Keynote Address

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TEN YEARS AFTER PL 96-517

UNLIKE BOTTICELLI'S FAMOUS PAINTING "THE BIRTH OF VENUS", WHERE VENUS ARISES FULL BLOWN FROM A SEASHELL, PL 96-517 ENJOYED NO SUCH INSTANTANEOUS AND SPECTACULAR BIRTH. RATHER THAT LAW WAS THE CULMINATION OF A LONG, SLOW, FRUSTRATING AND TEDIOUS PROCESS.

WHILE, I AM SURE, MOST OF YOU ARE FAMILIAR WITH PL 96-517 SINCE IT WAS THE PRIMARY KEY WHICH UNLOCKED TODAY'S EXTENSIVE TECHNOLOGY TRANSFER EFFORTS IN THE UNIVERSITY SECTOR, I AM JUST AS SURE THAT MOST OF YOU ARE UNFAMILIAR WITH ITS CREATION. IN KEEPING WITH THE CAPTION WHICH APPEARS ON THE FRONT OF THE NATIONAL ARCHIVES IN WASHINGTON:

"THE HERITAGE OF THE PAST
IS THE SEED THAT BRINGS
FORTH THE HARVEST OF THE
FUTURE"

IT SEEMS APPROPRIATE TO GIVE YOU AN HISTORICAL PERSPECTIVE OF PL 96-517, ITS ORIGIN, ITS FUNCTION, AND ITS GROWTH, THROUGH BOTH VOLUNTARY ACTS AND LEGISLATION. WITH THAT AS A PROLOGUE TO A CURRENT PERSPECTIVE OF THE LAW AND ITS IMPACT, YOU WILL BE ABLE TO MORE

FULLY APPRECIATE WHAT A TRULY SEMINAL PIECE OF LEGISLATION THAT LAW WAS.

PLEASE KEEP IN MIND THAT WHEN I SPEAK OF TECHNOLOGY TRANSFER TODAY, I AM NOT SPEAKING OF THE INFORMATIONAL TRANSFER THAT OCCURS THROUGH PUBLICATIONS IN SCIENTIFIC OR OTHER JOURNALS OR THROUGH CONSULTING OR EQUIVALENT RELATIONSHIPS THAT ARE THE NORM IN THE UNIVERSITY SECTOR. RATHER, I AM SPEAKING OF THE TRANSFER OF A PROPERTY RIGHT, USUALLY THROUGH A LICENSING ARRANGEMENT.

ORIGINS

THE CONCEPT THAT "INTELLECTUAL PROPERTY" - THE PRODUCTS OF THE MIND - HAD A VALUE AS PROPERTY AROSE DURING THE FRAMING OF THE U.S. CONSTITUTION. IT GREW OUT OF EXTENSIVE THOUGHT AND CORRESPONDENCE BETWEEN JAMES MADISON, THE PRIMARY ARCHITECT OF THE CONSTITUTION, AND THOMAS JEFFERSON. IT WAS CONSIDERED BY MADISON IMPORTANT ENOUGH TO BE TREATED SEPARATELY IN THE CONSTITUTION AND NOT MERELY INCLUDED IN WITH GENERAL PROPERTY RIGHT PROVISION. THE TECHNOLOGY TRANSFER FUNCTION IS, OF COURSE, BASED UPON THE RECOGNITION OF AND THE SPECIFIC PROVISION FOR THAT VERY SPECIAL PROPERTY RIGHT.

NATURE OF UNIVERSITY RESEARCH

DURING THE PREVALENCE OF THE "IVORY TOWER" CONCEPT OF UNIVERSITIES AND THE RESEARCH THAT WAS CARRIED OUT IN THEM, LITTLE THOUGH OR IMPETUS WAS GIVEN TO THE TRANSFER OF THE RESULTS OF THAT RESEARCH TO THE PUBLIC OTHER THAN THROUGH THE ACCEPTED AND ACCEPTABLE ROUTE OF SCIENTIFIC PUBLICATION. IN FACT, UNDER THAT "IVORY TOWER" CONCEPT, A RESEARCHER WHO ACCEPTED A CORPORATE SUBSIDY AROUSED THE SUSPICION AMONG HIS COLLEAGUES THAT HE HAD BEEN DIVERTED FROM HIS BASIC RESEARCH AND HAD BECOME A TOOL OF VESTED INTERESTS. HE HAD ACCEPTED "TAINTED MONEY".

WHEN, IN 1924, IT WAS SUGGESTED AT THE UNIVERSITY OF WISCONSIN THAT A PLAN BE DEVELOPED TO MAKE USE OF PATENTABLE INVENTIONS GENERATED BY FACULTY MEMBERS WHICH WOULD:

(1) PROTECT THE INDIVIDUAL TAKING OUT THE PATENT;

(2) INSURE PROPER USE OF THE PATENT; AND, AT THE SAME TIME;

(3) BRING FINANCIAL HELP TO THE UNIVERSITY TO FURTHER ITS RESEARCH EFFORT,

THE PURISTS QUICKLY APPLIED THE "TAINTED MONEY" THEORY TO THE PLAN. IT WAS FEARED THAT ANY SUCH ARRANGEMENT WOULD DIVERT THE SCIENTIST

FROM BASIC RESEARCH TO WORK ONLY ON THOSE IDEAS WHICH APPEARED TO HAVE COMMERCIAL POTENTIAL. IN OTHER WORDS, THE RESEARCH FUNCTION WOULD NO LONGER BE DRIVEN BY THE SEEKING OF NEW KNOWLEDGE BUT BY THE DOLLAR-DRIVEN NEED TO SOLVE CURRENT PROBLEMS IN THE REAL WORLD, EVEN TO THE DEVELOPMENT OF PRODUCTS AND PROCESSES TO MARKET-READY CONDITION.

THE FEARS PROPOUNDED BY THE PURISTS THEN, AND WHICH ARE STILL EMBRACED AMONG ACADEMIA BY SOME, DID NOT MATERIALIZE. THERE WAS NO GREAT RUSH TOWARD PATENTING. THERE WAS NO EVIDENT MOVEMENT AMONG UNIVERSITY RESEARCHERS TOWARD APPLIED RESEARCH TIED DIRECTLY TO ACTUAL PRODUCT DEVELOPMENT. NOR WAS THERE ANY OBSERVABLE CHANGE IN THE RESEARCH SCIENTISTS' ATTITUDE. IN FACT, UNIVERSITY RESEARCH THEN, EVEN AS NOW, REMAINED ESSENTIALLY BASIC IN CHARACTER.

THE GENERATION OF INVENTIONS IS ALMOST NEVER THE MAIN OBJECTIVE OF BASIC RESEARCH. IF INVENTIONS DO FLOW FROM THAT RESEARCH ACTIVITY, IT IS A LARGELY FORTUITOUS HAPPENING THAT TAKES PLACE BECAUSE THE RESEARCHER, OR, PERHAPS, AN ASSOCIATE, HAS THE ABILITY TO SEE SOME SPECIAL RELATIONSHIP BETWEEN HIS SCHOLARLY WORK PRODUCT AND THE PUBLIC NEED. IT IS FROM THE RECOGNITION OF THIS CONNECTION,

WHICH CAN CONVERT A DISCOVERY OR INVENTION INTO PATENTABLE INVENTION, THAT INNOVATION ARISES.

A SHORT 15 TO 20 YEARS AGO THE TERM "INTELLECTUAL PROPERTY", IF IT WAS KNOWN AT ALL, WOULD HAVE BEEN VIEWED IN ACADEME AS ALIEN AND, IF KNOWN, UNWELCOME. HOWEVER, AT THAT TIME, AND EVEN MUCH EARLIER, A NUMBER OF UNIVERSITIES WERE ENGAGED IN PATENTING AND LICENSING INTELLECTUAL PROPERTY GENERATED ON THEIR RESPECTIVE CAMPUSES WITH THE ATTENDANT OPPORTUNITY TO GENERATE FUNDS TO AID IN SUPPORTING THE RESEARCH FUNCTION. PROMINENT AMONG SUCH INSTITUTIONS WERE THE UNIVERSITY OF CALIFORNIA, IOWA STATE UNIVERSITY, BATTELLE DEVELOPMENT CORPORATION, RESEARCH CORPORATION, WHICH REPRESENTED A NUMBER OF UNIVERSITIES AND THE UNIVERSITY OF WISCONSIN THROUGH ITS PATENT MANAGEMENT ORGANIZATION THE WISCONSIN ALUMNI RESEARCH FOUNDATION.

THE GOVERNMENT VECTOR

DURING THE EARLY HISTORY OF THE UNITED STATES, VERY LITTLE TECHNICAL DEVELOPMENT WORK WAS DONE BY THE GOVERNMENT AND, THEREFORE, AS A PRACTICAL MATTER, THE QUESTION OF THE GOVERNMENT OWNING A PATENT NEVER AROSE. GRADUALLY, FEDERAL AGENCIES BEGAN TO

UNDERTAKE THE PRACTICAL KIND OF DEVELOPMENT WORK WHICH LED TO INVENTIONS. SINCE, PRIOR TO WORLD WAR II, ALMOST ALL GOVERNMENT-FINANCED RESEARCH AND DEVELOPMENT WORK WAS CONDUCTED IN FEDERAL LABORATORIES BY FULL-TIME GOVERNMENT EMPLOYEES, THERE WAS A SMALL, BUT RECURRING, PROBLEM OF WHAT TO DO WITH INVENTIONS RESULTING FROM SUCH WORK - INVENTIONS WHICH, IF MADE BY PRIVATE PARTIES, WOULD HAVE BECOME THE SUBJECT OF PATENT APPLICATIONS.

THIS SITUATION CHANGED RAPIDLY DURING AND AFTER WORLD WAR II WHEN THE TECHNOLOGICAL BURDENS IMPOSED BY MORE AND MORE SOPHISTICATED MILITARY REQUIREMENTS, AS WELL AS THE INCREASING COMPLEXITY OF SUPPORT SERVICES, MADE IT QUICKLY EVIDENT THAT THERE WERE NOT SUFFICIENT RESOURCES WITHIN THE GOVERNMENT ITSELF TO UNDERTAKE ALL THE SCIENTIFIC PROJECTS NECESSARY TO A WINNING WAR EFFORT. THE ABSOLUTE NECESSITY TO UTILIZE THE BEST TECHNICAL ABILITY AVAILABLE, REGARDLESS OF ITS LOCUS, SPAWNED A RAPID PROLIFERATION OF GOVERNMENT-SPONSORED-AND-FUNDED RESEARCH AND DEVELOPMENT.

THE PROPER DISPOSITION OF RIGHTS TO PATENTS RESULTING FROM THIS WORK WAS THEORETICALLY AS IMPORTANT THEN AS NOW BUT WAS NEVER SERIOUSLY ADDRESSED AS A MAJOR PROBLEM BECAUSE OF THE EXIGENCIES OF WARTIME NEEDS.

POST WORLD WAR II, THE RAPID TECHNOLOGICAL STRIDES MADE UNDER THE IMPETUS OF A WARTIME FOOTING AND THE OBVIOUS NECESSITY FOR CONTINUING TECHNOLOGICAL SUPERIORITY, AT LEAST IN DEFENSE-ORIENTED EFFORTS, MADE IT IMPERATIVE FOR THE GOVERNMENT TO CONTINUE TO PROVIDE SUPPORT FOR SCIENCE. NOR WAS THAT SUPPORT LIMITED TO MILITARY-ORIENTED EFFORT. FOR EXAMPLE, IN 1950 CONGRESS FINALLY APPROVED AN ANNUAL BUDGET OF $15 MILLION FOR THE NATIONAL SCIENCE FOUNDATION TO CONDUCT BASIC SCIENTIFIC RESEARCH AT UNIVERSITIES.

DURING THE SAME PERIOD, HUNDREDS OF MILLIONS OF DOLLARS WERE APPROPRIATED BY THE GOVERNMENT FOR MEDICAL RESEARCH AS THE BEGINNING OF AN ALL-OUT ATTACK ON DISEASE.

WITH THE RAPID EXPANSION OF SCIENTIFIC PROJECTS BEING UNDERTAKEN AND SUPPORTED BY THE GOVERNMENT, THE SAME SHORTAGE OF TECHNICAL ABILITY AND FACILITIES PREVALENT UNDER THE PRESSURES OF WORLD WAR II WAS AGAIN IN EVIDENCE. SINCE, AGAIN, THE GOVERNMENT COULD NOT, IN ITS OWN FACILITIES, DO ALL THE NECESSARY WORK, IT SOUGHT OUT QUALIFIED PRIVATE COMPANIES, UNIVERSITIES AND NON-PROFIT ORGANIZATIONS TO PERFORM MUCH OF THE RESEARCH AND DEVELOPMENT UNDER CONTRACTUAL ARRANGEMENTS. IN SUCH ARRANGEMENTS THE SAME OLD PROBLEM OF OWNERSHIP OF RIGHTS IN INTELLECTUAL PROPERTY WAS PRESENT

BUT WAS SELDOM, IF EVER, DIRECTLY ADDRESSED. IN THE CASE OF UNIVERSITIES AND NON-PROFIT ORGANIZATIONS, FEW WERE ENGAGED IN PATENTING THE RESULT OF RESEARCH AND IN TECHNOLOGY TRANSFER ACTIVITIES. SINCE THE MONEY FROM THE GOVERNMENT WAS READILY AVAILABLE AND FLOWING FREELY, THE PREVAILING ATTITUDE WAS TO "TAKE THE MONEY AND RUN".

THE GOVERNMENT ITSELF HAD NOT DEVELOPED ANY SINGLE OR OVERRIDING POLICY REGARDING THE DISPOSITION OF THE RIGHTS IN INTELLECTUAL PROPERTY. AS A CONSEQUENCE, EACH GOVERNMENTAL AGENCY WHICH SUPPORTED A RESEARCH AND/OR DEVELOPMENT EFFORT, THROUGH EITHER OR BOTH OF CONTRACTUAL OR GRANT ARRANGEMENTS, DEVELOPED ITS OWN POLICY. THE ULTIMATE RESULT WAS THAT PRIOR TO THE PASSAGE OF PL 96-517 SOME 26 DIFFERENT AGENCY POLICIES WERE IN PLACE. OFTEN, BECAUSE OF CO-MINGLED FUNDS IN MANY UNIVERSITY RESEARCH PROJECTS, MORE THAN ONE AGENCY POLICY HAD TO BE CONSIDERED AND THE MOST RESTRICTIVE POLICY ALWAYS CONTROLLED.

GOVERNMENT POLICY - MOVE TOWARDS UNIFORMITY

AN EFFORT TO EFFECT A MORE UNIFORM GOVERNMENT POLICY TOWARD INVENTIONS AND PATENTS ON A GOVERNMENT WIDE BASIS, WAS MADE IN 1963 BY JEROME WEISNER, PRESIDENT KENNEDY'S SCIENCE ADVISOR. THIS EFFORT

WAS FOLLOWED IN 1971 BY THE ISSUANCE OF A REVISED STATEMENT OF GOVERNMENT PATENT POLICY BY PRESIDENT NIXON. THE FUNDAMENTAL THRUST OF THAT STATEMENT WAS:

> A SINGLE PRESUMPTION OF OWNERSHIP OF PATENT RIGHTS TO GOVERNMENT-SPONSORED INVENTIONS EITHER IN THE GOVERNMENT OR ITS CONTRACTORS IS NOT A SATISFACTORY BASIS FOR GOVERNMENT PATENT POLICY AND, THAT A FLEXIBLE, GOVERNMENT-WIDE POLICY BEST SERVES THE PUBLIC INTEREST.

THEN, DURING THE PERIOD FROM 1963 TO 1971, WHILE EXPERIENCE WITH THE WEISNER-KENNEDY EFFORT WAS BEING GAINED, FURTHER EFFORTS WERE BEING MADE TO PERSUADE SEVERAL FEDERAL AGENCIES, SPECIFICALLY, THE DEPARTMENT OF HEALTH, EDUCATION AND WELFARE AND THE NATIONAL SCIENCE FOUNDATION, TO ENTER INTO INSTITUTIONAL PATENT AGREEMENTS (THE I.P.A.). THE POLICIES OF BOTH OF THESE AGENCIES PERMITTED A WAIVER OF RIGHTS TO THE INVENTIONS MADE WITH THEIR FUNDS. HOWEVER, ON THE VERY FEW OCCASIONS WHERE SUCH A WAIVER WAS GRANTED (REFERRED TO AS AN 8.2(B) GRANT OF GREATER RIGHTS) IT WAS SO FRAUGHT WITH RESTRIC-

TIVE PROVISIONS THAT IT PRESENTED AN UNWORKABLE BASIS FOR TRANSFERRING TECHNOLOGY TO THE PRIVATE SECTOR. NO COMMERCIAL FIRM WAS WILLING, UNDER THE CONDITIONS IMPOSED UNDER THE WAIVER, TO RISK THE EXPENDITURE OF THE NECESSARY DEVELOPMENT FUNDS.

SUBSEQUENTLY, AFTER FIVE YEARS OF EFFORT THE THEN DEPARTMENT OF HEALTH, EDUCATION AND WELFARE, IN 1968, ISSUED ITS FIRST NEW INSTITUTIONAL PATENT AGREEMENT (IPA) TO THE UNIVERSITY OF WISCONSIN. THIS WAS FOLLOWED IN 1973, AFTER ANOTHER FIVE YEARS OF EFFORT, BY AN INSTITUTIONAL PATENT AGREEMENT BETWEEN THE NATIONAL SCIENCE FOUNDATION AND THE UNIVERSITY OF WISCONSIN - THE FIRST EVER OF SUCH AGREEMENTS WITH THAT AGENCY.

THAT EVIDENCE OF NOT ONLY THE AVAILABILITY OF AN IPA, BUT THAT THOSE TWO AGENCIES WOULD ACTUALLY GRANT THEM, APPEARED TO PROVIDE SOME IMPETUS TO UNIVERSITIES TO ENGAGE IN THE TECHNOLOGY TRANSFER BUSINESS. NEVERTHELESS, SOME OF THE PROVISIONS OF THE IPA'S AVAILABLE FROM THOSE TWO AGENCIES WERE UNACCEPTABLE UNDER SOME UNIVERSITIES' POLICIES, WHILE MANY OTHER GOVERNMENTAL AGENCIES STILL CLUNG TENACIOUSLY TO THE POLICY OF TAKING TITLE TO ALL INVENTIONS MADE WITH FUNDS THEY HAD SUPPLIED.

ALTHOUGH LIMITED TO TWO AGENCIES, THE IPA'S WERE NOT ONLY IMPORTANT AS MANIFESTING A CHANGE IN THE ATTITUDE OF THOSE AGENCIES BUT MORE IMPORTANTLY AS ESTABLISHING, THROUGH NEGOTIATION, TERMS AND PROVISIONS WHICH WERE CARRIED INTO AND SET THE TONE FOR THE LEGISLATIVE EFFORT WHICH CULMINATED IN THE PASSAGE OF PL 96-517, THE PATENT AND TRADEMARK LAW AMENDMENTS ACT, IN 1980. IN FACT, THAT LAW IS OFTEN LOOKED UPON AS A CODIFICATION OF THE TERMS AND PROVISIONS OF THE IPA'S.

FINALLY, THERE IT WAS, THE REWARD FOR ALMOST 20 YEARS OF EFFORT, PL 96-517, THE LAW THAT CHANGED THE PRESUMPTION OF TITLE TO ANY INVENTION MADE BY SMALL BUSINESSES, UNIVERSITIES AND OTHER NON-PROFIT ENTITIES THROUGH THE USE OF GOVERNMENT FUNDS, IN WHOLE OR IN PART, FROM THE GOVERNMENT TO THE CONTRACTOR-GRANTEE. ANOTHER FACTOR, OFTEN OVERLOOKED, IS THAT THE LAW DID AWAY WITH THE DISTINCTION WHICH THE AGENCIES HAD ALWAYS MADE BETWEEN GRANTS AND CONTRACTS WHEN DEALING WITH UNIVERSITIES, A DISTINCTION WHICH A NUMBER OF AGENCIES RIGOROUSLY APPLIED IN THEIR ZEAL TO RETAIN RIGHTS TO INTELLECTUAL PROPERTY UNDER RESEARCH CONTRACTS.

THE PASSAGE OF THE LAW WAS NOT, HOWEVER, THE END OF THE BATTLE. IT TOOK OVER A YEAR TO SETTLE THE CONTROVERSY WHICH AROSE

OVER THE WRITING OF THE REGULATIONS UNDER THE LAW. DURING THE COURSE OF THE LEGISLATIVE EFFORT, AN ALMOST ADVERSARIAL RELATIONSHIP HAD DEVELOPED AS BETWEEN THE UNIVERSITIES ON THE ONE HAND AND THE DEPARTMENTS OF ENERGY AND DEFENSE AND NASA ON THE OTHER HAND. THE NATURE OF THAT RELATIONSHIP BECAME VERY CLEAR WHEN THOSE AGENCIES COMBINED TO WRITE REGULATIONS WHICH ACTUALLY CONTROVERTED THE LAW. AS A CONSEQUENCE, MUCH GREATER ATTENTION WAS GIVEN TO THE REGULATIONS BY A UNIVERSITY GROUP WHICH BUILT INTO THE REGULATIONS PROTECTION AGAINST BOTH ARBITRARY EXEMPTIONS TO THE LAW AT AGENCY DISCRETION AND TO THE EXERCISE OF MARCH-IN RIGHTS.

SINCE I WAS HEAVILY INVOLVED IN ALL FACETS OF THIS HISTORICAL PROCESS, THERE IS A CERTAIN NOSTALGIA IN RECAPPING THESE DEVELOPMENTS WITH YOU. HOWEVER, THE EXPERIENCE IS IN KEEPING WITH THE EXPRESSION:

> "ONLY NOSTALGIA COULD FIND ANYTHING NICE ABOUT WALKING BAREFOOT ON A GRAVEL ROAD."

THE ECONOMIC CLIMATE

TO MORE FULLY APPRECIATE WHAT HAS EVOLVED THROUGH THE SEQUENCE OF EVENTS WHICH HAS BEEN ENUMERATED, IT MUST BE KEPT IN MIND THAT THROUGH THIS PERIOD, THE ECONOMY OF THE COUNTRY AS A WHOLE, AS WELL AS THE ECONOMY OF EACH STATE, WAS AND STILL IS IN TRANSITION. TODAY, UNIVERSITIES OPERATE IN AN ECONOMIC CLIMATE WHICH:

(1) IS KNOWLEDGED BASED - NOT CAPITAL BASED (ALTHOUGH, WITHOUT QUESTION, AVAILABILITY OF CAPITAL IS A NECESSITY);

(2) IS ENTREPRENEURIALLY BASED - WITNESS THE LARGE NUMBERS OF NEW COMPANIES CREATED IN RECENT YEARS;

(3) INVOLVES WORLD MARKETS - THE INTERNATIONAL ASPECT OF PROTECTION FOR INTELLECTUAL PROPERTY GENERATED THROUGH THE RESEARCH FUNCTION MUST BE A CONSIDERATION;

(4) REFLECTS CONTINUOUS AND OFTEN RADICAL TECHNOLOGY CHANGES;

(5) IS BECOMING MORE DECENTRALIZED - MAKING STATE AND LOCAL OPTIONS AND INITIATIVES MORE SIGNIFICANT;

(6) IS AN ECONOMY OF APPROPRIATENESS NOT ONE OF SCALE - I.E., MERELY INCREASING THE SIZE OF A PRODUCTION PLANT WILL NOT

NECESSARILY REDUCE THE COST OF PRODUCT OR INCREASE ITS QUALITY;

(7) IS INCREASINGLY COMPETITIVE ON A GLOBAL SCALE - WITNESS THE ADVENT OF THE EUROPEAN ECONOMIC COMMUNITY SCHEDULED TO COME INTO FULL EFFECT IN 1993.

IN VIEW OF THIS CONTINUALLY EVOLVING ECONOMIC CLIMATE, AND SINCE NEW PRODUCTS ARISE FROM NEW FUNDAMENTAL IDEAS AS WELL AS FROM NEW APPLICATIONS OF EXISTING TECHNOLOGY, THE NECESSITY FOR SUPPLYING ADEQUATE SUPPORT FOR RESEARCH IS EVIDENT. HOWEVER, SUPPORT OF RESEARCH IS NOT ENOUGH. THAT SUPPORT MUST BE COUPLED WITH A CREATIVE TECHNOLOGY TRANSFER CAPABILITY. INVENTION WITHOUT INNOVATION HAS LITTLE ECONOMIC VALUE.

WITH THE PASSAGE OF PL 96-517 AND, IN THE SAME YEAR, THE DECISION OF THE SUPREME COURT IN THE CHAKRABARTY CASE, WHICH STOOD FOR THE PROPOSITION THAT MERELY BECAUSE SOMETHING WAS ALIVE (IN THAT CASE A BACTERIUM) IT WAS NOT PRECLUDED FROM BEING PATENTABLE, ALONG WITH THE EVOLUTION OF GENETIC ENGINEERING CONCEPTS, THE UNIVERSITIES WERE LITERALLY PROPELLED INTO AN AWARENESS OF THE POTENTIAL ECONOMIC VALUE OF THE TECHNOLOGY THAT WAS BEING GENERATED BY THEIR RESEARCH PROGRAMS. THAT FACT MADE IT SELF-EVIDENT THAT STEPS

HAD TO BE TAKEN TO MAKE INNOVATION FOLLOW INVENTION SINCE INVENTION ALONE HOLDS LITTLE HOPE FOR GENERATING NEEDED REVENUES TO SUPPORT AN EXPANDING RESEARCH EFFORT. BECAUSE THE GOVERNMENT HAS BEEN AND STILL IS THE PRIMARY SOURCE OF THE FUNDS SUPPORTING THE RESEARCH EFFORT AT UNIVERSITIES, THE PASSAGE OF PL 96-517 PERMITTED THE UNIVERSITIES TO POSITION THEMSELVES, THROUGH THE ESTABLISHMENT OR EXPANSION OF TECHNOLOGY TRANSFER CAPABILITIES, TO BETTER INSURE THAT INNOVATION WOULD FOLLOW INVENTION.

IN MY VIEW, PL 96-517 WAS A LANDMARK PIECE OF LEGISLATION IN THAT, AFTER MANY FALSE STARTS AND UNSUCCESSFUL EFFORTS, IT WAS, FINALLY, A RECOGNITION BY CONGRESS:

(1) THAT IMAGINATION AND CREATIVITY ARE TRULY A NATIONAL RESOURCE;

(2) THAT THE PATENT SYSTEM IS THE VEHICLE WHICH PERMITS US TO DELIVER THAT RESOURCE TO THE PUBLIC;

(3) THAT PLACING THE STEWARDSHIP OF THE RESULTS OF BASIC RESEARCH IN THE HANDS OF UNIVERSITIES AND SMALL BUSINESS IS IN THE PUBLIC INTEREST; AND, SIGNIFICANTLY,

(4) THAT THE EXISTING FEDERAL PATENT POLICY WAS PLACING THE NATION IN PERIL DURING A TIME WHEN INNOVATION WAS BECOMING THE PREFERRED CURRENCY IN FOREIGN AFFAIRS.

BECAUSE OF THE SALUTARY EXPERIENCE WITH PL 96-517, AS REPORTED BY THE COMPTROLLER GENERAL, AND RESPONSIVE TO CONTINUING EFFORTS BY THE UNIVERSITY SECTOR, A SUBSEQUENT BILL WAS PASSED BY CONGRESS WHICH BECAME PL 98-620. THAT LAW REMOVED MANY OF THE RESTRICTIONS WHICH HAD BEEN BUILT INTO PL 96-517 FOR THE PURPOSE OF POLITICAL EXPEDIENCY AND GAVE THE UNIVERSITIES A MUCH FREER REIN IN CONDUCTING TECHNOLOGY TRANSFER.

THE HERITAGE OF PL 96-517

PL 96-517 REPRESENTED THE FIRST CAUTIOUS STEP WITH A NEW RELATIONSHIP BETWEEN THE GOVERNMENT, AS REPRESENTED BY ITS AGENCIES, AND THE UNIVERSITIES. IT ALSO PRESAGED A NEW AND CLOSER RELATIONSHIP WITH INDUSTRY. THE CERTAINTY OF TITLE IN THE UNIVERSITIES TO INVENTIONS MADE WITH GOVERNMENT FUNDS, WHICH WAS SUPPLIED THROUGH PL 96-517, PROVIDED THE MAJOR IMPETUS TO NEW AND EXPANDING UNIVERSITY-INDUSTRY RELATIONSHIPS. INASMUCH AS THE GOVERNMENT ALWAYS RECEIVES AN IRREVOCABLE ROYALTY-FREE LICENSE UNDER ANY OF

SUCH INVENTIONS, AND BECAUSE OF OTHER PROVISIONS OF PL 96-517 AND THE ENSUING REGULATIONS UNDER THAT LAW, THE RELATIONSHIP IS, IN REALITY, A UNIVERSITY-INDUSTRY-GOVERNMENT RELATIONSHIP.

ONE OF THE IMMEDIATE POSITIVE FALL-OUTS RESULTING FROM THE PASSAGE OF PL 96-517 BECAME EVIDENT SHORTLY AFTER THE BILL BECAME LAW FROM A COMMENT MADE BY MY THEN CONGRESSMAN, ROBERT KASTENMEIER, WHO WAS CHAIRMAN OF THE JUDICIARY SUBCOMMITTEE ON COURTS, CIVIL LIBERTIES AND THE ADMINISTRATION OF JUSTICE, A KEY COMMITTEE IN THE LEGISLATIVE PATH OF PL 96-517. HE TOLD ME THAT SINCE NOW, FINALLY, CONGRESS HAD SHOWN AN INTEREST IN INTELLECTUAL PROPERTY LEGISLATION HE INTENDED TO SPONSOR AND INTRODUCE MUCH SUCH NEW LEGISLATION. TIME PROVED HIM TO BE AS GOOD AS HIS WORD. HE ALWAYS LENT A SYMPATHETIC EAR TO THE UNIVERSITY POSITION AND SOUGHT OUT THE ADVICE OF THE UNIVERSITY SECTOR ON MANY NEW PIECES OF LEGISLATION EVEN PRIOR TO THEIR INTRODUCTION.

IMPACT OF PL 96-517

HOW CAN WE TAKE THE MEASURE OF THE PRACTICAL IMPACT OF PL 96-517? SINCE WE ARE DEALING FOR THE MOST PART WITH THE TRANSFER OF TECHNOLOGY FROM A PROTECTED BASE, THE OBVIOUS ANSWER IS TO LOOK

FOR THE CHANGE IN THE NUMBER OF PATENTS WHICH HAVE ISSUED TO UNIVERSITIES SINCE THE PASSAGE OF PL 96-517.

IN 1990 U.S. UNIVERSITIES RECEIVED 2.4 PERCENT OF ALL U.S. ORIGIN PATENTS. THAT IS UP FROM ABOUT 1.0 PERCENT A DECADE EARLIER. THE CHANGES CAN READILY BE SEEN IN FIGURE 1. ASSOCIATED WITH THOSE DATA ARE THE NUMBER OF PATENTS AWARDED TO THE TOP 100 ACADEMIC RESEARCH PERFORMERS (FIGURE 2). IT IS EVIDENT THAT THE LARGEST RESEARCH UNIVERSITIES ACCOUNT FOR A LARGE AND GROWING SHARE OF ALL ACADEMIC PATENTS. AMONG THE TOP 100 ONLY 64 RECEIVED ANY PATENTS DURING THE PERIOD FROM 1969-1975. DURING THE PERIOD FROM 1986-1990, HOWEVER, 89 OF THOSE INSTITUTIONS OBTAINED PATENTS. EVEN MORE SIGNIFICANT IS THE FACT THAT THE NUMBER OF PATENTS ISSUED TO UNIVERSITIES HAS DOUBLED IN THE PAST SIX YEARS TO A TOTAL OF 1,346 IN 1991.

THAT RAPID GROWTH IS READILY EVIDENT FROM FIGURE 3 WHICH ALSO SHOWS THE NUMBER OF PATENTS ISSUED TO THE TOP 10 UNIVERSITIES IN TERMS OF NUMBERS OF PATENTS OBTAINED. THOSE TOP 10 UNIVERSITIES, THE NUMBER OF PATENTS EACH OBTAINED IN 1991 AND THEIR RESPECTIVE R&D SPENDING LEVELS IN 1990 IS SHOWN IN FIGURE 4.

ALTHOUGH THE FOCUS IS GENERALLY ON THE TOP PERFORMERS AMONG UNIVERSITIES AS MEASURED BY R&D EXPENDITURES, IT IS INTERESTING TO NOTE THAT THE TOP 10 IN THE NUMBER OF PATENTS ISSUED ARE NOT NECESSARILY THE TOP 10 IN R&D EXPENDITURES. IT IS TEMPTING TO VIEW PATENTS ISSUED ON A YEAR-TO-YEAR BASIS AS EVIDENCE OF CURRENT ACTIVITY, PARTICULARLY FOR THOSE WHO ARE NOT FAMILIAR WITH THE PATENTING PROCESS, INCLUDING APPLICATION PENDENCY TIMES. OVER THE SHORT TERM THAT KIND OF ASSESSMENT CAN BE VERY MISLEADING. OVER THE LONGER TERM, HOWEVER, FOR EXAMPLE THE 10 YEAR PERIOD SINCE THE PASSAGE OF PL 96-517, IT IS A MORE MEANINGFUL MEASURE. THE LAG TIME INVOLVED AND THE ROLLER-COASTER EFFECT IN USING YEAR-TO-YEAR COMPARISONS IN UTILIZING ISSUED PATENTS AS THE MEASURE OF ACTIVITY IS EVIDENT FROM FIGURES 1 AND 2.

I BELIEVE THAT FIGURE 1 IS HIGHLY SIGNIFICANT IN SHOWING THE INFLUENCE OF THE PASSAGE OF PL 96-517. IT ILLUSTRATES THAT THE UNIVERSITY SECTOR, IN THE PERIOD FROM 1981-1985 WAS GEARING-UP TO EITHER ENGAGE IN OR EXPAND TECHNOLOGY TRANSFER EFFORTS AND THAT THE FRUITS OF THOSE EFFORTS BECAME ABUNDANTLY CLEAR IN THE LARGE INCREASE IN PATENTS ISSUED TO THAT SECTOR IN THE 1986-1990 PERIOD. THAT UPSWING IS READILY EVIDENT FROM FIGURE 5 SHOWING PATENTS ISSUED TO THE 100 INSTITUTIONS WITH THE GREATEST R&D VOLUME.

IN FIGURE 6 I HAVE SELECTIVELY LISTED THE NUMBERS OF PATENTS AWARDED TO U.S. UNIVERSITIES BY PATENT AND TRADEMARK OFFICE TECHNOLOGY CLASS FOR THE PERIOD FROM 1969-1990. THE SELECTION WAS MADE TO SHOW THE CLASSES IN WHICH THE GREATEST ACTIVITY AND INCREASE IN ACTIVITY WAS DISPLAYED. IT CAN READILY BE SEEN THAT THE MOST ACTIVE CLASSES HAVE BEEN IN THE SEVERAL SUBDIVISIONS UNDER THE BROAD CLASS DEFINITION OF "DRUG, BIO-AFFECTING AND BODY TREATING COMPOSITIONS" AND "CHEMISTRY: MOLECULAR BIOLOGY AND MICROBIOLOGY". THE BROAD CLASS DEFINITION "SURGERY" ALSO INDICATES HIGH ACTIVITY. ONE CAN CONCLUDE FROM THAT LIFE-SCIENCE ORIENTATION OF THE CLASSES OF PATENTS THAT THE RESULTS OF GENETIC ENGINEERING RESEARCH IS STRONGLY REPRESENTED, AN AREA OF EXPLOSIVE GROWTH IN ACADEMIA AND THE HERITAGE OF BOTH PL 96-517 AND THE CHAKRABARTY DECISION MENTIONED EARLIER.

A FURTHER REASON FOR THAT LIFE-SCIENCE ORIENTATION IS UNDOUBTEDLY THE RESULT OF THE LARGE SUMS FOR ACADEMIC R&D SUPPLIED BY THE NATIONAL INSTITUTES OF HEALTH (NIH) AND THE NATIONAL SCIENCE FOUNDATION. THOSE TWO AGENCIES SUPPLY THE BULK OF ACADEMIC R&D MONEY. THE PATENT AND LICENSING ACTIVITY ASSOCIATED WITH NIH AND NSF FUNDS FOR THE FISCAL YEARS 1989 AND 1990 IS SHOWN IN FIGURES 6A AND 6B.

THAT IS NOT TO SAY THAT THERE WAS NOT A CONTINUING EFFORT GOING FORWARD TO INCREASE AND DIVERSIFY TECHNOLOGY TRANSFER ACTIVITIES THROUGH THAT 1986-1990 PERIOD AND ALSO TODAY. MOST SIGNIFICANTLY, THAT CONTINUING EFFORT IS EVIDENCED BY THE FACT THAT OF THE TOP 100 R&D PERFORMERS IN 1980 FIFTY-FIVE HAD AT LEAST ONE PATENT ISSUE BUT THAT, OVERALL, BY 1989, 144 DIFFERENT UNIVERSITIES HAD AT LEAST ONE PATENT ISSUED.

THE REAL MEASURE OF TECHNOLOGY TRANSFER IS NOT, OF COURSE, THE NUMBER OF PATENTS WHICH THE UNIVERSITY SECTOR HOLDS, BUT THE AMOUNT OF THE TECHNOLOGY REPRESENTED BY THOSE PATENTS WHICH HAS BEEN TRANSFERRED. WHAT THEN HAS BEEN THE LICENSING EXPERIENCE? A RECENT STUDY OF 35 UNIVERSITIES BY THE GENERAL ACCOUNTING OFFICE (GAO), WHICH WAS DIRECTED TO "CONTROLLING INAPPROPRIATE ACCESS TO FEDERAL FUNDED RESEARCH RESULTS" IS INDICATIVE OF THE PRESENT LEVEL OF ACTIVITY AMONG THOSE 35 UNIVERSITIES. FIGURE 7 SHOWS THE ACTIVITY FOR FISCAL YEARS 1989 AND 1990. NOTE ALSO, AS ILLUSTRATIVE OF THE EXPANDING DIVERSITY OF TECHNOLOGY TRANSFER EFFORTS AND CAPABILITIES, THAT LICENSES GRANTED FOR SOFTWARE AND TANGIBLE RESEARCH PROPERTIES, INCLUDED UNDER THE COLUMN HEADING "OTHER", EXCEED THOSE GRANTED FOR PATENTS. THE $113.1 IN LICENSE INCOME SHOWN IS SUBSTANTIALLY GREATER THAN THE LICENSING INCOME OF ABOUT $30

MILLION WHICH 112 LEADING RESEARCH UNIVERSITIES (INCLUDING ALMOST ALL OF THE 35 SURVEYED FOR THE GAO REPORT) REPORTED TO THE GAO FOR FISCAL 1986. THE PATENT AND LICENSING ACTIVITIES OF THE 35 INDIVIDUAL UNIVERSITIES SURVEYED IS SHOWN IN FIGURE 8.

I, PERSONALLY, BELIEVE THAT ONE OF THE BEST MEASURES OF THE IMPACT OF PL 96-517 IS THE GROWTH OF MEMBERSHIP IN THE ASSOCIATION OF UNIVERSITY TECHNOLOGY MANAGERS (AUTM) AND ITS PREDECESSOR ORGANIZATION SUPA (THE SOCIETY OF UNIVERSITY PATENT ADMINISTRATORS). THAT GROWTH IS SHOWN GRAPHICALLY IN FIGURE 9. HOWEVER, THE NUMBERS ALONE, ALTHOUGH STRONG EVIDENCE OF THE INCREASING INTEREST AND INVOLVEMENT IN THE TECHNOLOGY TRANSFER FUNCTION, DO NOT TELL THE WHOLE STORY. IN ITS EARLY YEARS SUPA ANNUAL MEETINGS WERE CONSIDERED HIGHLY SUCCESSFUL IF ATTENDED BY 75 - 100 PEOPLE. TODAY WE LOOK TOWARD ATTENDANCE IN EXCESS OF 600. ALSO, AS THE OPPORTUNITIES FOR TECHNOLOGY TRANSFER IN THE UNIVERSITY SECTOR EVOLVED UNDER THE UMBRELLA OF PL 96-517 THE LENGTH, DIVERSITY AND SOPHISTICATION OF THE PROGRAMS INCREASED. TODAY, IT IS DIFFICULT TO ACCOMMODATE ALL THE VARIED INTERESTS AND POSITIONS ON THE LEARNING CURVE OF THOSE ATTENDING THE MEETINGS.

WHY THE CONTINUING AND GROWING INTEREST IN TECHNOLOGY TRANSFER BY THE UNIVERSITY SECTOR? THE PRIMARY REASON IS, OF COURSE, THAT MOST RESEARCH AT UNIVERSITIES IS SUPPORTED AT LEAST IN PART BY FEDERAL FUNDS. IN FACT, TODAY IT IS DIFFICULT TO FIND AN INVENTION THAT DOES NOT INVOLVE THE EXPENDITURE OF FEDERAL FUNDS. IN MOST CASES, THEREFORE, THE TERMS AND PROVISIONS OF PL 96-517 AS MODIFIED BY PL 98-620 HOLDS SWAY. THE FUNDAMENTAL PREMISE IN THE EXPENDITURE OF THOSE FUNDS IS THAT THE PUBLIC SHOULD BENEFIT FROM THE RESEARCH IT SUPPORTS. SINCE, MOST OF THE RESEARCH CONDUCTED BY THE UNIVERSITIES WITH THOSE FUNDS IS BASIC IN NATURE, INVENTIONS WHICH ARISE TEND TO BE EMBRYONIC AND REQUIRE FURTHER DEVELOPMENT. PL 96-517 HAS SUPPLIED AND CONTINUES TO SUPPLY THE MECHANISM BY WHICH THAT FURTHER DEVELOPMENT CAN BE ACHIEVED THROUGH PATENTING AND LICENSING THE PRIVATE SECTOR. AT THE SAME TIME UNIVERSITIES, UNDER THAT LAW, HAVE THE INCENTIVE TO ENGAGE IN THAT ACTIVITY BECAUSE OF THE POTENTIAL FOR INCOME FOR THE UNIVERSITY. THERE IS, OF COURSE, THAT MOTIVATION WHICH COMES FROM THE HOPE OF FINDING AMONG THE INVENTION DISCLOSURES WHICH YOU RECEIVE THAT ONCE-IN-A-DECADE INVENTION WHICH TURNS YOUR PROGRAM INTO A GOLD MINE - AT LEAST FOR A FEW YEARS. IT CAN AND HAS HAPPENED BUT, AS I AM SURE YOU ALL KNOW, TECHNOLOGY TRANSFER IS NOT A GET-RICH-QUICK SCHEME.

ALTHOUGH IT IS DIFFICULT TO ESTABLISH A DIRECT NEXUS WITH PL 96-517, I BELIEVE THAT GROWTH OF R&D AT UNIVERSITIES IS, AT LEAST IN PART, ATTRIBUTABLE TO THAT LAW. EVIDENCE IN SUPPORT OF THE CONCLUSION I HAVE DRAWN COMES FROM LOOKING AT THE FUNDING PATTERNS FOR R&D IN ACADEMIA.

IN 1991 AN ESTIMATED $17.2 BILLION WAS SPENT FOR R&D AT U.S. ACADEMIC INSTITUTIONS. THE CHARACTER OF THE WORK AND THE PERFORMER OF THAT WORK IS SHOWN IN FIGURE 10. THAT LEVEL OF EXPENDITURE REPRESENTS A CONTINUING TREND OF AN INCREASING ROLE FOR ACADEMIC PERFORMERS IN TOTAL U.S. R&D.

MEASURED IN TERMS OF CONSTANT 1982 DOLLARS ACADEMIC R&D INCREASED AN ESTIMATED 74.2 PERCENT BETWEEN 1980 AND 1991. BETWEEN 1985 AND 1991 THE ACADEMIC R&D GROWTH WAS MUCH STRONGER FOR THE ACADEMIC SECTION (ESTIMATED AT ABOUT 44 PERCENT) THAN FOR ANY OTHER PERFORMING SECTOR. THIS TENDS TO COMPORT WITH THE LARGE INCREASE IN PATENTS ISSUED TO THE UNIVERSITY SECTOR DURING THAT SAME PERIOD AS SHOWN IN FIGURE 5 DISCUSSED EARLIER. AS A PROPORTION OF THE GROSS NATIONAL PRODUCT (GNP) THE ACADEMIC SHARE ROSE SIGNIFICANTLY OVER THE PAST DECADE, FROM 0.23 TO 0.31 PERCENT.

AS IS EVIDENT FROM FIGURE 10 ACADEMIC R&D ACTIVITIES ARE CONCENTRATED HEAVILY ON BASIC RESEARCH. VERY LITTLE DEVELOPMENT IS DONE. THAT BREAKDOWN IS MORE READILY SEEN IN FIGURE 11. FIGURE 12 SHOWS THE R&D EXPENDITURES OF THE TOP 20 UNIVERSITIES AND COLLEGES BY SOURCE OF FUNDS.

WHAT IS EVEN MORE INTERESTING IS THE SOURCES OF THE FUNDS USED BY ACADEMIA FOR ITS RESEARCH ACTIVITIES. THIS IS SHOWN IN FIGURE 13. AS I AM SURE YOU ALL KNOW, AND AS IS SHOWN BY FIGURES 10 AND 13, THE MAJORITY OF THE FUNDS FOR ACADEMIC R&D ARE PROVIDED BY THE FEDERAL GOVERNMENT. WHAT MAY BE SURPRISING IS THAT THE ACADEMIC INSTITUTIONS THAT PERFORMED THE R&D PROVIDED THE SECOND LARGEST SOURCE OF FUNDS. FROM 1971 TO 1991 THE INSTITUTIONAL SHARE GREW FROM 11 PERCENT TO ABOUT 20 PERCENT. YOU MAY ALSO BE SURPRISED THAT, WHILE INDUSTRY'S SHARE OF SUPPORT HAS RISEN FROM ABOUT 3 PERCENT IN 1971 TO AN ESTIMATED 7 PERCENT IN 1991, THE INSTITUTION'S SUPPORT OF R&D IS ALMOST THREE TIMES THAT OF INDUSTRY. THOSE WHO HOPE THAT AS GOVERNMENT FUNDING SHRINKS INDUSTRY WILL PICK UP THE SLACK ARE ENTERTAINING A FORLORN HOPE INDEED. THE DISPARITY IN THE AMOUNT OF FUNDS SUPPLIED IS MUCH TOO GREAT. IT MUST ALSO BE KEPT IN MIND THAT INDUSTRY PHILOSOPHIES AND GOALS ARE VERY DIFFERENT FROM THAT OF BOTH THE GOVERNMENT AND UNIVERSITIES. I DO FIRMLY BELIEVE, HOWEVER,

THAT INDUSTRY'S INCREASED SUPPORT WAS, AT LEAST IN PART, THE DIRECT RESULT OF PL 96-517 SINCE UNDER THAT LAW THE CERTAINTY OF TITLE TO INVENTIONS IN THE UNIVERSITIES WAS ESTABLISHED.

YOU MAY ALSO FIND INTERESTING THE DIFFERENCE IN SOURCES OF R&D FUNDS AT PUBLIC AND PRIVATE INSTITUTIONS SINCE I ASSUME THAT SOME OF BOTH ARE REPRESENTED HERE TODAY. THOSE DATA APPEAR IN FIGURES 14 AND 15. THE CHANGE IN SUPPORT IN THE DECADE AFTER THE PASSAGE OF PL 96-517 FOR EACH GROUP IS ALSO SHOWN.

FEDERAL TECHNOLOGY

TRANSFER ACT OF 1986

WHAT IS OFTEN OVERLOOKED IS THE FACT THAT PL 96-51 IS THE FIRST PIECE OF LEGISLATION THAT SPECIFICALLY GAVE THE GOVERNMENT THE RIGHT TO OWN PATENTS. PRIOR TO THE PASSAGE OF THAT LAW THE RIGHT TO OWN PATENTS HAD BEEN CONSIDERED AS A NECESSARY ADJUNCT TO PERMIT THE VARIOUS GOVERNMENT AGENCIES TO PERFORM THEIR RESPECTIVE MISSIONS - IT WAS AN IMPLIED RIGHT ONLY. ALSO, IN SITUATIONS WHERE A FEDERAL EMPLOYEE WAS A CO-INVENTOR OF A GIVEN INVENTION WITH A UNIVERSITY SCIENTIST, THE GOVERNMENT COULD ASSIGN ITS RIGHTS IN AND

TO THE INVENTION TO THE UNIVERSITY SUBJECT TO THE TERMS AND PROVISIONS OF PL 96-517.

PL 96-517 IS GIVEN CREDIT FOR FOCUSING CONGRESSIONAL INTEREST ON INTELLECTUAL PROPERTY - ORIENTED LEGISLATION. WITH THAT FOCUS ESTABLISHED THE NEXT TEN YEARS SAW MANY PIECES OF SUCH LEGISLATION INTRODUCED. SOME HAVE BECOME LAW, MOST HAVE NOT. ONE PIECE OF LEGISLATION WHICH COULD BE CONSIDERED TO HAVE BEEN ALMOST DIRECTLY SPAWNED BECAUSE OF OR AS THE RESULT OF PL 96-517 IS THE FEDERAL TECHNOLOGY TRANSFER ACT OF 1986 (FTTA). THAT ACT WAS INTRODUCED AS AN AMENDMENT TO THE STEVENSON-WYDLER ACT OF 1980 WHICH ACT HAD BEEN INTENDED TO PROMOTE THE UTILIZATION OF TECHNOLOGY GENERATED IN GOVERNMENT LABORATORIES, BUT WAS SINGULARLY UNSUCCESSFUL IN ACCOMPLISHING THAT GOAL.

THE FTTA WAS LARGELY A RESPONSE TO THE INCREASINGLY TOUGH INTERNATIONAL COMPETITION FACING THE UNITED STATES AND THE PREVALENT COMPLAINT THAT "THE U.S. WINS NOBEL PRIZES WHILE OTHER COUNTRIES WALK OFF WITH THE MARKET. THE DESIGNERS OF THE FTTA BUILT THE ACT UNDER CERTAIN FUNDAMENTAL PRINCIPLES:

(1) THE FEDERAL GOVERNMENT WILL CONTINUE TO UNDERWRITE THE COST OF MUCH IMPORTANT BASIC RESEARCH IN SCIENTIFICALLY PROMISING AREAS THAT TAKES PLACE IN THE UNITED STATES.

(2) TRANSFERRING THIS RESEARCH FROM THE LABORATORY TO THE MARKETPLACE IS PRIMARILY THE JOB OF THE PRIVATE SECTOR, WITH WHICH THE FEDERAL GOVERNMENT SHOULD NOT COMPETE.

(3) THE FEDERAL GOVERNMENT CAN ENCOURAGE THE PRIVATE SECTOR TO UNDERTAKE THIS BY JUDICIOUS RELIANCE ON MARKET-ORIENTED INCENTIVES AND PROTECTION OF PROPRIETARY INTERESTS.

THE PRINCIPAL POINTS OF THIS ACT ARE SHOWN IN FIGURE 16.

THE PRINCIPLES ENUMERATED WERE FIRST TESTED BY PL 96-517 AND THE FTTA RESPONDED TO THE LESSONS LEARNED FROM THAT LAW, PERHAPS THE MOST IMPORTANT OF WHICH WAS ITS SUCCESS IN PROMOTING UNIVERSITY-INDUSTRY COOPERATION.

THE FTTA IS, CLEARLY, A DIRECT HIGHLY BENEFICIAL LEGACY OF PL 96-517.

THE CURRENT CLIMATE

THE GROWTH OF TECHNOLOGY TRANSFER HAS TAKEN PLACE OVER THE LAST 30 YEARS IN AN ENVIRONMENT THAT HAS BEEN SLOWLY PROGRESSING FROM HOSTILE TO FAVORABLE. THAT PROGRESSION WAS GIVEN MAJOR IMPETUS BY THE PASSAGE OF PL 96-517. DURING THAT PERIOD WE HAVE SEEN A DRAMATIC CHANGE IN THE ATTITUDE OF THE JUSTICE DEPARTMENT AND THE INTERPRETATION OF THE ANTI-TRUST LAWS WHERE PATENTS AND ANTI-TRUST ARE NO LONGER VIEWED AS ANTITHETICAL. WE HAVE SEEN A MOVE TOWARD A FAVORABLE STATUTORY BASIS UNDER WHICH WE HAVE MUCH GREATER FREEDOM TO OPERATE. WE HAVE AN ACTIVE EFFORT ON BEHALF OF THE ADMINISTRATION TO OBTAIN EQUITABLE TREATMENT FOR U.S. CITIZENS IN FOREIGN VENUES, BOTH IN TRADE AND INTELLECTUAL PROPERTY PURSUITS. WE HAVE HAD NUMEROUS AND FAR-REACHING CHANGES IN THE PATENT LAWS OF THOSE FOREIGN VENUES WHICH HAVE PROVIDED GREATER OPPORTUNITIES FOR TECHNOLOGY TRANSFER. WE HAVE HAD THE BENEFIT OF A KNOWLEDGE-ABLE COURT IN THE COURT OF APPEALS FOR THE FEDERAL CIRCUIT WHICH HAS SLAIN MANY OF THE MYTHICAL DRAGONS ATTACHED TO INTELLECTUAL PROPERTY LAW TO PROVIDE UNIFORMITY OF INTERPRETATION OF THOSE LAWS AND BEFORE WHICH WE CAN EXPECT EQUITABLE TREATMENT. WE HAVE OBTAINED THE ATTENTION OF CONGRESS AND, PARTICULARLY, THE ATTENTION IN THAT BODY TO THE UNIVERSITY SECTOR'S PERSPECTIVE ON INTELLECTUAL

PROPERTY LAW ISSUES. WE HAVE SEEN AN EXPANSION OF ALLOWABLE PATENT COVERAGE THROUGH UNILATERAL ACTS OF THE PATENT AND TRADEMARK OFFICE, THROUGH DECISIONS OF THE PATENT AND TRADEMARK OFFICE BOARD OF APPEALS AND THE COURTS, AND WE HAVE SEEN THE INTRODUCTION AND PASSAGE OF LEGISLATION FAVORABLE TO THE UNIVERSITIES AND THEIR TECHNOLOGY TRANSFER EFFORTS. WE HAVE ALSO SEEN DEVELOPED, NOT ONLY IN THE UNIVERSITY SECTOR, BUT IN UNIVERSITY-INDUSTRY RELATIONSHIPS AND UNIVERSITY-INDUSTRY-GOVERNMENT RELATIONSHIPS, A GREATER AWARENESS OF TECHNOLOGY TRANSFER AND A GROWING RECOGNITION OF THE POSSIBILITIES WHICH CAN BE MADE AVAILABLE THROUGH CREATIVE TECHNOLOGY TRANSFER EFFORTS AND A MUCH GREATER SOPHISTICATION IN HANDLING THOSE POSSIBILITIES. TODAY WE OPERATE IN A CLIMATE WHICH IS BETTER THAN IT HAS EVER BEEN. WE WOULD LIKE TO THINK THAT MUCH OF THIS HAS COME ABOUT BECAUSE THE UNIVERSITIES, AS A SOURCE OF FUNDAMENTAL DISCOVERIES AND INVENTIONS, HAVE BEEN THE SOURCE OF ENLIGHTENMENT FOR A RECOGNITION OF THE VALUE OF INNOVATION.

A WORD OF CAUTION, HOWEVER!!! WE WORK IN A VERY UNCERTAIN BUSINESS WHERE, ON THE AVERAGE, IT TAKES IN EXCESS OF 10 YEARS AND HUNDREDS OF THOUSANDS, EVEN MILLIONS, OF DOLLARS TO BRING AN INVENTION TO THE MARKETPLACE. WE MUST ALSO REMEMBER THAT, AS A LICENSOR, WE HAVE VERY LITTLE ACTUAL CONTROL OVER THE PROCESS BY

WHICH AN INVENTION IS BROUGHT TO THE MARKET OR HOW, ULTIMATELY, IT IS MARKETED. WE ARE ALWAYS VULNERABLE TO THE ATTACKS OF SPECIAL INTEREST GROUPS, WHETHER INSIDE OR OUTSIDE GOVERNMENT, WHICH ARE BASED NOT ON FACT BUT ON EMOTION OR WHICH MAY BE WAGED FOR PSYCHOLOGICAL REASONS. AS LONG AS ENVY AND JEALOUSY ARE PART OF THE HUMAN CONDITION SUCH ATTACKS ARE INEVITABLE, ONLY THE INTENSITY WILL RISE AND FALL.

THE EMPHASIS TODAY, AS WELL AS THE BUZZWORD IN WASHINGTON IS "COMPETITIVENESS". WE ARE SEEING MURMURINGS AND EVEN TANGIBLE PROPOSALS TO RESTRICT THE DISSEMINATION OF INFORMATION FROM THE UNIVERSITY SECTOR AND EVEN TO CURTAIL ITS TECHNOLOGY TRANSFER EFFORTS. WE ARE IN THE MIDST OF AN EFFORT BY MANY NATIONS, INCLUDING THE UNITED STATES, TO HARMONIZE THEIR RESPECTIVE PATENT LAWS. IN THIS REGARD, AS AN ITEM OF INTEREST, I HAVE INCLUDED A TABLE, AS FIGURE 17, WHICH SHOWS THE NUMBER OF U.S. PATENTS GRANTED BY NATIONALITY OF INVENTOR. ALSO, WITH RESPECT TO HARMONIZATION WE ARE FACED WITH A RECOMMENDATION FROM THE ADVISORY COMMISSION ON PATENT LAW REFORM WHICH WILL, THROUGH THE PROVISION OF PRIOR USER RIGHTS IN A FIRST-TO-FILE SYSTEM, DISENFRANCHISE THE UNIVERSITIES, AS WELL AS OTHER NON-MANUFACTURING ENTITIES UTILIZING THE PATENT SYSTEM, FROM

EXERCISING THE CONSTITUTIONALLY-BASED RIGHT IN THE PATENTEE TO EXCLUDE OTHERS.

WE HAVE ALREADY PASSED THROUGH AN ERA WHERE SCIENCE WAS BEING MADE SUBSERVIENT TO POLITICS. IN TODAY'S TECHNOLOGICALLY INTENSE ATMOSPHERE, WHERE THE MAXIMUM PROTECTION FOR INTELLECTUAL PROPERTY IS MORE THAN EVER NECESSARY TO PROVIDE PROTECTION FOR THE HEAVY INVESTMENT NECESSARY TO TECHNOLOGY DEVELOPMENT, WE MUST REMAIN ALERT.

EVEN IN THE CURRENT FAVORABLE CLIMATE FOR THE TECHNOLOGY TRANSFER FUNCTION AS THE HERITAGE OF PL 96-517, VIEWS ON THE ISSUES IN THE CONTROL OF INTELLECTUAL PROPERTY, WHETHER BY GOVERNMENT OR SPECIAL INTERESTS, CAN LEND THEMSELVES TO EMOTIONAL MOLDING. OUTSPOKEN CLAIMS TO THE GUARDIANSHIP OF THE PUBLIC INTEREST OR WELFARE IS A RICH FIELD FOR CULTIVATING POLITICAL POWER. WE MUST NEVER FORGET THAT FREEDOM DEMANDS A CONSTANT PRICE.

IN THE STRUGGLE TO OBTAIN THE PASSAGE OF PL 96-517 AND THEN PL 98-620, AS WELL AS ON OTHER PIECES OF PROPOSED LEGISLATION WHICH IMPINGED ON THE UNIVERSITY SECTOR, THE UNIVERSITIES, COLLECTIVELY, SPOKE WITH A LOUD AND SINGLE VOICE. WE MUST CONTINUE TO DO SO IN ALL

CIRCUMSTANCES WHICH THREATEN THE RIGHTS AND OPPORTUNITIES WHICH WE HAVE EARNED OVER MANY YEARS BY DINT OF PERSISTENCE, PATIENCE AND HARD WORK. THIS WILL REQUIRE YOUR ACTIVE AND CONTINUING PARTICIPATION.

TO QUOTE RALPH WALDO EMERSON:

"WHAT LIES BEHIND US AND
WHAT LIES BEFORE US ARE
TINY MATTERS COMPARED TO
WHAT LIES WITHIN US."

Patents Granted to U.S. University and Colleges

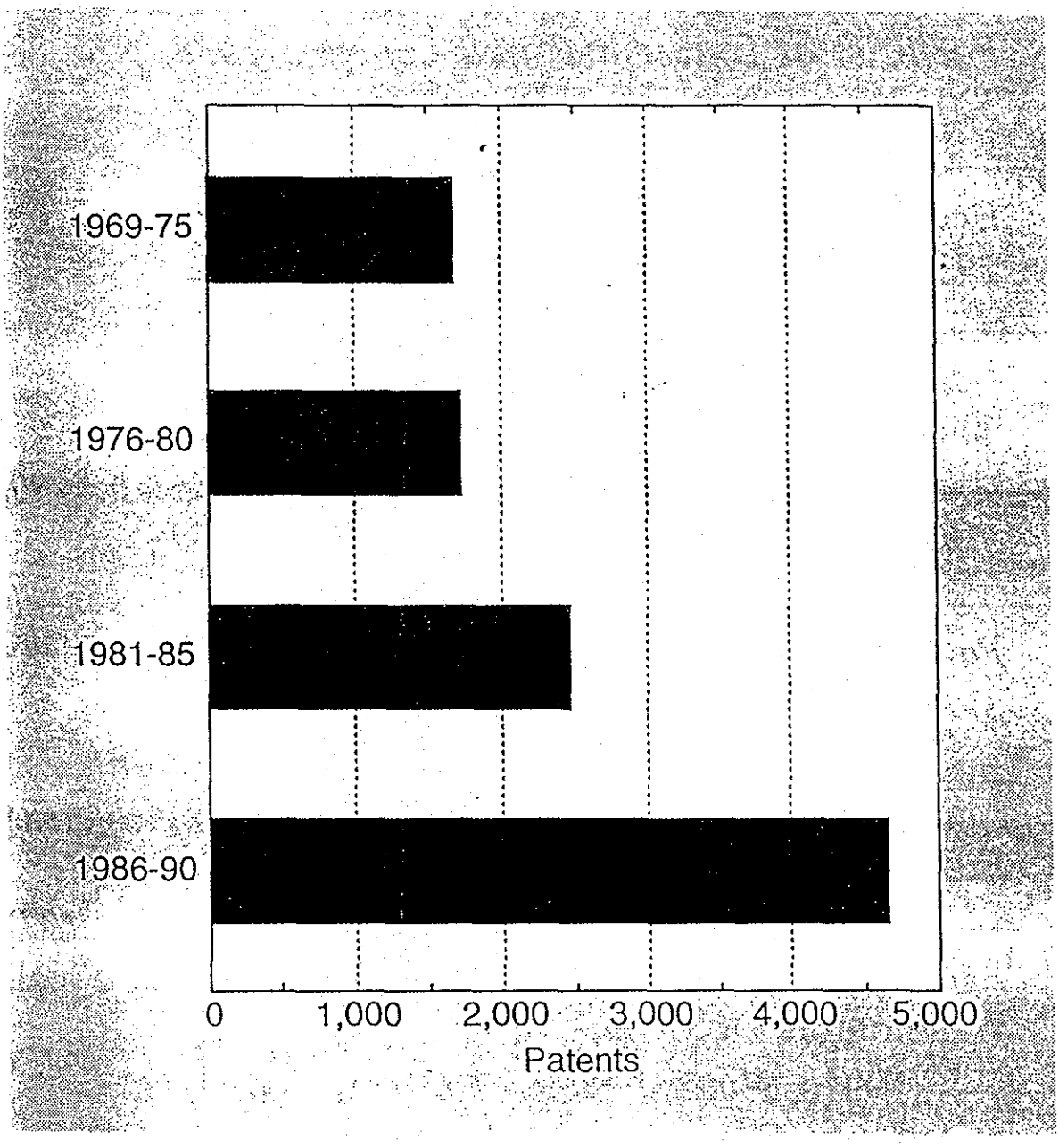


FIGURE #1

Patents Awarded to Top 100 Academic Research Performers

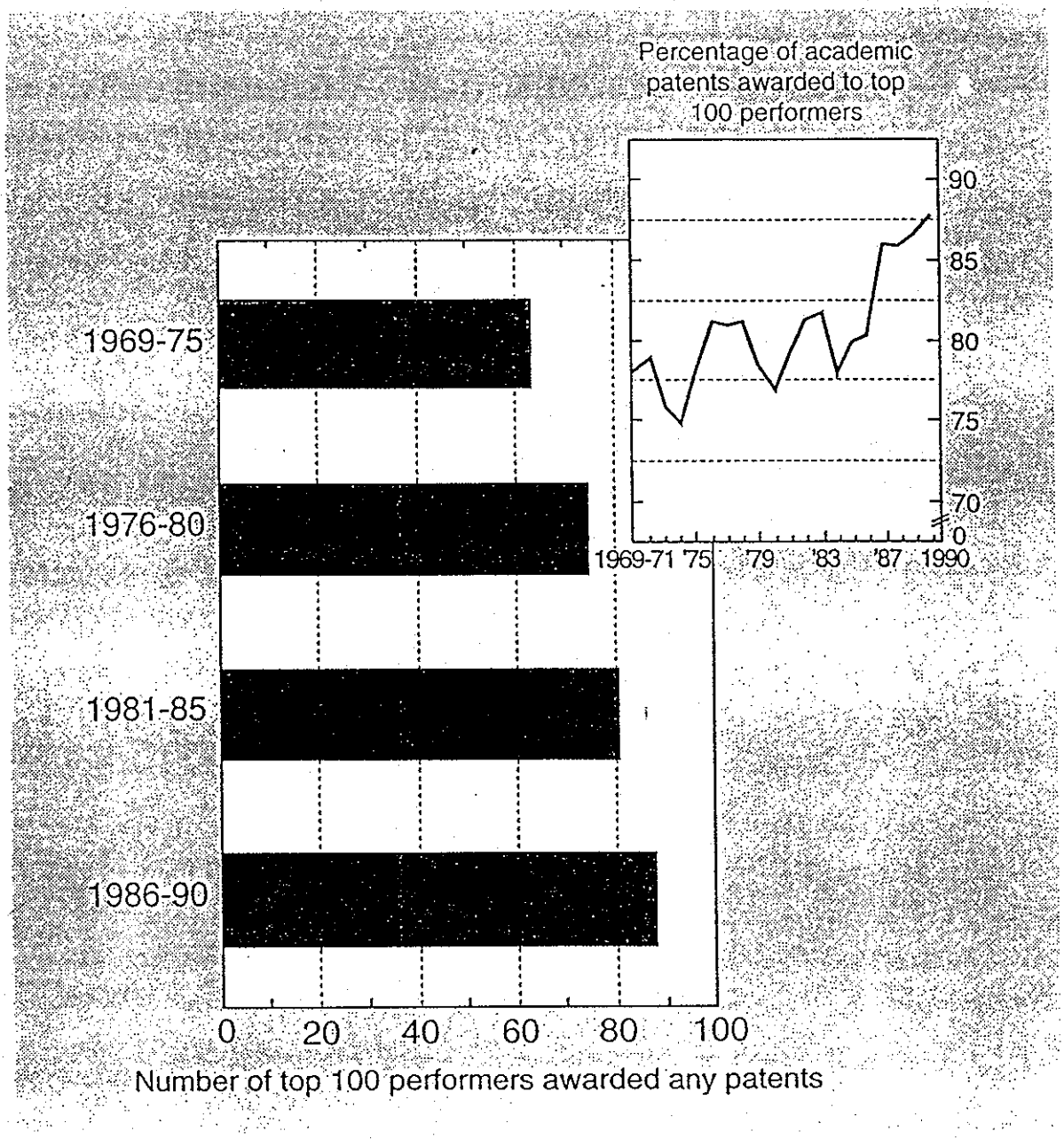


FIGURE #2

Patents to universities doubled in past six years

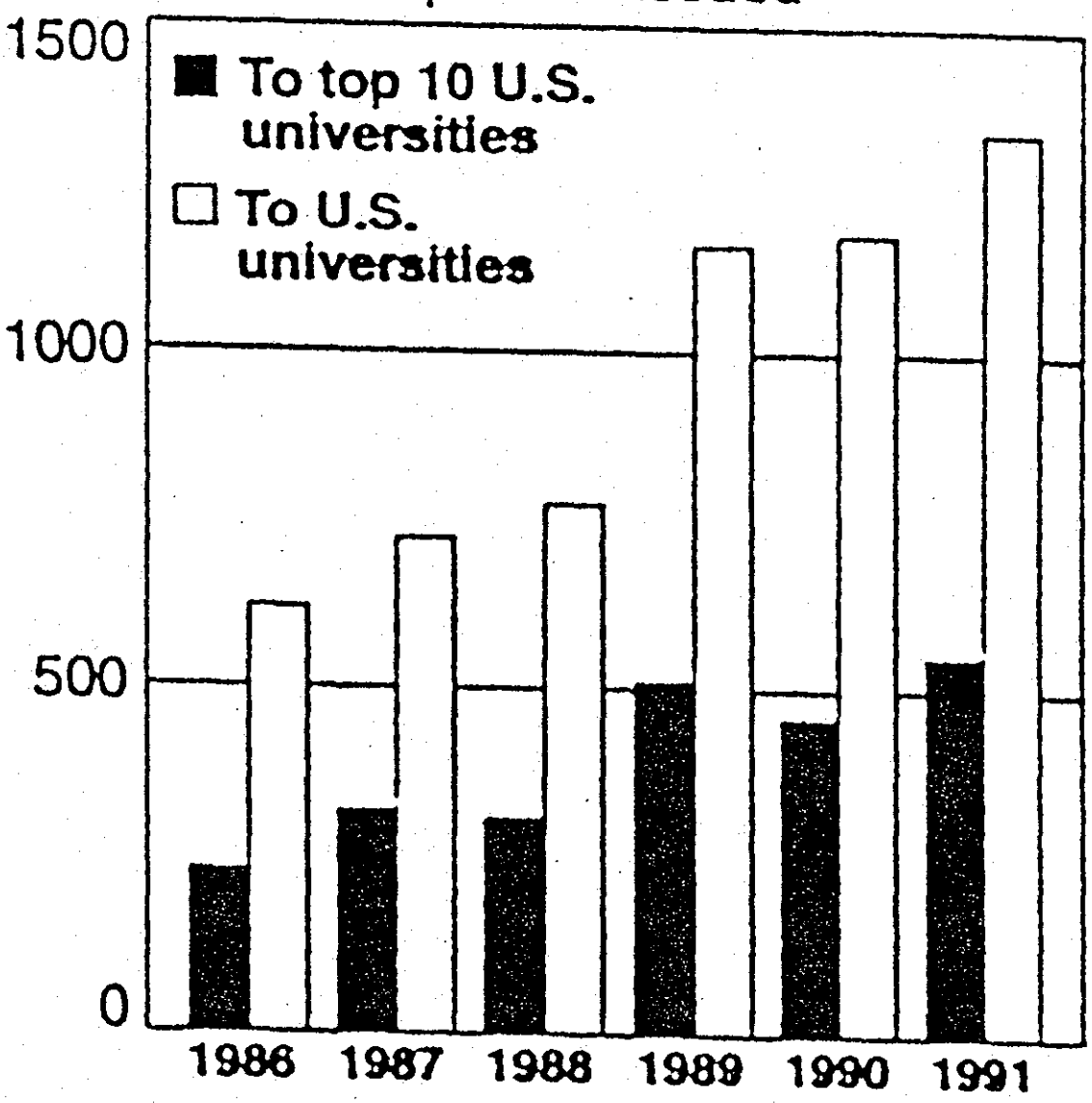


FIGURE #3

MIT Leads in U.S. Patents Awarded to Universities - 1991

	Number of U.S. Patents Issued in 1991	R&D Spending in 1990 ($ Millions)
Massachusetts Inst. of Technology	105	$ 312
University of California	87	1344
University of Texas	83	405
Stanford University	57	306
University of Wisconsin	45	310
University of Florida	44	140
Cornell University	41	300
Iowa State University	38	116
California Institute of Technology	36	106
University of Minnesota	31	292
State University of New York	26	191
Johns Hopkins University	26	669
University of Michigan	22	311

FIGURE #4

Patents Awarded to the 100 Academic Institutions with the Greatest R&D Volume: 1969-1990

(30 Institutions Shown)

	Total 1969-90	1969-71	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
ALL ACADEMIC PATENTS	10,559	630	237	258	249	320	357	363	367	262	390	436	457	433	551	585	670	817	805	1,217	1,155
Patents to top 100 R&D performers	8,399	476	181	189	180	242	281	285	289	199	290	335	360	343	416	453	521	682	671	1,022	984
Massachusetts Institute of Technology	1,109	94	28	40	37	44	59	39	53	43	44	66	51	47	47	35	45	63	63	101	110
University of California	752	59	16	25	22	17	22	25	23	1	2	38	42	48	46	42	54	67	60	81	62
California Institute of Technology	428	29	17	14	15	27	18	16	18	12	26	16	19	16	15	16	23	27	18	56	30
Stanford University	415	3	3	6	7	16	19	18	10	4	11	10	4	16	36	38	33	48	54	43	36
University of Wisconsin	338	15	12	13	8	17	20	25	13	7	28	26	17	13	16	17	17	11	20	27	16
Iowa State University	332	42	11	14	20	15	14	15	12	8	12	12	15	10	14	21	9	15	15	28	30
University of Minnesota	258	15	9	6	4	5	3	5	6	7	6	12	10	5	6	11	16	28	26	40	38
Cornell University	243	11	1	2	3	5	10	10	10	7	11	8	6	10	14	20	13	30	16	22	34
University of Texas	222	0	0	0	0	0	0	1	2	0	1	6	7	5	8	20	25	21	21	51	54
Johns Hopkins University	214	9	7	5	4	10	3	9	10	4	6	9	8	6	10	15	18	18	21	27	15
Purdue University	204	16	10	4	1	13	15	12	6	4	13	15	11	11	14	18	9	4	2	11	15
University of Utah	198	15	8	3	2	5	7	6	12	17	12	7	14	15	9	11	7	12	9	13	14
University of Illinois	189	17	7	8	9	9	14	11	11	6	10	8	7	8	8	10	12	4	9	15	6
Ohio State University	176	38	12	8	3	4	7	9	8	0	3	4	5	8	3	10	5	12	14	13	10
University of Florida	153	0	0	1	1	2	2	0	1	3	7	4	0	6	10	7	10	13	21	33	32
State University of New York	112	0	0	0	0	0	0	0	0	0	1	2	8	2	11	5	11	18	10	25	19
Georgia Institute of Technology	112	6	0	3	5	1	1	2	2	5	3	7	8	3	6	11	9	9	7	8	16
University of Michigan	109	0	0	0	4	0	2	8	2	4	4	1	2	2	1	1	10	6	14	23	25
Harvard University	105	0	0	0	0	0	0	1	2	0	4	3	11	10	7	1	2	9	17	15	23
University of Rochester	100	0	0	0	0	0	4	2	4	0	6	7	8	9	6	2	8	9	11	11	13
University of Southern California	98	0	0	2	3	4	5	6	15	6	7	2	5	1	7	5	5	4	7	8	6
Northwestern University	91	12	0	2	1	0	0	2	7	5	7	1	7	3	2	2	8	10	10	7	5
University of Kentucky	86	8	2	3	6	0	0	1	3	2	5	4	6	6	7	5	7	4	7	6	4
University of Iowa	78	2	0	0	0	0	3	3	2	5	4	4	5	3	4	1	8	8	6	8	12
University of Virginia	78	0	0	1	3	0	3	7	8	6	1	3	8	4	2	1	4	3	4	8	12
University of Pittsburgh	75	0	0	0	0	0	0	0	0	2	6	3	2	5	8	3	8	10	6	11	11
Indiana University	72	24	5	2	0	1	4	4	7	2	2	1	0	3	2	4	0	3	1	6	1
Columbia University	72	0	0	0	0	0	0	0	0	0	0	0	0	2	3	4	7	6	15	19	16
University of Missouri	72	0	0	0	2	3	5	0	6	4	1	2	9	5	4	0	3	8	9	5	6
University of Pennsylvania	71	4	1	2	2	1	2	5	5	3	1	1	1	2	4	5	1	2	1	9	19

FIGURE #5

Patents Awarded to U.S. Universities by Technology Class: 1969-1990

Technology Class		1969-75	1976-80	1981-85	1986-90
73	Measuring and Testing	69	59	71	105
128	Surgery	68	67	110	224
600	Surgery	5	5	11	13
604	Surgery	7	11	36	78
606	Surgery	14	8	21	54
204	Chemistry: electrical and wave energy	41	36	65	92
250	Radiant energy	38	54	46	117
324	Electricity: measuring and testing	30	16	37	129
350	Optics, systems and elements	20	24	42	119
356	Optics, measuring and testing	19	24	31	86
372	Coherent light generators	15	14	27	74
424	Drug, bio-affecting and body treating compositions	52	69	137	261
435	Chemistry: molecular biology and microbiology	58	84	192	446
436	Chemistry: analytical and immunological testing	23	56	72	65
437	Semiconductor device manufacturing process	5	14	26	50
514	Drug, bio-affecting and body treating composition	46	119	225	464
530	Chemistry: peptides or proteins; lignins or reaction products thereof	9	14	79	117

FIGURE #6

Patenting and Licensing of Technology Resulting from NIH or NSF - Funded Research (Fiscal Years 1989 and 1990)

Universities	Patent Applications Filed	Licenses Granted		License Income
		Patents	Other	
All Surveyed	690	329	207	$82.0
Top Five	274	203	156	67.1

Dollars in Millions

FIGURE #6A

Income From Exclusive and Nonexclusive License for NIH or NSF Funded Technology (Fiscal Years 1989 and 1990)

	Licenses Granted		License Income	
Universities	Exclusive	Nonexclusive	Exclusive	Nonexclusive
All Surveyed	197	339	$29.3	$52.7
Top Five	99	263	20.6	50.8

Dollars in Millions

FIGURE #6B

Patenting and Licensing of Technology Resulting From All Sources of Funding (Fiscal Years 1989 and 1990

Universities	Patent Applications Filed	Licenses Granted		License Income
		Patents	Other	
All Surveyed	2,043	731	779	$113.1
Top Five	893	393	481	81.8

Dollars in Millions

FIGURE #7

Individual Universities' Patent and Licensing Activities

Fiscal (989 and (990)

Surveyed university	Invention disclosures	Patent applications filed	Patents received	Licenses granted		License Income
				Patents	Other	
Alabama	95	11	7	9	6	$ 457
California						
Berkeley	96	62	22	9	11	808
Los Angeles	83	47	17	6	1	421
San Diego	72	49	14	7	0	1,009
San Francisco	101	98	37	12	0	11,394
Santa Barbara	30	16	13	1	68	83
California Institute of Technology	61	44	29	9	2	803
Carnegie Mellon	65	15	12	4	5	166
Chicago	86	45	24	10	4	98
Colorado	135	71	17	79	1	3,762
Columbia	109	51	37	12	29	11,540
Cornell	181	141	54	36	30	1,186
Duke	105	49	23	8	14	605
Harvard	165	61	37	37	36	2,568
Illinois	104	25	23	12	58	672
Indiana	47	9	8	10	2	251
Johns Hopkins	141	57	18	8	3	1,059
Maryland	79	16	3	13	5	208
MIT	609	411	200	64	43	5,213
Michigan	162	75	44	2	19	716
Michigan State	64	30	8	10	1	12,053
Minnesota	309	118	83	84	0	2,286
North Carolina	138	39	10	10	4	685
Northwestern	57	20	15	5	3	232
Pittsburgh	51	21	19	4	4	483
Princeton	45	20	19	3	0	157
Purdue	102	40	31	15	56	1,084
Rochester	67	18	30	5	6	442
Southern California	99	30	15	6	40	283
Stanford	311	79	62	120	256	24,786
Washington University	100	52	22	16	27	598
University of Washington	148	38	14	46	24	3,024
Wisconsin	225	125	48	35	0	21,999
Yale	108	50	21	17	14	1,170
Yeshiva	30	10	0	7	7	754
Total	4,380	2,043	1,036	731	779	$113,055

FIGURE #8

AUTM MEMBERSHIP

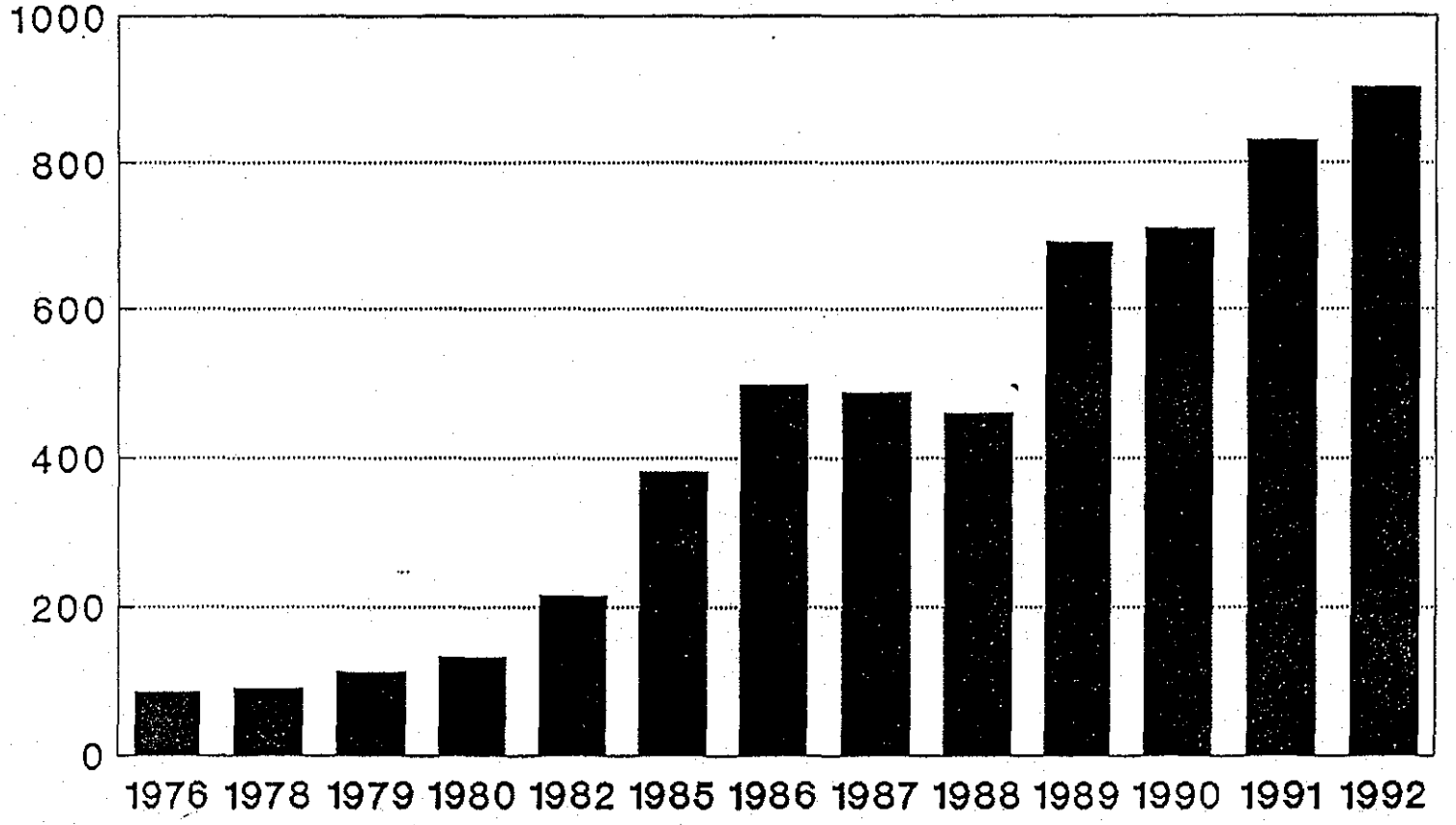


FIGURE #9

National and Academic R&D Expenditures by Character of Work and Performer: 1991

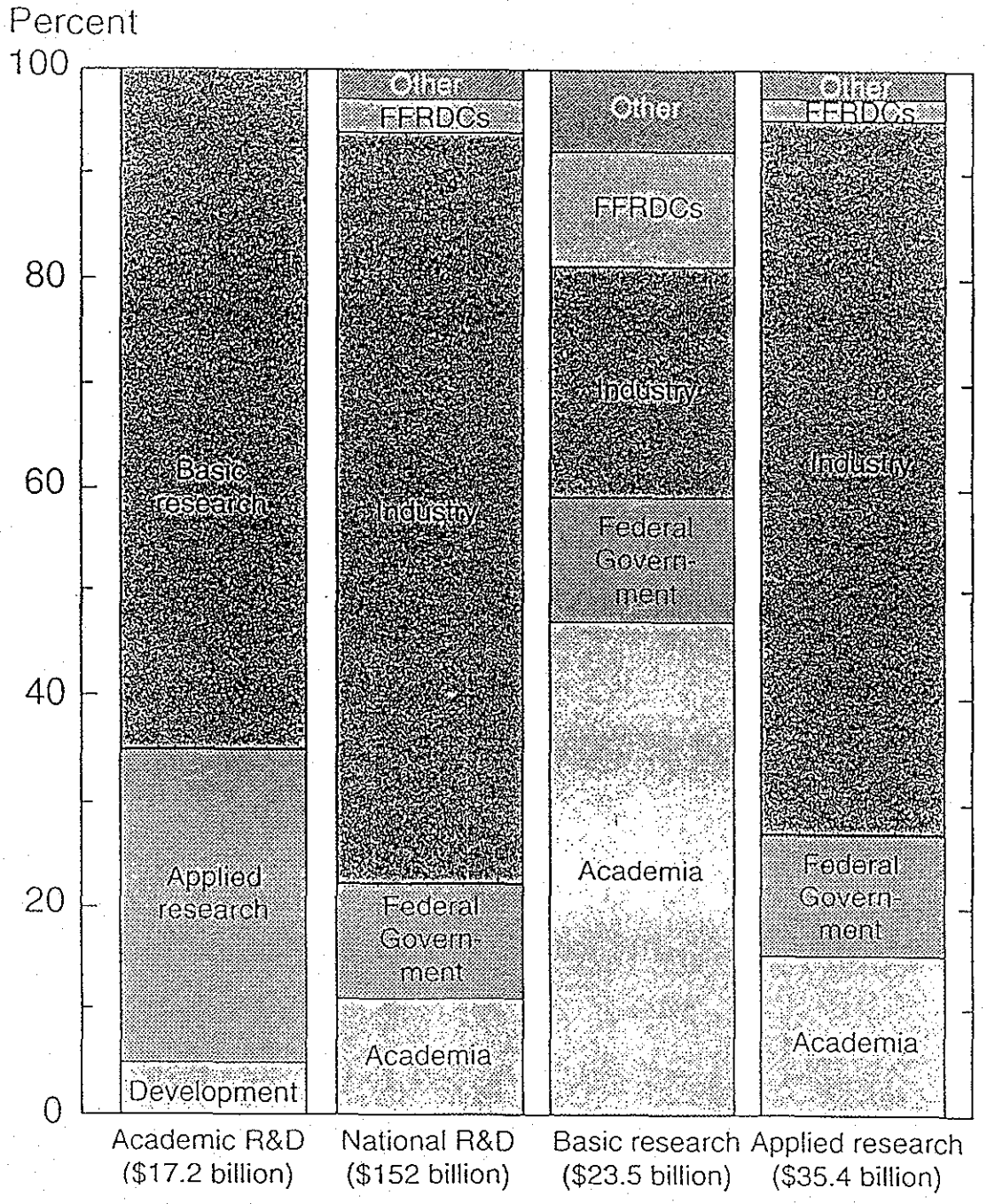
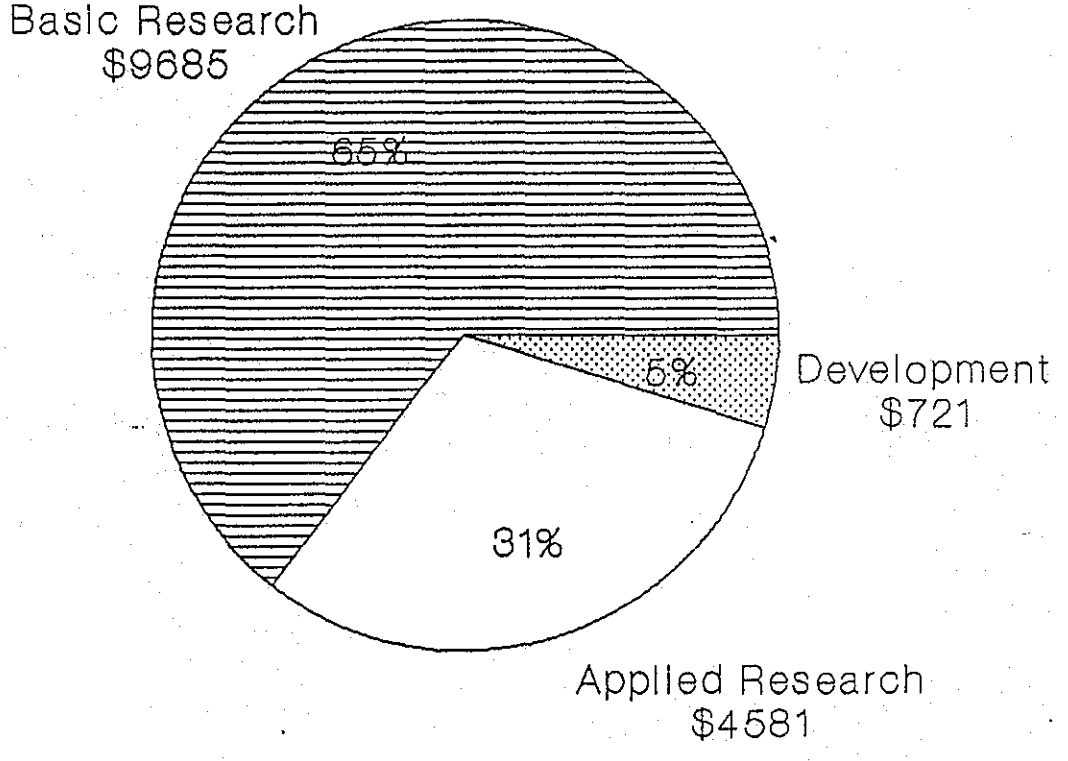


FIGURE #10

Character of University R&D Spending
1989



Millions of Current Dollars

FIGURE #11

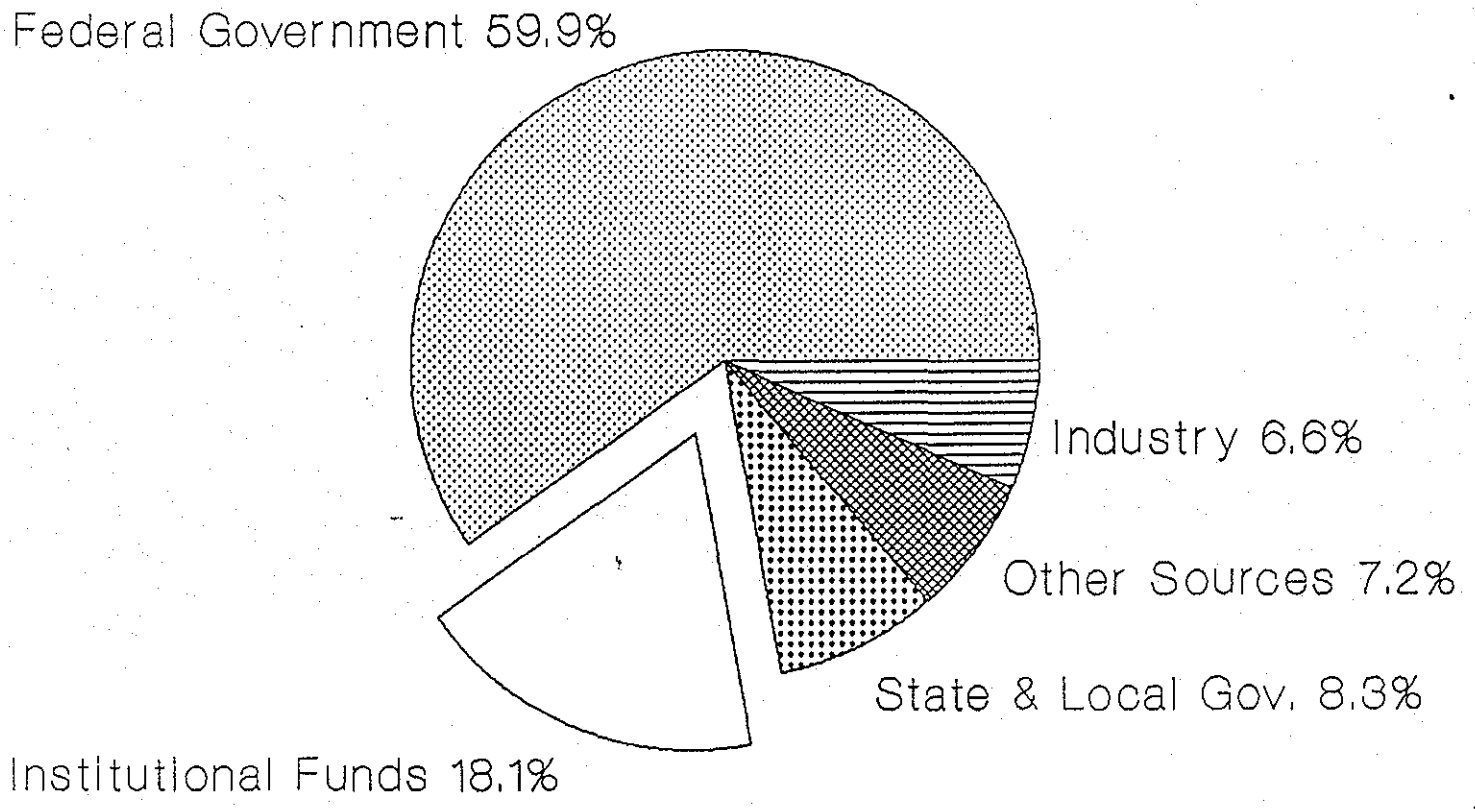
R&D Expenditures at the top 100 University and Colleges, by Source of Funds: 1989

(Top 20 Shown)

Academic institutions' ranking	Institutional category	Total	Federal Gov't	State and local gov't	Industry	Academic institutions	All other sources
		Thousands of dollars					
Total, all institutions[1]		14,556,179	8,550,551	1,238,860	983,574	2,700,657	1,082,539
1 Massachusetts Institute of Technology	Private	287,157	215,140	3,211	39,650	6,692	22,464
2 Cornell University	Private	286,733	157,984	40,405	16,627	49,157	22,560
3 Stanford University	Private	285,994	238,650	392	13,764	14,261	18,927
4 University of Wisconsin-Madison	Public	285,982	169,452	49,054	11,035	37,916	18,525
5 University of Michigan	Public	280,905	174,875	2,533	22,023	61,626	19,848
6 University of Minnesota	Public	258,614	132,880	42,542	12,389	43,713	27,090
7 Texas A & M University-all campuses	Public	250,706	93,584	65,179	21,204	63,053	7,686
8 University of California-Los Angeles	Public	227,828	159,002	3,479	7,548	32,975	24,824
9 University of Washington	Public	221,712	182,453	3,795	19,135	13,181	3,148
10 Pennsylvania State University-all campuses	Public	219,930	114,646	8,907	30,256	66,036	85
Total, 1st 10 institutions		2,605,561	1,638,666	219,497	193,631	388,610	165,157
11 University of California-San Francisco	Public	219,446	159,906	8,770	6,226	24,269	20,275
12 Johns Hopkins University[1]	Private	217,295	168,267	2,087	11,013	17,577	18,351
13 University of California-San Diego	Public	216,991	171,479	3,288	6,824	19,057	16,343
14 University of Illinois-Urbana	Public	210,590	114,398	25,838	15,785	47,336	7,233
15 University of California-Berkeley	Public	209,967	124,371	7,154	8,480	59,984	9,978
16 Harvard University	Private	209,519	143,451	1,135	10,461	16,602	37,870
17 University of Texas-Austin	Public	193,337	94,311	15,724	2,694	64,591	16,017
18 University of California-Davis	Public	180,297	72,718	10,322	8,039	79,601	9,617
19 Georgia Inst. of Technology-all campuses	Public	174,664	98,048	1,093	21,346	54,177	0
20 University of Arizona	Public	174,119	80,533	7,257	9,729	66,070	10,530
Total, 1st 20 institutions		4,611,786	2,866,148	302,165	294,228	837,874	311,371

FIGURE #12

Academic Institutions Fund a Fifth of all Academic R&D



Fiscal 1989 Academic R&D Expenditures = $15 Billion

Source: National Science Foundation

FIGURE #13

Sources of R&D Funds at Public Institutions by Sector: 1980 vs 1989

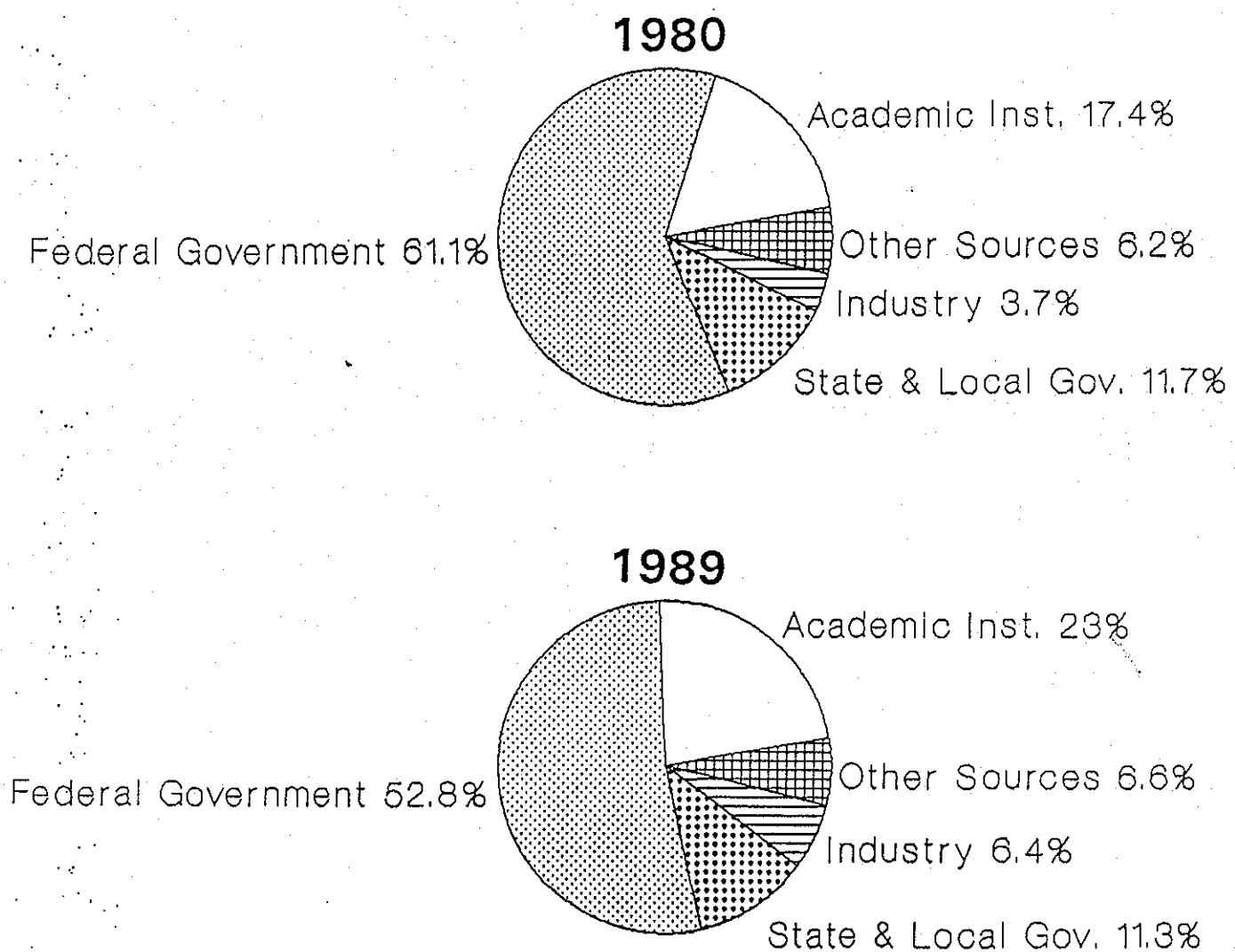


FIGURE #14

Sources of R&D Funds at Private Institutions by Sector: 1980 vs 1989

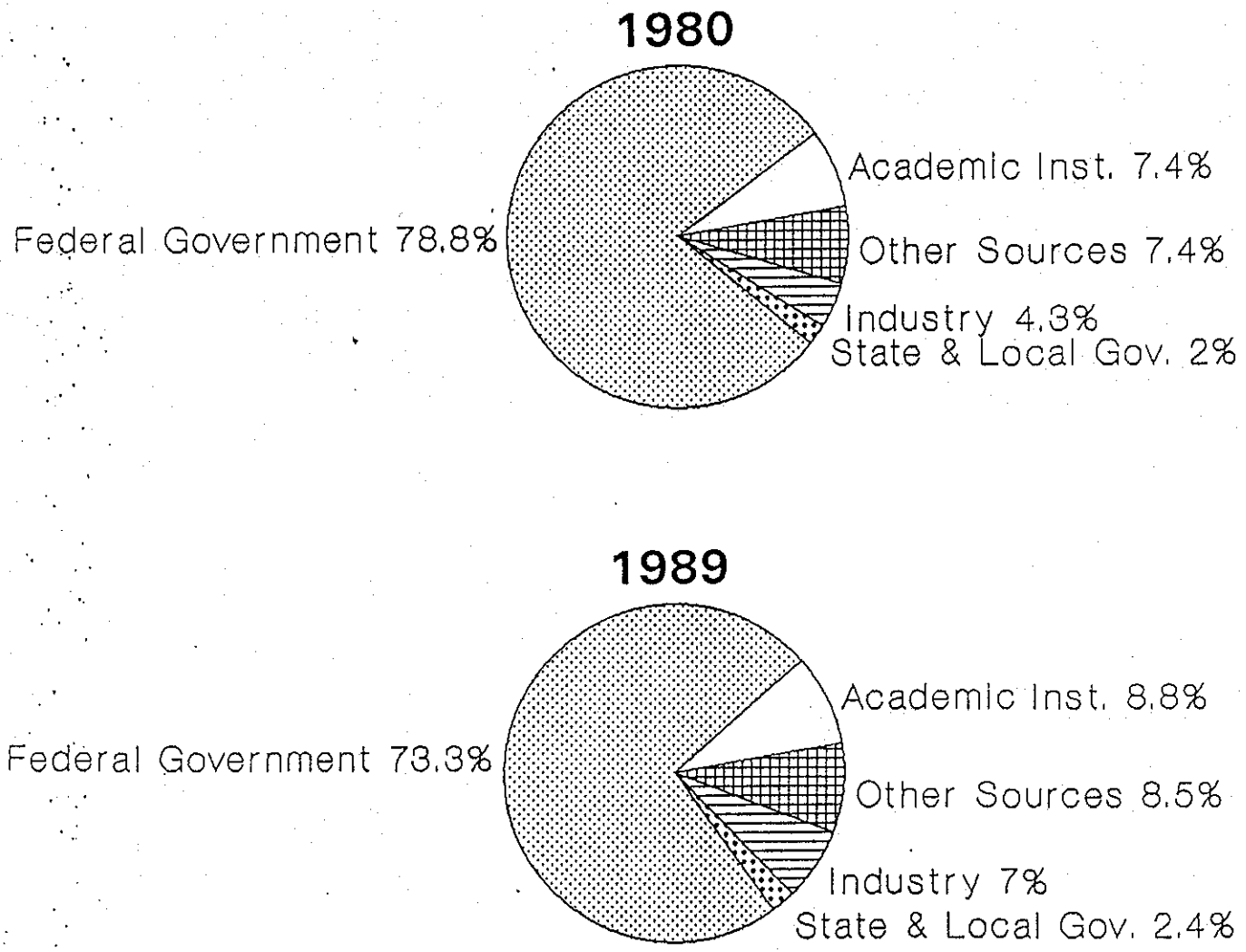


FIGURE #15

Federal Technology Transfer Act of 1986

Principal Points

- Amends the Stevenson-Wydler Act of 1980 (PL 96-480)
- Strengthens Policy Making Technology Transfer Part of Lab Mission
- Lab with More Than 200 S&E Personnel Must Have a Full Time Orta
- Each Agency must Report Annually with Budget Submission
- Establishes the Federal Laboratory Consortium
- Provides Authority for Government Labs to Enter into Cooperative R&D Agreements
- Provides 15% of Royalties to Inventors and the Majority of the Balance to Labs

OFFICE OF RESEARCH AND TECHNOLOGY APPLICATION

FIGURE #16

U.S. Patent Granted by Nationality of Inventor and Year of Grant: 1963-1990

	Total	1963-76	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
TOTAL	1,902,916	924,876	65,263	66,098	48,850	61,810	65,766	57,882	56,855	67,186	71,649	70,778	82,860	77,799	95,262	89,982
U.S. origin	1,227,516	674,289	41,480	41,251	30,076	37,351	39,221	33,891	32,867	38,354	39,549	38,078	43,462	40,416	50,036	47,195
U.S. corporations owned	882,489	486,886	29,561	29,418	21,143	25,963	27,621	24,081	24,037	27,997	28,943	27,305	31,267	29,267	35,717	33,283
U.S. Government owned	38,244	23,268	1,484	1,233	961	1,232	1,116	1,003	1,044	1,229	1,125	1,013	973	728	865	970
U.S. individuals owned	300,270	161,580	10,249	10,399	7,803	9,939	10,240	8,538	7,558	8,881	9,245	9,453	10,853	10,066	12,989	12,477
Foreign owned	6,513	2,555	186	201	169	217	244	269	228	247	236	307	369	355	465	465
Foreign origin	675,400	250,587	23,783	24,847	18,774	24,459	26,545	23,991	23,988	28,832	32,100	32,700	39,398	37,383	45,226	42,787
U.S. owned	53,798	25,013	1,968	1,962	1,364	1,694	1,839	1,715	1,658	2,029	2,268	2,166	2,442	2,146	2,848	2,686
Foreign owned	621,602	225,574	21,815	22,885	17,410	22,765	24,706	22,276	22,330	26,803	29,832	30,534	36,956	35,237	42,378	40,101
Foreign corporations	512,515	175,152	17,880	18,873	14,446	18,662	20,546	18,587	19,020	22,988	25,716	26,223	31,977	30,575	36,937	34,933
Foreign governments	7,667	2,553	215	249	186	253	249	369	336	438	482	477	551	453	443	413
Foreign individuals	101,420	47,869	3,720	3,763	2,778	3,850	3,911	3,320	2,974	3,377	3,634	3,834	4,428	4,209	4,998	4,755
Foreign origin	675,400	250,587	23,783	24,847	18,774	24,459	26,545	23,991	23,988	28,832	32,100	32,700	39,398	37,383	45,226	42,787
European Community	337,183	149,763	12,316	12,646	9,538	12,198	12,934	11,346	10,937	12,729	13,826	13,877	16,246	15,080	17,684	16,063
Japan	203,580	43,481	6,217	6,910	5,250	7,124	8,387	8,149	8,792	11,109	12,743	13,198	16,539	16,137	20,100	19,444
West Germany	152,706	63,310	5,537	5,850	4,527	5,745	6,250	5,408	5,423	6,254	6,665	6,795	7,815	7,300	8,286	7,541
United Kingdom	73,534	38,901	2,654	2,722	1,910	2,406	2,475	2,134	1,931	2,271	2,495	2,408	2,777	2,581	3,091	2,778
France	57,500	25,094	2,108	2,119	1,604	2,088	2,181	1,975	1,895	2,162	2,398	2,365	2,868	2,655	3,134	2,854
Switzerland	32,935	14,679	1,219	1,226	862	1,081	1,135	990	1,000	1,206	1,340	1,311	1,593	1,488	1,957	1,848
Canada	32,628	15,388	1,346	1,330	1,025	1,265	1,239	1,147	1,017	1,174	1,233	1,208	1,373	1,244	1,358	1,281
Sweden	20,835	8,179	756	725	596	805	883	752	625	794	919	995	1,183	1,075	1,291	1,257
Italy	20,422	9,500	862	826	573	822	766	685	623	701	857	883	948	776	834	766
The Netherlands	18,283	7,902	708	659	525	654	641	618	626	726	766	721	921	805	1,060	951
Belgium	6,869	3,242	255	264	185	244	263	224	205	240	240	242	294	302	357	312
USSR	6,580	3,128	394	412	354	460	373	209	222	214	147	116	121	96	160	174
Hungary	1,909	505	80	66	63	87	98	112	106	111	108	131	127	94	129	92
East Germany	690	53	26	24	19	35	52	59	54	68	53	53	64	46	50	34
Taiwan	3,072	52	52	29	38	65	80	88	65	98	174	208	343	457	592	731
South Korea	807	51	5	12	4	8	15	14	26	29	38	45	84	95	157	224
Hong Kong	527	139	9	21	13	27	33	18	14	24	25	30	34	41	47	52

SOURCE: Patent and Trademark Office, *Patenting Trends in the United States, 1963-1989* (Washington, DC: August 1990).

FIGURE #17

TEN YEARS AFTER PL 96-517

UNLIKE BOTTICELLI'S FAMOUS PAINTING "THE BIRTH OF VENUS", WHERE VENUS ARISES FULL BLOWN FROM A SEASHELL, PL 96-517 ENJOYED NO SUCH INSTANTANEOUS AND SPECTACULAR BIRTH. RATHER THAT LAW WAS THE CULMINATION OF A LONG, SLOW, FRUSTRATING AND TEDIOUS PROCESS.

WHILE, I AM SURE, MOST OF YOU ARE FAMILIAR WITH PL 96-517 SINCE IT WAS THE PRIMARY KEY WHICH UNLOCKED TODAY'S EXTENSIVE TECHNOLOGY TRANSFER EFFORTS IN THE UNIVERSITY SECTOR, I AM JUST AS SURE THAT MOST OF YOU ARE UNFAMILIAR WITH ITS CREATION. IN KEEPING WITH THE CAPTION WHICH APPEARS ON THE FRONT OF THE NATIONAL ARCHIVES IN WASHINGTON:

"THE HERITAGE OF THE PAST
IS THE SEED THAT BRINGS
FORTH THE HARVEST OF THE
FUTURE"

IT SEEMS APPROPRIATE TO GIVE YOU AN HISTORICAL PERSPECTIVE OF PL 96-517, ITS ORIGIN, ITS FUNCTION, AND ITS GROWTH, THROUGH BOTH VOLUNTARY ACTS AND LEGISLATION. WITH THAT AS A PROLOGUE TO A CURRENT PERSPECTIVE OF THE LAW AND ITS IMPACT, YOU WILL BE ABLE TO MORE

FULLY APPRECIATE WHAT A TRULY SEMINAL PIECE OF LEGISLATION THAT LAW WAS.

PLEASE KEEP IN MIND THAT WHEN I SPEAK OF TECHNOLOGY TRANSFER TODAY, I AM NOT SPEAKING OF THE INFORMATIONAL TRANSFER THAT OCCURS THROUGH PUBLICATIONS IN SCIENTIFIC OR OTHER JOURNALS OR THROUGH CONSULTING OR EQUIVALENT RELATIONSHIPS THAT ARE THE NORM IN THE UNIVERSITY SECTOR. RATHER, I AM SPEAKING OF THE TRANSFER OF A PROPERTY RIGHT, USUALLY THROUGH A LICENSING ARRANGEMENT.

ORIGINS

THE CONCEPT THAT "INTELLECTUAL PROPERTY" - THE PRODUCTS OF THE MIND - HAD A VALUE AS PROPERTY AROSE DURING THE FRAMING OF THE U.S. CONSTITUTION. IT GREW OUT OF EXTENSIVE THOUGHT AND CORRESPONDENCE BETWEEN JAMES MADISON, THE PRIMARY ARCHITECT OF THE CONSTITUTION, AND THOMAS JEFFERSON. IT WAS CONSIDERED BY MADISON IMPORTANT ENOUGH TO BE TREATED SEPARATELY IN THE CONSTITUTION AND NOT MERELY INCLUDED IN WITH GENERAL PROPERTY RIGHT PROVISION. THE TECHNOLOGY TRANSFER FUNCTION IS, OF COURSE, BASED UPON THE RECOGNITION OF AND THE SPECIFIC PROVISION FOR THAT VERY SPECIAL PROPERTY RIGHT.

NATURE OF UNIVERSITY RESEARCH

DURING THE PREVALENCE OF THE "IVORY TOWER" CONCEPT OF UNIVERSITIES AND THE RESEARCH THAT WAS CARRIED OUT IN THEM, LITTLE THOUGH OR IMPETUS WAS GIVEN TO THE TRANSFER OF THE RESULTS OF THAT RESEARCH TO THE PUBLIC OTHER THAN THROUGH THE ACCEPTED AND ACCEPTABLE ROUTE OF SCIENTIFIC PUBLICATION. IN FACT, UNDER THAT "IVORY TOWER" CONCEPT, A RESEARCHER WHO ACCEPTED A CORPORATE SUBSIDY AROUSED THE SUSPICION AMONG HIS COLLEAGUES THAT HE HAD BEEN DIVERTED FROM HIS BASIC RESEARCH AND HAD BECOME A TOOL OF VESTED INTERESTS. HE HAD ACCEPTED "TAINTED MONEY".

WHEN, IN 1924, IT WAS SUGGESTED AT THE UNIVERSITY OF WISCONSIN THAT A PLAN BE DEVELOPED TO MAKE USE OF PATENTABLE INVENTIONS GENERATED BY FACULTY MEMBERS WHICH WOULD:

(1) PROTECT THE INDIVIDUAL TAKING OUT THE PATENT;

(2) INSURE PROPER USE OF THE PATENT; AND, AT THE SAME TIME;

(3) BRING FINANCIAL HELP TO THE UNIVERSITY TO FURTHER ITS RESEARCH EFFORT,

THE PURISTS QUICKLY APPLIED THE "TAINTED MONEY" THEORY TO THE PLAN. IT WAS FEARED THAT ANY SUCH ARRANGEMENT WOULD DIVERT THE SCIENTIST

FROM BASIC RESEARCH TO WORK ONLY ON THOSE IDEAS WHICH APPEARED TO HAVE COMMERCIAL POTENTIAL. IN OTHER WORDS, THE RESEARCH FUNCTION WOULD NO LONGER BE DRIVEN BY THE SEEKING OF NEW KNOWLEDGE BUT BY THE DOLLAR-DRIVEN NEED TO SOLVE CURRENT PROBLEMS IN THE REAL WORLD, EVEN TO THE DEVELOPMENT OF PRODUCTS AND PROCESSES TO MARKET-READY CONDITION.

THE FEARS PROPOUNDED BY THE PURISTS THEN, AND WHICH ARE STILL EMBRACED AMONG ACADEMIA BY SOME, DID NOT MATERIALIZE. THERE WAS NO GREAT RUSH TOWARD PATENTING. THERE WAS NO EVIDENT MOVEMENT AMONG UNIVERSITY RESEARCHERS TOWARD APPLIED RESEARCH TIED DIRECTLY TO ACTUAL PRODUCT DEVELOPMENT. NOR WAS THERE ANY OBSERVABLE CHANGE IN THE RESEARCH SCIENTISTS' ATTITUDE. IN FACT, UNIVERSITY RESEARCH THEN, EVEN AS NOW, REMAINED ESSENTIALLY BASIC IN CHARACTER.

THE GENERATION OF INVENTIONS IS ALMOST NEVER THE MAIN OBJECTIVE OF BASIC RESEARCH. IF INVENTIONS DO FLOW FROM THAT RESEARCH ACTIVITY, IT IS A LARGELY FORTUITOUS HAPPENING THAT TAKES PLACE BECAUSE THE RESEARCHER, OR, PERHAPS, AN ASSOCIATE, HAS THE ABILITY TO SEE SOME SPECIAL RELATIONSHIP BETWEEN HIS SCHOLARLY WORK PRODUCT AND THE PUBLIC NEED. IT IS FROM THE RECOGNITION OF THIS CONNECTION,

WHICH CAN CONVERT A DISCOVERY OR INVENTION INTO PATENTABLE INVENTION, THAT INNOVATION ARISES.

A SHORT 15 TO 20 YEARS AGO THE TERM "INTELLECTUAL PROPERTY", IF IT WAS KNOWN AT ALL, WOULD HAVE BEEN VIEWED IN ACADEME AS ALIEN AND, IF KNOWN, UNWELCOME. HOWEVER, AT THAT TIME, AND EVEN MUCH EARLIER, A NUMBER OF UNIVERSITIES WERE ENGAGED IN PATENTING AND LICENSING INTELLECTUAL PROPERTY GENERATED ON THEIR RESPECTIVE CAMPUSES WITH THE ATTENDANT OPPORTUNITY TO GENERATE FUNDS TO AID IN SUPPORTING THE RESEARCH FUNCTION. PROMINENT AMONG SUCH INSTITUTIONS WERE THE UNIVERSITY OF CALIFORNIA, IOWA STATE UNIVERSITY, BATTELLE DEVELOPMENT CORPORATION, RESEARCH CORPORATION, WHICH REPRESENTED A NUMBER OF UNIVERSITIES AND THE UNIVERSITY OF WISCONSIN THROUGH ITS PATENT MANAGEMENT ORGANIZATION THE WISCONSIN ALUMNI RESEARCH FOUNDATION.

THE GOVERNMENT VECTOR

DURING THE EARLY HISTORY OF THE UNITED STATES, VERY LITTLE TECHNICAL DEVELOPMENT WORK WAS DONE BY THE GOVERNMENT AND, THEREFORE, AS A PRACTICAL MATTER, THE QUESTION OF THE GOVERNMENT OWNING A PATENT NEVER AROSE. GRADUALLY, FEDERAL AGENCIES BEGAN TO

UNDERTAKE THE PRACTICAL KIND OF DEVELOPMENT WORK WHICH LED TO INVENTIONS. SINCE, PRIOR TO WORLD WAR II, ALMOST ALL GOVERNMENT-FINANCED RESEARCH AND DEVELOPMENT WORK WAS CONDUCTED IN FEDERAL LABORATORIES BY FULL-TIME GOVERNMENT EMPLOYEES, THERE WAS A SMALL, BUT RECURRING, PROBLEM OF WHAT TO DO WITH INVENTIONS RESULTING FROM SUCH WORK - INVENTIONS WHICH, IF MADE BY PRIVATE PARTIES, WOULD HAVE BECOME THE SUBJECT OF PATENT APPLICATIONS.

THIS SITUATION CHANGED RAPIDLY DURING AND AFTER WORLD WAR II WHEN THE TECHNOLOGICAL BURDENS IMPOSED BY MORE AND MORE SOPHISTICATED MILITARY REQUIREMENTS, AS WELL AS THE INCREASING COMPLEXITY OF SUPPORT SERVICES, MADE IT QUICKLY EVIDENT THAT THERE WERE NOT SUFFICIENT RESOURCES WITHIN THE GOVERNMENT ITSELF TO UNDERTAKE ALL THE SCIENTIFIC PROJECTS NECESSARY TO A WINNING WAR EFFORT. THE ABSOLUTE NECESSITY TO UTILIZE THE BEST TECHNICAL ABILITY AVAILABLE, REGARDLESS OF ITS LOCUS, SPAWNED A RAPID PROLIFERATION OF GOVERNMENT-SPONSORED-AND-FUNDED RESEARCH AND DEVELOPMENT.

THE PROPER DISPOSITION OF RIGHTS TO PATENTS RESULTING FROM THIS WORK WAS THEORETICALLY AS IMPORTANT THEN AS NOW BUT WAS NEVER SERIOUSLY ADDRESSED AS A MAJOR PROBLEM BECAUSE OF THE EXIGENCIES OF WARTIME NEEDS.

POST WORLD WAR II, THE RAPID TECHNOLOGICAL STRIDES MADE UNDER THE IMPETUS OF A WARTIME FOOTING AND THE OBVIOUS NECESSITY FOR CONTINUING TECHNOLOGICAL SUPERIORITY, AT LEAST IN DEFENSE-ORIENTED EFFORTS, MADE IT IMPERATIVE FOR THE GOVERNMENT TO CONTINUE TO PROVIDE SUPPORT FOR SCIENCE. NOR WAS THAT SUPPORT LIMITED TO MILITARY-ORIENTED EFFORT. FOR EXAMPLE, IN 1950 CONGRESS FINALLY APPROVED AN ANNUAL BUDGET OF $15 MILLION FOR THE NATIONAL SCIENCE FOUNDATION TO CONDUCT BASIC SCIENTIFIC RESEARCH AT UNIVERSITIES.

DURING THE SAME PERIOD, HUNDREDS OF MILLIONS OF DOLLARS WERE APPROPRIATED BY THE GOVERNMENT FOR MEDICAL RESEARCH AS THE BEGINNING OF AN ALL-OUT ATTACK ON DISEASE.

WITH THE RAPID EXPANSION OF SCIENTIFIC PROJECTS BEING UNDERTAKEN AND SUPPORTED BY THE GOVERNMENT, THE SAME SHORTAGE OF TECHNICAL ABILITY AND FACILITIES PREVALENT UNDER THE PRESSURES OF WORLD WAR II WAS AGAIN IN EVIDENCE. SINCE, AGAIN, THE GOVERNMENT COULD NOT, IN ITS OWN FACILITIES, DO ALL THE NECESSARY WORK, IT SOUGHT OUT QUALIFIED PRIVATE COMPANIES, UNIVERSITIES AND NON-PROFIT ORGANIZATIONS TO PERFORM MUCH OF THE RESEARCH AND DEVELOPMENT UNDER CONTRACTUAL ARRANGEMENTS. IN SUCH ARRANGEMENTS THE SAME OLD PROBLEM OF OWNERSHIP OF RIGHTS IN INTELLECTUAL PROPERTY WAS PRESENT

BUT WAS SELDOM, IF EVER, DIRECTLY ADDRESSED. IN THE CASE OF UNIVERSITIES AND NON-PROFIT ORGANIZATIONS, FEW WERE ENGAGED IN PATENTING THE RESULT OF RESEARCH AND IN TECHNOLOGY TRANSFER ACTIVITIES. SINCE THE MONEY FROM THE GOVERNMENT WAS READILY AVAILABLE AND FLOWING FREELY, THE PREVAILING ATTITUDE WAS TO "TAKE THE MONEY AND RUN".

THE GOVERNMENT ITSELF HAD NOT DEVELOPED ANY SINGLE OR OVERRIDING POLICY REGARDING THE DISPOSITION OF THE RIGHTS IN INTELLECTUAL PROPERTY. AS A CONSEQUENCE, EACH GOVERNMENTAL AGENCY WHICH SUPPORTED A RESEARCH AND/OR DEVELOPMENT EFFORT, THROUGH EITHER OR BOTH OF CONTRACTUAL OR GRANT ARRANGEMENTS, DEVELOPED ITS OWN POLICY. THE ULTIMATE RESULT WAS THAT PRIOR TO THE PASSAGE OF PL 96-517 SOME 26 DIFFERENT AGENCY POLICIES WERE IN PLACE. OFTEN, BECAUSE OF CO-MINGLED FUNDS IN MANY UNIVERSITY RESEARCH PROJECTS, MORE THAN ONE AGENCY POLICY HAD TO BE CONSIDERED AND THE MOST RESTRICTIVE POLICY ALWAYS CONTROLLED.

GOVERNMENT POLICY - MOVE TOWARDS UNIFORMITY

AN EFFORT TO EFFECT A MORE UNIFORM GOVERNMENT POLICY TOWARD INVENTIONS AND PATENTS ON A GOVERNMENT WIDE BASIS, WAS MADE IN 1963 BY JEROME WEISNER, PRESIDENT KENNEDY'S SCIENCE ADVISOR. THIS EFFORT

WAS FOLLOWED IN 1971 BY THE ISSUANCE OF A REVISED STATEMENT OF GOVERNMENT PATENT POLICY BY PRESIDENT NIXON. THE FUNDAMENTAL THRUST OF THAT STATEMENT WAS:

> A SINGLE PRESUMPTION OF OWNERSHIP OF PATENT RIGHTS TO GOVERNMENT-SPONSORED INVENTIONS EITHER IN THE GOVERNMENT OR ITS CONTRACTORS IS NOT A SATISFACTORY BASIS FOR GOVERNMENT PATENT POLICY AND, THAT A FLEXIBLE, GOVERNMENT-WIDE POLICY BEST SERVES THE PUBLIC INTEREST.

THEN, DURING THE PERIOD FROM 1963 TO 1971, WHILE EXPERIENCE WITH THE WEISNER-KENNEDY EFFORT WAS BEING GAINED, FURTHER EFFORTS WERE BEING MADE TO PERSUADE SEVERAL FEDERAL AGENCIES, SPECIFICALLY, THE DEPARTMENT OF HEALTH, EDUCATION AND WELFARE AND THE NATIONAL SCIENCE FOUNDATION, TO ENTER INTO INSTITUTIONAL PATENT AGREEMENTS (THE I.P.A.). THE POLICIES OF BOTH OF THESE AGENCIES PERMITTED A WAIVER OF RIGHTS TO THE INVENTIONS MADE WITH THEIR FUNDS. HOWEVER, ON THE VERY FEW OCCASIONS WHERE SUCH A WAIVER WAS GRANTED (REFERRED TO AS AN 8.2(B) GRANT OF GREATER RIGHTS) IT WAS SO FRAUGHT WITH RESTRIC-

TIVE PROVISIONS THAT IT PRESENTED AN UNWORKABLE BASIS FOR TRANSFERRING TECHNOLOGY TO THE PRIVATE SECTOR. NO COMMERCIAL FIRM WAS WILLING, UNDER THE CONDITIONS IMPOSED UNDER THE WAIVER, TO RISK THE EXPENDITURE OF THE NECESSARY DEVELOPMENT FUNDS.

SUBSEQUENTLY, AFTER FIVE YEARS OF EFFORT THE THEN DEPARTMENT OF HEALTH, EDUCATION AND WELFARE, IN 1968, ISSUED ITS FIRST NEW INSTITUTIONAL PATENT AGREEMENT (IPA) TO THE UNIVERSITY OF WISCONSIN. THIS WAS FOLLOWED IN 1973, AFTER ANOTHER FIVE YEARS OF EFFORT, BY AN INSTITUTIONAL PATENT AGREEMENT BETWEEN THE NATIONAL SCIENCE FOUNDATION AND THE UNIVERSITY OF WISCONSIN - THE FIRST EVER OF SUCH AGREEMENTS WITH THAT AGENCY.

THAT EVIDENCE OF NOT ONLY THE AVAILABILITY OF AN IPA, BUT THAT THOSE TWO AGENCIES WOULD ACTUALLY GRANT THEM, APPEARED TO PROVIDE SOME IMPETUS TO UNIVERSITIES TO ENGAGE IN THE TECHNOLOGY TRANSFER BUSINESS. NEVERTHELESS, SOME OF THE PROVISIONS OF THE IPA'S AVAILABLE FROM THOSE TWO AGENCIES WERE UNACCEPTABLE UNDER SOME UNIVERSITIES' POLICIES, WHILE MANY OTHER GOVERNMENTAL AGENCIES STILL CLUNG TENACIOUSLY TO THE POLICY OF TAKING TITLE TO ALL INVENTIONS MADE WITH FUNDS THEY HAD SUPPLIED.

ALTHOUGH LIMITED TO TWO AGENCIES, THE IPA'S WERE NOT ONLY IMPORTANT AS MANIFESTING A CHANGE IN THE ATTITUDE OF THOSE AGENCIES BUT MORE IMPORTANTLY AS ESTABLISHING, THROUGH NEGOTIATION, TERMS AND PROVISIONS WHICH WERE CARRIED INTO AND SET THE TONE FOR THE LEGISLATIVE EFFORT WHICH CULMINATED IN THE PASSAGE OF PL 96-517, THE PATENT AND TRADEMARK LAW AMENDMENTS ACT, IN 1980. IN FACT, THAT LAW IS OFTEN LOOKED UPON AS A CODIFICATION OF THE TERMS AND PROVISIONS OF THE IPA'S.

FINALLY, THERE IT WAS, THE REWARD FOR ALMOST 20 YEARS OF EFFORT, PL 96-517, THE LAW THAT CHANGED THE PRESUMPTION OF TITLE TO ANY INVENTION MADE BY SMALL BUSINESSES, UNIVERSITIES AND OTHER NON-PROFIT ENTITIES THROUGH THE USE OF GOVERNMENT FUNDS, IN WHOLE OR IN PART, FROM THE GOVERNMENT TO THE CONTRACTOR-GRANTEE. ANOTHER FACTOR, OFTEN OVERLOOKED, IS THAT THE LAW DID AWAY WITH THE DISTINCTION WHICH THE AGENCIES HAD ALWAYS MADE BETWEEN GRANTS AND CONTRACTS WHEN DEALING WITH UNIVERSITIES, A DISTINCTION WHICH A NUMBER OF AGENCIES RIGOROUSLY APPLIED IN THEIR ZEAL TO RETAIN RIGHTS TO INTELLECTUAL PROPERTY UNDER RESEARCH CONTRACTS.

THE PASSAGE OF THE LAW WAS NOT, HOWEVER, THE END OF THE BATTLE. IT TOOK OVER A YEAR TO SETTLE THE CONTROVERSY WHICH AROSE

OVER THE WRITING OF THE REGULATIONS UNDER THE LAW. DURING THE COURSE OF THE LEGISLATIVE EFFORT, AN ALMOST ADVERSARIAL RELATIONSHIP HAD DEVELOPED AS BETWEEN THE UNIVERSITIES ON THE ONE HAND AND THE DEPARTMENTS OF ENERGY AND DEFENSE AND NASA ON THE OTHER HAND. THE NATURE OF THAT RELATIONSHIP BECAME VERY CLEAR WHEN THOSE AGENCIES COMBINED TO WRITE REGULATIONS WHICH ACTUALLY CONTROVERTED THE LAW. AS A CONSEQUENCE, MUCH GREATER ATTENTION WAS GIVEN TO THE REGULATIONS BY A UNIVERSITY GROUP WHICH BUILT INTO THE REGULATIONS PROTECTION AGAINST BOTH ARBITRARY EXEMPTIONS TO THE LAW AT AGENCY DISCRETION AND TO THE EXERCISE OF MARCH-IN RIGHTS.

SINCE I WAS HEAVILY INVOLVED IN ALL FACETS OF THIS HISTORICAL PROCESS, THERE IS A CERTAIN NOSTALGIA IN RECAPPING THESE DEVELOPMENTS WITH YOU. HOWEVER, THE EXPERIENCE IS IN KEEPING WITH THE EXPRESSION:

> "ONLY NOSTALGIA COULD FIND ANYTHING NICE ABOUT WALKING BAREFOOT ON A GRAVEL ROAD."

THE ECONOMIC CLIMATE

TO MORE FULLY APPRECIATE WHAT HAS EVOLVED THROUGH THE SEQUENCE OF EVENTS WHICH HAS BEEN ENUMERATED, IT MUST BE KEPT IN MIND THAT THROUGH THIS PERIOD, THE ECONOMY OF THE COUNTRY AS A WHOLE, AS WELL AS THE ECONOMY OF EACH STATE, WAS AND STILL IS IN TRANSITION. TODAY, UNIVERSITIES OPERATE IN AN ECONOMIC CLIMATE WHICH:

(1) IS KNOWLEDGED BASED - NOT CAPITAL BASED (ALTHOUGH, WITHOUT QUESTION, AVAILABILITY OF CAPITAL IS A NECESSITY);

(2) IS ENTREPRENEURIALLY BASED - WITNESS THE LARGE NUMBERS OF NEW COMPANIES CREATED IN RECENT YEARS;

(3) INVOLVES WORLD MARKETS - THE INTERNATIONAL ASPECT OF PROTECTION FOR INTELLECTUAL PROPERTY GENERATED THROUGH THE RESEARCH FUNCTION MUST BE A CONSIDERATION;

(4) REFLECTS CONTINUOUS AND OFTEN RADICAL TECHNOLOGY CHANGES;

(5) IS BECOMING MORE DECENTRALIZED - MAKING STATE AND LOCAL OPTIONS AND INITIATIVES MORE SIGNIFICANT;

(6) IS AN ECONOMY OF APPROPRIATENESS NOT ONE OF SCALE - I.E., MERELY INCREASING THE SIZE OF A PRODUCTION PLANT WILL NOT

NECESSARILY REDUCE THE COST OF PRODUCT OR INCREASE ITS QUALITY;

(7) IS INCREASINGLY COMPETITIVE ON A GLOBAL SCALE - WITNESS THE ADVENT OF THE EUROPEAN ECONOMIC COMMUNITY SCHEDULED TO COME INTO FULL EFFECT IN 1993.

IN VIEW OF THIS CONTINUALLY EVOLVING ECONOMIC CLIMATE, AND SINCE NEW PRODUCTS ARISE FROM NEW FUNDAMENTAL IDEAS AS WELL AS FROM NEW APPLICATIONS OF EXISTING TECHNOLOGY, THE NECESSITY FOR SUPPLYING ADEQUATE SUPPORT FOR RESEARCH IS EVIDENT. HOWEVER, SUPPORT OF RESEARCH IS NOT ENOUGH. THAT SUPPORT MUST BE COUPLED WITH A CREATIVE TECHNOLOGY TRANSFER CAPABILITY. INVENTION WITHOUT INNOVATION HAS LITTLE ECONOMIC VALUE.

WITH THE PASSAGE OF PL 96-517 AND, IN THE SAME YEAR, THE DECISION OF THE SUPREME COURT IN THE CHAKRABARTY CASE, WHICH STOOD FOR THE PROPOSITION THAT MERELY BECAUSE SOMETHING WAS ALIVE (IN THAT CASE A BACTERIUM) IT WAS NOT PRECLUDED FROM BEING PATENTABLE, ALONG WITH THE EVOLUTION OF GENETIC ENGINEERING CONCEPTS, THE UNIVERSITIES WERE LITERALLY PROPELLED INTO AN AWARENESS OF THE POTENTIAL ECONOMIC VALUE OF THE TECHNOLOGY THAT WAS BEING GENERATED BY THEIR RESEARCH PROGRAMS. THAT FACT MADE IT SELF-EVIDENT THAT STEPS

HAD TO BE TAKEN TO MAKE INNOVATION FOLLOW INVENTION SINCE INVENTION ALONE HOLDS LITTLE HOPE FOR GENERATING NEEDED REVENUES TO SUPPORT AN EXPANDING RESEARCH EFFORT. BECAUSE THE GOVERNMENT HAS BEEN AND STILL IS THE PRIMARY SOURCE OF THE FUNDS SUPPORTING THE RESEARCH EFFORT AT UNIVERSITIES, THE PASSAGE OF PL 96-517 PERMITTED THE UNIVERSITIES TO POSITION THEMSELVES, THROUGH THE ESTABLISHMENT OR EXPANSION OF TECHNOLOGY TRANSFER CAPABILITIES, TO BETTER INSURE THAT INNOVATION WOULD FOLLOW INVENTION.

IN MY VIEW, PL 96-517 WAS A LANDMARK PIECE OF LEGISLATION IN THAT, AFTER MANY FALSE STARTS AND UNSUCCESSFUL EFFORTS, IT WAS, FINALLY, A RECOGNITION BY CONGRESS:

(1) THAT IMAGINATION AND CREATIVITY ARE TRULY A NATIONAL RESOURCE;

(2) THAT THE PATENT SYSTEM IS THE VEHICLE WHICH PERMITS US TO DELIVER THAT RESOURCE TO THE PUBLIC;

(3) THAT PLACING THE STEWARDSHIP OF THE RESULTS OF BASIC RESEARCH IN THE HANDS OF UNIVERSITIES AND SMALL BUSINESS IS IN THE PUBLIC INTEREST; AND, SIGNIFICANTLY,

(4) THAT THE EXISTING FEDERAL PATENT POLICY WAS PLACING THE NATION IN PERIL DURING A TIME WHEN INNOVATION WAS BECOMING THE PREFERRED CURRENCY IN FOREIGN AFFAIRS.

BECAUSE OF THE SALUTARY EXPERIENCE WITH PL 96-517, AS REPORTED BY THE COMPTROLLER GENERAL, AND RESPONSIVE TO CONTINUING EFFORTS BY THE UNIVERSITY SECTOR, A SUBSEQUENT BILL WAS PASSED BY CONGRESS WHICH BECAME PL 98-620. THAT LAW REMOVED MANY OF THE RESTRICTIONS WHICH HAD BEEN BUILT INTO PL 96-517 FOR THE PURPOSE OF POLITICAL EXPEDIENCY AND GAVE THE UNIVERSITIES A MUCH FREER REIN IN CONDUCTING TECHNOLOGY TRANSFER.

THE HERITAGE OF PL 96-517

PL 96-517 REPRESENTED THE FIRST CAUTIOUS STEP WITH A NEW RELATIONSHIP BETWEEN THE GOVERNMENT, AS REPRESENTED BY ITS AGENCIES, AND THE UNIVERSITIES. IT ALSO PRESAGED A NEW AND CLOSER RELATIONSHIP WITH INDUSTRY. THE CERTAINTY OF TITLE IN THE UNIVERSITIES TO INVENTIONS MADE WITH GOVERNMENT FUNDS, WHICH WAS SUPPLIED THROUGH PL 96-517, PROVIDED THE MAJOR IMPETUS TO NEW AND EXPANDING UNIVERSITY-INDUSTRY RELATIONSHIPS. INASMUCH AS THE GOVERNMENT ALWAYS RECEIVES AN IRREVOCABLE ROYALTY-FREE LICENSE UNDER ANY OF

SUCH INVENTIONS, AND BECAUSE OF OTHER PROVISIONS OF PL 96-517 AND THE ENSUING REGULATIONS UNDER THAT LAW, THE RELATIONSHIP IS, IN REALITY, A UNIVERSITY-INDUSTRY-GOVERNMENT RELATIONSHIP.

ONE OF THE IMMEDIATE POSITIVE FALL-OUTS RESULTING FROM THE PASSAGE OF PL 96-517 BECAME EVIDENT SHORTLY AFTER THE BILL BECAME LAW FROM A COMMENT MADE BY MY THEN CONGRESSMAN, ROBERT KASTENMEIER, WHO WAS CHAIRMAN OF THE JUDICIARY SUBCOMMITTEE ON COURTS, CIVIL LIBERTIES AND THE ADMINISTRATION OF JUSTICE, A KEY COMMITTEE IN THE LEGISLATIVE PATH OF PL 96-517. HE TOLD ME THAT SINCE NOW, FINALLY, CONGRESS HAD SHOWN AN INTEREST IN INTELLECTUAL PROPERTY LEGISLATION HE INTENDED TO SPONSOR AND INTRODUCE MUCH SUCH NEW LEGISLATION. TIME PROVED HIM TO BE AS GOOD AS HIS WORD. HE ALWAYS LENT A SYMPATHETIC EAR TO THE UNIVERSITY POSITION AND SOUGHT OUT THE ADVICE OF THE UNIVERSITY SECTOR ON MANY NEW PIECES OF LEGISLATION EVEN PRIOR TO THEIR INTRODUCTION.

IMPACT OF PL 96-517

HOW CAN WE TAKE THE MEASURE OF THE PRACTICAL IMPACT OF PL 96-517? SINCE WE ARE DEALING FOR THE MOST PART WITH THE TRANSFER OF TECHNOLOGY FROM A PROTECTED BASE, THE OBVIOUS ANSWER IS TO LOOK

FOR THE CHANGE IN THE NUMBER OF PATENTS WHICH HAVE ISSUED TO UNIVERSITIES SINCE THE PASSAGE OF PL 96-517.

IN 1990 U.S. UNIVERSITIES RECEIVED 2.4 PERCENT OF ALL U.S. ORIGIN PATENTS. THAT IS UP FROM ABOUT 1.0 PERCENT A DECADE EARLIER. THE CHANGES CAN READILY BE SEEN IN FIGURE 1. ASSOCIATED WITH THOSE DATA ARE THE NUMBER OF PATENTS AWARDED TO THE TOP 100 ACADEMIC RESEARCH PERFORMERS (FIGURE 2). IT IS EVIDENT THAT THE LARGEST RESEARCH UNIVERSITIES ACCOUNT FOR A LARGE AND GROWING SHARE OF ALL ACADEMIC PATENTS. AMONG THE TOP 100 ONLY 64 RECEIVED ANY PATENTS DURING THE PERIOD FROM 1969-1975. DURING THE PERIOD FROM 1986-1990, HOWEVER, 89 OF THOSE INSTITUTIONS OBTAINED PATENTS. EVEN MORE SIGNIFICANT IS THE FACT THAT THE NUMBER OF PATENTS ISSUED TO UNIVERSITIES HAS DOUBLED IN THE PAST SIX YEARS TO A TOTAL OF 1,346 IN 1991.

THAT RAPID GROWTH IS READILY EVIDENT FROM FIGURE 3 WHICH ALSO SHOWS THE NUMBER OF PATENTS ISSUED TO THE TOP 10 UNIVERSITIES IN TERMS OF NUMBERS OF PATENTS OBTAINED. THOSE TOP 10 UNIVERSITIES, THE NUMBER OF PATENTS EACH OBTAINED IN 1991 AND THEIR RESPECTIVE R&D SPENDING LEVELS IN 1990 IS SHOWN IN FIGURE 4.

ALTHOUGH THE FOCUS IS GENERALLY ON THE TOP PERFORMERS AMONG UNIVERSITIES AS MEASURED BY R&D EXPENDITURES, IT IS INTERESTING TO NOTE THAT THE TOP 10 IN THE NUMBER OF PATENTS ISSUED ARE NOT NECESSARILY THE TOP 10 IN R&D EXPENDITURES. IT IS TEMPTING TO VIEW PATENTS ISSUED ON A YEAR-TO-YEAR BASIS AS EVIDENCE OF CURRENT ACTIVITY, PARTICULARLY FOR THOSE WHO ARE NOT FAMILIAR WITH THE PATENTING PROCESS, INCLUDING APPLICATION PENDENCY TIMES. OVER THE SHORT TERM THAT KIND OF ASSESSMENT CAN BE VERY MISLEADING. OVER THE LONGER TERM, HOWEVER, FOR EXAMPLE THE 10 YEAR PERIOD SINCE THE PASSAGE OF PL 96-517, IT IS A MORE MEANINGFUL MEASURE. THE LAG TIME INVOLVED AND THE ROLLER-COASTER EFFECT IN USING YEAR-TO-YEAR COMPARISONS IN UTILIZING ISSUED PATENTS AS THE MEASURE OF ACTIVITY IS EVIDENT FROM FIGURES 1 AND 2.

I BELIEVE THAT FIGURE 1 IS HIGHLY SIGNIFICANT IN SHOWING THE INFLUENCE OF THE PASSAGE OF PL 96-517. IT ILLUSTRATES THAT THE UNIVERSITY SECTOR, IN THE PERIOD FROM 1981-1985 WAS GEARING-UP TO EITHER ENGAGE IN OR EXPAND TECHNOLOGY TRANSFER EFFORTS AND THAT THE FRUITS OF THOSE EFFORTS BECAME ABUNDANTLY CLEAR IN THE LARGE INCREASE IN PATENTS ISSUED TO THAT SECTOR IN THE 1986-1990 PERIOD. THAT UPSWING IS READILY EVIDENT FROM FIGURE 5 SHOWING PATENTS ISSUED TO THE 100 INSTITUTIONS WITH THE GREATEST R&D VOLUME.

IN FIGURE 6 I HAVE SELECTIVELY LISTED THE NUMBERS OF PATENTS AWARDED TO U.S. UNIVERSITIES BY PATENT AND TRADEMARK OFFICE TECHNOLOGY CLASS FOR THE PERIOD FROM 1969-1990. THE SELECTION WAS MADE TO SHOW THE CLASSES IN WHICH THE GREATEST ACTIVITY AND INCREASE IN ACTIVITY WAS DISPLAYED. IT CAN READILY BE SEEN THAT THE MOST ACTIVE CLASSES HAVE BEEN IN THE SEVERAL SUBDIVISIONS UNDER THE BROAD CLASS DEFINITION OF "DRUG, BIO-AFFECTING AND BODY TREATING COMPOSITIONS" AND "CHEMISTRY: MOLECULAR BIOLOGY AND MICROBIOLOGY". THE BROAD CLASS DEFINITION "SURGERY" ALSO INDICATES HIGH ACTIVITY. ONE CAN CONCLUDE FROM THAT LIFE-SCIENCE ORIENTATION OF THE CLASSES OF PATENTS THAT THE RESULTS OF GENETIC ENGINEERING RESEARCH IS STRONGLY REPRESENTED, AN AREA OF EXPLOSIVE GROWTH IN ACADEMIA AND THE HERITAGE OF BOTH PL 96-517 AND THE CHAKRABARTY DECISION MENTIONED EARLIER.

A FURTHER REASON FOR THAT LIFE-SCIENCE ORIENTATION IS UNDOUBTEDLY THE RESULT OF THE LARGE SUMS FOR ACADEMIC R&D SUPPLIED BY THE NATIONAL INSTITUTES OF HEALTH (NIH) AND THE NATIONAL SCIENCE FOUNDATION. THOSE TWO AGENCIES SUPPLY THE BULK OF ACADEMIC R&D MONEY. THE PATENT AND LICENSING ACTIVITY ASSOCIATED WITH NIH AND NSF FUNDS FOR THE FISCAL YEARS 1989 AND 1990 IS SHOWN IN FIGURES 6A AND 6B.

THAT IS NOT TO SAY THAT THERE WAS NOT A CONTINUING EFFORT GOING FORWARD TO INCREASE AND DIVERSIFY TECHNOLOGY TRANSFER ACTIVITIES THROUGH THAT 1986-1990 PERIOD AND ALSO TODAY. MOST SIGNIFICANTLY, THAT CONTINUING EFFORT IS EVIDENCED BY THE FACT THAT OF THE TOP 100 R&D PERFORMERS IN 1980 FIFTY-FIVE HAD AT LEAST ONE PATENT ISSUE BUT THAT, OVERALL, BY 1989, 144 DIFFERENT UNIVERSITIES HAD AT LEAST ONE PATENT ISSUED.

THE REAL MEASURE OF TECHNOLOGY TRANSFER IS NOT, OF COURSE, THE NUMBER OF PATENTS WHICH THE UNIVERSITY SECTOR HOLDS, BUT THE AMOUNT OF THE TECHNOLOGY REPRESENTED BY THOSE PATENTS WHICH HAS BEEN TRANSFERRED. WHAT THEN HAS BEEN THE LICENSING EXPERIENCE? A RECENT STUDY OF 35 UNIVERSITIES BY THE GENERAL ACCOUNTING OFFICE (GAO), WHICH WAS DIRECTED TO "CONTROLLING INAPPROPRIATE ACCESS TO FEDERAL FUNDED RESEARCH RESULTS" IS INDICATIVE OF THE PRESENT LEVEL OF ACTIVITY AMONG THOSE 35 UNIVERSITIES. FIGURE 7 SHOWS THE ACTIVITY FOR FISCAL YEARS 1989 AND 1990. NOTE ALSO, AS ILLUSTRATIVE OF THE EXPANDING DIVERSITY OF TECHNOLOGY TRANSFER EFFORTS AND CAPABILITIES, THAT LICENSES GRANTED FOR SOFTWARE AND TANGIBLE RESEARCH PROPERTIES, INCLUDED UNDER THE COLUMN HEADING "OTHER", EXCEED THOSE GRANTED FOR PATENTS. THE $113.1 IN LICENSE INCOME SHOWN IS SUBSTANTIALLY GREATER THAN THE LICENSING INCOME OF ABOUT $30

MILLION WHICH 112 LEADING RESEARCH UNIVERSITIES (INCLUDING ALMOST ALL OF THE 35 SURVEYED FOR THE GAO REPORT) REPORTED TO THE GAO FOR FISCAL 1986. THE PATENT AND LICENSING ACTIVITIES OF THE 35 INDIVIDUAL UNIVERSITIES SURVEYED IS SHOWN IN FIGURE 8.

I, PERSONALLY, BELIEVE THAT ONE OF THE BEST MEASURES OF THE IMPACT OF PL 96-517 IS THE GROWTH OF MEMBERSHIP IN THE ASSOCIATION OF UNIVERSITY TECHNOLOGY MANAGERS (AUTM) AND ITS PREDECESSOR ORGANIZATION SUPA (THE SOCIETY OF UNIVERSITY PATENT ADMINISTRATORS). THAT GROWTH IS SHOWN GRAPHICALLY IN FIGURE 9. HOWEVER, THE NUMBERS ALONE, ALTHOUGH STRONG EVIDENCE OF THE INCREASING INTEREST AND INVOLVEMENT IN THE TECHNOLOGY TRANSFER FUNCTION, DO NOT TELL THE WHOLE STORY. IN ITS EARLY YEARS SUPA ANNUAL MEETINGS WERE CONSIDERED HIGHLY SUCCESSFUL IF ATTENDED BY 75 - 100 PEOPLE. TODAY WE LOOK TOWARD ATTENDANCE IN EXCESS OF 600. ALSO, AS THE OPPORTUNITIES FOR TECHNOLOGY TRANSFER IN THE UNIVERSITY SECTOR EVOLVED UNDER THE UMBRELLA OF PL 96-517 THE LENGTH, DIVERSITY AND SOPHISTICATION OF THE PROGRAMS INCREASED. TODAY, IT IS DIFFICULT TO ACCOMMODATE ALL THE VARIED INTERESTS AND POSITIONS ON THE LEARNING CURVE OF THOSE ATTENDING THE MEETINGS.

WHY THE CONTINUING AND GROWING INTEREST IN TECHNOLOGY TRANSFER BY THE UNIVERSITY SECTOR? THE PRIMARY REASON IS, OF COURSE, THAT MOST RESEARCH AT UNIVERSITIES IS SUPPORTED AT LEAST IN PART BY FEDERAL FUNDS. IN FACT, TODAY IT IS DIFFICULT TO FIND AN INVENTION THAT DOES NOT INVOLVE THE EXPENDITURE OF FEDERAL FUNDS. IN MOST CASES, THEREFORE, THE TERMS AND PROVISIONS OF PL 96-517 AS MODIFIED BY PL 98-620 HOLDS SWAY. THE FUNDAMENTAL PREMISE IN THE EXPENDITURE OF THOSE FUNDS IS THAT THE PUBLIC SHOULD BENEFIT FROM THE RESEARCH IT SUPPORTS. SINCE, MOST OF THE RESEARCH CONDUCTED BY THE UNIVERSITIES WITH THOSE FUNDS IS BASIC IN NATURE, INVENTIONS WHICH ARISE TEND TO BE EMBRYONIC AND REQUIRE FURTHER DEVELOPMENT. PL 96-517 HAS SUPPLIED AND CONTINUES TO SUPPLY THE MECHANISM BY WHICH THAT FURTHER DEVELOPMENT CAN BE ACHIEVED THROUGH PATENTING AND LICENSING THE PRIVATE SECTOR. AT THE SAME TIME UNIVERSITIES, UNDER THAT LAW, HAVE THE INCENTIVE TO ENGAGE IN THAT ACTIVITY BECAUSE OF THE POTENTIAL FOR INCOME FOR THE UNIVERSITY. THERE IS, OF COURSE, THAT MOTIVATION WHICH COMES FROM THE HOPE OF FINDING AMONG THE INVENTION DISCLOSURES WHICH YOU RECEIVE THAT ONCE-IN-A-DECADE INVENTION WHICH TURNS YOUR PROGRAM INTO A GOLD MINE - AT LEAST FOR A FEW YEARS. IT CAN AND HAS HAPPENED BUT, AS I AM SURE YOU ALL KNOW, TECHNOLOGY TRANSFER IS NOT A GET-RICH-QUICK SCHEME.

ALTHOUGH IT IS DIFFICULT TO ESTABLISH A DIRECT NEXUS WITH PL 96-517, I BELIEVE THAT GROWTH OF R&D AT UNIVERSITIES IS, AT LEAST IN PART, ATTRIBUTABLE TO THAT LAW. EVIDENCE IN SUPPORT OF THE CONCLUSION I HAVE DRAWN COMES FROM LOOKING AT THE FUNDING PATTERNS FOR R&D IN ACADEMIA.

IN 1991 AN ESTIMATED $17.2 BILLION WAS SPENT FOR R&D AT U.S. ACADEMIC INSTITUTIONS. THE CHARACTER OF THE WORK AND THE PERFORMER OF THAT WORK IS SHOWN IN FIGURE 10. THAT LEVEL OF EXPENDITURE REPRESENTS A CONTINUING TREND OF AN INCREASING ROLE FOR ACADEMIC PERFORMERS IN TOTAL U.S. R&D.

MEASURED IN TERMS OF CONSTANT 1982 DOLLARS ACADEMIC R&D INCREASED AN ESTIMATED 74.2 PERCENT BETWEEN 1980 AND 1991. BETWEEN 1985 AND 1991 THE ACADEMIC R&D GROWTH WAS MUCH STRONGER FOR THE ACADEMIC SECTION (ESTIMATED AT ABOUT 44 PERCENT) THAN FOR ANY OTHER PERFORMING SECTOR. THIS TENDS TO COMPORT WITH THE LARGE INCREASE IN PATENTS ISSUED TO THE UNIVERSITY SECTOR DURING THAT SAME PERIOD AS SHOWN IN FIGURE 5 DISCUSSED EARLIER. AS A PROPORTION OF THE GROSS NATIONAL PRODUCT (GNP) THE ACADEMIC SHARE ROSE SIGNIFICANTLY OVER THE PAST DECADE, FROM 0.23 TO 0.31 PERCENT.

AS IS EVIDENT FROM FIGURE 10 ACADEMIC R&D ACTIVITIES ARE CONCENTRATED HEAVILY ON BASIC RESEARCH. VERY LITTLE DEVELOPMENT IS DONE. THAT BREAKDOWN IS MORE READILY SEEN IN FIGURE 11. FIGURE 12 SHOWS THE R&D EXPENDITURES OF THE TOP 20 UNIVERSITIES AND COLLEGES BY SOURCE OF FUNDS.

WHAT IS EVEN MORE INTERESTING IS THE SOURCES OF THE FUNDS USED BY ACADEMIA FOR ITS RESEARCH ACTIVITIES. THIS IS SHOWN IN FIGURE 13. AS I AM SURE YOU ALL KNOW, AND AS IS SHOWN BY FIGURES 10 AND 13, THE MAJORITY OF THE FUNDS FOR ACADEMIC R&D ARE PROVIDED BY THE FEDERAL GOVERNMENT. WHAT MAY BE SURPRISING IS THAT THE ACADEMIC INSTITUTIONS THAT PERFORMED THE R&D PROVIDED THE SECOND LARGEST SOURCE OF FUNDS. FROM 1971 TO 1991 THE INSTITUTIONAL SHARE GREW FROM 11 PERCENT TO ABOUT 20 PERCENT. YOU MAY ALSO BE SURPRISED THAT, WHILE INDUSTRY'S SHARE OF SUPPORT HAS RISEN FROM ABOUT 3 PERCENT IN 1971 TO AN ESTIMATED 7 PERCENT IN 1991, THE INSTITUTION'S SUPPORT OF R&D IS ALMOST THREE TIMES THAT OF INDUSTRY. THOSE WHO HOPE THAT AS GOVERNMENT FUNDING SHRINKS INDUSTRY WILL PICK UP THE SLACK ARE ENTERTAINING A FORLORN HOPE INDEED. THE DISPARITY IN THE AMOUNT OF FUNDS SUPPLIED IS MUCH TOO GREAT. IT MUST ALSO BE KEPT IN MIND THAT INDUSTRY PHILOSOPHIES AND GOALS ARE VERY DIFFERENT FROM THAT OF BOTH THE GOVERNMENT AND UNIVERSITIES. I DO FIRMLY BELIEVE, HOWEVER,

THAT INDUSTRY'S INCREASED SUPPORT WAS, AT LEAST IN PART, THE DIRECT RESULT OF PL 96-517 SINCE UNDER THAT LAW THE CERTAINTY OF TITLE TO INVENTIONS IN THE UNIVERSITIES WAS ESTABLISHED.

YOU MAY ALSO FIND INTERESTING THE DIFFERENCE IN SOURCES OF R&D FUNDS AT PUBLIC AND PRIVATE INSTITUTIONS SINCE I ASSUME THAT SOME OF BOTH ARE REPRESENTED HERE TODAY. THOSE DATA APPEAR IN FIGURES 14 AND 15. THE CHANGE IN SUPPORT IN THE DECADE AFTER THE PASSAGE OF PL 96-517 FOR EACH GROUP IS ALSO SHOWN.

FEDERAL TECHNOLOGY

TRANSFER ACT OF 1986

WHAT IS OFTEN OVERLOOKED IS THE FACT THAT PL 96-51 IS THE FIRST PIECE OF LEGISLATION THAT SPECIFICALLY GAVE THE GOVERNMENT THE RIGHT TO OWN PATENTS. PRIOR TO THE PASSAGE OF THAT LAW THE RIGHT TO OWN PATENTS HAD BEEN CONSIDERED AS A NECESSARY ADJUNCT TO PERMIT THE VARIOUS GOVERNMENT AGENCIES TO PERFORM THEIR RESPECTIVE MISSIONS - IT WAS AN IMPLIED RIGHT ONLY. ALSO, IN SITUATIONS WHERE A FEDERAL EMPLOYEE WAS A CO-INVENTOR OF A GIVEN INVENTION WITH A UNIVERSITY SCIENTIST, THE GOVERNMENT COULD ASSIGN ITS RIGHTS IN AND

TO THE INVENTION TO THE UNIVERSITY SUBJECT TO THE TERMS AND PROVISIONS OF PL 96-517.

PL 96-517 IS GIVEN CREDIT FOR FOCUSING CONGRESSIONAL INTEREST ON INTELLECTUAL PROPERTY - ORIENTED LEGISLATION. WITH THAT FOCUS ESTABLISHED THE NEXT TEN YEARS SAW MANY PIECES OF SUCH LEGISLATION INTRODUCED. SOME HAVE BECOME LAW, MOST HAVE NOT. ONE PIECE OF LEGISLATION WHICH COULD BE CONSIDERED TO HAVE BEEN ALMOST DIRECTLY SPAWNED BECAUSE OF OR AS THE RESULT OF PL 96-517 IS THE FEDERAL TECHNOLOGY TRANSFER ACT OF 1986 (FTTA). THAT ACT WAS INTRODUCED AS AN AMENDMENT TO THE STEVENSON-WYDLER ACT OF 1980 WHICH ACT HAD BEEN INTENDED TO PROMOTE THE UTILIZATION OF TECHNOLOGY GENERATED IN GOVERNMENT LABORATORIES, BUT WAS SINGULARLY UNSUCCESSFUL IN ACCOMPLISHING THAT GOAL.

THE FTTA WAS LARGELY A RESPONSE TO THE INCREASINGLY TOUGH INTERNATIONAL COMPETITION FACING THE UNITED STATES AND THE PREVALENT COMPLAINT THAT "THE U.S. WINS NOBEL PRIZES WHILE OTHER COUNTRIES WALK OFF WITH THE MARKET. THE DESIGNERS OF THE FTTA BUILT THE ACT UNDER CERTAIN FUNDAMENTAL PRINCIPLES:

(1) THE FEDERAL GOVERNMENT WILL CONTINUE TO UNDERWRITE THE COST OF MUCH IMPORTANT BASIC RESEARCH IN SCIENTIFICALLY PROMISING AREAS THAT TAKES PLACE IN THE UNITED STATES.

(2) TRANSFERRING THIS RESEARCH FROM THE LABORATORY TO THE MARKETPLACE IS PRIMARILY THE JOB OF THE PRIVATE SECTOR, WITH WHICH THE FEDERAL GOVERNMENT SHOULD NOT COMPETE.

(3) THE FEDERAL GOVERNMENT CAN ENCOURAGE THE PRIVATE SECTOR TO UNDERTAKE THIS BY JUDICIOUS RELIANCE ON MARKET-ORIENTED INCENTIVES AND PROTECTION OF PROPRIETARY INTERESTS.

THE PRINCIPAL POINTS OF THIS ACT ARE SHOWN IN FIGURE 16.

THE PRINCIPLES ENUMERATED WERE FIRST TESTED BY PL 96-517 AND THE FTTA RESPONDED TO THE LESSONS LEARNED FROM THAT LAW, PERHAPS THE MOST IMPORTANT OF WHICH WAS ITS SUCCESS IN PROMOTING UNIVERSITY-INDUSTRY COOPERATION.

THE FTTA IS, CLEARLY, A DIRECT HIGHLY BENEFICIAL LEGACY OF PL 96-517.

THE CURRENT CLIMATE

THE GROWTH OF TECHNOLOGY TRANSFER HAS TAKEN PLACE OVER THE LAST 30 YEARS IN AN ENVIRONMENT THAT HAS BEEN SLOWLY PROGRESSING FROM HOSTILE TO FAVORABLE. THAT PROGRESSION WAS GIVEN MAJOR IMPETUS BY THE PASSAGE OF PL 96-517. DURING THAT PERIOD WE HAVE SEEN A DRAMATIC CHANGE IN THE ATTITUDE OF THE JUSTICE DEPARTMENT AND THE INTERPRETATION OF THE ANTI-TRUST LAWS WHERE PATENTS AND ANTI-TRUST ARE NO LONGER VIEWED AS ANTITHETICAL. WE HAVE SEEN A MOVE TOWARD A FAVORABLE STATUTORY BASIS UNDER WHICH WE HAVE MUCH GREATER FREEDOM TO OPERATE. WE HAVE AN ACTIVE EFFORT ON BEHALF OF THE ADMINISTRATION TO OBTAIN EQUITABLE TREATMENT FOR U.S. CITIZENS IN FOREIGN VENUES, BOTH IN TRADE AND INTELLECTUAL PROPERTY PURSUITS. WE HAVE HAD NUMEROUS AND FAR-REACHING CHANGES IN THE PATENT LAWS OF THOSE FOREIGN VENUES WHICH HAVE PROVIDED GREATER OPPORTUNITIES FOR TECHNOLOGY TRANSFER. WE HAVE HAD THE BENEFIT OF A KNOWLEDGE-ABLE COURT IN THE COURT OF APPEALS FOR THE FEDERAL CIRCUIT WHICH HAS SLAIN MANY OF THE MYTHICAL DRAGONS ATTACHED TO INTELLECTUAL PROPERTY LAW TO PROVIDE UNIFORMITY OF INTERPRETATION OF THOSE LAWS AND BEFORE WHICH WE CAN EXPECT EQUITABLE TREATMENT. WE HAVE OBTAINED THE ATTENTION OF CONGRESS AND, PARTICULARLY, THE ATTENTION IN THAT BODY TO THE UNIVERSITY SECTOR'S PERSPECTIVE ON INTELLECTUAL

PROPERTY LAW ISSUES. WE HAVE SEEN AN EXPANSION OF ALLOWABLE PATENT COVERAGE THROUGH UNILATERAL ACTS OF THE PATENT AND TRADEMARK OFFICE, THROUGH DECISIONS OF THE PATENT AND TRADEMARK OFFICE BOARD OF APPEALS AND THE COURTS, AND WE HAVE SEEN THE INTRODUCTION AND PASSAGE OF LEGISLATION FAVORABLE TO THE UNIVERSITIES AND THEIR TECHNOLOGY TRANSFER EFFORTS. WE HAVE ALSO SEEN DEVELOPED, NOT ONLY IN THE UNIVERSITY SECTOR, BUT IN UNIVERSITY-INDUSTRY RELATIONSHIPS AND UNIVERSITY-INDUSTRY-GOVERNMENT RELATIONSHIPS, A GREATER AWARENESS OF TECHNOLOGY TRANSFER AND A GROWING RECOGNITION OF THE POSSIBILITIES WHICH CAN BE MADE AVAILABLE THROUGH CREATIVE TECHNOLOGY TRANSFER EFFORTS AND A MUCH GREATER SOPHISTICATION IN HANDLING THOSE POSSIBILITIES. TODAY WE OPERATE IN A CLIMATE WHICH IS BETTER THAN IT HAS EVER BEEN. WE WOULD LIKE TO THINK THAT MUCH OF THIS HAS COME ABOUT BECAUSE THE UNIVERSITIES, AS A SOURCE OF FUNDAMENTAL DISCOVERIES AND INVENTIONS, HAVE BEEN THE SOURCE OF ENLIGHTENMENT FOR A RECOGNITION OF THE VALUE OF INNOVATION.

A WORD OF CAUTION, HOWEVER!!! WE WORK IN A VERY UNCERTAIN BUSINESS WHERE, ON THE AVERAGE, IT TAKES IN EXCESS OF 10 YEARS AND HUNDREDS OF THOUSANDS, EVEN MILLIONS, OF DOLLARS TO BRING AN INVENTION TO THE MARKETPLACE. WE MUST ALSO REMEMBER THAT, AS A LICENSOR, WE HAVE VERY LITTLE ACTUAL CONTROL OVER THE PROCESS BY

WHICH AN INVENTION IS BROUGHT TO THE MARKET OR HOW, ULTIMATELY, IT IS MARKETED. WE ARE ALWAYS VULNERABLE TO THE ATTACKS OF SPECIAL INTEREST GROUPS, WHETHER INSIDE OR OUTSIDE GOVERNMENT, WHICH ARE BASED NOT ON FACT BUT ON EMOTION OR WHICH MAY BE WAGED FOR PSYCHOLOGICAL REASONS. AS LONG AS ENVY AND JEALOUSY ARE PART OF THE HUMAN CONDITION SUCH ATTACKS ARE INEVITABLE, ONLY THE INTENSITY WILL RISE AND FALL.

THE EMPHASIS TODAY, AS WELL AS THE BUZZWORD IN WASHINGTON IS "COMPETITIVENESS". WE ARE SEEING MURMURINGS AND EVEN TANGIBLE PROPOSALS TO RESTRICT THE DISSEMINATION OF INFORMATION FROM THE UNIVERSITY SECTOR AND EVEN TO CURTAIL ITS TECHNOLOGY TRANSFER EFFORTS. WE ARE IN THE MIDST OF AN EFFORT BY MANY NATIONS, INCLUDING THE UNITED STATES, TO HARMONIZE THEIR RESPECTIVE PATENT LAWS. IN THIS REGARD, AS AN ITEM OF INTEREST, I HAVE INCLUDED A TABLE, AS FIGURE 17, WHICH SHOWS THE NUMBER OF U.S. PATENTS GRANTED BY NATIONALITY OF INVENTOR. ALSO, WITH RESPECT TO HARMONIZATION WE ARE FACED WITH A RECOMMENDATION FROM THE ADVISORY COMMISSION ON PATENT LAW REFORM WHICH WILL, THROUGH THE PROVISION OF PRIOR USER RIGHTS IN A FIRST-TO-FILE SYSTEM, DISENFRANCHISE THE UNIVERSITIES, AS WELL AS OTHER NON-MANUFACTURING ENTITIES UTILIZING THE PATENT SYSTEM, FROM

EXERCISING THE CONSTITUTIONALLY-BASED RIGHT IN THE PATENTEE TO EXCLUDE OTHERS.

WE HAVE ALREADY PASSED THROUGH AN ERA WHERE SCIENCE WAS BEING MADE SUBSERVIENT TO POLITICS. IN TODAY'S TECHNOLOGICALLY INTENSE ATMOSPHERE, WHERE THE MAXIMUM PROTECTION FOR INTELLECTUAL PROPERTY IS MORE THAN EVER NECESSARY TO PROVIDE PROTECTION FOR THE HEAVY INVESTMENT NECESSARY TO TECHNOLOGY DEVELOPMENT, WE MUST REMAIN ALERT.

EVEN IN THE CURRENT FAVORABLE CLIMATE FOR THE TECHNOLOGY TRANSFER FUNCTION AS THE HERITAGE OF PL 96-517, VIEWS ON THE ISSUES IN THE CONTROL OF INTELLECTUAL PROPERTY, WHETHER BY GOVERNMENT OR SPECIAL INTERESTS, CAN LEND THEMSELVES TO EMOTIONAL MOLDING. OUTSPOKEN CLAIMS TO THE GUARDIANSHIP OF THE PUBLIC INTEREST OR WELFARE IS A RICH FIELD FOR CULTIVATING POLITICAL POWER. WE MUST NEVER FORGET THAT FREEDOM DEMANDS A CONSTANT PRICE.

IN THE STRUGGLE TO OBTAIN THE PASSAGE OF PL 96-517 AND THEN PL 98-620, AS WELL AS ON OTHER PIECES OF PROPOSED LEGISLATION WHICH IMPINGED ON THE UNIVERSITY SECTOR, THE UNIVERSITIES, COLLECTIVELY, SPOKE WITH A LOUD AND SINGLE VOICE. WE MUST CONTINUE TO DO SO IN ALL

CIRCUMSTANCES WHICH THREATEN THE RIGHTS AND OPPORTUNITIES WHICH WE HAVE EARNED OVER MANY YEARS BY DINT OF PERSISTENCE, PATIENCE AND HARD WORK. THIS WILL REQUIRE YOUR ACTIVE AND CONTINUING PARTICIPATION.

TO QUOTE RALPH WALDO EMERSON:

"WHAT LIES BEHIND US AND
WHAT LIES BEFORE US ARE
TINY MATTERS COMPARED TO
WHAT LIES WITHIN US."