a "stable life all the way" under the care of various family members. Says Poodry: "They were very powerful in terms of encouraging me to get out there...and do something."

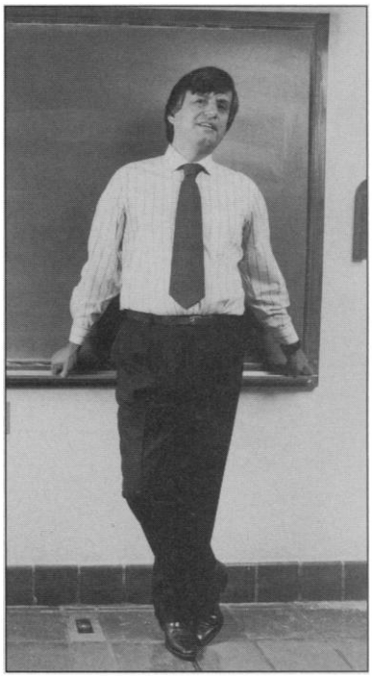
Sometimes the support systems for these scientists extended into communities: Molecular parasitologist George C. Hill, 53, of Meharry Medical College in Tennessee remembers a group of neighbors in his Camden, Pennsylvania, neighborhood who took it upon themselves to "nurture" a dozen brainy kids. "We were called the Sigma Rays. We wore 'nerd' sweaters," says Hill. In Muskegee, says Jones, "All elements of the community stressed education. They didn't let me get away with anything. That sort of oversight gave me confidence that I could survive in a more rigorous environment."

And some older scientists claim that negative peer pressure, though present, wasn't as ugly as today. Three of Davis' classmates became Ph.D. chemists, and they were enough to create "a peer group where it was cool to be smart," he says. Peer pressure still had to be answered to—physicist Homer Neal, 50, of the University of Michigan remembers, "I had to prove I could excel in something like basketball before I could excel in physics." But James Mitchell, 49, head of analytical chemistry at AT&T's Bell Labs in Murray Hill, New Jersey, who went to segregated schools in North Carolina, says, "It was the thing to do to be academically inclined."

TEACHERS/MENTORS

Most of the black scientists in this generation started out in segregated schools. And many Hispanics went to ones that might as well have been. Lena Austin, a 54-year-old medical mycologist at Howard University, remembers the former type: "The books we had were always the ones left over from the whites." But Austin and others also remember teachers who were something special. "Our teachers had master's degrees from prestigious institutions like Harvard, Iowa State, and Columbia," says Davis of his instructors at the only black high school in Kansas City. Billy Joe Evans, 50, a researcher in inorganic chemistry at the University of Michigan, Ann Arbor, contends that his segregated schools in a poor area of Macon, Georgia, were "the best thing that ever happened to me," because the teachers were so good. If it hadn't been for segregation, Evans believes they would have been in more affluent communities (or, today, they might be scientists themselves).

And because of the rigorous standards teachers espoused, economist Walter Williams of George Mason University, 56, who went to public school in Philadelphia, says: "Black people who emerged from high school with my skills were not unusual." Williams recalls that in his junior high, a student might find a composition ripped to pieces because the grammar wasn't perfect. Rough justice, but "at least you could spell correctly." A similar experience from a Kansas City parochial school is described by University of Texas mathematician Manuel Berriozobal, 61: "I probably wouldn't be where I am today if it weren't for parochial education. In those days the nun was the boss and your job was to learn." Of course, there are exceptions to this picture—like mathematician Richard Tapia, 53, of Rice University, who says his schools in downtown Los Angeles were "awful. Nobody pushed me, except I pushed myself."



"Nobody pushed me, except I pushed myself."
—Richard Tapia

MENTORS, NOT MODELS

Role models and mentors are fashionable today. But 30 years ago, there was hardly such a thing as a black or Hispanic scientist. "I didn't see my first Ph.D. role model Latino till the age of 28,"—a year after he got his own Ph.D. in developmental biology—says Eloy Rodriguez, 45, of the University of California, Irvine. But he and others seemed to be able to find the inspiration they needed. For chemist Leo Davis, "what [made] a difference was that I knew there had been George Washington Carver."

Jumping Racial Barriers

It's no surprise that this generation of scientists, especially the women, got discouraging feedback along the way. University of Pittsburgh cell biologist Sandra Murray, 44, recalls a high school guidance counselor telling her she should be "realistic" and set her sights toward becoming a nurse or something "supportive." Brown University microbiologist James Wyche says that as the only black in his Long Island high school class, he was advised not to try for a 4-year college. Engineer Michelle Hoyte remembers a boss at Hughes Aircraft who "looked at me and said, 'I don't know what to do with you.' I didn't fit into any slots in his mind."

And some minorities feel they have had to confront stereotyped expectations from both outside and inside their group. Cell biologist Elma Gonzalez at UCLA calls Mexican-American female scientists "the ultimate filtrate"—because they had to pass through sieves of prejudices from both the white and Hispanic worlds. "Hispanic families tend to be very close knit, and going into science is not a close-knit sort of thing," explains microbiologist Mary Sanchez Lanier of Washington State University. When she was growing up, women were expected to get married and have kids right out of high school, she says, and going to graduate school was considered "just prolonging being a bum." These attitudes knocked out many of Lanier's Hispanic female colleagues in grad school. She herself had a secret weapon: a family history of independent-mindedness exemplified by her father, who "was virtually the only Hispanic lawyer in Albuquerque."

–C.H.

Virtually all these scientists, however, cite individual teachers who guided them to college and grad school. Evans, for example, got to Morehouse College courtesy of a high school social studies teacher who paid a scholarship exam fee his parents couldn't afford. But once in college, except for those who went to black colleges, the mentors were always white. Cornell biomathematician Carlos Castillo-Chavez, 40, says that although he loved math, "I couldn't believe I could do it for a living." But encouragement and positive feedback changed his mind. "A lot of mathematicians went out of their way to help me," he says, pushing him to go for his master's and then his doctorate at the University of Wisconsin. Microbiologist James Wyche, 50, associate provost at Brown University, remembers the enthusiasm and generosity of visiting European-born Nobel Prize–winners who always had time to "sit down and talk to me" when he was a student at Johns Hopkins.

The message from within. But what enabled these scientists to focus on the positive feedback and ignore the negative messages they were also getting? All seem to have an exceptional amount of self-confidence and resilience. Rodriguez says he finally got into graduate school at the University of Texas after being turned down twice. "I always knew I never could be mediocre," he says. "I have a big ego." Walter Williams thinks orneriness helped. He cites a certain "inner hostility or failure to adjust" that helped him move into a role society never imagined for him. Dukepoo, too, thinks a feisty nature has served him well. Plus, "I got discipline and determination from my dad."

These individuals are the kind who would probably have been successful in any line of work they chose, but a crucial factor was their powerful attraction to science. Says Mitchell of AT&T: "I think I was born a chemist." And despite the odds, he succeeded in becoming one.

–Constance Holden

The Burdens of Success

Even now that they've successfully navigated the education system to its highest reaches, this generation of survivors still faces extra burdens at the top, as administrators or tenured researchers. As the rare representatives of their group, minorities who have "made it" are tapped to take on extra professional responsibilities.

Most wanted. Everyone wants Sandra Murray on their committee—but she wants to do research.

Many are gladly working with minority schoolchildren as well as mentoring undergraduates. But they also find themselves pressured to join scores of committees eager for minority members, and the diverse demands can jeopardize research careers. One tenure-track scientist asked that her photo not be included in this issue because she didn't want the extra publicity—and the extra invitations sure to follow.

It's a serious conflict, warns cell biologist Sandra Murray at the University of Pittsburgh. Service work doesn't count for a lot at tenure time—but if you turn down requests, you may miss making valuable contacts, and "you can build enemies by not being a team player." Says biochemist George Jones of Emory University in Atlanta, "One of the most important things you have to learn as a faculty member is how to say no."

Furthermore, minorities are often asked to put research on the back burner and move into administration. "I suspect you will find that a significant fraction of us have been lured into administrative positions," says Jones, who finds it isn't easy to carry on his own work on antibiotic resistance while serving as vice president for research.

The burden of proof. What's more, if you're the only minority scientist in your department, you can't help but feel your work affects the reputation of your race. Cornell biomathematician Carlos Castillo-Chavez, who was born in Mexico, says that the "strong driving force" for him has been the feeling that "I had something to prove not just for me but for everybody." Says economist Walter Williams of George Mason University: "Black people can now afford to do badly in competing in baseball and basketball—but not in nuclear physics."

These high achievers often feel an additional burden: others' suspicions that they came up by an easier route than their white colleagues. George Hill of Meharry Medical College says, "You feel compelled to demonstrate that you are not there because of tokenism." And Leo Davis, chemist and associate vice president at the University of Iowa, contends that the constant pressure to prove oneself is even more onerous for younger scientists, who "feel they are [seen as] affirmative action babies." Says the outspoken Williams: "I am glad I got most of my education before it became fashionable for white people to like black people....When I got a C it was a really honest-to-God C, not an affirmative action C."

James Wyche, associate provost and microbiologist at Brown University, says negative perceptions about minority scientists' qualifications are also affecting research. "Very few minority scientists have nonminority collaborators," he claims, because white scientists see such associations as disadvantageous to career advancement. That's why a lot of white students don't want black mentors, according to Davis.

Solidarity. So minority scientists may be looking to each other more in the future for support. One sign of this trend is the imminent launch of a new *Journal of Interdisciplinary Biological and Physical Sciences*, which, according to editor Julius Jackson of Michigan State University (now on leave at Clark Atlanta University), will provide a forum for minority issues as well as seek submissions from minority scientists who haven't broken into mainline journals.

But there's nothing like being with others like you to counter the sense of isolation that is a price of success for so many minority scientists. That's why meetings such as those of the National Organization for Black Chemists and Chemical Engineers and the Society for the Advancement of Chicanos and Native Americans in Science are especially important. For many, these gatherings are a lifeline. Says mathematician Tapia, "You see these people like yourself and you hug them without even knowing who they are."

–C.H.