The MIT Faculty Newsletter

Vol. III No. 7 May/June 1991

Vandiver Assumes Faculty Chair

Newsletter Staff

The new chair of the faculty is J. Kim Vandiver, Professor of Ocean Engineering.

Vandiver attended Harvey Mudd College and earned a B.S. in Engineering in 1968. After a year of graduate school at MIT's Department of Ocean Engineering, he entered the U.S. Army Corps of Engineers as a second lieutenant and served one year in Vietnam, before returning to the MIT and Woods Hole Oceanographic Institution Joint Program in Oceanographic Engineering. After completing his dissertation, he joined the faculty of the Ocean Engineering Department in 1975, where he has taught and conducted research in structural dynamics and mechanical vibration.

Kim grew up in Washington State and spent much of his leisure time hiking, fishing, and camping with his father. While a graduate student he worked as a teaching assistant to Doc Edgerton and took a series of high speed color Schlieren photographs of candles, soap bubbles, and bullet shock waves. He credits Edgerton with being his most significant mentor and faculty role model.

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Report To The Faculty

Context, So Far

L.M. Lidsky and M.R. Smith

The Context Initiative was introduced as a suite of "Context Courses," first offered in 1987-1989. Attendance at those courses was very disappointing and, at the behest of Deans MacVicar, Wilson, and Friedlaender, the Context Program was reassessed by a group chaired by Francis Low. The second version of the Context Initiative, based on the Low Committee recommendations, has been in existence for one and a half years. This is an informal report of progress to date, our near-term plans, conclusions we have reached, and suggestions for future development of the Context Initiative.

The Low Report recommended, *inter alia*, that there should be a faculty member, with some financial resources, who would serve as leader of the program. We (Lidsky and Smith) were appointed co-directors of the Context Initiative and given a small budget to play with. Our first official action was the *de facto* declaration of a "Context Support Office." The title was intended to make explicit the goal of augmenting existing contextual efforts and assisting in the creation of new ones. The Context

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The Complexion of Scientific Communities

Kenneth R. Manning

[*The following is Part Two of a two-part excerpt from the Sarton Memorial Lecture, February 1991.*]

Since the early nineteenth century, free blacks had begun moving into the medical profession in greater numbers as an outlet for their scientific interests. Medicine offered a career in which the educational requirements were not as extensive or as demanding as those necessary for a career in research science. Medicine fulfilled, in a direct way, a notion of community service, as expressed in the educational philosophy of Booker T. Washington. Moreover, a medical career for a black was almost invariably carried out in the black community - to clinically treat blacks, to help cure blacks, to protect whites from diseases in the black community, and to avoid tainting the complexion of white professional institutions.

Washington himself had said, in an address delivered at a meeting in Atlanta in 1895, that the races should be kept as separate as the fingers on a hand. At this same meeting, blacks in medicine started a national organization and began to develop a

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Editorial

A Delicate Balance

If you stand in Lobby 7 you can read the words of MIT's Founding Father William Barton Rogers: "Established for advancement and development of science its application to industry the arts agriculture and commerce."

From its inception MIT has been charged with maintaining a balance between the theoretical and the practical; between its obligation to academia and to the nation. This balance has never been static. Every now and again, the balance must be reassessed. Finding a new balance and inspiring the faculty to believe in and work toward a new vision is a true test of leadership. Our history shows that success in this endeavor can have dramatic and long lasting consequences.

Karl Compton was brought in from the "outside" as president in 1930 to redress a skewed academic focus. He inspired a vision that sustained us for nearly 50 years. Now Charles Vest, the next "outside" president, faces a university that has again drifted off-keel.

Karl Compton was brought in from the "outside" as president in 1930 to redress a skewed academic focus. He inspired a vision that sustained us for nearly 50 years. Now Charles Vest, the next "outside" president, faces a university that has again drifted off-keel. He will preside over the change that must come.

During its early years, MIT tended increasingly towards the application, rather than the advancement side of Roger's original charge. In the 19th and 20th centuries, fledgling industries had to recruit from engineering and technical schools, which thus developed a practical and technique-oriented approach; until WWII, Institute requirements included foundry and forge practice. As a leader among scientific institutions, MIT responded with alacrity to the needs of industry by churning out many technically trained graduates - and a few theoretically prepared ones.

But by 1930, the pendulum had swung. Visionary, dynamic President Maclaurin had died in 1920, and MIT was foundering through a leaderless, administratively makeshift decade. The more important industries were growing rapidly and increasing their own technical staffs - what they now needed were scientists trained in the theory and fundamental principles of science, math, and engineering. As industrial demands increased in scope, the Institute found itself unequipped to meet them. Like a massive but outdated warship, MIT had not been able to right itself after surging to meet the technological need of previous years.

Enter Karl Taylor Compton. Prominent member of several national scientific boards, and director of the Experimental Lab of Physics and head of the Physics Department at Princeton, Compton initially wanted no part of the job offered by MIT in 1930. But as he reviewed the school's history, he began to see the presidency not as an abandonment of his career, but as a "great obligation and...great opportunity" to save MIT by shoring up research and the roles of the scientific departments. In his 1935 manuscript, "Put Science to Work: A National Program" (written, significantly, after he assumed the presidency) Compton discusses exactly the dual roles of science that the Institute was struggling to balance.

Science plays a tangible role when it contributes quantifiably to the physical world; equally important, however, is "the freedom and imagination which it [science] has brought to the human spirit and the sense of relationship and unity in the world." MIT's "real challenge" would be to maintain technological superiority **and** scientific depth by expanding its research and theoretical education programs - a challenge Compton met. His status as an outsider probably helped this process; entering MIT untouched by internal university politics, and bringing with him a range of scientific experience from research lab to national board, he could recognize the larger needs of current society, and pinpoint the ways in which MIT had fallen behind in meeting those needs.

Now once again MIT is out-of-balance; academically, financially, and administratively. Whereas Compton's academic challenge was clear - to expand MIT's theoretical branches of study in response to societal needs -

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A Delicate Balance

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President Vest may be harder pressed to posit such concrete solutions. In 1930, Compton met the explosion of industrial need through scientific expansion; in 1991, Vest may better meet today's complex problems with "visionary selection," that is, a careful re-evaluation of MIT's role. In its expansion, MIT has become sprawling and unwieldy, with a bloated bureaucracy. Continuing on the path of expansion blazed by Compton, MIT now finds itself dangerously over-extended. Instead of spreading itself thin, promising all fields to all people, the Institute needs to take stock of its academic repertoire and make selective, carefully researched decisions as how best to support activities that will lead us into the future.

In funding its enormous array of scientific and academic pursuits, MIT has become a hostage to outside funding, its own agenda inextricably entangled with those of government and industry. Approximately 40% of MIT's total funding depends on these sources, which help pay faculty salaries and reimburse indirect costs. The already meager endowment, which makes up only 60% of total funding, is being stressed to bolster salaries for new faculty.

By their nature, these monetary arrangements limit the freedom of scientific exploration so vital to academic and scientific greatness, and so important to Compton. Mired in increasingly complex commercial relations with government and industry, MIT needs to increase its supply of untouchable "hard money." If it continues on the path of patronage, MIT will find its spirit of free and wide-ranging scientific enquiry snuffed completely.

The recent inauguration offers an opportunity for self-reflection. How can MIT best serve a society with proliferating scientific and technological needs, while also maintaining a degree of financial and intellectual independence? MIT needs to disentangle itself from the strings of government and industrial money by increasing internal funding. MIT needs to restore the appropriate balance between science and engineering, research and practice, if it is to maintain its status as scientific leader. Now it is President Vest's turn to provide a strong and stable leadership, and, with the faculty, develop a rigorous new model of MIT to take us into the 21st century.

The stakes are higher now. Compton's vision lead to MIT playing a major role in bringing the benefits of science and technology to our society. Now, we face the more difficult task of ensuring that all the members of our much richer society can contribute to and benefit from the scientific and technological advances to come.

Editorial Committee

We encourage contributions on these or related subject matter (you have all summer to work on it!) and ask that you submit your contributions by August 15th.

Please send all pieces to: ***The MIT Faculty Newsletter*, 38-160,** or to any member of the Editorial Board.

New Editorial Board Formed

The new crop of *Faculty Newsletter* Editorial Board members were introduced at the Board's final meeting for the year in late May.

New members include: B. L. Averbach, Materials Science and Engineering; Nazli Choucri, Political Science; Ernst G. Frankel, Ocean Engineering; Gordon Kaufman, Sloan School; Stephen J. Lippard, Chemistry; Haynes Miller, Mathematics; David Thorburn, Literature; and Robert V. Whitman, Civil Engineering.

Next Issue

This is the final issue of *The MIT Faculty Newsletter* for this academic year. Our next issue will appear in September.

The focus of the September *Newsletter* will be education in general, and teaching in particular. Over the summer the Editorial Committee will prepare articles on a variety of teaching-related subjects, both at MIT and elsewhere, and there are plans for a Report To The Faculty from the K-12 Committee.

Williams Concludes Fast

More than 80 students, including many members of the Black Student Association (a graduate student group) together with a dozen faculty members, joined Prof. Jim Williams on the last Wednesday of his April fast in front of President Vest's office.

This *Newsletter* will continue to report on developments concerning issues of diversity and underrepresented minorities at the Institute.

FROM THE FACULTY CHAIR

On Our Faculty Governance

Henry D. Jacoby

"Is this really the way we ought to be doing this?" This question has come up more than once in my period helping manage the faculty's involvement in Institute governance. Our system is a peculiar MIT concoction: a unitary faculty meeting with real power and influence, but which draws more than 15% of the faculty only when a hot item is on the agenda; a meeting designed to do the faculty's business, but which is chaired by the President on most occasions, and which includes top members of the administration under Rule 1 and welcomes input from other senior administrative staff (see box). No senate, but a Faculty Policy Committee which serves *de facto* as a sort of executive committee of the faculty - keeping an eye on issues of faculty concern, hearing the flak, and shaping issues on their way to the faculty meeting. No elections, but three faculty officers and members of standing committees chosen by a nominations committee with faculty-meeting ratification.

Early in my term as chair, I tried to explain this system to colleagues at a meeting of presidents of faculty senates, to their widespread mystification.

The system has its good points and bad. It is of a piece with a broader MIT culture which blurs the boundary between faculty and administration. One factor contributing to this style is the revolving-door nature of administration here. Outside the specialized business functions most top officials are faculty members, many continuing to teach, and spread through the faculty ranks are former department heads, deans, and provosts.

Involvement of the president in the conduct of the faculty meeting tends to reinforce this close relationship. Not only is the president in regular face-to-face contact with the faculty, but this style of meeting draws the participation of the provost, deans, and VPs. We avoid the gulf that has opened up in many of our fellow institutions. The faculty meeting is not "question time" in the British parliamentary sense, but it is a regular occasion where issues of importance to the faculty can be addressed, and concerns can be raised by individual members.

Some feel it would be better if the faculty's position within the Institute were more sharply defined, with clearer mechanisms for confronting the administration with faculty views. I have the impression, on the other hand, that most faculty are satisfied with the current arrangement. They trust that reasonable decisions be will be worked out in collaboration, and they are willing to participate in the process for reasonably confined periods of time. They know they have a forum, with direct access to the president, provost, and faculty officers, when they believe something has been badly handled. Meanwhile they are happy to get on with their work.

Another characteristic of this system is the great influence it accords to minority opinion, strongly felt. Essentially, faculty votes on controversial issues are weighted by passion level, because of who shows up. In an otherwise poorly attended meeting, people concerned with a particular agenda item can have great influence. The effect on faculty and institute-wide decisionmaking is profound. The faculty-meeting gauntlet puts pressure on the committee process, by which most issues come to the floor, to work out a consensus ahead of time. It increases the shoe leather cost of those managing difficult issues, but probably leads to better thought-out proposals in the end.

On the other hand, months and even years of hard work can be overturned in a few moments of thrashing on the faculty floor, in a process of debate and decision by members who are not always well-informed about the issue and the background work that has been done. Overall, the result is a strong conservative bias.

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EX OFFICIIS

In the May faculty meeting, the officers again did not add any new names to the list of the members of the academic staff appointed to the faculty on an annual basis, *ex officiis*. After a review this past year, the officers and the FPC concluded that this appointment is not achieving the goal of bringing the expertise of key members of the administrative staff into faculty-meeting deliberations. The process tends to exclude rather than include. The list has been allowed to decrease by attrition for some years, but now the officers have declared the list closed as a matter of policy. Other measures are planned to insure that senior members of the administrative staff are welcomed, and their input sought on topics of their special expertise. Because the historical list contains people who have served for many years in ex officio status, and who make a substantial contribution to the meeting, it is being left as is during a period of transition.

Letters

To The Faculty Newsletter:

In the April '91 *Newsletter*, Ethics and Ethos, the question is asked re: the "...competition for increasingly scarce research funds....Is it any wonder that corners get cut and data get hyped in the process?" That such a question should arise is a measure of the very problem being discussed. Yes, it is a wonder and against all the traditions of an honorable profession.

I joined the faculty at MIT (after a stint in industry pursuing excellence in engineering under the stimulus of competition) over forty years ago. At that time we used to tell our students that honesty in our profession was not only a moral obligation but a necessity because nature could never be fooled. I am glad to see from the survey results in Caroline Whitbeck's article that at least the Engineering School showed continuing concern for maintaining this tradition.

R.H. Miller
Professor Emeritus
Department of Aeronautics and Astronautics

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To The Faculty Newsletter:

Congratulations on the April *Faculty Newsletter*, and especially the editorial "Ethics and Ethos." I hope it gets read by all the faculty.

I am delighted that Widnall will chair the Committee on Academic Responsibilities, and I am hoping that she will become a sort of ombudsman to whom anyone suspecting falsification of data or other flaw in integrity can go in privacy, suggesting an investigation.

Thomas D. Cabot

Vandiver Assumes Faculty Chair

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Vandiver's interest in faculty governance was stimulated by a term on the Committee on Education Policy. He later served on the Committee on Curricula and then became the associate chair of the faculty from 1985-1987. In 1989 and 1990 he served on the faculty Nominations Committee.

Being involved in the governance process often also includes participating in ad hoc committees which deal with current issues. Professor Vandiver chaired a committee which reviewed the MIT-ROTC relationship and worked with Associate Provost Jay Keyser on a review of the procedures of the Committee on Discipline. Kim was involved in the changes to Pass-Fail, in the revision of the HASS-D requirements, and recently in the addition of biology to the GIR's.

In addition to teaching a variety of departmental subjects over the years, Professor Vandiver served as the Director of the Experimental Study Group (ESG) from 1984 to 1989. He received a Graduate Student Council teaching award in 1987.

In the fall of 1988 he co-taught an advisor seminar on Vietnam with Lee Perlman. Lee, the 1970's war resister, and Kim, the young lieutenant, had a rewarding experience revisiting Vietnam with 12 freshmen.

His time away from MIT is centered on his family including his wife, Kathy, and children, Amy, Ben, and Alex. His leisure activities include softball and flying. He is an FAA certified instructor in gliders.

On Our Faculty Governance

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Would some other system be better? And exactly what does "better" mean? The common alternative is an elected faculty senate, with balanced representation by school, rank, or some other category, and usually with officers elected from within the senate. It is hard to know what the effect of such a system would be at MIT.

I suspect that faculty-wide participation in its own affairs and the Institute's governance would decrease, as the task was given over to people willing to stand for the elected positions. Efficiency would go up as decisions were addressed in a more orderly deliberative body, and likely the boundary between faculty and administration would be sharpened as the administration was presented with a more clearly defined set of people to deal with. The influence of minority views surely would decrease, and I fear that the role of faculty opinion in the running of the Institute would be channelled and more orderly but ultimately reduced. In short, the result would be sharper distinctions but less impact on day-to-day decisions and on proposals for major change.

All these views can be debated, and should be. Our environment is changing, producing new pressures on us as a faculty and on those responsible for managing the show. We ought to think about whether we have the right system for the next decade or two. If we conclude, as I have in two years of working the system, that no alternative is evidently better in our context, then we need to devote some real effort to the search for ways that we can keep our own unique system vital, and responsive to evolving circumstances.

Dead White Men Vs. Diversity

Vera Kistiakowsky

At the end of April I participated in a conference at the University of Illinois at Urbana-Champaign on *Changing Cultural Values and the Role of the University*. The panel of which I was a member addressed the topic, *The University, The Military-Industrial Complex and Alternatives: Ethical Issues*. More specifically, we were asked to "expand the long-standing discussion over military support for university research into the broader discussion of converting a civilian economy."

The timing was not auspicious. The Persian Gulf "War" had created a glorification of military might which had at least two outcomes that do not bode well for conversion: 1) the separation of the federal budget last fall into four separate and non-communicating parts - military, civilian, foreign aid, and entitlements, and; 2) the use of the "War" by the Bush administration to justify augmented weapons expenditures. However, the Illinois conference program had been decided long in advance, so I dealt with the situation as optimistically as I could.

The second member of the panel spoke about the necessity of conversion, and the third, a very distinguished physicist, spoke personally, rather than analytically, saying that he felt that the source of funding had never influenced the research that he chose to do. I was sorry that we did not have a more objective and generally knowledgeable spokesperson for military funding of university research, but the conference organizers had been unable to find someone of that description. And it was educational for those in the audience who were opposed to such indifference to end use to attempt argument with this practitioner of "pure" research.

Having had much experience with the money-has-no-odor point of view, I found the topics of other panels much more interesting, in particular the panel on *Challenges to Canons and Curricula*. Its charge was outlined in the conference program: "Challenges to curriculum and course content from changing student demographics and the issue of representation. Challenges to the traditional canons and curricula: What should we be teaching? In what ways should changing student demographics and the issue of representation affect how and what we teach? The university and the transmission of culture: How should the university respond to increasing demographic and cultural diversity? Whose culture should the university be transmitting and how? How can the university reconcile the competing values of preserving tradition and promoting social change?" The panelists included articulate speakers whose opinions covered the full range from traditional to multicultural.

Some diversity is creeping in among the dead white men, and there are signs that the high-school-curriculum-like rigidity of the [HASS-D] requirements may be replaced by a respect for the judgement of the faculty who teach the courses....

This topic was very quickly renamed *Dead White Men vs. Diversity* by participants and audience. It was a discussion that should have taken place at MIT in public fora before the HASS-D requirements were instituted, instead of the process of committee discussion followed by a steamrollered and grudging acceptance by the faculty in a meeting at the end of the semester.

Time and the intrinsic folly of some aspects of the HASS-D system are bringing modifications. Some diversity is creeping in among the dead white men, and there are signs that the high-school-curriculum-like rigidity of the requirements may be replaced by a respect for the judgement of the faculty that teach the courses, a respect that is certainly accorded the members of my department.

But President Vest's endorsement of diversity has broadened the appropriateness of these issues to much more of what goes on at MIT than just HASS-D. At the May 15th faculty meeting a professor spoke of requiring a year of 19th century physics, a year of 19th century mathematics, half a year of early 20th century chemistry, and now, the meeting having voted affirmatively, half a year of late 20th century biology. It strikes me that the questions which were discussed at the Illinois conference have a bearing on these requirements also.

Yes, MIT is primarily a technical university, but it does have eminent departments in fields other than those of science and engineering. The student body has changed and will continue to change as the percentage of white males interested in MIT in the pool of students satisfying admissions criteria continues to decline. I think that the projected demographics of the future suggest that we take a long, hard look at ourselves, and that the discussion be open, multi-faceted, and that speakers from outside MIT be included.

The Complexion of Scientific Communities

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professional identity. The National Medical Association, founded in 1895, was the black counterpart of the American Medical Association, which, until the 1950's, effectively barred most blacks from becoming members. Black scientists who emerged in the early twentieth century did not, however, organize as a group. By and large, they pursued their careers as individuals.

One of the earliest opportunities that black scientists had to pursue research was in seasonal laboratories such as the Marine Biological Laboratory at Woods Hole, which brought them directly into a white environment. Among the blacks who worked there during the summer season were Charles Henry Turner, E. E. Just, Samuel Milton Nabrit, and, a female zoologist, Roger Arliner Young. Often confronted by the prevailing racial attitudes of the time, these scientists nevertheless managed to engage in pioneering work at such laboratories. E. E. Just accomplished first-rate results in embryology, despite the subjection of himself and his family to a hostile environment and racial slurs both in a scientific and non-scientific context.

Science was a deeply felt, personal commitment for Just, one that he finally left America to pursue in Europe. But his experience at Woods Hole, disturbing as it was in some ways, nevertheless paved the way for other blacks to go there. The doors of the community had been opened, and after the 1920's it was no longer as shocking to see a black researcher walking around the laboratory halls and out in the streets, or joining in the extracurricular activities and the social life of the place. One of the hardest things for blacks in these all-white communities was to locate housing or lodging.

During this same period, the first part of the twentieth century, Jews came into their own in science, first mainly in Germany and later in America. The associated institutes of the Kaiser-Wilhelm Gesellschaft in Berlin-Dahlem, founded in 1910, permitted scientists of Jewish heritage such as Richard Goldschmidt and the Nobel laureates Otto Meyerhof and Otto Warburg to engage in pioneering scientific research prior to World War II. Although anti-Semitism in the early twentieth-century scientific community in this country was prevalent, a quota system served to limit admissions to graduate schools and the hiring of faculty at major universities, but not to bar Jewish scientists from these places completely.

With the reputations of Einstein, Michelson, and others to support them, Jewish students and scientists could be found spread out among major American universities and research institutions, and serving in some key scientific and administrative roles. Many carried on a tradition of acute social awareness and moral energy that had been hallmarks, for example, of Einstein and of the eighteenth-century black American scientist Banneker - a tradition generated in part by their personal experience of ethnic and racial intolerance. In this connection I think particularly of Jacques Loeb, the Flexner brothers - Abraham and Simon, Selig Hecht, and Robert Oppenheimer, to name a few. Thus, a critical mass insured the inclusion of other Jews.

It is indeed ironic that it was the Second World War that brought some public notice to black scientists. Before that time, they had worked individually and at black institutions, their number and presence not yet having really been strongly felt or observed in the scientific community. At Los Alamos and in the various branches of the Manhattan Project underway at the University of Chicago, Columbia University, and several research laboratories, some white scientists witnessed for the first time a sizable portion of black physicists and chemists entering their world, being mobilized as part of the scientific war effort. Blacks who worked on the bomb project included Moddie D. Taylor, Edwin R. Russell, George W. Reed, and the brothers William J.

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[Henry C.] McBay's achievement, done with small resources, stands in stark contrast to the situation at major white institutions where a wealth of financial and other assets are commonplace....It is astonishing to realize that the first black to graduate from the Johns Hopkins Medical School did not do so until 1967.

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Knox and Lawrence H. Knox. In a talk at the American Physical Society in 1946, Arthur Holly Compton remarked that the bomb project revealed the extent to which "colored and white, Christian and Jew" could work together for a common purpose. Would it were the case that this kind of cooperation and collaboration could have continued after the war effort.

After World War II, a few white universities did begin to open up opportunities for blacks on their faculty as well as for blacks seeking graduate training within the departments. Still, the major problems facing blacks pursuing careers in science lingered: lack of access to a high-quality elementary and high-school science preparation, weak undergraduate curricula in certain black colleges, exclusion from admission to many white colleges, the high cost of graduate training, and systemic discrimination in the professional world of science. As an example of the last point, professional meetings of national scientific groups such as the AAAS were still being held in segregated cities like Atlanta and New Orleans, where, as late as the 1950s, black scientists who wanted to attend were not given living accommodations at the conference hotels. Several faculty at Fisk University signed a letter to *Science* magazine in 1951, protesting the action of the Mathematical Association of America in its denial of banquet tickets to black participants at a conference held at Vanderbilt in Nashville.

Integration, inclusion, diversification - these moved as slowly in science as in any other social institution. The attitudes of many white scientists continued to be unenlightened, as suggested, for example, by letters of evaluation written in the 1940's by scientists at a major northern university concerning a black Ph.D. candidate in physics. One faculty member wrote, and I quote: "[He] has more analytic ability than any Negro I ever expected to meet." Another wrote, and I quote again: "[He] has more mental ability than we had supposed possible in a Negro; in fact he is the equal of a considerably above average white graduate student in all respects (including analytical ability).... He is a very likeable young man. Our white graduate students... treat him as one of themselves; he has been invited to their parties, etc.,-all without any attempt on his part to push himself upon their company." Often, Jewish graduate students were stereotyped quite crudely, as in the case of one academic dean who wrote, and I quote: "[He is] one of two Hebrews in class. Has none of traits common in Jews of commercial class. Likeable, perfectly frank and open, does not show forwardness which might be anticipated. Could not do better if there is room for one of his race." It is no wonder that many Jews chose to change their names in order to gain admission to graduate schools.

Just as a century earlier, when some women resorted to male impersonation to enter science and the professions, Jews and blacks had their own unique methods of subterfuge. The common Jewish method in eighteenth- and nineteenth-century Europe was to convert, to become baptized, and to acquire documents forging a new identity. In America, the tradition carried over and came to involve a simple name change - for example, from Abraham to Allendale. The phenomenon was observable in academia and especially in medicine, where strict and limited, though sometimes informal, admission quotas were adhered to in many universities and research institutes.

The solution was not quite so simple for blacks, who could not, except in rare instances, assume a new racial identity. There were several cases, however, of what came to be known as "passing," that is, of light-skinned blacks allowing themselves to be taken as white to secure educational and career opportunities. The practice forced some blacks to assume whole new lives and identities; others chose to cross over only part of the way, carrying on the masquerade for white consumption, but simultaneously maintaining contact with and conveying useful information to the black community.

Individual black scientists devised their own routes into science in the 1930's and 1940's. There was a common pattern to their experience - struggle, perseverance, resistance to openly hostile encounters both within and outside the scientific community. In general, these scientists' stories are not to be found in the scientific literature itself, but rather in a contextual literature involving letters of evaluation, deans reports, and personal correspondence. Locked away in archives, or in trunks and attics, the documents encompassing these stories are the raw materials that give us insight into the world of scientists - their lives, their communities.

After the first wave of black scientists, including people of the caliber of the physicist Herman Russell Branson of Howard University and the biologist Samuel Milton

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Nabrit of Atlanta University, others continued to direct young talented blacks into the field while themselves meeting the demands of their research interests. Particularly noteworthy in this regard is the work of a chemist, Henry C. McBay, who after doing extraordinarily well in his Ph.D. program at the University of Chicago, began in 1945 to teach at Morehouse College, the historically black college in Atlanta. Over the next thirty years his persistent guidance and mentorship, principally of black men, but of women too, stimulated over forty blacks to obtain their Ph.D.'s in chemistry and allied fields.

McBay's achievement, done with small resources, stands in stark contrast to the situation at major white institutions where a wealth of financial and other assets are commonplace. Throughout the history of American science, we should scrutinize this issue of how resources and potential needs match or intersect. It is astonishing to realize that the first black to graduate from the Johns Hopkins Medical School did not do so until 1967. Thus, for many decades, a national resource like Hopkins was unavailable to blacks. Jews, on the other hand, became established in science and academia right after the Second World War and have held their ground since.

The 1964 Civil Rights Bill marked something of a milestone in educational opportunities for blacks and other minorities. Then, opportunities for blacks opened up somewhat at both the undergraduate and graduate levels at many white colleges and universities throughout the country. As a result, careers in the field of science became a firmer reality for black students, in both academia and industry.

The 1970's and 1980's saw efforts by scientific organizations, universities, and learned societies to be more inclusive in their membership. The AAAS itself set up a program, "Opportunities in Science," to address the precise question of the underrepresentation of minorities in science. The decade of the 1980s saw the leadership of that organization effectively administered by a woman, Sheila Widnall, and then, for the first time, by a black, Walter Massey. These are powerful messages about the nature of science, about who produces it, and who is part of it. Still, the representation of blacks and other minorities in scientific careers hovers around two or three percent. Increasing the pool will require time and more than lip service on the part of all concerned. So far, recent intervention efforts have had a greater systematic impact on bringing women into the ranks than on bringing blacks in.

At this point, conditions for blacks and other minorities leave much to be desired. While integration of elementary and high schools has supposedly opened up roots of access, a disguised form of segregation known as "tracking" has emerged - a system which assigns students to courses within a school system by ability groups. Since it is deeply ingrained in American culture and society that African-Americans have inferior minds in general and inferior ones for logical deduction and analysis in particular, minority students are often steered away by counselors and teachers, not all white, from the rigorous scientific and mathematical courses requisite for future training in science. And when these students survive high school and find themselves at prestigious white institutions, many are confronted with professors who have lower expectations for their performance than for the performance of white students. This is more insidious and often more destructive a situation than an openly segregated one.

So far in this country, science has inspired awe but is sparing in its invitation to participate. This may be one reason why the National Academy of Sciences has just one black member, the mathematician David Blackwell - which is one more than the Country and Western Hall of Fame.

At certain junctures in history, historians and other observers of society affect the complexion of the scientific community by choosing to honor or isolate groups. The Nobel Committee does so on a yearly basis, almost in ritualistic fashion. Other powerful symbolic communities of

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The Complexion of Scientific Communities

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scientists are created within the culture for our benefit, just as we are reminded through various images of communities of artists, musicians, politicians. In Paris, one strolls along streets significantly named rue Monge, rue Descartes, and rue Pasteur.

When walking in front of MIT with the Charles River at your back, one looks up to see names in large letters topping the crowns of the buildings. In largest letters are Aristotle, Newton, Franklin, Pasteur, Lavoisier, Faraday, Archimedes, Da Vinci, Darwin, and Copernicus. A host of other names appear, between nine and twelve surrounding each of the large-sized names. Considerable thought went into the selection of names around 1916, when the Institute moved from Boston to its new campus in Cambridge. Each department at the Institute had a say, and there was discussion back and forth as to who would be included, where the names would be placed in hierarchy of importance, which fields would be represented, and by how many representatives, and so forth. There was special concern to include an American, which is one reason Benjamin Franklin is so prominently placed.

A community was being created, a community of so-called greats. There were no women, no Jews, no blacks. Curie was omitted because she was living at the time. Although Einstein's real fame did not come until 1919, he no doubt would have been omitted on the same grounds. No one had heard of Banneker, and the mood of the country would not have permitted his inclusion anyway, though much later, in 1970, the omission of his name from the Dictionary of Scientific Biography caused turmoil and embarrassment for the editors and historians of science, and was the subject of comment in *The New York Times*.

If baseball cards, with their thumbnail biographical sketches of players, usually white and always male, and a piece of bubblegum, have come to symbolize a national sport and helped shape it as a key ingredient of American culture, one wonders whether perhaps something similar could happen in the world of science, creating an impact that would broaden the community, say, of girls and boys, black and white, who go out for science at an early age. In sports, entertainment, and what are generally considered less daunting fields, accessible to a wider range of people, such imagery and symbolism have been peculiarly effective, in certain instances inspiring, and to a high degree reflective of the direction and consolidation of a culture.

The images and symbols of science have been advanced in small ways recently through newspaper comic strips and the like, but no concerted trend is yet discernible in this regard, despite the fact that science has been widely proclaimed by politicians and others as the bedrock of our future as a nation. So far in this country, science has inspired awe but is sparing in its invitation to participate. This may be one reason why the National Academy of Sciences has just one black member, the mathematician David Blackwell - which is one more than the Country and Western Hall of Fame.

Now, to return to the image of Newton that we started with - the history of optics, light and its rays. If we can carry through the analogy or metaphor, we have witnessed, in the evolution of the modern scientific community, the beginnings of a prismatic effect. As light passes through the prism, we discern as complexion the sharp colors of the rainbow. It is a particularly appropriate image because the rainbow is something that every child, from Antiquity to the present, has wondered about. Indeed, the rainbow is often the entry-point for the inquiring mind of many a potential young scientist.

In the science of optics, Newton came up with a complete theory of colors. We must strive to make that metaphor fully applicable and begin to share its political meaning, by building a scientific community whose complexion reflects the myriad colors of the rainbow. But I think we must pursue Newton's experiment to its ultimate conclusion and extend the political meaning of the metaphor even further.

Newton, we must recall, took a second prism, positioning it in the path of the refracted rays produced by the first prism, and reformed the component colors into one ray. Once we do that, we are in an entirely new position, not back where we started. The separated and component parts, and the significance of both, assume a clear perspective. If we fail to follow through with both parts of the experiment, and fall back instead on the colorless, abstract image of what people like to term scientific objectivity, then we are in danger of foregoing a full, rich, and diverse level of participation by all who want to be part of the scientific enterprise.

[For a complete text of the Sarton Memorial Lecture, write: ***The MIT Faculty Newsletter*, 38-160.**]

Report To The Faculty

Context, So Far

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Support Office also serves as contact point for parties outside the Institute interested in contextual issues. Dean Enders agreed to serve as executive officer of the Context Support Office.

The Context Support Office undertook a variety of activities, including Context Workshops, IAP Activities, an undergraduate seminar on MIT and its environment, the "MIT, In Reality" seminar series, and the publishing each term of a list of "Natural" Context subjects offered within the Institute.

We have found that the Institute community is generally sympathetic to the main themes of the context idea - that students and instructors should be made aware of and have knowledge about the contexts - cultural, political, economic, environmental, ethical - within which the practice of science and engineering takes place. However, the contextual approach is not built in to the formal academic structure of the Institute, nor into the research agenda of the faculty. As a result, contextual considerations are secondary for both students and faculty. The prime consequence of this is that contextually-oriented initiatives tend to dissipate unless they are continually supported and encouraged. Because contextual activities occur on the margin, and the margin has been severely eroded, participation is often limited. The following examples are typical.

The Context Support Office conceived and co-sponsored (with the Undergraduate Association) the seminar series "MIT In Reality." The series was designed to introduce students to research being done at MIT and to related contemporary issues. The speakers were well-known faculty at MIT and the topics were chosen to have considerable current interest. The speakers included Bob Solow on the economy and jobs, Randall Davis on software copyrights, and Phil Gschwend on cleaning up the Woburn toxic waste site. The series was widely advertised both by poster and in *The Tech*. The Undergraduate Association, also provided additional publicity. Faculty teaching related courses were asked to inform their students of relevant lectures in the series. Refreshments were provided.

The lectures were stimulating, as evidenced by the discussion sessions and subsequent interest in the audio and video tapes of several of the talks. The average attendance at these lectures was approximately 40, of which number approximately 50% were graduate students. Undergraduate attendance was uniformly small, approximately 10-15, and the balance was made by faculty and research staff. We consider the attendance disappointingly small given the reputations of the speakers, the extensive advertising, the importance of the topics, and the size of the potential audience.

There seemed to be relatively few repeat attendees, with most of those present at each meeting being made up of those with a direct interest in the particular topic under discussion at that time. We concluded that this program was not worth the considerable drain on our limited resources and do not plan to continue this series at this time. If we had greater resources, we would continue this series to see if we could build a constituency. We will probably attempt a similar, smaller effort focused on seminars in the various living groups.

The Context Support Office sponsored and coordinated a number of IAP activities aimed at the faculty and at more general Institute audiences. The recent faculty workshop on the "Art of Engineering" affords an interesting example. This workshop, on a topic clearly of interest to both the engineering and non-engineering faculty, was widely advertised. Notices were mailed to each faculty member. Both the internal and external speakers (Cyril Smith and Joel Moses, David Billington of Princeton) are widely known to be intellectually stimulating speakers. And yet, there were only some fifteen or so faculty out of the total attendance of twenty-five for this one day activity. Graduate students comprised the balance of attendees. There were several conflicts with other IAP activities and many faculty were out of town for at least some time during IAP. Nonetheless, even if faculty attendance had doubled, it would still have represented a very small fraction of the total population.

We've also provided seed money or incremental assistance to context-related Institute activities. Some of the Institute activities under the fiscal sponsorship of the Context Support Office included: a visit by Congressman Don Ritter, speaking on "Science, Technology, and Politics"; an all-day workshop entitled "Error, Fraud, and Misconduct in Science"; the R/O Week Design Project; a bibliographic project on ethics in engineering; partial support to the Undergraduate Seminar, "Politics, Cambridge, and the MIT Student." The seed money seems to have been money well spent.

We have just convened a fourteen member volunteer(!) Context Advisory Group composed of faculty interested in furthering the goals of the Context Initiative. Our goal in forming this group was to enhance our search for targets of opportunity, to spread the burdens of proselytizing and advocacy, and to try to help us figure out what to do next. Based on our experience with activities outside the normal classroom/laboratory environment, we will probably expend more effort on enhancing ongoing activities (such as UROP) rather than on the sponsorship of extracurricular activities.