

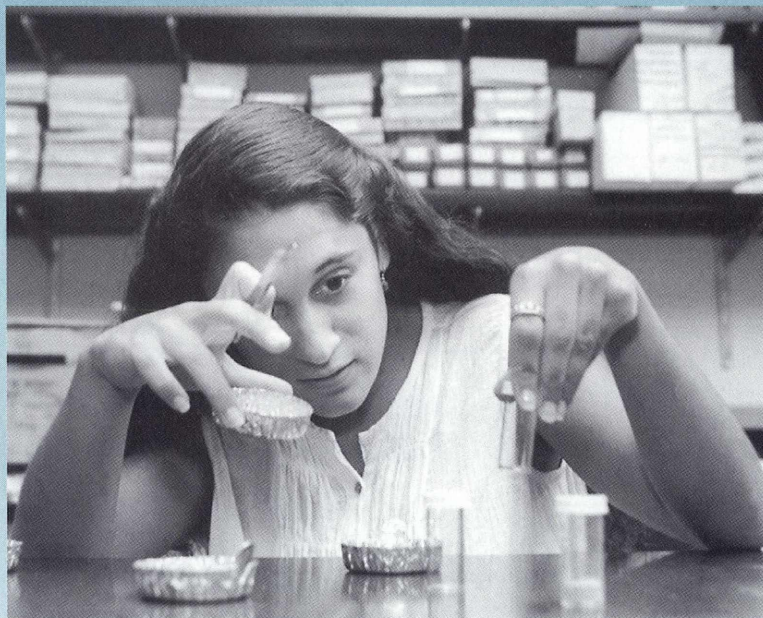


# Alliances that work

BY

Dr. William E. McHenry  
*director, Alliances for  
 Minority Participation*

**S**outh Carolina AMP student Gina Perez conducts research based on her expedition to Lake Baikal in Russia under the direction of Dr. Douglas Williams, professor of geological sciences at the University of South Carolina.



This November, the Alliances for Minority Participation program at the National Science Foundation will be 4 years old. At the end of the 1996 spring semester, students who started as first-year students in the first six AMPs in 1992 should be completing their fourth, or senior, year of study. Based on a comprehensive review of each AMP project that involves a computer-based annual reporting of degrees granted, enrollment and activity data, the AMP program is working. The first six AMPs report an average increase in science, engineering and mathematics degree production of 50 percent, which translates into an average annual increase of about 15 percent. These AMPs will double their graduation rates in five years if they maintain this degree of productivity for two more years. This is the minimum

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## Why we need AMP

The Alliances for Minority Participation program is a multidisciplinary, comprehensive undergraduate program designed to significantly increase the number of baccalaureate degrees in science, engineering and mathematics earned by individuals from minority groups that are under-represented in these areas. AMPs bring science, mathematics, engineering and technology leaders together to address barriers that prevent full participation by all citizens in SMET disciplines.

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by **Dr. Neal Lane**,  
director, National Science Foundation

In the 21st century, society increasingly will rely on science and technology to improve our nation's living standards. Our institutions of learning will face greater demands to train superior scientists and engineers and to lead the way in ensuring we have a scientifically literate citizenry that can adapt to rapid and constant changes.

As the primary funding agency in the nation's effort to improve science, mathematics, engineering and technology education, the National Science Foundation is uniquely positioned to make a major impact. A significant part of the Foundation's strategic plan includes funding programs that enhance the knowledge base and expose the scientific process to many who were previously excluded.

The Alliances for Minority Participation program is at the cornerstone of these efforts. The colleges and universities funded three years ago by AMP already are reporting an average increase of 50 percent in the number of minority students in the target disciplines—a fact of which we are very proud.

Experience has taught us that long-term investments in scientific education and research pay handsome dividends. We are certain the return to society from AMP will be far greater than the investment we have made. The program has established high expectations, a high level of accountability, and

emphasis on results, outcomes, and indicators to measure progress. With the newly established teacher preparation component, AMP program outcomes will now include production of K-12 science and mathematics teachers, researchers, university faculty, and individuals prepared to enter the science, engineering, and mathematics work force in other professional roles.

As a vehicle for enhancing the United States' intellectual capital in these areas, the AMP program continues to forge increasing numbers of partnerships with public- and private-sector institutions and will play an expanded role in linking research and education. We are very pleased with AMP's efforts to build student involvement in research and internship opportunities through the private sector.

It is through activities such as these that AMP and similar programs can ensure that our nation remains competitive internationally and that a large

portion of the population will be able to participate in the coming economy, an economy that will be driven increasingly by science and technology. Numerous reports indicate our competitors overseas are gaining ground and many appear headed toward greater prominence as developers of technology. America must continue to strengthen its own investments in the R&D enterprise, especially in human resources, if we are going to meet the increased economic challenges brought on by the high-tech developments overseas.

With the scientists trained through AMP, we are already ensuring a future where science will yield tangible results and improve the quality of life for all citizens. I believe that diversity is an asset for any society and the fields of science, engineering and mathematics are no exception. We stand firm in our efforts to continue the progress the AMP program already has made. ■

## CALCULUS reform program completes first year

by **Dr. Gilbert Casterlow Jr.**, CCRCA  
director and professor of mathematics,  
North Carolina A&T State University

The National Science Foundation, the Mathematical Association of America and Hewlett Packard combined their efforts to support a year of active involvement in nine historically black colleges and universities in the calculus reform movement.

Twenty-five university faculty members received 10 days of intensive summer training on the use of state-of-the-art graphing calculators to teach calculus as part of the Collegiate Curriculum Reform and Community Action program. Instructional follow-up activities included three days at a conference on technology in collegiate mathematics and two one-day faculty workshops each semester.

This project was designed to increase the involvement of minority-serving institutions in undergraduate calculus

reform initiatives. Specific objectives were aimed at attracting more students from groups underrepresented in the science, technology, engineering and mathematics work force to undergraduate majors in STEM disciplines by developing and implementing activities that utilize modern, effective techniques for introducing students to calculus. A unique provision of this program has been that students enrolled in the participants' courses are provided with HP48G/GX calculators for the semester at no cost. Hewlett Packard's donation of 42 sets of 30 calculators provided access for 1,260 students per semester to this graphing calculator technology.

The activities and successes of the first year of the program were highlighted at a national CCRCA conference

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NSF's Dr. Luther Williams spoke at this summer's AMP Research Conference at the University of California, Irvine.

by **Dr. Joan S. Bissell**, senior lecturer in education, University of California, Irvine

**T**he AMP program in the 21st century will address the nation's need for an increasingly large, high-quality and diverse knowledge-based work force, said Dr. Luther Williams, assistant director for Education and Human Resources at NSF, in his keynote speech at the AMP Research Conference held in July at the University of California, Irvine. Williams emphasized the importance of AMP's role and contributions in preparing students for participation in a primarily knowledge-based work force—one in which knowledge has largely replaced capital and labor as the most critical of resources.

Williams challenged AMP project directors to work with him to continue to expand the AMP program's record as a profitable investment in the nation's economic well-being.

Williams said he has emphasized excellence, equity, opportunity for all, accountability and measurement of outcomes in his administration of \$600 million in program funds. He said that in the AMP program in particular the return to society has been far greater than the investment made in the program.

Graduates of the AMP program must be competitive within the international marketplace, Williams said. The indicators of effectiveness for the AMP pro-

gram must now include qualitative measures that assess its achievement in producing graduates who have reached the levels of intellectual attainment needed within this rapidly changing work force, he said.

In examining the significance of the education programs within the National Science Foundation, Williams noted the poor performance of 13-year-olds in the United States in science and mathematics compared with the performance of students in other nations with which the United States competes economically. He said hundreds of billions of dollars are lost annually in this country as a result of graduates who are not being prepared to perform the functions that are required in the work force. Despite the fact that the nation invests more than \$540 billion annually in education, he said, only a small fraction of those funds are invested in science and mathematics education.

Among the areas of concern within the Directorate for Education and Human Resources, Williams listed the critical importance of systemic K-12

reform, of attention to diversity and of ensuring quality preparation for a knowledge-based work force. In a knowledge-based economy, he said, the separation between research and education, particularly at the university level, becomes increasingly blurred.

Williams said that as the AMP program moves forward it will be characterized by expanded partnerships with business and industry and with the research sector, more integration between research and education, an expanded focus on the development of intellectual capital, and attention to the necessary infrastructure for achieving these ends.

In the 21st century, Williams said, academia will continue to play a central role in creating and transmitting knowledge, and this role will require increased integration and better linkages between research and education. The AMP program, he said, is one that can contribute substantially to this endeavor and one that "we have every reason to be proud of, but one that has only just begun." ■

## NSF PROGRAMS train most talented from all groups

by **Dr. Roosevelt Calbert**,  
division director, Human Resource  
Development, National Science Foundation

**T**he National Science Foundation maintains its commitment to contribute significantly to the preparation of this nation's work force for the 21st century. To sustain our competitive edge in the global economy, we must train the most talented members from all groups who will make the best scientists and engineers.

Earlier efforts in broadening participation in science, mathematics, engineering and technology within the NSF's Directorate for Education and Human Resources focused on discrete enrichment activities for a subset of our student populations who were in need of a better quality of education. With the advent of several national educa-

tional initiatives, NSF decided to assume a leadership role in the arena and is now implementing a systemic reform effort that increases the educational opportunities and quality of education for all students. The aim of this effort is a well-trained work force in the SMET enterprise that is unparalleled in our nation's history.

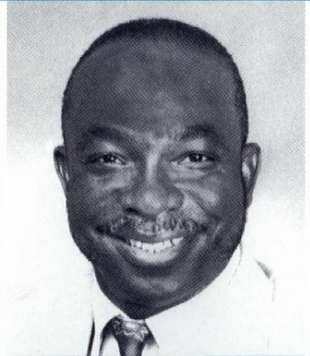
NSF emphasizes the importance of investing in our nation's future in its recently published strategic plan. This document also reaffirms NSF's realization that in a democratic society that is highly dependent on SMET, the science and engineering enterprise cannot thrive at peak levels unless it is open to

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# MENTORING

National AMP's first Outstanding Mentor award winners

inspire, motivate, encourage and challenge their students



Dr. Celestine Ntuen  
North Carolina A&T State University



Dr. Carlos Corleto  
Texas A&M University-Kingsville

Program option in industrial engineering. A mentorship program was started from the HME group, which pairs graduate students and seniors with lower-level students.

The High School Para-Research Program is another of Ntuen's projects. It brings potential engineering students from local high schools to his research laboratory during the summer.

Student Dara Strickland said Ntuen inspired her to pursue a master's degree in human factors. She described him as the "driving force" for her recent publication about pilot fatigue.

Patricia Banks said Ntuen was instrumental in alleviating her anxiety about changing her major. She said he gave her all the information she needed to make the change, which is what she expected. What she didn't expect, she said, was that he would use humor to relieve her uneasiness and would encourage her to be optimistic about the change.

"When I left his office that day I was not the same student," she said. "I was confident and for the first time felt optimistic about my upcoming transfer."

Banks said Ntuen has continued to encourage her throughout her academic career.

"Whatever my profession, I will endeavor to reach outside of its boundaries and go the extra mile," she said, "to give more of myself as does Dr. Ntuen, who teaches his students by example."

### Dr. Carlos Corleto

Dr. Carlos Corleto is an assistant professor of mechanical and industrial engineering at Texas A&M University-Kingsville. He is actively involved in the NSF-funded Foundation Coalition project, a nationwide effort that is developing an integrated curriculum for engineering education. He serves as coordinator of the first-year faculty team. He is also co-principal investigator of the STAR project at TAMUK, a NASA program that provides a research experience for high school seniors and college freshmen during the summer.

Corleto has been with the Texas AMP program since its inception in 1992. He

mentors 20-25 AMP students in addition to other mechanical and industrial engineering students. He encourages all his students to consider obtaining master's and Ph.D. degrees.

"Research is an effective way to motivate students to pursue graduate studies," Corleto said. "Undergraduate research is a great tool for letting students see the link between theory in the classroom and solutions to real problems."

Dora Arevalo, an undergraduate research assistant for Corleto, said he helped her gain confidence in her abilities by giving her advice that would lead her in the right direction rather than criticizing her work.

"He would incorporate the mistakes I made to teach me how to become more methodical in my work and therefore helped me to avoid making those mistakes again. He never gave me the feeling that, if I made a mistake, what I was doing was plainly wrong or incorrect. Instead, he would always point out the things I had accomplished. By doing this, he has increased my motivation to pursue my career as well as my research work."

Jose Hurtado, who worked with Corleto for three years before beginning graduate school in environmental engineering, said Corleto helped him get a clear view of what his goals were. Corleto also was available whenever he had a problem, Hurtado said, regardless of whether it was school-related or personal.

"He made me realize that every human being is capable of accomplishing what a person wants to be," Hurtado said. "He made a tremendous impact in my life and he has been a great inspiration in my pursuit of a graduate degree. If I ever become a professor, I want to be like Dr. Corleto." ■

**H**e made a tremendous impact in my life."

"I have been enriched by his presence at the university."

"He has been a great inspiration."

These are just a few of the ways students have described this year's National AMP Outstanding Mentor award winners: Dr. Celestine Ntuen, North Carolina AMP; and Dr. Carlos Corleto, Texas AMP.

This was the first year for this award, and the nominees were so exceptional that it was decided to honor two mentors. The award is based on how well the faculty member exemplifies the qualities of a mentor.

### Dr. Celestine Ntuen

Ntuen is a professor of industrial engineering at North Carolina A&T State University. He has been recognized as Best Freshman Adviser by the College of Engineering and by the university. He initiated the Industrial Apprenticeship in which all industrial engineering students must spend one year with local industries as student interns. In addition to his full teaching and advising load and his rigorous involvement in research activities, Ntuen has personally raised money each year to support student travel to these industries. He also works with the students in preparing projects and oral presentations based on their internship experiences. The apprenticeship program has provided local industries with more than 4,000 hours of free service per year.

Ntuen also began the Human-Machine Engineering Program five years ago to increase the pool of minority students in the Human Factors

### Congratulations to all the nominees for Outstanding Mentor:

DR. DIANE SUTER, Chicago AMP, associate professor of biology, Loyola University Chicago

DR. REGINA ARAGÓN, New Mexico AMP, assistant professor of mathematics, Eastern New Mexico University

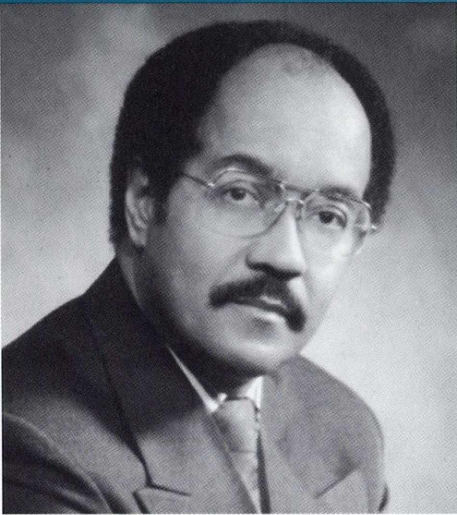
DR. JAMES FROST, New York City Alliance, professor of computer information systems, LaGuardia Community College, CUNY

DR. DOUGLAS WILLIAMS, South Carolina AMP, professor of geological sciences, University of South Carolina

DR. JORGE LOPEZ, University of Texas System AMP, associate professor of physics, University of Texas, El Paso

# SUCCESS

Two new AMP programs led by HBCUs will bring a strong history of producing minority graduates



by **William H. Gray III**, president and CEO, The College Fund/UNCF

**T**he College Fund/UNCF is very pleased to announce that two new Alliances for Minority Participation will be led by UNCF members: Xavier University of Louisiana in New Orleans and LeMoyne-Owen College in Memphis, Tenn. These are the first AMP alliances to be led by independent historically black colleges and universities, a fitting capstone to the AMP program. The Xavier-led alliance is unique in being entirely composed of private HBCUs. The LeMoyne-Owen alliance will have three independent HBCUs collaborating with three majority and three two-year colleges. Both alliances will bring much-needed support to minority SEM students in the Tennessee-Arkansas-Mississippi region.

The AMP program stands to significantly enhance its record of success by supporting alliances composed of UNCF members and other private HBCUs. Statistics and long experience have demonstrated the disproportionately large impact of UNCF colleges and universities in nurturing and graduating minority students in science and technology. UNCF's record also is impressive in getting these graduates into advanced degree programs.

While UNCF institutions enroll only 7 percent of all African Americans attending four-year colleges and universities, they account for the following percentages of degrees earned by African

Americans: 10.2 percent in computer science, 15.7 percent in the life sciences, 18 percent in mathematics and 25.9 percent in the physical sciences.

While only 3 percent of U.S. higher education institutions are HBCUs, more than a third of all African Americans graduate from HBCUs. Of all African Americans who earn Ph.D.s, 43 percent graduate from HBCUs.

Building upon this record of success, NSF's support for alliances composed of and led by UNCF colleges and universities will make the AMP program a far more representative success. UNCF appreciates NSF's initial support in holding a planning conference in the fall of 1994 to determine how to consolidate the efforts and identify the needs of its member institutions in the sciences, mathematics and engineering. This planning process produced a special report this summer on outstanding existing programs in these fields at UNCF colleges and universities.

UNCF will produce or help raise the matching funds necessary for its member colleges and universities to successfully carry out all the programs proposed by participating AMP members. An example of this is the recently announced \$20 million Merck/UNCF Science Initiative designed to increase access of African-American students to the sciences and to scientific internship opportunities at the undergraduate and graduate levels. UNCF also will broaden its efforts to obtain support to improve educational opportunities in the sciences, engineering and mathematics at all member colleges and universities to both enhance AMP activities and improve SEM offerings.

Likewise, UNCF plans to disseminate all significant results and useful applications emerging from the AMP experience to all UNCF colleges and universities offering SEM programs, whether or not they have been able to participate in the AMP program. ■

## RETENTION studies measure AMP progress

**S**tudies of retention and graduation rates at institutions within the Alabama AMP and Mississippi AMP are allowing the two programs to measure their progress in increasing the number of minority scientists, engineers and mathematicians. The results of these studies, which were conducted by Theresa Smith, director of institutional research at the University of Oklahoma, will provide a database to be used to monitor the rate of improvement in retention and graduation at institutions in the two alliances.

Dr. Louis Dale, project director for the Alabama AMP, said this information will be funneled back to each of the participating institutions, which will then determine how they can best use it. Dale said the data will allow these institutions to look at student movement and try to find ways to keep students in school, find out what the problems are, pay more attention to students drop-

ping out and the reasons they drop out, and take corrective action.

Dale said the information is especially helpful for the smaller institutions that do not have the resources to undertake such studies.

"One of the good things about AMP," Dale said, "is that it gets most institutions to look at things that they wouldn't ordinarily look at."

Dr. Richard Sullivan, project director for the Mississippi AMP, said he will use the information to gain insights into the impact of MAMP and to develop a strategy for addressing the issues raised by the study.

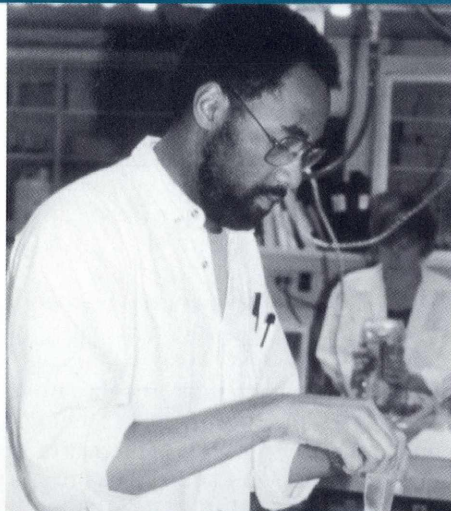
"We will use the results of the study to direct the scope and focus of our intervention efforts," he said.

Smith examined data from 1985-92 at the Alabama AMP and from 1985-91 at the Mississippi AMP and analyzed the general entering freshman popula-

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# RESEARCH

South Carolina's Dr. Michael Howell studies deep-sea sediments as part of the Ocean Drilling Program's efforts to unlock the secrets of the Earth's past



Dr. Michael Howell samples deep-sea cores for shipboard studies.

by **Dr. Michael W. Howell**, South Carolina AMP project director and research associate professor of marine science, University of South Carolina

**D**oes a career in which you get to travel to interesting parts of the world while getting paid sound appealing? I have been fortunate to do exactly that throughout my career as a geoscientist and as a recent participant on Leg 160 of the Ocean Drilling Program in the eastern Mediterranean Sea. Sponsored by the National Science Foundation and various participating countries, ODP is an international effort that seeks to understand the past 200 million years of Earth history through the study of the ocean's geological record.

From March to May of this year, I was part of an international contingent of 28 scientists who spent seven continuous weeks aboard the research vessel *JOIDES Resolution*, recovering deep-sea sediment samples from the Mediterranean. We departed from Marseille, France, and drilled 10 sites from the Strait of Sicily to as far east as Cyprus, before finishing in Naples, Italy.

As an oceanographer specializing in paleoceanography, I use deep-sea sediments to reconstruct the history of past changes in the Earth's oceans and climate systems through geological time. This information provides us with a better understanding of present-day

ocean-atmosphere dynamics and what could happen if parts of the system were altered. My research has primarily focused on the oceanic and climatic evolution of the Mediterranean, and the scientific objectives of the cruise were in line with my particular interests. The Mediterranean is interesting because, as a sea surrounded by the African and European continental margins, it allows us to study the interplay between regional and global climate dynamics.

For a program of this magnitude to be successful, it takes a wide variety of scientists from many different countries, institutions and disciplines, including geophysicists, geochemists, petrophysicists, sedimentologists and micropaleontologists. The drilling operations continue round-the-clock with each of the 115 members of the ship's crew working a 12-hour shift, seven days a week. The scientists' shifts are arranged so that there is always an expert in a particular discipline on duty.

As a shipboard micropaleontologist, I was responsible for providing age data

on the sediments we recovered. The microfossils also provided information about the environment in which the sediments formed. The information is used by the shipboard scientific party to calculate sediment accumulation rates, correlate cores from between holes at a site, and detect missing zones and/or intervals of redeposition. After finishing a site, we had to write reports and prepare for the science meetings, where as a group the scientists would discuss the preliminary results.

From the 10 different sites, we recovered more than 6 kilometers of deep-sea cores ranging in age from more than 65 million years to recent. Of particular interest were the organic-rich sediments known as sapropels. These sapropels can contain anywhere from 2 percent to 30 percent organic carbon, which is unusual because most deep-sea sediments normally contain less than 1 percent organic carbon. Understanding the origin of these sapropels was one of the major objectives of our cruise. We are particu-

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## EMPOWERMENT practices sustain diversity

by **Dr. K.F. Smith**, research section manager, Analytical Research, Rohm and Haas Co.

**S**cientific research must be fed constantly by new ideas and approaches, many of which may come from an empowered work force. Many research institutions believe that such an empowered work force is critical for success. Empowered workers are proactive and create new opportunities from their own initiatives that are consistent with the goals and objectives of the organization. Empowerment exists when each employee feels that his or her creativity is welcomed as much as that of any other member of the organization. The evidence is, that when objectives are clear and boundaries are understood, people with different styles, skills, and perspectives and with mutual respect for each other's proven capabilities can combine their

unique talents in very creative ways.

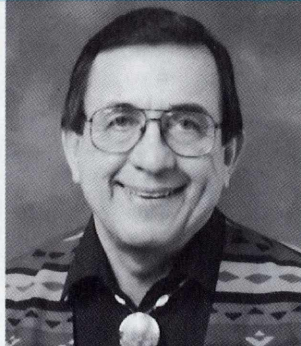
Research institutions that accept empowerment as a necessary philosophy for success should therefore have no problem accepting diversity in the workplace, since the very practices (respect for differences and the leveraging of those differences into creative activity) that are necessary to foster an empowered work force are themselves important for sustaining diversity in the workplace. In an empowered organization, skilled people of different races, sexes or national origins can work and create together.

Many science-based companies with large research arms, such as Rohm and Haas Co. and Procter and Gamble, have

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Dr. Laurel L. Wilkening  
chancellor, University of California, Irvine



Dr. Joseph McDonald  
president, Salish Kootenai College

He said that science, mathematics and engineering are areas that are very important to the development of the tribal economy and to tribal development on the reservation.

"AMP provides us an opportunity to encourage them to be involved in science," McDonald said. "It's not an impossible task. They can do it."

Although the All Nations AMP has been in operation only since January, McDonald said it has already had a significant impact on the participating institutions. A baccalaureate program in natural resources has been developed; one of the AMP staff members, who is a former student with a Ph.D. in microbiology, is serving as a role model for the students; and curriculum changes are being made, including distance learning programs in physics and calculus.

"The distance programs are taught by way of interactive television and computer," McDonald said. "Our goal is for all participating schools to be able to take advantage of this."

The California AMP is beginning its fifth year of operation and its impact on the entire University of California System is being acknowledged, Wilkening said.

"One of the most tangible reflections of that impact is that the UC regents last year recognized CAMP as one of the two most successful outreach programs in the system and awarded it half a million dollars over two years to support infrastructure for the program," she said. "That was a great vote of confidence in AMP."

Wilkening said that other institutional changes include the creation of the Center for Academic and Research Excellence and installation of a new director for programs for science undergraduates at UCLA. At her own institution, Wilkening said, the percentage of entering underrepresented minority students who select an SEM field for a major has more than doubled to 35 percent since AMP's inception.

Both Wilkening and McDonald are

trying to augment AMP funding with resources from other areas. CAMP in particular is working with the corporate sector, federal agencies and national laboratories to enhance its programs.

The AMP program will help meet some serious needs in the institutions administered by Wilkening and McDonald. In the tribal colleges, McDonald said, there is a desperate need for good science facilities, equipment, and laboratories and good science instructors to encourage students to get into science.

"We need to have these scientists work with secondary and middle school science instructors to encourage them to improve their science teaching and encourage more minorities into science," McDonald said. "It's just a whole systemic change that has to take place."

Wilkening said that producing more minority faculty will take some of the load off current minority faculty members.

"Minority faculty members are overtaxed, overburdened, and much in demand by their colleagues, administrators, and students," Wilkening said. "My concern is to try to protect all junior faculty members to ensure that they achieve tenure and become successful as faculty scientists or engineers or mathematicians. We have to be mindful of the additional obligations that are being placed on minority faculty."

"This means that having more tenured minority faculty members is a big goal for all of us. I think one of the reasons AMP is so important is that it helps fill that pipeline with students who have good educational experiences and decide this is a field they want to go into."

Wilkening said the prime motivating factor in getting students interested in SEM fields is to have them work directly with faculty members and researchers in a laboratory setting.

"There's no substitute for faculty involvement," she said, "so that young people can see themselves as fitting into a scientific or technical work environment. This also allows the students to have fun doing science or engineering. They can see that all of us who are scientists think that the field is terrifically exciting and fun." ■

**W**hen the top administrator of a college or university talks, people listen. And when that top administrator talks about the AMP program, people know that AMP is a high-priority item for that institution.

Two administrators are not only talking about AMP, they are serving as project directors for their AMP programs. Dr. Laurel L. Wilkening, chancellor of the University of California, Irvine, and Dr. Joseph McDonald, president of Salish Kootenai College in Montana, are using their positions to give AMP a prominent role at their institutions.

Wilkening said that the emphasis on California AMP at UCI is a result of its origin in the faculty and its development by both the faculty and the administration.

"I think it's a recognition of an important partnership between the faculty and the administration to make this a successful program," Wilkening said.

McDonald said the status of the All Nations AMP at his college stems from the need to encourage Native Americans to get involved in science. Salish Kootenai is a tribal college and is serving as the coordinating institution for an alliance that covers nine states and includes 24 tribal colleges and 31 state universities. McDonald said that, traditionally, Native Americans have felt that they couldn't do well in math or science, but he believes that they just haven't had the opportunity to do so.

"They haven't had the family background and family support or role models," McDonald said. "They haven't had encouragement from their schools."

# STUDENTS

## Alabama

Moncenyia L. Chatman is a senior majoring in microbiology at Auburn University. She is a Dean's Honor Roll student and a member of Alpha Lambda Delta Honor Society, Phi Eta Sigma Honor Society and Alpha Epsilon Delta Honor Society. She is also a distinguished AMP scholar. Working with mentor Dr. Asim Bej, a biologist at the University of Alabama at Birmingham, Chatman investigated the possibility of detecting the disease endocarditis using the Polymerase Chain Reaction (PCR) method. The ability to detect *Staphylococcus aureus* and *Corynebacterium jeikeium*, bacteria causing endocarditis, using the rather rapid PCR procedure could greatly benefit the scientific and medical worlds.



CHATMAN

For her research efforts, Chatman received first place in the life sciences division of the Alabama AMP Scientific Exhibit Competition. She said the AMP program has given her opportunities in learning and research that might not have been available to her otherwise.

## California

Jaime Ramos is a June graduate of the University of California, Santa Barbara. Ramos, who earned a B.S. degree in statistics and a B.A. degree in economics, entered the graduate program in economics at UC, Berkeley, this fall.



RAMOS

While at UC, Santa Barbara, Ramos received the College of Letters and Science Daniel G. Aldrich Outstanding Senior Award for scholarship and contributions to the campus community. He was an invited commencement speaker and graduated with college honors.

Ramos was the first statistics peer facilitator for the university's Achievement Program. An active participant in professional development seminars, he introduced a special session for statistics students on overcoming anxiety and developing effective study

and examination skills.

During the academic year Ramos worked as a research assistant, a teaching assistant and a tutor. He spent one summer in an internship as an insurance actuary, applying his mathematical and statistics training to the real world.

## California State University

Byron Garcia is in his second year in the AMP program. He is a sophomore at California State University, Northridge, majoring in electrical engineering. He has been able to maintain a 3.92 GPA while taking 18-unit course loads each semester. He was invited to attend the National High Magnetic Field Laboratory summer program this past summer. The program, at the University of Florida, concentrated on the development of a marginal oscillator that could be used for high-accuracy magnetic field measurements. Garcia plans to become a communication system analyst when he completes his academic work.



GARCIA

## Florida/Georgia

Luis J. Medina, a junior in electrical engineering at Florida International University, is scheduled to graduate in 1996. Medina plans to pursue a Ph.D. after receiving his bachelor's degree. He spends his time outside of the classroom involved in research and serving



MEDINA

as president of the FGAMP @ FIU Student Government Association.

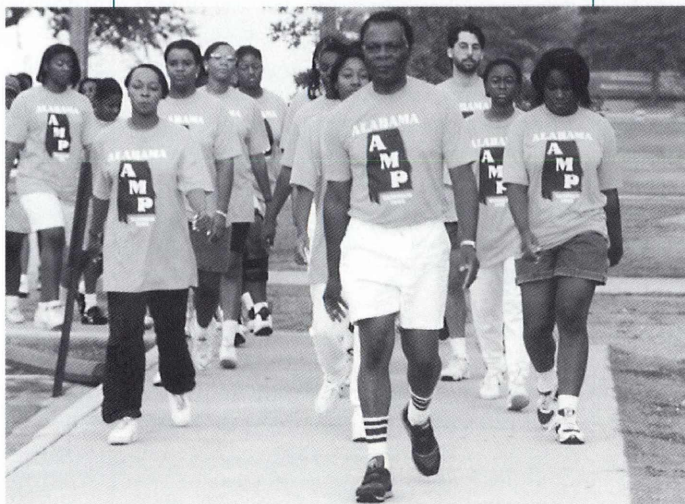
In the Solid State Devices Lab at FIU under the direction of Dr. Pierre Schmidt, Medina has analyzed the I-V characteristic diode, bipolar transistors and field effect transistors, using the semiconductor analyzer and the pulse generator from Hewlett-Packard. He also had an internship at the Microwave Remote Sensing Laboratory at the University of Massachusetts at Amherst.

As FGAMP @ FIU president, Medina has served as a role model for other students. He is instrumental in ensuring that professors attend the FGAMP social meetings to become familiar with FGAMP members and thereby provides an avenue for the students to coordinate their efforts with the appropriate research professor. His leadership ability helped students working for a better college experience to bring their efforts together in outside activities.

## Greater Newark

Seven years ago, when Sandra Caceres arrived in the United States from Colombia, she was unable to speak a word of English. Today she is an honor student in the B.S./M.S. program in civil engineering at New Jersey Institute of Technology. She will receive her bachelor's degree in December and then continue her studies at NJIT in civil engineering with a specialization in construction engineering.

Caceres decided to participate in the cooperative education program at NJIT to get some hands-on experience in construction management. She was employed by the New York State Department of Transportation as a construction inspector for repair work on the Brooklyn Bridge. She supervised iron workers, including a team of foremen and six workers who were cutting weathered vertical bridge trusses, putting in new members and



*Dr. Louis Dale, project director of the Alabama AMP, leads early morning physical fitness activities, which helped make students and faculty more alert during the summer programs held at AAMP universities.*



replacing floor beams on the concrete deck.

"It was my responsibility to ensure that the job was done to specifications, but it wasn't always easy," she said. "The workers were more than twice my age, macho and tough to the point of trying to intimidate me. One of the workers yelled, 'We'll throw you off the bridge if you bother us too much,' so I said, 'I'm your boss and you better listen if you want this job. I've had much greater challenges in my life—I won't be intimidated at all!'"

## Mississippi

James Magee, a mathematics senior at Jackson State University, expects to graduate with high honors in 1996. He is the 1995-96 president of the JSU Student Government Association. He credits MAMP with exposing him to opportunities to build leadership and research skills, and with supporting him in his efforts to expand those skills while maintaining high academic standards as a MAMP Scholar.



MAGEE

Researching the classical rudiments of mathematics during the second semester of his freshman year gave Magee an introduction to research methodology in his major discipline. It also left him with a keen desire to pursue other research opportunities, leading to summer internships at Indiana University in Bloomington (training computers to recognize letters of the alphabet) and at the U.S. Army Corps of Engineers Waterways Experiment Station in Vicksburg, Miss. (researching video teleconferencing). As a result of these experiences, he plans to pursue graduate study in engineering after graduation from Jackson State.

Along with other JSU/MAMP students, Magee assisted teachers in the National Algebra Project with their middle school students and found it a most rewarding experience. In addition, he tutors freshmen and sophomores in University College. These experiences prepared him for his selection as a bridge program counselor for the 1995 MAMP Summer Bridge Program.

## New Mexico

Carmen Sifuentes is an electrical and computer engineering major at New Mexico State University who transferred from Albuquerque Technical-Vocational Institute last spring. This summer she participated in her second internship with the Los Alamos National Laboratory. During her first summer, Sifuentes worked with research mentor Dr. William Osborne to fabricate a demodulator, a research project that she presented at NSF's Conference on Diversity



SIFUENTES

She also presented her research to LANL and New Mexico State University faculty. She said she was nervous about the amount of preparation required for all of her presentations.

"The idea of presenting a technical paper was nerve-racking because of the question and answer period after the presentation," she said. "You have to be prepared to answer technical questions from anyone in the audience. I was worried that I would be asked a question I couldn't answer. But I had a lot of help from my mentor and from workshops where I was able to prepare mock presentations and practice answering questions from people who were experienced in my field. By the time I gave my presentation, I was prepared to answer questions competently."

## New York

For years John Romo worked as an architect in city planning. When he decided to change careers and come to Borough of Manhattan Community College to study physics, he found that AMP would allow him to pursue a project that had been in his mind since the 1980s.



ROMO

When his father-in-law died of insulin shock before medical help could arrive, Romo began to dream of a compact medical rescue helicopter that could circulate swiftly in the urban environment. It would be able to fly over traffic jams, through narrow tree-lined streets, and at low altitude within city underpasses.

Romo has had a patent pending on the idea since 1985. The AMP Undergraduate Research Experience Program has provided him with the financial support, mentoring and access to computer programs that he needed to proceed with the helicopter's design.

Since the fall of 1994, Romo has met with faculty mentor Dr. Lawrence Sher to consult about applying computer-assisted calculus to the solution of engineering problems inherent in the helicopter's development. This fall he will move closer to his goal of a prototype: He intends to produce engineering graphics that depict the helicopter with great accuracy.

Romo is in his last semester at BMCC. He expects to graduate from City College in 1996 with a bachelor's degree in mechanical engineering.

## North Carolina

Chadwin D. Young is a senior in electrical engineering at the University of Texas at Austin. His research on negative differential resistance output testing was conducted at the university's Microelectronics Center. Young's research on measuring the negative differential region is attractive in the design of high-speed oscillator circuits. The research has concentrated on the development of a negative output resistance voltage source to produce a positive slope load line to measure the negative differential region.



YOUNG

Young has presented his ongoing research on the design and construction of a negative output resistance voltage source at the NSF Conference on Diversity, the Southeastern Alliance for Minority Participation Research Conference and the National Conference on Undergraduate Research.

Young acknowledges the role of educational directives such as AMP in providing future researchers and teachers the opportunity to work on cutting-edge research. He plans to reach his goal of becoming a faculty member at a research institution by earning a doctoral degree in electrical engineering.

## Oklahoma

Rachal Jackson graduated last spring with a bachelor's degree in geology from Oklahoma State University. She was a President's Distinguished Scholar and was on the Dean's Honor Roll and President's Honor Roll. She is currently pursuing a master's degree in environmental geological sciences focusing on hydrogeology risk assessment.



JACKSON

Jackson and her mentors Drs. Arthur Hounslow and Will Fotch, both in the geology department, submitted a proposal that resulted in her acceptance into the 1995 OKAMP Summer Research Internship Program at OSU. Her research is part of a larger research project designed to facilitate the transfer of innovative technology developed by the government to the private sector. Jackson assisted in the development of an algorithm for the design of a pre-processor software program that will translate environmental sampling data into a format required for input into an environmental risk assessment model.

The internship program had a tremendous impact on Jackson's outlook for a future in her discipline.

"I have been introduced to hands-on work and research that I had not experienced," she said. "The AMP program has provided me the chance to learn so much about the application of computers in investigative work."

Jackson plans to work for a public-sector environmental agency, but has not ruled out working in private industry. She wants to use her education to serve her community and later would like to be an administrator involved in maintaining the vitality and strength of science and math curricula in secondary education.

## Puerto Rico

Miguel A. Rosa is a senior mechanical engineering student at the University of Puerto Rico at Mayagüez. He is doing metallurgical area studies of aircraft body aluminum alloys. Working under the



ROSA

direction of Dr. Pranah Mazundar at the university's Fatigue and Fracture Laboratory, Rosa is responsible for the calibration and maintenance of the laboratory equipment and is in charge of training five students at the laboratory.

Rosa received first place for his poster presentation in engineering at the AMP Research Conference in California this summer. He also gave presentations on his research at the Puerto Rico Interdisciplinary Scientific Meeting in 1994 and the NSF Conference on Diversity in 1993.

Rosa plans to pursue an advanced degree after he graduates this year.

## South Carolina

Winston Wilson is a 1995 graduate of Midlands Technical College in Columbia, S.C., majoring in computer technology. At the recent AMP Research Conference in California, Wilson won first place in the oral presentation category for mathematics and computer science for his research project on artificial intelligence. This was the first time a first-place award was given to a community college student at a national AMP conference. Wilson's research was on a knowledge-based system called PC Consultant, a software program he designed using VP Expert.



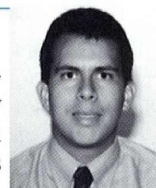
WILSON

Wilson said his participation in the AMP program has allowed him the opportunity to meet other science students and learn from their experiences. He said he also appreciates the opportunities to make presentations and engage in the scientific research the SCAMP programs have offered him.

Wilson plans to earn his four-year degree at the University of South Carolina and continue his AMP activities.

## Southern Rocky Mountain

Juan M. Esguerra graduated from the University of Colorado at Boulder in May with a bachelor's degree in aerospace engineering. Esguerra had the opportunity to participate in several projects sponsored by CIMD, working with



ESGUERRA

professor George W. Morgenthaler, during his junior and senior years.

In the spring of 1994, Esguerra studied the validity of a rule-of-thumb toxic mixture equation for the Center for Environmental Health/NASA Specialized Center of Research and Training. His results were presented at the annual NSCORT meeting in Rochester, N.Y.

In the summer of 1994, Esguerra worked on a study of the wake of the Concorde for a NASA/Howard University/University of Colorado joint project that is measuring the pollution of supersonic aircraft in the upper atmosphere.

"Working on these projects with Dr. Morgenthaler has developed my leadership, communication and group work skills, which are very important in order to be successful in industry today," Esguerra said. "These projects gave me the opportunity to interact with people in the industry. Also, presenting my results in Rochester was a great experience because I got the chance to talk in front of several NASA officials and experience the pressure of making an important presentation."

Esguerra is currently seeking a position in the design or testing of aerospace vehicles. His work with CIMD also has interested him in pursuing a master's degree in aerospace engineering in the near future.

## Texas

Blanca Velazquez is a senior civil engineering student at Texas A&M University with a 3.91 overall GPA and a 4.00 GPA in her major. She is a member of Tau Beta Pi National Engineering Honor Society, Chi Epsilon Civil Engineering Honor Society and Phi Eta Sigma Honor Society. She has received the C. Greer Civil Engineering Scholarship, a Study Abroad Fellowship and the Texas A&M Presidential Achievement Award. She also has been on the Dean's Honor List.

Velazquez has participated in research sponsored by NSF, the Offshore Technology Research Center and Texas Engineering Experiment Station. She presented her research to Texas State



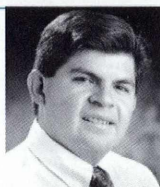
VELAZQUEZ

Representative Steve Ogden in Austin.

She is a teaching assistant for academic workshops sponsored in part by AMP. She also is involved in the Society of Mexican-American Engineers and Scientists, the American Society of Civil Engineers and other student organizations.

### University of Texas System

Richard Coronado is a senior electrical engineering major at the University of Texas, El Paso. He recently presented his research on gravity wave detection in space tracking data at the AMP Research Conference in California. He was awarded first in oral presentation. He also will present his research at the NSF Conference on Diversity this fall.



CORONADO

The scope of this project entailed the study of tracking data through the use of spectral analysis to detect the presence of a gravitational wave in an altered electromagnetic signal.

Prior to participating in AMP, Coronado was involved in co-op programs with the Automation and Robotics Division and the Systems Engineering Division of the Johnson Space Center. He also completed an internship in support of air control systems testing for Delco Electronics.

Coronado said the AMP program was unique and valuable in its mentoring experience.

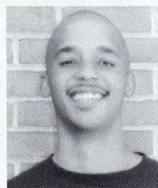
"Being under the wing of professor Jorge Lopez provided a chance to fit all of the pieces of the educational puzzle together," Coronado said. "It is one thing to learn equations and techniques from a book or classroom, but to use them in proper application to solve real life problems provides education cohesion; it completes the circle."

Coronado said he also benefited from the close research partnership.

"Working with Dr. Lopez really brought life to the idea that I could achieve so much more. I, too, can do this," Coronado said. "Seeing, talking and learning with a visible role model who has cultural similarities gave me confidence and a reason to create loftier expectations for myself."

### Washington-Baltimore-Hampton Roads

Quintence Mays has participated in the AMP Summer Institute and Research Traineeship in Terrestrial and Extraterrestrial Atmospheres for the last two summers and continued his research during the school year under the direction of professor Peter Hambright in the chemistry department. The focus of Mays' research has been to investigate possible chemical candidates for the diffuse interstellar bands. These are discrete spectral lines that arise from interstellar dust. The chemical composition of interstellar dust is currently unknown. However, absorption spectra of interstellar dust



MAYS

are available from astronomical observations and consequently there has been much speculation as to the size and complexity of the molecules or ions responsible for the visual extinction of radiation from distant stars. For the past year, Mays has been involved in the synthesis of several porphyrins that have been proposed as likely constituents of interstellar dust.

"The AMP SIRTTEA program gave me many valuable new experiences in inorganic chemistry research," Mays said. "Among these experiences, I gained insights on how to conduct research and present data and conclusions from this research. Presenting our special projects helped build my confidence as far as presenting data in front of my peers." ■

## 1994 NSF CONFERENCE ON DIVERSITY Student Research Awards

### PRECOLLEGE STUDENT AWARDS

*sponsored by National Science Teachers Association*

#### **Terrence R. Ruffin**

Freshman, Laney High School, North Carolina

#### **Liza Gabriella Ruvalcaba**

Sophomore, Socorro High School, Texas

#### **Roosevelt R. Love**

Senior, Beaumont High School, Missouri

#### **Felicia Nicole Colon-Barnes**

Freshman, Holy Name Academy, Washington

### UNDERGRADUATE STUDENT RESEARCH AWARDS

*sponsored by Phi Beta Kappa*

#### **Monica Renee Page**

Senior, Tennessee State University

#### **Gisela Rodriguez Rosado**

Senior, University of Puerto Rico

### GRADUATE STUDENT RESEARCH AWARDS

*sponsored by Council of Graduate Schools*

#### **Thomas Tenoio**

Ph.D. student, New Mexico State University

#### **Nathaniel A. Whitmal III**

Ph.D. student, Northwestern University

## National Science Foundation

Dr. Luther S. Williams, assistant director,  
Education and Human Resources

Dr. Roosevelt Calbert, division director,  
Human Resource Development

Dr. William McHenry, director,  
Alliance for Minority Participation  
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Chicago State University  
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## University of Texas System - 23

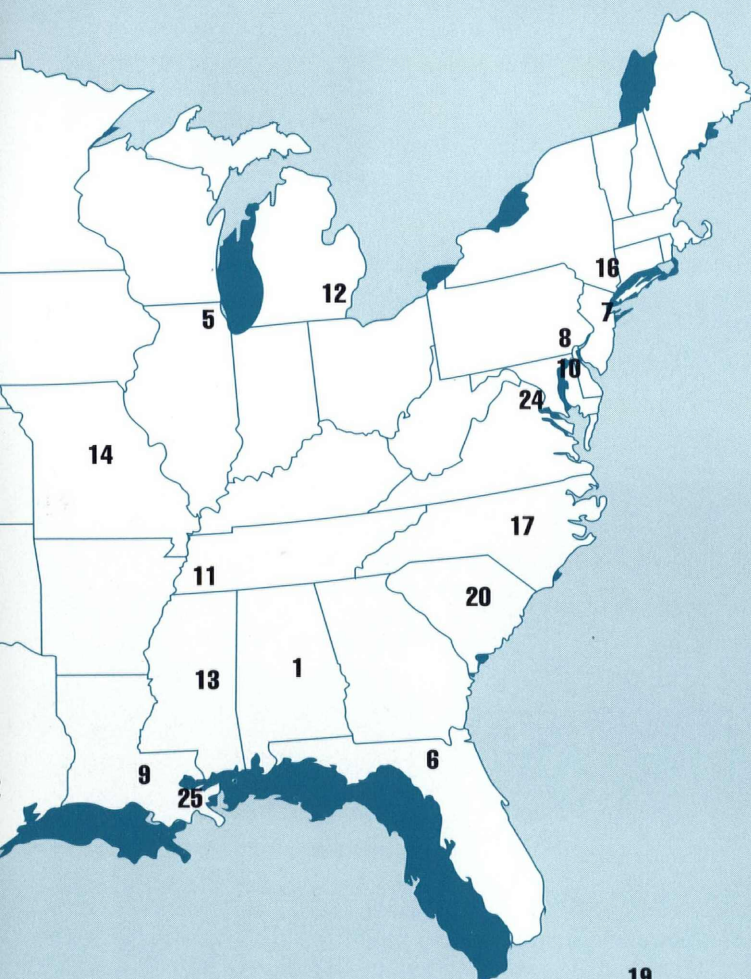
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# BRIEFS

Five new projects have been added to the AMP program, bringing the total number to 25. The new projects are the Louisiana AMP (Southern University), Maryland AMP (University of Maryland, Baltimore County), Memphis AMP (LeMoyne-Owen College), Missouri AMP (University of Missouri-Columbia), and Xavier/UNCF AMP (Xavier University of Louisiana). Congratulations to these newest alliances.

Two new project directors have assumed the leadership of AMP programs this year. Dr. Karan L. Watson, assistant dean of engineering at Texas A&M University, is the project director for the Texas AMP. She replaces Dr. Ana Guzmán, who resigned in January to accept a position with Austin Community College. Dr. Neville A. Parker, Herbert G. Kayser Professor of Civil Engineering at City College and director of the City University of New York Institute for Transportation Systems, is leading the New York City Alliance as project director. He succeeds Dean Fitzgerald B. Bramwell of Brooklyn College who has been appointed vice president for graduate studies and research at the University of Kentucky.

Dr. Carl A. Erdman, former project director of the Texas AMP, died on June 12. Erdman was director of academic development for the engineering program at Texas A&M University. Prior to that he had held several positions during his 14 years at Texas A&M, including department head of nuclear engineering, associate dean of engineering and executive associate dean of engineering. Erdman also had worked with the University of Virginia, Brookhaven National Laboratory, the U.S. Nuclear Regulatory Commission, Los Alamos National Laboratory and NASA's Johnson Space Center.

The full House Appropriations Committee approved the fiscal year 1996 budget numbers for the National Science Foundation that were recommended by the VA, HUD and Independent Agencies Appropriations Subcommittee. The NSF budget declines from current year funding of \$3.26 billion to

\$3.16 billion for fiscal year 1996. The committee report accompanying this legislation noted the following concerning Education and Human Resources:

"For fiscal year 1996, the Committee has provided the President's request of \$599 million. This level is \$6.94 million below the fiscal year 1995 appropriation. Given the resource constraints facing the Foundation, the Committee believes that the Foundation support for math and science education should be provided strictly on the basis of merit to institutions of higher education, independent museums, professional societies and associations, state and local education entities, and other similar eligible organizations that are primarily associated with educational activities."

Elsewhere the report stated:

"Further, ... the Committee recognizes the significant accomplishments of the Alliances for Minority Participation in Science and the Advanced Technology Education programs. The Committee urges the Foundation to give the highest priority attention to these two very important activities."

— *The American Institute of Physics Bulletin of Science Policy News*

California AMP students at UCLA who are in the Center for Academic and Research Excellence (CARE) program showed just how much they care by participating in the UCLA Mardi Gras, a large carnival put on by students to benefit Unicamp, a camp for underprivileged children who are mostly minorities from the inner city. The CARE students sponsored, designed and constructed a milk can toss booth for the May event. The students' efforts won them awards for best facade and best overall booth.

"This is especially exciting," said Diane Crabtree, assistant coordinator for CAMP at UCLA, "because our students wanted to feel like they weren't always on the receiving end, and this was a chance to give something back to other kids."

The 1995 AMP Research Conference was held in July at the University of California, Irvine. Sixty-six students representing 16 AMP programs from around

the nation presented the research work they have performed with faculty mentors from more than 50 institutions. Students, faculty and AMP administrators discussed solutions to problems encountered by minority SEM students. The conference also gave students an opportunity to interact with faculty and with their peers. Proceedings from the conference will be available in September at the NSF Conference on Diversity or by mail request through the CAMP office, 600 Administration; University of California, Irvine; Irvine, Calif.; 92717-1023.

Dr. Joan S. Bissell, a University of California, Irvine, faculty member, and Dr. James Ashurst, a principal consultant with Research Support Services, are working together on a feasibility study for science and mathematics teacher preparation within the AMP program. Bissell, who was one of the architects of the California AMP, specializes in new teacher preparation and program evaluation. Ashurst is an experienced statistical analyst whose expertise is in the creation and analysis of large-scale data sets.

Bissell and Ashurst also are co-directing the preparation of a study that reviews the first three years of the AMP program. They will be contacting the project directors of each of the 15 alliances that have been funded for at least 12 months to clarify information previously submitted in annual reports.

Dr. Marilyn Moriarty has written "The Conceptual Handbook to Scientific Writing: Critical Thinking Through Writing," which will be available this fall. The book evolved from Moriarty's experience directing the writing component for the 1992 California AMP academy at the University of California, Irvine, and was in direct response to the writing needs of the CAMP program.

Moriarty, who earned her Ph.D. at UCI, teaches English at Hillins College in Roanoke, Va.

Copies of this book can be obtained from Jones and Bartlett Publishers Inc., Portola Valley, Calif., 94208-7737; telephone (415) 851-0182. AMPs that order the book in quantity may qualify for a discount off the list price of \$20. ■

# AMP PROGRAM REPORTS

## Alabama

The Alabama AMP sponsored a forum on Attracting Minorities to Teaching Mathematics and Science, which was designed to discuss the problem of underrepresentation of minorities in the mathematics and science teaching professions and recommend strategies for bringing more minorities to these areas, including action items for NSF and the AMP institutions. The forum was attended by more than 50 participants from nine alliances.

Alabama AMP conducted three summer programs during 1995. These included an internship program; a bridge program held at Alabama A&M University, Alabama State University, and the University of Alabama at Birmingham; and a Science Teacher Cadet Program held at Alabama A&M University and the University of Alabama at Birmingham. All programs included morning physical fitness activities at 6 a.m. These activities were designed to relieve stress and make students more alert during their classes and research experiences. All program faculty and staff at each of the program sites participated along with the students in these activities.

## All Nations

The goal of the All Nations AMP is to attract more Native-American students to majors in science, mathematics, engineering and technology. The alliance develops programs based on the unique Native-American culture of the various tribal nations within a nine-state area, including Montana, Nebraska, North Dakota, South Dakota, Minnesota, Kansas, Wisconsin, Washington and Michigan.

Nebraska Indian Community College's summer precollege program maintained cultural sensitivity in teaching in the areas of science. The program incorporated perspectives from educational psychology on Native-American learning styles. For example, the Native-American Star Knowledge course at NICC utilized modern astronomy and traditional regional American Indian constellations as seen and studied by

the Omaha Tribe, the Pawnee Tribe and the Lakota/Dakota Tribes.

Stone Child College science and math faculty developed an Ecological Institute focused on research on physical and biological phenomena on the Rocky Boy Indian Reservation. Institute participants are collecting baseline data for water quality, ecological succession, impact on land use, siltation, erosion, and wildlife and population assessment, because little or no data has ever been collected.

Fort Berthold's Community College Research for Results Project is designed to expand and supplement ongoing student research to plan, design, conduct and evaluate the results of research projects that have been requested by local health-care entities and natural resource agencies of the three affiliated tribes.

## California

The California AMP strengthened existing programs that provide academic support and faculty mentoring, including undergraduate research, faculty and peer mentorship, training in a state-of-the-art computer laboratory, career awareness, and opportunities to attend professional conferences. Corporate partnerships formed within each of the four regions provided for student placement in research and development.

UC Irvine offered the CAMP-NSF Summer Science Academy for UCI freshmen majoring in engineering, mathematics, biological and physical sciences, and computer science. Eighty students engaged in an intense and challenging curriculum with a strong experimental focus during the five-week residential program. The Transfer Academy, a three-week residential program, was offered to meet the needs of transferring community college students. The American Indian Computer Science Institute offered participants academic and corporate experience during the eight-week residential program, including mentoring from computer engineering, software, hardware and research professionals.

Through the Center for Academic and Research Excellence, UCLA provided students with laboratory research

experience that focused on group study, individual research and faculty mentoring. The MS<sup>2</sup> program provided cooperative learning through EXCEL workshops led by advanced graduate students to prepare students for calculus.

UC Davis engaged more than 45 students in its Summer Undergraduate Research Achievement Program and Mentorships for Undergraduate Researchers in Agriculture, Letters and Science. MURALS motivated students toward graduation and toward careers in academia. Minority Opportunities for Research in Engineering exposed students to practical engineering applications and prepared them for admission to graduate school.

At UC Santa Cruz, a faculty-guided research experience emphasized writing, research and computer experience as well as time management and study skills. Students explored career opportunities and were encouraged to develop a sense of community and mutual support.

Faculty participated in a faculty lecture series and provided mentoring as well as reviewed and implemented curricular reform in science and math-based lower-division courses. Faculty participating in the American Indian Computer Science Institute received cultural sensitivity training.

The effort to create a statewide CAMP alliance brought together representatives from each segment of post-secondary education as well as from communities and private organizations. Faculty symposia were held and are being expanded among more institutions.

Agreements were entered into with numerous partners in the private sector, one state institution, several foundations and others. Combined cash and in-kind contributions totaled nearly \$2 million. Additional contributions were made for student and faculty travel, provision of speakers and conference facilities.

## California State University

The California State University AMP has just completed its second summer and its first full academic year of operation. Freshman summer workshops had an enrollment of 680 students, while

the summer program for sophomores enrolled 530. This is an increase in the freshman program from the summer of 1994. The total for sophomore and freshman enrollment exceeds the program's original proposal total by more than 100 students.

Academic-year enrollment for minority freshmen grew even faster, jumping from 1,400 in the fall of 1993 to more than 1,600 in the fall of 1994. Community college transfers also showed a significant increase in fall enrollment.

## Chicago

Five of the Chicago AMP partners offered summer bridge programs for incoming underrepresented minority freshmen. Students attended classes in mathematics, chemistry, physics, and biology with labs, computer science, communication skills, study skills, and career planning.

Assessment of students' basic skills were conducted to identify the students' strengths and weaknesses so that special attention could be given to those areas requiring further development. Assessments conducted at the end of the summer session indicated that students were substantially better prepared for their academic classes in the fall. This was especially true of their analytical and quantitative skills. Students wrote more accurately, clearly and persuasively upon completion of the communication skills class. Also, oral skills were improved and test-taking anxieties were reduced.

The bridge programs also introduced the students to the campus, where they became familiar with the facilities and services. Those campuses that provided a residential component as part of the bridge program selected former summer program participants or other upper-class SMET students to serve as tutor-counselors in the living units.

Cooperative learning activities were designed for intra-campus and inter-campus student interaction. Students cooperatively developed research projects and presentations and designed and constructed a Chicago AMP Bridge logo.

## Florida/Georgia

The Florida/Georgia AMP held its first career EXPO hosted by Bethune-Cookman College in Daytona Beach. The EXPO helped identify highly capable students with career interests in SEM areas for summer internships. This event gave representatives from major research universities, government laboratories and science-based corporations an opportunity to meet with and interview more than 300 upper-level SEM students for summer internships and cooperative work experiences. The EXPO provided a forum through which students could interact with representatives from agencies and graduate programs and enhance their familiarity with the GRE standardized test techniques and multimedia authoring. This event also gave FGAMP students an opportunity to interact and exchange ideas with one another.

More than 130 FGAMP participants secured internships in 30 states and Germany for this past summer, gaining valuable technical knowledge as well as professional and social skills. Each institution that supports FGAMP scholars will host a poster session featuring the students' research experiences. Three FGAMP participants will present findings on their summer and academic-year research at the 1995 NSF Conference on Diversity.

Mentors play a significant role in facilitating interest and persistence in SEM careers. Dr. Ronald Bell, who received his Ph.D. from the University of South Florida this year, served as a mentor to undergraduates on his campus as well as to junior high school students. Bell, with 10 other African-American graduate students, formed DIMENSIONS, an organization that focuses on students at the junior high level. The group acts as positive role models, developing personal bonds with the students while mentoring and teaching math and science through game activities that are both motivational and educational.

The DOE Office of Science Education and Technical Information, in conjunction with the Science and Energy Research Semester, provided

research opportunities for two FGAMP undergraduate students from Florida International University during the 1993 spring semester. Jorge Rico and Cairo Vanegas spent the semester at Los Alamos National Laboratory and Argonne National Laboratory, respectively, using the co-op approach to further their interest in the sciences. Through the SERS program, students have opportunities to conduct research with scientific teams during the academic year at any of seven DOE laboratories.

For the second year, FGAMP held a symposium at the annual Florida Academy of Sciences Meeting. This collaboration is expected to pay high dividends in enhancing the education of future scientists, engineers and mathematicians.

The partnership approach promoted by FGAMP has already heightened interest in SEM areas as evidenced by an increase in the number of majors matriculating at participating institutions.

## Greater Newark

The Greater Newark AMP was established in 1994 through a five-year cooperative agreement funded by NSF. It is a comprehensive program providing minority students a receptive learning environment and extensive support services. The services include mentoring and tutoring programs; undergraduate research experience; academic and financial support; guaranteed no-cost tuition to qualified students; a minority scholars program; diversity training for all students, faculty, and staff in the program; a student tracking system to catalog progress; and a newsletter for the dissemination of information.

GNAMP is an alliance of 11 New Jersey colleges and universities. It is a partnership between the institutions of higher education and industry, science centers, school boards, and the scientific, civic and governmental communities.

By 2000, GNAMP plans to double the number of minority students successfully completing undergraduate degrees in SEM fields and entering either professional careers or graduate school.



## Greater Philadelphia Region

The first Greater Philadelphia Region AMP Research Symposium and Open House was held in April and attracted representatives from AMP institutions, industry, and professional organizations, as well as 23 high school and undergraduate students.

The students showcased their research projects and competed for cash prizes in two separate divisions. Two high school seniors and seven Greater Philadelphia Region AMP undergraduate students received AMP Excellence Awards of \$250 for their research projects in the areas of biology, biochemistry, chemistry, engineering and physics. Three of the top undergraduate student winners were selected to present their research at the National Science Foundation Conference on Diversity in Washington, D.C., in September.

Representatives of the Greater Philadelphia Region AMP program were available to talk to students and parents about admissions, financial aid and academic programs. The symposium also included panel discussions on how to apply to college, college survival and the graduate school experience. Congressman Chaka Fattah gave the keynote address on the importance of education. Dr. Kenneth Smith, research section manager of Rohm and Haas Co., spoke about the value of a technical education and the opportunities it creates in the industrial environment.

Other businesses, organizations and agencies represented at the symposium were the U.S. Department of Agriculture, MFS Trans Tech, the National Action Council for Minorities in Engineering, the National Organization for the Advancement of Black Chemists and Chemical Engineers, GEM Inc., and INROADS.

## Metropolitan Detroit

At Wayne State University, one of the Metropolitan Detroit AMP institutions, the Chris Webber/Science Training Apprenticeship Research Student program has been funded by

the chemistry department, AMP and a major gift from National Basketball Association star Chris Webber of the Washington Bullets. Designed to link minority undergraduate students in the Wayne State chemistry department with high school students interested in science careers, the program provides lectures, workshops for parents, reference materials and assistance in the development of science projects.

The WSU mathematics department has been awarded funds from AMP to expand the Emerging Scholars Program, a collaborative learning approach to math instruction through beginning calculus. During the winter 1995 semester, 134 students were served by the program.

A scholarship program has been initiated for SEM minority students at WSU, with awards for 1995-96 being made this summer. In addition, the director of admissions has agreed to provide Presidential Scholarships to both freshmen and transfer minority SEM students who meet the criteria for the Presidential Scholarship program.

Lawrence Technological University is using alumni and corporate members as role models for AMP students. These role models are being used in small group activities such as one-on-one lunches, small interest groups and groups exploring research/internship opportunities.

The LTU NSF coordinator is planning a fall symposium for the MDAMP to be held Oct. 7 at Wayne State University.

The University of Detroit Mercy hosted a career panel last spring to allow engineering and science alumni to share their professional and academic experiences since graduation. Alumni from several engineering and science disciplines attended and fielded the students' questions.

The UDM College of Engineering and Science has initiated the Detroit Technology Awareness Program for local high schools. A manufacturing-robotics-CNC machine system is sent to schools for one month for teachers to use with their students. The machine exposes high school students to applications of engineering, science, and math and encourages them to consider

these as fields of study in college. AMP students will be trained on the machine's computer-integrated manufacturing capabilities and will work with the teachers and students, instructing them in manufacturing novelty key chains. The UDM students will gain exposure to technology, increase their understanding of systems integration and computer-integrated manufacturing, and improve their public-speaking skills.

## Mississippi

Mississippi's eight public universities, which compose the Mississippi AMP, are steadily increasing the number and rate of minority students who earn undergraduate degrees in science, mathematics, engineering and technology. Starting with a baseline of 243 degrees annually, Mississippi universities are producing SMET graduates at a rate consistent with exceeding the goal of 543 degrees annually by 1996.

Improving student performance and retention was the major focus of MAMP during the past year. At the annual fall retreat for MAMP leadership, site coordinators from each campus reflected on specific aspects of their programs that affect performance and retention.

MAMP students throughout the state have participated in workshops designed to teach them how to earn a "Guaranteed 4.0." Led by Donna O. Johnson, a chemical engineer at Amoco Corp. who is presently on loan to the National Society of Black Engineers, the workshops present proven techniques Johnson developed during her undergraduate years. Essential elements of the program include very intentional planning for and practice of time and stress management.

Summer bridge programs on all eight campuses were another major component of the MAMP strategy to improve student performance and retention. At Mississippi State University, students spent one of the four weeks of the program shadowing a researcher in their chosen disciplines. At Delta State University, students built community and learned to think like a scientist during a trip to a university research setting

out of state. Students at Jackson State University and Alcorn State University participated in a strong life skills component designed to enhance their personal growth and development and to instill the social skills (such as communication, decision-making and conflict management) critical to successful interaction in society. Intensive academic experiences on these and the other MAMP campuses (Mississippi Valley State University, Mississippi University for Women, University of Mississippi and University of Southern Mississippi) gave students a real awareness of the rigorous pace and content to expect in college courses. Summer bridge students have become the MAMP student leaders and as such extend even further the influence and effectiveness of the bridge experience.

## New Mexico

The New Mexico AMP is working to increase the number of minorities earning baccalaureate degrees in science, engineering and mathematics from the current number of more than 300 per year to more than 700 in 1998 and more than 1,800 in 2003. The program is also striving toward increasing the number of graduate degrees awarded in these fields to minorities from the current 65 per year to more than 100 per year in 1998.

During its first year of operation, the New Mexico AMP has achieved a 30-percent increase in the number of B.S. degrees awarded in SEM fields to minorities in New Mexico institutions. While these students were already in the pipeline, New Mexico AMP assistance enabled many students with financial hardships to complete their degrees.

Native-American graduates from New Mexico AMP universities represent 3 percent of all SEM graduates compared with a national average of 0.4 percent. Hispanic graduates represent 28 percent of all SEM graduates compared with a national average of 4 percent.

Summer bridge programs to help students deal with difficult academic subjects attracted 107 New Mexico students at eight institutions in 1994.

Twenty degree plans/transfer guides to aid students by providing them with a streamlined transfer plan have been completed for four-year universities and two-year colleges. Ten additional guides are currently pending.

Eight institutions enrolled 45 students using distance learning with videotapes to expand course offerings.

Summer internships were offered to seven students in 1994 by Los Alamos National Laboratory, Colorado State University and the University of Arizona. Los Alamos National Laboratory expanded its support for 1995.

Retention components included scholarships and stipends (22 percent of partners), tutoring (13 percent of partners) and mentoring (11 percent of partners).

Equipment upgrades for chemistry, physics, biology and mathematics laboratories were made at seven of the partner institutions.

## New York

Data gathered for the New York City Alliance's second year show a 22-percent increase in enrollment in SEM programs for underrepresented minorities over the 1992 baseline data. While the alliance targets minority students, the changes it brings about enhance mathematics and science instruction for all students.

With AMP support, 100 students are working on research projects under the supervision of 40 faculty mentors. There will be 70 faculty mentors in the program by this fall. The alliance benefits from CUNY's research faculty, which last year attracted \$37 million in external research funding and from the university's aggressive recruitment of minority scientists and engineers. Active partners in AMP research include Polytechnic University, NASA's Goddard Institute for Space Studies, AT&T, Bell Labs, and the U.S. Food and Drug Administration's New York Regional Laboratory. NASA's GISS has budgeted \$333,000 per year, for three years, for collaborative research involving AMP students and faculty from five CUNY campuses, minority students and faculty from four New York City high

schools, and NASA GISS scientists. A number of research scholars have been awarded CUNY Pipeline Fellowships, which are designed to encourage promising minority students to pursue teaching careers in higher education.

The New York City Alliance is currently supporting the formulation, implementation and evaluation of an introduction to research course at community college campuses, as well as collaborative two- and four-year faculty research projects that guarantee continuity of SEM student research activities and the preparation of cooperative grant proposals.

Many individual campuses have sponsored AMP faculty and/or student workshops. Topics have included introduction to computer algebra/calculus system, collaborative learning, and authorware and multimedia courseware. CUNY has supported AMP university-wide professional development workshops such as restructuring seminars for calculus, physics, and chemistry; mentoring in The Urban University; and critical thinking. The New York City Alliance has joined forces with The Urban Systemic Initiative to offer conferences on technologies in introductory calculus courses for college professors and advanced placement high school teachers.

CUNY increased its contribution to AMP and included AMP in its 1995 state budget request. Funds will be requested to institutionalize the learning centers and for the restructuring of SEM courses. A fund-raising plan to supplement AMP includes a request made to Con Edison to provide funding for 50 AMP/Con Edison research scholars. Similar requests will be made to major corporations in the New York City area.

## North Carolina

Major initiatives implemented by the North Carolina AMP are categorized under three target project areas: academic enrichment, linkage/outreach and community college, and industry involvement. Other special efforts were accomplished in faculty development, curriculum reform and SEM bridge pro-

grams. In addition, NCAMP implemented a mentoring/tutorial initiative for SEM undergraduates in conjunction with the U.S. Navy Recruiting Command. This year all partner campuses also increased the number of SEM scholarships awarded to minority students.

The NCAMP Faculty Forum on increasing faculty involvement in minority academic enrichment, hosted by the University of Texas at Austin, brought together SEM faculty members from the seven partner campuses. A special feature of the forum included a minority student panel consisting of African-American and Hispanic undergraduate engineering students who shared their personal academic experiences. Topics addressed included mentoring of students by faculty, critical thinking/problem solving, performance-impacting behaviors, and academic enrichment programs. Four work teams were formed by faculty to develop ideas and to prepare an action plan for increasing faculty involvement in each of the four areas.

## Oklahoma

During its first year, the Oklahoma AMP has established three undergraduate programs: the Scholarship Program, the Freshman Summer Bridge Program and the Summer Research Internship Program. The lead institution, Oklahoma State University, offers all three programs. The seven partner institutions operate similar scholarship and internship programs. There are 22 affiliate institutions, representing every region of the state, that students with OKAMP scholarships can attend if they are sponsored by any funded member.

At the larger universities, discipline-related groups of undergraduate students participate in SEM-centered activities encouraging retention and raising the level of preparedness for graduate study. Groups of scholars at smaller schools are more heterogeneous, but awareness meetings, study groups, tutoring, workshops, SEM seminars and field activities are requirements that are common to programs at all OKAMP institutions.

The Summer Bridge Program, held at

OSU, provided 35 college freshmen with an advance start on the gatekeeping courses: college algebra and English composition. The Math Learning Resources Center offered small group and individual tutoring sessions. Writing lab privileges were provided for students in the English course. To explore one rapidly rising new area of science, special sessions on molecular modeling were conducted by the department of biochemistry and molecular biology for all program students. An orientation for program participants and their parents also was conducted.

The Summer Internship Program offered quality research opportunities for the continuing undergraduate or post-graduate in summer transition to graduate school. At partner institutions, interns engaged in a variety of mentored SEM activities, including research.

At OSU's research-oriented program, students arranged to work with a research faculty mentor, developed and submitted a plan for research, carried out the work over the summer session, and reported findings in poster format. During the summer session, interns held weekly meetings as a support and resource group to report research progress, share information on departmental seminars and discuss related matters. Interns volunteered to serve as mentors to interested OSU Summer Bridge Program freshmen. Bridge students were invited to one weekly intern meeting to hear research progress reports, tour facilities and discuss college life as a science major. A poster session for alliance interns was held at the close of the summer session. Three of those interns were selected to exhibit a poster at the NSF Conference on Diversity this fall.

## Puerto Rico

The Puerto Rico AMP seeks to increase the annual number of B.S. degrees earned by minority SEM students at alliance institutions by 934 by 1996, an increase of more than 30 percent over the 1991 baseline. A secondary goal of the PR-AMP is to increase the number and quality of Puerto Ricans who complete Ph.D. pro-

grams in SEM from 60 to 130 per year by 1996. The central strategy for accomplishing these goals has been to promote systemic change at the institutional level by improving effectiveness and efficiency in SEM education.

The program results obtained during 1993-94 provide strong evidence of the soundness of this PR-AMP strategy. Since the beginning of the PR-AMP, the number of graduating students has increased by 20 percent (from 1,709 to 2,086), thus reaching 96 percent of the expected total for 1994 and 36 percent of the total increase to be achieved by 1996.

In 1994 more than 3,000 students were affected by PR-AMP student activities, representing 23 percent of the total SEM student enrollment for PR-AMP institutions. Four hundred students made presentations at the Puerto Rico Interdisciplinary Scientific Meeting. The number of students presenting their research at national conferences increased from 13 to 32. Twenty-eight students participated in summer internships at national laboratories and at the National Institute of Standards and Technology.

Courses in which cooperative learning was incorporated showed a substantial improvement in the grades obtained by students: A and B grades increased by 8 percent while D and F grades and withdrawals decreased by 11 percent. The total number of students participating in this activity increased from 1,498 in 1993 to 2,023 in 1994. In 1993-94, 419 students participated in learning skills programs, an increase of 185 percent.

Four proposals were selected and implemented for revising and pilot-testing courses. Workshops to disseminate the results of the pilot projects were offered to 168 faculty in 1994. About one-third of the faculty who teach general physics at PR-AMP institutions participated in a workshop where it was decided to experiment with an integrated laboratory course. This course will change assessment strategies and provide for ample use of demonstration so that it will be more conceptual and less algorithmic.

In engineering, new teaching strategies and learning technologies (self-

paced learning and computer-assisted instruction) were incorporated throughout the curriculum. Enrollment in engineering increased from 3,750 in 1991 to 3,937 in 1993-94. Student participation in the self-paced learning activity nearly tripled from 147 to 419. A pre-engineering program was offered at both the Ana G. Méndez (100 participants) and the Mayagüez (30 participants) campuses. Through these programs students are brought to the campuses and offered motivational and academic preparation activities. A careers fair exposed 700 students to the range of opportunities in SEM fields. An Encounter of Future Scientists and Engineers offered 400 students, including those who have participated in research, a chance to interact with researchers from PR-AMP institutions.

### South Carolina

The South Carolina AMP has formed a partnership with Data Systems Technology to hold seminars to introduce computer science majors to the information systems industry. Topics include general industry information, elements of effective resumes, how to gain experience and interviewing techniques.

Through systematic efforts, the University of South Carolina has adopted Clemson University's Engineering Mentoring Program. Academic-year student research is also in place at USC. South Carolina's Experimental Program to Stimulate Competitive Research (EPSCoR) has placed 22 AMP students in summer internships through special collaboration between the programs. Seven students were chosen to display a scientific research project for one week at the South Carolina Capitol. These students were also introduced to both houses of the South Carolina Legislature.

The alliance was expanded to include the College of Charleston. Clemson University's AMP enrollment increased more than 100 percent by sending AMP students to local high schools to recruit students. A University of South Carolina AMP student was the first-place winner at the

Alabama Southeastern AMP Conference held in 1994. A Benedict College student and a University of South Carolina student were both National Winners at the CIMD Expanding Minority Opportunities Conference held in Arizona in January. At the SCAMP Summer Research Science Fair in August, three \$500 scholarships were awarded.

### Southern Rocky Mountain

In the Southern Rocky Mountain AMP, minority students are tapping into valuable resources available in higher education: research faculty, advanced computer technology, and, most important, each other. Working with research faculty, students are enhancing and increasing their educational participation while developing academic and professional relationships as well as earning money to meet their college costs.

During the past two years SRM-AMP has compiled numerous sources of financial aid and internships for minority students in the sciences and engineering. The alliance is publishing Hypermedia-based software (HyperAMP) that allows students to search for financial and SMET programs electronically. An electronic bulletin board is accessible through the Internet (World Wide Web address is <http://www.eas.asu.edu/~cimd>) that will allow students to download HyperAMP and other files of interest, communicate with faculty and students, and conduct Electronic Peer Study Groups.

The Electronic Peer Study Groups are essentially being run by SRM-AMP students. Problem sets in calculus, chemistry and physics are developed by upper-division minority students under the direction of faculty who routinely teach these gatekeeping courses. Lower-division minority students work on these problems through local and/or distance study groups.

More than 500 resource individuals at 75 campuses and organizations are participating in SRM-AMP (not including the participation of corporations or secondary school educators) by

instructing, mentoring or tutoring students and/or being a member of one of the operational committees of the project. Approximately 85 percent are scientists, engineers, and other faculty and 15 percent are administrators; slightly more than 40 percent of these resource participants are underrepresented minorities themselves.

At the undergraduate level, the SRM-AMP has exceeded its goals for the first, second and third year of activities. SRM-AMP had proposed to serve 400 Level 1 students in each of the first two years and actually served 611 the first year and 646 in the second year. For the third year, SRM-AMP proposed to serve 700 Level 1 students and actually served 793. Level 1 students are engaged in new activities that were created with AMP funding: faculty-directed undergraduate research projects, peer study groups, summer bridge programs, and undergraduate summer research and graduate preparation institutes.

### Texas

The Texas AMP will be taking on a slightly more urban look since Texas A&M-Corpus Christi and Texas A&M International (Laredo), two of its city-based A&M partners, have expanded from two-year to four-year status. Together with Houston Community College, El Centro College of the Dallas Community College District, and San Antonio Community College, Laredo and Corpus Christi extend the benefits of AMP to additional populations of city-dwelling students.

Texas AMP has in place improved evaluation methods, tools, and staff to gather, manage, and analyze data for all alliance reports to NSF. The NSF Database/Evaluation Work Group, composed of alliance administrators, has made suggestions to improve evaluation and reporting processes for all AMPs in the country and for NSF.

Texas AMP four-year institutions continue to conduct successful bridge programs for incoming freshmen and community college transfer students, which increase the success and retention of AMP students in SEM disci-

plines. During 1993-94, Texas AMP had a total minority enrollment of 2,808. The number of SEM degrees totaled 535.

Faculty mentors, who regularly meet with students, play an integral part in the retention of minority students. The alliance continues to offer opportunities for professional enhancement to faculty members who serve as mentors.

The alliance attempts, every year, to conduct some meetings and professional development activities via the Trans-Texas Videoconferencing Network, which is available at all Texas A&M University System institutions and accessible to community colleges in the alliance. All community colleges are within a two-hour drive of a TTVN facility. This system reduces travel expenses for staff and coordinators and increases the amount of communication among alliance partner institutions.

Texas AMP four-year institutions continue to work on increasing the number of articulation agreements with community colleges and other Texas universities. Currently the alliance institutions have 34 articulation agreements in place.

### University of Texas System

Within the University of Texas System AMP, community college to university summer bridge programs were conducted at seven campuses, involving more than 100 students. The summer bridge program at UT, Brownsville, was held for the first time with cooperation from Texas Southmost College. Four students involved in the program were later selected to participate in a summer research experience hosted by Sandia National Laboratories.

More than 50 SEM majors were supported by undergraduate research stipends through AMP. This program has been highly successful and involves students on every campus of the UT System.

More than 20 sections of revised freshman courses in chemistry, engineering, mathematics and physics

were piloted with AMP support at alliance institutions. The freshman year in engineering at UT, El Paso, was completely restructured and includes a pilot of a two-semester interdisciplinary introduction to engineering course sequence that provides undergraduates with an early exposure to the concepts of applied problem solving, engineering design and computer applications.

UT, Pan American, opened a new undergraduate mathematics laboratory through the support of AMP. This laboratory utilizes undergraduate facilitators to assist students by providing additional instruction and problem sessions for undergraduate mathematics courses. UT, San Antonio, is conducting its first "Jump on Success" summer institute for first-year minority students majoring in SEM fields. The decision to sponsor such an institute grew out of recommendations from an institutional self-study sponsored by AMP. UT, Dallas, has aggressively pursued and successfully obtained funding from local industries to help support minority majors in science and engineering. Strategies utilized by UT, Dallas, are being shared with other members of the alliance in an attempt to broaden the level of industrial support.

To assist in the dissemination of AMP accomplishments, a workshop was jointly sponsored with the Texas AMP at the Texas Higher Education Coordinating Board's 11th Annual Minority Recruitment and Retention Conference. Following the conference, a student research poster exposition featuring 40 AMP students from eight institutions was held in the Texas Capitol to highlight the work of undergraduate minority researchers.

In the 1993-94 academic year, the UT System recorded an 18.1-percent increase over the previous year in the number of baccalaureate degrees awarded to underrepresented minorities in SEM fields.

### Washington-Baltimore-Hampton Roads

For the past two summers, the Center for the Study of Terrestrial and

Extraterrestrial Atmospheres and the Washington-Baltimore-Hampton Roads AMP have jointly sponsored a summer institute and research traineeship program for upper-level undergraduate physical sciences and engineering students enrolled at Howard University, the University of the District of Columbia, and Morgan State University. The primary objectives of the program are to introduce students to areas of science and to provide research opportunities that are both unique and challenging.

More than 50 students from these schools have participated in a comprehensive eight-week program of classroom lectures, plenary talks, tours to research facilities and cutting-edge research in the atmospheric sciences. The first four weeks are divided between classroom lectures and research, while the final four weeks are dedicated to full-time research. Each student is paired with a Howard University faculty mentor in either chemistry, physics, electrical engineering or mechanical engineering. At the conclusion of the summer program, an open colloquium is held in which all students give brief oral presentations of their research. The students also are responsible for writing a technical paper detailing their research.

The interest in atmospheric sciences generated during the first summer program spawned two new courses at Howard University: "Introduction to Atmospheric Chemistry" and "Introduction to Atmospheric Sciences." These courses represent the initial efforts by Howard University and CSTE to develop the curriculum for a master's degree program in atmospheric sciences beginning in 1997 and a Ph.D. program that will begin in 2001. The introductory courses in atmospheric sciences are open to students at any of the AMP institutions. ■

## Alliances that work *continued from page 1*

result required if this program is to achieve the goals set by NSF.

Following are some factors that contribute to the achievements of this first set of six AMPs:

**Realistic Accountability.** AMP supports alliances through cooperative agreements that contain each alliance's degree production goal and specific work statements that describe how the alliance will achieve its goal. Each alliance agrees to participate in an annual three-phase review process that involves a site visit, an annual report and a reverse site visit. Prior to funding, each AMP is informed that NSF holds the alliance accountable for achieving what it committed to achieve in its proposal.

**Practical Strategies.** Each alliance develops practical strategies for addressing gatekeeping courses—courses that have traditionally served as filters instead of funnels for student participation in SMET disciplines. Alliances also develop meaningful collaborations with community colleges, colleges, universities and businesses. All alliance strategies involve developing means to institutionalize successful AMP activities.

**Committed Leadership.** The key element in the success of an AMP is strong institutional leadership at all levels. AMP becomes just another attractive episodic activity without strong institutional leadership. This leadership comes from all participants: students, faculty, administrators and business persons.

**Effective Partnerships.** One of the major benefits noted by all AMPs is that alliances bring two-year college faculty and administrators together with university and college faculty to assist students matriculate from two-year programs to four-year programs with SMET majors. AMPs also provide a forum for networking businesses with college students early in their career development to assist the students in better understanding the culture of SMET industries. AMPs assist traditional in-state institutional competitors to unite to achieve a focused goal in a cooperative manner.

**Supportive AMP Culture.** Elements of the AMP culture include estab-

lishing clear institutional goals and objectives based on proven cost-effective activities; ensuring that all involved in the AMP have high expectations for performance of administrators, faculty, and students; and establishing a mechanism to monitor objective achievement and sharing the results throughout the alliance.

In addition to these accomplishments, AMP projects have produced new textbooks and courses, including an extraordinary scientific and technical writing textbook that will be published in December. AMP projects have gained impressive industrial support, including a second year of support from Hewlett Packard for increasing the involvement of minority institutions in calculus reform efforts. Many AMP projects report strong state support, exemplified by the second straight year of direct support from the South Carolina Legislature for the South Carolina AMP.

Within this newsletter there are many examples of alliances that are working. While the chart below shows the numerical gains that alliances are making, producing the numbers is not sufficient to achieve NSF's goal of a healthy SMET work force. Diversity of the SMET work

force is important because it increases the global competitiveness of the United States in these industries.

An African-American Ph.D. graduate recently spoke before a Senate appropriations committee. He was asked why Congress should support minority student participation in areas of national need. The senators reminded him that Congress has a very limited budget and that there are many other issues competing for support, such as research on disease prevention and management, space exploration, development of superconducting materials and job creation activities. The young man responded that Congress could not afford *not* to invest in education. "Who will discover the next miracle drug," he asked, "or a high-temperature superconducting material or an industrial procedure that creates jobs and profits or the first complete genetic code for an animal or a new integrated communication strategy? Who will do the science?"

Clearly, including all groups in science, mathematics, engineering and technology activities is an investment in the future of our country that has a direct impact on the quality of life for all U.S. citizens. ■

### B.S. Degree Production in Science, Engineering and Mathematics

Alliances		1990	1993	% change
GROUP 1 (FUNDED NOV. 1991)	Alabama	541	917	70
	California	1,339	1,766	32
	Mississippi	288	456	58
	Puerto Rico	1,709	2,086	22
	Southern Rocky Mountain	484	824	70
	Texas	344	534	55
Alliances		1991	1993	% change
GROUP 2 (FUNDED NOV. 1992)	City University of New York	321	393	22
	Florida/Georgia	537	751	40
	North Carolina	*875	1,124	28
	South Carolina	232	332	43
	University of Texas System	564	666	18
<i>*1990 degree production data</i>				
Alliances		1991	1993	% change
GROUP 3 (FUNDED NOV. 1993)	California State University	750	923	23
	Chicago	272	326	20
	New Mexico	327	396	21
	Washington-Baltimore-Hampton Roads	615	598	-3

B.S. degrees are reported for the academic year beginning on July 1 and ending on June 30 of the following year.

## **Empowerment** *continued from page 6*

appreciated the link between diversity and empowerment and have expressed their intention to seek a diverse work force. These companies have strong commitments to hiring, retention and advancement of minorities and believe that diversity in the workplace cannot be avoided and, when managed well, can strengthen competitive positions. All science-based industry should be so committed, for minorities are severely underrepresented in this industry: 5 percent as compared to 18 percent in the general work force.

All industries, especially high-skill research and development institutions, have a responsibility to actively seek ways to increase the number of minorities in their work force. There is ample evidence in terms of the success of those minorities who now work in research and development to support the view that industries lose nothing by hiring and promoting minorities. Further, the philosophy of empowerment, by giving employers the tool to effectively manage a diverse work force, removes a potential restraint to minority hiring.

Industry, however, must be able to find qualified minorities for the positions that are available. Data published in 1991 suggest that it is difficult to attract minorities to college science programs in the first place, as well as retain them in those programs through graduation and post-graduate degrees.

So when an institution such as the Greater Philadelphia Region AMP, an alliance of eight colleges in the Philadelphia area, commits to doubling in five years the number of baccalaureate degrees awarded to minorities in science, engineering, and math, it is important that schools, civic and professional organizations, and industry get involved.

Industry has an especially critical role in endeavors such as this. It can help define the skills that graduates should have, and it can provide tangible support such as access to its equipment and its experts.

I believe industry will respond, because for them to staff their research programs and other activities and have the greatest potential for success, no group from the available work force can be excluded. ■

## **Why we need AMP** *continued from page 1*

As we prepare to enter the Knowledge Age of the 21st century, SMET leaders recognize that full participation by all U.S. citizens in SMET is required if the United States is to maintain its global SMET leadership. Jobs, economic growth, community health, societal stability and effective government are directly dependent upon the health of the SMET work force and the SMET literacy of our nation's population.

The Knowledge Age, which will be one of the most important periods our nation has ever known, will be fueled by SMET activities more than by any other academic areas. Higher education will be the instrument for ensuring that the United States has a healthy SMET work force. To prepare for the Knowledge Age, most higher education institutions are rapidly refocusing their SMET structures to respond to a new set of challenges.

The AMP program was designed to be integral to how higher education addresses the challenges of the changing demography of America. If higher education does not appropriately address this issue, higher education could be viewed as contributing to the problem instead of providing the solution. ■

—*Dr. William E. McHenry, director, AMP*

## **Calculus reform** *continued from page 2*

hosted by North Carolina A&T State University in May. Mathematics faculty from more than 30 minority-serving institutions participated in the conference. First-year faculty from each of the nine participating HBCUs made presentations at the conference. There were also graphing calculator instructional sessions presented by CCRCA consultants and calculus reform experts.

The second year of CCRCA began in June with a 10-day intensive training program at Spelman College for 19 new faculty members from seven minority-serving institutions. Follow-up three-day training sessions will be conducted on each participant's campus during the fall and spring by CCRCA instructors. These sessions will include other math faculty on each campus.

CCRCA participants who completed the first year of training will coordinate

instructional efforts to train other faculty on their campuses during this academic year.

North Carolina A&T State University is the lead institution for CCRCA. The program is a component of the North Carolina AMP under the leadership of Dr. Harold L. Martin, vice chancellor for academic affairs and AMP project director. ■

## **Research** *continued from page 6*

larly interested in the oceanographic and climatic changes that occurred, allowing these distinctive and unusual sediments to form. Currently, I am involved in post-cruise research in which I am utilizing stable isotopes of oxygen and carbon to discern hydrographic changes during sapropel formation.

Being an ODP scientist is a challenging but very rewarding experience that I highly recommend to anyone who enjoys unlocking the secrets of the Earth's history. ■

## **NSF programs** *continued from page 3*

all segments of the population. America's future depends on the next generation, those currently being educated in our schools, colleges, and universities or embarking on their careers in industry, academia, or government. Enhancing their capacity to create, innovate and solve problems must be a vital component of NSF's activities. Vibrant educational experiences must be made available to all persons, including those groups who traditionally have been underserved in some manner by our current system: minorities, women and persons with disabilities.

As more people from underrepresented groups enter the work force in the next century, they will bring positive benefits and new approaches that result from the diverse experiences and perspectives that individuals from these groups hold. There will be significant changes in the way science, engineering and technology are conducted in the classroom and in the work place. NSF has put systemic programs and policies in place that will contribute significantly to this innovative approach to building the nation's work force in terms of quality and quantity. ■

tion and SEM majors. These groups were also divided into race and gender subgroups. The findings, which were similar for both alliances, included the following:

- ◆ African Americans and females constituted a growing percentage of the entering freshman population.
- ◆ Retention and graduation rates were lower for African Americans than for other ethnic groups.
- ◆ Retention and graduation rates were higher for females than males.
- ◆ SEM majors graduated at a higher rate than non-SEM majors.
- ◆ Female SEM majors were more likely than males to complete a baccalaureate degree. However, at MAMP institutions they were less likely than males to complete a degree within the SEM fields. At AAMP institutions, females were more likely than males to complete a degree within the SEM fields.
- ◆ The percentage of African-American SEM majors at MAMP institutions grew from 43 percent to 45 percent; the percentage of female SEM majors grew from 41 percent to 46 percent.
- ◆ Within AAMP institutions, 30 percent of entering freshmen were SEM majors in 1985. This figure had dropped to 27 percent by 1992. However, during the same period, African-American SEM majors as a percentage of total entering freshmen increased from 10 percent to 11 percent.
- ◆ Within six years, 48 percent of the 1985-86 freshman SEM majors at MAMP institutions completed a baccalaureate degree, but only 25 percent graduated from an SEM field. Among African-American SEM majors, 35 percent completed a baccalaureate degree, but only 20 percent graduated from an SEM field.
- ◆ Within AAMP institutions, 54 percent of the 1985-87 freshman SEM majors completed a baccalaureate degree within six years and 34 per-

cent graduated from an SEM field. African-American SEM majors completed a baccalaureate degree at the rate of 42 percent, with 38 percent graduating from an SEM field.

Smith noted that as a result of the lower retention and graduation rates, the representation of African Americans decreases dramatically as they progress from college entry to graduation. Within AAMP institutions, these students constituted 37 percent of the 1985-87 first-time freshman population, but only 25 percent of those graduating six years later. In MAMP institutions, African Americans constituted 36 percent of the 1985-86 first-time freshman population, but only 26 percent of those graduating six years later. African Americans constituted 42 percent of the 1985-86 entering SEM majors, but only 31 percent of those graduating six years later.

Sullivan said the enrollment data show that MAMP recruitment activities have been successful and give him an idea of where to concentrate MAMP's efforts.

"This implies that the most important strategy for increasing the numbers of successful students is to increase the retention and graduation rates," he said, "since further enrollment increases are unlikely in the immediate future."

Dale said that the information shows that the Alabama AMP is making progress, but that the progress is a little slower than he wants it to be.

"When we do our next report," he said, "I expect that we will see a little more progress than we have in the last couple of years. The reason for that is that when we started the alliance we were at ground zero, so the things that we are doing in the alliance are supposed to enable us to improve our retention."

Dale said he believes the study will be positive for the AMP program.

"I think it is very helpful and will have a very good effect on the alliance," he said. "I don't think a lot of our institutions would have thought about retention if it had not been for AMP." ■

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