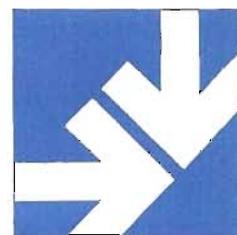


SEARCH

Scientists Who Serve God



HE WORKS (AND PLAYS) IN INDUSTRY



In 1956, chemist Robert L. Bohon accepted a position with the 3M Company of St. Paul, Minnesota. One big attraction, he admits, was a chance to play the violin in the symphony orchestra open to all 3M employees. Another was the challenge of using his scientific skills to develop new commercial products and industrial processes. His work has also helped diminish chemical pollution of the earth's environment.

Bob Bohon was born in 1925 in Decatur, Illinois. When he was about eight years old, his parents bought him a violin and a set of lessons from a traveling "Music Man." Bob's father, who sold caskets, let his son melt down discarded lead casket handles and cast the metal into toy soldiers. That boyhood metallurgical interest was further stimulated by a good high school chemistry teacher and later by courses at the local James Millikin University. A medical deferment for poor eyesight enabled Bob to stay in school throughout World War II.

Becoming a chemist with a practical bent

To major in chemical engineering, Bohon enrolled at the University of Illinois in Champaign-Urbana, where he soon met a first-year education major named Lois. They married in the summer of 1947. That was a year after Bob received his B.S. and started on a doctoral program in physical chemistry. The Bohons became active in a young adult group in University Baptist Church.

In 1945 Bohon began working part-time in a new commercial lab set up in Champaign by one of his physics professors. Told to wear old clothes, he spent his first day at Anderson Physical Laboratory painting a room solid black, as a darkroom for optical instruments. One of the first commercial infra-red spectrometers was used to study the behavior of glass surfaces, under contract from Owens-Illinois Glass Co. In 1950 Dr. Bohon became the full-time head of the lab's infra-red section, studying many different kinds of materials.

Doing research that made a difference

To earn his Ph.D., Bohon determined the solubility in water of certain hydrocarbons. Day after day he made painstaking measurements as part of a project supported by both the Illinois State Water Survey and the U.S. Public Health Service. The discovery that water molecules could wrap around hydrocarbons to form actual compounds explained winter freeze-ups of natural gas lines and helped solve many other problems. The tip-off was a dip in the curve when the data were plotted against temperature; a dip that delighted Bohon's major professor. Similar but more stable compounds now known to chemists are called "clathrates," or "inclusion compounds."

Scientists enjoy seeing their work put to constructive use. Bohon's data and thermodynamic calculations were published in the *Journal of the American Chemical Society*. A petroleum engineer wrote to thank him for helping account for mysterious losses from an oil refinery. No one had realized that so much oil could "leak" into waste water.

Today, Robert Bohon heads a large laboratory in a major chemical company. He's had the satisfaction of seeing environmental scientists, using sensitive modern methods, confirm findings he once made as a graduate student.

And for over thirty years, Bob Bohon has also had the satisfaction of playing the violin in the 3M Company orchestra.

Scientific Investigation

A VERSATILE CHEMIST IN A VERSATILE COMPANY

THEY STICK TOGETHER

"3M" (MMM on the New York Stock Exchange) stands for Minnesota Mining & Manufacturing Co. It was founded in 1902 in Two Harbors, Minn., when an abrasive grit mined for sandpaper turned out to be no good. Forced to do research to save the enterprise, 3M soon invented "wet or dry" abrasive papers and pressure-sensitive tape, both quickly adopted by the auto industry.

Today, Scotch brand transparent tape, strapping tape, and masking tape are well-known consumer products, and the 3M Company "mines" any technology it can apply to a flat surface to make something useful. Consumer products account for 10% of sales, industrial products 45%, and products for service industries another 45%. The mix includes videocassettes, computer diskettes, Scotchgard textile stain protector, Post-it note pads, diaper tapes to replace safety pins, and patches that slowly dispense medicine when stuck to the skin. As a sponsor of the 1988 Olympics, 3M showed off sportswear made of Thintech, a new breathable waterproof fabric—trimmed for nighttime safety, of course, with Scotchlite reflective material.

Worldwide, 1987 sales added up to almost \$9.5 billion, of which 3M spent \$624 million on R&D, bringing its total R&D expenditures for the past five years to over \$2.5 billion. The company employs over 80,000 people, about 50,000 of them in the U.S., almost half of those in Minnesota.

Even if it hadn't sponsored an orchestra, 3M Company was what Robert Bohon was looking for: a diversified manufacturing company with a lasting commitment to research and development ("R&D"). In 1987, more than a fourth of 3M's sales came from products that R&D had brought to market in the past five years.

At first Bohon probed reaction rates of heat-sensitive iron-soap-phenolic mixtures used in the coated papers for 3M's Thermofax, the world's first dry-copy process (later overshadowed by "plain-paper copiers").

From blow-ups to foul-ups

In 1959, with the space race on, Bohon was shifted from the Corporate Research Laboratories (CRL) for a four-year stint in a government-sponsored crash program. Again he used his thermal-analysis skills, this time to explore solid rocket propellants. The inherently unstable compounds were hard to study because they frequently blew up in the lab. Today more stable solids are used as rocket booster fuels, even though they give less thrust per pound.

Back at CRL, Bohon stepped into technical management, directing first a Materials Evaluation group and then Special Research Services. He added to his skills by investigating new analytical techniques. In 1985 he began directing the CRL Analytical & Properties Research Lab, his present post. For eleven years in between, he ran an environmental lab providing analytical support for Environmental Engineering & Pollution Control at 3M Company.

Bohon's lab showed that 3M's Tartan Turf, designed to replace grass on athletic fields, retained the mercury catalyst used in synthesizing the polyurethane material. Mercury, a toxic heavy metal, could be released to the environment as the plastic weathered. The company took the product off the market, leaving the field to Monsanto's rival Astro Turf. That hurt.

Protecting both the company and the environment

In the early 1970s, Congress passed laws to clean up the water we drink, the air we breathe, and solid-waste disposal sites. Proud of his company's exemplary record, Bohon admits that the first environmental work it did was "mostly defensive." Yet before the Toxic Substances Control Act (TSCA, nicknamed "Tosca") became law in 1976, his company had been cooperating voluntarily with regulatory agencies.

TSCA mandates that before manufacturing any new *chemical*, a U.S. company must supply the Environmental Protection Agency (EPA) with a thorough report on its environmental impact. Most of the thousand chemicals 3M makes are used within the company, but it did more than the law requires by assessing the impact of each of its many finished *products*. As an international company now operating in 50 countries, 3M was aware of global environmental problems and of growing international regulation.

Bohon's role at 3M led him to serve many hours on international committees wrestling with technical solutions to pollution problems. The Organization for Economic Cooperation & Development (OECD) draws together a Business & Industry Advisory Committee (BIAC) from each of its 24 member-nations. Bohon was a charter member of the US/BIAC subcommittee on chemicals. He met with European scientists to hammer out realistic testing guidelines for the Dangerous Substances Act, the European Economic Community's version of TSCA.

In general, he says, environmentalists have the concern, politicians have the responsibility, but industrial scientists frequently have the know-how to control worldwide pollution.

Bob Bohon feels good about his contribution to that goal.

Robert Bohon thinks of himself not as an expert in any particular area of chemistry, but as competent in a number of areas. In his Christian life also, he comes across as versatile and service-oriented. He sees science and religion "converging" in individuals who are open to both.

In such individuals one senses a kind of wholeness, not because they have two kinds of truth but because they come at truth from more than one direction, "giving it all they've got." In one of Bohon's favorite New Testament passages (John 10:10), Jesus said, "I came that they may have life, and have it abundantly." Bob admires the creative approach to Christian service taken by the Church of the Saviour in Washington, D.C., as chronicled in several books by Elizabeth O'Connor.

Bohon was once reading O'Connor on a flight to the nation's capital to advise on environmental regulations when a man in the next seat asked what he was reading. Bob told him about Church of the Saviour. Visiting that congregation on another trip years later, Bob and Lois were warmly greeted by a stranger who introduced himself as that very passenger. He thanked Bob for pointing him to a caring church where he found his own place of service.



Bob & Betty Bohon

Faith is no straitjacket

Some scientists master a technique and apply it to all kinds of problems. Others focus on a problem and bring to it all the skills they can muster. Science needs generalists as well as specialists, analyzers and synthesizers, experimentalists and theoreticians, managers and technicians. In the Christian life, also, there is room for many approaches.

Scientists must learn their discipline, but science is open to all who commit themselves to it. Similarly, all who humble themselves and learn from Jesus Christ may enter through "the narrow gate" of Christ's death and resurrection. God's forgiveness and acceptance are great levelers.

Then comes on-the-job training in the laboratories of life. Christians go to work in Christ's name with whatever skills they have, facing whatever needs he brings to their attention. As the apostle Paul wrote in Romans 12, each "member of Christ's body" has a different function, some more general, some more specialized. While serving Christ in different capacities, all are to rejoice in hope, be patient in tribulation, pray steadily, help other believers, practice hospitality, and generally be "imitators of Christ."

Abundant life comes spiced with variety

Alert scientists are seldom bored, because new problems keep cropping up. Life is equally exciting to alert Christians. On a journey where the tickets are free but offered only to admitted sinners, one should expect a variety of passengers. The church is rich in styles from the formal and liturgical to the free and charismatic; in theologies from Arminian to Calvinist; in cultural expressions from Chinese peasant to middle-class American.

On their journey of discovery, Christians can take along a spiritual fruit-basket of love, joy, peace, patience, kindness, goodness, faithfulness, gentleness, and self-control (Galatians 5:22). With so much to do, and with such varied traveling companions, they need all those traits.

One of Lois Bohon's favorite passages in Ephesians 3:20-21: "Now to him who by the power at work within us is able to do far more abundantly than all we ask or think, to him be glory in the church and in Christ Jesus to all generations, for ever and ever. Amen."

Theological Reflection

WANTED: VERSATILE CHRISTIANS

A WORLDWIDE FAITH

Christianity is a huge multinational enterprise uniting about one-third of the world's five billion people, but without producing uniformity. In fact, crossing so many boundaries guarantees great cultural diversity.

Some 19 out of 20 Christians live outside the United States. The worldwide growth of Christianity, and its survival in some countries where churches have been officially persecuted, has been amazing. Many Third-World countries to which missionaries have taken the gospel in the past now have strong indigenous churches sending missionaries to other countries.

Even in the U.S., Christianity looks more and more like a "rainbow coalition." The city of Los Angeles has some 280 traditional (Anglo-Saxon) Presbyterian churches, but they are already outnumbered by Korean Presbyterian churches in that city.

Christians in industry interact with non-Christians on a daily basis around the world. Christians with technical skills can go where traditional missionaries are not welcome. Developing countries send their most promising youth to study technical subjects in the U.S., where American Christians can befriend them. Science and technology seem to be paving the way for the spread of the gospel.

In a sense, science and Christian faith are "converging" on a global scale.

Bob Bohon has met many other scientists who play musical instruments. It helps them express emotion, he thinks, balancing their strongly developed analytical side. To this Christian chemist/musician, life *should* be a symphony blending various melodic themes, or perhaps a choral anthem sung in individual parts.

The Bohons' own life blends family, church, and career. Bob and Lois have three grown children, the eldest born a year after Bob finished graduate school. Joking about her "major roles" as "chauffeur and audience," Lois adds that her experience selling real estate some years back was of help in buying a lot in White Bear Lake and building their present home.

Close harmony

Lois also did some teaching but she especially loved working at the Science Museum of Minnesota for eight years, first as a volunteer and then on the paid staff, helping to coordinate the work of other volunteers. She has been a "quiet feminist" in American Baptist Church circles, frequently being the first woman in some role like trustee or moderator. At the regional level she has actively supported internships for American Baptist women in ministry.

Bob has also served the local church and denomination in many ways. Together Bob and Lois helped found Woodbury Baptist Church, an extension of First Baptist in St. Paul. In the early 1970s, as director of Woodbury's choir and member of the Fellowship of American Baptist Musicians, Bob learned of several inspiring Christian musicals written for young people. Soon he was gathering youngsters from many churches to rehearse and perform such shows as "Tell It Like It Is," "Natural High," and "The Carpenter."

With their second daughter in high school and many of her generation seeming to lose their way, Bob found it exciting to work with serious but joyful young people. After producing and conducting a musical each year for four years, though, he had to give it up. "It took all my spare time," he says, "and Lois and I were both exhausted."

Hanging in there

Besides the American Chemical Society and North American Thermal Analysis Society, Bob has been active in the American Scientific Affiliation (ASA), a nationwide fellowship of evangelical Christians in science and technology. He once arranged for the North Central ASA section to meet at 3M Company.

In graduate school days, the Bohons joined other young couples at potlucks after Sunday school and worship at "Uni Baptist" in Champaign. Those informal gatherings brought them closer to Jesus Christ and to each other. So rich was their spiritual experience, in fact, that the Young Adult Fellowship has continued to hold reunions every few years. The same "young adults" (most of whom now have grandchildren) gather to share their ups and downs, pray for each other, and sing together once again their favorite hymns of faith.

To Bob and Lois Bohon, it means a lot to be with friends who have gone their separate ways but have held on to Jesus Christ for over forty years.



And, Bohon says, the singing is wonderful.

Thoughtful Worship

LIFE AS A SYMPHONY

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