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1. form	Request for appointment. ss#s. (1p, partial)	9/28/87	B6

RESTRICTIONS

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C. Closed in accordance with restrictions contained in donor's deed of gift.

Carol

THE WHITE HOUSE

WASHINGTON

July 17, 1987

MEMORANDUM FOR HOWARD H. BAKER, JR.

THROUGH: WILLIAM HENKEL JLH FOR

FROM: JAMES L. HOOLEY JLH

SUBJECT: VISIT TO THE NATIONAL INSTITUTES OF HEALTH
THURSDAY, JULY 23, 1987

Event Concept

On the day of the announcement of the Commission on AIDS, The President will visit the National Institutes of Health to witness NIH's recent successes in the field of AIDS research and to take part in a forum designed to present the newly appointed Commission to the health community.

At the Clinical Center, the President will proceed to a working laboratory to observe "cutting edge" research and be briefed by Dr. Broder, a world renowned scientist who discovered the AZT antibiotic in that very laboratory. The President will then cross the hall to a Pediatric Ward to visit young AIDS victims and their parents.

Finally, the President will participate in a panel briefing on the state of AIDS research, accompanied by the Commission and attended by approximately 100 to 150 members of the health community.

The President will conclude the briefing with "a charge" to the Commission and other members of the Health community, to work together on a series of recommendations to be reported at a later date.

This memorandum is being forwarded to Rhett Dawson for submission to the President unless otherwise instructed.

cc: K. Duberstein
W. Ball
F. Carlucci
R. Dawson
F. Donatelli
M. Fitzwater
T. Griscom
N. Risque
D. Chew
J. Courtemanche
T. Dolan
M. Maseng
C. Powell
R. Riley
F. Ryan
J. Kuhn
M. Weinberg

07/17/87 9:00 a.m.

THE WHITE HOUSE

WASHINGTON

PROPOSED SUMMARY SCHEDULE FOR THE PRESIDENT

THURSDAY, JULY 23, 1987

1:05 p.m. MARINE ONE departs the South Lawn en route Bethesda landing zone.

Flight Time: 15 mins.

Nighthawk II and III depart Pentagon landing zone en route Bethesda landing zone.

Nighthawk II and III arrive Bethesda Naval Hospital landing zone.

1:20 p.m. MARINE ONE arrives Bethesda Naval Hospital landing zone.

THE PRESIDENT deplanes and proceeds to motorcade for boarding.

PRESS POOL COVERAGE

1:25 p.m. THE PRESIDENT departs Bethesda Naval Hospital landing zone en route the National Institutes of Health.

Drive Time: 5 mins.

1:30 p.m. THE PRESIDENT arrives rear entrance of the Warren Grant Magnussen, Clinical Center, Building 10 and proceeds inside to elevators.

THE PRESIDENT arrives 13th floor and proceeds to Broder Laboratory.

Met by:

Dr. Broder

OFFICIAL PHOTOGRAPHER ONLY

07/17/87 9:00 a.m.

1:35 p.m. THE PRESIDENT receives briefing on status of AIDS research and treatment from Dr. Broder.

PRESS POOL COVERAGE

1:40 p.m. THE PRESIDENT proceeds to Pediatric Ward to meet with patients.

OFFICIAL PHOTOGRAPHER ONLY

1:50 p.m. THE PRESIDENT concludes patient greeting and proceeds to holding room, via stairs.

THE PRESIDENT arrives holding room.

THE PRESIDENT departs holding room en route off-stage announcement area at 14th floor Auditorium.

1:55 p.m. THE PRESIDENT arrives 14th floor Auditorium off-stage announcement area.

Announcement (off-stage)

THE PRESIDENT proceeds on-stage and takes seat.

OPEN PRESS COVERAGE

2:00 p.m. Program begins.

NOTE: Format of Program TBD

OPEN PRESS COVERAGE

2:25 p.m. Program concludes.

THE PRESIDENT proceeds to holding room.

THE PRESIDENT arrives holding room.

THE PRESIDENT proceeds to motorcade for boarding, via elevator.

2:30 p.m. THE PRESIDENT departs NIH, Building 10, en route Bethesda Naval Hospital landing zone.

Drive Time: 5 mins.

2:35 p.m. THE PRESIDENT arrives Bethesda Naval Hospital landing zone.

THE PRESIDENT proceeds to Marine One for boarding.

2:40 p.m. MARINE ONE departs Bethesda Naval Hospital landing zone en route The White House.

Flight Time: 15 mins.

Nighthawk II and III depart Bethesda Naval Hospital landing zone en route Pentagon landing zone.

2:55 p.m. MARINE ONE arrives the South Lawn.

THE PRESIDENT deplanes and proceeds to Oval Office.

Nighthawk II and III depart Bethesda Naval Hospital landing zone en route Pentagon landing zone.

THE WHITE HOUSE

WASHINGTON

VISIT TO THE NATIONAL INSTITUTES OF HEALTH

THURSDAY, JULY 23, 1987

On the day of the announcement of the Commission on AIDS, you will visit the National Institutes of Health to witness NIH's recent successes in the field of AIDS research and to take part in a forum designed to present the newly appointed Commission to the health community.

At the Clinical Center, you will proceed to a working laboratory to observe "cutting edge" research and be briefed by Dr. Broder, a world renowned scientist who discovered the AZT antibiotic in that very laboratory. You will then cross the hall to a Pediatric Ward to visit young AIDS victims and their parents.

Finally, you will participate in a panel briefing on the state of AIDS research, accompanied by the Commission and attended by approximately 100 to 150 members of the health community.

You will conclude the briefing with "a charge" to the Commission and other members of the Health community, to work together on a series of recommendations to be reported at a later date.

THURSDAY, JULY 23, 1987

1:05 p.m. MARINE ONE departs the South Lawn en route Bethesda landing zone.

1:20 p.m. MARINE ONE arrives Bethesda Naval Hospital landing zone.

1:30 p.m. Arrive Warren Grant Magnusen, Clinical Center at the National Institutes of Health.
  * Broder Laboratory Briefing (PRESS POOL)
  * Visit to Pediatric Ward (OFFICIAL PHOTOGRAPHER)
  * Panel Briefing
    - Opening and Closing remarks (OPEN PRESS)

2:30 p.m. Depart National Institutes of Health en route Bethesda Naval Hospital landing zone.

2:40 p.m. MARINE ONE departs Bethesda Naval Hospital landing zone en route The White House.

2:55 p.m. MARINE ONE arrives the South Lawn.

07/17/87 10:00 a.m.

THE WHITE HOUSE
WASHINGTON

NATIONAL INSTITUTES OF HEALTH

NAME	ORGANIZATION	HOME PHONE	OFFICE PHONE
JAMES L. HOOLEY	DIR. WH ADVANCE	395-2000	456-7565
ANDREW LITTLEFAIR	LEAD WH ADVANCE	395-2000	456-7565
JOE BRENNAN	PRESS LEAD WH ADVANCE	395-2000	456-7565
SHELBY SCARBROUGH	TRIP COORD. WH ADVANCE	395-2000	456-7565
LARRY LANDRUM	WHCA TRIP OFFICER	395-2000	395-4040
CDR. J.J. QUINN	WH MILITARY AIDE	395-2000	395-2150
SAM TONG	USSS LEAD		
BOB SWEET	WH CABINET AFFAIRS	456-1414	456-2800
HANS KUTTNER	WH CABINET AFFAIRS	456-1414	456-2800
SHARON LUMPKINS	WH DRUG POLICY OFFICE	456-1414	
Kim Fuller	Secretary Bowen	~~521-5989~~ ~~245-7000~~	245-7000
MEL LUKENS	SECRETARY BOWEN/SECURITY	703/ 979-0483	245-3410
TOM RUFTY	Chief, Crime Prevention NIH	4969818	
Tom Flavin	Protocol, NIH	565-0596	496-4713
Chris Adams	W.H. Communications	395-2000	395-4040
ART BONNET	ENGINEERING COORD, NIH	281-3093	496-4995
Tony Clifford	Deputy Dir. Div. of Engineering	4697434	4966186
Anne Thomas	Director, Public Affairs	469-5941	496-5787
Al Sweat	Chief of Security - N.I.H.		496-6893

NAME	ORGANIZATION	HOME PHONE	OFFICE PHONE
[illegible]	[illegible]	[illegible]	[illegible]
Sharyn Lumpkins	Drug Abuse Policy Office	703 821-2379	456-2761
Carol Hayes	Speechwriting Office	895-2000	456-7750
REDACTED	REDACTED	REDACTED	REDACTED
William Fedyna	Deputy Protocol NIH	301-371-7722	496-4713

PRESIDENTIAL COMMISSION ON THE HUMAN IMMUNODEFICIENCY VIRUS EPIDEMIC

Independent

AUTHORITY: E.O. 12601, June 24, 1987
E.O. 12603, July 16, 1987 (increases membership)

METHOD: Appointed or designated by the President

MEMBERS: THIRTEEN, who shall be distinguished individuals who have experience in such relevant disciplines as medicine, epidemiology, virology, law, insurance, education, and public health.

CHAIRMAN: Designated by the President from among the members of the Commission

TERM: Pleasure of the President

PURPOSE: Advise the President, the Secretary of Health and Human Services, and other relevant Cabinet heads on the public health dangers including the medical, legal, ethical, social, and economic impact, from the spread of the HIV and resulting illnesses including AIDS, AIDS-related complex, and other related conditions. The primary focus of the Commission shall be to recommend measures that Federal, State, and local officials can take to (1) protect the public from contracting the HIV; (2) assist in finding a cure for AIDS; and (3) care for those who already have the disease. In particular, the Commission shall (1) evaluate efforts by educational institutions and other public and private entities to provide education and information concerning AIDS; (2) analyze the efforts currently underway by Federal, State, and local authorities to combat AIDS; (3) examine

(CONTINUED - PAGE TWO)

PRESIDENTIAL COMMISSION ON THE HUMAN IMMUNODEFICIENCY VIRUS EPIDEMIC

Independent

PURPOSE: (Continued) long-term impact of AIDS treatment needs on the health care delivery system, including the effect on non-AIDS patients in need of medical care; (4) review the United States history of dealing with communicable disease epidemics; (5) evaluate research activities relating to the prevention and treatment of AIDS; (6) identify future areas of research that might be needed to address the AIDS epidemic; (7) examine policies for development and release of drugs and vaccines to combat AIDS; (8) assess the progression of AIDS among the general population and among specific risk groups; (9) study legal and ethical issues relating to AIDS; and (10) review the role of the United States in the international AIDS pandemic.

SALARY: Paid at the daily rate specified for GS-18 of the General Schedule. While engaged in the work of the Commission, members appointed from among private citizens of the United States, to the extent funds are available, may be allowed travel expenses, including per diem in lieu of subsistence, as authorized by law for persons serving intermittently in the government service (5 USC 5701-5707).

ADMINISTRATIVE SUPPORT: The Office of the Secretary of Health and Human Services, subject to the availability of appropriations, shall provide the Commission with such administrative services, funds, facilities, staff, and other support services as may be necessary for the performance of its functions. The heads of other Executive departments and agencies, to the extent permitted by law, shall cooperate with the Commission and provide such personnel and administrative support as may be necessary for the performance of its functions.

INTERIM REPORT; FINAL REPORT; AND TERMINATION: The Commission shall make a preliminary report to the President not later than 90 days after the date the members of the Commission are first appointed or designated and shall make its final report no later than 1 year from the date of this Order (June 23, 1988). The Commission, unless sooner extended, shall terminate 30 days after submitting its final report to the President.

lenges ahead for keeping America healthy, for developing the science and the art of medicine, for making sure that good health care remains available to all our people.

So, that's what I've come to hear about, and the floor is yours.

Remarks at the Close of the Forum

Well, if I could just say: I find myself in great agreement with everything that I have heard here today, and being married to a nurse's aide, that includes your statement about their importance. I made great use of that a few weeks ago.

But, yes, in these last statements it seems to me that we have a great deal still to do in education in the sense of informing our people of some things. As Governor of California—and several widely publicized catastrophic family cases came to view there—we set out and worked out a plan with the private insurance companies in which, if we would agree to be compulsory, to compel everyone who worked in California to take out catastrophic health insurance at that time, they could have provided that insurance, limitless as to cost, for $35 a year.

And when I say, speaking of education, there's something about this. The frequency of that is not sufficient. You know, that everybody thinks it won't happen to them. We couldn't even get a postcard. We were going to make this available to the people to decide. We just couldn't get any attention at all about it, and it just died aborning. No one ever thought it would happen to them. And I think here maybe this is a field for us to work harder than we have.

Incidentally, Dr. Bowen, there, may have some comments, if I may be so bold. I'm not in charge here, but Dr. Bowen, as nearly as I have been able to figure it out, is only the seventh physician to ever serve in a Presidential Cabinet in the history of the United States. And having been a Governor doesn't hurt at all. I had just remarked to him a little while ago, we need more Governors in Washington. [*Laughter*]

***Note:** The President first spoke at 1:15 p.m. and then at 1:35 p.m. in the library at the College of Physicians. In his closing comments, he referred to Secretary of Health and Human Services Otis R. Bowen.*

Philadelphia, Pennsylvania

Remarks at a Luncheon for Members of the College of Physicians. April 1, 1987

You know, I can't help thinking what a great place this would be, and a great moment, to get a pain in the neck—[*laughter*]—or maybe even a lower back pain—[*laughter*]—but I left Congress in Washington. [*Laughter*] I don't mean that personally. [*Laughter*] For me, politics is forgive and—as you may have heard sometimes—forget. [*Laughter*] One thing I didn't forget today, it was to bring with me someone special. I am told that he may be only the seventh physician ever to serve in a Presidential Cabinet from George Washington times until now: Dr. Otis Bowen.

This year throughout America our eyes are turned to Philadelphia as Americans everywhere remember that here 200 years ago a small group of men fashioned the greatest experiment in self-government in the history of man: the Constitution of the United States. The founders represented the people of the Nation, and they submitted their work to the Nation for ratification, which marked a turning point in history. Yes, that's what I told Ben Franklin at the time. [*Laughter*] Never before had an entire people joined together so peacefully and so effectively to govern themselves.

The Constitution called for a limited government, and in the two centuries since then, many around the world have asked how is it possible that self-government and limited government work so well in America? Well, the answer is simple, and you're a part of it. As the Frenchman de Tocqueville found, when we Americans want to do something, we don't wait for government. We join together, and do it ourselves. And there's no better example of Americans joining together for a common good than the founding, almost 200 years ago, also in this city, of one of America's first academies for the discussion of medical issues, the College of Physicians.

Yes, it was in January 1787, under the guidance of Dr. Benjamin Rush, 24 physicians joined together "to advance the science of medicine and lessen human misery." And for 200 years the college has done just that. Its leadership in public health began with efforts to combat the Philadelphia yellow fever epidemic of 1793, and it continues to this day. And as a leader in medical studies, the college boasts one of the world's finest and most used medical libraries, one of the best medical history libraries in the world, one of the few medical museums in America, and a skull collection that would make Hamlet delirious. [*Laughter*] For two centuries the College of Physicians has made a living reality of its motto—"Not for oneself, but for all"—and in the process has helped make all of American medicine what it is today: the best in the world.

Now, I know that as doctors sometimes you're asked to take the spirit of "not for yourselves, but for all" a little far. And this is my way of sliding into an anecdote; doctors somehow inspire a lot of anecdotes.

Have you ever noticed, you're in a profession where when you're introduced sometimes at a social gathering to someone you've never met before, and the first thing that you know, when they hear that word "doctor" they start right out by saying, "Well, Doctor, I've been having——" and they go on with that? Well, we had a fellow in the business I used to be in, in show business—Moss Hart, the playwright—and he was an inveterate along that line. Anytime he was introduced to a doctor, he had a complaint. And one night at a party in Hollywood, he was introduced to a Dr. Jones and immediately started talking about this low back pain that he was having. And the fellow that introduced him was embarrassed, and he said, "Moss, Dr. Jones is a doctor of economics." [*Laughter*] That didn't stop Moss. He turned right back to the doctor and said, "I bought some stock last week." [*Laughter*]

But in this bicentennial year, as we look back, I believe we must also look forward. We must ask ourselves: How will we prepare America for the journey ahead? How will we prepare America for the 21st century? What kind of country will we pass on to our children? And will our children be ready for the jobs and opportunities of America's future?

This challenge, preparing America for the 21st century, includes finding ways to make the best use of our science and technology. It includes building a fair, open, and growing world economy, which will be the source of many of the jobs of our future. It includes making use—or, sure that American education is the best in the world, investing in our human and intellectual capital, so our children are ready for those jobs.

It includes improving the climate for entrepreneurship and growth here at home, so that the only limits on what our children can achieve are the limits of their dreams. The key here is lower tax rates and fewer needless regulations. We've made great progress in both those areas, but the job won't be done until we get control of Federal spending so that tax rates won't go up again. And that's why it's time for Congress to cut the Federal budget and leave the family budget alone.

And finally, and the reason why I'm here today, the challenge includes preparing American medicine for the 21st century. I said that American medicine is the best in the world, and on that we need no second opinions, because there are no other opinions. Our competitive system has produced the finest health care in history. And with each year that passes, it saves more lives, finds cures to more diseases, makes life better for more people than ever before.

Yes, the pulse of American medicine is strong. And as a result, life expectancy has been rising. Once-common diseases like tuberculosis, diphtheria, and polio are distant memories. Infant mortality is falling. The rate of Americans who die from heart problems drops each year. More cases of cancer are found quickly and treated with total success each year, and I have reason to be grateful for that. Operations like cataract surgery, which once were difficult and required long recoveries, have become simple office procedures. And for those who do go to the hospital, average hospital stays have fallen dramatically in the past two decades.

A stock scene in the movies has a father rushing his gravely injured child to a hospital. But now when he gets there, he finds doctors are more ready for him than ever before. Intensive care units have become not the exception but the rule, as have trauma centers staffed around the clock with surgeons. This is an important reason auto crash deaths have fallen over the last

10 years. Crash victims have a much better chance of living if they're treated within that first critical hour, and more are.

Almost every disease we know can be rapidly diagnosed and treated. The most obvious and disturbing exception is AIDS. And yet here, too, medicine is vaulting ahead. Six years ago the world had never heard of AIDS. Since then the AIDS virus has been isolated and identified. A test has been developed that is helping to ensure that transfusions are free of contamination. One drug, AZT, has been developed that may help treat AIDS patients, and it received FDA approval just 2 weeks ago. Other medicines are on the way, and American researchers will soon begin testing vaccines.

This is unprecedented progress against a major virus. It took 40 years of study to learn as much about polio. It took 19 years to develop a vaccine against hepatitis B. But then our battle against AIDS has been like an emergency room operation: We've thrown everything we have into it.

We've declared AIDS public health enemy number one. And this fiscal year we plan to spend $416 million on AIDS research and education and $766 million overall. Next year we want to spend 28 percent more on research and education and a total of $1 billion. That compares to $8 million just 5 years ago. Spending on AIDS has been one of the fastest growing areas of the budget.

And that's not all. Recently, Prime Minister Chirac and I announced an agreement that opens the way for cooperation between researchers in France and the United States. We are also unlocking the chains of regulation and making it easier to move from the pharmaceutical laboratory to the market with AIDS drugs. AZT received FDA approval in just 4 months, and that is one-fifth the average time for reviewing drugs. No, the limit on AIDS research today is not money or will but the physical limits of research facilities and the number of people trained in the necessary techniques.

But all the vaccines and medications in the world won't change one basic truth: that prevention is better than cure. And that's particularly true of AIDS, for which right now there is no cure. This is where education comes in. The Public Health Service has issued an information and education plan for the control of AIDS. The Federal role must be to give educators accurate information about the disease. Now, how that information is used must be up to schools and parents, not government. But let's be honest with ourselves. AIDS information cannot be what some call "value neutral." After all, when it comes to preventing AIDS, don't medicine and morality teach the same lessons?

Some time ago I heard the story of a man who received what turned out to be a transfusion of blood contaminated with the AIDS virus. He was infected, and in turn his wife was infected. And within 2 years, they both had died. Well, I'm determined that we'll find a cure for AIDS. When the Carthaginian general Hannibal was preparing to cross the Alps and was told there was no way across, he said: "We'll find a way, or make one." And that's the kind of determination we all have about curing AIDS. We'll find a way, or make one.

American medicine is making miracles commonplace, and that's good news as America prepares for the 21st century. But while our quality is the highest in the world, so are our prices. Last year medical costs climbed seven times faster than the rate of inflation. It's getting to where many patients feel that the recovery room should be next to the cashier's office. Doctors, patients, insurers—everyone feels sick about the rising cost of getting well.

As a nation, we spend up to twice the proportion of gross national product on health care as such major trading partners as Japan, Britain, and Canada. One of our greatest challenges in preparing for the competitive world of the 21st century is to get this medical cost crisis under control. Worst hurt are the uninsured and the elderly citizens on Medicare who face a catastrophic illness. Our catastrophic illness proposal will help those on Medicare. And as part of the package, we will also encourage the States to use their authority to require catastrophic coverage in insurance available through employers. The aim here is to make sure the guy who pumps gas or works in the corner store can get coverage, too.

But as we protect those who are most vulnerable, we must also do something to hold costs down. And let's face it, government has played a large role in the inflation of medical costs. As the head of one suburban hospital told a reporter not long ago: "The incentives used to be to keep people in the hospital, to perform more tests and procedures, to increase costs." When we came into office, Medicare was facing bankruptcy, and when it came to the public assigning liability, doctors were hurt, too. Stories of soaring costs and excessive bills tarnished the profession's reputation.

Four years ago we changed the Medicare hospital payment system. We also allowed health maintenance organizations and competitive medical plans to contract to give care, and the results were astonishing. Health care inflation was cut in half. Efficiency rose. Service did, too. And the Medicare trust fund was pulled back from the brink. And still, to insure that the fund remains strong through the year 2000, we must do more. And that's why I've sent a new package of proposals to Congress.

A lot is wrapped up in that package: more choices for Medicare beneficiaries, more incentives for doctors to improve efficiency, more incentives for States to give more choices to those on Medicaid. But let me tell you one thing that will not be in that or any future package from my administration: a mandatory cost containment system. I know some want to go that route, but a mandatory system would discourage innovation, restrict services, and be a step toward government control of the entire medical profession. American medicine is the world's best because it is private, and it must stay that way.

Now let me turn to one of the most important cost issues facing medicine and many fields today: liability insurance and tort reform. When I hear of what goes on in the courts, it reminds me of the hypochondriac who was complaining to the doctor. He said, "My left arm hurts me and also my left foot and my back. And oh, there's my hip and, yes, my neck." Well, the doctor muttered something to himself, sat the man down, had him cross his legs, tapped him there—you know, that spot, with the little rubber hammer. He says, "How are you now?" The patient said, "Well, now my knee hurts, too." [*Laughter*] Sometimes it seems as though the courts are ready to award damages even to that man.

Last year a jury awarded one woman a million dollars in damages. She'd claimed that a CAT scan had destroyed her psychic powers. [*Laughter*] Well, recently a new trial was ordered in that case, but the excesses of the courts have taken their toll. As a result, in some parts of the country, women haven't been able to find doctors to deliver their babies, and other medical services have become scarce and more expensive.

This is both a State and Federal matter. When Secretary Bowen was Governor of Indiana, Indiana reformed its liability law. Two-thirds of the States, including Pennsylvania, have taken action since the beginning of 1986. It's time to make it 50, and for Congress to follow, too.

We can debate the details, but doesn't it make sense, in effect, to give lawyers a Hippocratic oath so that they will, as you swear to do, "abstain from every voluntary act of mischief." Although I guess, for some lawyers—and I emphasize some—mischief is a compulsive act. [*Laughter*]

I've talked today about some of the challenges facing American medicine as we prepare for the 21st century. Sometimes it's easy, particularly on the cost issues, to turn to government for the answers. Yes, government has a role, but in the end, physicians are in charge of this operation.

And just as a surgeon must decide when to call for the scalpel, clamps, and thread during an operation, you must decide when to call for the tools that will help you remove enlarged costs from the body of medicine. I heard from a panel in the college library today about bringing down costs by making better use of nurses and other health professionals. Well, you must decide how and when to do this. A few negligent doctors can raise the health care and liability insurance costs for everyone. You must decide if medical societies will get tough on those guilty of negligence or of failing to conform to the ethical standards of medicine.

As patients expect more from medicine, and as they pay more, they also want to know more about their choices. And you must decide how to get the information to them. As less expensive, simpler procedures come available, you must decide when to use them. In your hands is American medicine's great tradition of healing all in need regardless of their wealth.

And let me add one other thing that is vital to our nation's future that in many ways is in your hands as well: the war on drug abuse. You can teach your patients about the health risk of drugs. You can show them, particularly your young patients, why it's important to them, their families, and their communities to just say no to drugs.

Yes, your hands will fashion the future of American medicine. But I believe that's just saying that American medicine is in the best hands in the world. Compare your healing powers to the doctors of any other country. Take, for example, the Soviet Union, which talks so much about the superior quality of its medicine, but where sanitation is so poor that, as recently as 2 years ago, a third of all operations there left patients with postoperative infections, where a third of all hospitals do not have adequate facilities for blood transfusions, and where, partly as a result of poor medicine, life expectancy has been falling and infant mortality climbing. There's no contest there or anyplace else. You are the best.

I say that with confidence, because I know the quality and commitment of America's physicians, not only firsthand but through my family as well. My father-in-law was a physician. My brother-in-law is. I saw their dedication to medicine. I saw my father-in-law's devotion to his patients and to his students. I saw his enormous dignity. And I saw his dedication to excellence, how he constantly searched for better ways to diagnose and cure. Yes, I saw how he helped people, whether or not they could pay, and treated all patients with the same courtesy and respect.

As our nation prepares for the 21st century, I'm confident that American medicine remains in hands like his. So I say to you, some of America's most distinguished doctors: Let us begin to get ready now, so that in the year 2000, American medicine will still be the best and most widely available in the world and physicians across our land will say with pride, "Not for oneself, but for all."

Thank you, and God bless you.

Note: The President spoke at 2:03 p.m. in the Wyndham Ballroom at the Franklin Plaza Hotel. In his opening remarks, he referred to Secretary of Health and Human Services Otis R. Bowen.

Philadelphia, Pennsylvania

Remarks to the Volunteers and Staff of "We the People." April 1, 1987

Governor Casey and Mayor Goode and ladies and gentlemen, to begin with, let me put you all at ease by letting you know that I intend to keep my remarks brief. I will, as Henry VIII said to each of his six wives: "I won't keep you long." [*Laughter*] You know, I often reflect that George Washington gave an inaugural address of only 135 words and became a great President. And then there was William Henry Harrison. In his inauguration he spoke for nearly 2 hours, caught pneumonia, and was dead within a month. [*Laughter*]

But it's an honor to be in this historic place with all of you who are doing so much this year to help make our history come alive. Especially on September 17th, the 200th anniversary of the day of our Constitution, the eyes of the world will turn here to Philadelphia. The hours and hours that you've spent contributing the energy and imagination—all of these represent a magnificent gift to the Nation, and on behalf of all Americans, I thank you.

By the way, looking around I can't help thinking that the National Park Service has done a darn good job at taking care of this place. It looks almost like new. And I ought to know; I was here the day it opened. [*Laughter*] I can't tell you how nice the bell in the other building looked before it cracked. [*Laughter*]

But on a serious note, join me, if you will, in considering three moments in the history of this square. First, it is December 1790. Sixty-five Representatives and twenty-six Senators have gathered here in Congress for drug-free campuses. We owe it to our kids to do our very best to protect them against this menace. And that's why part of our plan will also focus on high-risk youth, those young people with serious drug problems.

Drugs pervade every part of our society, and the United States isn't the only one confronting this problem. In June we will be participating in a United Nations conference in Vienna to spur international commitment to battle illegal drugs.

Of course, well-organized and coordinated Federal action is only part of the solution. State and local governments play an indispensable role through community school boards, hometown treatment and rehabilitation programs, as well as enforcing of law. Most of all, however, we need the active involvement of the American people in developing a national attitude of intolerance to illegal drugs.

Nancy was asked for advice by a young student worried about what to say when approached by drug users and dealers. She told her the answer was simple: Just say no. Together, we can deal with this threat to our families and country. We can help our loved ones and friends. We all need to speak with one voice: Say no to drugs in the school; say no to drugs in the workplace; say no to drugs in the home. Together, say yes to a drug-free America.

Until next week, thanks for listening, and God bless you.

Note: The President spoke at 12:06 p.m. from Camp David, MD.

American Foundation for AIDS Research

Remarks at the Foundation's Awards Dinner. May 31, 1987

The President. Dr. Silverman, Elizabeth, Don Ross, award winners, ladies and gentlemen, I hope Elizabeth won't mind, but some years ago when I was doing a television show, "General Electric Theater," part of my work required visiting the General Electric plants, 139 of them, and meeting all the employees. And knowing better tha to have a canned speech for them, I woul go and suggest that they might ask questions. And every place I went, the first question was "Is Elizabeth Taylor really that pretty?" [*Laughter*] And being the soul of honesty, I would say, "You bet." [*Applause*]

But you know, fundraisers always remind me of one of my favorite but most well-worn stories. I've been telling it for years, so if you've heard it, please indulge me. A man had just been elected chairman of his community's annual charity drive. And he went over all the records, and he noticed something about one individual in town, a very wealthy man. And so, he paid a call on him, introduced himself as to what he was doing, and he said, "Our records show that you have never contributed anything to our charity." And the man said, "Well, do your records show that I also have a brother who, as the result of a disabling accident, is permanently disabled and cannot provide for himself? Do your records show that I have an invalid mother and a widowed sister with several small children and no father to support them?" And the chairman, a little abashed and embarrassed, said, "Well, no, our records don't show that." The man said, "Well, I don't give anything to them. Why should I give something to you?" [*Laughter*]

Well, I do want to thank each of you for giving to the fight against AIDS. And I want to thank the American Foundation for AIDS Research and our award recipients for their contributions, as well. I'm especially pleased a member of the administration is one of tonight's recipients. Dr. [C. Everett] Koop is what every Surgeon General should be. He's an honest man, a good doctor, and an advocate for the public health. I also want to thank other doctors and researchers who aren't here tonight. Those individuals showed genuine courage in the early days of the disease when we didn't know how AIDS was spreading its death. They took personal risks for medical knowledge and for their patients' well-being, and that deserves our gratitude and recognition.

I want to talk tonight about the disease that has brought us all together. It has been talked about, and I'm going to continue.

The poet W.H. Auden said that true men of action in our times are not the politicians and statesmen but the scientists. I believe that's especially true when it comes to the AIDS epidemic. Those of us in government can educate our citizens about the dangers. We can encourage safe behavior. We can test to determine how widespread the virus is. We can do any number of things. But only medical science can ever truly defeat AIDS.

We've made remarkable progress, as you've heard, already. To think we didn't even know we had a disease until June of 1981, when five cases appeared in California. The AIDS virus itself was discovered in 1984. The blood test became available in 1985. A treatment drug, AZT, has been brought to market in record time, and others are coming. Work on a vaccine is now underway in many laboratories, as you've been told.

In addition to all the private and corporate research underway here at home and around the world, this fiscal year the Feder- Government plans to spend $317 million n AIDS research and $766 million overall. Next year we intend to spend 30 percent more on research: $413 million out of $1 billion overall. Spending on AIDS has been one of the fastest growing parts of the budget, and, ladies and gentlemen, it deserves to be.

We're also tearing down the regulatory barriers so as to move AIDS from the pharmaceutical laboratory to the marketplace as quickly as possible. It makes no sense, and in fact it's cruel, to keep the hope of new drugs from dying patients. And I don't blame those who are out marching and protesting to get AIDS drugs released before the I's were—or the T's were crossed and the I's were dotted. I sympathize with them, and we'll supply help and hope as quickly as we can.

Science is clearly capable of breathtaking advances, but it's not capable of miracles. Because of AIDS' long incubation period, it'll take years to know if a vaccine works. These tests require time, and this is a problem money cannot overcome. We will not have a vaccine on the market until the mid- to late 1990's, at best.

Since we don't have a cure for the disease and we don't have a vaccine against it, the question is how do we deal with it in the meantime. How do we protect the citizens of this nation, and where do we start? For one thing, it's absolutely essential that the American people understand the nature and the extent of the AIDS problem. And it's important that Federal and State Governments do the same.

I recently announced my intention to create a national commission on AIDS because of the consequences of this disease on our society. We need some comprehensive answers. What can we do to defend Americans not infected with the virus? How can we best care for those who are ill and dying? How do we deal with a disease that may swamp our health care system? The commission will help crystallize America's best ideas on how to deal with the AIDS crisis. We know some things already: the cold statistics. But I'm not going to read you gruesome facts on how many thousands have died or most certainly will die. I'm not going to break down the numbers and categories of those we've lost, because I don't want Americans to think AIDS simply affects only certain groups. AIDS affects all of us.

What our citizens must know is this: America faces a disease that is fatal and spreading. And this calls for urgency, not panic. It calls for compassion, not blame. And it calls for understanding, not ignorance. It's also important that America not reject those who have the disease, but care for them with dignity and kindness. Final judgment is up to God; our part is to ease the suffering and to find a cure. This is a battle against disease, not against our fellow Americans. We mustn't allow those with the AIDS virus to suffer discrimination. I agree with Secretary of Education [William J.] Bennett: We must firmly oppose discrimination against those who have AIDS. We must prevent the persecution, through ignorance or malice, of our fellow citizens.

As dangerous and deadly as AIDS is, many of the fears surrounding it are unfounded. These fears are based on ignorance. I was told of a newspaper photo of a baby in a hospital crib with a sign that said, "AIDS—Do Not Touch." Fortunately, that photo was taken several years ago, and we now know there's no basis for this kind of

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fear. But similar incidents are still happening elsewhere in this country. I read of one man with AIDS who returned to work to find anonymous notes on his desk with such messages as, "Don't use our water fountain." I was told of a situation in Florida where 3 young brothers—ages 10, 9, and 7—were all hemophiliacs carrying the AIDS virus. The pastor asked the entire family not to come back to their church. Ladies and gentlemen, this is old-fashioned fear, and it has no place in the "home of the brave."

The Public Health Service has stated that there's no medical reason for barring a person with the virus from any routine school or work activity. There's no reason for those who carry the AIDS virus to wear a scarlet A. AIDS is not a casually contagious disease. We're still learning about how AIDS is transmitted, but experts tell us you don't get it from telephones or swimming pools or drinking fountains. You don't get it from shaking hands or sitting on a bus or anywhere else, for that matter. And most important, you don't get AIDS by donating blood.

Education is critical to clearing up the fears. Education is also crucial to stopping the transmission of the disease. Since we don't yet have a cure or a vaccine, the only thing that can halt the spread of AIDS right now is a change in the behavior of those Americans who are at risk.

As I've said before, the Federal role is to provide scientific, factual information. Corporations can help get the information out, so can community and religious groups, and of course so can the schools, with guidance from the parents and with the commitment, I hope, that AIDS education or any aspect of sex education will not be value-neutral.

A dean of St. Paul's Cathedral in London once said: "The aim of education is the knowledge not of facts, but of values." Well, that's not too far off. Education is knowing how to adapt, to grow, to understand ourselves and the world around us. And values are how we guide ourselves through the decisions of life. How we behave sexually is one of those decisions. As Surgeon General Koop has pointed out, if children are taught their own worth, we can expect them to treat themselves and others with greater respect. And wherever you have self-respect and mutual respect, you don't have drug abuse and sexual promiscuity, which of course are the two major causes of AIDS. Nancy, too, has found from her work that self-esteem is the best defense against drug abuse.

Now, we know there will be those who will go right ahead. So, yes, after there is a moral base, then you can discuss preventives and other scientific measures. And there's another aspect of teaching values that needs to be mentioned here. As individuals, we have a moral obligation not to endanger others, and that can mean endangering others with a gun, with a car, or with a virus. If a person has reason to believe that he or she may be a carrier, that person has a moral duty to be tested for AIDS; human decency requires it. And the reason is very simple: Innocent people are being infected by this virus, and some of them are going to acquire AIDS and die.

Let me tell you a story about innocent, unknowing people. A doctor in a rur county in Kentucky treated a woman wh caught the AIDS virus from her husband, who was an IV drug user. They later got divorced, neither knowing that they were infected. They remarried other people, and now one of them has already transmitted the disease to her new husband.

Just as most individuals don't know they carry the virus, no one knows to what extent the virus has infected our entire society. AIDS is surreptitiously spreading throughout our population, and yet we have no accurate measure of its scope. It's time we knew exactly what we were facing, and that's why I support some routine testing.

I've asked the Department of Health and Human Services to determine as soon as possible the extent to which the AIDS virus has penetrated our society and to predict its future dimensions. I've also asked HHS to add the AIDS virus to the list of contagious diseases for which immigrants and aliens seeking permanent residence in the United States can be denied entry.

Audience members. Boo! Boo!

The President. They are presently denied entry for other contagious diseases. I've asked the Department of Justice to plan for testing all Federal prisoners, as looking into ways to protect uninfected inmates and their families. In addition, I've asked for a review of other Federal responsibilities, such as veterans hospitals, to see if testing might be appropriate in those areas. This is in addition to the testing already underway in our military and foreign service.

Audience members. No! No!

The President. Now let me turn to what the States can do. Some are already at work. While recognizing the individual's choice, I encourage States to offer routine testing for those who seek marriage licenses and for those who visit sexually transmitted disease or drug abuse clinics. And I encourage States to require routine testing in State and local prisons.

Not only will testing give us more information on which to make decisions, but in the case of marriage licenses, it might prevent at least some babies from being born with AIDS. And anyone who knows how viciously AIDS attacks the body cannot object to this humane consideration. I should think that everyone getting married ould want to be tested.

You know, it's been said that when the night is darkest, we see the stars. And there have been some shining moments throughout this horrible AIDS epidemic. I'm talking about all those volunteers across the country who've ministered to the sick and the helpless. For example, last year about 450 volunteers from the Shanti Project provided 130,000 hours of emotional and practical support for 87 percent of San Francisco's AIDS patients. That kind of compassion has been duplicated all over the country, and it symbolizes the best tradition of caring. And I encourage Americans to follow that example and volunteer to help their fellow citizens who have AIDS.

In closing, let me read to you something I saw in the paper that also embodies the American spirit. It's something that a young man with AIDS recently said. He said: "While I do accept death, I think the fight for life is important, and I'm going to fight the disease with every breath I have."

Ladies and gentlemen, so must we. Thank you.

Note: The President spoke at 8:16 p.m. at the Potomac Restaurant. In his opening remarks, he referred to Dr. Mervyn Silverman, president of the American Foundation for AIDS Research; Elizabeth Taylor; and Donald Ross, chairman of the board of New York Life Insurance Co.

Bicentennial of the United States Constitution

Remarks on Greeting the Winners of the Elementary School Essay Project.
June 1, 1987

The President. Well, welcome to the White House and congratulations to the special representatives of the 1987 Elementary School Essay Project. It could be said that each of you boys and girls here is just about one in a million, because that's how many children entered the Elementary School Essay Project—more than a million. And the judges tell me they read countless outstanding essays, but yours, well, they just stood out just a little bit above all the rest. And that's why you're here. So again, congratulations. I know you and your parents and teachers and principals are proud, and you deserve to be.

You know, Thomas Jefferson once wrote a friend to say that our Constitution represented "unquestionably, the wisest ever yet presented to men." Well, right about here, you probably think I'm going to say there's no truth to the rumor that I was the friend he was writing the letter to. [*Laughter*]

But history has certainly borne out Mr. Jefferson's judgment. Through two centuries now, our Constitution has proven a source of strength, stability, and unerring wisdom, serving longer than any other written constitution in the world. Think of that: Young as our country is, we're really, though, the oldest republic in the world. I know that, what with some of the budget bills, Presidents have days when they think the Constitution created one branch of government too many. But seriously, the Constitution has blessed us with what I have to believe is the finest Government in history.

Of course, as President, I find that the Constitution is part of my daily life. It's the Constitution that established the Office of

Carol

STATEMENT BY THE PRESS SECRETARY

ANNOUNCEMENT OF AIDS COMMISSION MEMBERS

The President is announcing today the appointment of the Presidential Commission on the Human Immunodeficiency Virus Epidemic -- the AIDS Commission.

The Commission's 13 members are drawn from a wide range of backgrounds and points of view. They bring together expertise in scientific investigation, medical care, and its costs, public health, private research, and both State and national government, as well as in fields that deal with the many painful issues of ethics, law, and behavior involved in the AIDS epidemic.

The primary focus of the Commission will be to recommend measures that Federal, State, and local officials can take to stop the spread of AIDS, to assist in finding a cure for AIDS, and to better care for those who have the disease.

In the course of its work, the Commission will: 1. review current efforts at AIDS education; 2. examine what is being done at all levels of government and outside of government to combat the spread of AIDS; 3. examine the impact of the needs of AIDS patients in years to come on health care in the United States; 4. review the history of dealing with communicable disease epidemics in the United States; 5. evaluate current research relating to the prevention and treatment of AIDS; 6. identify areas for future research; 7. examine policies for development and release of drugs and vaccines to combat AIDS; 8. assess the extent to which AIDS has spread both among specific risk groups and the population as a whole; 9. study the legal and ethical issues relating to AIDS; 10. review the role of the United States in the international battle against AIDS.

The Commission will proceed under the leadership of Dr. Eugene Mayberry, the Chief Executive Officer of the Mayo Clinic. The President has asked Dr. Mayberry to move quickly. Accordingly, the Commission begins its work today. It will deliver its first report to me within 90 days. It will produce a final report within a year.

The President believes that the spread of AIDS is a cause for deep concern, but not panic. It should not become an excuse to point fingers at one another. Instead, if Americans work together with common sense and common purpose, the President believes we will, in the end, defeat this common threat.

SUPPLEMENTAL: THURSDAY, 25 JUNE 1987

ADVANCED MATERIALS

nature 4 JUNE 1987 Pg. 356

Japanese poised to dominate in superconductors as well?

Tokyo

WHAT is happening in high-temperature superconductor research in Japan? Is Japan Incorporated ready to conquer the world? Not yet. Research is under way on a broad front but is largely uncoordinated, as government agencies and ministries manoeuvre to stake out territory and preserve their interests.

Since a group of researchers at Tokyo University confirmed superconductivity at about 30 K in a copper-oxide ceramic at the end of last year, research on the new materials in Japan has exploded. The April and May special issues of the *Japanese Journal of Applied Physics* contain nearly 200 papers on the new superconductors by several hundred scientists in about 80 laboratories throughout Japan. And barely a day goes by without the announcement of another 'breakthrough'.

Much of the effort, however, involves unnecessary duplication. On 4 March, the Science and Technology Agency's National Research Institute for Metals in Tsukuba announced that it had succeeded in making a high T_c ceramic, only to find that the same announcement had been made the day before by its Tokyo research institute. Researchers at the two laboratories were apparently unaware that they were making the same ceramics even though both had representatives on the agency's research committee on high-temperature superconductors. The committee, with representatives drawn from the universities, industry and the agency's laboratories, was formally set up in February but began informal meetings at the end of last year. The committee's principal job is to organize workshops and symposia; the first symposium was held on 1 May with I. Bednorz of IBM Zurich as guest speaker.

According to Koichi Kitazawa of Tokyo University, one of the committee members, the Science and Technology Agency has been very quick off the mark and has played an important role in disseminating news. The right 'atmosphere' to win financial support from the Ministry of Finance is being created. The new superconductors also provide a golden opportunity to boost the agency's National Research Institute for Metals whose fortunes have been declining along with those of the iron, steel and aluminium industries. On 28 May, the agency announced the establishment of a 50-man research centre at the Tsukuba site next spring to carry out basic and applied research on the new ceramics.

When it comes to funding research, though, the agency has been beaten off the mark by, surprisingly, the Ministry of Education. Casting aside its conservative image, the ministry has taken the extraordinary step of extending a major fixed-term grant, something that has only previously been done in the case of a natural disaster. A special research project to investigate new superconducting materials headed by Professor Nakajima of Tokai University (formerly of Tokyo University) is to be extended at a cost of Y180 million ($1.3 million). In addition, Professor Kazuo Fueki of the Tokyo University group has been awarded Y36 million by the ministry for this fiscal year (April 1987–March 1988). And Professor Shoji Tanaka, leader of the Tokyo University group, is a strong candidate for one of the ministry's special distinguished grants which are announced at the end of this month. Running from three to five years, the grants are usually worth Y100–200 million (about $1 million).

But the biggest government backer of technology development, the Ministry of International Trade and Industry (MITI), has yet to show its cards. MITI has long been a strong supporter of superconductor research. Companies such as Toshiba and Hitachi, nurtured in MITI's magnetohydrodynamic project, and aided by Japan National Railway's bid to build a high-speed train levitated on superconducting magnets, have gone on to supply many of the magnets for US particle accelerators. Josephson junction research has also been supported within the national supercomputer project. Although US companies, including IBM, abandoned similar work, researchers at NEC, Hitachi and Fujitsu remain confident that a Josephson junction computer can be built by the twenty-first century.

MITI money is also being funnelled to private companies through the Electric Power Central Laboratory in Tokyo, thereby allowing eight companies all to continue production of conventional superconducting wire, despite the comparatively small size of the Japanese market. It was from them that the first reports of the manufacture of high-temperature superconducting wires emanated. First off the mark was Fujikura Densen with La-Sr-Cu oxide encasedin drawn-out tubes of copper and steel. Then on 2 April, Toshiba released pictures of wire fashioned from Y-Ba-Cu oxide. Although the current-carrying capacity of the wire was initially very low (a few amps per square centimetre), within a month Toshiba had reached 520 A cm^{-2} and now Hitachi claims the record at 4.000 A cm^{-2} for ceramic wire (0.8 mm diameter) encased in silver.

Despite these projects, however, MITI has yet to formulate a policy on the new superconductors. Some of the problems are internal. There are fears that a new project may siphon off funds from projects already established — to the Ministry of Finance, superconductors are all the same be they ceramic or otherwise.

After a hearing of the science and technology committee in the lower house of the Diet on 28 May, Professor Shoji Tanaka called for a national project to develop applications, such as a magnetically levitated train. Also present at the hearing was Yoshihiro Kyotani, head of Japan's linear motor car (MAGLEV) project. But ruling party politicians suggested that the project should be international and might even be proposed at the Venice summit next week.

Tanaka denies that he is suggesting that Japan set up a research association similar to the well-known VLSI (very large-scale integrated circuit) project of the late 1970s

CONTINUED NEXT PAGE

Just five years from superconductor cable

Washington

THE US Department of Energy (DoE) is showing unusual alacrity in pushing for research on the new superconductors. Motivated by constant but uncertain rumours of furious Japanese activity, DoE officials have taken some considerable steps towards an organized national effort in this new technology.

A series of conferences to promote collaboration between the national laboratories, universities and industry is already under way, but DoE has now gone beyond this cheerleading role and has given Argonne National Laboratory a specific brief to produce a practical superconducting wire, operating in liquid nitrogen, in five years. (Argonne researchers have already made 'wires' by embedding superconducting grains in a plastic base.) The aim of the programme, in which Brookhaven and Ames (Iowa) Laboratories will also participate, is to make a cable suitable for electric transmission lines.

DoE also announced last week that it is setting up a computerized database to help US scientists to cope with the huge flow of results. Secretary of Energy John S. Herrington said that the normal channels of scientific communication are being overwhelmed, and that the DoE, by expanding its existing systems, could expedite the flow of information. The database will be accessible through electronic mail, and will be open to anyone who pays an entry fee.

The impetus for these initiatives is apparently coming from the top. At DoE headquarters, 'research applications' and 'Japan' are whispered in the same breath, and the current political climate is ideal for any venture which seeks to encourage US industry.

David Lindley

Superconductivity at room temperature

New Delhi

SCIENTISTS at the National Physical Laboratory (NPL) in New Delhi are proudly claiming to have found the hottest ever superconducting oxide phase. It shows superconductivity all the way up to +26 °C (299 K), or room temperature.

The development was officially made public before publication in a scientific journal in an attempt to ensure its legitimate place in the race in superconductivity both in India and elsewhere. Indian scientists frequently complain that although they are keeping pace with the latest developments in Japan and the United States, their work is often dated by the time it is printed in international scientific journals.

The NPL discovery was made in multiphase samples of $Y(Ba,Sr)_2Cu_3O_x$ prepared by the direct oxide-mixing technique. The typical resistance-versus-termperature curves show a sharp drop in resistance above 230 K followed by a gradual metal-like decrease of resistance with temperature. A study of the inverse a.c. Josephson effect revealed the presence of a phase superconducting up to +26 °C. "It is the hottest superconducting phase observed so far", said Dr A.V. Narlikar, the leader of the NPL team.

Because the sample had many phases, the studies were repeated in several different samples. In each of them, superconductivity was found to persist up to temperatures of 15 to 26 °C, said Narlikar. Studies also showed that the 26 °C phase constituted the bulk of the sample. Narlikar said his team is now working on isolating this phase. "When we do that, we will really have a room-temperature superconductor", he said. K.S.Jayaraman

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which drew together Japan's electronics giants with MITI support and helped power the conquest of world semiconductor memory markets. But it is no secret that Tanaka has close connections with Japanese industry, in particular Toshiba and Hitachi where several of his present and former students carry out research.

Other scientists who are on the government/industry university committee established by MITI to study the new superconductors doubt that the ministry will form a research association. Rather, they think that a medium-scale project under the category "basic research for future industries" may be possible. These projects which cover new materials, biotechnology and new molecular devices (including biochips) typically receive funding of a few thousand million yen (around $10 million) per year. But the earliest such a project could be set up would be 1988, and consensus would have to be reached in MITI within the next few months.

Meanwhile, research in industry is largely "free-style" with no particular coordination, government or otherwise, according to Dr Janshen Tsai, supervisor of the advanced device research laboratory at NEC. NEC has fewer than 10 researchers working full-time on the new superconductors but there are about 30 or 40 part-timers and many more are interested in joining the research, which covers primitive Josephson junction devices and thin films.

Researchers at Toshiba's Research and Development Centre in Kawasaki, on the other hand, seem to be interested primarily in wires and thin films, and they have no intention of pursuing Josephson junction research. Osamu Horigami, Toshiba's chief research scientist at the centre's energy science and technology laboratory, has 28 researchers working on superconductors and cryogenics and they are collaborating with scientists in the metals and ceramics laboratory of the same centre. Horigami says his laboratory began investigating superconducting ceramics about six years ago in collaboration with Professor Tanaka of Tokyo University — but they gave up when they reached a critical temperature of only 18 K.

How much money are these companies putting into the research effort? Company officials will quote only the percentage of total sales devoted to all research and development (8–7 per cent for Toshiba and 10 per cent for NEC). But Dr Ushio Kawabe of Hitachi says that in general they budget about Y10 million ($70,000) per researcher per year.

Patents are being sought apace. Sumitomo Electric Industries, a large wire and cable manufacturer, is reported to have applied for 800 patents on superconducting technology covering materials, processing and application. Many of the leading researchers in Japan have also taken out patents, although nobody knows who was first.

Tanaka fears that Japan may once again be criticized for failing to contribute to basic research. He and his colleagues have been publishing heavily to make the world aware of their efforts as students grind out ceramics in the laboratory (now up to processing 48 samples a day). And to drive home the point, 1,000 copies of the April special issue of the *Japanese Journal of Applied Physics*, weighing 0.7 tonnes, were airfreighted to the United States and distributed free of charge at the Material Research Society meeting in San Francisco. Mitsui Co Ltd agreed to cover the Y3 million ($20,000) air freight costs as a "contribution to basic science".

Other Japanese researchers are less concerned about such matters. "Our interest is how to get wire and devices using this material", says Horigami of Toshiba. **David Swinbanks**

SUPPLEMENTAL: TUESDAY, 30 JUNE 1987

NEWSWEEK 6 JULY 1987 Pg.42

Getting Warmer . . .

The race is on to find materials that superconduct at room temperature

The conference in Berkeley, Calif., last week seemed like an old science-fiction movie in which scientists find a chunk of flying saucer. The center of attention: mysterious materials, black and chalky, impossible to polish, that possess properties never before seen on earth. Hundreds of researchers have spent months examining the substances, knowing they could revolutionize world industry. As they met last week to exchange results, the mystery deepened: no single theory fully explained how the strange compounds worked. And there was more. In laboratories from Zagreb to Houston, scientists had seen the odd materials do amazing things—but no one had been able to repeat the results.

The materials are high-temperature superconductors, and they are hardly science fiction. Discovered in the past year by researchers K. Alex Müller in Zurich and C. W. Paul Chu in Houston, they have touched off one of the hottest scientific scrambles of the century. The stakes are enormous. When manufacturers learn to fabricate the exotic substances, they should produce dozens of applications, from low-cost medical imaging to faster computers and even high-speed levitated trains. If scientists can make them work at room temperature, the possibilities will be even greater: superefficient power lines, for example, and batteries that run indefinitely, even storing solar power for use at night.

JAMES D. WILSON—NEWSWEEK

A maddeningly elusive prize: *Zettl with samples*

Superconductivity is a simple property. Ordinary materials that conduct electricity, like copper wire, also resist its flow, wasting valuable energy as heat. Superconductors have no such resistance. An electric current set flowing in a loop of superconductor keeps going forever. Scientists in 1911 discovered that some materials possess the property; the hitch was that these materials had to be cooled to temperatures more than 400 degrees below zero. The new superconductors are actually ceramics, fired in ovens. But they are no ordinary clay: they superconduct at temperatures warmer than 300 degrees below zero, high enough to achieve with inexpensive and easily managed liquid nitrogen.

A year ago most researchers scoffed at the idea of superconductors that worked with liquid nitrogen. Indeed, the notion of a room-temperature superconductor seemed pure fantasy. But by last week three laboratories had announced seeing superconductivity at unprecedented high temperatures, and other researchers were rumored to have similar results. "The public announcements are only the tip of the iceberg," says Robert Dynes of Bell Telephone Labs. "There's something up there, and everyone is working their tails off to try to find it."

The ultimate prize—a room-temperature superconductor—has proven maddeningly elusive. "It keeps popping up all over the world," says Müller. "But it's not stable. It comes and goes." Three weeks ago Michigan researcher Stanford Ovshinky claimed that his company, Energy Conversion Devices, had discovered a superconductor that operates at an astounding 90 degrees above zero, but nobody has been able to duplicate his results. Ovshinky didn't even attend the Berkeley gathering. "Anyone who spends five days at a conference," he said, "is wasting valuable time."

'Madame Curie': The most detailed sighting of the will-o'-the-wisp came from Alex Zettl and Myron Cohen of the University of California. Last March Zettl mixed a batch of material, baked it and produced a superconductor the size of a small fishing sinker. For three hours the sample showed absolutely no resistance at room temperature. "We checked all the wires," says Zettl. "Everything was working." But when Zettl heated and recooled the sample, the effect vanished, thus far never to return. Cohen suspects that a high-temperature filament had formed within the larger sample—so delicate that it was destroyed upon heating. Finding it again, he says, "might be like Madame Curie looking for a tiny

Fever Pitch

68°-72°F
A few scientists claim they have achieved superconductivity at room temperature—but only fleetingly

-284°F
Early this year Chu and his colleagues push the temperature to that of cheap liquid nitrogen

-408°F
In mid-1986 Müller observes superconductivity in some ceramics—compounds of metal and oxygen

-452°F
In 1911 scientists discover that some metals superconduct at near absolute zero (460°F)

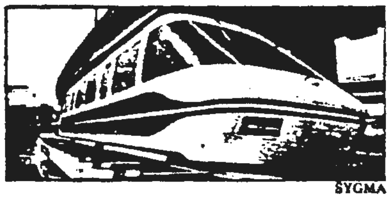
CONTINUED NEXT PAGE

Great Expectations: A 'Superpower' Is Born

Reseachers have already produced superconductors in a variety of forms—and as temperatures continue to climb, dozens of applications should be possible. A sampling:

ARGONNE NATIONAL LABORATORY

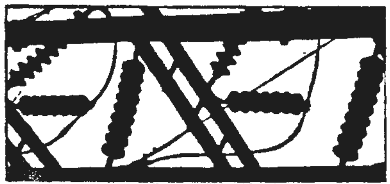
The magnetic properties of superconductors will facilitate levitation systems—such as Japan's floating train.



SYGMA

ARGONNE NATIONAL LABORATORY

Power lines made of superconducting wire would save the 15 percent of energy now lost in transmission over conventional lines.



FRANK FISHER—GAMMA-LIAISON

LARRY BARNES—BLACK STAR

Current medical scanners use costly liquid helium; new superconducting magnets could bring much less expensive systems.

SYGMA

SUPERCONDUCTIVITY...CONT.

amount of uranium in tons of pitchblende."

The comparison to uranium may be apt. Room-temperature superconductors would make practical applications far easier—and most researchers think that won't be long. After a dinner at Berkeley's chic Chez Panisse restaurant, a tableful of ranking luminaries took a private straw poll. The most conservative estimate: three to five years. "The pace is, if anything, increasing," says Zettl.

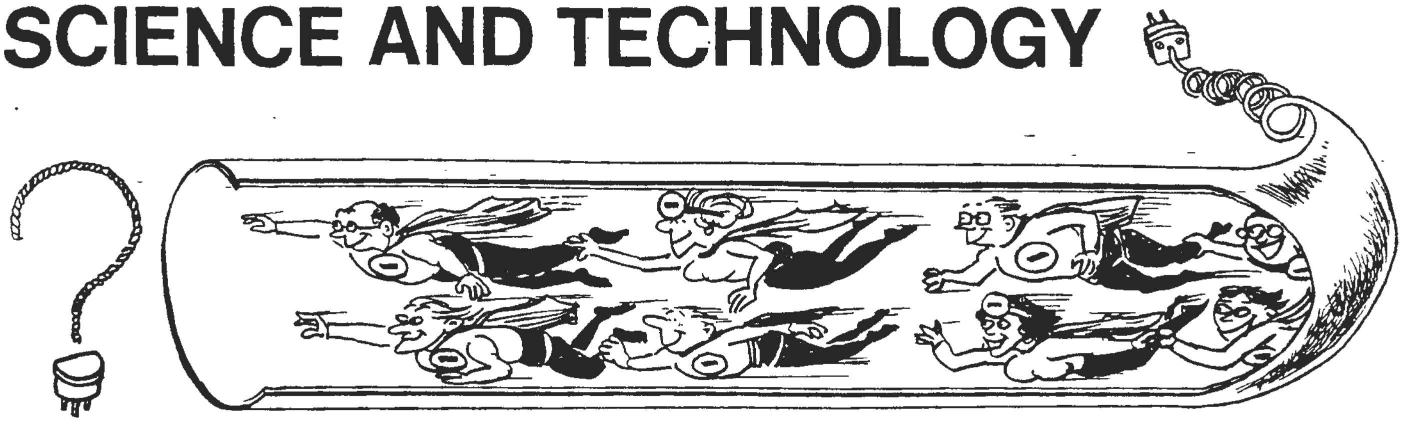
Researchers are also still trying to decipher the exact molecular structure that makes superconductors work. "Our articles of faith change weekly," says one scientist. The reigning theory (which won John Bardeen, Leon Cooper and J. Robert Schrieffer the Nobel Prize in 1972) holds that materials become superconductive when their electrons pair up and smooth the flow of electricity. Scientists had believed that cold temperatures were needed to overcome the electrons' natural repulsion. But as superconductor temperatures rise, even Bardeen admits the 30-year-old theory needs mending.

'Julia Child': To add to the confusion, the new superconductors are incredibly sensitive to the slightest change in ingredients. This has given rise to "Julia Child" research: mixing dozens of combinations, hoping one yields results in the magic room-temperature range. Scientists digging for new recipes are dismantling the best existing compounds, exposing samples to X-rays and neutron beams, magnetic fields and ultrasonic vibrations. They slice, polish, heat and chill, crystallize, pulverize and vaporize. Pieces of superconductor are squeezed in diamond vises, zapped with powerful electrical charges and exposed to exotic gases at bone-crushing pressures.

The flurry of experiments has outpaced the traditional journal articles that often take a year or more to see print. Instead, researchers are sending papers directly to each other—so many, says Müller, that he has a foot-tall stack unread on his desk. The frenzy has also led to some charges of sloppy science. "In this field you don't retract anything," says one cynic. "You just stop claiming it."

Few scientists even ventured out into the Berkeley sunshine last week as the talk proceeded nonstop. When the International Workshop on Novel Mechanisms of Superconductors was planned a year ago, organizers expected 40 participants; more than 400 showed up. The international mix—from Israel and the Soviet Union to England and Korea—was a reminder that the stakes are global. (And the absence of scientists from Japanese commercial firms left some Americans worrying that secrets were being withheld.) For most attendees, though, competition was secondary to the excitement of discovery—and the promise of greater marvels just out of reach. During one technical presentation, a researcher from Argonne National Laboratory blurted: "I think it would be nice if we all decided to take a vacation." The audience laughed—and kept on taking notes.

MICHAEL ROGERS *in Berkeley*



The great electron race

Not-so-superconductors

These are exhilarating and chaotic times for physicists. The big fuss is about a novel type of superconductor, recently discovered by Dr Paul Chu and his colleagues at the University of Houston in Texas, that promises to make the wonders of superconductivity affordable. Is a technological revolution really just around the corner?

Near the absolute zero of temperature, minus 273° Celsius, some materials lose all electrical resistance and thus waste no energy when conducting a current—that is, they superconduct. What makes the new type of superconductor special is that it keeps superconducting at up to 98° above absolute zero: four times higher than most scientists thought possible.

The material discovered by Dr Chu and his colleagues earlier this year is a sooty-black ceramic compound of the elements barium, yttrium, copper and oxygen. At the end of May, Dr Chu announced that another closely related (and still secret) ceramic compound showed signs of superconducting at 225° above absolute zero. New records are claimed almost every week. Researchers describe the new superconductors not only as a scientific marvel, but also as the basis of a technological revolution.

They are right about it being a marvel. The sudden jump in temperature is a surprise because it seems to defy the standard theory of superconductivity, which is often described as one of the great successes of theoretical physics. Physicists are now re-examining an older, rival account in the hope of explaining high-temperature superconductivity (see page 99).

The claim that it represents a technological revolution is more debatable. Superconductivity has held out great promise for quite a while. Yet few of its applications have ventured out of the laboratory. Fewer still have achieved commercial success. High-temperature superconductors make a big difference. They can use liquid nitrogen at 77 degrees above absolute zero as a fluid coolant rather than the liquid helium at four degrees absolute that other superconductors must rely on. Nitrogen is abundant and cheap to cool. Helium is scarce and expensive to keep cold.

First, consider what superconductors do best: small, lightweight superconductor coils can produce intense magnetic fields. Copper coil electromagnets can produce magnetic fields of four Tesla and more (one Tesla is about 200,000 times the earth's own magnetic field), but need huge amounts of energy to do so. The water needed to keep such a magnet from melting would amount to the flow of a largish river. Compare this with a four-Tesla superconductor magnet. Without its heat insulation, the magnet is about the size of a coffee pot. When running, the magnet consumes next to no power, so only the cost of helium refrigeration needs to be reckoned with.

It is not hard to see, then, why the word revolution comes to researchers' lips. The catch is that the revolution occurred in 1960, when American researchers developed a compound of niobium and tin that was ideal for powerful superconducting magnets. That compound and its relatives have since been at the heart of nearly every practical superconductor project.

What happened to superconductors in the 1960s was more radical than what is happening now. It was not merely that a new technology displaced an old one. The superconductor magnets of the 1960s go far beyond the limits that the old technology had met: ten-Tesla magnets are now built almost as a matter of routine. Like the laser, or the integrated circuit, superconducting magnets made the apparently impossible suddenly seem trivial.

High-temperature superconductors are a comparatively minor breakthrough. Scientists are not claiming that the new material can do things that the older superconductors cannot. Only that it can do them much more cheaply. Even that is questionable.

High-temperature superconductors offer big savings for those applications in which cooling the magnet is the main expense. Medical scanners that use three- or four-Tesla superconducting magnets are expensive. The initial cost of the helium, with its bulky insulation, is about $100,000; the running costs of the helium refrigeration are around $50,000 a year. Nitrogen-cooled magnets could slash the capital and running expenses to one tenth, or less, of their current cost, and make scanners much smaller.

But few other applications give high-temperature superconductors such a clear advantage, because cooling costs are not usually the limiting factor. Here are some sobering examples in which, contrary to some common claims, superconductors do not make a revolutionary difference.

For the past ten years, Dr Eric Forsyth and his colleagues at Brookhaven National Laboratory in New York have studied the feasibility of superconducting underground cables for the transmission of electricity. Superconductors offer two advantages over conventional underground cables. First, they can carry three gigawatts of power—six times more than normal underground cables—and as much as the highest capacity overhead lines. Second, they can span distances of up to 100 miles, some five times longer than would otherwise be possible underground, and comparable with the longest distances overhead lines can reach.

But, contemporary myth not withstanding, superconductor cables do not transfer power without losing a single watt. Although a superconductor offers no resistance to a direct current, it loses part of the energy it transfers when the current is alternating—and alternating current (AC) is what the utilities provide.

Put simply, AC power losses happen because an alternating current generates radio waves that are absorbed by the insulating material in the cable. This happens whether the cable is superconducting or not. In the best cable design to come out of the Brookhaven studies, the AC losses were close to those of an overhead line of similar capacity. But the cost of helium cooling doubles the cables' losses. So even reducing cooling costs will not make underground cables suddenly look the best bet.

Magnetic levitation trains (maglevs) are another instance in which the advantages of superconductors are unclear. Japanese National Railways has built a test maglev using superconductor magnets. A West German firm, Transrapid International, has built one using conventional iron-core magnets. The Japanese train boasts the highest speeds—over 500 kilometres an hour, but also has the bumpiest ride. The Japanese model could certainly be made lighter and cheaper to run by switching to liquid nitrogen cooling. But a technical hitch remains: that of accelerating the train on wheels until the magnetic field induced by the superconductors in the metal guide rails is enough for take-off.

That complication makes the train and track more expensive. The Transrapid, by contrast, can hover at a halt. Also, the superconductor maglev generates much stronger magnetic fields than its competitor. These fields may disrupt electronic devices, such as a passenger's wristwatch or, more seriously, his pacemaker.

High hopes for high-tech

However they are built, one problem for maglevs could be lack of demand. Building maglevs alongside Japan's loss-making bullet trains would look like overkill. Last year, transport ministers from France, West Germany, Britain, Holland and Belgium agreed in principle to an ambitious inter-city high-speed-link project. But the competition for those lines will probably be between conventional high-speed trains, such as France's *Train à Grande Vitesse*, and West Germany's Inter City Express. Sceptics say that maglevs have missed their chance by about a century. As they see it, when rail transport was an expanding, competitive industry, new technology generated excitement. It is now a mainly contracting, nationalised industry, in need of better management rather than expensive new toys. On that reasoning, superconductors should have brighter prospects in high-tech applications, such as computers.

A few years ago, superconducting computers were the futurologists' favourite remedy for the problems that bedevilled semiconductors. The idea was to replace semiconductor transistors with a superconducting version called a Josephson junction, named after its inventor, Dr Brian Josephson of Cambridge University.

The role of a transistor is to amplify a small voltage signal into a large current change, thus acting as an on-off switch that can represent the 1s and 0s of binary arithmetic that every computer uses. The advantage of a Josephson junction is that it responds to a tiny voltage signal. The signal needed to flip it is a hundred times weaker than that required by the best semiconducting transistors. This is helpful because the time it takes to switch a transistor is roughly proportional to the voltage signal, and the heat produced by the transistor increases as the square of that voltage. Thus, a 100-fold reduction in the voltage signal should mean speedy computers that can be crammed into minute spaces without the risk of melting. Or so the theory goes.

Chu's breakthrough

In 1983, IBM closed down its Josephson junction project. Others cut their efforts substantially—with the notable exception of some Japanese companies. Two technical problems prompted the shift away from superconductors. First, the difficulty of mass-producing junctions that could be cooled repeatedly to four degrees above absolute zero. Second, the slow, but sure, progress of semiconductor technology threatened to whittle away the advantages of Josephson junctions, and make helium-cooled computers not worth the bother. But nitrogen-cooled superconductors should change all that, say those who believe that Silicon Valley will be replaced by Barium-yttrium-copper-oxide Valley. Cooling with nitrogen does make a difference, but that difference is not entirely for the better.

To understand why, consider the real secret behind the Josephson junction. The fact that it can be triggered by such a small voltage has little to do with superconductivity, and much to do with the temperature of liquid helium. At four degrees above absolute zero, the thermal "background noise" in a circuit, which is produced by electrons bouncing around, is very low. A tiny voltage signal registers like a sneeze in a library. At 77 degrees absolute—the temperature of liquid nitrogen—that signal is more like a sneeze on a crowded street. It cannot be heard.

A simple rule of thumb says that the voltage signal required to switch a transistor is proportional to the absolute temperature. Working at 77 degrees absolute, rather than four, means forfeiting speed and increasing heat output. What little theoretical advantage remains for Josephson junction computers threatens, once more, to be eaten away by the plodding advance of semiconductor technology.

Josephson junctions have other uses, though. An intriguing one is the superconducting quantum interference device, or SQUID, which exploits the Josephson junction's high sensitivity to magnetic fields. SQUIDs are used as magnetometers, and are some 1,000 times more sensitive to changes in a magnetic field than are other instruments. IBM researchers have demonstrated a high-temperature SQUID. Although working at liquid nitrogen temperature degrades the performance of a SQUID, the fact that it can be packed in much less cumbersome insulation would be a clear advantage for many applications, including mineral prospecting and submarine tracking.

High-temperature superconductors may yet find their way into the microelectronics industry, but probably in a less-than-grand role: by transmitting the signals that semiconductor transistors send to one another. Superconductor wiring between transistors would generate less heat and boost the speed at which the transistors can switch. Dr Theodore Geballe of Stanford University in California, whose group was one of the first to demonstrate a Josephson junction using high-temperature superconductors, reckons that hybrid superconductors-semiconductor circuits could boost computer speeds about fivefold. If, that is, the technical hurdles can be jumped.

High-temperature superconductors are not yet out of the laboratory. Some researchers have already produced wires and tapes of the stuff—no mean feat, considering that the new ceramic superconductors are brittle, while a wire must be flexible. But cautious scientists say that it could take years to make wires good enough for industrial use. The main stumbling block seems to be the maximum current that a superconductor will carry before it reverts to normal conductivity. At the moment, the biggest current that researchers have managed to push through a wire measuring one millimeter across is around ten amperes. For powerful magnets, that figure needs to be boosted about 1,000 times.

The source of the problem is not yet apparent. A wealth of experience with conventional superconductors suggests that small non-superconducting defects in the wire are partially blocking the current, and causing resistance when the current is raised too high. For the superconductor wiring on a silicon chip, those defects are bad news. Such wires would be only a few billionths of a metre across. Single defects, which the current could easily bypass in a thicker wire, would block the current entirely in a tiny wire.

In May, IBM's Watson Research Centre in Yorktown Heights, New York, announced that its scientists had made some headway with this problem. By growing a thin single crystal layer of the superconductor, researchers were able to achieve reasonable currents. Unfortunately, the key to IBM's success lies in the perfection of the material. The jumble of minute crystallites that makes up a wire is bound to have more defects than a single crystal.

Such pessimistic observations may enrage scientists, especially those in America who are trying to convince Congress that superconductors are the battlefield for the next technology fight with the Japanese. But nothing will stop hundreds of fertile minds from looking for new applications of superconductivity. Perhaps they will soon find them, and make this article look out of date. But be clear that the superconductor revolution has not quite happened yet.

How electrons mate

It took 45 years, at a rate of about three failed theories a year, to find an apparently workable explanation for superconductivity. In 1957, Dr John Bardeen, Dr Leon Cooper and Dr John Schrieffer, all then at the University of Illinois, developed a theory known as BCS that seemed to account for all the quirks of superconductors. Now the BCS theory needs modifying, too, and others are coming into vogue, including one that is almost as old but was until recently unfashionable.

To see why the BCS theory is not the whole story, look first at how it works. At the level of atoms, heat energy in a crystal simply consists of atoms jiggling around fixed positions within the atomic lattice of the crystal. Passing electrons collide with the jiggling atoms and lose energy. Such collisions are the main source of electrical resistance in normal conductors.

However, under certain conditions, electrons join together in pairs, called Cooper pairs, and behave oddly. All electrons are negatively charged, so it might seem suprising that two like charges can attract. The explanation is that an electron distorts the crystal structure of the atoms around it and attracts a partner, in much the same way as two people sleeping in a soft bed will tend to roll into the middle because of the depressions they make in the mattress.

A Cooper pair of electrons is best thought of as a single entity, belonging to the category of elementary particles known as bosons. Strangely, a lone electron belongs in another category, that of fermions. Bosons and fermions behave very differently. Fermions are individualists—a single electron may be involved in a collision with atoms, quite independently of what other electrons in the same crystal are doing. Bosons are groupies, and do it together or not at all. Jiggling atoms cannot deflect all the Cooper pairs in a crystal at once. Thus, once the pairs are set in motion by a voltage, the Cooper pairs travel along, oblivious to the atoms.

This works only so long as the atoms are not jiggling too violently—ie, so long as the crystal is cold. If the temperature is too high, the Cooper pairs are wrenched apart and the electrons no longer behave as bosons, so they keep bashing into atoms.

In order to raise the critical temperature at which a material becomes superconducting, the force with which the Cooper pairs are held together must be increased. This means increasing the distortions that passing electrons produce in the lattice. There are at least two ways to do this.

- The chemist's approach is to weaken the chemical bonds of the crystal by changing its constituent atoms. The atoms are then more easily displaced by the electrons, and the critical temperature for superconductivity becomes higher. But there are limits to this technique. Eventually, the crystal is held together so weakly that it changes to a more stable structure that does not superconduct.
- The physicist's approach is to switch one chemical element in the crystal with another of the element's isotopes. Although two isotopes of an element are chemically identical, they have different masses. In theory, if the new isotope is lighter, the distortion of the lattice is larger, the Cooper pair is more strongly bound together, and so the critical temperature for superconductivity should be higher.

Boson-like behaviour

This April, Dr Bertram Batlogg and his colleagues at AT&T's Bell laboratories in New Jersey tested the isotope effect by replacing an oxygen isotope in one of the new superconductors with a more massive one. The BCS theory led them to expect a decrease in the critical temperature of their superconductor of over three degrees, but they found no change at all. This was the finishing stroke for BCS. It became clear that the theory needs some big changes.

For more than 20 years, Dr William Little of Stanford University in California has championed a controversial change to superconductor theory that might fit the bill, and also help scientists to find room-temperature superconductors. His theory is inspired by biology.

In the 1960s, Dr Little suggested that superconductivity might be achieved in organic molecules, which are long and have "side-chains", or branches, sticking out of them. Instead of nudging, and thus polarising, atoms as it passes through a crystal lattice, an electron travelling down the backbone of an organic molecule could polarise side-chains of the molecule by displacing electrons in them. The polarised chains would then serve to attract another electron, and a Cooper pair would be formed. Since electrons are far lighter than atoms, superconductivity in an organic molecule should be possible at much higher temperatures.

Researchers are now busy studying several organic compounds in the hope of proving Dr Little right. Superconductivity has been found in some of them but, so far, only at extremely low temperatures. Does the new family of superconductors, based on barium yttrium copper-oxide, fit the theory? Although not an organic compound, it does suit Dr Little's model. Copper-oxide side-chains stick out from each plane of atoms, making the new superconductors somewhat like organic molecules. And Dr Little's theory neatly accounts for the puzzling result of Dr Batlogg's experiment (because the mass of atoms, on Dr Little's theory, does not affect the strength of the bond between a Cooper pair). Until others have had time to cook up their own theories, Dr Little's 20-year-old idea has the field.

Carol

PRESIDENTIAL STATEMENT

ANNOUNCEMENT OF AIDS COMMISSION MEMBERS

I am announcing today the appointment of the Presidential Commission on the Human Immunodeficiency Virus Epidemic -- the AIDS Commission.

The Commission's 13 members are drawn from a wide range of backgrounds and points of view. They bring together expertise in scientific investigation, medical care, and its costs, public health, private research, and both State and national government, as well as in fields that deal with the many painful issues of ethics, law, and behavior involved in the AIDS epidemic.

The primary focus of the Commission will be to recommend measures that Federal, State, and local officials can take to stop the spread of AIDS, to assist in finding a cure for AIDS, and to better care for those who have the disease.

In the course of its work, the Commission will: 1. review current efforts at AIDS education; 2. examine what is being done at all levels of government and outside of government to combat the spread of AIDS; 3. examine the impact of the needs of AIDS patients in years to come on health care in the United States; 4. review the history of dealing with communicable disease epidemics in the United States; 5. evaluate current research relating to the prevention and treatment of AIDS; 6. identify areas for future research; 7. examine policies for development and release of drugs and vaccines to combat AIDS; 8. assess the extent to which AIDS has spread both among specific risk groups and the population as a whole; 9. study the legal and ethical issues relating to AIDS; 10. review the role of the United States in the international battle against AIDS.

The Commission will proceed under the leadership of Dr. Eugene Mayberry, the Chief Executive Officer of the Mayo Clinic. I have asked Dr. Mayberry to move quickly. Accordingly, the Commission begins its work today. It will deliver its first report to me within 90 days. It will produce a final report within a year.

I believe that the spread of AIDS is a cause for deep concern, but not panic. It should not become an excuse to point fingers at one another. I believe that, if we work together with common sense and common purpose, we will in the end defeat this uncommon threat.

1ST STORY of Level 1 printed in FULL format.

~~High Technology~~

July, 1987

SECTION: FEATURES; Pg. 16

LENGTH: 502 words

HEADLINE: Bringing Superconductors in from the Cold

BODY:

Ordinary electrical current consists of electrons flowing individually through a metal wire. In superconductors, however, electrons travel in pairs, easily overriding resistance from atoms. At ordinary temperatures, thermal vibrations of the material's atoms disrupt the subatomic "glue" that binds these electrons to each other. Thus superconductivity occurs only when these vibrations are suppressed, at temperatures close to absolute zero (-459 degrees F).

The new superconductors are based on copper oxide and metals such as lanthanum, barium, strontium, and yttrium. In these materials, electron pairs are bound together so strongly that superconductivity occurs at higher temperatures than previously possible.

The discovery of these new superconductors has proceeded at a dazzling pace. In November 1986, researchers at the IBM research lab in Zurich found evidence of superconducting in lanthanum copper oxide at -396 degrees F, shattering a record of -418 degrees F attained in 1973. Unlike previous reports of high-temperature superconductors, the IBM results stood up, as physicists from the University of Houston and the University of Tokyo started analyzing the superconducting oxides. In December, these three groups presented their findings at a conference in Boston -- and the rush was on.

Like master chefs, scientists tried one recipe after another. At Houston, Paul Chu and colleagues reached -364 degrees F by subjecting the oxide material to a crushing 12,000 atmospheres of pressure. Then a group at Bell Communications Research achieved -387 degrees F, with no pressure increase, by substituting strontium for some of the lanthanum.

The true breakthrough came early this year: Chu reached -290 degrees F by substituting a mixture of yttrium and barium for lanthanum. This was the first observation of superconductivity above the temperature of liquid nitrogen (-321 degrees F). In May, Chu attained superconductivity at a balmy -54 degrees F. This is warmer than dry ice, raising the prospect that superconductors might work with a cooling system no more exotic than those used to refrigerate produce.

Despite these developments, the new superconductors are far from practical use. The oxides are brittle and thus difficult to make into wire. Moreover, they operate at the reported high temperatures only when carrying small amounts of current; they must be kept much colder in order to superconduct the current levels required for magnets or power transmission. In May, IBM scientists managed to raise the current capacity significantly, but only by fabricating the material in the form of single crystals. While such crystals could be made large enough for some applications -- such as electronic devices -- there's little near-term prospect for this technique in the handling of industrial electrical needs. "Everybody is getting very excited about the lab work, but that's really the easy part," says Carl Rosner, president of Intermagnetics General.

GRAPHIC: Figure, no caption

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10TH STORY of Level 1 printed in FULL format.

Financial Times

July 15, 1987, Wednesday

SECTION: SURVEY; Pg. XI

LENGTH: 1193 words

HEADLINE: Japan 11;
Superconductivity Research Breakthrough

BYLINE: Peter Marsh

BODY:

Toshiba, the Japanese electronics company, was responsible earlier this year for a notable breakthrough in the fast-moving area of superconductivity. It produced a wire made from oxides of yttrium, barium and copper that demonstrated zero electrical resistance at minus 23 degrees C, which at the time was the highest temperature at which superconductivity had been demonstrated.

Toshiba's work in superconductivity - the sudden decline in electrical resistance which occurs when materials are cooled - illustrates the general level of advance in materials research in Japan.

Many leading Japanese companies are increasing their research activities in this area as a way, so they hope, of laying the basis for new industries for the next century.

In recent months, superconductive materials have grabbed the headlines on the grounds that substances which show zero resistance at relatively high temperatures could have a marked change on a range of industries, including electricity generation, electronics, transport and medical equipment.

The publicity has been caused by the discovery that certain mixtures of materials, mainly based on ceramics, demonstrate zero resistance at relatively high temperatures. Hitherto, the only way to make materials behave as superconductors has been to cool them to extremely low temperatures, normally around - 253 deg C. This has required use of liquid helium, which has a very low boiling point but is extremely expensive and difficult to handle.

The new advances mean that liquid nitrogen, which boils at 196 deg C, a higher temperature than helium, and which is much cheaper and easier to store, could be used in place of the lower-temperature liquid.

In turn, this could make superconducting materials, which hitherto have been reserved for extremely exotic applications, such as in the coils of powerful magnets used in nuclear physics, far more commonplace. For instance, wires made from superconductors could be used in electricity transmission systems, greatly reducing energy losses due to resistance and so saving vast sums of money for power utilities.

Most of the recent fundamental advances in superconductors have been reported from US laboratories. But Professor Kent Bowen, a ceramics expert at the Massachusetts Institute of Technology, says that the Japanese are not far behind. He says Japan has 20-30 laboratories doing "highly creative" work in superconductivity.

One of Japan's leading research groups in this field is run by Professor Shoji Tanaka, of the applied physics department at Tokyo University. Out of Prof Tanaka's 30-strong research team, 10 of the scientists have been seconded from companies, which include, in addition to Toshiba, Hitachi, Matsushita and Tokyo Electric Company.

Prof Tanaka says he expects to see the first fruits of his research in about four years, with the advent of laboratory systems based on the new generation of superconductors. He expects fully commericalised systems - such as medical equipment based on magnets which use the new superconductors materials - in about 10 years.

Another area of matierals research strongly supported in Japan involves engineering ceramics. These are novel non-metallic, non-organic substances usually based on the oxides or nitrides of elements like silicon and zirconium.

The materials, which are light and strong and can also show useful electronic characteristics, are used in a variety of applications, from aerospace to car engines to computers.

According to projections by Japan's Ministry for International Trade and Industry, the market in Japan for engineering ceramics will grow from Y 500 bn (Dollars 3.5 bn) in 1981 to Y 10,200 bn by the year 2000.

With their sights on this increasing market, Japanese companies are putting a lot of effort into ceramics research. Total research and development in this area in Japan accounted for some Y 85 bn in 1984, of which only about Y 3 bn was contributed by the Government.

A diverse range of companies is interested in new applications for ceramics. They include Kyocera, which is best known for making ceramic substrates for integrated circuits. Shinagawa, Toshiba and Kurosaki, all of which make refractory materials; Ino Seito and Noritake, which make tiles and china respectively; and engineering groups such as Hitachi, Sumitomo, Toyota and Toyoda Machine.

Electronics companies such as Fujitsu, NEC and Hitachi are putting a great deal of emphasis on research in electronics materials. Substances such as gallium arsenide and other compounds made from mixtures of lithium, nitrogen and boron can be used in a variety of products, including new generations of microchips, optical fibres and sensors that transfer light signals into electrical impulses (and vice versa) and which are used in optoelectronic devices.

Japanese companies have shown much interest in amorphous silicon, a non-crystaline form of the element. Compared with the crystalline form, which is the standard type of silicon used in today's microchips, amphorous silicon is relatively difficult to produce in large amounts, which has limited its use to date.

In recent years, however, engineers have made advances in producing amorphous silicon, coming up with new ways to deposit the material as films on to substrates of metal or ceramic. In these techniques, the engineers start with ways of producing a plasma (a mixture of energetic ions or charged atoms) containing silicon and then arrange for the plasma to come into contact with the substrate so that a layer is gradually built up.

The research thrust has come about because amorphous silicon has some clear advantages over the crystalline form. It can show better electrical characteristics, particularly for photo-electric applications, such as in photocopiers or solar cells. And electronic devices made from the amorphous form can, in theory, be very cheap because only thin deposits are required.

Among the Japanese companies most closely involved with amorphous silicon are Sharp, which makes electronics equipment and solar cells and Canon.

Nippon Steel, Japan's biggest steel maker, is also trying to develop applications for amorphous silicon, as part of its drive to move into new areas of commerce. The company is doing this with the aid of a technology-exchange agreement with Energy Conversion Devices, a US company which has developed a series of techniques to turn out amorphous materials relatively cheaply.

With an eye even more towards the future, a group of companies in Japan has set up a research group aimed at exploring the potential for producing materials in the low gravity of outer space.

According to the group, the Japan Space Utilisation Promotion Centre, space platforms could in the next couple of decades house workshops for the production of substances difficult or impossible to make on earth. The classes of materials that might lend themselves to production with the forces of gravity largely stripped away include new semiconductors, drugs and alloys.

About 40 companies have formed the new centre putting up a total of Y 600 m to get it off the ground.

11TH STORY of Level 1 printed in FULL format.

July 14, 1987, Tuesday

SECTION: National; Pg. 3

LENGTH: 1913 words

HEADLINE: From lab to market: Can it be done?

SERIES: SUPERCONDUCTORS. The hype and the promise. Part 3 of a 3-part series

BYLINE: Peter N. Spotts, Staff writer of The Christian Science Monitor

DATELINE: Boston

BODY:

Think about making wire from a brick.

That's what it's like for researchers trying to make useful shapes from recently discovered ceramic superconductors, says Donald M. Smyth, director of the Materials Research Center at Lehigh University in Pennsylvania.

From Bombay and Boston to Paris and Peking, thousands of scientists and engineers are trying to solve the puzzles posed by a new class of materials that lose all resistance to electricity at temperatures that, while still frigid, were thought to be impossibly high only six months ago.

Their efforts fall into three broad areas: working the copper-oxide ceramic materials into useful forms; trying to figure out what makes them work; and looking for ways to push toward less-frigid temperatures.

No one harbors any illusions about the difficulties that lie ahead in trying to take these materials from the lab to the marketplace. Indeed, some scientists don't give them much of a market niche beyond replacing technology already available at colder liquid helium temperatures - encouraging, they say, but not revolutionary.

But given the sheer number of people working on the new superconductors - and the potential economic and scientific bonanzas that may lie ahead - many other researchers are optimistic about the outcome. ''We can't say now where it's all going to end up,'' says Neil Ashcroft, a Cornell University physicist. ''But the pace of discovery is so rapid that within a year you'll have some pretty solid predictions.''

''I do not see any inherent roadblocks'' to practical applications of these new materials, Dr. Smyth says.

From the standpoint of electrical properties, the last of those roadblocks were shoved aside in late May when scientists at IBM's Thomas J. Watson Research Center at Yorktown Heights, N.Y., announced that a carefully prepared thin-film crystal of the new superconducting material carried enough current to be of practical use in electrical circuits. Up to that point, it was already clear that the material was a superconductor and that in principle it could withstand extraordinarily large magnetic fields without losing its resistance-free properties.

The scientists built their crystal - atoms at a time - out of layers of individual grains of material. The grains within each layer were aligned side by side, like so many pancakes. They found that the crystal's current-carrying ability was some 30 times better going ''with the grain'' than against it.

''There's no hype left because of the IBM results,'' says James F. Smith, head of the Center for Materials Science at the Los Alamos National Laboratory in New Mexico.

''I'm predicting two years before we see the first (small-scale) devices,'' says Lehigh's Smyth. By small-scale, he means electronics.

Researchers at IBM and the National Bureau of Standards, among others, have used the new ceramic materials to make rudimentary versions of devices known as SQUIDs, which are extremely sensitive to magnetic fields and can be instruments for areas as diverse as medicine, geology, space research, physics, and defense. IBM's device was made of a thin film about 100 times thinner than a human hair.

Thin films of the ceramic material are likely to find their first application as connecting lines between components on circuit boards. IBM scientists have also found that the copper-oxide materials can be ''painted'' on materials used for making printed circuits, using a high-temperature technique called plasma spraying.

''This means you can start beating heat problems'' that crop up as designers try to squeeze more and more components into smaller and smaller chips, says Dr. Smith. The next step would be connections between components on individual chips. ''Hybrid'' circuits might include a new generation of transistors made from new semiconductor composites that operate best at liquid-nitrogen temperatures - within the limits of the ceramic superconductors, says Harold Weinstock, program manager for superconductivity at the US Air Force Office of Scientific Research.

Additional impetus for these applications has come from Bell Communications Research in New Jersey. Late last month Bellcore scientists announced a technique that would help chipmakers ensure that the ceramics maintain their superconducting properties during fabrication without damaging the other components on a chip in the process.

Paul Chu, who along with his collaborators first announced the discovery of superconductors that would work at liquid-nitrogen temperatures, says, ''It's also important to look at the normal (non-superconducting) properties of these materials.''

The material of choice at the moment is a made from a recipe of copper, oxygen, barium, and the rare-earth metal, yttrium. Dr. Chu says that a pinch less of one ingredient, or a pinch more of another, can in principle yield nearly all the basic building blocks for a new generation of electronic circuits: superconductors; semiconductors, which form the basis of transistors; and insulators, which don't conduct electricity at all.

Much more work remains to be done. For example, it's still not clear if the new superconductors are suitable for applications in microwave and other radio equipment. But things seem to be humming along in electronics when compared with the agonizing progress in the realm of wires and other so-called bulk forms.

If computer chips are the thoroughbreds of electronics, then wires are the draft horses. Wind wire around a metal object, such as an iron bolt, apply a battery to it, and you have an electromagnet. Wire windings are found in motors and generators. Wire made from copper alloys can be bent in a variety of shapes. But wires made from the ceramic superconductors? ''To my knowledge, no one has made a wire that is both flexible and superconducting,'' says John Rowell, assistant vice-president of solid state science and technology research at Bellcore.

''There's a big difference between making a three-inch or six-inch wafer and a magnet. The average small magnet has 15 kilometers of wire in it,'' says Donald Capone II, of Argonne National Laboratory in Illinois.

Researchers at AT&T Bell Laboratories in New Jersey have poured the ceramic superconductor's powdered ingredients into a thin metal tube. The tube is then stretched, shaped, and fired so that the core becomes the superconducting ceramic. At Argonne, on the other hand, the powders are mixed with a binding material that holds everything together while the copper-oxide mixture is shaped. Once shaped, the ceramic is fired, burning away the binder and leaving the superconductor.

Another approach is to treat the ingredients like metals instead of ceramics. For example, a team at the Massachusetts Institute of Technology substituted europium for yttrium, then combined it with copper and barium to form an alloy. Once the alloy is shaped, it is combined with oxygen at high temperature to turn it into a superconductor.

Unlike their thin-film relatives, wires made from the ceramic superconductors so far cannot yet carry enough current to make them practical. This is because the grains of material in shapes formed by ceramic techniques are a hodgepodge, unlike the tightly formed ranks of perfectly aligned grains in the crystal IBM produced. The MIT team hopes that the alloy route may lead to more uniformly aligned grains, hence a higher ''current density.''

The goal is to carry 100,000 to 1 million amperes for every square centimeter of cross section. Currently the prototype wires are handling only about 1,000 to 10,000 amps per square centimeter.

Some researchers point out that the solution may lie along avenues other than trying to shape new materials into traditional forms. ''You know, we may have to learn better how to exploit the properties of this material,'' says Robert Doremus, chairman of the materials engineering department at Rensselaer Polytechnic Institute in Troy, N.Y., as he surveys efforts to whip ceramic superconductors into shape.

''Motors and generators are made the way they are because of the qualities of metals and wires,'' he says. Instead of struggling to make the new superconductors conform to old ways of making such devices, it might prove more fruitful to rethink the way those machines are made in light of the ceramics' properties.

''What's holding us back is a lack of scientific understanding'' of the new materials, says Bill R. Appleton, director of the solid-state division of the Oak Ridge National Laboratoy. A correct theory not only would help pinpoint the proper ways of mixing and fabricating the new materials for maximum effect, it also might point the way to superconductors that work at even higher temperatures.

To that end, scientists are probing the materials with X-rays and microwaves, pummeling them with neutrons, and peering at them through electron microscopes in an attempt to feed theorists the information they need to explain why the new superconductors work and what roles the chemical ingredients play in the overall recipe.

Indeed, the pace of experiments is so great that the scientists trying to come up with the theory of how these materials work have been left spinning in the dust.

''There's a plethora of information,'' says Princeton University physicist and Nobel laureate Philip W. Anderson. ''The problem is, how trustworthy is it? What was the quality of the sample? I'd like to see some real old-fashioned, simple measurements on single crystals'' of the new materials. Two related concepts are driving scientists to push for higher-temperature superconductors: widespread use, and reliability.

The first isn't difficult to understand. Shoebox-sized supercomputers aren't likely to crop up in every den or office if they require frequent doses of frosty liquid nitrogen, which boils at 77 Kelvins (about 321 degrees below zero, F.).

And even if nitrogen-cooled devices somehow caught on like wildfire, the superconductors they used would have to retain their resistance-free traits at around 150 K. For some applications, it still might be desirable to cool the new superconductors to liquid-helium temperatures (about 4 K), some researchers say.

''It's very important to get superconductors above 90 K'' if liquid nitgrogen is to be the coolant, says Stanford University's Theodore Gabelle. ''Ninety Kelvins is not enough of a margin above 77 K for reliable technology.''

This is because superconductors are somewhat finicky. Not only must they be cooled to very low temperatures. To be practical, they also must withstand large magnetic fields and high electrical currents. These last two characteristics tend to improve as the temperature falls. ''For most applications you want to cool to about half'' of the temperature at which the material loses its electrical resistance, says Dr. Capone.

The most consistent hints of higher temperatures come from researchers who report seeing evidence of superconductivity at between 225 and 240 K. The problem is that the measurements are often indirect, difficult to reproduce, and often can be attributed to other phenomena that up to a certain point mimic superconductivity. Also, the samples involved are unstable.

Still, say some scientists, where there's smoke, there's fire. '' Superconductivity is marvelous: If it's present in a trace, it will let you find it,'' Dr. Gabelle says.

Second of three articles. Next: US and Japan in hot competition.

GRAPHIC: CHIllustration, no caption, ''Breaking temperature barriers'' - strides made since the early 20th. century; SOURCE: BELL COMMUNICATIONS RESEARCH; TESTIMONY BEFORE THE HOUSE SPACE SCIENCE AND TECHNOLOGY COMMITTEE, JUNE 10, HEIDI MACK - STAFF; Picture, Dr. Capone tests superconductor wire, ARGONNE NATIONAL LABORATORY

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The Christian Science Monitor

July 13, 1987, Monday

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HEADLINE: The disk that's turning science on its ear

SERIES: SUPERCONDUCTORS. The hype and the promise

BYLINE: Peter N. Spotts, Staff writer of The Christian Science Monitor

DATELINE: Cambridge, Mass.

HIGHLIGHT:
New superconductors, like the disk in this MIT experiment, hold the potential to revolutionize our lives. They may open the way to cheaper electricity, tiny computers, 'floating' trains, or new ways to launch satellites. In a three-part series, the Monitor examines the prospects and the challenges of bringing this discovery into homes and businesses.

BODY:

Gordon Roesler lifts a stainless steel thermos and pours bubbling liquid nitrogen over a black disk about the size of a quarter.

Sitting on a makeshift stand - a plastic foam coffee cup turned upside down - the disk chills rapidly as the frigid liquid pours over it. White vapor swirls. Mr. Roesler carefully lowers a tiny magnet over the disk; he lets go and it quivers, suspended just above the disk.

''That's beautiful!'' says this research assistant at the Massachusetts Institute of Technology. This small disk represents a potential technological turning point that would rival the vacuum tube and transistor, each of which found its way into technologies as diverse as radios, TVs, and computers. The disk is a superconductor. With no outside help it repels the magnet's field. That's a sure-fire way to tell when you have a superconductor.

But pass electricity through it, and that's when a superconductor really sparks applause: The current surges through it unhindered. Normal resistance and energy losses vanish.

The recent discovery of new ceramic superconductors, like Roesler's disk, has turned the physics community on its ear. The ceramics have punched through a temperature barrier that many thought impossible to breach. Where more traditional superconductors operate at temperatures just a whisker above absolute zero (minus 459 degrees F.), the new materials can operate at temperatures some 18 times higher. This makes them less costly to use, and therefore widens the possibilities for their application.

The recent discoveries have reawakened hopes of achieving practical superconductivity at room temperatures - a feat that could irreversibly alter existing technologies and spawn new ones in ways people haven't even imagined.

''The implications are tremendous,'' says Robert Stratton, a corporate vice-president at Texas Instruments (TI) and the director of its Central Research Laboratories. ''One has to caution the general public'' about specific applications of the new materials, he says. ''But on the other hand, the first integrated circuit was tremendously primitive, and no one could guess (then) at today's megachip technology. High-temperature superconductors are at the same point: They are crude, but they have the seeds of success.''

Scientists and engineers are cultivating those seeds at a furious pace.

''Sometimes I'd get home from the lab about 10:30 at night and go to bed. But I couldn't sleep. You get an idea, and you don't want to wait to try it out,'' says Temple University physicist Jack E. Crow. ''So I'd get out of bed about 1 a.m., and when I'd get to the lab, I'd still find my students hard at work.'' On several occasions, he says, his wife complained about not having him home for dinner. ''Finally she got so disgusted, she made dinner for the entire lab and served it there just to be able to eat with me.''

Multiply that kind of intensity by the thousands, and it's easy to see why research is moving so quickly that the staid scientific journals that normally publish experimental results and new theories are swamped. One scientist who assesses the quality of articles for a prominent US physics journal says, ''I'm burning the candle at both ends. I've got 20 papers to review this week, and I've got to spend at least an hour on each to do them justice. And that's on top of my regular job'' as a vice-president of a major corporation.

As a result of such backlogs, advanced copies of articles - so-called preprints - are flying thick and fast, as scientists call their colleagues for their latest work.

''My research tools? A telephone,'' says Boston University physicist James S. Brooks with a grin. Elsewhere in the building here at MIT's National Magnet Laboratory, two of his graduate students are getting set to run experiments on samples of the new superconductors sent - in tiny, ornate glass containers - from scientists at Peking University.

''The excitement is well deserved,'' says TI's Dr. Stratton. ''These ceramics represent a new class of materials that exhibit superconductivity in profoundly different ways'' than previous materials.

Unlike conductors such as copper wire, superconductors don't resist the flow of electric current. So they carry electricity without losing any of it as heat, which for many uses means wasted energy. In theory, if someone started a current flowing through a superconducting loop today, it would take a 1 followed by 100 zeros to write out the number of years the current would continue to flow.

In addition, under the right conditions, superconductors can carry larger amounts of current and generate larger magnetic fields than a normal conductor of the same size. Superconducting materials now in use have to be chilled with liquid helium, which boils at a frosty 4.2 Kelvins (minus 455 degrees F.), to operate reliably. Although technology for cooling to these temperatures is well in hand, the size and expense of refrigeration has restricted the use of superconductors to highly specialized areas, such as scientific research and medicine.

The new crop of materials, on the other hand, loses all resistance to electricity at around 100 Kelvins, opening the possibility of using liquid nitrogen as a coolant. Nitrogen, which boils at 77 Kelvins, is much less expensive and easier to handle than liquid helium. Liquid helium costs $4 or more a liter; liquid nitrogen can be picked up for 11 cents a liter.

''People have had a lot of dreams based on superconductivity, but inventions have been held back by a lack of materials,'' says Richard Arons, a member of the advanced-materials group at PA Technologies, a research and consulting firm. ''With superconducting temperatures rising so rapidly, that's changed. It makes the dreams more realizable.''

Some of those dreams include:

*Shoe-box-sized supercomputers of incomparable speed. The heart of computers consist of complex networks of electronic switches. Josephson junctions - switches made from superconductors - are at least 10 times faster than their conventional counterparts. In addition, because they generate so little heat, more of them can be shoehorned into smaller packages, thus reducing the amount of time it takes for electrical signals to pass from one component to another. By one estimate, a superconducting computer could be squeezed into a cube 2 inches on a side. Its cycle time - in essence the time between ''ticks'' in its internal clock, which synchronizes the computer's various operations - would be on the order of 2 billionths of a second, some 10 times faster than today's supercomputers.

*Exquisitely sensitive devices for detecting magnetic fields. Known as SQUIDs (for superconducting quantum interference devices), these components can be used in fields as diverse as space exploration, submarine detection, and medical imaging of the human body.

*Satellite communications and ultra-high resolution radar. With superconductors, transmitters and receivers may be able to operate at frequencies 100 times greater than the billions-of-cycles-per-second range now. This will allow satellite communications systems to carry vastly more information than they can today. Space-borne detectors operating at these frequencies would give astronomers a new window on the universe.

*Electric power generation, storage, and transmission. Superconductors hold the promise of saving billions of dollars by substantially reducing, if not eliminating, the energy wasted as heat in generators and power lines. Because of their greater current-carrying capacities, superconductors could also reduce the size of devices such as generators and transformers. Large superconducting rings could store electricity indefinitely, allowing power plants to ''save up'' electricity generated during off-peak hours for use during times of peak demand.
*Smaller, more powerful magnets. Magnets wound from superconducting wire can generate large magnetic fields without the need for the iron cores around which current electromagnets are wound. The smaller size, smaller power requirement, and powerful field of a superconducting magnet would find uses in electric motors of all kinds. Such magnets could also be used to harness energy from nuclear fusion, fling satellites into space, speed trains along a cushion of magnetic fields, or hurtle projectiles at tanks or nuclear missiles.

In some instances, prototypes and commercial products based on these ideas already exist, using current superconducting technology. And many researchers say that quite a number of concepts would not be economically competitive until practical materials are found that lose their resistance to electricity well above room temperature.

But others working on the new ceramic superconductors say people are not being imaginative enough.

Kits made out of these new materials ''ought to be in every high school in the fall,'' says Boston University's Dr. Brooks. ''To demonstrate low-temperature physics before, you'd stick a rubber hose into liquid nitrogen, bang it on the table, and watch it shatter. Who will that stimulate? With a chunk of this material and a little kit, you can demonstrate physics in a simple and fundamental way.''

James R. Smith, director of the Center for Materials Science at the Los Alamos National Laboratory in New Mexico, says, ''Let's send (kits) out to elementary schools to get the attention of kids. Let them see something float. Their minds are creative and unbiased,'' he says. ''We've always known what superconductors can do. There need to be more things.''

Next: From lab to marketplace.

GRAPHIC: Picture 1, no caption, ROBERT HARBISON - STAFF; Picture 2, Brooks: 'My research tool? A telephone', ROBERT HARBISON - STAFF

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July, 1987

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HEADLINE: SUPERCONDUCTING

BYLINE: BY T. A. HEPPENHEIMER; T. A. Heppenheimer, of Fountain Valley, Cal., is a frequent contributor to HIGH TECHNOLOGY.

HIGHLIGHT:
The New Billion Dollar Business

BODY:

During the early weeks of 1987, two separate developments raised the prospect that superconductivity may emerge as a major industry. On January 30, President Ronald Reagan announced that he would ask Congress to build the $4.5 billion Superconducting Super Collider (SSC), which is to be the world's largest high-energy physics accelerator. Its array of superconducting magnets, 52 miles in circumference, will apply this technology on the scale of an electric or natural-gas utility. The SSC is to be built using established approaches that rely on liquid helium as a refrigerant.

But at its temperature of -452 degrees F, liquid helium is among the most costly and difficult substances in industrial use. Excitement was thus generated by the news that a number of laboratories had produced superconductors that could operate at much higher temperatures, including that of liquid nitrogen at -321 degrees F. And improvements keep coming; University of Houston physicist Paul Chu recently reported superconducting at -54 degrees F. These discoveries have been widely hailed as the most important in solid-state physics since the invention of the transistor. They may provide vast improvements in the cost and convenience of superconductivity. The resulting applications could take on major roles within the electronic, electric-utility, and perhaps the transportation industries. And amid this rapidly burgeoning field is the widespread hope that superconductivity will soon be achieved at room temperature -- a prospect that could make most existing electrical and electronic technologies obsolete.

Superconductivity is a physical state in which all electrical resistance vanishes. Whereas an ordinary conductor such as copper requires a battery or generator to overcome resistive losses, a superconductor can circulate electricity indefinitely without a power source. Such currents produce intense magnetic fields and require energy only to run their liquid-helium refrigerators.

The chief commercial market for such magnets is presently in magnetic-resonance imaging (MRI), a medical technique for observing tissues within the human body. The intense, steady fields produced by superconducting coils shorten exposure time and produce sharper, higher-contrast pictures than those made with conventional magnets. More than 300 MRI units are being sold annually for a 1986 market of $600 million, with a rise to $1.4 billion anticipated by 1990. Some 25 percent of the cost of these instruments represents superconducting magnets and their cooling systems. Oxford Instruments and Intermagnetics General are the magnet builders; General Electric and Diasonics offer complete systems.

Carl Rosner, president of Intermagnetics General, compares the 1987 developments to the rapid emergence of electronic computing 40 years ago. In 1947 mathematician John von Neumann launched the first mainframe computers, built with the vacuum-tube technology of the day but incorporating most of the features of modern systems. Around the same time, a Bell Labs group announced the invention of the transistor. These two events together formed the basis for the modern electronics industry. Similarly, the SSC offers a large and stable market for today's superconducting systems, while the new high-temperature superconductors suggest a greatly expanded industry based on new applications.

The SSC is to accelerate beams of protons to energies as high as 20 trillion electron volts and cause the beams to collide, presumably yielding a host of new insights about the fundamental nature of matter. Superconducting coils will create intense magnetic fields to guide and propel the beams. These energies are millions of times higher than those at which physical reactions of technological significance take place. Thus the new particles that physicists hope to find with the SSC would be as esoteric as moon rocks.

With a $4.5 billion price tag, the SSC would require more than three years of funding by the entire National Science Foundation, which underwrites federal support across the board of the basic sciences. "There's been a frame of mind that this wild thing was going to fall apart," remarks Stanley Wojcicki, the SSC deputy director. "Now that it has to be taken seriously, the critics are coming forth." Rustum Roy, for example, a science policy specialist at Pennsylvania State University, has been urging the nation to put more funds into small-scale university research, rather than into multibillion-dollar efforts such as the SSC. Arno Penzias, who holds a Nobel prize in physics and is vice-president for research at Bell Labs, notes that studies in high-energy physics "are unrelated to any conceivable combination of human acts" and describes the hope of practical applications from such work as "hunting for the nickel under the street-light when you dropped it somewhere else."

One way to view the SSC is as the largest element in a variety of administration-proposed increases within the federal science budget. A 17 percent increase slated for the $1.36 billion National Science Foundation is part of an administration plan to double its outlays in five years. And there is serious talk of a multibillion-dollar project to determine the complete genetic sequence of human DNA, in what would be an Apollo program for biotechnology. Senior officials in the Department of Energy secured presidential approval for the SSC on the basis that it would be built with extra funds, rather than money reallocated from ongoing programs. If the proposed new moneys appear on schedule, the SSC could go ahead as planned. But if there is little or no change in the overall science budgets, the SSC allotment will be trimmed and its timetable stretched to fit within the existing high-energy physics budget of some $700 million per year.

Another way of viewing the SSC is as an incentive to the growth of technology and new industries, particularly those based on superconductivity applications. Here the prospects can be assessed more precisely, for the design of the SSC is already well in hand. Sponsored by the Department of Energy, the Central Design Group at Lawrence Berkeley Laboratory has conceived of the SSC as a scaled-up version of what is to date the largest particle accelerator: the trillion-electron-volt Tevatron at Fermi National Accelerator Laboratory (Batavia, Ill.).

The promise of the SSC, then, is that it will spur the superconductor industries in the fashion of the Tevatron, but on a much larger scale. Richard Lundy, who headed the construction of Fermilab's magnets, recalls that the Tevatron effort "created a market for fine-filament niobium-titanium," the basic material used in conventional approaches to superconductivity. Such firms as Oxford Instruments, Intermagnetics General, and Supercon, which had been living on modest sales to specialized energy-research projects, found a steady market through the Tevatron that totaled $15 million over some five years. This sum accounted for at least half of these firms' revenue during that period and gave them a basis for growth.

The magnets and the cryogenic systems being built for the much larger SSC could create a market of more than $1 billion. Again, such sums will not represent one-time orders but rather will stand as continuing commitments to production over a number of years. The SSC thus may underpin an industrial infrastructure capable of applying the superconducting magnets in areas such as electric-power generation, transmission, and storage.

Similarly, the SSC could involve industry in the cryogenic refrigerators needed to achieve superconductivity. If largescale applications of superconductors are to emerge, there must be industries capable of supplying these refrigerators (called cryostats), along with the magnets. The major air-liquefaction firms are obvious candidates, but "the helium cryogenic refrigerator business has been too small to attract many companies in the air-liquefaction business," says Mike McAshen, a cryophysicist in the SSC's Central Design Group. However, by demanding an array of cryostats costing well over $100 million, the SSC could offer big business to air-liquefaction companies such as Air Products, CVI, the Linde division of Union Carbide, Koch Process, Garrett, and the overseas firms Air Liquide and Sulzer.

With congressional support, the SSC program should begin in October. Full-scale magnet production is scheduled for January 1990. To envision the size and cost of this effort, think of an auto racetrack 20 times larger than the Indianapolis Speedway, its entire length bumper-to-bumper with top-of-the-line Mercedes. The size and shape of the racetrack resembles the SSC. The Mercedes represent the more than 10,000 superconducting magnets set end to end and cost about the same per foot.

Large superconducting magnets have been built by General Dynamics (San Diego) and GA Technologies (San Diego) as well as by Westinghouse (Pittsburgh) and General Electric R&D Center. But the SSC magnets are to carry stronger currents and generate more powerful fields than any previously constructed. These magnets are simple in concept, consisting of flat niobium-titanium cable wound around a copper tube and secured with laminated collars of stainless steel or aluminum. The cable must be kept from moving in response to the huge magnetic force it will experience. A shift of just one-thousandth of an inch would generate enough energy to heat the wire above its critical temperature, changing it abruptly from a superconductor to a state of ordinary electrical resistance. Following this transformation -- called a quench -- the electric current would quickly heat the magnet to several hundred degrees, and the entire SSC would have to be shut down.

In the past six months higher-temperature superconductive materials have burst upon the scene (see "Bringing Superconductors in from the cold") that may allow liquid nitrogen to replace liquid helium as a coolant. At a few cents per liter, liquid nitrogen is cheaper than milk, whereas liquid helium costs as much as fine brandy.

The new materials are copper oxides, combined with such seldom-used elements as lanthanum, yttrium, and strontium. They take the form of ceramics, which are ordinarily brittle and hard to work with. But the aerospace industry has recently developed techniques that turn such ceramics into yarns and flexible fibers. Researchers at AT&T Bell Laboratories have already prepared a wide, flexible, vinyllike tape from one of the new superconductors. And Argonne National Laboratory has formed a high-temperature superconductor into wires of about a hundredth of an inch in diameter, which allow it to remain relatively flexible.

One of the first commercial applications of superconductors is in electronic devices. Superconducting elements called Josephson junctions can switch as fast as one picosecond (one-trillionth of a second), some 10 times faster than the best conventional devices. Moreover, the absence of electrical resistance reduces heat dissipation a thousandfold, which in turn allows circuit elements to be packed more closely together, thus reducing signal-transmission delays. IBM spent $300 million in a 15-year effort to develop this technology, but abandoned it in 1983.

Superconducting devices are showing up first in laboratory instrumentation, not in general-purpose computers. Early this year Hypres -- an IBM spinoff -- introduced an oscilloscope that uses Josephson junctions to measure signals as brief as 10 picoseconds. Such swift readings are needed to develop advances radar and optoelectronic systems, as well as to process high-speed digital signals.

The superconducting material in Hypres's devices is not lead, which IBM used, but niobium. Although easy to fabricate, lead could not withstand the repeated freeze-thaw cycles experienced in real use (systems would have to be warmed to room temperature to be serviced). Niobium, though more difficult to work with, performs comparatively well.

The Japanese also have a major initiative in superconducting electronics. Hitachi, for example, has built a gate array with 544 logic cells, as well as a four-bit multiplier consisting of more than 100 logic elements. The multiplication time is a fast 0.21 nanoseconds, with a power dissipation of three milliwatts.

Still, many more such circuits must be developed and interconnected before a true superconducting computer technology can emerge. Work on applying high-temperature superconductors to electronic devices is just beginning. Stanford and IBM researchers have so far fabricated superconductors into only the simplest devices -- resembling individual transistors -- by vapor deposition of both lanthanum-strontium and yttrium-barium.

Another promising application for the new superconductors is in large-scale transmission of electric power. Conventional overhead lines are unsightly and require extensive swaths of land. Underground cables need only an easement, but electrical resistance can cause them to overheat. Superconducting transmission lines would avoid these difficulties.

Helium-cooled superconducting lines would be cost-competitive, however, only when carrying at least 3000 megawatts of power, according to studies at the Electric Power Research Institute (EPRI). The largest transmission line presently in use -- the Pacific Intertie, which runs the length of the West Coast -- carries only 2000 megawatts.

The new superconductors lower the power rating at which such lines become competitive. Their simple designs would include current carriers made of copper tubes coated with moderately thin layers of superconductor materials. Yttrium-barium copper oxide, which superconducts as high as -54 degrees F, has already shown that it can carry a current density of 1000 amperes per square centimeter. That would allow a 345-kilovolt line to carry 1000 megawatts with a cross-section of nitrogen-cooled superconductor of no more than half a square inch. Conventional resistive transmission lines sustain losses of some one percent per 100 miles.

That is why there is no transcontinental power grid within North America. It has been cheaper to build new power plants than to install long lines. But superconducting transmission would eliminate resistive loss, and the prospect of low-cost, nitrogen-cooled superconductors suggests the feasibility of continent-size grids. Indeed, power lines on such a large scale could permit development of electric-power resources in places that may appear too remote. The vast hydropower resources of northern Canada and even of the island of New Guinea might be developed and tapped. Transmission lines thousands of miles long, laid as transcontinental links or undersea cables, might join the world in a common power pool.

Superconductors could also bring higher performance to the production of electric power. Coils of superconducting wire can efficiently produce the magnetic fields needed to transform the energy of a spinning turbine into electricity. And because superconducting magnets can be more compact for the same field strength than conventional electromagnets, generators can be smaller and hence cheaper to build. GE has successfully demonstrated an experimental 20-megawatt generator of this type. Because the U.S. utility industry does not anticipate the need for major new capacity, however, GE has not pressed its superconducting generator effort.

By contrast, Japan's Central Research Institute of the Electric Power Industry has invested $150 million in this area, with involvement of Mitsubishi and Toshiba. A 50-megawatt device is already being used as a synchronous condenser, a voltage-correction element resembling a generator without the turbine and steam plant. Synchronous condensers are traditional testing grounds for new generator technology, since they can be tried out without adding equipment to a major power plant. Moreover, the West German firm of Kraftwerkunion is testing a superconducting magnet in a 600-megawatt generator.

Another role that superconductors might play in the utility network is in energy storage. A large superconducting coil could stockpile electricity, allowing generators to run full-time while adjusting to the peaks and valleys of daily demand. Such load leveling is now accomplished by using excess electricity to pump water up-stream and into a reservoir, in what amounts to a reversible hydroelectric dam. According to EPRI, pumped-hydro storage is more economical. Storage costs about $25 per kilowatt-hour versus $160 for a superconducting coil. Moreover, a pumped-hydro facility typically holds about 20,000 megawatt-hours -- quadruple the capacity of proposed superconducting systems.

Beyond the utility industry, superconducting magnets may find significant application in materials separation. For example, Eriez Magnetics has developed a system that removes impurities from coal or clay. It is more compact and 90 percent less power-hungry than conventional separators.

Finally, there is the possibility of magnetically levitated (maglev) trains, which run a few inches above a track at hundreds of miles per hour. The Japanese have built experimental prototypes of superconducting maglevs. But using conventional resistive electromagnets, a monorail system called Transrapid-06 provides regular service near Breman, West Germany, carrying nearly 200 passengers at more than 200 miles per hour. The U.S. Department of Transportation has approved the Transrapid for a proposed 8800-passenger-a-day link between San Bernadino, Cal., and Las Vegas.

Since magnets represent only a modest share of the costs of maglev trains, the new superconductors offer little advantage. Still, high-temperature materials would enhance reliability by reducing the frequency of quenches and therefore might improve the prospects for Japan's superconducting maglev as a competitor to the German Transrapid.

The new materials still need considerable development, however. Magnets, in particular, are among the most demanding applications for superconductors because they must stand up to strong fields and high currents. Under such conditions, superconduction occurs at reduced temperatures. For example, the new yttrium-barium compound, which superconducts at -290 degrees F in the absence of a magnetic field, must be cooled to -390 degrees F in an intense field. Maury Tigner, head of the SSC's Central Design Group, has stated that even if this compound were commercially available, he would run it at only -405 degrees F (ruling out liquid nitrogen cooling) for protection against quenching. Some advantage might be gained over helium by using liquid hydrogen (-453 degrees F), or liquid neon (-410 degrees F). But hydrogen is flammable, and neon gas is costly. Thus, a true nitrogen-cooled magnet technology depends on higher transition temperatures than those reached so far.

At the rate researchers have been progressing, we may not have to wait long. In May, Houston researcher Chu reported superconductivity at an astonishingly warm -54 degrees F. The attainment of superconductivity at room temperature is imminent, asserts Mario Rabinowitz, EPRI's leading superconductor specialist. Chu claims there is no end in sight to the recent spurt in superconducting temperatures, and he sees nothing that will keep the new materials from being developed for industrial products.

But Intermagnetics General's Rosner sounds a caution. It will be three to ten years, he says, before the new high-temperature materials can be engineered into useful products. The biggest danger, he continues, is in raising unrealistic expectations. "If we make a lot of big promises that aren't fulfilled, industry is going to lose interest and stop funding superconductor R&D. Then the Japanese will take over."

GRAPHIC: Cover Photo, no caption, Walter Bibikow; Picture 1, Houston's Paul Chu: leader in the superconductor revolution, DAN FORD CONNOLLY; Illustrations 1 and 2, The Players, Companies poised to prosper from a superconducting boom, MARK ALSOP/DATA: HIGH TECHNOLOGY RESEARCH; Illustrations 3 through 8, The Applications, Projections show a diversifying market, MARK ALSOP/DATA: HIGH TECHNOLOGY RESEARCH; Picture 2, Hypres president Sadeg Faris holds block of niobium, the superconductor used in the company's ultrafast signal processing chips. A. J. BERNSTEIN; Figure 1, The Superconducting Super Collider: The $4.5 Billion Kickoff To A New Industry, MARK ALSOP; Picture 3, New superconductors recall the birth of computers, says Intermagnetics General's Rosner, shown with medical imaging magnet. A. J. BERNSTEIN; Figure 2, 1987 R&D Spending

Document No. ____________

Clark

WHITE HOUSE STAFFING MEMORANDUM

DATE: 07/16/87 ACTION/CONCURRENCE/COMMENT DUE BY: c.o.b. July 17th

SUBJECT: PRESIDENTIAL REMARKS: NATIONAL INSTITUTES OF HEALTH PANEL DISCUSSION ON AIDS (07/16 6:00 p.m. draft)

	ACTION	FYI		ACTION	FYI
VICE PRESIDENT	☐	☑	FITZWATER	☐	☑
BAKER	☐	☑	GRISCOM	☑	☐
DUBERSTEIN	☐	☑	HENKEL	☐	☑
MILLER - OMB	☑	☐	HOBBS	☑	☐
BALL	☑	☐	KING	☐	☐
BAUER	☑	☐	MASENG	☑	☐
CARLUCCI	☐	☐	RISQUE	☑	☐
CRIBB	☑	☐	RYAN	☐	☐
CRIPPEN	☐	☐	SPRINKEL	☐	☐
CULVAHOUSE	☑	☐	TUTTLE	☑	☐
DAWSON	☐ P	☑ S	DOLAN	☐	☑
DONATELLI	☑	☐	GRAHAM	☑	☐

REMARKS:

Please provide any comments/recommendations to Tony Dolan by close of business on Friday, July 17th, with an info copy to this office. Thank you.

RESPONSE:

JUL 17 8 16 AM '87

Rhett Dawson
Ext. 2702

Dr. Broder told me, by the way, that more progress is coming. He mentioned work on a number of new and promising drugs for treating AIDS. And I understand that a vaccine will soon go into testing. As these drugs and vaccines come along, I am determined that red tape will not keep them away from those in need. We will make certain that they get the same kind of accelerated review from the Food and Drug Administration that got the A.Z.T. application approved in only 4 months -- record time.

I know that everyone here understands how dazzling the progress against AIDS has been. It took 40 years of study to learn as much about polio. It took 19 years to develop a vaccine against hepatitis B. To keep up the momentum, this year the Federal Government will spend $307 ~~$317~~ million on AIDS research and X $845 ~~$760~~ million overall. Next year we'll spend 30 percent more on research and 1.26 ~~$1~~ billion overall. [The only limits on research spending today are the physical limits of research facilities and people trained in the necessary techniques.]

B. Selfridge (x 4852)

Today we're taking another big step against AIDS. This morning at the White House we announced the members of the Presidential Commission on the Human Immunodeficiency Virus Epidemic. Dr. Eugene Mayberry, the Chief Executive Officer of the Mayo Clinic, is chairman of the Commission, the members of which are drawn from a wide range of backgrounds and points of view. And I say Dr. Mayberry "is" chairman, not "will be" chairman, because not only did we announce the Commission's membership today, but today is also the Commission's first day of work. They're wasting no time. And, in fact, talk about speed,

Delete -- could be seen as

(~~Recommend deleting as may represent~~ implied commitment for willingness to accept further construction and training expansions.)

B. Selfridge (x 4852)

Carol

THE WHITE HOUSE
WASHINGTON

July 17, 1987

MEMORANDUM FOR ANTHONY R. DOLAN
DEPUTY ASSISTANT TO THE PRESIDENT AND
DIRECTOR OF SPEECHWRITING

FROM: ARTHUR B. CULVAHOUSE, JR.
COUNSEL TO THE PRESIDENT

SUBJECT: Presidential Remarks: National Institute of Health Panel Discussion on AIDS

Counsel's office has reviewed the above-referenced remarks and, subject to the following comment, has no objection to them from a legal perspective.

The President refers to his recent call for certain kinds of testing in making an appeal to end ignorance about the disease. The sentence containing this reference is a brief and general one, but I question whether any reference to testing does more good than harm. As witnessed by the President's May 31 speech at the AIDS research awards dinner, comments by the President on testing evoke considerable controversy and dominate media coverage, thereby obscuring the many positive and widely-supported features of the President's program.

Attachment

cc: Rhett B. Dawson

Dr. Mayberry will present the Commission's first report to me in 90 days.

Dr. Mayberry and his colleagues will recommend a full-fledged strategy for battling AIDS. We already have a research strategy for finding a cure. The Commission will be reviewing not only that, but also looking at questions of treatment and prevention. How can we most compassionately care for those who have AIDS? How can we most justly and effectively protect the public from the spread of AIDS?

What we need right now in the battle against AIDS is a good, strong dose of common sense. It seems to me common sense to recognize that, when it comes to stopping the spread of AIDS, medicine and morality teach the same lessons.

It's also common sense that ignorance about the extent of the spread of AIDS won't help anyone -- those who have it; those who might get it; those who are looking for ways of preventing its spread. This is why I called recently for certain kinds of testing. I hope the Commission will help us all put aside our suspicions and work together with common sense against this common threat.

I wish I could say that the vast amounts of money and effort we're putting into AIDS research will give us a cure in a week, or a year, or by an absolutely certain date. The truth is, none of us knows for certain just when a cure will come. It might not be until the late 1990's. It might not be until later. That's why prevention and treatment are so important now.

Document No. ______________

Carol

WHITE HOUSE STAFFING MEMORANDUM

DATE: 07/16/87 ACTION/CONCURRENCE/COMMENT DUE BY: c.o.b. July 17th

SUBJECT: PRESIDENTIAL REMARKS: NATIONAL INSTITUTES OF HEALTH PANEL DISCUSSION ON AIDS (07/16 6:00 p.m. draft)

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CRIPPEN	☐	☐	SPRINKEL	☐	☐
CULVAHOUSE	☑	☐	TUTTLE	☑	☐
DAWSON	☐P	☑S	DOLAN	☐	☑
DONATELLI	☑	☐	GRAHAM	☑	☐

REMARKS:

Please provide any comments/recommendations to Tony Dolan by close of business on Friday, July 17th, with an info copy to this office. Thank you.

RESPONSE:

Rhett Dawson
Ext. 2702

(Judge/ARD)
July 16, 1987
6:00 p.m.

PRESIDENTIAL REMARKS: NATIONAL INSTITUTES OF HEALTH PANEL DISCUSSION ON AIDS WEDNESDAY, JULY 22, 1987

Thank you. As you know, generally, when I talk to a group like this, I open with a joke or two -- to put all of us at ease, get things rolling. I hope you'll forgive me if I skip that today. I've just come from the ward you have here for children who are dying of AIDS. Let me just make a promise to those children and all others who have contracted this disease. We will -- I will -- do all that God gives us the power to do to eliminate ~~find a cure for~~ AIDS. We will not stop, we will not rest, until we have sent AIDS the way of smallpox and polio.

Those are words of resolve. Now I'd like to add a few words of encouragement ~~hope~~. One of the amazing stories of modern medicine is the progress that we've already made in understanding ~~against~~ AIDS. I know this is old news to you in this room. So many of the breakthroughs were achieved right here in this building. But, for our friends in the press, I thought I should put the speed of progress in perspective. Just think that the day I was sworn in as President, we didn't even know that AIDS existed. It wasn't until 5 months later that the disease was discovered. But only 3 years after that, in a laboratory three floors below us, Dr. Robert Gallo isolated the AIDS virus. Within a year, a blood test was available. And now a treatment drug, A.Z.T., is also on the market, also developed here in this building, by Dr. Sam Broder, whom I met earlier this afternoon.

Dr. Broder told me, by the way, that more progress is coming. He mentioned work on a number of new and promising drugs for treating AIDS. And I understand that a vaccine will soon go into testing. As these drugs and vaccines come along, I am determined that red tape will not keep them away from those in need. We will make certain that they get the same kind of accelerated review from the Food and Drug Administration that got the A.Z.T. application approved in only 4 months -- record time.

I know that everyone here understands how ~~dazzling~~ remarkable the progress ~~against~~ in understanding AIDS has been. It took 40 years of study to learn as much about polio. It took 19 years to develop a vaccine against hepatitis B. To keep up the momentum, this year the Federal Government will spend $317 million on AIDS research and $766 million overall. Next year we'll spend 30 percent more on research and more than $1 billion overall. The only limits on research spending today are the physical limits of research facilities and people trained in the necessary techniques.

Today we're taking another big step against AIDS. This morning at the White House we announced the members of the Presidential Commission on the Human Immunodeficiency Virus Epidemic. Dr. Eugene Mayberry, the Chief Executive Officer of the Mayo Clinic, is chairman of the Commission, the members of which are drawn from a wide range of backgrounds and points of view. And I say Dr. Mayberry "is" chairman, not "will be" chairman, because not only did we announce the Commission's membership today, but today is also the Commission's first day of work. They're wasting no time. And, in fact, talk about speed, Dr. Mayberry will present the Commission's first report to me in 90 days.

Dr. Mayberry and his colleagues will recommend a full-fledged strategy for battling AIDS. We already have a research strategy~~ for finding a cure~~. The Commission will be reviewing not only that, but also looking at ~~questions of treatment and prevention~~ broader issues. How can we most compassionately care for those who have AIDS? How can we most justly and effectively protect the public from the spread of AIDS?

What we need right now in the battle against AIDS is a good, strong dose of common sense. It seems to me common sense to recognize that, when it comes to stopping the spread of AIDS, medicine and morality teach the same lessons.

It's also common sense that ignorance about the extent of the spread of AIDS won't help anyone -- those who have it; those who might get it; those who are looking for ways of preventing its spread. This is why I called recently for ~~certain kinds of~~ routine testing. I hope the Commission will help us <u>all</u> put aside our suspicions and work together with common sense against this common threat.

I wish I could say that the vast amounts of money and effort we're putting into AIDS research will ~~give us a cure~~ solve the problem in a week, or a year, or by an absolutely certain date. The truth is, none of us knows for certain ~~just when a cure will come~~ how we will stop AIDS. It might not be until the late 1990's. It might not be until later. ~~That's why prevention and treatment are so important now.~~ See insert next page

INSERT

That's why it is so important that we stop the spread of this disease. Men and women continue to become infected and in doing so their lives are at risk. For those who are already infected with the virus, it is important to continue our efforts to develop treatments to keep the virus from doing harm. And our ultimate goal is to develop a vaccine which will give full protection from this scourge. It is my hope that you will be successful in your research and that your success will come soon.

~~But in the spirit of hope, let's not forget, a cure might possibly arrive much sooner. A few weeks ago I was reading about another field of astonishingly rapid scientific progress -- not in medicine, but in physics. Despite all the advances of the last year, in what has become known as the phenomenon of superconductivity, one problem was said to be years from solving, that of finding a material that could handle what I, as a layman, would call large volumes of electricity. One week later, another report appeared announcing that the problem had been solved. Years of progress in one week. I don't know if the day will come when such progress will be in the cards for AIDS research.~~

~~But that is my hope~~. And after the visit to the ward today and after the death by AIDS of friends and former associates -- Rock Hudson for one -- that is my prayer.

And now let me turn the meeting over to Secretary Bowen.

[CLOSING]

Thank Dr. Bowen, Dr. ___________, and Dr. _________. By the way, I thought you would all like to know that, near as I can determine, Dr. Bowen is only the seventh physician to serve in the Cabinet from George Washington's time to the present.

As I was listening to the panel and going on the tour today, I couldn't help remembering something W.H. Auden said -- that the true men of action in our times are not politicians or statesmen but scientists. The Commission will be working with you and many others to chart the Nation's course against this disease. I believe that, when the medical history of our times is written, you and they will go down as among our greatest men and women of action.

Thank you and God bless you.

Document No. ______________

Carol

WHITE HOUSE STAFFING MEMORANDUM

DATE: 07/16/87 ACTION/CONCURRENCE/COMMENT DUE BY: c.o.b. July 17th

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BALL	☑	☐	**KING**	☐	☐
BAUER	☑	☐	**MASENG**	☑	☐
CARLUCCI	☐	☐	**RISQUE**	☑	☐
CRIBB	☑	☐	**RYAN**	☐	☐
CRIPPEN	☐	☐	**SPRINKEL**	☐	☐
CULVAHOUSE	☑	☐	**TUTTLE**	☑	☐
DAWSON	☐P	☑S	DOLAN	☐	☑
DONATELLI	☑	☐	GRAHAM	☑	☐

REMARKS:

Please provide any comments/recommendations to Tony Dolan by close of business on Friday, July 17th, with an info copy to this office. Thank you.

RESPONSE:

JUL 17 8 16 AM '87

Rhett Dawson
Ext. 2702

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(~~Recommend deleting as may represents~~ implied commitment for willingness to accept further construction and training expansions.)

B. Selfridge (x 4852)

THE WHITE HOUSE

WASHINGTON

Carol

7/17/87

MEMORANDUM

TO: DONALD IAN MACDONALD

FROM: FREDERICK J. RYAN, JR. FJR

SUBJECT: APPROVED PRESIDENTIAL ACTIVITY

MEETING: Trip to National Institutes of Health

DATE: July 23, 1987

TIME: Depart approximately 1:05 pm

DURATION: Return approximately 2:55 pm

LOCATION: Bethesda, Maryland

BACKUP LOCATION:

REMARKS REQUIRED: Yes

MEDIA COVERAGE: Coordinate with Press Office

FIRST LADY PARTICIPATION: No

NOTE: PROJECT OFFICER, SEE ATTACHED CHECKLIST

W. Ball
J. Lamb
R. Dawson
J. Courtemanche
M. Coyne
E. Crispen
F. Donatelli
T. Griscom
D. Dellinger
A. Dolan
J. Erkenbeck
L. Faulkner
C. Fuller
W. Henkel
J. Hooley
N. Risque
J. Kuhn
M. Archambault
C. O'Donnell
J. McKinney
R. Shaddick
B. Shaddix
M. Fitzwater
G. Walters
WHCA Audio/Visual
WHCA Operations

Document No. ______

CAROL

WHITE HOUSE STAFFING MEMORANDUM

DATE: 07/16/87 ACTION/CONCURRENCE/COMMENT DUE BY: c.o.b. July 17th

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(07/16 6:00 p.m. draft)

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DONATELLI	☑	☐	GRAHAM	☑	☐

REMARKS:

Please provide any comments/recommendations to Tony Dolan by close of business on Friday, July 17th, with an info copy to this office. Thank you.

RESPONSE:

W.H. Auden (p.4) was, I believe, gay, if that matters

Rhett Dawson
Ext. 2702

25TH STORY of Level 1 printed in FULL format.

The New York Times

May 23, 1987, Saturday, Late City Final Edition

SECTION: Section 1; Page 1, Column 1; National Desk

LENGTH: 924 words

HEADLINE: BIG LEAP REPORTED IN THE CONDUCTIVITY OF ELECTRIC CURRENT

BYLINE: By JAMES GLEICK

BODY:

Pushing past the milestones of the last two months, scientists yesterday reported the loss of electrical resistance in new materials at the temperature of ordinary dry ice, far warmer than ever before.

A University of Houston physicist presented data to science officials in Washington showing the telltale electrical and magnetic signs of superconductivity at 54 degrees below zero Fahrenheit, an improvement of well over 100 degrees.

The new results bring the promise of a host of applications in electricity and magnetism far closer to room temperature. The warmer temperatures make more feasible waste-free electrical transmission lines of such materials, for example, or giant magnet coils that could store electricity for use in off-peak periods.

'The Sky Is the Limit'

''It shows that all of the dreams we have had can come true,'' said Arthur J. Freeman, a theorist at Northwestern University who has followed the recent developments. ''The sky is the limit.''

Superconductors carry current with perfect efficiency, unlike ordinary wires and electronic circuits, which lose a portion of their energy in the form of heat. Superconductors can also create magnets of unparalleled strength. These properties raise the prospect of a new generation of high-speed computers, magnetic devices, electric generators and many other applications.

The latest results, including data from tests of a new ceramic material last week at the National Magnet Laboratory in Cambridge, Mass., were described by Ching-Wu Chu of the University of Houston as part of a presentation to the National Science Board, the governing board of the National Science Foundation.

Four Compounds Cited

Although Dr. Chu said that his samples remain hard to stabilize and reproduce, physicists called his data the strongest confirmation to date of hints that have tantalized experimenters at several laboratories. Dr. Chu said four different compounds seem to behave in the same way and he also described tentative indications that still another material began losing resistance at room temperature.

Scientists, already numbed by a rapid sequence of startling developments, said the new report brought superconductivity across an important threshold. ''I think it's wonderful,'' said Marvin Cohen of the University of California at Berkeley. ''Now you're at the point that I call a cold day in Alaska.''

Dr. Cohen and Alex Zettl of Berkeley said their group had also measured a drop in resistance to zero in a material even warmer than room temperature. They, too, have been cautious about reporting the data because it has been hard to confirm with other tests and because the material has been hard to isolate.

Longstanding Barrier Falls

Until recently, superconductivity was an obscure phenomenon of quantum physics, existing only at the most extreme cold temperatures and thus suitable only to applications that could justify the expense of cooling with liquid helium.

A longstanding barrier fell late last year with a discovery by two International Business Machines scientists in Zurich. After more than a decade with no improvement in the temperature of metal superconductors, they found a kind of ceramic - a copper oxide doped with two other elements - that lost all resistance at 35 kelvins, or 396 degrees below zero Fahrenheit.

In January, Dr. Chu and his colleagues discovered an even warmer superconductor, a copper oxide with yttrium and barium, pushing the temperature up to 98 kelvins. That substance, along with a group of related substances discovered in the weeks that followed, opened the way for applications that could be cooled relatively cheaply with liquid nitrogen.

In impure samples of the material, his group and several others detected hints of another substance - believed to be a different molecular arrangement of the same atoms - that lost its resistance at a much higher temperature. Researchers at Wayne State University reported electrical measurements that suggested true superconductivity, but the signals remained hard to confirm.

Most researchers have tested their samples by attaching tiny wires to them, cooling them down and passing a current through them. That allows an indirect measurement of electrical resistance.

The most trusted sign of superconductivity, however, is its ability to expel magnetic fields, a phenomenon known as the Meissner effect. ''A drop in resistance can be due to many things, but the Meissner effect is far more definitive,'' Praveen Chaudhari, an I.B.M. vice president for science, said yesterday.

Dr. Chu said tests at the National Magnet Laboratory showed the Meissner effect in a tiny but significant portion of the material at 225 kelvins. His colleagues have been conducting other tests at the Lockheed Research Center in Palo Alto and the University of Houston.

In the few months since they were discovered, the 98-kelvin superconductors have been turned into prototype wires and thin films, photographed with electron microscopes and bombarded with X-rays, and their crystal structure is well known.

The materials showing signs of superconductivity at or near room temperature have so far remained more elusive. They show up in impure samples, making it hard even to determine their composition. And physicists worry that some promising measurements may turn out to be false alarms.

Nevertheless, most continue to be encouraged by the rapid pace of the latest developments. ''It's room temperature if you open your window in Alaska,'' Dr. Cohen said.

SUBJECT: ELECTRICITY; RESEARCH; SUPERCONDUCTORS; PHYSICS

NAME: GLEICK, JAMES

50TH STORY of Level 1 printed in FULL format.

May 17, 1987, Sunday, Home Edition

SECTION: Business; Part 4; Page 3; Column 4; Financial Desk

LENGTH: 1095 words

HEADLINE: VIEWPOINTS;
JOBS IN AMERICA;
TECHNOLOGY HAS LIFTED QUALITY OF TODAY'S WORK

BYLINE: By GEORGE GILDER, George Gilder is the author of Spirit of Enterprise and Wealth and Poverty and is working on a book about the computer industry.

BODY:

With 14.4 million new jobs created in the past five years, Americans have been expanding employment faster than any other major industrial nation. Responding to the incentives of supply-side policy, U.S. citizens have launched a job miracle that amazes the leaders of the planned economies of the world.

But the real jobs miracle in America comes not in the amount of employment but in the dramatic improvement in the quality of American jobs. Contrary to widespread complaints about a low-wage "McJobs" economy, the new opportunities in the United States are unprecedented in their challenge, remuneration and real productivity.

The rise in the quality of work springs from a transformation of technology. Americans are mastering new technologies and starting new businesses at an unprecedented pace.

They have launched about 14,000 new software firms in six years, transforming the computer from an alien device to a popular appliance.

Using nine times more small computers than the Japanese, Americans are revitalizing the job market with the challenging new opportunities of the information age.

The new tools of knowledge are personal technologies, increasingly available to individuals, enabling people to launch new products and ideas from their own homes or garages.

There now are cheap work stations on which any individual can learn to design a computer chip, a new toy, a manufacturing layout, a dress or a complex business plan.

The new employment in America consists of opportunities that are truly new, reflecting new skills and services rather than the subsidized, retread patchwork of industrial employment provided in the so-called job-creation projects in European social democracies.

Economic analyst Warren Brookes of the Heritage Foundation estimates from the latest Labor Department data that two-thirds of the additional jobs created in America since the Reagan Administration tax cuts in 1981 have been managerial and professional slots paying more than $29,048 a year.

In addition, with new business starts more than doubling since 1978, to 640,000 a year, and with venture capital rising 200-fold over the average level during the high-tax years between 1970 and 1977, millions of Americans have begun earning entrepreneurial returns rather than wages and salaries.

With rising job opportunities, soaring real estate values and the stock market tripling the worth of individual retirement account and pension holdings, the middle class has reduced debt as a proportion of assets and sharply expanded its share of the national economy.

Meanwhile, despite the upsurge in new jobs, the percentage of workers at the minimum wage has dropped 31% since 1982, with the downward trend in low-paid jobs accelerating since 1984 as a proportion of the total.

By the only measure that counts -- take-home pay -- job quality has risen sharply. Real after-tax income per capita is up 11.3% since early 1981, and the rise is even greater if you take fringe benefits into account.

Nonetheless, in the ceaseless search for a new proletariat as a vanguard of Marxist revolt, the prophets of envy and gloom continue to tell of a jobs crisis in America. In florid falsehoods and lurid television images, media gurus prattle of a "vanishing middle class" and speak of a society riven between "greed at the top," need at the bottom and homeless everywhere.

Rep. Richard A. Gephardt (D-Mo.) announced his presidential candidacy with a whole series of imaginary complaints, from falling wages to inadequate employment. He said the problem is Japan, which as anyone knows who drives a car or uses a videocassette recorder, is a major asset for the U.S. economy. The VCR, in fact, is responsible for an exciting revitalization of the American movie industry and for the emergence of huge new job and entrepreneurial opportunities in videocassette magazines, home movies, education and software far exceeding the VCR manufacturing employment in Japan.

Most of the advocates of a job crisis end their statistics in 1983 to catch the two recessions of the early 1980s and to miss the second-longest recovery of this century.

The Joint Economic Committee of Congress went to the extreme of appealing to Barry Bluestone and Bennett Harrison, a pair of leftist economists from Boston University, to find a new proletariat to save. They came up with the theory that the jobs were no good. Ignoring that new jobs always tend to pay less than established jobs, they brought forth the shocking news that 58% of the new jobs created under President Reagan were below the minimum wage (less than $7,012 a year).

To conjure up this statistic, Bluestone and Harrison actually didn't count jobs at all; instead, they counted people doing jobs. This was clever because low-paid jobs are held by more people (they have higher turnover) than high-paid jobs. If a McDonald's job was held by four teen-agers during the course of a year, it was counted as four jobs. If a lawyer chose to take off 10 months of a year to have a baby or write a book, the two-month income made the law practice a low-paid job.

The first principle to understand about the quality of work is that it is an effect of the quality of workers. There is no such thing as an "economy" that creates jobs. People create jobs by producing more than they consume, by performing work that is useful to others.

In recent years, the most successful job creators in the United States have been immigrants. Black immigrants are 50% more likely than white natives to earn more than $35,000 a year. Cuban and Mexican immigrants who don't even know the language quickly out-earn American citizens who prefer leisure and welfare to entry-level jobs.

The entire concept of "bad jobs" is deeply misleading, because it suggests that the "society" can somehow will "good jobs" into existence. Good jobs are the effect of hard work by productive workers and entrepreneurs. All the positive trends in the U.S. economy will gain new momentum from the new tax reform, lowering the top rates and opening new horizons for every wage and salary earner.

With the emergence of such new technologies as superconductivity, artificial intelligence, parallel processing, bioengineering and computerized chip design, job possibilities and entrepreneurial opportunities are more exciting than ever. Nonetheless, no one is going to create a job for you. You have to learn one of these fields -- or one of thousands of others -- and make yourself a creative worker. There is no such thing as an economy; you are the economy.

GRAPHIC: Drawing, MARK PAVLOVICH / for The Times

Foundation for AIDS Research and our award recipients for their contributions as well. I'm especially pleased a member of the Administration is one of tonight's recipients. Dr. Koop is what every Surgeon General should be--an honest man, a good ~~scientist~~ pediatric surgeon, and an advocate for the public health.

And I also want to thank other doctors and researchers who aren't here tonight. These individuals showed genuine courage in the early days of the disease when we didn't know how AIDS was spreading its death. They took personal risks for medical knowledge and for their patients' well-being. And that deserves our gratitude and recognition.

I want to talk tonight about the disease that has brought us all together. The poet W.H. Auden said that the true men of action in our times are not the politicians and statesmen, but the scientists. I believe that's especially true when it comes to the AIDS epidemic.

Those of us in government can educate our citizens about the dangers; we can encourage safe behavior; we can test to determine how widespread the virus is; we can do any number of things. But only medical science can ever truly defeat AIDS. ~~Medical science is the silver bullet.~~

We've made remarkable progress already. Over the past ~~2~~ few years, scientists have collected more information about AIDS than they've collected ~~during 40 years of research on polio.~~ in the same amount time about any other virus.

clinician

" The true men of action in our time: those who seek to change the world and not the politicians & statesmen, but the scientists."

Since 1981

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Polio - last 2 yr. extra. [illegible] polio

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HEADLINE: AIDS RESEARCH: WHERE THE BATTLE STANDS

BYLINE: By Sana Siwolop in New York, with Scott Ticer in Atlanta, Reginald Rhein Jr. in Washington, Lois Therrien in Boston, Christopher S. Eklund in Philadelphia, David Hunter in Paris, Mark Maremont in London, and bureau reports

HIGHLIGHT:
Some drugs are promising, and there has been progress toward a vaccine

BODY:
No four-letter word inspires more fear or carries a greater social stigma than AIDS. Despite five years of intense research, the disease is shrouded in rumor and misinformation. But the fear isn't unfounded. AIDS kills, and there is still neither a drug to cure it nor a vaccine to prevent it. " AIDS has been a moving target," admits June E. Osborn, dean of the University of Michigan School of Public Health.

Yet an intense research effort is making headway. During the past two years scientists have collected more data on the nature of AIDS than they have during 40 years of research on polio. Moreover, the tools of molecular biology that they're using, such as the ability to decode DNA and produce treatments based on the body's own defenses, barely existed a decade ago. It is frighteningly true that had AIDS struck in the early 1970s, medical science would have been as helpless as it was 400 years ago when a syphilis epidemic left 10 million dead in Europe.

Just three years after the first cases were identified in 1981, two teams of American and French researchers independently discovered the AIDS virus, sparking hope that it could eventually be beaten. "Within a year, we could see the different strains of the virus, as well as how it had evolved," says L. Patrick Gage, vice-president for exploratory research at Hoffmann-La Roche Inc. in Nutley, N.J. "That gave us a clear target for developing therapeutics."

SISTER DRUGS. Numerous laboratories and more than two dozen biotechnology and drug companies, including Genentech Inc. and Chiron Corp., are racing to beat AIDS with the same weapon that defeated polio: a protective vaccine. AIDS, however, is proving to be a far more difficult problem. Its genetic structure, for example, varies considerably from one strain to another, and an effective vaccine would have to protect against all the strains. Even so, French researchers in Zaire are already testing the first vaccine. Whether it is effective will not be known until April.

There is also no definitive word on drugs that either permanently shut down the reproductive machinery of the virus or that rally the body's defenses into squelching it (table, page 130). At the top of the list are the very few drugs that might either kill the virus or stop it from spreading from one cell to the next. Two sister compounds, AZT and DDC, seem to hold special promise.

THE MOST PROMISING DRUGS IN THE WAR ON AIDS

DRUG/Developer	
AZT Burroughs Wellcome	The first drug shown to prolong the lives of AIDS patients, especially those in the early stages of the disease. The drug blocks the virus's ability to reproduce but causes anemia so severe that frequent blood transfusions are necessary. Already approved in Britain and France; full-scale U.S. approval is imminent.
DDC Hoffmann-La Roche	A sister drug to AZT that appears extremely promising in laboratory experiments. Has been testing on only nine patients so far, but some researchers believe it may prove to be more potent and less toxic than AZT.
AL721 Praxis Pharmaceuticals	Developed to treat the symptoms of drug withdrawal, it is in very early stages of testing against AIDS. Trials with eight patients with AIDS -related swelling of the lymph nodes have been encouraging.
GRANULOCYTE-MONOCYTE COLONY-STIMULATING FACTOR Genetics Institute	Animal tests with the substance have been encouraging, but results from the first human tests probably won't be available until late spring.
ALPHA INTERFERON Biogen/Schering-Plough Hoffmann-La Roche/Genentech	Has proven to be an effective treatment of Kaposi's sarcoma, an AIDS -linked skin cancer. It is now being tested against AIDS in combination with AZT.
INTERLEUKIN-2 Hoffmann-La Roche/Immunex Cetus	Tests with IL-2 alone have been disappointing but limited. Researchers, however, speculate that it may be more effective in combination with other drugs. Tests with AZT are planned.
CYCLOSPORINE Sandoz	A highly toxic drug used to prevent rejection of organ transplants. Last year, French researchers reported that it can control AIDS in early stages. Larger tests are under way in the U.S. and Europe. No results have been reported.

Burroughs Wellcome Co.'s drug AZT was the first to win widespread approval as a treatment for AIDS. It was cleared in England and France in early March, and the Food & Drug Administration is soon expected to make it widely available to patients with AIDS and the early form of the disease called AIDs -related complex (ARC). Although the drug does not cure the disease and has serious side effects, it does prolong the lives of many who take it, especially if they suffer from ARC. It also stops the virus from reproducing in the brain, possibly preventing some of the brain damage now commonly associated with AIDS.

AZT's close relative, DDC, has just been put into early clinical tests. "We're at the same point with it as we were with AZT a year and a half ago," says Samuel Broder, the National Cancer Institute researcher who has tested it on nine patients so far. But Broder and others are optimistic: Laboratory studies suggest that DDC may be more effective and less toxic than AZT.

SYNERGISM. Researchers also hope to find more effective ways to use those drugs in combination with new gene-spliced ones that boost the body's immune defenses, such as interleukin-2. Scientists in San Francisco recently began testing AZT together with acyclovir, used to treat herpes. In laboratory experiments the two seem to work synergisticaly to kill the virus.

Against the backdrop of a frantic search for cures, other researchers are getting a firm handle on exactly who stands the greatest chance of contracting the disease. The consensus: AIDS remains unusually hard to get. Although the virus is found in a variety of body fluids, including saliva, tears, urine, and vaginal secretions, it is in the greatest concentrations in blood and semen. To date, only those two body fluids have been conclusively shown to transmit it.

Outside the body the virus is fragile, easily killed by sunlight, common household cleaners, and even hand soap. Unlike the flu or hepatitis A viruses, it can't be spread through contaminated food or water because it prefers to infect immune-system cells not usually found in the mouth or throat.

Some studies indicate that a woman who has frequent sex with a carrier of the virus has a 33%-50% chance of becoming infected -- roughly the same as for catching syphilis or gonorrhea. But epidemiologists in Tennessee found that even after four years of steady sexual contact, infected spouses pass the virus to their partners only about 20% of the time. The chances are smaller for one act of intercourse.

Indeed, the idea that AIDS is rapidly becoming a major, undiscriminating threat to Americans is the subject of considerable speculation. The estimate by the Centers for Disease Control in Atlanta that up to 1.5 million Americans already carry the virus cannot be verified without much wider testing. And that estimate is as high as the number obtained from studies on applicants to the military -- the largest single group for which reliable blood test results exist. "The prevalence of AIDS is unknown," admits James W. Curran, head of the AIDS program at CDC. "And there is a lot of variability by age, sex, geography, and sexual orientation."

Nor does AIDS seem to be sweeping wholesale into the heterosexual population, even though the number of heterosexual cases is increasing. Experts estimate that by 1991 about 5% of AIDS cases will be heterosexuals who do not use intravenous drugs and who have not received a blood transfusion. About 3.7% of the cases reported to date have been such individuals. But roughly half of those have been people from central Africa or countries such as Haiti who may have contracted the disease before moving to the U.S. In New York City, the percentage of AIDS cases who are heterosexuals outside those risk groups has stayed constant at 2% since 1982.

Intravenous drug use is the main way AIDS is spread to heterosexuals and, through infected mothers, to children. For a non-IV drug user who is straight, monogamous with a similar partner, and hasn't received a blood transfusion, the chances of developing the disease are still only about one in a million. "Heterosexual transmission is still slow and likely to stay slow," says Paul Volberding, director of the AIDS program at San Francisco General Hospital.

NEW UNDERCLASS. Even so, the disease is creating a new group of AIDS victims within the nation's ghettos. Often destitute, homeless, and more likely to use intravenous drugs or work as prostitutes, these victims now make up about two-thirds of the heterosexual cases reported to date. Black and Hispanic women are up to 15 times more likely to become infected than white women. And women within the AIDS underclass are also the mothers of about 70% of the children who have contracted the disease. By 1991 some 3,000 children may have it -- an eightfold increase from 1986.

Those statistics bear a striking resemblance to the incidence of AIDS in central Africa, where the annual rate of infection is one adult in 1,000. Although it also appears to be spread through the frequent use of prostitutes, as well as dirty medical needles, cultural factors may also contribute to the wider incidence of heterosexual AIDS in Africa. Ceremonial mutilation of women's genitals is widely practiced. And those women bleed more readily during vaginal intercourse -- providing the virus with the blood it prefers for infection.

Around the world, however, anal intercourse is the practice that puts most people at risk. It often produces tiny tears within the wall of the rectum, giving the AIDS virus an easy portal into the body. And sex may be risky for another reason. Last January researchers at the National Institutes of Health discovered that the AIDS virus may prefer to infect and multiply in cells in the rectum and colon rather than cetain other types of body cells.

Just as sobering is the firm evidence that the risk of developing AIDS may actually increase, rather than decrease, with the passage of time after exposure. An ongoing CDC study of 6,700 homosexual and bisexual men in San Francisco found that 4% of those infected developed the disease within three years. That figure, however, jumped to 36% within seven years. "We thought AIDS would be like cancer -- if you lasted five years your chances of beating it would be much better," says biologist Jay A. Levy at the University of California at San Francisco. "Now it's beginning to look like five years is the median."

PREVENTION IS KEY. But some researchers suspect that factors other than exposure to the virus play a role in determining who develops the disease. These co-factors include infections with other viruses such as hepatitis B, anemia, poor diet, lack of sleep, the use of certain recreational drugs, stress, or even a genetic flaw in the body's immune system.

Although dramatic new therapies and vaccines are being readied to help fight AIDS, public health experts continue to emphasize that prevention, not treatment, is the key to curbing the disease's pernicious spread. They recommend that all people, whether they consider themselves at risk or not, limit their number of sexual partners. Condoms are also a highly effective, if not foolproof, tool for preventing AIDS transmission.

That these measures work is more than just speculative. Last year, largely because of educational efforts in San Francisco, the annual rate of new infections among the gay men being tracked in the CDC study dropped to 7%, from a high of 20% in 1984. The message from that effort underscores a British AIDS educational slogan: No one needs to die from ignorance.

GRAPHIC: Picture, AN AIDS PATIENT AND THE MANY DRUGS HE TAKES IN HOPES OF HALTING OR SLOWING THE PROGRESS OF THE DISEASE, REININGER/CONTACT