SUMMARY REPORT

WISCONSIN ALUMNI RESEARCH FOUNDATION

614 WALNUT STREET
MADISON, WISCONSIN 53705

JANUARY 1, 1986

A SUMMARY REPORT ON

THE WISCONSIN ALUMNI RESEARCH FOUNDATION

WHAT THIS REPORT IS ALL ABOUT

Sixty years ago, when the Wisconsin Alumni Research Foundation was established, the development of a patentable invention by a university scientist was an unusual event for which there were few precedents.

Several decades earlier, University of Wisconsin Professor Stephen M. Babcock had invented a revolutionary new test for the butterfat content of milk that ultimately would win worldwide acceptance. He chose not to patent the process but to "give it freely to the world." However, Babcock discovered that without patent rights he had no way to control the standards of accuracy or reliability for the test that carried his name. Moreover, there were financial benefits from its use which did not accrue to the inventor, the University, or the people of Wisconsin.

In the early 1920s the situation arose again with Professor Harry Steenbock's work in vitamin D irradiation processes. This time, a farsighted group of University of Wisconsin professors, administrators, and alumni determined to find a solution. The result was the creation, in 1925, of the Wisconsin Alumni Research Foundation (WARF, pronounced "waarrff"). For six decades WARF has offered a remarkably effective way to develop the inventions of Wisconsin scholars and scientists and funnel the largest share of license royalties back to Wisconsin's University in support of further research.

In the 60 years since its founding, WARF has granted some $150 million to the University at a current annual rate of $8½ million in fiscal 1986, meanwhile building up a multi-million-dollar endowment. During the 60 years as well, WARF-associated processes and products have improved markedly the human condition. As the oldest and most successful organization of its kind in effecting university-industry cooperation in the public interest, WARF has helped

the University of Wisconsin Foundation, incorporated in the 1940s to solicit gifts and bequests from alumni and friends in aid of a wide range of programs and projects at what is now UW-Madison.

The Wisconsin Alumni Research Foundation occupies the top two floors of the 14-story WARF Building on WARF land at the western periphery of the UW-Madison campus. WARF rents "surge" space on the lower 12 floors as a service to UW-Madison departments or units temporarily without adequate quarters elsewhere.

WHAT WARF DOES

WARF's present purposes are clearly specified in its May 2, 1975, second restated Articles of Incorporation:

(1) To promote, encourage, and aid scientific investigation and research at the University of Wisconsin by the faculty, staff, alumni, and students thereof, and to provide or assist in providing means and machinery by which their scientific discoveries, inventions, and processes may be developed, applied, and patented, and by which such utilization or disposition may be made of such discoveries, inventions, and processes and patent rights or interests therein as may tend to provide funds for and to stimulate and promote further investigation and research within said University.

(2) To pay out and distribute the corporation's funds to or for scientific investigation and research at the University of Wisconsin.

(3) To use and administer gifts, grants, bequests, and devises for the benefit of the University of Wisconsin.

(4) To engage in any and all lawful activities incidental to the foregoing purposes.

At the very start of their Trusteeship, WARF's leaders adopted two crucial operating policies: (1) to build an endowment principal of substantial amount, only the annual income of which might be used to advance research in the

the request that a way be found for the University to apply for patents and subsequently administer them in the public interest. The Regents declined.

Professor Steenbock then conferred with H. L. Russell, Dean of the College of Agriculture of the University of Wisconsin, and C. S. Slichter, Dean of the Graduate School. He had, he told them, been offered a substantial sum--$1,000,000--for exclusive patent rights in the invention. But rather than sell his discovery to a commercial concern, resign from the University to manage his invention, or simply dedicate it to the public without controls of any kind, he preferred that whatever patents might issue be administered and regulated in the public interest by an agency identified with but independent and separate from the University. Moreover, Professor Steenbock wanted whatever earnings might be realized from such a plan to be channeled to the University of Wisconsin to support further research.

Intrigued by the idea, Dean Slichter enlisted the interest and financial support of several volunteer alumni of the University of Wisconsin, and the idea for a not-for-profit agency separate from the University began to evolve. Articles of Organization were filed with Wisconsin's Secretary of State on November 14, 1925, and nine alumni contributed $100 apiece as capital--still carried on the WARF books as the original $900 "Dues Paid In."

Article Three of the Charter stated that "the name of the corporation shall be Wisconsin Alumni Research Foundation." Article Four specified that "the corporation shall be without capital stock, and no dividends or pecuniary profits shall be declared or paid to the members thereof."

The five original alumni Trustees of the Foundation were George I. Haight, Chicago, Illinois, lawyer, President; Thomas E. Brittingham, Jr., Madison, Wisconsin, financier, Vice President; L. M. Hanks, Madison, Wisconsin, banker, Secretary-Treasurer; William S. Kies, New York, New York, banker; and Timothy Brown, Madison, Wisconsin, lawyer.

1940s became a "lost" disease. The conquest of rickets was described by science writer Paul de Kruif at the time as "a public health victory as complete as any in history."

Comparable in importance to the vitamin D developments were the later anticoagulant discoveries from the laboratories of Professor Karl Paul Link of the University of Wisconsin's Biochemistry Department. Searching for the agent in spoiled sweet clover that caused cattle to hemorrhage, Link and his co-workers isolated a number of compounds that were to affect the lives of millions of human beings and to effect the deaths of hundreds of millions of rats and mice.

The identification of dicoumarin from spoiled sweet clover and parallel studies of the effects of vitamin K and other compounds on blood coagulation made it possible to control bleeding in ways not previously feasible. Even more important, however, was the subsequent synthesis of Dicumarol, the first anticoagulant that could be administered to humans orally. "This," according to the citation accompanying the Albert Lasker Award presented to Professor Link in 1955, "opened a gateway to the further study of the mechanism of blood clotting and to the treatment of many important diseases of the heart and blood vessels for which little had been done in the past."

From the Dicumarol research came the synthesis of a number of other related anticoagulant compounds. Among them was Compound 42--or Warfarin, an internationally used household word coined by combining the initial letters of the Wisconsin Alumni Research Foundation with the "arin" from coumarin, the class of compounds to which it belongs. Introduced in 1950 as a rodenticide that induced fatal hemorrhage in rodent pests after several days of repeated feedings, Warfarin was a dramatic "breakthrough" in pest control compounds. Its unprecedented effectiveness in controlling rats and mice and its unsurpassed record of safety to humans and other nontarget species undoubtedly accounted for its widespread success.

same period that only about 4 percent of the University's annual research expenditures have come to be supplied by WARF. Yet the relative decline has not diminished the continuing importance of WARF's financial contributions. A "no-strings-attached" Foundation policy has lent a significant measure of latitude and flexibility to the University's research program that has helped to maintain in it the viability and imagination characteristic of its past performance.

HOW WARF FUNCTIONS TODAY

WARF's first Executive Director, Harry L. Russell, once prescribed that "the Foundation's job is to earn the money and give it to the University," while "the professors' job is to spend the money as wisely as they know how." Or, as WARF's first President, George I. Haight, reputedly once said, "We take the money to the University doorstep, and then turn and run."

From 1928, when its first grant of $1,200 was made, to June 30, 1985, WARF's total grants and commitments to the University of Wisconsin have been:

General Research Grants	$115,064,461
Buildings, Land, Major Equipment, Incentives	24,252,325
Donor-Directed Gifts	6,453,847
Faculty Enhancement Funds	6,000,000
Reserve Fund Income	205,861
	$151,976,494

The scale of WARF's annual basic benefaction is mounting:

1982-83	$ 5,966,000
1983-84	6,550,000
1984-85	7,137,000
1985-86	8,550,000

inventor to University officials for a determination whether there may be prior claims to patent rights. This procedure is made necessary by restrictions imposed by federal agencies on the disposition of inventions resulting from government-supported research.)

In large part because of the recognized expertise exhibited by the WARF staff in relieving faculty inventors of the countless complicated technical details relating to the development and management of inventions in the public interest, up to June 30, 1985, there have been an astounding 2,426 discoveries disclosed to WARF (better than three a month). Out of those disclosures have come 448 patents, of which 203 (representing 95 inventions) have been licensed. Of those licensed patents, 100 (representing 76 inventions) have produced income greater than expenses. Approximately a third of those 76 inventions have earned less than $10 thousand each, another third have produced between $10 and $100 thousand, and another third have earned in excess of $100 thousand. Total net income from patents, 1929-85, is more than $30 million, with 10 patents producing about 90% of that income. In 1985, 42 inventions were still producing income.

For the record, here is the list of WARF's leading money-earning inventions by first patent date, as of June 30, 1985:

Date of First Patent	Invention	Principal Investigator
8/14/28	Vitamin D Irradiation	Steenbock
9/13/32	Copper-Iron Complex	Hart
9/16/47	Anticoagulants	Link
8/11/53	Coating Process	Wurster
12/25/62	Fungicide	Knight
8/23/71	Vitamin D Derivatives	DeLuca
5/20/80	Digital Vascular Imaging	Mistretta

In a revised statement of Patent Policies and Procedures issued by its Office of Research Administration in 1984, the University of Wisconsin-Madison: (1) reaffirmed its tradition of not claiming proprietary rights in any invention generated by faculty, staff, or students, (2) officially designated WARF as the agency to handle all patent and licensing services pertaining to inventions made in performance of Federal grants and contracts, (3) confirmed that WARF continues to stand ready to provide similar service for inventions conceived through activities where no third party is contractually entitled to exercise control over proprietary rights; and (4) repeated its instructions that an inventor must clear with the University administration before approaching WARF, to make sure that any obligations to any grantor are fully met.

Managing Patents

While the great bulk of WARF income has derived from investments, there would have been no investments in the absence of royalty revenue derived from license agreements based on patented inventions. So managing patents bulks large as a WARF strategy. A recent case study concludes that "WARF has gained a reputation for skill and professionalism unsurpassed in university patenting and licensing operations."

This "complex and difficult task" involves assessing the patentability and commercial potential of a faculty idea, acquiring the rights to a promising idea, refining the discovery, securing a patent, identifying licensees, arranging license agreements, assisting in product acceptance, taking cognizance of consumer protection, and defending patent rights against encroachment and legal challenge.

Disclosures by University scientists often represent major contributions to an art, but usually require expenditure of significant monies on market and product development. It is WARF's role to locate industrial licensees for inventions brought to it by UW researchers, and to offer, through licensing, incentives by which to secure their development. The University itself has recognized the need to assist faculty engaged in inventive research who have special

organized a new Wisconsin Center for Computer Software Development that will in turn encourage faculty to involve WARF in a computer software copyright refinement and licensing role. Meanwhile the WARF staff continues to apply its recognized expertise in pharmaceutical and medical fields and to position itself for a comparable role in the emerging arena of biotechnology.

Patent management is thus on-going at WARF. In Fiscal 1985, 82 innovations were disclosed to WARF by UW personnel, 29 U.S. patent applications and 117 foreign applications were filed, 16 U.S. patents and 29 foreign patents were granted, license agreements were negotiated and finalized with 18 companies, 4 other agreements were being negotiated, WARF was involved in 1 patent infringement suit, and royalty-free and non-exclusive licenses were granted on 13 different inventions to the U.S. Government under the federal law in which WARF is the designated agent for all patents discovered via University research funded in whole or in part by an agency of the federal government.

Two current examples are illustrative of WARF patent management at work in concert with University scientists and private industry:

Harry Steenbock was able to demonstrate that vitamin D prevented rickets, but he was never able to find out exactly how the phenomenon occurred. Given the laboratory protocols and apparatus available to him in his day, his quest was probably futile. But he did bequeath his profound insights and insatiable curiosity to some of his graduate students, among the last of whom was Hector DeLuca, once WARF Research Assistant, WARF Postdoctoral Fellow, as Assistant Professor of Biochemistry the recipient of WARF grants-in-aid and instrumentation, now WARF Harry Steenbock Research Professor of Biochemistry.

Through enormously time-consuming and complicated basic research, Professor DeLuca and his associates have begun to unravel the marvelously articulated vitamin D endocrine system, to provide a new dimension to an understanding of

than before. Now, 12 years, several Ph.D. dissertations, and a 1980 WARF patent later, "digital subtraction angiography," or DSA, has assumed an important role alongside traditional angiography. The DSA technique has several advantages. When the contrast agent is injected into arteries, DSA produces clearer images--a capability that has saved some patients from limb amputations. With DSA, arteries can also be visualized when the contrast agent is injected into a vein--a simpler, safer, and less expensive procedure. Three companies now manufacture DSA equipment under WARF licenses, and the resulting royalties have already lifted DSA into the roster of WARF's 10 most profitable patents. Meanwhile Dr. Mistretta, colleagues, and graduate students are experimenting with a filter that can eliminate the problem of part of a typical chest x-ray negative being over-exposed and another part under-exposed because the radiation travels unevenly through the patient and onto the film, leading to possible misinterpretation of the image. If the team project is successful, WARF will be ready to manage the already-existing patent.

Energizing Support Units

Coincident with administering the Steenbock patents in the 1930s, WARF formed a consumer-protection Testing Laboratory to assure the quality and quantity of the vitamin D content of licensed foodstuffs and pharmaceuticals; and also formed a Concentrates Division to supply dairies with a quality-controlled fluid milk vitamin D additive. In time both of these subsidiaries were sold to private companies.

In the 1950s, WARF organized three subsidiaries to conserve and administer the extensive riparian property bequeathed to the Foundation by the Crandall family in the scenic gorge of the Wisconsin River at the Dells. These subsidiaries are still extant, "performing a real public service in preserving this valuable asset for the long-range enjoyment of all our citizens," in the words of former U.S. Senator Gaylord Nelson.

In 1984 the Foundation organized a new wholly-owned corporate subsidiary, Project

after-the-fact. In other words, WARF writes the Research Committee an annual check transmitting funds that are unencumbered (except that they must be used for research activities). As a WARF President once described the policy, "WARF doesn't cross the campus line."

In proposing research projects for WARF funding, individual faculty members likewise act independently; that is, their proposals do not follow a "chain of command" through department chairs and deans' offices but go directly to the Research Committee. But winning WARF-fund support is not easy: the application form calls for precise facts and figures plus a detailed attached curriculum vitae. The forms used by Research Committee members investigating and evaluating proposals are at least as complicated: an interview report form, a rating scale, a faculty salary eligibility determination, an interview check sheet, and a recommendation sheet, accompanied by two pages of instructions and an added sheet defining various forms of "insurance" and "contingent" grants. That the "sifting and winnowing" system works is mute testimony to the diligence of the 800-some faculty members who annually file applications, and to the devotion of the Research Committee members who contribute untold hours of their own time figuring what kind of support to give to whom. Volunteerism has no more shining example.

What then does the Research Committee favor in reviewing proposals? Current guidance to faculty members states:

"We look forward to receiving imaginative, innovative, and well-planned proposals which will continue to provide the excellent research and graduate training environment for which Madison is famous....The Research Committee would like to emphasize its desire to use WARF funds to help in opening up new areas of research, supporting research for which outside funding is not yet available, and helping new faculty get started in research when this cannot be done with outside funds. Conversely, funds for continuing operation of existing projects must be obtained from appropriate agencies and foundations."

RECENT MAJOR WARF SPECIAL GRANTS TO UW-MADISON

1982	Microelectronics Center, stimulating University-industry teamwork	$ 600,000
1983	Biochemistry Building addition	300,000
1983	Animal Research Facility (contingent)	300,000
1983	X-ray Lithography Center, to develop a new generation of electronics "chips"	1,250,000
1983	Cardiology Program (contingent)	300,000
1983	Magnetic Resonance Imaging Instrument, a new non-invasive diagnostic approach	800,000
1983	Farmland for a University-Industry Research Park	1,535,000
1984	A Set-Aside Fund for a Research Faculty Enhancement Program--WARF Senior Research Professorships	5,000,000
1984	Biotechnology Center, to coordinate campus-industry teamwork in a rapidly expanding field	500,000
1985	Research Park	250,000
1985	Synchrotron Radiation Center, linked to the Lithography Center (contingent)	1,000,000
1985	Clinical Cancer Center (contingent)	600,000
1985	Center for Business Venture Development	100,000

sources, a status engendered in no small part by WARF's record of 50-plus years of stimulation.

In a larger sense, in partnership with the people of Wisconsin the WARF idea has helped make the Wisconsin way of life healthier, the Wisconsin economy more vigorous, and Wisconsin's system of public education a national model.

WHY WARF HAS SUCCEEDED

"The Wisconsin Alumni Research Foundation," says a 1984 Harvard University case study, "is the oldest and most widely cited precedent in the quest of university efforts to commercialize faculty research findings; given its long history, current prominence, and success, a close examination of the WARF experience can provide useful lessons."

Toward the close of his long, distinguished career, much of it in intimate association with WARF, University of Wisconsin President Emeritus Fred posed these questions that "deserve special consideration" by future analysts:

1. Why has WARF been successful in building a great research fund?

2. Why have attempts to copy the WARF program at other institutions failed to produce similar results?

From the record, six factors appear to have been crucial to WARF's success. First, of course, was the gift of a patent on a process with incalculable commercial potential, and the immediate major royalty payments from eager licensees. Second was the massive time devoted to the enterprise by skilled independent alumni, and the vigorous research-and-development efforts led by a tough-minded Foundation Director. Third was the exquisite timing that allowed WARF initially to escape, on the one hand, the stock-market collapse of 1929 and on the other, for a time, the arrival of onerous anti-trust and income-tax interpretations. Fourth were imaginative marketing, legal defense, and money-management strategies. Fifth was the good luck or

Princeton University: "Rapidly changing circumstances....render it necessary that a constant process of adjustment should go on."

Nor could WARF have succeeded without the trust of faculty, of University administrators, and of the public as represented by the Legislature and Governor. That trust is based on careful conformance to reporting requirements, oversight by a Board of unquestioned reputation and integrity, and more than half a century of outstanding work.

WHAT THE FUTURE HOLDS

In Emeritus President Fred's words: "Without exception, the WARF Trustees have possessed to a rare degree three outstanding characteristics: vision, courage, and industry--flexible, resilient, and responsive to changing conditions....As the University plans for the future, it is certain that WARF will be as important as ever, but perhaps in new and different ways."

With the number of WARF-supported scientists, scholars, instruments, and structures growing each year, the 60-year period from 1925 to 1985 has been a most rewarding one for the Foundation. As for the future, WARF can only pledge a continuation of its chartered aims--to help the University and to benefit mankind. As always, the Foundation will continue to lend momentum to the perpetual cycle of research to public benefit to research again--the essence of WARF, facilitating university-industry teamwork in the public interest.

Lundberg, James T.
Sr. Vice President & Treasurer
Wausau Insurance Companies
Wausau, Wisconsin

Mathis, James F.
Former Vice President
Science & Technology
Exxon Corporation
Summit, New Jersey

Murphy, William Beverly
Former President
Campbell Soup Company
Camden, New Jersey

Nagle, Robert O.
Attorney at Law
Brobeck, Phleger & Harrison
San Francisco, California

Nielsen, Arthur C., Jr.
Chairman of the Board
A. C. Nielsen Company
Chicago, Illinois

Roper, Wayne J.
Gibbs, Roper, Loots & Williams
Milwaukee, Wisconsin

Rowland, Raymond E.
Former President
Ralston Purina Company
St. Louis, Missouri

WISCONSIN ALUMNI RESEARCH FOUNDATION STAFF
1985

General Administration

Managing Director	John R. Pike
Controller	Kenneth C. Sprain
Secretary to the Director	Eileen M. Lent
Main Receptionist	Else Arnold
Accounting Clerk	Jodie L. Grauvogl
Building Engineer	Ray Peterson

Investment Department

Director of Investments	George Austin
Associate Director	Martin C. (Mark) Bear
Secretary	Doreen B. Chipman

Patent-Licensing Division

Director of Licensing	Marvin D. Woerpel
Associate Director	Thomas M. Hinkes
Licensing Associate	William N. Fetzner
Secretary	Merry Hobbins
Patent Counsel	Howard W. Bremer
Patent Attorney	David J. Houser
Secretary	Ruth Wilson
Secretary	Dana Templeman

Wisconsin Dells Subsidiaries

General Manager	W. T. (Tim) Johnson

further investigation and research within said University.

(2) To pay out and distribute the corporation's funds to or for scientific investigation and research at the University of Wisconsin.

(3) To use and administer gifts, grants, bequests and devises for the benefit of the University of Wisconsin.

(4) To engage in any and all lawful activities incidental to the foregoing purposes except as limited herein.

C. This corporation shall at all times be operated solely in connection with the University of Wisconsin.

Article 4. The corporation shall have no members. The management and control of the corporation shall reside in the Board of Trustees. The number of Trustees may be fixed by By-Law but shall not be less than seven.

Article 5. It is intended that this corporation shall continue to have the status of a corporation which is exempt from federal income taxation.

Article 6. The corporation shall be without capital stock, and no dividends or pecuniary profits shall be declared, paid to, or inure to the benefit of the Trustees thereof in their private capacity.

Article 7. The principal office of the corporation at the time of the adoption of these Restated Articles is Madison, Wisconsin.

Article 8. The address of the registered agent at the time of adoption of these Restated Articles is 614 North Walnut Street, Madison, Wisconsin 53705.

Article 9. The name of the registered agent at such address at the time of the adoption of these Restated Articles is Edwin O. Rosten.

Article 10. Only those persons shall be Trustees who (1) have attended the University

was adopted by the members on the 2nd day of May, 1975, by the following vote:

Members Entitled to Vote	Members Voting For	Members Voting Against
24	20	None

2. The original Articles of Incorporation were recorded with the Register of Deeds for Dane County, Wisconsin in Vol. 69 of Miscellaneous, at page 549.

3. Restated Articles of Incorporation were recorded with the Register of Deeds for Dane County, Wisconsin, in Volume 152 of Miscellaneous, at page 13.

Dated and seal affixed this 2nd day of May, 1975.

ROBERT M. BOLZ, *Vice President*

B. MAUTZ, *Secretary*

REVISED BY-LAWS OF THE WISCONSIN ALUMNI RESEARCH FOUNDATION (As Amended May 2, 1975)

ARTICLE I.

MEMBERS:

Section 1. This corporation has no members.

ARTICLE II.

TRUSTEES:

Section 1. The management and control of the corporation shall reside in the Board of Trustees.

Section 2. The number of Trustees of the corporation shall be eighteen (18).

Section 3.

(a) The term of office of Trustees shall be five years, provided, however, that any Trustee other than one serving

Section 5. Actual presence of a Trustee at any meeting shall constitute a waiver of any notice herein provided as to such Trustee.

Section 6. A quorum at the annual meeting of the Trustees, or at any regular or special meeting of the Trustees, shall consist of a majority of the Trustees then in office.

Section 7. The Trustees may hold their meetings, whether annual, regular or special, and keep the books of the corporation within or outside the state of Wisconsin, except as otherwise provided by statute.

Section 8. The Trustees as such shall not receive any compensation for their services, but may be reimbursed for their expenses in connection with attendance at any annual, regular or special meeting of the Board; provided that nothing herein contained shall prevent any Trustee from serving the corporation in any other capacity and receiving reasonable compensation therefor. Such compensation and the capacity in which such Trustees serve, shall be reported annually to the Board of Trustees.

Section 9. The Board of Trustees shall at its annual meeting elect a President, one or more Vice Presidents, a Treasurer, one or more Assistant Treasurers, a Secretary and one or more Assistant Secretaries, and such other officers as the Board of Trustees may from time to time determine. All officers of the corporation, except Assistant Treasurers and Assistant Secretaries, shall be Trustees. The officers of the corporation shall hold office until their respective successors are chosen and qualify. Any officer elected or appointed by the Board of Trustees may be removed at any time by the affirmative vote of the majority of the whole Board.

Section 10. A Trustee may be elected to fill the office of President of the Board of Trustees of the corporation for a maximum of four full one year terms, and after completing

absence or disability for any cause whatever of the latter.

Section 5. The principal duties of the Secretary shall be to countersign all conveyances, assignments and contracts executed by the corporation, affixing the seal of the corporation thereto and to such other papers as may be required or directed to be sealed, and to keep a record of the proceedings of the meetings of the Trustees, and to safely and systematically keep all books, papers, records and documents belonging to the corporation or pertaining to the business thereof.

Section 6. The principal duties of the Treasurer shall be to keep an account of all monies, credits and property of any and every nature of the corporation which shall come into his hands, and keep an accurate account of monies received and disbursed and proper vouchers for monies disbursed, and to render such accounts, statements and inventory of monies received and disbursed and of money and property on hand, and generally of all matters pertaining to this office as shall be required by the Board of Trustees.

ARTICLE IV.

COMMITTEES:

Section 1. There shall be appointed annually by the President, subject to ratification by the Board of Trustees, the following standing committees of the Board of Trustees:

(a) Executive Committee
(b) Investment Committee
(c) Pension–Salary Committee
(d) Audit Committee

The Executive Committee shall consist of the President, Vice Presidents, Secretary and Treasurer of the corporation, and the immediate past President if serving as a Trustee.

Other standing committees shall consist of Trustees and staff members appointed by the President and each committee shall be

followed by the corporation's staff in order to make certain that the staff is following sound accounting principles and procedures in the administration of the internal affairs of the corporation. The Audit Committee within its discretion may make direct contact at any time with independent outside auditors employed by the corporation and review all audits of the corporation's books and affairs prepared by such independent auditors. The Audit Committee shall report periodically on its activities to the Board of Trustees and shall also report such activities to the Board of Trustees at any time when requested by the Board of Trustees.

Section 6. The Board of Trustees may at any time create additional standing committees with such powers and duties as the Board of Trustees may determine.

Section 7. The President may at any time create special committees with such powers, duties and membership as he may determine.

ARTICLE V.

SEAL:

The corporate seal shall have inscribed thereon the name of the corporation and the words "Corporate Seal." Such seal may be used by causing it or a facsimile thereof to be impressed or affixed or reproduced.

ARTICLE VI.

FISCAL YEAR:

The fiscal year of the corporation shall be from July 1 through June 30.

ARTICLE VII.

INDEMNIFICATION OF TRUSTEES, DIRECTORS AND OFFICERS:

Section 1. Definition of Terms:

(a) "Trustee, Director, Officer or Employee" shall include any person who

director, officer or employee who was or is a party or is threatened to be made a party to any threatened pending or completed action as defined herein by reason of the fact that he is or was a Trustee, director, officer or employee of the corporation, or is or was serving at the request of the corporation as a director, officer or employee of another corporation against those of his expenses specified herein and pursuant to the provisions and under the conditions of subsections (a), (b) and (c) herein.

(a) **Successful Defense of Action:** To the extent that a Trustee, director, officer or employee of the corporation has been successful on the merits or otherwise in the defense of any action or in the defense of any claim, issue or matter therein, he shall be indemnified against expenses (including attorneys' fees) actually and reasonably incurred by him in connection therewith.

(b) **Actions by or in the Right of the Corporation:** To the extent not covered by Subsection (a) of this Section, if a determination is made by the Board of Trustees, or, in the event that a quorum of the Board of Trustees is not obtainable, or even if obtainable, a quorum of disinterested Trustees so directs, by independent legal counsel in a written opinion, that a Trustee, director, officer or employee acted in good faith and in a manner he reasonably believed to be in or not opposed to the best interests of the corporation, he shall be indemnified against expenses, including attorneys' fees actually and reasonably incurred by him in connection with the defense or settlement of any action by or in the right of the corporation to procure a judgment in its favor; provided that (unless directed otherwise by the Court in which such action was brought), no indemnification

good faith and in a manner which he reasonably believed to be in or not opposed to the best interest of the corporation and, with respect to any criminal action, had reasonable cause to believe his conduct was unlawful.

Section 3. Appointment of Independent Legal Counsel: In the event a situation arises which may give rise to indemnification under Section 2 of this Article, the Board of Trustees, by a majority vote of those Trustees not parties to the actions described in that Section, whether or not a quorum, may appoint independent legal counsel to make the written determinations provided for in Sections 2 (b) and 2 (c) of this Article.

Section 4. Discretionary Insurance: The corporation may upon affirmative vote of a majority of its Board of Trustees, purchase commercial insurance for the benefit of a Trustee, director, officer or employee against all or any part of the expense, liabilities or settlement payments arising from actions against such Trustee, director, officer or employee, whether or not the corporation would have the power to indemnify such Trustee, director, officer or employee against such expenses or liability under Section 2 of this Article. Such insurance may, but need not, be for the benefit of all Trustees, directors, officers or employees.

Section 5. Liability for Determinations: The corporation and its Trustees, directors, officers or employees shall not be liable to anyone for making or refusing to make any payment under Sections 2 (b) and 2 (c) of this Article in reliance on the determination by the Board of Trustees and on the written opinion of independent legal counsel as provided in those Sections.

Section 6. Other Rights: The foregoing indemnification provisions shall be in addition, and may be claimed without prejudice, to any

WARF takes over the development and marketing of patentable ideas, pays the inventor a small share of the royalties, and gives a small additional share to support other research in his or her department. The balance becomes a major source of support for UW-Madison research programs. Often the Graduate School turns to WARF for some major scientific building or a new kind of scientific equipment that the State of Wisconsin is not able to provide. A much larger share of WARF's support goes to the Graduate School to fund, on a competitive basis, the research of faculty members in all parts of the University.

Without question, WARF is one of the primary reasons that the UW-Madison is a great university rather than only a "good" or "adequate" one. Young Ph.D.s with a reputation and potential that would bring them much higher salaries at some other universities have often come here because Wisconsin offered the best funding and encouragement for their research. The availability of WARF support has also kept some people here who, in salary terms, could have done much better elsewhere.

WARF raises, invests, and expends money solely for the benefit of the scholarly work at the University. The decisions on how its contributions are spent are made within the University, on the basis of merit and with the help of a broadly-based faculty committee of scientists and scholars. As a result, this information is a matter of complete and open public record. The fiscal affairs of WARF itself are also kept under scrutiny through the reporting requirements of the federal law governing foundations and the IRS rules for tax exempt status. It operates under the direction of a Board of distinguished Wisconsin citizens and alumni. These are men and women who have earned public trust by many years of selfless public contributions. They receive no pay except for reimbursement of their expenses, but they devote many hours to the work of WARF and the needs of the University--BRYANT KEARL, UW-Madison Dean of University Outreach, June, 1985.


WISCONSIN
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other rights which any Trustee, director, officer or employee may have.

Section 7. Advance Payment of Expenses: Expenses incurred by a Trustee, director, officer or employee in defending an action may be paid by the corporation in advance of the final disposition of such action if (a) there has been a determination by the Board of Trustees as herein provided or by independent legal counsel appointed pursuant to Section 3 of this Article VII that such person has met the applicable standard of conduct set forth in Section 2 hereof; and (b) such person gives a written undertaking to repay the amount advanced unless it shall ultimately be determined that he is entitled to be indemnified by the corporation.

ARTICLE VIII.

DISTRIBUTIONS:

In the distribution of the net income of the Foundation, priority will be given to grants for the support of scientific investigation and research in the University of Wisconsin at Madison.

ARTICLE IX.

AMENDMENT OF BY-LAWS:

These By-Laws may be amended, altered or repealed at any annual, regular or special meeting of the Board of Trustees, providing that notice of the proposed amendment be given in writing to all of the Trustees at least five days before such meeting.

shall be made in respect to any claim, issue or matter as to which such person shall have been adjudged to be liable for negligence or misconduct in the performance of his duty to the corporation unless and only to the extent that the Court in which such action or suit was brought shall determine upon application that, despite the adjudication of liability but in view of all circumstances of the case, such person is fairly and reasonably entitled to indemnity for such expenses which such Court shall deem proper.

(c) **Other Civil Actions and Criminal Actions:** If a determination is made by the Board of Trustees by a majority vote of a quorum consisting of Trustees who are not parties to any action, suit or proceeding not covered by subsection (a) or subsection (b) hereof, or, if such a quorum is not obtainable, or even if obtainable, a quorum of disinterested Trustees so directs, by independent legal counsel in a written opinion, that with respect to such action, a Trustee, director, officer or employee of the corporation acted in good faith and in a manner he reasonably believed to be in or not opposed to the best interests of the corporation, and with respect to any criminal action that he had no reasonable cause to believe his conduct was illegal, he shall be indemnified against expenses (including attorneys' fees), judgments, fines and amounts paid in settlement and reasonably incurred by him in connection therewith. The termination of any action, suit or proceeding by judgment, order settlement, conviction, or upon a plea of nolo contendere or its equivalent, shall not, of itself, create a presumption that the person did not act in

may have served at the request of the Wisconsin Alumni Research Foundation as a director, officer or employee of another corporation in which the Wisconsin Alumni Research Foundation owned stock or was a creditor at any time during the period of said service, and all past, present and future Trustees, officers and employees of the Wisconsin Alumni Research Foundation, whether or not so serving at the time of incurring the expenses or liabilities referred to herein, and their personal representatives.

(b) "Action" means any civil, criminal or administrative action, suit, proceeding or claim, or threat thereof, in which a Trustee, director, officer or employee may be involved as a party or otherwise, by reason of his having served as such Trustee, director, officer or employee or by reason of anything done or omitted by him as such Trustee, director, officer or employee, or alleged to have been so done or omitted.

(c) "Determination by the Board of Trustees" means a determination made by resolution by a majority vote of a quorum consisting of Trustees who were not parties to an action, suit or proceeding in which a Trustee, director, officer or employee may be involved.

(d) "Determination by Independent Legal Counsel" means a determination in the form of a written opinion addressed to the Board of Trustees by legal counsel appointed as provided in Section 3 hereof, that indemnification of a Trustee, director, officer or employee is proper in the circumstances because he has met the applicable standards of conduct set forth in Section 2 hereof.

Section 2. Mandatory Indemnification: The corporation shall indemnify each Trustee,

comprised of whatever number of persons the President, in his discretion and subject to ratification by the Board of Trustees, shall determine. The President shall designate the chairman of each standing committee. The chairman of each such committee shall preside at all meetings of the committee and shall report to the Board of Trustees on behalf of the committee.

Section 2. The Executive Committee shall be entitled to exercise all the powers of the Board of Trustees when not in session, but subject to the direction thereof.

Section 3. All members of the Board of Trustees shall constitute alternate members of the Investment Committee and may be called upon by the chairman of such committee to serve in the absence of any of the regular members of such committee. The Investment Committee shall have general supervision of the investments made by the corporation and shall establish all policies relating to investments, subject to approval of such policies by the Board of Trustees. The committee shall report on its activities at the annual meeting of the Board of Trustees and at each regular meeting thereof and at such other times as requested.

Section 4. The Pension–Salary Committee shall (a) establish policies with respect to salaries to be paid employees of the corporation; and (b) shall periodically review the terms of the corporation's Pension Plan and from time to time make any recommendations to the Board of Trustees it sees fit to make, to the end that the corporation's Pension Plan will at all times be kept up to date. The Pension–Salary Committee shall make periodic reports of its activities to the Board of Trustees and also will report to the Board of Trustees when called upon by the Board.

Section 5. The Audit Committee shall review the accounting procedures and practices

as Trustee upon October 3, 1972 shall be designated as an honorary Trustee upon attaining age 72.

(b) The Trustees may elect at any meeting persons who have had a connection with the Wisconsin Alumni Research Foundation over the history of its existence and deemed to be worthy of the honor, as honorary Trustees, in addition to the persons who become honorary Trustees by virtue of the provisions of Section 3 (a) hereof.

(c) Honorary Trustees shall be entitled to attend all meetings of the Board of Trustees and shall be notified of such meetings, but shall not be entitled to vote on any matter presented at such meetings.

(d) The office of Trustee created by an amendment of these By-Laws enlarging the number of Trustees of the corporation shall be filled at its discretion by the Board of Trustees. Vacancies due to resignation, death, or change to honorary status shall be filled at its discretion by the Board of Trustees for the unexpired term.

Section 4. The annual meeting of the Board of Trustees shall be held upon the call of the President at any time during the months of April or May of the year for which such annual meeting is to be held. Regular meetings of the Board of Trustees may be held at such time and place as shall from time to time be determined by the Board of Trustees. Special meetings of the Board of Trustees may be called by the President on five days' notice to each Trustee, either personally or by mail, telegram, or telephone. At least ten days prior to all regular meetings of the Board of Trustees, a written reminder notice thereof shall be sent by the Managing Director of the corporation to each Trustee by mail to the address furnished by such Trustee.

this tenure of office such Trustee shall be ineligible to further occupy at any future time the office of President of the Board of Trustees.

Section 11. Any action required by the Articles of Incorporation or By-Laws of this corporation, or any provision of law to be taken at a meeting or any other action which may be taken at a meeting, may be taken without a meeting if a consent in writing setting forth the action so taken shall be signed by all of the Trustees or members of a Committee thereof entitled to vote with respect to the matter thereof. Such consent shall have the same force and effect as the unanimous vote, and may be stated as such in any Articles or document filed with the Secretary of State under Chapter 181 of the Wisconsin Statutes.

ARTICLE III.

OFFICERS:

Section 1. The officers of the corporation shall have such powers and perform such duties respectively as are normal to such offices or as shall from time to time be assigned to them by the Board of Trustees.

Section 2. In the absence of the President or in the event of his inability or refusal to act, the Vice Presidents in the order designated by resolution of the Board of Trustees, or in the absence of any designation, then in the order of their appointment, shall perform the duties of the President, and when so acting shall have all the powers of and be subject to all the restrictions upon the President.

Section 3. The principal duties of the President shall be to preside over all meetings of the Board of Trustees, and to have general supervision of the affairs of the corporation.

Section 4. The principal duties of the Vice Presidents shall, in accordance with the terms of Section 2 of this Article, be to discharge the duties of the President in the event of

of Wisconsin for a period of not less than two years, or (2) who are graduates of the University of Wisconsin. The Trustees shall be those qualified persons who are Trustees at the time of the adoption of these Restated Articles, and such other persons as may be elected from time to time by the Trustees. The terms and conditions governing the qualifications and selection of Trustees shall be fixed by the By-Laws.

Article 11. In case of the dissolution of the corporation, the Trustees after paying or making provision for payment of all of the liabilities of the corporation, shall distribute all assets of the corporation exclusively for the aforesaid purposes of the corporation, as the Trustees shall determine, to the University of Wisconsin, or to such organization or organizations, including trusts, organized and operated exclusively for charitable, educational or scientific purposes, and shall at the time qualify as an organization or organizations described in Section 501 (c) (3) of the Internal Revenue Code of 1954, upon the condition that such organization or organizations receiving such distributions shall apply and devote such assets exclusively for the benefit of the University of Wisconsin for the aforesaid purposes of the corporation, provided however, that any transfer or disposition of such net assets shall be subject to the execution and performance of any trust under which its property or any part thereof may have been received or may be held.

Article 12. These Articles may be amended upon a two-thirds vote of the Trustees, but no such amendment shall change substantially the original purpose of the corporation or the provisions of Article 11 hereof.

The undersigned officers of Wisconsin Alumni Research Foundation certify:

1. The foregoing Second Restatement of the Articles of Incorporation of said corporation

SECOND RESTATED ARTICLES OF INCORPORATION OF WISCONSIN ALUMNI RESEARCH FOUNDATION

as of May 2, 1975

These Restated Articles are executed for the purpose of perpetuating a Wisconsin corporation under Chapter 181 of the Wisconsin Statutes without stock and not for profit, and supersede and take the place of the heretofore existing Articles of Incorporation and amendments thereto.

Article 1. The name of the corporation shall be Wisconsin Alumni Research Foundation.

Article 2. The period of existence shall be perpetual.

Article 3. The purposes for which the corporation is formed are as follows:

A. Subject to the limitations herein, this corporation is organized and shall be operated exclusively for the benefit of the University of Wisconsin.

B. This corporation is organized and is to be operated exclusively for charitable, scientific or educational purposes, including for such purposes—

(1) To promote, encourage and aid scientific investigation and research at the University of Wisconsin by the faculty, staff, alumni and students thereof, and to provide or assist in providing means and machinery by which their scientific discoveries, inventions and processes may be developed, applied and patented and by which such utilization or disposition may be made of such discoveries, inventions and processes and patent rights or interests therein as may tend to provide funds for and to stimulate and promote

HONORARY TRUSTEES, 1985

Hood, Wayne J.
Former Executive Vice
President & Treasurer
The Trane Company
LaCrosse, Wisconsin

Lenher, Samuel
Former Vice President
E. I. duPont deNemours & Co.
Wilmington, Delaware

Rewey, Stanley L.
Vice Chairman of the Board
Marshall & Ilsley Bank
Milwaukee, Wisconsin

PRESIDENTS OF THE BOARD

George I. Haight	May 8, 1926 - September 30, 1955 (Died in Office)
Thomas E. Brittingham, Jr.	October 22, 1955 - April 16, 1960
Donald C. Slichter	April 23, 1960 - July 17, 1964
William R. Kellett	July 17, 1964 - June 22, 1968
Walter A. Frautschi	June 22, 1968 - May 11, 1972
H. I. Romnes	May 11, 1972 - November 19, 1973
Stanley L. Rewey	January 10, 1974 (to fill unexpired term of H. I. Romnes who died in office 11/19/73) February 2, 1974 - June 2, 1978
William O. Beers	June 2, 1978 - April 30, 1982
William B. Murphy	April 30, 1982 - to date

WISCONSIN ALUMNI RESEARCH FOUNDATION TRUSTEES
1985

Beers, William O.
Director and Former
Chairman of the Board
Kraft Corporation
Glenview, Illinois

Bolz, Robert M.
Former President
Oscar Mayer & Co.
Madison, Wisconsin

Cleary, Catherine B.
Former President, First
Wisconsin Trust Company
Milwaukee, Wisconsin

Cleary, Russell G.
President
G. Heileman Brewing Co., Inc.
LaCrosse, Wisconsin

Draper, Robert F., Sr.
Counselor to Management
Draper Associates
Montrose, Colorado

Erickson, Donald J.
Senior Partner (retired)
Arthur Andersen & Company
Chicago, Illinois

Frautschi, Walter A.
Chairman, Board of Directors
Webcrafters, Inc.
Madison, Wisconsin

Kellett, William R.
Former President
Kimberly-Clark Corporation
Neenah, Wisconsin

Kress, James F.
President
Green Bay Packaging, Inc.
Green Bay, Wisconsin

grace that has produced, one after another, a series of lucrative patents. And finally there was the happy circumstance that each of those processes or products in turn has made such a profound contribution to the human condition.

Why it hasn't been possible for other institutions to duplicate the WARF experience has simply been because one or more of those six components of WARF's success have been either missing, ineptly exploited, or impossible to replicate.

The odds today are very high against a lone scientist duplicating a discovery as encompassing as the Steenbock process, and, furthermore, donating the resulting patent to an independent party, represented by a WARF. The WARF independent-party concept itself has proven to be rare; the temptation has been great to encumber university research support mechanisms with personnel, policy, and political constraints that limit their flexibility and subject them to extraneous pressures.

The odds today are equally high against a handful of volunteer alumni money managers applying such sensational astuteness and timing to building up a very substantial endowment. Current federal court decisions, IRS codes, and FDA procedures militate strongly against a replication of the WARF experience. The whole social environment has changed. (For example, WARF's royalty revenues on the Steenbock process hinged in part on permission granted to a licensee to use a package or advertisement emblem certifying to the vitamin D content of a product. Such a "seal of approval" would be hazardous in today's litigious climate because the threat of product liability suits would be too great.)

The odds are enormous against one lucrative patent in the public interest being succeeded almost like clock-work with donated replacement patents.

Perhaps most crucial of all, the WARF Trustees have adhered to a principle stated by Woodrow Wilson when he was yet President of

What, in summary, do multiple WARF funds buy? Writing in 1973 from the perspective of a man who for more than 25 years played a dominant role in spending WARF funds, President Emeritus E. B. Fred catalogued their "special" uses in this way:

WARF funds provide salaries of research staff members, associates, assistants, etc.; create travel grants; finance endowed or named professors, visiting professors, and visiting lecturers; purchase supplies and apparatus; and erect buildings. These grants are of special value to the University:

*As venture capital--for exploratory research programs;

*For research projects thought to be greater risks than those usually supported by state or federal funds;

*As start-up funds to help promising young faculty who, because they have not yet firmly established their positions, cannot yet qualify for support money from extramural sources;

*For scholarships and fellowships; WARF's chief product has not been vitamin D irradiation or its other discoveries, but its production of researching young men and women;

*To develop entirely new ideas that may or may not have any value;

*To provide funds for long-range projects that require well-trained, mature, and experienced investigators;

*To provide special equipment;

*To provide funds for the construction of research buildings, as well as matching funds for facilities.

Such is the caliber of the UW-Madison faculty today that the institution consistently rates in the top two or three of American research universities in the annual receipt of research grants from government and private

Implied is a long-standing Research Committee policy that it supports the type of fundamental or basic research for which other funding sources are limited.

Based on the estimated need for funds with which to respond to requests for research support, the Dean of the Graduate School and the Chancellor develop a consolidated annual request and submit it to the WARF Board of Trustees. Assuming sufficient funds are available, the Trustees award the grant subject to acceptance by the University Board of Regents. Responsibility for administration of WARF grant expenditures is vested in the University, using regular University systems of purchase and audit and of personnel appointment procedures. In other words, all WARF grants to the University go through the Regents to the UW-Madison Chancellor and hence through schools and colleges to departments and thence to the target professors, with all the legal, fiscal, and ethical controls the trail entails. All such procedures respecting the WARF "channel" are evidence of a devoted thoroughness and expertise.

WARF special grants are in response to needs brought forward by UW-Madison as an institution through the Chancellor rather than by the Research Committee on behalf of individual scholars and scientists. While over the years they have not bulked so large monetarily in total as have the annual grants-in-aid, the special grants have met crucial needs at crucial times, positioning the University at the cutting edge of research.

An initial special grant in 1937 launched the University of Wisconsin Press. A strategic grant in the form of a novel housing complex--University Houses--attracted ex-GIs as potential faculty stars at the close of World War II. In recent years special grants of six figures or more have included:

Phoenix of Madison, Inc. PPI is a fiscal means of helping link personnel and technology of the Nicolet Instrument Corporation, Madison, Wisconsin, with key University of Wisconsin-Madison faculty members and research facilities engaged in the type of University-industry collaborative enterprise encouraged by state leaders. As a corporate device, PPI's central mission is to facilitate a unique R & D concept--the design, manufacture, and test-marketing of a new and significantly improved type of hearing aid--based on a better fundamental understanding of the ear, a greater knowledge of individual hearing impediments, and modern digital microchip technology. In a larger sense, PPI itself is an experiment in more effective teamwork between private industry and public university aimed at reducing the lead-time between laboratory research and the delivery of a product to a public in need. In turn, PPI has the potential to add impulse to the Wisconsin economy as well as to generate royalty revenues that could ultimately help fund additional research activities at UW-Madison.

All of WARF's subsidiaries are fully taxable under federal, state, and municipal laws.

Supporting Research

There are two forms of major WARF grants to UW-Madison today: (1) general research grants-in-aid, and (2) special grants for buildings, land, major equipment, program incentives, and research faculty enhancement funds. WARF also provides some donor-directed gift funds and income from special reserves.

General research grants-in-aid are by far the largest category. They follow a unique "channel". At its hub is a Graduate School Research Committee of 30-plus rotating faculty members appointed by the UW-Madison Chancellor. It is this Committee alone that determines what research grants-in-aid go to what faculty members, when, for what. WARF does not propose or recommend projects for consideration or approval by the Research Committee nor does it veto individual projects. Neither the Trustees nor the WARF staff has information about the nature of individual researchers and their projects until

metabolic bone diseases, and to introduce new therapeutic tools for management of disorders of calcium and phosphorus imbalance.

Via four basic WARF patents, their associated WARF licenses, and the resulting pharmaceuticals, the fruits of research in the DeLuca laboratories are at work around the world treating bone degeneration in patients with kidney failure, treating parathyroid gland failure that results in a convulsive (tick) or tetanic (immobile) state, and treating a genetic defect known as vitamin D-resistant rickets.

Through overseas WARF patents and licenses, commercial versions of DeLuca et al calcitriol (super-active vitamin D) are prescribed to reduce bone fractures caused by osteoporosis, a bone disease that afflicts millions of the elderly, particulary women. Calcitriol therapy is seen as a way to restore calcium balance and prevent the bone fractures caused by osteoporosis. (Calcitriol has yet to receive approval from the FDA for use in the U.S. in the treatment of osteoporosis.)

Evolving the multiple patents and working out the manifold licenses stemming from Hector DeLuca's monumental researches into vitamin D derivatives has taken nearly as much creative energy in their own way as did the basic research in the first place. Just as Professor DeLuca and his associates have built on Harry Steenbock's pioneering investigations, so has WARF's present staff built on the experience of its predecessors in managing the Steenbock and Link patents.

While WARF patent management has focused on the pharmaceutical field, WARF has been open to a wide variety of innovations. In 1973, Charles Mistretta, a young UW Medical School professor of medical physics, began to pioneer the technology that started a quiet but far-reaching revolution in angiography--the use of x-rays to examine blood vessels. He experimented with involving television and special-purpose computers with x-ray. By comparing images taken before and after injection of a contrasting substance, or "contrast agency," Dr. Mistretta was able to obtain images with less contrast agent

needs in order to develop their inventions to the maximum benefit of society. A special faculty committee on technical innovation reviews proposals from faculty and makes modest awards to meet such needs, where appropriate.

After a patent is obtained by a faculty member with the help of WARF, how does WARF make contact with companies which might be interested in commercial development? WARF's long identification with valuable research findings at the University of Wisconsin has resulted in ready access to most corporations, particularly in the pharmaceutical and related industries. This access is utilized by direct phone contact when a new invention becomes available for license.

The licensing staff maintains a membership in the Licensing Executive Society (L.E.S.), an international organization of industrial, legal, and university personnel involved in all aspects of the licensing of intellectual property. Attendance at the LES meetings provides opportunity to make or renew personal relationships which are invaluable to the licensing effort. (Other devices, such as invention listing in computerized data bases, and attendance at trade exhibits of new inventions, have also been employed, but with minimum results.) Many companies send representatives to Madison to visit WARF for the purpose of finding licensable inventions for their companies. There are catalogs of manufacturers of a variety of goods. These plus the financial information on publicly owned companies which exists in WARF's investment files are very helpful in locating and identifying potential licensees.

It can be observed from all of this account that WARF's licensing actions are primarily individual and personal. The system works because, even with a small staff size, WARF experts are either on top of the technologies they receive each year or are ready to educate themselves in the intricacies of new fields. For example, faced with a seemingly intractable problem respecting the management of computer software innovations, WARF buttressed its staff with a person specialized in the field. With WARF encouragement the University itself has

WARF encourages disclosures also with a bottom-line provision that inventors share at least modestly in any royalty revenues. The historic arrangement provided for an inventor receiving 15% of net royalties (that is, after filing fees and other out-of-pocket costs were deducted). As of October 1, 1983, WARF has markedly increased the percentage of royalty income that can accrue to an inventor or team of inventors and to their department or departments:

When a patent application is filed, the inventor will receive a $1,000 payment (shared among all co-inventors if a joint patent application is filed). Subsequently, in the event that the invention is licensed successfully, the inventor(s) receives 20% of the gross income directly from WARF. (That is, filing fees and other costs are not deducted from the income before calculating the inventor's royalties). In addition, 15% of the gross income is provided through the Graduate School to the inventor's department as an unrestricted grant to support research. These funds are to be awarded as determined by the departmental executive committee for initiating research programs of new faculty members, providing departmental research facilities and special instrumentation, supporting research projects as selected by the committee (including those of the inventor), and otherwise enhancing the research productivity of the department. These funds are non-lapsing, and larger amounts may be retained in a segregated WARF account and invested so that additional income will also be available for departmental research purposes. The remaining 65% of the gross income becomes part of the pool of resources from which the annual WARF gift to the University is derived.

Other significant changes in WARF's relations with inventors, the University, and the federal government have stemmed from passage of Public Law 96-517 which for the first time gave universities the first right to take title to inventions resulting from projects funded with federal monies.

Where has the money come from? In round numbers:

Income from investments, 1929-1985, 76%; 76 inventions which have produced income greater than expenses, 1928-1985, 20%; and gifts, donations, and bequests, 1927-1985, 4%.

As it has gone about putting assets to work to earn the money with which to accomplish its principal assigned mission, "to promote, encourage, and aid scientific investigation and research at the University," WARF has perfected several strategies that have made it the most successful organization of its kind, as follows:

Attracting Disclosures

Because WARF has no scientists or laboratories of its own, stimulating and attracting innovative UW-Madison faculty ideas is a primary WARF strategy. Fortunately UW-Madison has a roster of top-level scientists working in some of the best-equipped laboratories in the world.

WARF accepts assignment of inventions only from UW personnel. University inventors are not required to assign patent rights to WARF, even though support for their research may have been supplied altogether or in part by the Foundation. Since WARF has no part in assigning research grants to individual scientists or to individual projects, there is no pressure on University scientists to patent their discoveries or to refer them to the Foundation or to any other similar agency.

A great many inventors do choose to disclose their discoveries to WARF for development. When they do, Foundation personnel examine all pertinent information and data, determine whether the invention has value to the public, and conduct surveys to learn how it may reach the public in its best possible form and as expeditiously as practicable. (Inventions referred to the Foundation must first be submitted by the

Another Link development was the sodium salt of Warfarin, a lifesaving drug used to adjust the coagulability of blood in human patients. Sodium warfarin found an ever-growing acceptance among physicians who made it at the time the most widely prescribed anticoagulant in America. It is estimated that in the United States alone the life-prolonging Link anticoagulants, Dicumarol, sodium warfarin, and crystalline sodium warfarin, have been prescribed for over 1,000,000 patients to help prevent vascular thrombosis associated with heart disease and stroke.

* * * *

The first grant by WARF to the University of Wisconsin was made in the academic year 1928-29. This initial gift, amounting to $1,200, was used by Professors E. B. Fred and W. H. Peterson for research in the fermentation of wood waste to produce lactic and acetic acids--an early form of biotechnology.

In succeeding years the University's research programs expanded at a greatly accelerated pace, increasing the requirements for funds for research as well as for research space and facilities. WARF grants accordingly grew. In 1933-34 the annual grant passed the $100,000 figure for the first time. In 1955-56, the annual WARF grant exceeded $1,500,000, and in 1957-58 exceeded $2,000,000.

In the Depression years of 1933-35, when a scarcity of state funds imperiled the University's entire research program, the Foundation's gifts increased sixfold over those for the preceding biennium, even exceeding the grants for the two-year period that followed. In the two academic years beginning in 1933, the Foundation research grants accounted for more than half the University's total research budget. WARF research grants exceeded federal grants and contracts from 1933 to 1942 and again from 1946 to 1948. Although WARF's annual research grants rose sharply in the period following World War II, federal grants, state appropriations, and miscellaneous industrial, foundation, and individual gifts also increased so greatly in the

The first official action of the Foundation was to accept from Professor Steenbock his discoveries in the field of vitamins on which an initial government patent was to be issued on August 14, 1928.

The Trustees of WARF, constituting the entire personnel of the organization in its early years, transacted the affairs of the Foundation and developed plans and policies in the critical formative period. The first license granted by WARF was issued to the Quaker Oats Company for the vitamin D supplementation of its breakfast cereals. Arrangements were subsequently made with a number of pharmaceutical companies to distribute to the public a vitamin D medicinal preparation called Viosterol.

Acceptance of vitamin D fortification of foods and drugs by the medical profession and the public grew slowly at first, then with increasing momentum as dramatic evidence of its performance began to develop. As the public demand grew, so also did the challenges associated with responsible supervisory programs. These programs involved continuing research, quality control, public education, and persistent vigilance in protecting the public interest. Also demanding attention was the investment of earnings for grants to the University of Wisconsin--one of the two primary reasons for WARF's existence. In addition, other inventions were now being brought to the Trustees of WARF by faculty inventors.

It soon became apparent that part-time supervision of WARF functions by the Board of Trustees was no longer practicable. Accordingly, in 1930, H. L. Russell resigned his Deanship to become full-time Director of the Foundation.

Mere recitation of names, facts, and dates, however, fails by far to convey the excitement and drama that prevailed at WARF as it joined with the forces of science, education, government, and industry to combat a nutritional disease that had crippled and deformed millions upon millions of children. As a result of these cooperative efforts, vitamin D found its way to rachitic infants and children in almost all inhabited areas of the world, and rickets by the

University; and (2) to accumulate a reserve necessary to finance the protection of the inventions at stake from infringement.

These policies have meant that through fiscal prudence the WARF Trustees have built a 1931 portfolio of $400,000 in early patent income into varied assets that today are capable of providing $8.5-plus million a year in support of UW-Madison research, as well as providing a patent-defense reserve. Under their current investment guidelines, the WARF Trustees are interested primarily in "well-managed, medium-size companies with above-average growth potential; the selection process emphasizes individual company growth prospects much more than industry or group considerations."

WHEN AND HOW WARF GOT STARTED

Joe I. Abrams, WARF's original Director of Education, who was in on the formative years, has left an account of WARF's origins and early development:

The discovery by University of Wisconsin biochemist Harry Steenbock in the early 1920s that the antirachitic food constituent vitamin D could be produced in foods and drugs through ultraviolet irradiation was the genesis of another discovery--a novel mechanism for converting the fruits of research into the seeds of fresh research. Recognizing the scientific, social, and economic significance of his findings, Professor Steenbock likewise recognized that without planned direction, realization of the invention's benefits might well be severely limited, owing to lack of a satisfactory, responsible program, insufficient financial incentive to industry, and possible unscrupulous exploitation. (Particularly, Steenbock wanted to protect the Wisconsin dairy industry from the threat of fortified substitutes.)

Professor Steenbock submitted his vitamin D findings to the University Board of Regents with

make the world a healthier place than it was in 1925, and has helped to strengthen the University of Wisconsin-Madison as a world-class research university and center of higher education.

WHAT EXACTLY WARF IS AND ISN'T

The Wisconsin Alumni Research Foundation is a pioneer not-for-private-profit instrumentality incorporated in 1925 under the laws of the State of Wisconsin for two principal purposes: to work with private business and industry in helping make available to the public some of the applications of University of Wisconsin research and scholarship by managing in the public interest patents on University faculty discoveries, and to grant back to the University royalty revenues from patent licenses to "promote, encourage, and aid" further "scientific investigation and research" at that institution.

WARF derives its name from two policy criteria: (1) only alumni of the University of Wisconsin, otherwise unaffiliated with that institution's faculty and administration, may serve on its Board of Trustees; and (2) only UW programs of research, as distinguished from instruction and extension, may be so supported. Until the 1960s the priority for use of WARF funds was research in the natural sciences at what is now UW-Madison. More recently other UW-Madison fields of science and scholarship benefit from WARF's resources.

While WARF is associated exclusively with the University of Wisconsin, by state charter it operates as a free-standing entity, distinct from the institution it serves. No state employee has ever been on WARF's Board or staff, nor has WARF ever been in receipt of any state funds; counterwise no WARF grants-in-aid have ever gone to any state employee other than subject to the accountability of the Board of Regents of the University.

WARF is to be distinguished from the Wisconsin Alumni Association, a voluntary organization of former students formed in the 1890s to "support by organized effort the best interests" of their Alma Mater, now UW-Madison; and from