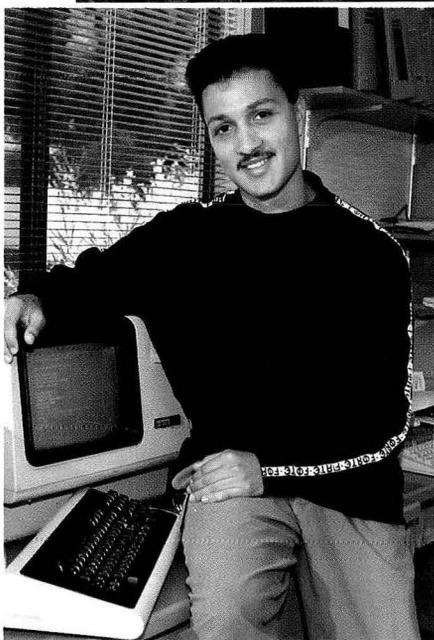
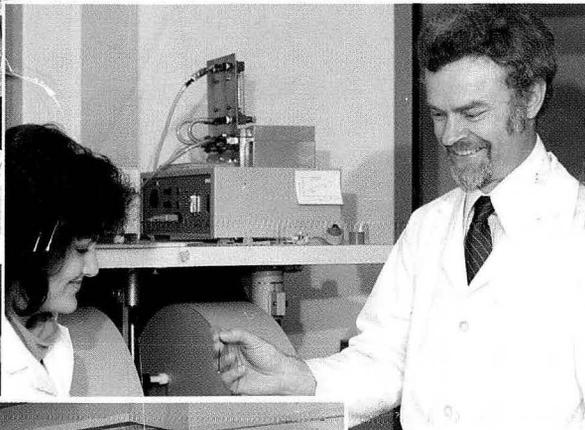


**1983-1993**

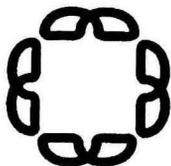


# Science Consortium

**Lawrence Berkeley Laboratory**  
*Berkeley, California*

**Jackson State University**  
*Jackson, Mississippi*

**Ana G. Méndez University System**  
*Río Piedras, Puerto Rico*



The Lawrence Berkeley Laboratory/Jackson State University/Ana G. Méndez University System Science Consortium is supported by the Office of University and Science Education Programs, U.S. Department of Energy, under Contract DE-AC03-76SF00098.



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# A HISTORY OF THE SCIENCE CONSORTIUM

In 1983, a formal Memorandum of Understanding (MOU) joined the Ana G. Méndez University System (AGMUS), Jackson State University (JSU), and the Lawrence Berkeley Laboratory (LBL) in a consortium designed to advance the science and technology programs of JSU and AGMUS. This was the first such collaboration among a Hispanic university system, a historically Black university, and a national laboratory. The goals of this consortium, described in the 1983 MOU, are to assist and strengthen the AGMUS and JSU in their efforts to prepare minority students for careers in science and technology, and to contribute through research to scientific knowledge and to the science mission of the federal government.

Numerous studies have been published citing reasons for the limited success of minority youths in the sciences and mathematics. Upon graduating from secondary schools, some African-American, Native American, Mexican-American, and Puerto Rican students are not well prepared academically to pursue college-level mathematics and science. Those who do enroll in university courses typically perform at lower academic levels than their white counterparts. In addition, minority students who attend predominantly minority universities and colleges must cope with the limited capacity of these institutions to offer diverse mathematics, natural science, and computer science curricula. Many of these institutions lack the broad array of equipment required to conduct scientific and applied research. At some institutions, few faculty members have doctorates in the sciences,

mathematics, and engineering, and those with doctorates have little or no research experience. Historically, support programs and services for strengthening these institutions were rare, a factor that made it difficult for minority institutions to help the typical student seeking a career in the sciences, mathematics, or technology. These conditions also acted as barriers inhibiting the full participation of minority institutions in the mission and programs of federal agencies such as the U.S. Department of Energy (DOE), the National Institutes of Health, and the National Aeronautics and Space Administration.

It is clear that minority institutions play a critical role in

fulfilling the science education mission of the nation. These institutions serve a large percentage of African-American and Hispanic-American undergraduate students. More than 33% of the nation's African-American undergraduate students attend historically Black colleges and universities, while 45% of all Hispanic undergraduate students are being served by Hispanic colleges and universities. It is also clear that African-American and Hispanic-American professional scientists and engineers represent the smallest percentage among all scientists and engineers in the United States.

The Lawrence Berkeley Laboratory and its sponsor, the DOE,



*As a biology major from JSU, Cedric Buckley (right) participated in the LBL Student Research Program, working with Jeffrey Gingrich (left) of LBL's Life Sciences Division. Cedric is now a graduate student at Michigan State University.*

systematically and methodically began to address these concerns. Their underlying philosophy holds that sustained progress will be made by strengthening minority institutions so they are better equipped to educate and train future scientists and engineers.

The process began with the 1978 LBL-DOE "Conference on Energy Research at Historically Black Colleges and Universities." At this conference, the consortium idea began to take root. In 1981, LBL signed an agreement with Jackson State University creating a program of educational and scientific collaboration. It established a joint program, which included faculty exchange and student cooperative appointments. The goal of this program was to enhance the computer sciences and scientific research programs at both institutions and to strengthen LBL's minority recruitment program.

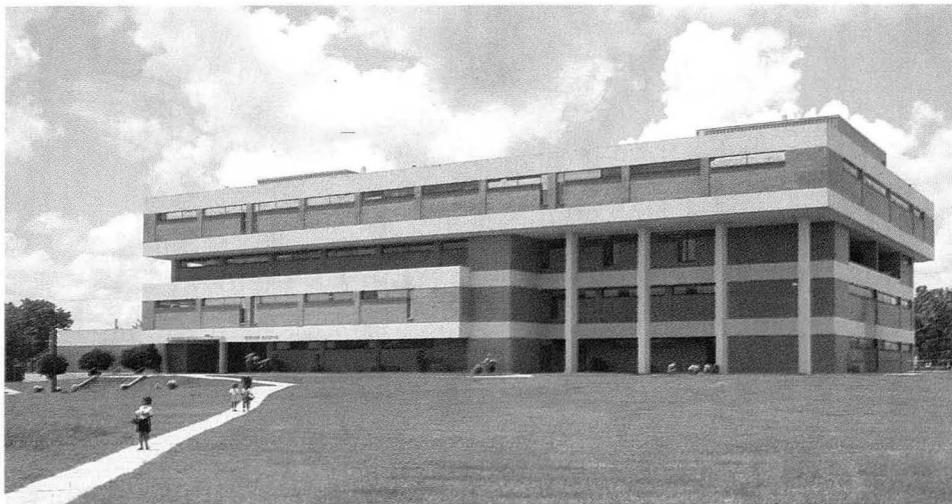
Two years later, in 1983, Ana G. Méndez University System, formerly the Ana G. Méndez Educational Foundation, joined the project, and the LBL/JSU/AGMUS Science Consortium was in place. The three institutions embarked on a long-term, comprehensive program that will enable JSU and AGMUS to provide high-quality education and training in the natural and computer sciences and engineering.

Notable achievements have been made since 1983. Graduates of JSU and AGMUS schools will be prepared to contribute to our nation's scientific mission, and the institutions themselves are better equipped to meet future challenges in educating young minority scientists.

The following pages of accomplishments are a testimony to the *decade of change* brought about through collaboration and cooperation.

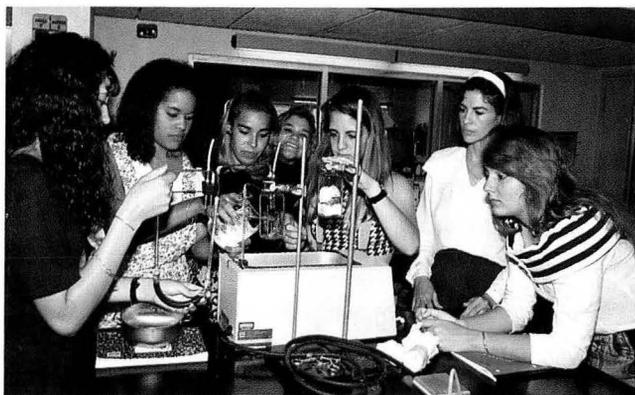


*Science and Education Research Building at Metropolitan University, an AGMUS school in Río Piedras, Puerto Rico.*



*School of Science and Technology Building at JSU, Jackson, Mississippi.*

# STUDENT DEVELOPMENT



A group of Metropolitan University students work in one of the school's laboratories.

## OBJECTIVE

To increase the number and quality of JSU and AGMUS mathematics, science, technology, and engineering students pursuing graduate degrees or energy-related careers.

Stephen Ekunwe consults with Laurie Craise of LBL's Life Sciences Division. After participating in the LBL Student Research Program and earning an M.S. degree at JSU, Stephen entered a doctoral program in molecular biology at Michigan State University.



## ACCOMPLISHMENTS

In 1983, few students from JSU and AGMUS participated in energy-related research and development activities on campus or at DOE national laboratories. By 1993, over 210 students participated in over 250 research appointments at LBL alone, and many others have gone to other national laboratories or were student research assistants on campus.

### AGMUS

- 150 students have participated as research assistants in projects supported by the Science Consortium at AGMUS.
- 90 students have participated in the LBL student research program.
- 17 students from AGMUS have received master of science degrees at JSU.

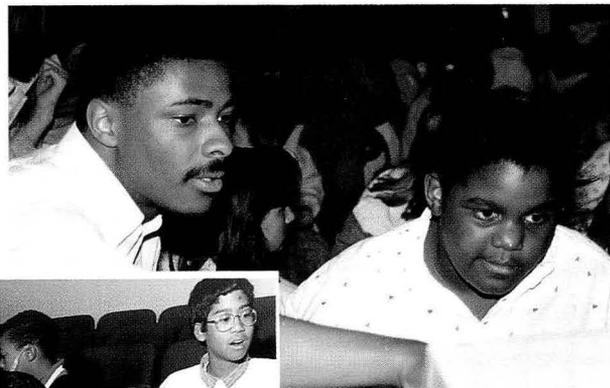
### JSU

- 127 students have participated in the LBL student research program.
- 20 students are pursuing Ph.D. and master's degrees at other universities, and 3 are enrolled in JSU's newly established environmental Ph.D. program.
- 40 students have received Science Consortium support to pursue master of science and bachelor of science degrees at JSU.

## PRECOLLEGE PROGRAMS

### OBJECTIVE

To increase the number of JSU and AGMUS freshmen who have the potential for earning graduate degrees and establishing careers in science, engineering, or technology.



*JSU student Reginald Liddell offers computer assistance to a student in one of the Consortium's precollege programs.*



*Precollege students visiting LBL learned about the properties of supercold substances.*

### ACCOMPLISHMENTS

In 1983, AGMUS and JSU had no precollege outreach programs in the schools of science and technology on their campuses. By 1993, hundreds of teachers and students annually benefit from summer precollege outreach programs as a result of the Science Consortium's emphasis and support.

#### AGMUS

- Comprehensive Activities to Upgrade Science Academics (CAUSA) was established through the Carnegie Foundation to help develop the precollege programs of the Science Consortium at AGMUS. Since 1984, more than 850 students have participated, and many have been accepted to top universities. Approximately 50 teachers, 9 laboratory technicians, 7 counselors, 6 tutors, and 1 coordinator have participated each year.

- In 1990, Great Explorations in Math and Science (GEMS) began at the Lawrence Hall of Science. High school teachers attending this program translate modules into Spanish and adapt them for use in high school biology classrooms in Puerto Rico.

- In 1991, a pre-freshman engineering program started at Turabo University and in-service teacher programs started at Metropolitan University, strengthening instruction in Puerto Rico's public schools.

- In 1993, 90 high school students attended the precollege program at Turabo University and 45 students attended the program at Metropolitan University. Twenty-three of a total of 135 participants (17%) applied to one of the science and technology programs offered by AGMUS.

#### JSU

- The Mississippi QEM Network Alliance was formed in the spring of 1991. It includes representatives from universities, precollege educational systems, business and industry, government, and community/professional organizations.

- Beginning in 1990, special emphasis was placed on Summer Residential Science Academies, a precollege initiative of the School of Science and Technology. This program includes follow-up during the academic year. Since 1990, the program has supported approximately 175 middle school and high school participants, 12 counselors, and 16 instructors.

- The Parent Advisory Group was formed in the summer of 1992 to support the precollege program.

- The School of Science and Technology received \$4 million from the National Science Foundation for a "Comprehensive Regional Center for Minorities Program" to increase the number of Mississippi minority students studying math and science in middle/high school and those choosing to major in math and science in college. The funding period is from September 1, 1993 to August 31, 1998.

## FACULTY DEVELOPMENT

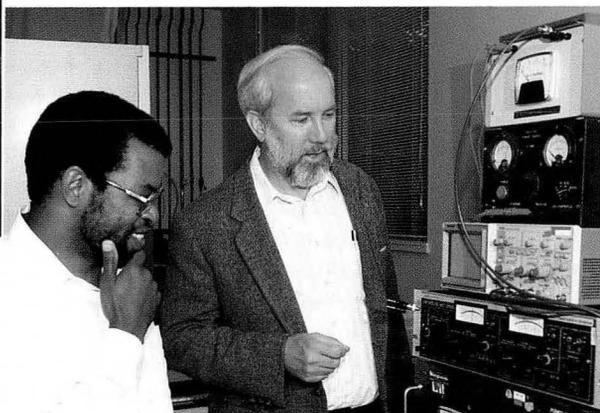


*JSU physics professor Floyd James (left) and Paul Berdahl of LBL's Energy & Environment Division collaborated on research exploring narrow band-gap semiconductor materials.*

### OBJECTIVE

To increase faculty capability for research and teaching.  
To create peer relationships among researchers at LBL, AGMUS, and JSU.

*JSU microbiology professor Wen-Hsun Yang was a key participant in the Bioremediation Education, Science and Technology (BEST) Program with scientists from LBL and the University of California, Berkeley.*



## ACCOMPLISHMENTS

In 1983, JSU had minimal faculty-development programs for its School of Science and Technology, and few JSU faculty had been to DOE national laboratories. Of the 36 AGMUS science faculty members, 1 had a doctoral degree, 30 had master's degrees, and 5 held bachelor's degrees. No faculty members at AGMUS and few at JSU had peer-reviewed publications in the fields of energy, environment, mathematics, and computer sciences. In 1993, several of the AGMUS faculty have doctoral degrees and are actively involved in collaborative research. JSU faculty members are obtaining competitive research grants, annually publishing peer-reviewed papers, and attending conferences and workshops.

### AGMUS

- Today 15 science faculty members hold Ph.D.s, 5 are doctoral candidates, 24 hold master's degrees, and 2 hold B.S. degrees.
- 45 faculty members participated in approximately 60 professional conferences and workshops. In 1992, one faculty member received national recognition from the American Chemical Society for his collaborative research with LBL.
- 27 faculty members have participated in summer research programs at LBL.

### JSU

- 3 faculty members received support for doctoral studies.
- 27 faculty members have participated in summer research at LBL.
- 70 faculty members participated in a total of 83 professional conferences, and 45 participated in a total of 54 workshops to strengthen teaching and research skills.

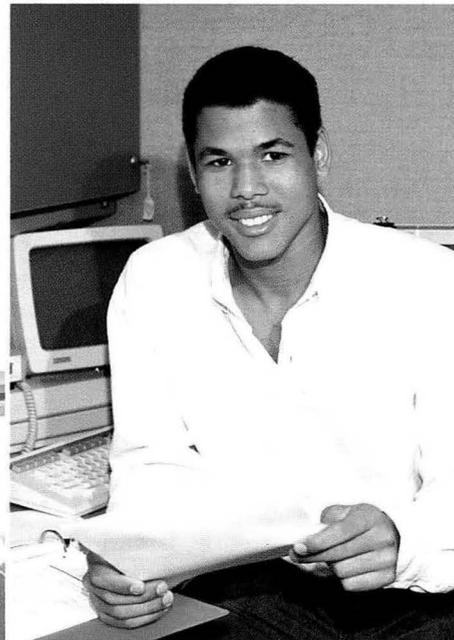
## CURRICULUM DEVELOPMENT

### OBJECTIVE

To establish curricula that will provide students with the knowledge and skills necessary for careers in science and technology.



*JSU math major Zelena Ratliff worked in LBL's Energy & Environment Division on cost-effective energy conservation for single-family homes.*



*Computer science student Zoilo Medrano-Durán from Metropolitan University gained valuable experience working in LBL's Information & Computing Sciences Division.*

### ACCOMPLISHMENTS

In 1983, AGMUS offered only an associate degree in the natural sciences, and JSU lacked computers and laboratory equipment to effectively support bachelor of science programs in its School of Science and Technology. By 1993, JSU and AGMUS had developed a modern curriculum in the sciences and computing sciences that includes the use of up-to-date equipment.

#### AGMUS

- University College of the East — A.S. in natural sciences, pharmacy assistance, technological radiology, medical records, and ultrasound diagnosis.
- Metropolitan University — A.S. in general science, computer science, and nursing, and B.S. in biology, computer science, general natural science, nursing, respiratory therapy, and sales and distribution of pharmaceutical and chemistry products.
- Turabo University — B.S. in biology, chemistry, applied mathematics, and applied natural science.

#### JSU

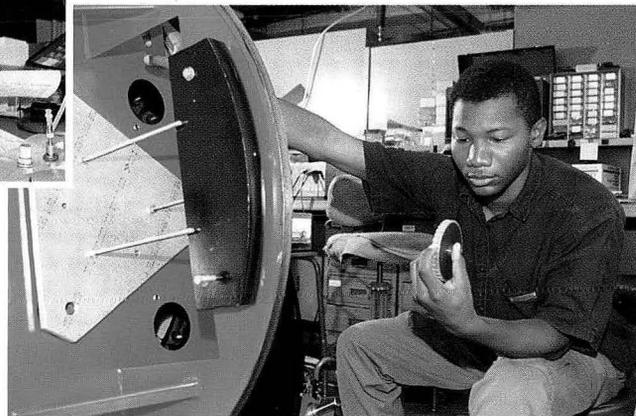
- LBL provided VAX computer terminals and computer science staff to develop and strengthen the computer science curriculum.
- Three courses were developed and included in the curriculum of the School of Science and Technology: cryptography and number theory, mathematical modeling, and biotechnology.
- A Ph.D. program in environmental science was developed and implemented.

## RESEARCH



*Susana Felix, an environmental chemistry student at Turabo University, worked in LBL's Energy & Environment Division.*

*JSU physics student Tracy Miller worked on a remote control telescope at LBL.*



### OBJECTIVE

To strengthen and expand the energy-related research capabilities of LBL, JSU, and AGMUS.

## ACCOMPLISHMENTS

In 1983, AGMUS did not have a research capability in science or computer science. JSU had little energy research and development activity and limited collaborative research. By 1993, collaborative research activities involving LBL scientists had led to nationally recognized publications, follow-on research grants from federal agencies, and opportunities for students to be involved in forefront research projects. The most successful of the projects established Bioremediation Education, Science and Technology (BEST) Centers at the three institutions and led to a Memorandum of Understanding with the School of Natural Sciences of the University of California, Berkeley, to carry out advanced research and development in this emerging field.

### AGMUS

- The El Yunque Campaign gave faculty, staff, and students research opportunities and led to the first NSF-supported collaborative research project at AGMUS. The project was initiated in 1985 and expanded by DOE in 1990.
- 25 research proposals were funded, resulting in the participation of 27 faculty members in the Summer Faculty Research Program at LBL.
- One faculty member has established an ongoing nationally ranked research project in toxic metal-organic co-contaminants. The project now involves federal agencies in addition to the DOE.
- A BEST Center has been established to address the need for environmental restoration and waste management.

### JSU

- 47 papers were published in refereed journals.
- 95 scientific presentations were made by faculty at professional meetings.
- 122 "seed fund" projects were funded.
- 7 collaborative research projects were funded.
- 37 projects received external funding for a total of \$3,284,988.
- A BEST Center has been established to address the need for environmental restoration and waste management.

## INFRASTRUCTURE

### OBJECTIVE

To manage and leverage resources to maximize the Science Consortium's impact on the mathematics, science, technology, and engineering student pipeline.



Faculty member William Torres (right) of Metropolitan University collaborated with John McCarthy (left) of LBL's Information & Computing Sciences Division.

### ACCOMPLISHMENTS

In 1983, JSU and AGMUS had inadequate computing and networking capability to support scientific research or science and technology education. AGMUS lacked adequate facilities for faculty and student research. Early on, LBL donated excess computers, which JSU and AGMUS have since replaced with state-of-the-art computing systems. By 1993, both institutions had local area networks, and many faculty members were using Internet.

#### AGMUS

- A three-year plan was prepared to define and broaden the focus of the Science Consortium through outreach to other institutions and partnerships.
- The Science Consortium supported consultants to assist in the design and development of AGMUS's new science building, which was inaugurated in 1990.
- Local area network and connectivity to Internet was supported by the Science Consortium.

#### JSU

- Internet connectivity was established.
- The Science Consortium worked with other JSU science and technology partnerships to establish and pay for implementation of JSU's local area network.

# THE INSTITUTIONS

## Lawrence Berkeley Laboratory



LBL is a multiprogram national laboratory managed by the University of California for the

DOE. The oldest of the nine national laboratories, LBL is the only one located next to one of the world's great universities—the University of California, Berkeley (UCB).

The Laboratory's role is to serve the nation and its scientific and educational communities through energy-related research performed in its unique facilities. LBL's role encompasses a four-part mission:

- To perform leading multidisciplinary research in the general, energy, and life sciences in a manner that ensures employee and public safety and the protection of the environment.
- To develop and operate unique national experimental facilities for use by qualified investigators.
- To educate and train future generations of scientists and engineers.
- To foster productive relationships between LBL research programs and industry.

Current programs encompass all the natural sciences as well as engineering, mathematics, and computer sciences. Basic studies of the nature of the atom and the cell, research on new treatments for cancer patients, and the development of advanced materials, instruments, facilities, and new energy sources are typical examples of LBL research.

## Jackson State University



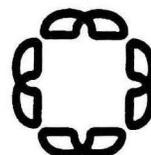
JSU is a coeducational institution founded in Mississippi in 1877 by the American Baptist Home Mission Soci-

ety. Originally established at Natchez, the university is presently located in Jackson. It is currently supported by legislative appropriations and supplemented by student fees and federal and private grants and donations. JSU's special commission to serve as the "urban university" is being pursued through programs and activities that seek solutions for urban problems. Its mission is "to develop persons who can and will assume prominent roles in the dynamics of societal growth and change."

JSU has an enrollment of about 6300 students. Programs are provided at the baccalaureate, master's, specialist in education, and doctoral levels. Through instruction, research, and service, the university endeavors to create an academic environment conducive to the free exchange of ideas through the transmission, creation, and application of knowledge. The university's major commitment is to provide quality education. In keeping with this primary thrust, the university has designated the teaching/learning process as an institutional priority.

JSU strives to provide educational activities that will prepare students to choose learning experiences; to initiate careers; and to contribute to the social, cultural, and economic development of the state, the nation, and the world.

## Ana G. Méndez University System



AGMUS is the second largest private university system in Puerto Rico. Its mission is to

expand post-secondary education opportunities for thousands of Puerto Rican youths who lack access to higher education and to attract students with high potential who, because of their academic, cultural, and economic background, would otherwise be denied a college education.

AGMUS believes that if Hispanics are to participate successfully in scientific and technical fields in significant numbers, they must receive quality education in these subjects. To achieve this goal, AGMUS administers and directs three universities—Metropolitan University, Turabo University, and the University College of the East—with a combined enrollment of over 17,000. Metropolitan University and the University College of the East, with enrollments of 5,000 and 4,500, respectively, are located in Río Piedras in the greater San Juan area. Turabo University, with 7,500 students, is in Gurabo in the interior of the island. The universities offer bachelor's degrees in a number of disciplines and master's degrees in business administration, education, and public affairs.

# THE SCIENCE CONSORTIUM'S FUTURE

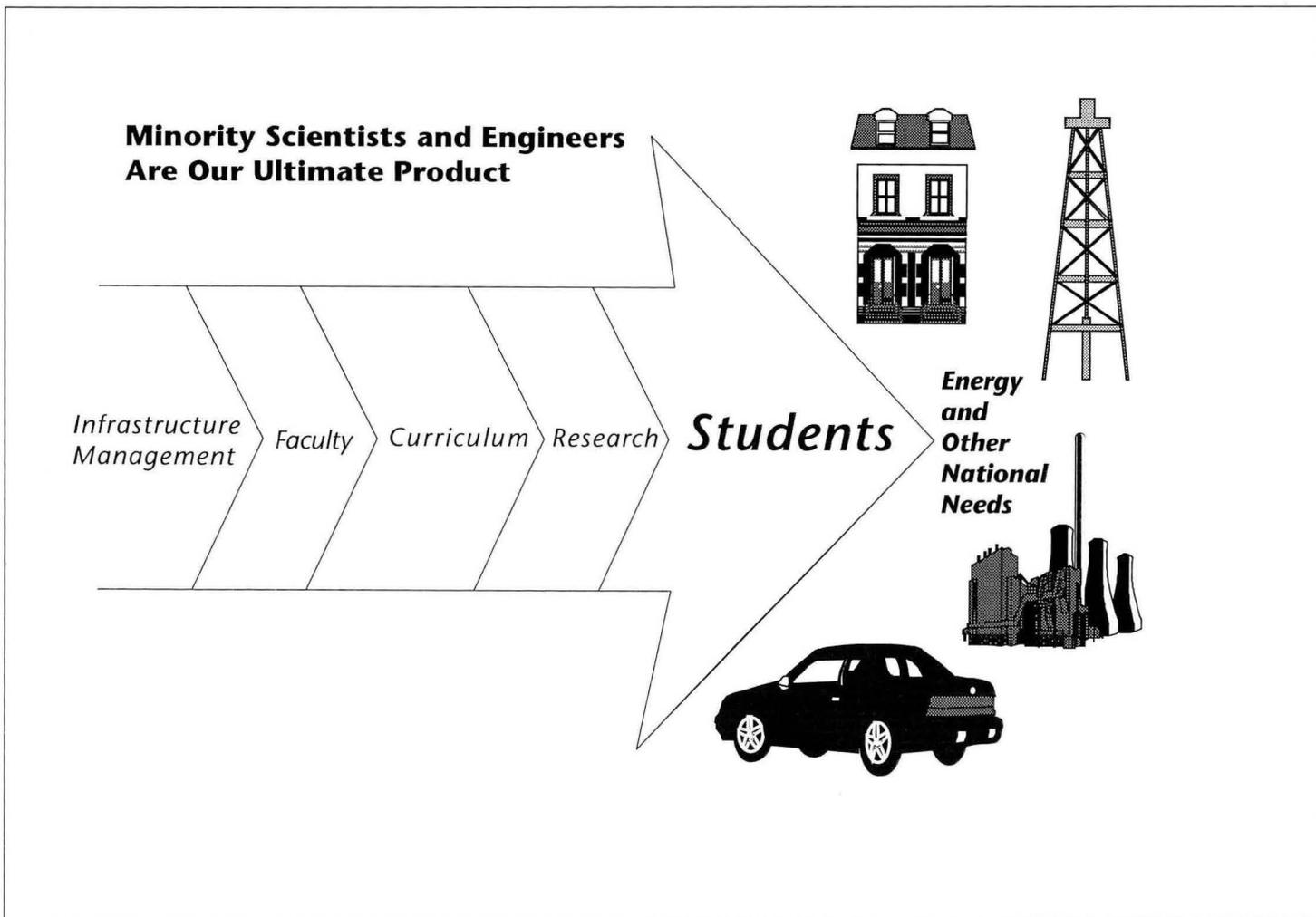
## MOVING THE MODEL FORWARD

Historically Black colleges and universities (HBCUs) and minority institutions (MIs) have had a history of developing minority undergraduate and graduate students for leadership responsibilities. Even though these institutions have produced graduates that excel in many disciplines, their numbers in the sciences and engineering have remained small.

This situation is largely due to the lack of resources for technical and science education at HBCUs and MIs. For these institutions to work without access to such resources limits opportunities for students and faculty, and results in the loss of a valuable resource for the nation. This understanding has been the driving force for strengthening Jackson State University and the Ana G. Méndez

University System through collaborations.

With a decade of experience in developing programs that have influenced the instructional and research capacities at JSU and AGMUS, the Science Consortium is ready to share its success with other HBCUs and MIs. Hence, the future of the Consortium will include the participation of other HBCUs and MIs in its programs. Our decade of experience and the knowledge gained from accomplishing our objectives



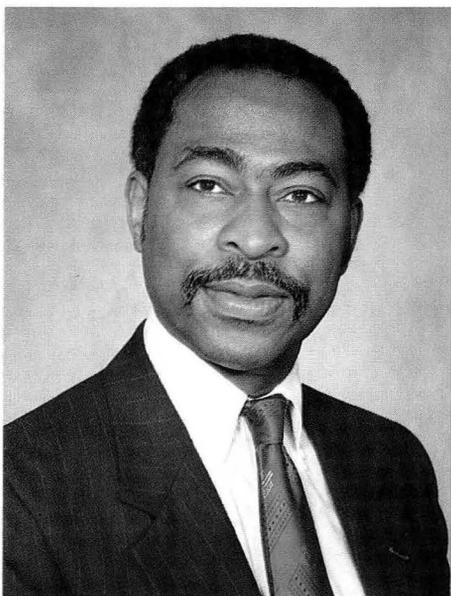


*Martha Krebs, Associate Laboratory Director of LBL's Office for Planning & Development, meets with AGMUS President José F. Méndez.*

have distinguished the Consortium as a model for the support of the nation's education mission.

This success is due largely to the Consortium's strategy of collaboration. This strategy for strengthening HBCUs and MIs has provided access to information, equipment, and scientific networks. The collaborative approach has proven that, by making these resources available to HBCUs and MIs, we can enhance opportunities for minority undergraduate and graduate students.

The Science Consortium's future will bring further opportunities for collaborations to strengthen faculty, curriculum, research, and infrastructure at other HBCUs and MIs. Our mission and objectives are designed to meet the needs of students, especially those with a desire for a career in the sciences and engineering. To this end, we see minority scientists and engineers as our ultimate product.



*James E. Lyons, Sr., President of JSU.*



*LBL Director Charles V. Shank.*

## SCIENCE CONSORTIUM FOUNDERS



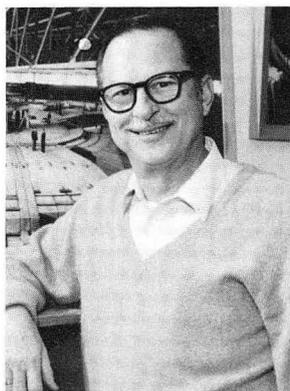
*John Peoples (left), former President of Jackson State University, and David Shirley, former LBL Director.*



*José F. Méndez, President of the Ana G. Méndez University System.*



*Harold Wilson, former head of minority student services at Lawrence Berkeley Laboratory.*



*Walter Hartsough, former Associate Laboratory Director for Engineering and Technical Services at Lawrence Berkeley Laboratory.*



*James Perkins, first Dean of Jackson State University's School of Science and Technology.*

For further information about the LBL/JSU/AGMUS Science Consortium, please contact:

Mr. Gerald R. Davis  
Executive Administrator for the  
Science Consortium  
MS 938C  
Lawrence Berkeley Laboratory  
Berkeley, CA 94720  
(510) 486-4858

Mr. Shelton Swanier  
Assistant to the Dean, Coordinator  
Jackson State University  
School of Science and Technology  
1400 J.R. Lynch Street  
Jackson, MS 39217  
(601) 968-2312

Dr. María de los Angeles Ortiz  
Vice President for Academic Affairs  
and Director of the Science  
Consortium  
Ana G. Méndez University System  
P.O. Box 21345  
Río Piedras, PR 00928  
(809) 751-0178, extension 218



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Lawrence Berkeley Laboratory  
Center for Science and Engineering Education  
University of California  
Berkeley, California 94720

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