日本科学技術

TECHNOLOGY REVIEW - Aug/Sept 1984

Bridging the U.S.-Nippon Technology Gap

A New Program Puts M.I.T. Students in Japan to Work and Learn

The dispatches indicate that it is a great success: the first round of interns working and studying in Japanese university and industrial research laboratories under the M.I.T.-Japan Science and Technology Program are coming to appreciate and impress their hosts.

The interns, six M.I.T. graduates now completing their first 12 months in Japan, are unique, according to D. Eleanor Westney. Westney is assistant professor of international management in the Sloan School and acting director of the M.I.T.-Japan S & T Program. She says that the interns are the vanguard of the only co-ordinated U.S. program to nurture the human skills needed to keep abreast of developments in Japanese science and technology which underlie that country's much-touted business success.

The M.I.T. program aims to boost two-way communication between the U.S. and Japan by building a cadre of technologically skilled professionals with language training, cultural understanding and research experience in Japan, Westney says. The fact that the interns have been doing excellent work, and that there are more opportunities opening up in Japanese universities and industries than there are available interns, can only help to ensure a long run for the fledgling enterprise.

While Professor Richard J. Samuels, Ph.D.'80, founder of the program, is finishing up a year conducting research in Japan and monitoring the first interns, Westney and her administrative assistant Alice Peattie are busy preparing a second group to go soon and recruiting a group of future interns who have the special personality and commitment to fit them for Japan's reserved, formal culture.

In the years preceding the internship, these students must acquire a comfortable facility in Japanese language and culture and enough technical experience to make them welcome in research settings.

Tapping Visitors' Knowledge

There are no courses in Japanese at M.I.T., so students either struggle in the heavily literary program at Harvard or find summer language training elsewhere. The cultural familiarization is taken care of in weekly seminars at M.I.T. on the

Japan's postage stamps reflect the integration of traditional culture and modern technology that is a vital lesson for students in the M.I.T.-Japan Science and Technology Program. As a guest at his professor's maiko-geisha club (photo below), Peter Poole, who completes a year in Japan this summer, demonstrates one aspect of this important lesson.

practical aspects of living and working in Japan. Seminar leaders include Westney, Peattie, and Japanese members of the M.I.T. community, among them the 150 visiting scientists and engineers typically in Cambridge at any given time. (Professor Westney has spent nearly three years in Japan, the first year as hostess at the Canadian government pavilion at Expo '70 in Osaka, and Peattie lived for nine years in Japan while her husband was on a diplomatic posting there.)

Interns in the M.I.T.-Japan S & T Program need courage, too. For in many respects the year in Japan is a year out of the professional mainstream. Westney observes that women students seem more willing to take that risk than men, yet it is the women who experience the greatest cultural pressures when they move to Japan.

The problem is that many Japanese women, if they work outside the home at all, are considered "office flowers," a title they earn with exquisite grooming and attire. Not men and certainly not office flowers, "foreign women from M.I.T. form a curious third species," Westney says.

Patricia Cullen, '82, who is interning as a researcher in the Hitachi Central Laboratory in Tokyo, is "a test case," she writes. "My superiors have made it clear that I am different than the Japanese women, and they want to see how an American woman scientist works and behaves."

Cullen is providing ample answers to their question. Working with state-of-the-art molecular beam equipment to grow nickel disilicide semiconducting layers on silicon, she had her name on two papers presented at a Japanese applied physics conference in April, and she expected to give a paper to an international group this summer.

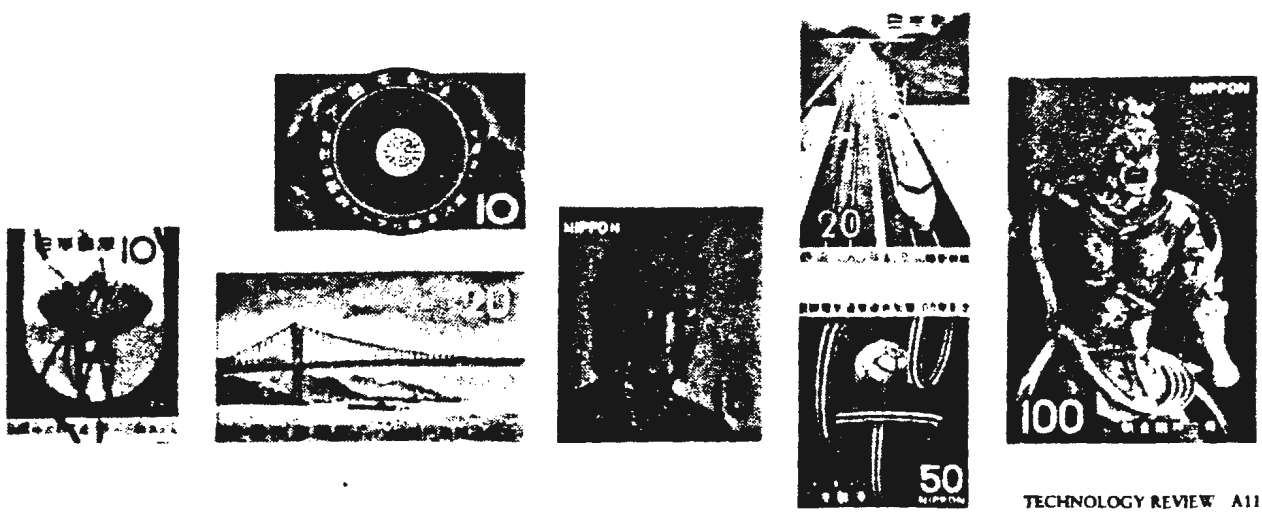
"They expect a very high level of work out of me, higher than normal for a new employee, because I am here just for a year," Cullen wrote to Alice Peattie. Samuels reports from Japan that Hitachi is very enthusiastic about Cullen's work and wants other M.I.T. interns.

"A Banana in a Coal Scuttle"

Tanya Sienko, '82, is also winning high praise from her Japanese mentors, Samuels reports. She originally enrolled in a nondegree program in electrical engineering at Tokyo University. Sienko survived the infamous Japanese "examination hell"—with the help of Goldstein's *Classical Mechanics*—and was admitted to the master's program at Tokyo, the country's top national university. It is an extraordinary achievement for a Western student.

"Learn Japanese," is Sienko's terse advice for would-be M.I.T.-Japan interns. "No matter how much you think the Japanese know English, you will find that it is invariably less than you think." Sienko lives with a Japanese family and speaks Japanese all the time.

She reports that women are al-



"If you stand around looking lost and helpless enough, someone will volunteer some help."

lowed a little more freedom if they are students, so long as they abide by the subtle codes that govern student group activities. "Remember that you are conspicuous—a banana in a coal scuttle," she cautions. Among Sienko's frustrations in daily life in Japan: colleagues who never understand your jokes; buildings with no insulation or central heat; spending the entire winter with a cold; beverages limited to beer, sake, orange soda, or tea; and routinely being lost on the trains.

On the other hand, Sienko has plenty of rewards, too. She has won a very generous Monbusho Scholarship from the Japanese government. Her research group really appreciates her determination to hang out with them, and to resist the temptation to gravitate to other *gaijin* (foreigners). She can buy almost all her favorite American products and brands—they're just expensive. And about the trains: "If you stand around looking lost and helpless enough, someone will volunteer some help."

Sienko also reports a great selection of books in English, even science fiction, a not-inconsequential bit of information for someone contemplating an entire year of culture upheaval.

Bring Your Motorcycle License

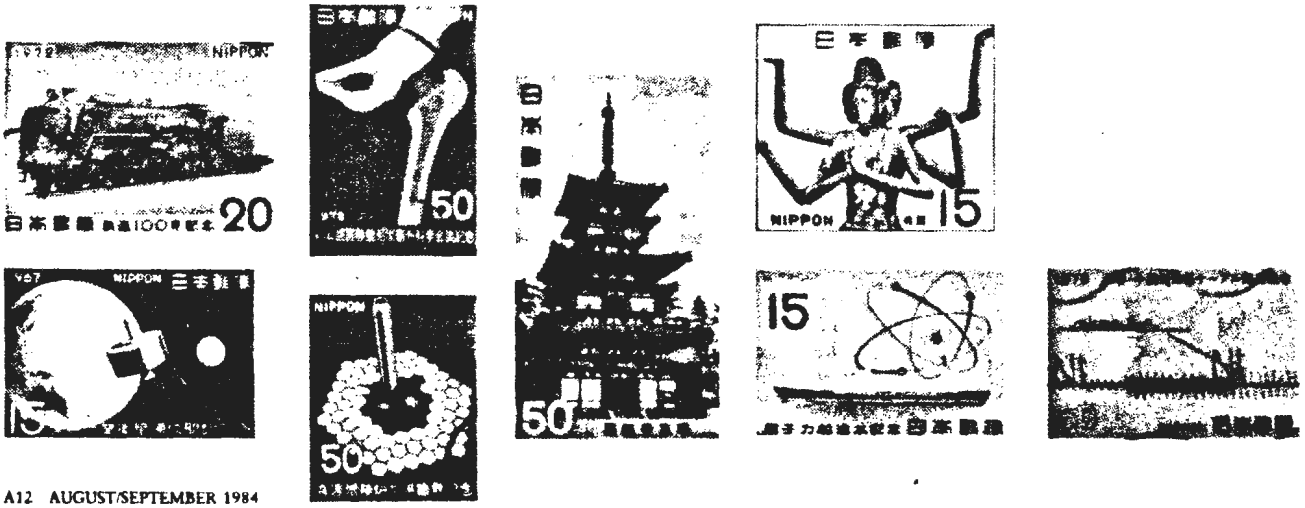
Peter Poole, who interrupted his graduate studies in the M.I.T. Technology and Policy Program to join in a new program for international graduate engineers at Kyoto University, describes with enthusiasm his experience as a civil engineering student there—almost an "industrial travelogue," he says. There are frequent trips to observe the billion-dollar civil projects that abound in the Kyoto area.

Poole is discovering the differences in learning style—the small amount of interdepartmental interaction, the "groupiness" of Japanese graduate students, and the distance and formality that characterize the relations between faculty and students.

As a result of the latter, Poole interacts primarily with the associate professor and research associates. But he finds appearances can be deceiving: his advisor, by virtue of his stature as a full professor and the government position that is inherent in professorships at national universities in Japan, can optimize Poole's research environment simply by introducing him in the right places.

Though Poole describes the Shugakuin International House at Koyto University as "unsurpassed in Japan," it's cold in the winter and reportedly hot and muggy in the summer. But he writes of the "exhilarating . . . freedom: of traveling by motorbike and hiking, free from crowds, trains, and buses." He recommends that interns bring motorcycle licenses, hiking boots, and sleeping bags.

Two goals are now at the top of Eleanor Westney's agenda: placing the first group of former interns in American jobs where their grasp of Japanese technology can be made to count, and raising additional funding to support special language training and to help Japanese universities and industries meet the costs of bringing highly qualified interns into their laboratories.—*S.L* □



Tech Talk,
March 30, 1983

Professor Richard J. Samuels and two of the eight MIT students who have applied for study or work positions in Japan through the MIT-Japan Science and Technology Program, which Professor Samuels directs. The students are Tanya Sienko, center, a senior in physics, and Helen Segal, graduate student in materials science and engineering.

Japan exchange to begin soon

Eight students at MIT are in the final stages of negotiations with industrial firms, universities and research centers in Japan where they hope to study or work for a year with the assistance of the MIT-Japan Science and Technology Program.

Those who succeed will be the first students to go to Japan under the program created in 1981 as a resource for educating MIT scientists, engineers and industrial managers about Japan and facilitating collaborative research among Japanese and American scholars.

Dr. Richard J. Samuels, assistant professor of political science, directs the program, which is administered through the Center for International Studies.

Professor Samuels said an open meeting will be held from 4:30-6pm Thursday, April 7, in Student Center Rm 491 to discuss the program.

"There is no technologically advanced foreign country less understood and more in need of understanding by America's technological leadership than Japan," Professor Samuels said. "People from MIT spend a year at GE or Westinghouse. Why not have them spend a year at Hitachi or Mitsubishi?"

Developing channels for such an exchange is the first order of business, Professor Samuels said, adding that the response from Japanese laboratories and firms has been very positive.

Because the United States has not been faced with the need to "catch up" in science and technology since the early years of this century, its industries and universities do not have sophisticated mechanisms for exploring technological developments beyond the country's borders, he said.

Dr. Samuels hopes to integrate engineering research and exposure to Japan for qualified students through the existing Engineering Internship Program. Plans call for a joint degree program—either a double SB in two fields or a joint SB/SM in the same field—that would include a year of study at a leading Japanese industrial or academic research laboratory. The Japan placement would provide the environment for a thesis research project, Professor Samuels said. Many MIT students prepare for a Japan placement through language study at Harvard.

Students currently concluding negotiations with Japanese organizations are:

Patricia Cullen, a graduate student in materials science and engineering. She has received an offer from Hitachi's Central Laboratory to work in its thin film devices program and is negotiating terms. Ms. Cullen also has been told by Tokyo Institute of Technology and Osaka University that they are willing to help her obtain a grant to finance her research.

Helen Segal, also a graduate student in materials science and engineering. She has been offered a one-year position beginning in June by Matsushita Electric Co. for work on super alloys and composite materials.

Tanya C. Sienko, a senior in physics. She is discussing a grant application with the University of Tokyo.

Patricia A. Morris, a graduate student in materials science and engineering. She has been invited by Japan's National Institute for Research in Inorganic Materials to do research in ceramics and is discussing terms.

Steven Cohen, a junior in electrical science and engineering. His applications to several universities are being processed.

Robert J. McGreevy, a senior in chemical engineering. He has applied to Osaka University and Tokyo University.

Peter J. Poole, a graduate student in civil engineering. He has submitted an application to the International Course at Kyoto University through an existing agreement between that university and MIT.

Ji Hoon Hong, a senior in economics. He is negotiating with the Research Institute of Telecommunications and Economics for a placement following his graduation this spring.

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October 8, 1984

Mr. Richard Levine
Deputy Director for International
Economic Affairs
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Washington, DC 20506

Dear Mr. Levine:

I recently learned from Mr. Arthur Corte in the Department of State (Office of Advanced Technology) that you have recently expressed an interest in the issue of Japanese scientific and technical information (JSTI)--more specifically, the issue of Japanese language capability among American scientists and engineers.

The North Carolina Japan Center has one of the few university programs in the country addressing the need for more Japan-related expertise among students of engineering and the sciences.

I have enclosed some information on our programs, including a copy of my testimony to the House Subcommittee on Science, Research and Technology earlier this year. I hope you find this material of interest.

If you have any further questions relating to our activities in JSTI, please do not hesitate to call me.

Sincerely yours,

Samuel Coleman, Ph.D.
Associate Director for Research
and Program Development

SC/soc

Enclosures

Programs in Applied Japanese Studies:

The North Carolina Japan Center and Its University-Industry Connections

Paper prepared for presentation at
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I. Problems and Challenges

Trends in technical and scientific communication between Japan and the United States point to a growing need for knowledge of Japan's language and social organization among American specialists in science and technology. Contrary to prevailing assumptions, the American scientific community is not indifferent to Japanese research activity. Science and engineering faculty in universities in the United States are aware of Japanese contributions to scientific and technological knowledge and regard Japanese colleagues' research with interest. A 1982 survey that I conducted at North Carolina State University found faculty across a wide spectrum of scientific fields holding a very high regard for Japanese colleagues' research, and wanting more channels for collaborating with them. (Please see the appendix for a brief description of relevant results.) Granted, a sample of one university hardly provides a complete picture of university faculty attitudes nationwide, but North Carolina State is typical enough of large land grant universities to merit serious consideration of the survey results. In addition, some United States university-based specialists have published evaluations of Japanese advances in their fields that call for a more serious regard for Japanese accomplishments and potentials. (See, for example, Kenney and Bowen 1983; National Research Council 1982.)

Accordingly, there is a growing interest in the United States in Japanese scientific and technical information (JSTI). A

recent conference organized by MIT's Japan Science and Technology Program, sponsored by the U.S. Department of State, devoted itself to examining the importance and availability of JSTI. Among its conclusions were that, although American science and technology could benefit considerably from greater availability of printed information in the sciences from Japan, only a small fraction is currently available, and efforts to obtain it are piecemeal and uncoordinated (Gillmor and Samuels 1983).

The greatest obstacle to increased availability and use of JSTI is, of course, the Japanese language itself. There has been conjecture that Japanese technical specialists do not publish more in European languages because they are more intent upon contributing to their own organizations than seeking international recognition, and that only a concerted effort to "internationalize" research results will avert the danger of international frictions (Takayama 1981). Although Japan's volume of English language reporting of research results may indeed become an issue in U.S.-Japan tensions over technology transfer, it would be unreasonable--as the MIT conference participants agreed--to expect the Japanese to publish primarily in English: the Japanese experience as much difficulty in preparing manuscripts for publication in English as Americans do in translating Japanese articles; moreover, the primary audience for such communication is, understandably, other Japanese scientists, and an effort to convert all of these writings into English would slow the flow of scientific communication both within and without (Gillmor and Samuels 1983:163). In addition, Japan is gaining a greater

degree of independence in world political affairs, which could in turn prompt less of a sense of obligation to make some forms of information available in English.

A critical factor, then, in future scientific and technological communication between our two countries, will be the American scientific community's ability to assimilate information in Japanese--oral as well as written, for a considerable portion of information transfer takes place in face-to-face encounters, and such personal contacts will probably play an increasingly important role. The conclusion of the MIT conference on JSTI states the case well:

> . . .a major element in any long-term solution to the problems encountered in acquiring and utilizing JSTI is investment in programs to produce technically-trained people with a command of the Japanese language. For the vast majority of Americans . . . Japan remains a "black box." This situation will not improve much until reasonable numbers of scientific and technical personnel are available who can peer into the "box" and facilitate a more balanced exchange of STI (Gillmor and Samuels 1983: 164; see also Cooper and Jones 1983: 43).

Despite the importance of Japanese language knowledge to the American scientific community, we have yet to marshall our resources to promote Japanese language study among our younger scientists currently receiving their education. We need to facilitate Japanese language study among science students, articulate and advertise the new career opportunities for those who have Japanese expertise, and provide incentives for students who add Japanese language study to their already demanding curriculum. Currently, science students with an interest and ability in Japanese do not get sufficient encouragement. Take, for example, the case of the senior majoring in physics at the University of

Michigan who, despite an A- average in Japanese and an overall grade point average of B, has decided to discontinue language study because "Japanese study requires a lot of time and the rewards just don't seem to justify the work." (This example comes from a three-university study in progress by Prof. Hiroko Kataoka, Language Coordinator for the North Carolina Japan Center. Her University of Michigan sample of 90 Japanese language students has only 7 majors in the sciences.)

The current orientation of university administrators and Japan specialists hinders their ability to help produce a new generation of scientists with Japan expertise or to play a facilitating role for American scientists who are eager to learn more about developments in Japan. University administrators tend to classify all "international" activities as acts of American good will (in which information only flows out from the U.S. source), or as efforts toward such abstract goals as mutual understanding or a well-rounded education for their students. One indication of this approach is in student exchange programs; American administrators overlook the benefits of information in-flow and network-building from foreign students who come from Japan and other OECD countries (see, for example, Goodwin and Nacht 1983). Contributors to a 1982 special edition of Engineering Education on international education programs failed--to the editor's dismay--to include any articles concerning projects involving other industrialized countries (Bugliarello 1982: 266).

Academic Japan specialists as well have not recognized the need for programs to aid the American scientific community. The only professional association for Japanologists in academia, the

Association for Asian Studies, has not evidenced any interest in activities to assist the scientific community. (A panel proposal on the subject for the 1984 national meeting was rejected.) A dramatic increase in Japan-related courses in graduate-level professional programs has been taking place in colleges and universities; they represent mostly heightened interest in Japanese business management practices, however, and academic Japanologists view the trend skeptically as a "fad" (Japan Foundation/Social Science Research Council 1983: 4-5).

II. Solutions and Potentials

The organizational structures generated to support university-industry cooperation in the United States could be very useful for improving Japan-related knowledge in the American scientific community as well. U.S. universities are playing an ever greater part in supporting technological innovation through links with industry in research and education (National Science Board 1982; U.S. Government, General Accounting Office 1983).

The following factors appear important to successful university-industry collaboration (see the 1983 U.S. Government GAO report): commitment on the part of university administrators and faculty to allocate a portion of university research and expertise toward industrial needs; strong leadership enjoying the respect of both academic and industrial communities; sustained sources of funding; and--in the case of research parks--a measure of luck (circumstantial factors beyond administrative control).

These ingredients are evidenced in North Carolina's Research Triangle and in the industry-related programs of North Carolina State University, the most active university partner with Triangle research firms and agencies. The Research Triangle is a three-cornered area in central North Carolina bounded by Duke University in the city of Durham to the northwest, the University of North Carolina at Chapel Hill to the west, and North Carolina State University in Raleigh, the state's capital, to the southeast. In its center is the Research Triangle Park, a 5,800-acre tract currently containing some 45 research-oriented firms and agencies with a workforce of about 20,000. One measure of the park's success is the economic development it represents; its buildings are worth over a billion dollars, and new investments totaling over $100 million are either completed or are in the working stages.

The park originated in the late 1950's, when a group of North Carolina citizens acquired the land that constitutes the park and endowed the Research Triangle Foundation with it. (The Foundation, a non-profit organization, manages the park.) the concept received the cooperation and encouragement of the state's government; like the citizen's group, the then Governor, Luther Hodges, was concerned about out-migration of the state's university graduates, and recognized knowledge-intensive industry as the most promising course for the state's economic development. Through the state government, the three major universities in the area participated in the planning of the park. Together, they formed the Research Triangle Institute,

under joint ownership but separate management. The Institute, together with the Chemstrand Research Center, became the park's first residents in 1960. The dramatic growth of the park only began some five years later, however, when IBM designated the place for its development and manufacture of communications equipment and the U.S. Environmental Protection Agency announced its plans for placing its Environmental Research Center in the park.

The park's history reflects the ability and the perspicacity of the state government. Note also that the universities were oriented from the very beginning to responding to industry needs and interests. The sizeable land investment in a strategic area had created a solid base for subsequent growth. Luck played a part in the natural amenities of the region, which enjoys a mild climate and scenic variety--important "quality of life" factors. One might also assign to luck the contiguity of three prominent universities.

For North Carolina State University in particular, responsiveness to industry needs antedated the Research Triangle Park: it was a condition of the university's creation. The university was founded in 1887 under the terms of the Morrill Act of 1862, the federal government's first effort to foster university-industry cooperation. The law authorized creation of land-grant colleges to provide an academic base in agriculture and the "mechanic arts."

NCSU has taken the model of agricultural extension--the United States' oldest recognized system for transferring technology from university to industry--and has modified and

elaborated on the theme in non-agricultural industries. These non-agricultural programs have stature and scale in the university that approach its agricultural extension. The Schools of Textiles, Engineering, and Forest Resources have particularly strong links with the research and educational activities of the university. The educational activities of these programs include short courses in company workshops, packaged courses for continuing education in engineering, and videotaped and televised courses. The constituencies served by these programs are generally well-organized politically, which helps assure continued state support (U.S. General Accounting Office 1983).

NCSU's interaction with the Research Triangle Park has mostly taken the form of education and consulting. The number of cooperative research projects involving area industries, such as the Center for Communications and Signal Processing, has also grown in recent years, however. In addition to information transfer, one of the primary benefits to NCSU in its relationship with the Research Triangle Park has been the teaching talent available to the university from area industries' specialists; in 1983, some 220 specialists held adjunct positions in the universities.

The North Carolina Japan Center at North Carolina State University has created and promoted its Japan-related activities in science and technology by linking up with the university's industry-related programs. The Japan Center was established in 1980 at NCSU by Governor James B. Hunt, with $140,000 from the State legislature and significant additional funding from the

university. The state's creation of a Japan Center represents part of a series of investments designed to foster cooperation among industry, universities and the state's government in developing the state's economy. Contemporary developments with the same obective include the Microelectronics Center of North Carolina and the North Carolina Biotechnology Center. The Japan Center was established primarily to make the state more attractive to Japanese capital, but it was given a broad mandate to conduct Japan-related activities for the benefit of the state. Its location at North Carolina State University reflected the planners' desire to draw upon and complement the university's greatest strengths: science, technology and public service.

Under the Center's first formal program, the Faculty Fellows Program, some 30 faculty members and professional staff were trained in elementary Japanese and provided a four-month period in Japan for professional activities. Ten of the Fellows are scientists and engineers, and another four are specialists in library service or televised educational production.

The Japanese language program at NCSU, the largest in the southeastern United States, is noteworthy in its student composition; over half of the regularly enrolled graduate and undergraduate students taking Japanese are majoring in the natural and applied sciences, and they are our best language students. This representation of the sciences in a Japanese language program results partly from a language program that is more accessible to such students because the number of weekly class hours is less than that of the typical Japanese language

program. It also represents active promotion beyond the traditional target population of students in the humanities.

Most of the Center's programs have grown along the lines of university extension and public service programs. The Center has been providing a ten-week on-site language and culture course to IBM's quality assurance staff, who travel to Japan frequently. The course enables the traveler to Japan to interact with Japanese colleagues with more self-confidence and fewer misunderstandings, and to be more independent when negotiating basic traveling tasks in Japan. The Center is also preparing a packaged course with the same objectives for the continuing education of businesspeople. Another Center project adapts some unothodox but highly effective televised education methods from an extension program; through one of the Fellows, an innovator in videotaped educational productions for the School of Textiles (Teacher Oriented Televised Education), we have devised a well-structured course in Japanese with qualified supervision for small and geographically dispersed groups of students.

Clearinghouse activity relating to scientific and technical publications from Japan takes place through the university's Technical Information Center. Its director, another Center Fellow, has catalogued over 400 technical periodicals from Japan in the library's collection, 213 of them current. The Japan Center has also provided information on technical translating services to university faculty and to industry, as well as travel-related information for those who go to Japan in the course of their professional work.

One other Japan Center contribution to improving scientific and technical communication between Japan and the United States resides in another adaptation of an existing NCSU program, Cooperative Education. Under the program, students alternate periods of supervised employment with their classroom courses. There are approximately 500 engineering students currently involved in the program. In the Japan Center version, students who have career goals that could benefit from Japan expertise, particularly students in technical and scientific majors, become eligible if they have demonstrated superior performance in the study of the Japanese language as well as maturity and solid achievement in their fields of specialization. Successful candidates spend a three-to four-month period as interns at cooperating firms in Japan, including affiliates and subsidiaries of U.S.-based companies. The program has just begun with two students who were accepted by Japan IBM's Fujisawa Development Laboratory to work in their respective fields of electrical engineering and computer science. This program will probably remain small for a good while to come because we are adhering to a stringent set of selection criteria, but it should nevertheless help encourage Japanese language study among our students in the natural and applied sciences.

These confluences between Japan Center programs and existing university structures are extremely recent; the issue of activities involving Japan, as of 1980, had been entirely new to North Carolina State University. Up until then, there was no Japanese language offering, save for a self-instructional program

involving one or two students. There had been (and still is) no East Asian studies program. Japan did previously enter university history: the first foreign graduate was Japanese (an 1898 Bachelor of Science degree in Engineering); and the university's Provost from 1962 to 1974, Harry C. Kelly, had had a distinguished postwar career of cooperation with the Japanese scientific community. Unfortunately, however, neither of these individual connections had any programmatic results. (NCSU's lack of institutional connections with Japan makes the results of the faculty survey summarized in the Appendix more noteworthy.)

Adding the Japanese dimension to university activities has necessitated knowledge and skills that overlap with those of academic Japanology but are intrinsically action-oriented. What does one teach an engineer in industry who has just been assigned to Japan? How does one apply knowledge of Japanese social organization to the structuring of collaborative research projects? How can Japanese language education best be structured for the demanding curriculum of a physics major? These are a sample of the questions that involve Japan expertise.

The Japan Center is not unique in addressing such challenges. The MIT-Japan Science and Technology Program is a kindred organization in goals and, in some cases, a leader in approaches. New York University has been planning a program that will encourage Japanese language study among computer science majors, and Ohio State University is investigating a number of possibilities for Japan-related programs in science and

technology. All of us share the task of putting our Japan-related knowledge to the service of the scientific and engineering community.

Despite the increasing call for the practical use of Japan-related knowledge within the university, there has yet to emerge such a subdiscipline among Japanologists. It is easy to imagine such a specialization; just as, years ago, anthropologists created Applied Anthropology to promote the use of anthropological concepts in structuring, analyzing and evaluating social programs, the current needs of the American scientific and industrial sector call for Applied Japan Studies. If the reader will forgive a homely analogy, social scientists have long been aided in their statistical analyses of large data sets by packaged programs created specifically for their use by computer specialists. Similarly, scientists in academia and industry could benefit from a distillation of Japan expertise that is formulated with their needs in mind, given the limitations of time and energy that prevent these people from becoming full-blown Japan specialists in their own right.

Universities with extensive industrial cooperation provide the best context for applied Japanology, not only because demand is greatest there, but because--perhaps more importantly--such schools encourage practical applications and public service as legitimate intellectual endeavors. Moreover, America's best examples of university-industry cooperation may eventually provide a new locus for expanded joint U.S.-Japan high-technology

projects in which the private sectors of both countries can participate extensively. Their success, in turn, will require a new generation of American scientists and engineers with a working knowledge of Japanese language and society. It is the university with an applied Japanese studies orientation that will produce these experts.

Appendix

NCSU Faculty Survey Summary

Date of Survey: November, 1982

Location: North Carolina State University, Raleigh, North Carolina, U.S.A.

Population: 1,384 Rank Faculty (lecturers, tenured faculty, and tenure-track appointments)

Responses: 819

Return Rate: 59 percent

Major Findings: 23 percent of the sample reported some form of current professional involvement with Japanese colleagues.

Over a third of the sample indicated that they were interested in developments in their field in Japan but lacked the channels for making use of them.

30 percent of the sample gave an "excellent" rating to Japanese research in their field. Of the nine schools within NCSU,[a] the six science and engineering schools registered the highest evaluation of Japanese colleagues' research. The mean evaluation, where 4.0 = "Excellent," was as follows:

School	Mean Ranking	No. of Question Respondents	No. of Survey Respondents
Engineering	3.68	59	73
Physical & Mathematical Sciences	3.59	91	123
Textiles	3.59	22	28
Veterinary Medicine	3.55	33	45
Forest Resources	3.48	21	39
Agriculture & Life Sciences	3.47	169	264

Variation among departments was considerable. Copies of the full survey report are available on request to the North Carolina Japan Center.

[a] The other three schools are Design, Education, and Humanities & Social Sciences.

References Cited

Bugliarello, George
1982 "International Concerns in Engineering Education." Engineering Education 72 (4): 266-268 (January).

Cooper, Richard N. and Philip B. Jones
1983 "The Long-Term Outlook for United States-Japanese Cooperation." In U.S.-Japan Relations: Towards a New Equilibrium. Annual Review 1982-83, The Program on U.S.-Japan Relations, Center for International Affairs. Cambridge, Mass.: Harvard University.

Gillmor, Reginald B. and Richard J. Samuels, eds.
1983 Japanese Scientific and Technical Information in the United States. (Workshop Proceedings, MIT, March 1983.) Springfield, Virginia: National Technical Information Service, Department of Commerce, U.S. Government.

Goodwin, Crauford and Michael Nacht
1983 Absence of Decision: Foreign Students in American Colleges and Universities. New York: Institute of International Education.

Japan Foundation/Social Science Research Council
1983 Japanese Studies in the 1980's: Surveys of Institutions and Individuals. Report of Findings (March). New York: Social Science Research Council.

Kenney, George B. and Kent Bowen
1983 "High Tech Ceramics in Japan: Current and Future Markets." Ceramic Bulletin 62 (5): 590-596 May).

National Research Council
1982 International Developments in Computer Science. Standing Panel to Survey International Developments in Computer Science, Computer Science and Technology Board, Commission on Physican Sciences, Mathematics, and Resources.) Washington, D.C.: National Academy Press.

National Science Board
1982 University-Industry Research Relationships: Myths, Realities and Potentials. Fourteenth Annual Report of the National Science Board. Washington, D.C.: National Science Foundation.

Takayama Masaya
1981 "Risāchi Furonto ni okeru Gijutsu Jōhō Ryūtsū no Jisshōteki Bunseki" (Analysis of Technological Information Transfer at a Research Front.) Library and Information Service (Japan) 19: 55-75.

U.S. Government, General Accounting Office
1983 The Federal Role in Fostering University-Industry Cooperation. Gaithersburg, Md.: U.S. General Accounting Office (May).

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March 7, 1984

Subcommittee on
Science, Research and Technology

I am honored and gratified by the invitation to testify that this subcommittee of the Committee on Science and Technology has extended to me. I wish to commend the Committee for its efforts to raise public awareness of our country's need for organizational mechanisms that can make Japanese scientific and technical information (JSTI) available.

After introducing the North Carolina Japan Center and my role there, I would like to briefly describe our JSTI-related needs and then propose some programmatic measures that should help meet the objectives of this subcommittee.

The Japan Center was established at North Carolina State University in 1980 as part of a series of investments designed to foster cooperation among industry, universities, and the state's government in developing the North Carolina economy. Other recent state-sponsored developments with the same objective include the Microelectronics Center of North Carolina and the North Carolina Biotechnology Center. The Japan Center was established primarily to make the state more attractive to Japanese investment, but it was given a broad mandate to conduct Japan-related activities for the benefit of the state. Its location at North Carolina State University, a land-grant institution, reflects the planners' desire to draw upon and complement the university's greatest strengths: science, technology, and public service through extension activities.

North Carolina State University, with Duke University and the University of North Carolina at Chapel Hill, forms the "Research Triangle" area of North Carolina. NCSU is the most

active university partner with companies located in the Research Triangle Park, a 6,000-acre tract in the center of the triangle that contains some 45 research-oriented firms and agencies with a workforce of about 20,000.

Since mid-1982, when I joined the Japan Center, I have been organizing and administering academic programs that relate in large part to scientific, technical and commercial activities that involve Japan. I am a Japan specialist by training, with a Ph.D. in Anthropology and an East Asian Institute Certificate, both from Columbia University. I earned them with the indispensable help of three years of National Defense Foreign Language fellowships.

The Center has emphasized Japanese language learning since its very inception; the first academic post filled was that of language instructor, and the first major program involved Japanese language instruction and a semester in Japan for a hand-picked group of NCSU faculty members from a variety of disciplines. Of 30 faculty who have benefited from the program, 10 are in scientific or engineering fields. As of fall, 1983, there were 72 students enrolled in our Japanese language classes, making ours the largest Japanese language program in the Southeastern United States. What makes our language program truly unique, however, is the composition of these classes: about two thirds of our regularly enrolled students are majoring in the sciences and engineering.

The Japan Center has just begun a program which places engineering and science students in internships in Japanese firms for one semester. One graduate student in Electrical and Computer Engineering and a recent graduate in Computer Science (both natives of North Carolina) are currently working at Japan IBM's Fujisawa Development Laboratories. The Center has also been providing a ten-week Japanese language and culture orientation for engineers at the IBM facility in the Triangle.

In addition, the Japan Center acts as a clearinghouse for information relating to translating and interpreting, academic exchanges, and Japanese business practices.

One problem that the Japan Center has not encountered is an indifference among our faculty to the accomplishments of their Japanese colleagues. In a 1982 survey of our faculty (819 responses, a return rate of 59 percent), Japanese research received excellent evaluations, not only in seven of the eight departments comprising our School of Engineering, but in a wide variety of departments in other scientific and technical schools as well, including botany, biochemistry, plant pathology, textile chemistry, marine, earth and atmospheric sciences, and microbiology.

Our faculty in the sciences and engineering--particularly those who have entered our language program--also support our efforts to provide Japanese language training to their students. We agree with the conclusion of the January 1983 M.I.T. workshop on JSTI that a long-term solution to our information needs must involve the creation of a new generation of scientific and technical specialists with Japanese language expertise (Gillmor and Samuels' March 1983 report, Japanese Scientific and Technical Information in the United States, reproduced by NTIS).

There are several sound reasons to advocate Japanese language training for future engineers and scientists. Japanese and American corporations are relying less and less on the traditional contractual forms of technology transfer, patents and licenses, and are opting instead for nontraditional arrangements such as information exchanges and visitation rights. (This trend results in large part from the complexity of the technologies involved and the difficulty of pricing them.) In order to participate in these new arrangements on an equal footing, our companies need technical specialists with a good

command of the Japanese language. Since an ever larger part of information transfer is taking place through face-to-face communication, these individuals would be much more effective when interacting with Japanese colleagues and clients. Their ability to do their own translating would greatly expedite the assimilation of printed JSTI also.

Perhaps of equal importance, we need greater numbers of technical and scientific specialists with ability in Japanese because the Japanese themselves are going to be less inclined to provide information in English as their technical self-sufficiency grows and as they achieve more political and military independence from the United States.

Our students in the sciences have begun to demonstrate an interest in learning Japanese, as evidenced by their majority presence in our language classes. But we need to reward their interest. We also need to bring these students into our language classes early enough in their college careers to give them a basic level of proficiency before they earn their degrees and leave the university. Currently, too many of our most promising first- and second-year Japanese language students discontinue their language study due to graduation. I should also note here that our best language-teaching investment will be in students, not established professionals: I am extremely proud of our faculty who have made the commitment to master the Japanese language, but our efforts to teach them have also revealed the considerable difficulties of adding such a time- and energy-consuming enterprise to their already demanding full-time careers. We have also encountered these difficulties in our courses for corporate professionals.

We need funding support for summer intensive language courses with scholarship support, so that our students in the sciences and engineering can integrate Japanese language study with their demanding course loads. We also need fellowships and

research awards to encourage and support our graduate students. I offer this subcommittee the case of Mr. Joseph Doolan, a Ph.D. student in Textile Chemistry at NCSU. His advisor has had an excellent collaborative relationship with colleagues at the Tokyo Institute of Technology, and is ready to send Mr. Doolan there for his dissertation research. There are no funding sources that address such research activity in Japan, however. Mr. Doolan began Japanese language study last year, but the uncertainty of his prospects for getting to Japan, coupled with a doctoral program timetable that makes no room for language study, have forced him to reconsider continuing his Japanese language course work.

Although I am focusing on Japanese language instruction as our country's most important long-range goal, there are a variety of university-based programs that would benefit our scientists and engineers who have no knowledge of Japanese, and these programs would also augment the efforts of our language programs. As one example, we are currently examining ways to encourage researchers and graduate students from Japanese industry and academia to come to our campus. These long-term visitors will provide many learning opportunities for our faculty. Through these associations, our faculty will become more adept at identifying and selecting those materials in Japanese that are most worth translating. And many of the Japanese visitors will provide local technical translating skills as well. They will also become valuable contacts for placing students in internships and academic exchanges, which in turn provide valuable means for the promotion of Japanese language study.

Multi-faceted programs at university-based centers of Japan-United States scientific and technical cooperation offer the most productive location for our JSTI-related

efforts because, as the above example illustrates, such programs create mutually reinforcing information networks. And the university centers that could best pass along the fruits of such networks to American industry would be those that have already developed a variety of cooperative relationships with business. Such schools are attuned to the needs of their corporate partners and have developed the most effective channels for meeting them while preserving academic goals. In addition, these universities are now devising practical solutions to the ever-present problems of honoring proprietary information while pursuing open exchange of information, and such solutions might well provide guidelines for projects that involve the Japanese private sector.

In response to the subcommittee's request for suggestions regarding constructive roles for government and industry, I would like to propose that the federal government provide funding support for scholarships and fellowships to students in the sciences and engineering who commit thenselves to the study of the Japanese language. Looking back at my own student career, I doubt if I could have persevered in my study of the Japanese language at Columbia University were it not for a federally supported foreign language fellowship program which enabled me to get a Ph.D. degree. We now need such a program for students like Mr. Doolan.

Industrial concerns can and should play a complementary role that begins with recognizing the value of technical specialists with a professional grasp of Japan's language coupled with some knowledge of the country's society and culture. We depend on the industrial community to create internships for our students that involve work in Japan. More importantly, we depend upon industry to define career opportunities for these students once they graduate. It would also be entirely appropriate for American corporations to fund academic chairs

that would honor and reward those scholars in the sciences and engineering who have demonstrated outstanding ability to collaborate effectively with Japanese colleagues to the benefit of their disciplines.

Federal support could take place in the context of designated regional university-based centers, and could also include support of programs for collecting and translating written JSTI. I have suggested that such centers of activity be located at those universities that have demonstrated a variety of viable cooperative relationships with industry, in order to expedite the flow of JSTI to the private sector. I would like to add another important criterion for selecting participating universities. The most effective university partners for the efforts that I have described are schools that can demonstrate the willingness and flexibility to design Japan-related course offerings to meet the specific needs of students in the sciences and technology. Long-established Japan programs at American universities do not automatically qualify: they are geared to the production of Japan specialists in the humanities and social sciences. Students in those programs can afford to devote up to half of their course work to language study, but such involvement poses an unreasonable demand for students in the sciences and engineering. To be successful, any attempt to provide the latter group with knowledge of the Japanese language and society must be coordinated with the curriculum demands of those students' majors. The non-language Japan courses for those students should consist of offerings in the social sciences and history that address their interests and knowledge needs also.

I hope that I have not disappointed the members of this subcommittee because I have emphasized language programs and have not focused on projects like centralized bibliographic and translating clearinghouses for JSTI. From my own university-based position, however, I see America's current JSTI needs

as a systemic challenge that requires a multi-faceted, coordinated solution in order to reap substantial long-term benefits.

I thank this subcommittee for the opportunity to discuss these issues, and I welcome any questions or requests for further information.

Chemical and Engineering News, Vol. 62 No. 12, March 19, 1984

Technical Data Policy On Japan Urged

The people who follow worldwide scientific and technological trends are now insisting with a single chorus that Japan is winning the global information war. It is winning because it has a well-organized global information strategy, and the U.S. has nothing to match it.

John A. Alic, policy analyst at Congress' Office of Technology Assessment, has studied the problem for OTA and says it is serious. "A surprising number of U.S. corporations, even among the larger multinationals, have neither offices in Japan nor information-gathering networks there," he says. "Sometimes they realize too late how good the competition has become." Alic made his comments earlier this month during hearings on the Japanese information threat held by the House Science & Technology Committee.

The reasons are many and varied as to why the U.S. has become such an information laggard. One possibility is that it has not until recently depended on trade as a key factor in economic growth. Another is the typical U.S. smugness in believing it always will be best at everything.

Whatever the reasons, the U.S. is faced with catching up with a power that may be moving too fast to reach. The key to doing that is a language and information policy toward Japan.

The U.S., most witnesses at the hearing said, must develop a total information strategy toward Japan. A good start would be training scientists and engineers in the Japanese language and culture. That is the only way the U.S. will be able to tap into Japanese innovations in science, technology, and management, Sam Coleman, an associate director of the North Carolina-Japan Center in Raleigh, N.C., told the hearing.

Chimed OTA's Alic, "How many Americans go to technical meetings in Japan, even those where English is spoken? How many technical articles written in English cite the Japanese literature? How many textbooks used in U.S. engineering schools mention Japanese contributions? How many scholarships or prizes recognize joint achievement in engineering and language?"

Seals: working to extend network

James V. Seals Jr., director of international programs for Chemical Abstracts Service, says the government could do a whole lot more to help the U.S. science information community establish a true national policy to understand and tie in with the global nature of information.

"U.S. federal policy makers are not sufficiently aware of the policy issues concerning information transfer and information technology," he says. "This virtual absence of national policies in the U.S. is in sharp contrast to the situation in Japan and the industrial European nations."

CAS recently joined with the West German national information center for energy, physics, and mathematics, Seals points out, "to form the first link in what will become a worldwide computer network of scientific and technical information." He adds, "We are working actively to extend this network into Japan. This would improve western access to some valuable Japanese scientific and technical databases as well as Japanese access to U.S. and European databases."

Alic says that anyone who has taken the time to look in detail at Japanese technology cannot help but be impressed. "In the automobile industry, Japanese engineers have learned to use chemical vapor deposition coatings to increase the life of blanking and forming dies by factors of 100 to 1000. Reading the technical literature on such processes is only a first step toward getting results comparable to Honda's. That takes experience with the technology. But especially at the research level, relatively few Americans work on such seemingly mundane problems."

For at least a decade, the U.S. Department of Commerce has played around the edges of establishing a working competitive assessment activity that would judge trends and threats to U.S. technology from foreign competition. At long last it has a Japan Office to do just that. George Mu, deputy director, says his office and the National Science Foundation are getting together on a pilot study of Japanese advances in computer science, "mechanotronics," nonsilicon-based microelectronics, and biotechnology. Mu says the Japanese have a competitive information advantage over the U.S. because vastly more of their technical facilities are facile in both English and Japanese.

"We hope," says Mu, "to be able to comment on the quality of R&D in Japan, assess how much of the significant developments in Japan are translated into English, and suggest ways and means to increase the utilization of this information to meet American competitive requirements."

Wil Lepkowski, Washington

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The North Carolina Japan Center's Intern Program

(May, 1984)

PURPOSES: This program is designed to promote Japanese language study among university students with professional and business career goals, particularly students in technical and scientific majors. It provides these students first-hand experience in Japanese workplaces and society, and affords them an opportunity to utilize Japanese language skills.

BASIC PLAN: Student candidates are screened by the North Carolina Japan Center; applications are forwarded for final selection to interested firms in Japan, including affiliates and subsidiaries of U.S.-based companies. Successful candidates work a minimum of three to four months (one academic term) in Japan. Participants may receive up to three hours of grade credit depending upon individual arrangements. The receiving company provides transportation to and from Japan plus either a salary commensurate with the interns' individual skills and background, or a stipend which covers day-to-day living expenses and commuting to the workplace.

STUDENT REQUIREMENTS: All candidates must be regularly enrolled graduate students or undergraduates at NC State University, or recent graduates who are enrolled in Japanese language study as special students. The applicant must have a major field of study that is pertinent to the specialties of a prospective employer in Japan. All applicants must have at least two years of Japanese language study at NCSU with a B+ average or better, or equivalent. Applicants must have demonstrated maturity and motivation, as reflected in grade point average, extracurricular interests, activities, and career goals.

CURRENT PARTICIPATION: In the first year of the program's operation, one graduate student in Electrical Engineering and a recent graduate in Computer Science went to Nippon IBM's Fujisawa Research Laboratories for a three-month internship. (Nippon IBM paid their air fare to Japan, accommodated them in a nearby hotel, and provided them with a stipend to cover daily living expenses.) Both students are North Carolina natives who began Japanese language study at NCSU. The Japan Center currently has four candidates, all undergraduates, in the fields of Electrical Engineering, Poultry Science, Aerospace Engineering, and Economics and Business.

ANTICIPATED PROGRAM EXPANSION: Expansion of the program depends primarily on the number of qualified, interested students who apply. We anticipate an average of five applicants yearly.

--A Note About Japanese Language Study at NCSU--

The Japanese language program at NCSU has been expanding at a mean annual rate of 66 percent since 1980, the first year of regular classroom instruction. We now have two full-time qualified instructors with academic appointments in the Department of Foreign Languages and Literatures, and we enjoy excellent cooperation with that department. One of the instructors, Professor Hiroko Kataoka, is the Japan Center's Language Coordinator. She has a Ph.D. degree in Education with a foreign language emphasis from the University of Illinois.

Enrollment in Japanese language courses at NCSU is currently about 60 students, including faculty and special students. Of these 60, 46 are regularly enrolled graduate and undergraduate students, of whom 15 are in the School of Engineering, 6 in the School of Physical and Mathematical Sciences, and 6 in Agriculture and Life Sciences. (For electronics: seven are in Electrical Engineering majors, five are in Computer Science, and one is in Physics. There are also six students majoring in Economics and Business.)

Two NCSU students will serve internships in Japan

By LUCY INMAN
Times staff writer

Two N.C. State University students will travel to Japan Saturday for vocational internships with IBM in Japan as part of the North Carolina Japan Center's efforts to link this state with Japan.

Leo Blume, a graduate student in electrical engineering, and Gene Mangum, a computer science graduate who now studies Japanese at NCSU, will be working at IBM's development laboratory in Fujisawa.

The internships, which will last one semester or until the end of April, will be the first in an internship program developing through the Japan Center, a state office established in 1980 to promote technological, economic and cultural exchanges between North Carolina and Japan.

"This signifies a new interest among students in the Japanese language and Japan in general," Samuel Coleman, assistant director of the center, said in a telephone interview.

Coleman said more internships will be arranged after students' work preferences are polled this semester. He said the job program will foster technological exchanges between this state and Japan.

"There are going to be more and more cooperative technological projects between the United States and Japan," Coleman said, such as the recently announced automotive venture between General Motors and Toyota.

"The United States and Japan are trade partners and political partners," he said, noting that Japan is second only to Canada in trade with this country. Coleman said sending Americans to work in Japanese firms will strengthen both the technological capacity of the United States as well as strenghten our friendship and bargaining ability with Japanese companies.

And because the internship program involves students from NCSU, Coleman said, "I think it definitely gives our state an edge over the rest of the country."

Blume and Mangum were selected from among several candidates for the jobs who were evaluated by IBM officials on the basis of extensive resumes. Job requirements include technical skills and advanced Japanese language skills. Both are A students and have studied Japanese for five semesters.

Blume, 24, who is from Fayetteville, will be developing computer hardware for video display terminals. Mangum, 25, from Albemarle, will work with software computer programs. But the students said their jobs haven't been specified beyond those categories.

Unlike the United States, where companies pick a certain person for a job, Mangum said, "In Japan, they take a person and try to fit a position to him."

Both said they expected to learn about other Japanese technological and management practices that are different from those in this country. "By seeing how the Japanese do things, we'll be able to relate their techniques to American firms," Blume said. "I think we'll have some capabilities that are pretty unique," he said.

Blume said he wasn't familiar with all the differences that exist between the Japanese and American working worlds. "We're prepared to be surprised," he said.

They consider their upcoming responsibilities to be to this state as well as to their own careers. "People will look at us as representatives of North Carolina," Blume said.

"It's going to make the Japanese possibly more aware of North Carolina," he said. "We're making a statement that the technical sciences are alive and well here."

Although the two will stay in a Japanese hotel, they won't be leaning on American staples. "We're going to try to live as the Japanese do," Mangum said.

Having lived as college students for some time, they said they may need haircuts for their new jobs.

Blume Mangum

Japan Economic Survey

A Monthly Review of
U.S.-Japan Economic Relations

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May 1984

IN THIS ISSUE

JSP Chairman Visits Washington

Masashi Ishibashi, chairman of the Japan Socialist Party, arrived in Washington April 7 at the outset of an eleven-day visit to the United States, the first by a leader of the party since 1979.

Mr. Ishibashi met Vice President George Bush, Secretary of State George Shultz, Defense Secretary Caspar Weinberger and members of Congress during his stay. He indicated that he hoped his visit as head of the "New Japan Socialist Party" would bring greater cooperation between the two countries.

Talks with the Secretary of State centered largely on arms reduction and Soviet deployment of SS-20 nuclear missiles in Asia. The problem of Korean reunification was also raised by the socialist leader, who urged trilateral talks among the United States, the Republic of Korea and the Democratic Republic of Korea to explore reunification proposals.

The session with Mr. Weinberger indicated the depth of differences between JSP and Reagan administration policies, although discussions were said to be cordial and productive. Mr. Ishibashi challenged the notion of the 1,000-mile sealane defense, indicating his own preference of unarmed neutrality over a policy which would require heightened Japanese defense capabilities.

Sandwiched in between the Shultz and Weinberger meetings was a session with Vice President Bush, during which Mr. Ishibashi called for a regional conference on disarmament among Asian and Pacific nations.

Mr. Ishibashi, who became chairman of the JSP in September 1983, said he wanted to visit the United States because it is the country closest to Japan. As a political party which hopes to assume control of the government in the near future, he regards establishing friendly relations with government officials in this country as essential.

A second aim, he said, was to correct misconceptions in the United States concerning his party's policies and goals. The chairman said that the differences in philosophy are vast but that he hopes to bring closer cooperation between the JSP and the United States through such exchanges.

He announced in New York on April 12 that to facilitate future exchanges the JSP would form a special office devoted exclusively to bilateral relations.

(continued on next page)

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(continued from page 1)

Mr. Ishibashi was frank in addressing the need to delineate realities from party ideals during the visit. He noted that as chairman, he hopes the party will adopt realistic policies which will enable it to attain leadership in the Japanese government.

Mr. Ishibashi will certainly need more than one successful trip to the United States to enable his party to come to power in Japan. The party still faces a strong ideological split between moderate and doctrinaire elements. The party's shift on the Self-Defense Forces —from total opposition to recognition of their "legal" but "unconstitutional" status—indicated the awkwardness of trying to retain the spirit of the party's philosophy while adjusting to political realities.

Likewise, the JSP's emphasis on increased agricultural self-sufficiency has been designed obstensibly with national security concerns in mind, but is at least in part an effort to attract more support from rural constituents—voting blocs which traditionally have supported the LDP and are not likely to change their habits in the near future.

Nevertheless, the trip is a step in the right direction. The meetings were considered useful by American government officials, if only to establish a dialogue between the two groups. Whether it will lead to a more prominent role for the JSP in Japan remains to be seen.

Annual Wage Negotiations Under Way

Since 1955, Japan's public and private labor unions have pooled their resources and pursued annual collective bargaining with industry from April to May.

The 1984 spring wage offensive, or *shunto*, has been characterized by labor union retrenchment. The national unions called for an average 6 percent increase this year, down from 1983's starting level of 7 percent.

Industry offers were even harsher than last year. After some hemming and hawing, the national unions accepted the steel industry's record low annual wage increase.

Automotive manufacturers Toyota and Nissan also offered less than they did last year, arguing that voluntary export restraints have prevented them from improving their 1983 performance enough to justify higher offers. Honda is an exception in the industry, and its profitable U.S. plants may have been a factor in setting its offer a bit higher than last year.

1984 Labor Union Demands
(base wage increase in dollars and percentage increase)

Sector	1984 Demands		1983 Settlements	
Steel workers	$52.00	5.3%	$29.57	3.1%
Private Railway Workers	80.43	8.9	44.78	5.0
Metal Workers				
(Zenkoku Kinzoku)	80.43	9.2	43.46	4.8
(Zenkin Domei)	53.33	6.0	36.64	4.5
Chemical Workers	80.00	8.0	41.61	4.8
Transportation Workers	71.11	7.3	37.83	4.1
Textile Workers	55.69	6.1	36.90	4.2
Shipbuilders	52.00	5.4	29.57	3.3
Power Industry Workers	56.00	6.0	41.74	4.2
Seaman's Union	52.89	6.7	29.35	3.8
Electric Machinery Workers	55.61	6.7	39.34	4.9
Automobile Workers	52.89	6.0	38.93	4.8
Public Railway Workers	100.89	10.7	36.33	4.0
Public Communications Employees	97.78	10.7	38.01	4.3

1984 Industry Offers
(base wage increases in dollars and percentage increase)

Sector	1984 Offers		1983 Settlements	
Steel (5 major companies)	$30.67	3.11%	$29.57	3.14%
Automobile Companies				
Toyota Motor Corp.	45.78	5.07	43.04	5.08
Nissan Motor Co., Ltd.	44.89	4.93	42.17	4.96
Honda Motor Co., Ltd.	44.44	5.43	41.74	5.39
Electric Machinery				
Hitachi Ltd.	42.71	5.00	39.79	4.90
Toshiba Corp.	43.88	5.00	40.84	4.90
Mitsubishi Electric Corp.	42.75	5.00	39.80	4.90
Shipbuilding				
Mitsubishi Heavy Industries, Ltd.	31.11	3.14	29.57	3.14
Ishikawajima-Harima Heavy Industries Co., Ltd.	31.11	3.18	29.57	3.20
Kawasaki Heavy Industries, Ltd.	31.11	3.20	29.57	3.22

The electric machinery sector, which includes such high technology giants as Mitsubishi Electric, NEC and Matsushita Electric, also raised their offers from last year's record low 4.9 percent, reflecting their rapid recovery.

This year's offensive has been a rather mild one. Some major protests were conducted by

cans say that the new monopoly corporation will still have a stranglehold on the market and will find ways to discourage foreign penetration.

The reform proposals appear to offer only a limited improvement in the situation for foreigners wishing to work Japan's lucrative market. The current head of JTS has been quoted as saying he wants to maintain the current monopoly situation at least as long as he is in control. In addition, current import duties will remain unchanged.

JEI Industrial Policy Study Released

Too many of America's views of Japan's industrial policies have been the result of "tunnel vision" without considering the larger context of macroeconomic policies, according to a new study released this month by the Japan Economic Institute.

Dr. Edward J. Lincoln, Executive Vice President and Director of Economic Studies at the Institute, concludes in his study that the image of an active Japanese industrial policy comes from examinations of the 1950s and 1960s, periods which were special and temporary.

The most important policies followed by the government that assisted economic growth were macroeconomic rather than microeconomic. Economic growth was facilitated by low interest rates, limited government spending during a period of high private sector demand for investment funds and government provision of a physical infrastructure.

The study was initiated as industrial policy became a prominent buzzword in Washington policy debates. "Japan is repeatedly raised as the prime example of a country with active, successful industrial policies," Dr. Lincoln notes. "In the process, Americans have created a distorted and almost mythological Japan, owing its economic success to an omnipotent government bureaucracy."

This study is aimed at stripping away the mythology and examining industrial policy in a broader concept in relation to the other factors figuring in Japan's economic success as well as in comparison with the United States.

Copies of the study—"Japan's Industrial Policies: What They Are, How They Matter"—are available from the Japan Economic Institute, 202/296-5633.

APRIL IN REVIEW

Former Foreign Minister Sunao Sonoda dies at age of 70 *(4/2).*

Cabinet adopts tobacco monopoly reorganization. EEC presents market liberalization demands to Japan *(4/3).*

Ambassador Mansfield communicates U.S. concerns on VAN proposals. U.S., Japan settle fishing fees case out of court *(4/5).*

JSP chairman Ishibashi arrives in U.S. Agreement reached on new beef, citrus quotas *(4/7).*

Diet upper house approves FY 84 budget *(4/10).*

Ways and Means Committee approves trade remedies bill; House Banking okays industrial policy measures *(4/10).*

Susumu Nikaido named LDP vice president. FTC approves GMC-Toyota joint venture *(4/11).*

U.S.-Japan high tech working group meets in Hawaii. Beef quota talks continue with Australia *(4/12).*

Financial liberalization discussions resume in Washington *(4/16).*

JDA announces increased participation in RIMPAC exercises *(4/17).*

Prime Minister Nakasone cancels planned visit to Western Europe. Japanese businesses organize second unitary tax lobbying mission *(4/19).*

MITI delays submission of software copyright bill indefinitely *(4/20).*

DSP national convention opens *(4/23).*

National Intergroup agrees to sell 50 percent of National Steel Corp. to Nippon Kokan *(4/25).*

Komeito holds national convention. UAW chief Owen Bieber calls for retention of auto export restraints *(4/26).*

President Reagan arrives in PRC. Japan unveils new market liberalization package *(4/27).*

FY 83 BOP data released, showing Japanese current account surplus of $24.3 billion—2.7 times higher than FY 82 *(4/27).*

Emperor Hirohito celebrates 83rd birthday *(4/29).*

Commentary

Dr. Bodo Bartocha on Bilateral Scientific Cooperation

Japan and the United States face a unique challenge in that they are one another's strongest ally as well as economic competitor. As the alliance between the two countries strengthens, emphasis on cooperative programs increases. However, as competition in such areas as electronics and related high technology fields heightens, the economic consequences of joint programs can be complex.

JES Editor Michael Chinworth recently discussed bilateral cooperation with Dr. Bodo Bartocha, Director of International Programs at the National Science Foundation, to examine the problems and rewards involved in such programs and their directions for the future.

As director of the international division, Dr. Bartocha is responsible for overall coordination of NSF's international activities and the implementation and management of bilateral cooperative research and exchange programs in some 50 countries, including Japan.

Prior to joining the foundation in 1967, Dr. Bartocha was a Milton Research Fellow in chemistry at Harvard University and served in the U.S. Navy, including an overseas assignment from 1964 to 1966 as Deputy Scientific Director of the Office of Naval Research in London.

Dr. Bartocha joined the NSF's Office of Planning and Policy Studies in February 1967. He became Executive Assistant to the Assistant Director for National and International Programs in 1971 before assuming his current position the following year. Dr. Bartocha has published extensively in technical literature and holds eight U.S. patents.

In this issue's Opinion page, Dr. Samuel Coleman discusses the attitudes of business, government and academia in expanding U.S. access to Japanese technical and scientific information.

Q. Would you describe the NSF's U.S.-Japan cooperative science program?

A. We're not the only one that has agreements with the Japanese government in one form or another. But I believe the NSF arrangement to be among the oldest.

It goes back to an agreement reached between Prime Minister Ikeda of Japan and President Kennedy to cooperate in science and technology, and accordingly on the Japanese side the Japan Society for Promotion of Science was asked to take that into their hands, attached to the Ministry of Education. On the U.S. side, the National Science Foundation was asked to become the prime agency.

Q. What is your assessment of the program?

A. From every point of view, the program is a successful one. We have had no political difficulties throughout this program. We have had no administrative ones. Most of the things that did come up were routinely solved.

The program is managed on either side with such satisfaction that we have used the U.S.-Japan program as a model for about 30, 35 additional agreements to cooperate on science and technology with foreign countries.

We have passed the 20-year mark; we are almost into 25 years of operation.

Q. Has funding been sufficient throughout those years?

A. If there is one thing that could be commented upon by either side, it is the fact that we never have enough money to do some of the things that we would want to do and might provide even more impact than we have in the past.

The program is usually funded between $650,000 and $850,000, depending on the year. This year it is $950,000 composite from both the cooperative science program and the photoconversion protocol. So let's say close to a million a year.

Q. Specifically, what type of activities do you carry out under the program?

A. The modes of operation are cooperative research; that is, your scientist is visiting my scientist to work in the laboratory. I will go and visit you in Tokyo and work in your laboratory, give perhaps a lecture or two and hold a seminar. There might be an exchange of letters.

We also arrange for seminars and workshops, and there are

about 30 to 35 a year in the Pacific region.

Thirdly, we support visits of scientists to each other's country. Most of those are short-term.

There has to be a co-principle investigator on each side in these programs. We both have to agree to fund it. If one party disagrees, then we reject the proposal.

This is why it is truly cooperative. There is no unilateral action.

Q. The criticism is often made, at least in other areas, that Japan benefits more from various cooperative programs than the United States...

A. There is obviously the question of balance. How much do we get; how much do we give?

Well, let me first say that since the program is cooperative and between people who have a fairly equal scientific level, we feel that the results have been gratifying from our point of view.

There may not be a quid pro quo in each of the research projects that we have. But overall I think our own motivations, our own guidelines for such a program, have been well served. It is certainly on par with some of the programs that are supported domestically.

The best and most stringent measure might be the assessment by peers and the publication record that is coming out of this work between our colleagues in Japan and our own.

Over the years, we have seen great interest in the program; our people are extremely satisfied with the quality of work and the publication record with our Japanese colleagues.

On occasion we have had specific areas where the opportunity to do research is not as well developed in the United States as it is in Japan; for instance, in instrumentation areas—let us say in microphotography and electron microscopy, or in other instrumentation areas—where Japanese developments and Japanese expertise has simply been better than our own.

So, if we look at the technology transfer problem, if we look at the problem of people's concern to give more to the Japanese than we are receiving, I would debate the issue as far as the basic sciences are concerned.

Q. What about personnel areas?

A. If there is one imbalance in the program, it is not a monetary one; it is not an imbalance in benefits. Perhaps, it's an imbalance in people.

Overall in these technical areas—not only in the business field—I think whereas we can count on Japanese researchers and students to come to the United States by the thousands—roughly 13,000 Japanese students a year—there is a handful, a mere hundred or so, of Americans going to Japan.

The same is evidenced in our program. We find there are far more Japanese scientists working in our laboratories than there are U.S. scientists working in Japanese laboratories.

We hope to be able to have the funds to change this. There are two programs now in the United States, notably the U.S.-Japan program at MIT run by Richard Samuels, and the U.S.-Japan program at North Carolina State run by Samuel Coleman.

In those programs people try to have engineering and science students acquire some language capability: teach them Japanese for a year or so, before they bring them over into Japan to continue their studies and do research work in Japanese universities. I think that is the principal problem that I see.

Q. Is the quality of Japanese basic R&D uniformly high?

A. I would say that the quality of these research labs is uneven. My own estimate would be that industrial research laboratories are far better equipped and far better managed than most of the university laboratories, where we seem to find a dearth of equipment at times, and certainly not the facilities that would guarantee progress and the best of research in all cases.

But satisfied we are, and I make the point again in this international environment, that this is one of the few programs that has been totally free of bureaucratic and political bickering. That is extremely unusual.

Q. That's an interesting point. What kinds of problems do you

"...Problems in the political-social-economic realm simply do not exist in our U.S.-Japan cooperation. This kind of freedom of exchange just does not occur with other countries..."

have in general terms with other groups that you don't have with Japan?

A. Well, first of all, we can always agree quite readily on areas where we wish to pursue our funding.

The next point is the actual funding: how do we solve the cost problem? And, again, in the U.S.-Japan program, it is simply a matter of each side paying its share. There is no problem of currency conversion. There is no problem of paying for travel and subsistence.

The third area is accessibility. Japan is a democracy, and we have never had any problems with anybody going where he wanted and being accommodated. It is a very friendly relationship that is absolutely positive.

This is not the case in most other areas, where there are more stringent rules; where people argue and wish to concentrate on two or three other areas of cooperation; or where people specifically exclude certain areas of cooperation. It may not be possible to visit certain installations that are important to one side or the other. In some cases it is not possible to freely import or move scientific equipment.

All of these problems that sit in the political-economic-social realm simply do not exist in our U.S.-Japan cooperation. If you were to take other countries—in Eastern Europe or Latin America, or even in Southeast Asian countries—this kind of freedom of exchange and non-restrictiveness just does not occur.

And, also, the partnership is a reliable one. We work with a minimum of paperwork. We have annual staff meetings and across the table solve most of our routine administrative problems.

So, as I pointed out earlier, it is a model program. And the surprising thing for me, having been in this job for twelve years myself, is that it continues to be a model program. If people do not begin to meddle in this—our motto being "if it ain't broke, don't fix it"—then I think we could look forward to another 20 or 25 years of very good and excellent cooperation.

Q. What about the relative importance of Japan in international programs? The reason I ask is because in a *Congressional Record* excerpt I have here on NSF authorizations, I noticed a phrase calling for special emphasis on programs in every region in the world *except* Japan.

A. That's right.

Q. If Japan is a reliable partner in this program, and if it does have a great deal that the United States can gain, why is there not more prominence given to the country?

A. It's the other way around. The U.S.-Japan program and our relationship with Japan are so solid that we do not feel that it should be brought up in a special way.

This does not mean that we would not like to see any changes, perhaps. If I were to suggest improvements or changes in the direction of the program, they would be less from a point of view of programatic changes. Our scientists are doing very well in setting those priorities.

What I would like to see is exploiting in a different way our manpower. I would like to see our flexibility for fellowship programs increase.

If you consider that a fellowship program costs perhaps $25,000 a year, then something like an additional 100 fellowships would be more than welcome. That would be $2.5 million, but it is not too much, certainly within the budgetary capability of the NSF or other government agencies.

This is where we are missing opportunities. This is where we are not doing enough because of financial restrictions and perhaps a lack of forward and policy planning.

Interestingly enough, this attitude is beginning to change in this administration, and for the first time we have seen an interest in making extra funds available for fellowships for industrialized countries. And, of course, Japan would get a share in that.

I make the point because the administration is quite often at-

tacked because of its position on science and technology, particularly in an international setting. The inside story, however, is somewhat different. We do get very good support and the expression of willingness to help.

We should not sit here and complain that too many Japanese, Chinese, Arabic or other students are coming to the U.S. There are roughly a total of about 360,000 foreign students in the U.S. at this time and, as I mentioned, an average figure of about 13,000 Japanese or so.

We should take care to send more U.S. graduates and postgraduates overseas—with language preparation—to expose them to foreign cultures; to different working environments; to make the friendships that would enable them to continue a constructive working relationship when they are in responsible university positions.

In our case, the concerns for technology transfer—unless you get into some very sensitive areas that are always mentioned by people, such as biotechnology, microelectronics, robotics, sensor technology and the like—simply are not very evident because the basic research that we pursue can only benefit all sides and would not help one side very much.

It is the data exchange, the serendipity of this research that is important; the exchange of data and knowing what the others are doing that has to be pushed.

And if we were to put restrictions on basic research, I think we would not only impair the freedom of exchanging information, but the United States would suffer in the end by being cut off from results that are obtained in other foreign countries. And I see a very grave danger in that whole process.

Q. How much of our inability to increase the numbers necessary to carry on these programs, in terms of manpower, is attributable to the U.S. educational system itself?

A. I would say in the case of Japan it is the language problem.

Perhaps to a certain degree it is in our inability to produce more people who are interested in a scientific career. I believe we are 25th in mathematics overall. We may win Olympics, but the overall educational status is low.

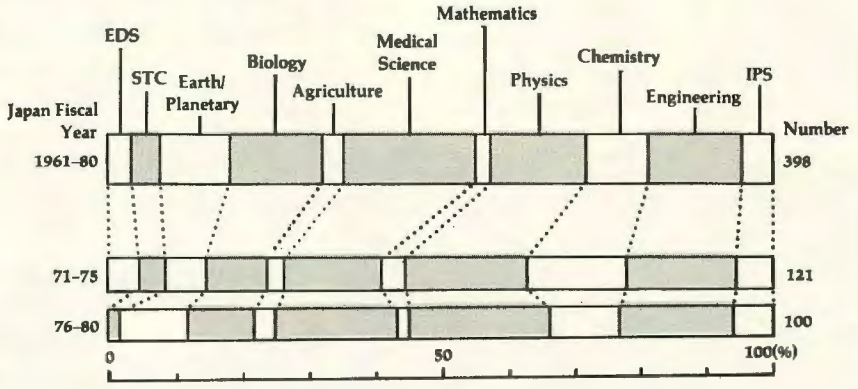
However, when it comes to studying in Japan, there is a certain intransigence to accepting anybody who is not fluent in the language. The university system is rather inflexible and would not take foreign students unless they have passed their linguistic exams.

We have never encountered the problem of a Japanese professor being unwilling to take in American post-graduates or researchers. However, even if that willingness exists, there is the

National Science Foundation
U.S.-Japan Cooperative Programs

Participants by Field of Science	Total Number of Participants	
	Japanese	American
Field:		
Education in Sciences	193	142
Scientific, Technical Communication	213	142
Earth, Planetary and Astronomical Sciences	499	485
Biological Sciences	695	614
Agricultural Science	142	191
Medical Science	1,046	873
Mathematical Science	141	116
Physical Science	746	656
Chemical Science	558	462
Engineering Science	863	667
Interdisciplinary Problems	203	169

Percentage Distribution of Fields



Source: U.S.-Japan Committee on Scientific Cooperation, *The Twenty-Year Report 1961-1980.*

"...If we were to put restrictions on basic research, I think the United States would suffer. I see a very grave danger in that whole process..."

difference in living conditions. There are social factors. There are formidable difficulties which you do not have in other countries, particularly if you get young students with families over there.

If I were to voice my main concern on all of these cooperative programs, we are simply not making enough funds available, or we are not creating an environment where we are able to send our own young people overseas to do work in foreign laboratories. I think that is a mistake and that it will cost us in the long range.

Q. What are some examples of specific results from this cooperative program over the last 20 years?

A. What are some nuggets that we can sight? Rice research; diseases; research in hypertension that brought very good results.

A study involving Japan and wheat strains increased crop yields in both Hokkaido and New Zealand.

In the area of salmon egg research, Japanese and U.S. researchers looked into salmon eggs that were to be imported from the Soviet Union into our breeding areas in Alaska and Washington. We wanted to be absolutely sure that they would be free of any viruses that have a tendency to creep in.

And, indeed, there was a problem. A method was developed to detect these viruses.

Well, you then go on to extrapolate, and you can say that you certainly saved part of the salmon industry and the fishing industry on the American west coast. Even if that is exaggerated, it certainly saved us a lot of problems in introducing diseases that our fish don't have at this time.

Another good example is our cooperation in earthquake engineering.

The Japanese have one of the largest test facilities in the world. We have built a building seven stories high—actual size—with half Japanese money, half American money; half built to Japanese specs, half built to American specs.

We have shaken this building to destruction—pre-programmed the pattern on the computer taken after a real earthquake in the Tokai area in the 70s.

The Japanese built the facilities; they have the computer installation; they have the personnel to run it. What we have contributed was one half the building cost, which was about $700,000 or so, through our engineering group.

Now, if from these experiments we can find a method to build earthquake-resistant buildings cheaper but better, you can very well imagine that, per year in California, the building industry could save billions of dollars; not only millions of dollars, but *billions* of dollars.

Pine wilt is a big one for the pine forests of the northeast which are being affected by the wilt which struck Japan quite a number of years ago. But the mutual research going on now will probably be one of the things to save the lumber industry in the northeast.

I don't want to exaggerate because most of the work that we are doing is simply basic research that will take quite a number of years to fruition. On the other hand, such results that we had in the salmonella virus research had an immediate application and impact, and they can be felt in economic terms.

Q. For the future, what would be some of the key basic research areas that you think the United States should concentrate on?

A. I think that we have to be very careful here in recognizing that industrial R&D support is higher in Japan than it is in the universities. We have to realize that our clientele is the academic environment.

I think where I would like to see closer cooperation between the U.S. and Japan is in biotechnology, specifically enzyme catalysis fermentation technology. The Japanese are very, very strong, and it is my opinion that we have not exploited this field properly in the U.S.

Q. What would that mean in terms of applications?

A. Well, processed foods, for instance. Making certain materials and chemicals at lower pressures and lower temperatures. That would save energy. Make a number of foodstuffs that are only accessible by very complicated methods. Fermentation technology, for instance, to make beer or alcohol from wheat or rye. I'm thinking of technologies that would reduce cellulose to sugar, for instance.

Now these are areas that are known, and where the U.S. is quite good. But it is that kind of approach, that kind of field—citric acid fermentation, for instance, or acetic acid by fermentation technology—a great number of natural product approaches where we use chemical approaches that take a lot of energy and special equipment. Most of these enzyme catalysis and fermentation processes can be done with relatively small and easy equipment. It would be one area.

Q. And others?

A. I would hate to go into the field of electronics and microcircuitry because the battle is raging with the economic interests that both parties have going into new generation computers and the 256K chip and others.

But again, because the Japanese have capabilities, by culture and education, that we do not have, the cognitive sciences should be stressed.

They are very good in pattern recognition, and I think if I had to pick a program I would push cooperation in sensor technology development in robotics.

We certainly are leading in the *theory* of the field. There is absolutely no question on that.

But, again, if we talk on a cooperative basis, there are capabilities that the Japanese have in these fields that have not been tapped and that should be exploited.

Materials processing is another area in which the Japanese have done very well from a practical point of view but not from a theoretical point of view, where we do have better people in surface chemistry and surface physics, in planing, in working, joining. One would be well advised to take a look at the Japanese industry from a basic research point of view.

Perhaps this is wishful thinking, perhaps I am pushing this a little too far to say we should take a look at the inherent capabilities of the Japanese system and exploit them. But it's realistic; it can be done.

There is too much of a defensive attitude here, of trying to prevent the flow of data, but not enough to exploit the situation to our benefit, in my opinion.

A lot of cries go out by people who are not very well informed about the real situation in Japan. And they can't be. Perhaps they are not to be blamed because the language barrier definitely exists. And that goes both ways.

The average American is not as well informed as he should be about Japan. And the average Japanese thinks he is informed, but he is very much influenced by a pro-Japanese education that tells him how good he is, if it doesn't tell him that he's the very best.

I think somebody should take a look at all of these things to make our relationship better because it would be so much more fruitful. Not very many attempts have been made to carry it from the adversary relationships and the defensive positions we take—the Japanese threat, the import problems we have, and all of this—to a more constructive approach.

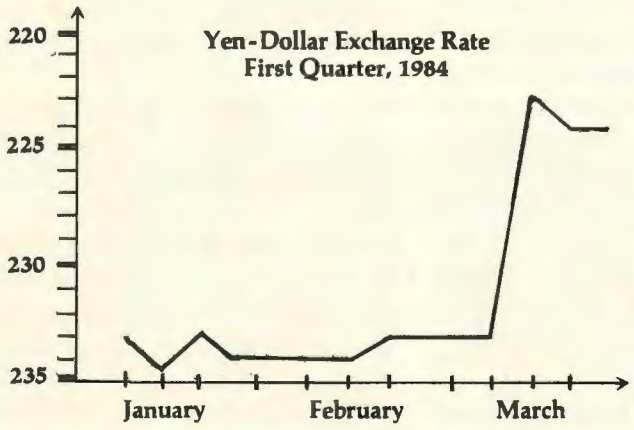
"...We should not sit here and complain that too many students are coming to the U.S. We should send more U.S. graduates overseas to expose them to foreign cultures and different working environments..."

First Quarter Exchange Market Activity

The yen-dollar exchange market was remarkably stable for most of the first quarter of 1984. In January and February, the yen strayed no higher than ¥232=$1 and no lower than ¥234 on the Tokyo interbank spot market, continuing a pattern of stability begun in October, 1983.

For a brief period at the beginning of March there was a very abrupt jump in the yen's value to ¥222 by March 7. Thereafter, though, stability returned, with the yen trading in a ¥222-226 range for the rest of the month.

Two forces have been at work in keeping the yen so stable. On the one hand, Japan has been experiencing rising current account surpluses, creating a trade related demand for yen that ought to cause the yen to appreciate.



On the other hand, though, the continuing interest rate differential between Japan and the United States has caused an outflow of capital, creating a demand for dollars that works to keep the value of the yen down. With these conflicting forces in the market, there has been great uncertainty over the future and little willingness to push the rate in either direction.

Why the jump at the beginning of March? The main explanation is that other major currencies had begun to move up against the dollar and the yen was belatedly catching up with this trend. However, there is no good explanation for its suddeness. Government intervention can be discounted, since the Bank of Japan did not intervene in the exchange market to any noticeable degree during this period.

Ways and Means Approves Trade Remedies...

The House Ways and Means Committee approved Rep. Sam Gibbons' (D, Fla.) trade remedies proposal (H.R. 4784) on April 10 by a 17-3 vote, adopting two changes which make the measure more restrictive than originally drafted. The first eliminates time restraints on countervailing duties imposed under the measure so that any import restraint will remain in effect indefinitely. The second retains control over import quotas within the Commerce Department.

Revised standards for investigating dumping from countries with nonmarket economies were deleted from the bill during the Ways and Means markup. The provisions proved so controversial that the entire section was dropped.

Administration backed amendments to delete industrial targeting and downstream dumping sections were soundly defeated by the committee. These sections would make imports which contain such government aid subject to countervailing duties.

An attempt to drop the contentious but key natural resources clause was also rejected. The section provides that countervailing duties may be levied in certain cases against imports which contain subsidized natural resource inputs.

H.R. 4784 has made more rapid progress since it was drafted by the subcommittee than originally anticipated. The bill appears to be one of Rep. Gibbons' most important personal legislative priorities.

However, its chances for passage are uncertain. Excessive amendment efforts on the House floor could threaten it there while the Senate is even less disposed to approve the trade remedies bill.

...While Banking Okays Industrial Policy Measures

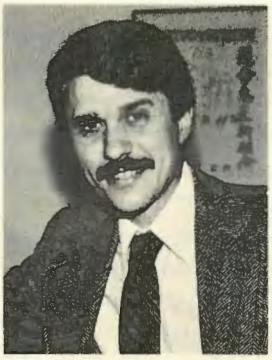
In an effort to establish an "industrial policy" for the United States, the House Banking Committee approved two bills on April 10 to increase industrial development funds and facilitate basic research.

The first measure, H.R 4360, establishes a Bank for Industrial Competitiveness, authorizing $8.5 billion in federal loan guarantees and

Opinion

Responding to Japan's High Technology Challenge

Samuel K. Coleman*



Now that a growing number of American business leaders and policymakers are becoming aware of Japan's high technology challenge, they must also recognize the need to create more Japan-related expertise, particularly Japanese language skills, among American scientists and engineers.

I currently work with academicians at North Carolina State University in a broad range of scientific and engineering specialties to develop programs that will enable us as a research institution to share in Japanese advances through cooperation, and that will help us as a nation to compete with our Japanese colleagues on an equal footing.

Contrary to prevailing opinion, university faculty are far from indifferent to Japanese advances in science and technology. In a recent survey on our campus, science and engineering faculty gave excellent evaluations to the research of their Japanese colleagues. The administration also supports plans for scholarships and fellowships to students in the sciences who study the Japanese language.

Our students in the sciences and engineering are enthusiastic; they account for about two-thirds of our total enrollment in Japanese, making ours the largest Japanese language program in the southeastern United States. Applicants for our program of internships in Japanese research facilities outnumber the available positions.

Although our students and faculty are ready to invest time and effort in order to respond to Japan's high technology challenge, prevailing attitudes in business and government are not as enlightened. Even their recognition of Japanese achievements is sometimes vitiated by the opinion that such accomplishments are largely skillful elaborations on American contributions.

The solutions they pose are either unrealistic "quick fixes" or narrow, inefficient and partial solutions that overlook the need for a cadre of American scientists and technologists with professional Japan expertise.

Can we fill our informational needs solely by hiring more translators, or by developing computer translating? Shall we put pressure on the Japanese to translate more into English? These suggestions ignore certain realities of technology transfer from Japan: selecting written materials for the expensive and time-consuming translation process requires a high level of knowledge about the organizations and individual specialists in Japan who produce a welter of publications and reports, particularly since the quality of such materials is quite uneven.

Oral, face-to-face communication between Japanese and American specialists may be as important as written materials, particularly in engineering. Insisting that Japanese publish more in English is unreasonable because they are writing primarily for an audience of domestic colleagues, and it is as difficult for them to translate into English as it is for us to translate into Japanese.

Such demands are also unrealistic long-range solutions, because Japan will be increasingly less inclined to comply as it becomes more self-sufficient in the sciences and more independent in international affairs.

The problem of access to Japanese scientific and technical information evokes the same array of alternatives posed by the issue of industrial competition between our two countries: we can pressure the Japanese to compensate for our own infrastructural inadequacies; we can approach the problem piecemeal, poking our fingers into each hole in the dike as it appears; or we can embark on a comprehensive program with an explicit strategy that recognizes the need for long-term investment in human capital.

I vote for the last option, as do my colleagues in the sciences and engineering—the same people who comprise the source of America's scientific and technological advances, and who look to business and government for support.

**Associate Director for Research and Program Development, North Carolina State University.*

Profile

Scientific Research and Development

According to Japanese government sources, a total of 676,277 persons were employed as of 1982 in research and development in Japan, including research in social and human sciences. Of these, 365,974 are employed in the private sector.

Academia is the second-largest employer of researchers in Japan, with 228,649 workers in all fields. Research institutes employ an additional 81,654 workers.

More than half of those involved in academic research concentrate on natural science and technology, with about 20 percent employed in social sciences, including law and liberal arts.

The corporate sector contributes the bulk of Japanese research and development funding. In 1982, companies spent ¥3.63 trillion ($14.6 billion) of the total $5.982 trillion ($24.02 billion) spent on scientific research.

Most of the companies involved in research and development are small- and medium-sized firms, although larger firms are the largest employers. Of the 16,348 companies involved in Japanese R&D, 12,475 are capitalized at ¥100 million ($401,000) or less and employ 42,800 in R&D. Larger firms, capitalized at ¥10 billion ($40 million) and over, employ 175,165.

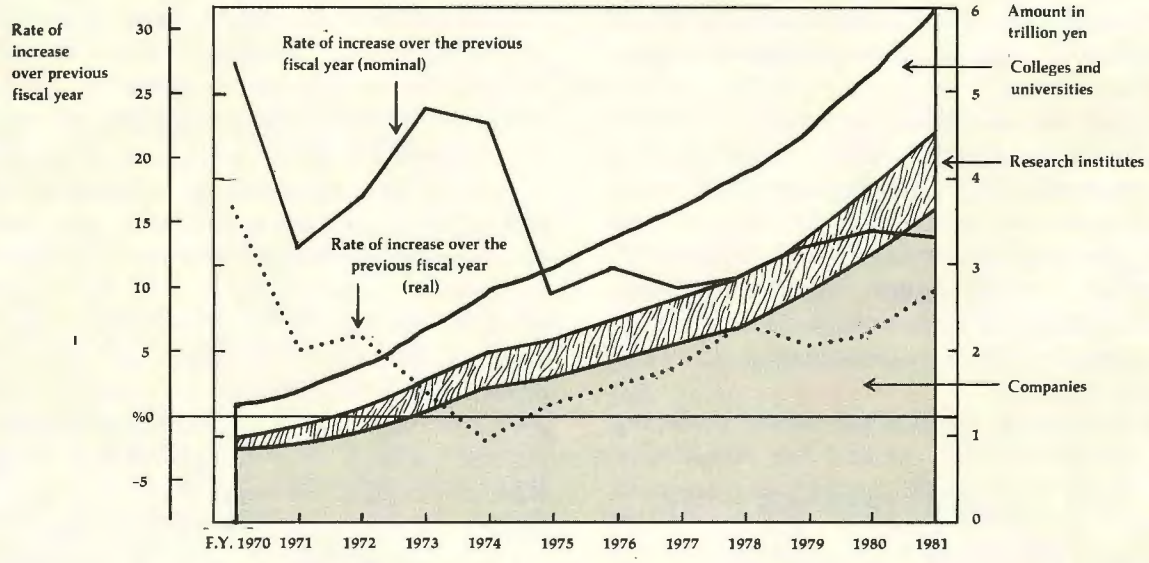
Manufacturing is the most heavily represented sector, with 14,308 companies and 185,482 researchers. Electrical machinery and chemical industries are also heavily represented.

Source: Statistics Bureau, Prime Minister's Office, *Japan Statistical Yearbook, 1983.*

Scientific and Technological Research Expenditures

Year	Total (Billion ¥/$)	Companies	Research Institutes	Colleges and Universities
1960	¥171 ($0.48)	¥96 ($0.27)	¥27 ($0.08)	¥49 ($0.14)
1965	438 (1.22)	244 (0.68)	65 (0.18)	130 (0.36)
1970	1,065 (2.96)	628 (1.74)	137 (0.38)	299 (0.83)
1975	2,716 (9.15)	1,589 (5.35)	409 (1.38)	718 (2.42)
1978	3,651 (17.35)	2,110 (10.03)	530 (2.52)	1,012 (4.81)
1979	4,046 (18.46)	2,291 (10.45)	604 (2.76)	1,151 (5.25)
1980	4,584 (20.22)	2,665 (11.75)	660 (2.91)	1,258 (5.55)
1981	5,246 (23.79)	3,142 (14.25)	764 (3.46)	1,340 (6.08)
1982	5,982 (24.02)	3,630 (14.58)	907 (3.64)	1,446 (5.81)

Research and Development Expenditures



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In addition to regular publications, JEI sponsors seminars, colloquia and conferences designed to bring Americans and Japanese together for discussion of bilateral issues. For more information, please write or telephone (202/296-5633).

Michael W. Chinworth
Editor

Robert C. Angel
Publisher

THE WILSON CENTER

JAMES H. BILLINGTON, *Director*

October 9, 1984

Mr. Richard B. Levine
Deputy Director
International Economic Affairs
National Security Council
Old Executive Office Building
Washington, D.C. 20506

Dear Mr. Levine:

We are writing to seek your financial assistance for a conference on a timely and important subject -- how to train Americans to deal with technical materials in Japanese and how to better prepare American scientists and engineers for a period of research in Japan. This conference is jointly sponsored by the Asia Program of the Woodrow Wilson International Center for Scholars and the MIT-Japan Science and Technology Program.

There is a critical national need for American business and government to be better informed about Japanese scientific and technical information. There is also the recognized need for more American scientists and engineers to be active in Japanese research activities and participating in Japanese scientific academic societies. One essential element for such cooperation and exchange is better Japanese language training, specifically appropriate courses and materials designed for technical personnel. To date this issue has not been adequately addressed. The conference proposed here would identify the issues, define the difficulties and make recommendations about the most efficient and effective means to attain the desired objectives.

A conference proposal and a budget estimate are enclosed for your examination. We hope that you will be able to assist in funding this conference. If you wish further information or have any questions please contact us directly.

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CONFERENCE PROPOSAL

TITLE SCIENTIFIC AND TECHNICAL JAPANESE

NATIONAL PRIORITY

Congress, the Executive Branch, private institutions and companies have all expressed the short- and long-term need to have better information and greater access to Japanese scientific and technical information and research facilities. It is widely agreed that the problem of access is an American one, the lack of technically sophisticated individuals with the necessary language skills and training. This conference will explore these issues and establish a basis for future governmental and private training projects. The Asia Program has conducted a seminar series on U.S.-Japan technical issues and has examined new priorities for teaching East Asian languages. The MIT-Japan Science and Technology Program has sponsored conferences on Japanese scientific and technical information in the United States and is involved in placing American scientists in Japanese research facilities. Together, these two institutions are uniquely positioned to manage this conference.

SCOPE

A two day conference would bring together linguists and technical advisers to evaluate the needs, issues and requirements for:

-- training in technical Japanese/linguistics for translating Japanese scientific materials;

-- the utilization and potential of machine translation;

-- training programs in preparing English speaking engineers and scientists for high-level communication in Japanese; and

-- curriculum materials to train people in the required skills.

FORMAT

Invited speakers (8 people) would prepare short papers dealing with the technical issues relating to the topics above. Approximately 50 other experts would be invited as participants on the first day. The second day would be for speakers and a few select people to draw up recommendations for the future. Adequate time will be provided for discussion of all topics. A conference report, edited by conference supervisors, will be widely distributed.