

THE WHITE HOUSE

WASHINGTON

November 8, 1984

Dear George:

I'm pleased to hear that the conference on Science and the Media went well. I know I enjoyed the interaction with the participants, who are a little different from the audiences I usually encounter. I understand that my remarks stimulated some further discussion the following week at a San Francisco conference of the Council for the Advancement of Science Writing, which had some overlapping attendance with your meeting.

I'm sorry we neglected to put a copy of the text in your hands before we left that afternoon, but by now you should have received a copy sent by my staff under separate cover. Just in case it misses you, I'm enclosing one with this letter. My only additional comment with regard to the subject matter is that I'm told that the science magazines, as a group, may not be quite as stable as I suggested, in spite of their very large circulations. Apparently, like many new products, some are having continuing difficulties in attracting the volume of advertising they feel they need.

Very sincerely yours,



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Enclosure

PROPOSED REMARKS OF DR. G. A. KEYWORTH, II  
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DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY  
EXECUTIVE OFFICE OF THE PRESIDENT  
TO THE CONFERENCE ON SCIENCE AND THE MEDIA  
THE ANNENBERG SCHOOL OF COMMUNICATIONS  
THE UNIVERSITY OF PENNSYLVANIA  
PHILADELPHIA, PENNSYLVANIA  
OCTOBER 22, 1984

"DO THE MEDIA COVER THE REAL ISSUES  
IN SCIENCE AND TECHNOLOGY?"

I CAN'T HELP BUT BE INTRIGUED WITH THE TITLE OF THIS CONFERENCE--"SCIENCE AND THE MEDIA: IMAGES, INFORMATION, EDUCATION." MY OWN IMPRESSION, AFTER THREE YEARS IN WASHINGTON, IS THAT WE COULD DO WITH A LOT BETTER BALANCE AMONG THOSE THREE ELEMENTS OF COMMUNICATIONS. IN PARTICULAR, I WOULD SAY THAT WE SUFFER FROM THE PROPENSITY OF MEDIA IMAGES ABOUT SCIENCE TO DIVERGE FROM AND OVERPOWER THE MORE USEFUL FUNCTIONS OF CONVEYING INFORMATION AND EDUCATING PEOPLE. IF WE HAD ONCE HOPED THAT SOME HIGHER VIRTUES WOULD ATTACH THEMSELVES TO OUR DEALING WITH IMPORTANT PUBLIC ISSUES SIMPLY BECAUSE THEY INVOLVED SUPPOSEDLY VALUE-FREE SCIENCE, WE WERE LONG AGO DISABUSED OF THAT NOTION.

MORE THAN TWENTY YEARS AGO THE FIRST DEAN OF THE ANNENBERG SCHOOL, GILBERT SELDES, TRIED TO GENERATE

SOME INTEREST IN WHAT HE HOPED WOULD BE A BUDDING NEW FIELD OF SCIENCE JOURNALISM, A PURSUIT REASONABLY WELL KNOWN THEN IN ENGLAND BUT NOT IN THIS COUNTRY. ONE OF THE FEW, IF NOT THE ONLY, SCIENTISTS HE WAS ABLE TO ENTICE AS A STUDENT AT THE ANNENBERG SCHOOL IS NOW A COLLEAGUE OF MINE IN THE WHITE HOUSE SCIENCE OFFICE. HIS RECOLLECTION OF SCIENCE JOURNALISM IN THE 1960S IS OF A LONELY, BARELY RECOGNIZED PROFESSION. NOW, IN CONTRAST, THERE'S A WHOLE CORPS OF WELL-TRAINED SCIENTISTS WHO ARE FULL-TIME REPORTERS AND WRITERS ABOUT SCIENCE.

THAT'S A REMARKABLE AND WELCOME CHANGE. IN FACT, ANY DISCUSSION OF SCIENCE AND THE MEDIA IN 1984 HAS TO START BY OBSERVING THAT WE'VE SEEN A VIRTUAL EXPLOSION OF SCIENCE PUBLICATIONS FOR NON-SPECIALIST AUDIENCES OVER THE PAST DECADE. AS RECENTLY AS TWO OR THREE YEARS AGO MOST OF US WERE CERTAIN THAT MANY, IF NOT MOST, OF THE RASH OF NEW SCIENCE MAGAZINES WOULD HAVE TO FAIL SOON. WHERE WOULD THE MARKET BE FOR SO MANY NEW ENTRIES, SUCH AS WHAT IS NOW CALLED SCIENCE 84, DISCOVER, OMNI, SCIENCE DIGEST, HIGH TECHNOLOGY, AND OTHERS, NOT TO MENTION THE WHOLE NEW GENRE OF COMPUTER MAGAZINES THAT ARE AT LEAST TANGENTIALLY RELATED TO SCIENCE? WELL, THE MARKET SEEMS TO BE GAINING STRENGTH, AND THERE'S NO QUESTION THAT THE

PERSON INTERESTED IN SCIENCE TODAY HAS A MUCH, MUCH BETTER CHANCE THAN EVER BEFORE TO LEARN ABOUT IMPORTANT SCIENTIFIC DEVELOPMENTS AND ABOUT HOW THEY RELATE TO ONE ANOTHER AND TO BROADER AREAS OF SOCIETY AS WELL.

WE HAVE TO RECOGNIZE THAT THE SUCCESS OF THESE NEW PUBLICATIONS, AS WELL AS THE HEALTH OF THE OLD STANDBYS THAT HAVE ALSO BEEN THRIVING DURING THIS EXPANSION, CAN ONLY MEAN THAT THE PORTION OF OUR POPULATION THAT IS INTERESTED AND KNOWLEDGEABLE ABOUT SCIENCE AND TECHNOLOGY IS GROWING. SO YEAR BY YEAR THERE'S A LARGER CORE OF CITIZENS WHO ARE, TO USE THAT INSIDIOUS TERM, SCIENTIFICALLY LITERATE. IN ANY WAY YOU WANT TO MEASURE THINGS, THAT'S A GOOD THING.

BUT WHILE IT'S AN IMPORTANT CHANGE, I DON'T THINK IT SIGNIFIES ANY GREAT GROUNDBREAKING BY THE MEDIA IN CHANGING PUBLIC TASTE. INSTEAD, I BELIEVE THE MEDIA ARE REFLECTING A CONTINUING AND FAR-REACHING CHANGE IN AMERICAN LIFE; PUT SIMPLY, SCIENCE AND TECHNOLOGY ARE INCREASINGLY PERVADING OUR LIVES AND OUR SOCIETY. SCIENCE AND TECHNOLOGY CREATE THEIR OWN MEDIA MARKET.

THAT'S THE ENCOURAGING DEVELOPMENT. BUT THE OTHER

SIDE OF THE COIN IS LESS COMFORTING. WITH ONLY A FEW EXCEPTIONS, THE TRUE MASS MEDIA HAVE MADE DISCOURAGINGLY LITTLE PROGRESS OVER THAT SAME PERIOD OF TIME IN PRESENTING INFORMATION ABOUT SCIENCE. THE TELEVISION WASTELAND THAT NEWTON MINOW PROCLAIMED IN THE EARLY 1960'S IS STILL PRETTY MUCH A WASTELAND FOR SCIENCE. NOT THAT THE WORLD OF SCIENCE IS ANY MORE IGNORED OR ABUSED THAN MOST OF THE OTHER IMPORTANT ELEMENTS OF SOCIETY, BUT THAT'S A TOPIC FOR ANOTHER CONFERENCE.

WHEN WE LOOK AT THE OTHER MAJOR FORM OF MASS COMMUNICATION, NEWSPAPERS, THE PICTURE IS HARDLY MUCH BETTER. ONE IS FORCED TO CONCLUDE THAT PEOPLE WHO RELY ON TELEVISION OR NEWSPAPERS AS THEIR ESSENTIAL SOURCES OF INFORMATION ABOUT WHAT'S GOING ON IN THE WORLD ARE NOT GOING TO BE VERY WELL INFORMED ABOUT SCIENCE.

WHAT CONCLUSIONS MIGHT WE DRAW FROM THIS DICHOTOMY? ARE TELEVISION AND NEWSPAPERS UNDERESTIMATING THE POTENTIAL AUDIENCE FOR SCIENCE? PROBABLY NOT. THOSE INSTITUTIONS ARE PRETTY GOOD AT GAUGING THEIR AUDIENCES, SO THEIR RELUCTANCE TO THROW OUT A WIDER NET MUST MEAN THAT THE SPECIALIZED AUDIENCE IS STILL BELOW THE CRITICAL SIZE THAT APPEALS

TO MASS COMMUNICATORS.

BUT, IN ANY CASE, THE COVERAGE OR LACK OF COVERAGE OF SCIENCE NEWS--THAT TRANSMISSION OF INFORMATION I MENTIONED EARLIER--IS NOT THE REALLY SERIOUS PROBLEM. THE REAL PROBLEM IS THAT ISSUES INVOLVING SCIENCE AND TECHNOLOGY ARE SO POORLY DEALT WITH IN THE MEDIA. AND THOSE ISSUES, AS OPPOSED TO THE MORE ESOTERIC KNOWLEDGE ABOUT SCIENCE ITSELF, ARE WHAT DO INDEED AFFECT PEOPLE, THE DECISIONS THEY MAKE, AND, MORE IMPORTANT, THE DECISIONS THAT OTHERS MAKE THAT AFFECT THEIR LIVES.

AS I SAID, THERE'S NO IGNORING, NOR ESCAPING, THE REALITY THAT SCIENCE AND TECHNOLOGY--AND THE DECISIONS MADE REGARDING THEM--PERVADE OUR LIVES MORE AND MORE EACH YEAR. THE ESSENTIAL INDUSTRIAL QUESTIONS FOR THE FUTURE ARE QUESTIONS OF HOW WE CAN USE TECHNOLOGY TO CREATE NEW INDUSTRIES AND NEW JOBS, AND HOW WE CAN SHORE UP THE TRADITIONAL SECTORS OF OUR ECONOMY BY USING TECHNOLOGY.

THAT MEANS OUR CHILDREN'S ECONOMIC FUTURES, IF NOT OUR OWN, DEPEND ON DECISIONS WE MAKE TODAY ABOUT SCIENCE AND TECHNOLOGY. MOREOVER, OUR NATIONAL SECURITY DEPENDS EQUALLY ON OUR ABILITY TO USE SCIENCE

AND TECHNOLOGY. AND THAT MEANS OUR CHILDREN'S VERY LIVES, NOT TO MENTION OUR OWN, DEPEND AGAIN ON SIMILAR DECISIONS ABOUT SCIENCE AND TECHNOLOGY. DOES ANYONE THINK YOU CAN GAIN THE PERSPECTIVE AND WISDOM NEEDED TO PLAN THAT FUTURE BY READING PEOPLE MAGAZINE OR BY SPENDING YOUR EVENINGS WITH THE "A TEAM?"

THE TITLE OF MY SPEECH ASKS IF THE MEDIA COVER THE REAL ISSUES IN SCIENCE AND TECHNOLOGY. WHAT I REALLY MEANT TO ASK WAS HOW WELL THE MEDIA IDENTIFY AND COVER THE IMPORTANT ISSUES. WHAT I'D LIKE TO DO IS LOOK FROM MY VANTAGE POINT AS THE PRESIDENT'S SCIENCE ADVISOR AT A HANDFUL OF WHAT I SEE AS IMPORTANT ISSUES OF SCIENCE AND TECHNOLOGY--AND LOOK AT HOW THOSE ISSUES ARE PRESENTED BY THE MEDIA.

LET'S START WITH A COUPLE OF ISSUES THAT I THINK HAVE BEEN MORE OR LESS OVERLOOKED.

IN THE CATEGORY OF ISSUES THAT HAVE BEEN MISSED, I WOULD PUT NEAR THE TOP SOMETHING THAT HAS FRUSTRATED ME FOR THE PAST THREE AND A HALF YEARS. ONE OF THE CENTRAL ELEMENTS OF FEDERAL SCIENCE POLICY DURING THE REAGAN ADMINISTRATION HAS BEEN THE RESTORATION OF STRONG SUPPORT FOR BASIC SCIENTIFIC RESEARCH, WITH A PARTICULAR EMPHASIS ON SUPPORT OF RESEARCH AT

UNIVERSITIES.

THE REASON IS NOT MERELY OUT OF LOVE FOR SCIENCE OR ACADEMIA, BUT OUT OF THE CLEAR CONVICTION THAT BOTH OUR INDUSTRIAL COMPETITIVENESS AND OUR NATIONAL SECURITY DEPEND CRITICALLY ON HOW WELL THIS COUNTRY DEVELOPS NEW KNOWLEDGE AND PRODUCES HIGHLY TRAINED TECHNICAL TALENT. THE BOTTOM LINE--THE RESULT OF THAT POLICY--HAS BEEN AN INCREASE IN FEDERAL FUNDING FOR BASIC RESEARCH OF 55 PERCENT OVER FOUR YEARS, OR NEARLY 30 PERCENT IN REAL GROWTH. THAT HAPPENS TO BE THE GREATEST INCREASE FOR UNIVERSITY BASIC RESEARCH IN NEARLY TWO DECADES, SINCE THE SPURT IN THE EARLY POST-SPUTNIK YEARS.

YET, AT LEAST UP UNTIL VERY RECENTLY, I DEFY YOU TO FIND MEDIA ACCOUNTS OF THE ADMINISTRATION'S POLICY WITH REGARD TO SCIENCE THAT DON'T FLATLY ASSERT THAT BASIC RESEARCH HAS BEEN AND CONTINUES TO BE GUTTED BY THE PRESIDENT.

YOU MAY QUESTION WHETHER THAT LAPSE REPRESENTS AN IMPORTANT OMISSION. I SAY IT DOES. FIRST OF ALL, IT REPRESENTS A REASONABLY IMPORTANT STORY THAT WAS MISSED NOT ONCE BUT TIME AND TIME AGAIN. THE STORY OF BUDGET CUTS FIRST SURFACED DURING THE TRANSITION

MONTHS OF EARLY 1981, AT A TIME WHEN THERE WERE THREATS OF SOME CUTBACKS. BY LATE 1981, HOWEVER, THE REAL STORY WAS ONE OF THE START OF RAPID GROWTH AND THE EMERGENCE OF A STRONG ADMINISTRATION SCIENCE AND TECHNOLOGY POLICY RATIONALIZING THAT GROWTH. YET FOR THE PAST THREE YEARS WE'VE CONTINUED TO SEE THE MEDIA TROT OUT THE OLD STORY, THE ONE THAT FIT BETTER WITH PRECONCEIVED NOTIONS OF WHAT THE ADMINISTRATION WAS EXPECTED TO DO BY PEOPLE WHO NEVER BOTHERED TO, OR DIDN'T WANT TO, LOOK AT REALITY.

I CAN'T RESIST SHARING WITH YOU THE MOST RECENT JERK OF THE KNEE. JUST FOUR DAYS AGO, IN AN ARTICLE ABOUT THE NOBEL PRIZES IN THE WASHINGTON POST, A PAPER THAT CAN HARDLY CLAIM TO BE ISOLATED FROM WHAT'S GOING ON IN WASHINGTON, WAS THE FOLLOWING STATEMENT. IT WASN'T IN QUOTES, IT WASN'T ATTRIBUTED TO ANYBODY, AND IT WASN'T ON THE EDITORIAL PAGE, SO I MUST ASSUME IT WAS INTENDED AS A STATEMENT OF FACT. IT SAID, AND I QUOTE RELUCTANTLY: "MANY AMERICAN SCIENTISTS HAVE WARNED FOR YEARS THAT CUTS IN RESEARCH BUDGETS DATING BACK TO THE EARLY 1970S WERE THREATENING AMERICAN LEADERSHIP IN NUMEROUS AREAS OF SCIENCE." THE IMPRESSION SUCH A BALD STATEMENT LEAVES IS UNAMBIGUOUS--GOVERNMENT IS CUTTING FUNDS FOR SCIENCE. IT'S MERELY 180 DEGREES OUT OF PHASE WITH REALITY.

THE REAL DAMAGE OF THIS KIND OF IRRESPONSIBILITY IN RECENT YEARS HAS BEEN ITS DISORIENTING EFFECT ON THE SCIENCE COMMUNITY ITSELF. ONE OF THE PROBLEMS WE FACE IN GOVERNMENT IS THAT THE IMPACTS OF MANY ACTIONS, ESPECIALLY BUDGET ACTIONS, EVEN THOUGH THEY'RE WELL ADVERTISED, AREN'T ACTUALLY FELT FOR UP TO A YEAR OR MORE AFTER THE POLICY IS FIRST ANNOUNCED. WE HAVE A LONG PIPELINE. BUT IT'S EXTREMELY IMPORTANT THAT THE INTERVAL BE WISELY USED TO PLAN FOR NEW PROGRAMS AND PROJECTS, TO THINK ABOUT HOW ADDITIONAL RESOURCES CAN BE BEST USED TO COME TO GRIPS WITH CHANGING RESEARCH NEEDS. MUCH OF THAT EFFORT JUST DIDN'T OCCUR, BECAUSE TOO MANY PEOPLE BELIEVED WHAT THEY READ IN THE PAPERS, BELIEVED THAT THEY SHOULD LIE LOW UNTIL BETTER TIMES.

EVEN MORE SERIOUS HAS GOT TO BE THE LIKELY IMPACTS ON THE ATTITUDES OF THOSE BRIGHT YOUNG PEOPLE WHO WERE TRYING TO MAKE CAREER DECISIONS DURING THAT TIME. I KNOW THAT WE NEED MORE GOOD SCIENTISTS AND ENGINEERS, BUT I FEAR THAT WE GOT MORE LAWYERS INSTEAD.

HERE'S A SECOND IMPORTANT ISSUE THAT HAS CLEARLY SUFFERED FROM THE SAME KIND OF UNEVEN COVERAGE. HOW MANY PEOPLE ARE AWARE OF THE DEPENDENCE OF WESTERN

NATIONS ON TECHNOLOGY FOR THEIR NATIONAL DEFENSE? ONE RARELY SEES A WORD ABOUT THE DIFFICULTIES OF NATO'S LIMITED NUMBER OF TROOPS MATCHING UP AGAINST THE NUMERICALLY SUPERIOR WARSAW PACT FORCES--AND WHY THAT LEADS TO THE WEST'S CONSEQUENT RELIANCE ON TACTICAL NUCLEAR WEAPONS IN EUROPE TO COMPENSATE FOR THAT MISMATCH. AND EVEN LESS OFTEN ARE PEOPLE GIVEN A CHANCE TO UNDERSTAND THAT THE ROUTE AWAY FROM THAT UNEASY RELIANCE ON TACTICAL NUCLEAR WEAPONS IS THROUGH THE USE OF MODERN TECHNOLOGY TO FIELD TRULY HIGH-LEVERAGE CONVENTIONAL WEAPONS. YET THE BULK OF THE MEDIA COVERAGE OF WEAPONS TECHNOLOGIES FOCUSES ON CONTRACT DISPUTES AND ANTI-WAR DEMONSTRATIONS. OR, IN AN EXAMPLE IN THE AREA OF STRATEGIC NUCLEAR WEAPONS, WHEN THE PRESIDENT PROPOSES TO START A PROGRAM TO TAKE ADVANTAGE OF OUR SCIENTIFIC AND TECHNICAL EXPERTISE TO TRY TO DEVISE A DEFENSE AGAINST OFFENSIVE NUCLEAR WEAPONS, THE MEDIA FALL OVER EACH OTHER IN AN ATTEMPT TO TURN A SERIOUS, THOUGHTFUL ISSUE INTO A CARTOON.

IN BOTH OF THE EXAMPLES I'VE CITED, SCIENCE BUDGETS AND WEAPONS TECHNOLOGIES, WE'VE SEEN A SIMILAR RESPONSE FROM THE MEDIA. THAT RESPONSE CONSISTS OF AN IMMEDIATE AND PREMATURE JUDGMENT, FOLLOWED BY A SOLIDIFICATION OF VIEWS THAT SIMPLY DON'T BUDGE AFTER THAT. I'M REALLY DISTRESSED AT HOW MANY REPORTERS WHO

COME TO SEE ME HAVE THEIR MINDS ESSENTIALLY CLOSED TO NEW IDEAS OR INFORMATION THAT DOESN'T FIT INTO THEIR CONCEPTION OF HOW THINGS ARE. IT'S VERY FRUSTRATING, TOO, THE WAY THE MEDIA SELECT AND ANNOINT THE SO-CALLED SCIENTIFIC EXPERTS, PEOPLE WHO ARE OFTEN TRANSPARENTLY BIASED AND THEMSELVES MEDIA GROUPIES WHO MAY NOT HAVE SEEN THE INSIDE OF A LABORATORY FOR DECADES. I THINK I'M PRETTY WELL INFORMED ABOUT THE SUBSTANTIVE ISSUES, BUT WHAT I SEE IN MEDIA COVERAGE OFTEN TRULY BAFFLES ME.

IF SOME ISSUES ARE DISTORTED BECAUSE MAJOR ASPECTS OF THEM ARE IGNORED, THEN THERE ARE MANY MORE THAT ARE DISTORTED BECAUSE THEY'RE OVERPLAYED. THE ONES THAT PARTICULARLY GALL ME ARE THOSE THAT PLAY ON A COMBINATION OF FEAR AND IGNORANCE. I HAVE TWO FAVORITE EXAMPLES.

THE FIRST IS NUCLEAR ENERGY. WITHOUT MAKING ANY APOLOGIES FOR THE MANNER IN WHICH THE NUCLEAR POWER BUSINESS HAS BEEN RUN OVER THE YEARS, I CAN STILL SAY THAT FEW INDUSTRIES HAVE EVER BEEN RAVAGED MORE RUTHLESSLY BY THE MEDIA THAN THIS HAS. WHAT'S ITS FAULT? ACCORDING TO WHAT WE READ OR SEE, NUCLEAR POWER ISN'T SAFE--AND IT'S TOO EXPENSIVE. IN FACT, NUCLEAR POWER HAS BECOME A HANDY WHIPPING BOY FOR

PEOPLE WITH A VARIETY OF COMPLAINTS AGAINST THE WORLD,  
ALL OF WHOM ARE GIVEN MEDIA SPACE ON A REGULAR BASIS.

IN SPITE OF THE FACT THAT NUCLEAR POWER'S SAFETY  
RECORD IS ENVIABLE COMPARED TO OTHER CENTRAL POWER  
SOURCES, IT'S ROUTINELY PICTURED AS HAZARDOUS TO HUMAN  
AND ECOLOGICAL WELL-BEING. ITS ECONOMICS HAVE BEEN  
SCRAMBLED NOT SO MUCH BY TECHNICAL PROBLEMS AS BY  
LEGAL ONES. HAVING DECLARED NUCLEAR POWER TO BE  
INHERENTLY UNSAFE, WE THEN SADDLE IT WITH SO MANY  
REGULATIONS AND DELAYS THAT WE VIRTUALLY GUARANTEE  
THAT IT WILL BE UNECONOMICAL AS WELL.

MEANWHILE, WHILE WE MAKE NUCLEAR POWER INTO A  
LIGHTNING ROD FOR ALL OUR APPREHENSIONS ABOUT MODERN  
LIFE, OUR MORE SENSIBLE NEIGHBORS AROUND THE WORLD ARE  
BUILDING ONE NUCLEAR PLANT AFTER ANOTHER BASED LARGELY  
ON OUR DESIGNS. FRANCE, WHICH ISN'T GOING TO WAIT FOR  
THE NEXT ENERGY CRISIS TO GALVANIZE IT INTO ACTION, IS  
WELL ON HER WAY TO HAVING THE VAST MAJORITY OF HER  
ELECTRICITY GENERATED BY NUCLEAR--AND SHE'LL BE  
EXPORTING CHEAP ELECTRICITY TO OTHER EUROPEAN  
COUNTRIES AS WELL. AND YOU MAY HAVE READ ABOUT THE  
CANADIANS WHO ARE CONSIDERING BUILDING A NUCLEAR PLANT  
EXPRESSLY FOR THE PURPOSE OF SELLING ELECTRICITY AT A  
PROFIT TO THEIR NEIGHBORS ACROSS THE BORDER IN NEW

ENGLAND WHO REFUSE TO PERMIT NUCLEAR POWER PLANTS TO BE BUILT THERE.

THE TRAGEDY OF THIS SITUATION IS TWO-FOLD. IN A VERY PRACTICAL SENSE WE'RE SETTING OURSELVES UP FOR A CRISIS SOMETIME IN THE 1990S WHEN THE GROWING INDUSTRIAL DEMAND FOR ELECTRICITY STRAINS THE CAPACITY OF EXISTING POWER PLANTS. WE'RE THEN GOING TO BE FACED WITH ONLY TWO REAL OPTIONS--COAL OR NUCLEAR. BUT MASSIVE INCREASES IN COAL BURNING BRING WITH THEM A HOST OF ENVIRONMENTAL CONCERNS THAT ARE GOING TO MAKE THAT CHOICE UNATTRACTIVE OR EXPENSIVE--ACID RAIN, CARBON DIOXIDE BUILDUP IN THE ATMOSPHERE, AND THE MINING PROCESS ITSELF.

YET IF WE WAIT UNTIL THE NEED IS UPON US TO SORT OUT THE NUCLEAR AND COAL OPTIONS--WHICH OF COURSE IS EXACTLY WHAT WE'RE ALLOWING BY DEFAULT--THEN WE MAY WELL HAVE A MORIBUND NUCLEAR POWER INDUSTRY ON OUR HANDS WHEN WE SUDDENLY DISCOVER HOW MUCH WE NEED IT. AND IF WE CAN'T PRODUCE NEEDED NEW ELECTRICITY AT REASONABLE RATES, THAT'S GOING TO HAVE A DIRECT AND VERY UNPLEASANT EFFECT ON OUR INDUSTRIAL COMPETITIVENESS, BECAUSE MODERN INDUSTRY INCREASINGLY RELIES ON ELECTRIC POWER. CAN OUR SOCIETY ALLOW THE ANTI-NUCLEAR POWER MOVEMENT TO CONTINUE TO OWN THE

PUBLIC FORUM AND CONTINUE TO MANIPULATE THE PUBLIC'S  
ABILITY AND RIGHT TO MAKE INFORMED  
DECISIONS--COURTESY, IN PART, OF THE MEDIA?

THAT SITUATION HAS BEEN GOING ON FOR MORE THAN A  
DECADE NOW. THERE'S ALSO A NEWER DEVELOPMENT THAT  
SEEMS TO BE IN DANGER OF FOLLOWING A SIMILAR PATTERN.  
IN MY MIND--AND I WOULD ADD IN THE MINDS OF THE VAST  
MAJORITY OF SCIENTISTS--WE ARE ON THE VERGE OF REAPING  
A HARVEST OF INCREDIBLE IMPORTANCE TO MANKIND--THE  
HARVEST OF NEW TECHNOLOGIES FROM SOME THIRTY YEARS OF  
BASIC RESEARCH IN MODERN BIOLOGY. WE'RE JUST NOW  
BEGINNING TO PERCEIVE THE SCOPE OF BENEFITS THAT LIE  
BEFORE US--NOT JUST NEW MEDICINES OR MEDICAL  
TECHNIQUES, BUT TREMENDOUS BREAKTHROUGHS IN  
AGRICULTURE AND IN INDUSTRIES AS FAR AFIELD FROM THE  
BIOLOGISTS' LABS AS MINING AND MANUFACTURING.

BUT, AGAIN, THE WAY WE COVER ISSUES IN OUR COUNTRY  
PERMITS A HANDFUL OF PEOPLE--THOSE SELF-STYLED  
EXPERTS--TO CAPTURE THE SPOTLIGHT AND DIRECT PUBLIC  
PERCEPTIONS AND FEARS IN THE DIRECTION THAT SUITS  
THEIR IDEOLOGIES. IF THE ONLY CONSEQUENCE OF THE  
FEAR-MONGERING WERE THAT PEOPLE DEVELOPED A HEALTHY  
RESPECT FOR UNFORESEEN POSSIBLE CONSEQUENCES OF  
TECHNOLOGICAL DEVELOPMENT, THAT WOULD BE FINE. BUT

INSTEAD WE SEE THE POSSIBILITY THAT WE'LL SO BURDEN-DOWN AN EMERGING INDUSTRY WITH REGULATIONS AND CAUTIONS THAT IT CAN'T DEVELOP IN THIS COUNTRY. AND ONCE AGAIN WE'LL SEE OUR FOREIGN COMPETITORS HARVEST OUR INVESTMENT IN RESEARCH.

THE WAY WE'VE APPROACHED BOTH THESE ISSUES, NUCLEAR POWER AND NOW BIOTECHNOLOGY, REFLECTS ANOTHER SCIENCE AND TECHNOLOGY ISSUE--MAYBE THE MOST FUNDAMENTAL OF ALL--THAT THE MEDIA HAVE MANAGED TO MANGLE. THAT ISSUE IS RISK AND BENEFIT. THERE'S VIRTUALLY NOTHING WE DO IN THIS WORLD THAT DOESN'T HAVE ITS MIXTURE OF THOSE TWO COMPONENTS. WHEN I FLEW UP HERE THIS MORNING I TRADED THE MINUSCULE RISK OF A PLANE CRASH WITH THE LARGE BENEFIT OF REDUCED TRANSPORTATION TIME. YET I COULD ALMOST GUARANTEE YOU THAT IF ORVILLE WRIGHT WERE TRYING TO GET A LICENSE TO OPERATE THE FIRST AIRPLANE IN TODAY'S CLIMATE, THE BURDEN ON HIM TO PROVE THAT THERE WOULD BE NO RISKS ASSOCIATED WITH HIS NEW TECHNOLOGY WOULD CHASE HIM BACK TO BUILDING BICYCLES.

EVERY ONE OF US KNOWS THERE IS NO SUCH THING AS ZERO RISK IN THIS WORLD, YET, ACCORDING TO THE MEDIA, THAT'S APPARENTLY WHAT'S EXPECTED FROM NEW TECHNOLOGIES.

SO HOW DO WE SQUARE OUR WILLINGNESS TO LIVE WITH RISK EVERY DAY--RISKS THAT IN TRUTH WE HAVE LITTLE CONTROL OVER--WITH OUR READINESS TO INSIST THAT PROGRESS BE DEFERRED UNTIL IT CAN BE PROVEN TO BE RISK-FREE? THE ANSWER, I THINK, IS THAT THE COSTS OF THESE UTOPIAN RISK-FREE SCENARIOS ARE NEVER BROUGHT UP AND CERTAINLY NEVER COMPARED TO POSSIBLE BENEFITS.

ISN'T IT ODD THAT WE LIVE IN AN INCREASINGLY QUANTITATIVE WORLD, YET YOU RARELY SEE A NUMBER CONNECTED WITH THE RISKS THAT WE'RE SUPPOSEDLY BEING SUBJECTED TO? I WOULD ALMOST BE WILLING TO PREDICT THAT WITH THE AMAZING SKILLS OF TODAY'S ANALYTIC CHEMISTS, THERE'S GOING TO BE A DAY NOT FAR OFF WHEN THEY'LL BE ABLE TO DETECT A TRACE OF ALMOST ANYTHING BAD IN ALMOST ANYTHING GOOD. EVEN TODAY I CAN ASSURE YOU THAT YOU'D PREFER NOT TO SEE A TRULY FINE-SCALE CHEMICAL ANALYSIS OF WHAT WE'VE JUST EATEN FOR LUNCH. YET, ACCORDING TO THE MEDIA, A TOXIC DUMP IS A TOXIC DUMP IS A TOXIC DUMP. AND THE VERY THOUGHT OF IT SCARES THE HELL OUT OF PEOPLE WHO HAVE NO WAY TO SORT OUT REAL DANGER FROM A SCARE STORY. IN FACT, ALL TOO MANY OF THE PEOPLE COVERING THESE STORIES ARE HARDLY ANY BETTER PREPARED TO ASSESS THOSE DANGERS THAN THEIR READERS ARE.

I SUPPOSE ALL THIS CAN BE TAKEN AS AN INDICTMENT OF SORTS OF THE MEDIA'S APPROACH TO ISSUES INVOLVING SCIENCE AND TECHNOLOGY, BUT I REALLY WOULDN'T WANT TO CARRY THE NOTION OF BLAME TOO FAR. I COME BACK TO MY EARLIER OBSERVATION THAT THE MEDIA ARE MORE LIKELY TO REFLECT THE VALUES OF SOCIETY THAN TO FORM THEM.

IF THERE WERE ANY SINGLE QUALITY I WOULD CHOOSE TO SEE INSTILLED INTO THE PUBLIC, IT WOULD BE A HEALTHY SKEPTICISM OF THE OPINIONS OF SO-CALLED EXPERTS. MOST OF THE ISSUES I'VE TALKED ABOUT ARE FAR FROM PURE TECHNICAL ISSUES, SO IT SHOULDN'T BE ANY SURPRISE THAT THE OPINIONS THAT SCIENTISTS GIVE CAN BE SO FIRMLY ENTRENCHED ON EITHER SIDE OF THE ISSUE. WHEN ASKED TO SUM UP THEIR VIEWS ON ISSUES, SCIENTISTS MIX IN PRECISION WITH OPINION AND OUTRIGHT BIAS--YET OFFER THEIR CONCLUSION AS IF IT WERE AS PRECISELY DEMONSTRABLE AS THE ANSWER TO A MATH PROBLEM.

THE OTHER QUALITY I WOULD LIKE TO SEE MORE OF IN THE PUBLIC IS KNOWLEDGE OF SCIENCE ITSELF, AND ESPECIALLY OF THE METHODS OF SCIENCE. MANY OF THE MORE OUTRAGEOUS MISUNDERSTANDINGS COULDN'T BE PERPETUATED ON A BETTER INFORMED PUBLIC--SUCH AS THE BELIEF THAT A NUCLEAR POWER PLANT IS A FORM OF ATOMIC

BOMB THAT COULD BLOW UP IF SOMETHING GOES WRONG, OR THAT THE PRESENCE OF PARTS-PER-BILLION AMOUNTS OF SOMETHING THAT'S HARMFUL IN LARGE AMOUNTS CONSTITUTES A HAZARD THAT MUST BE DEALT WITH AT ANY COST. I GUESS WHAT I'M REALLY SAYING IS THAT OUR EDUCATIONAL SYSTEM HAS NOT DONE A GOOD ENOUGH JOB OF PREPARING PEOPLE TO COEXIST WITH TODAY'S HIGHLY SOPHISTICATED SCIENCE AND TECHNOLOGY. AND WHEN WE COME DOWN TO THE BOTTOM LINE, THERE'S NO SUBSTITUTE FOR KNOWLEDGE AND JUDGMENT.

BUT LET ME COME BACK TO SOMETHING I SAID EARLIER. WE'RE SEEING AN IMPRESSIVE GROWTH IN SERIOUS INTEREST IN SCIENCE. IT'S REFLECTED IN THE RISE OF SCIENCE COVERAGE IN SPECIALIZED MEDIA--THE NEW MAGAZINES AND THE SMALLER-AUDIENCE PUBLIC TELEVISION SHOWS LIKE "NOVA." IT MAY WELL BE THAT WE'RE SEEING THE BEGINNING OF AN IMPORTANT PULSE THROUGH OUR SYSTEM, THE LEADING EDGE OF A STRONG NEW INTEREST AND SOPHISTICATION ABOUT SCIENCE AND TECHNOLOGY THAT WILL EVENTUALLY MANIFEST ITSELF IN A WISER, MORE SKEPTICAL, AND MORE INDEPENDENT PUBLIC. I CERTAINLY HOPE THAT'S THE CASE, BECAUSE I DON'T THINK WE CAN CONTINUE TO ALLOW THE MINORITY OF MEDIA-WISE, ANTI-TECHNOLOGY ACTIVISTS TO CONTINUE TO HOLD BACK THE PROGRESS THAT WE HAVE TO MAKE IN ORDER TO MAINTAIN OUR PROSPERITY IN THE INCREASINGLY COMPETITIVE WORLD WE LIVE IN.

I THINK THE ROOTS OF THIS CHANGE ARE AT LEAST PARTLY SEEN IN A HANDFUL OF TECHNICAL REVOLUTIONS THAT HAVE SO INDELIBLY MARKED THE RECENT DECADES. I WOULD PUT THE APOLLO MOON LANDING PROGRAM AT THE TOP OF THE LIST. THE EXCITEMENT AND LIFT OF THAT PROGRAM GALVANIZED A GENERATION OF YOUNG PEOPLE INTO SCIENCE CAREERS; I KNOW BECAUSE I WAS ONE OF THEM.

WELL, THAT SPACE-INDUCED BURST OF INTEREST IN SCIENCE AND TECHNOLOGY WAS FOLLOWED NOT LONG AFTER BY NEW COMMUNICATIONS TECHNOLOGIES, AND THEN BY MODERN MICROCOMPUTERS. I CAN'T HELP BUT THINK THAT THESE CLOSELY SPACED JOLTS TO OUR COMPLACENCY HAVE HAD A CUMULATIVE EFFECT AND ARE TO A LARGE DEGREE TIED UP IN THE RISING TIDE OF SCIENCE AND TECHNOLOGY SOPHISTICATION WE'RE SEEING. AND I'M INCLINED TO THINK THIS TREND HAS CONTINUED TOO LONG NOW FOR IT TO BE A FAD. I THINK WE'RE SEEING A REAL CHANGE IN OUR SOCIETY, A CHANGE THAT WILL, EVENTUALLY, BE REFLECTED IN A WIDESPREAD WAY IN THE MEDIA. I'M LOOKING FORWARD TO IT.

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