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REMARKS

I thought the enclosed papers from this meeting would be of interest to you.

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FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
Seymour Perry, M.D.	1/111
	Phone No. 62500

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CHAIRMAN'S MESSAGE

I am pleased to extend to you a most hearty welcome on behalf of the sponsors and organizers of this international conference on Technology Transfer in Industrialized Countries.

This conference marks the first time that two major components of NATO, the Defense Support Division and the Scientific and Environmental Affairs Division, have joined with the U.S. Army, Navy and Air Force in holding a meeting of this nature and scope. I believe that this is indicative of the current widespread interest in the subject of techology transfer and its importance in terms of its pervasive inpact on all sectors of society.

The program agenda has been prepared to offer maximum opportunity for spontaneous discussion and interchange of views and ideas by all participants. To do so required limiting the number of prepared presentations, and necessarily exercising a high degree of selectivity in the paper review process. The success of this more interactive type of conference, of course, is heavily dependent on the level of individual participation achieved. Let me therefore encourage each and everyone to participate to the fullest extent possible in the conference sessions. I hope that at the end of the conference we will depart with a better knowledge and improved understanding of the current state of affairs in techology transfer within the industrialized world. And, even more importantly, I hope we will have acquired additional ideas to pursue and at the same time developed a renewed commitment for improving technology transfer in our respective countries.

As a final note I wish to express my sincere appreciation to the many people within the NATO community who helped plan and organize this conference. A special note of thanks is extended to every attendee—speakers, session chairmen, panelists, and individual participants—for taking the time to come and contribute to the proceedings.

Sherman Gee

Sherman Gee
Conference Chairman

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CONFERENCE OBJECTIVE

Technology residing in industrialized countries constitutes the prinicpal hope and aspiration for significant social and economic betterment on the part of citizens in the industrialized world as well as those in the developing countries. This realization coupled with the already acknowledged importance of technology for military security has thrust matters of technology into the forefront of world affairs. The industrialized countries collectively possess the major share of the world's technology and must consequently be attentive to its wise management and utilization. To do so requires a firm resolve to continually assure that national policies and institutions are suitably aligned towards this goal. While recognizing that different conditions and constraints prevail in different countries, it nevertheless is also true that experiences gained and lessons learned by one country could be useful to other countries in the pursuit of effective management and utilization of technology.

The industrialized countries need to manage their technological affairs wisely and efficiently if for no other reason than the fact that technology composes an increasingly large proportion of the national resource base. Yet the growing impatience of the rest of the world for social and economic improvement introduces an urgency which disallows progress to be made at a leisurely pace.

It is for the purpose of providing an opportunity for the industrialized countries to interchange ideas and to share experiential knowledge directed towards fostering increased effectiveness and efficiency in the management of technology transfer affairs that this conference has been organized. A better understanding of the policies, institutions, and processes employed in individual countries hopefully would prove to be mutually beneficial in terms of improving existing methods of operation as well as promoting technological and economic cooperation among the industrialized countries.

GENERAL INFORMATION

Registration

Conference registration at the Hotel Palacio will be open as follows:

6 Nov 77	–	Sunday	–	1600 to 2000
7 Nov 77	–	Monday	–	0800 to 1000

The registration fee is $75.00 US. Other currencies will be accepted at the prevailing exchange rates.

Mixer-Reception

A no-host mixer-reception will be held at the hotel on

6 Nov 77	–	Sunday	–	1700 to 2000

Conference registrants and guests are cordially invited.

Hotel Placio Accomodations

Room rates are as follows:

Single	$21.00 US
Double	$34.00 US

Accomodations include daily continental breakfast and lunch. Beverage service during lunch is extra. (Thursday lunch is not included.)

Local Transportation

Train service between Estoril and Lisbon generally runs 2-3 times per hour. The train station in Estoril is within easy walking distance from the Hotel Palacio.

The hotel is approximately 30 km from the Lisbon airport. Taxi service is available. Cost is about $8.50 US.

Banquet

The conference banquet will be held on Wednesday evening, 9 Nov 1977, starting at 2000. Cocktails start at 1900. Dress will be informal.

Banquet ticket is included for conference registrants. Separate banquet tickets for guests of registrants may be purchased at the conference registration desk at $10.00 US each.

Optional Tour

A tour of local sites of interest is scheduled for Thursday afternoon, 10 Nov 77. No conference sessions will be held during this time, although there is an evening session scheduled (see Program Agenda).

The tour will visit the palaces at Sintra and Queluz, departing the hotel at 1430 and returning by 1730. Tour tickets may be obtained at the hotel desk for 200 escudos per person.

A tour of local sites of interest is scheduled for Thursday afternoon, 10 Nov 77. No conference sessions will be held during this time, although there is an evening session scheduled (see Program Agenda).

The tour will visit the palaces at Sintra and Queluz, departing the hotel at 1430 and returning by 1730. Tour tickets may be obtained at the hotel desk for 200 escudos per person.

Climate

The climate in the Lisbon area during November is generally sunny and cool. Temperatures generally reach a high of 60-65 Fahrenheit degrees during the day. Bring some cool weather clothing.

Conference Record

Conference papers and recording of the discussions will be printed as a part of the conference proceedings. Copies will be sent to every registered conference participant after the conference. Inquiries on how to obtain additional copies of the proceedings may be directed to:

Dr. Sherman Gee or Mr. Frederick Gleason
Naval Surface Weapons Center
White Oak, Silver Spring, Maryland 20910
U.S.A.

Telex: 898490 NSWC SVR
Telephone: (202) 394-1505

Messages

Messages for conference registrants may be sent directly to the Hotel Palacio.

Telex: 12757 Plage P
Telephone: 26 04 00

Country Representation

Representatives from the following 16 countries have preregistered for the conference: Belgium, Canada, Denmark, Federal Republic of Germany, France, India, Italy, Japan, Luxembourg, Netherlands, Norway, Portugal, Switzerland, Turkey, United Kingdom, and the United States.

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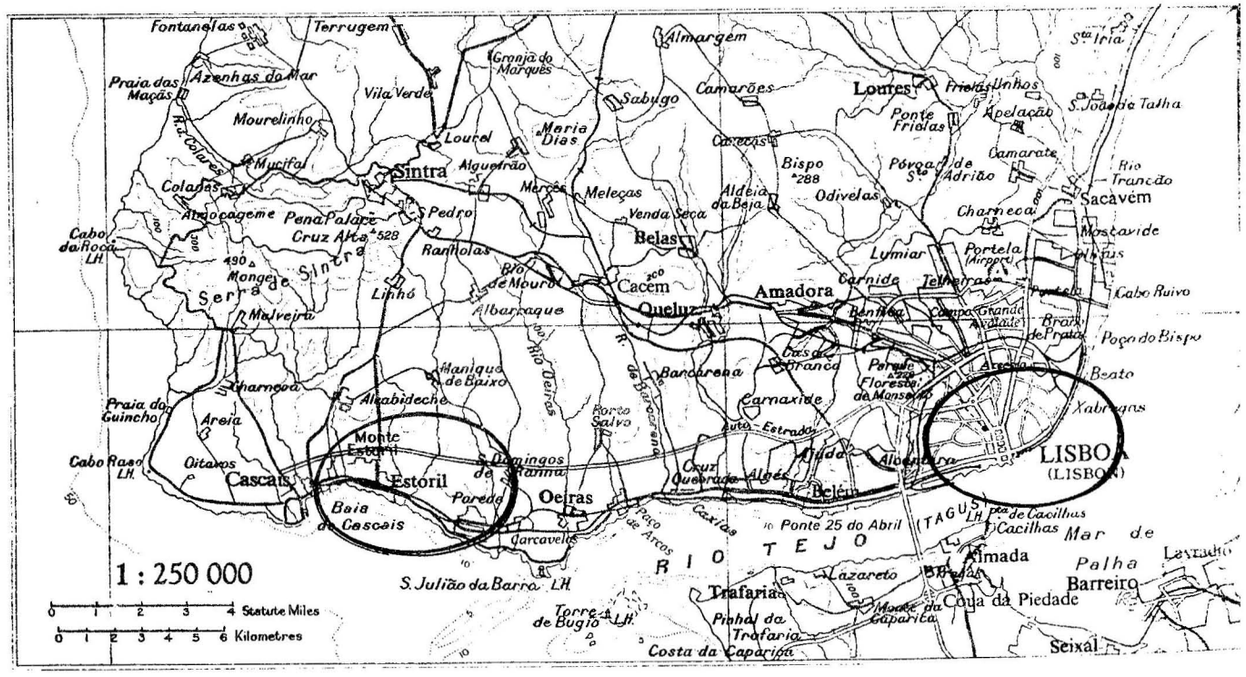
Conference Site



Conference Site

AGENDA AT-A-GLANCE

	Monda	
Morning	Opening Sessi Welcome Major Addr	
Afternoon	Session A Presentation Country Ove	
Evening		

	Monday	Tuesday	Wednesday	Thursday	Friday
Morning	Opening Session Welcome Major Addresses	Session B Presentations Discussion Period Role of Technical Information in Technology Transfer	Session D Discussion Period Processes and Mechanisms for Technology Transfer Discussion Period Barriers and Stimulants	Session F Discussion Period Military Standardization Panel Management of National Technology Transfer Affairs	Session H Discussion Period Human Factors and Attitudinal Considerations Closing Session Chairmen's Panel
	Luncheon at the Hotel		Palacio		Luncheon at Hotel
Afternoon	Session A Presentations Country Overviews	Session C Panel Role of Government in Promoting Technological Innovation Discussion Period Incentives for Innovation in Industry	Session E Panel Technology Acquisition and Domestic Technology Development Discussion Period Case Studies and Effective Measures	OPEN Optional Tour	Closing Session (Contd) Rapporteur's Synthesis and Summary Adjournment
Evening			Cocktails Banquet	Session G Discussion Period Licensing Policies and Practices	

PROGRAM AGENDA

Monday, 7 Nov

0800-1000 Registration

1000-1200 Opening Session

Chairman: Dr. Sherman Gee
Naval Surface Weapons Center
U.S.A.

1015 Host Country Welcome

Portuguese Government

1030 Address

Professor M.N. Özdaş
Asst. Secretary General for Scientific and Environmental Affairs
NATO

1115 Technology Transfer in the United States

Honorable Walter B. LaBerge
Undersecretary of the Army
U.S.A.

1200-1330 Luncheon

1330-1730 Session A: Country Overviews

Chairman: Dr. Robert H. Korkegi
Director, Advisory Group on Aerospace Research and Development
(AGARD)
NATO

1330 Technology Transfer in Japan: An Industry Perspective

Dr. Koji Kobayashi
Chairman of the Board and Chief Executive Officer
Nippon Electric Co., Ltd.
Japan

1400 Technology Transfer in the Netherlands: Science and Technology Policy

Prof. dr. ir A.A. Th.M. van Trier
Chairman, Advisory Council for Science Policy
Netherlands

Prof. dr. ir A.A. Th.M. van Trier
Chairman, Advisory Council for Science Policy
Netherlands

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1430 Technology Transfer in Canada

Dr. Josef Kates
Chairman, Science Council of Canada
Canada

1500 Break

1530 Technology Transfer in Belgium: An Industry Perspective

Mr. L. H. Beckers
Group Manager, Fabrimetal
Belgium

1600 Technology Transfer in Switzerland

Dr. Charles H. Tavel
Consultant in Strategy
Switzerland

1630 Technology Transfer in Portugal

Dr. Maria Elsa Ferreira
Institute for Foreign Investment
Portugal

1500 Technology Transfer in the Federal Republic of Germany

Dr. Ludwig Bölkow
Chairman, Messerschmitt-Bölkow-Blohm GmbH
Federal Republic of Germany

Tuesday, 8 Nov

0900-1230 Session B

Chairman: Mr. B.B. Goodman
Head, Technology Transfer Department
DG XIII, Commission of the European Communities
Luxembourg

Dr. Ludwig Bölkow
Chairman, Messerschmitt-Bölkow-Blohm GmbH
Federal Republic of Germany

Tuesday, 8 Nov

0900-1230 Session B

Chairman: Mr. B.B. Goodman
Head, Technology Transfer Department
DG XIII, Commission of the European Communities
Luxembourg

0900 Technology Transfer in the United Kingdom: Role of the Industrial Research Associations

0930 Role of EIRMA in Technology Transfer Within European Industry

Mr. R. Schulz
Secretary General, European Industrial Research Management Association
France

1000 Technology Transfer Activities in the Larger European Common Research Centers

Mr. Frank Jorgensen
Technology Transfer Project
Denmark

1030 Break

1100 Technology Transfer from Developed to Developing Countries: Experience in India

Dr. C.V.S. Ratnam
Managing Director, National Research Development Corporation of India
India

1130 Discussion Period: Role of Technical Information in Technology Transfer

Refining Data Resources to Assist Technology Transfer

Mr. Anthony J. Barrett
Managing Director and Chief Executive
Engineering Sciences Data Unit Ltd.
United Kingdom

1230-1400 Luncheon

1400-1730 Session C

Chairman: Mr. R. Medart
President, Office of Industrial Promotion
Belgium

1400 Panel: Role of Government in Promoting Technological Innovation

What should be the role of government and the nature of government policies for stimulating technological innovation in industry?

Panelists:

Mr. J.L.P. LeNoble
Director for Military Affairs
N.V. Philips' Gloeilampenfabrieken
Netherlands

Mr. J.L.P. LeNoble
Director for Military Affairs
N.V. Philips' Gloeilampenfabrieken
Netherlands

Dr. D. Schumacher
Director, Technology Transfer Service
Industrie-und Handelskammer Rhein-Neckar
Federal Republic of Germany

Mr. William G. Wells, Jr.
Staff Director, House Committee on Science and Technology
U.S.A.

Additional panelists to be selected from conference participants.

1500 Break

1530 Discussion Period: Incentives for Innovation in Industry

Innovation in Industry and Technology Transfer

Dr. L.B.J. Stuyt
President, Central Organization for Applied Scientific
Research in the Netherlands TNO
Netherlands

Technological Innovation Through Entrepreneurship

Dr. Robert M. Colton
Program Manager, National Science Foundation
U.S.A.

Wednesday, 9 Nov

0900-1230 Session D

Chairman: Mr. Robert Latournerie
Asst. General Manager, Office National d'Etudes et
de Recherches Aerospatiales (O.N.E.R.A.)
France

0900 Discussion Period: Processes and Mechanisms for Technology Transfer

Mechanisms for Technology Transfer: Role of the Infrastructure

Wednesday, 9 Nov

0900-1230 Session D

Chairman: Mr. Robert Latournerie
Asst. General Manager, Office National d'Etudes et
de Recherches Aerospatiales (O.N.E.R.A.)
France

0900 Discussion Period: Processes and Mechanisms for Technology Transfer

Mechanisms for Technology Transfer: Role of the Infrastructure

Dr. Tom Anyos
Program Director, Stanford Research Institute
U.S.A.

1100 Break

1130 Discussion Period: Barriers and Stimulants

Technology Transfer Via Military Projects: Case of the F-16

Professor Bernard Udis
Director, Bureau of Economic Research
University of Colorado
U.S.A.

1230-1400 Luncheon

1400-1700 Session E

Chairman: Professor Federico Filippi
Politecnico di Torino
Italy

1400 Panel: Technology Acquisition and Domestic Technology Development

What are the governing factors affecting the decision to import technology rather than to rely on domestic R&D for military and/or commercial applications?

Panelists:

Major Thomas G. Wetheral
U.S. ROLAND Project Office
U.S.A.

Mr. Irving M. Pikus
Deputy Director, Office of Technology Policy
Department of State
U.S.A.

Mr. Nils Tommeraas
Chief of Research
Raufoss Munitions Factories
Norway

Additional panelists to be selected from conference participants.

1500 Break

1530 Discussion Period: Case Studies and Effectiveness Measures

Technological Guidance in Belgium

Dr. W. Degrieck and J. Van Keymeulen
Institute for Encouragement of Scientific Research in Industry and Agriculture
Belgium

Technological Guidance in Belgium

Dr. W. Degrieck and J. Van Keymeulen
Institute for Encouragement of Scientific Research in Industry and Agriculture
Belgium

Effectiveness Measurement in Technology Transfer

Mr. D.F. Koeppe
International Consultant
U.S.A.

1900 Cocktails

2000 Banquet

Thursday, 10 Nov

0900-1230 Session F

Chairman: Mr. Thomas A. Callahan, Jr.
Director, Allied Interdependence Project
Georgetown Center for Strategic and International Studies
U.S.A.

0900 Discussion Period: Military Standardization

Military Standardization

LTC John F. Corby
Standardization Representative
U.S. Army Research and Standardization Group
United Kingdom

Technology Transfer Relevant to Co-operative Developments and/or Production of Specific Weapons

Rear Adm. Glicerio Azzoni (Ret.)
Consultant, OTO Melara
Italy

1100 Break

1130 Panel: Management of National Technology Transfer Affairs

Should the management of national technology affairs be centralized or dispersed—from
U.S. Army Research and Standardization Group
United Kingdom

Technology Transfer Relevant to Co-operative Developments and/or Production of Specific Weapons

Rear Adm. Glicerio Azzoni (Ret.)
Consultant, OTO Melara
Italy

1100 Break

1130 Panel: Management of National Technology Transfer Affairs

Should the management of national technology affairs be centralized or dispersed—from both a geographical and organizational standpoint? What are the advantages and disadvantages?

Dr. G.O. Krause
Fraunhofer-Gesellschaft/Institut fur Systemtechnik und Innovationsforschung
Federal Republic of Germany

Mr. B.B. Goodman
Head, Technology Transfer Department
DG XIII, Commission of the European Communities
Luxembourg

Additional panelists to be selected from conference participants.

1230-2030 Open

2030-2230 Session G

Chairman: Mr. Philip Mitches
Licensing Attorney
Canada

2030 Discussion Period: Licensing Policies and Practices

Impact of Patents and Licenses on Technology Transfer

Mr. Albert Brown
Federal Union, Inc.
U.S.A.

Legal Restriction on International Technology Transfer

Mr. David R. Murphy
Littlepage, Quaintance, Murphy, Richardson & Webner
U.S.A.

Friday, 11 Nov

0900-1200 Session H

Chairman: Professor N. Moray
Department of Psychology
University of Stirling
United Kingdom

0900 Discussion Period: Human Factors and Attitudinal Considerations

Applied Anthropological Methodology as a Contribution to Technology Transfer Programs within NATO

Dr. David K. Evans
Director, Overseas Research Center
Wake Forest University
U.S.A.

Programs within NATO

Dr. David K. Evans
Director, Overseas Research Center
Wake Forest University
U.S.A.

1015 Break

1045-1500 Closing Session

Chairman: Dr. Sherman Gee
Naval Surface Weapons Center
U.S.A.

1045 Chairmen's Panel: Synopses, Impressions and Conclusions Drawn from Session Proceedings

1200-1330 Luncheon

1330 Conference Rapporteur's Synthesis and Summary

Dr. B.J.A. Bard
Arlington Technology Services, Ltd.
United Kingdom

1430 Conference Adjournment

CONFERENCE COMMITTEE

Chairman: Dr. Sherman Gee
Navy

Mr. Harold F. Davidson
Army

Mr. Edward J. Kolb
Army

Mr. Frederick J. Gleason
Navy

Capt. James W. MacDonald
Air Force

Mr. Nick Montanarelli
Army

Members of the committee are available for general information and assistance. They can be identified by their yellow badges.

17

CONFERENCE BANQUET

Toastmaster

Mr. James E. Colvard
Technical Director
Naval Surface Weapons Center
U.S.A.

Guest Speaker

Chief Judge Howard T. Markey
U.S. Court of Customs and Patent Appeals

Dress Informal

Faculty and Staff Misconceptions Slow Transfer of Technology

Preliminary findings from the Patent Awareness Program being conducted by Research Corporation (see Summer 1975 *Quarterly Bulletin)* point to misgivings, misconceptions and lack of interest on the part of faculties and administrations as major factors in hindering the public utilization of university research results. In most cases the halting or slowing of technology transfer is nurtured by a dearth of accurate information.

The purpose of the foundation program, funded in 1974 by a grant of $198,700 from the National Science Foundation, is to heighten the awareness of faculty researchers and administrators to the possibility of inventive concepts resulting from government-supported research and to point out the steps that can be taken to bring research results into public use. Completion of this process provides a tangible return in the form of useful goods and services for the taxpayers who foot the bill for research funding, and may result in new income for the institution and the faculty inventor.

The program is based on experience gained by Research Corporation in more than 40 years of administering inventions for educational and scientific institutions. The foundation's Patent Program—an entity entirely separate from its Grants Program—currently makes available without charge a broad range of invention evaluation, patenting and licensing services to nearly 300 nonprofit institutions.

VARIETY OF ATTITUDES REVEALED

Through a series of seminars, smaller group meetings and individual conferences with faculty and administrators, members of the Research Corporation team have discovered tremendous variations in attitudes toward the handling of technology resulting from research.

Some administrators are acutely aware of their obligations to federal granting agencies, as well as the potential of additional income for the institution; they have evolved realistic patent policies which have been communicated to the faculty, they have set up effective procedures to review and evaluate research results, and in some cases they have provided in-house capabilities for patenting and licensing faculty inventions. At the other end of the scale, however, are many who make only a superficial effort or none at all.

Discussions with faculties have developed an equally broad spectrum of attitudes. Some feel that there is something unethical or unprofessional about seeking patents. Some think only of doing research, publishing and getting on with the next project. Many do not realize that they have a contractual obligation to report inventions to

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the funding government agencies. In addition to these more general impressions, there appear to be four particular areas of confusion and uncertainty for researchers.

MAIN AREAS OF CONFUSION

- The kinds of academic inventions that can be protected by patents. "I can't see anything in my research area that might be patented," or "I do only basic research; nothing patentable will ever come of it."
- Effect of government sponsorship of research. "I'm working with federal funds, so anything I discover belongs to the government."
- Effect of publication on patenting. "It doesn't concern me; my only responsibility is to publish my research results, and if I publish I can't patent."
- The patent policy of the institution. "If there should be any income, do I share in it? Does my department?"

As to the kinds of academic inventions that can be patented, many researchers do not understand how basic work in chemistry, physics or biology can result in findings of potential value in pharmaceuticals, industrial processes, laboratory equipment, medical devices and other useful products or procedures. Since it is difficult to define precisely which research results may be of value, researchers are advised to disclose *all* summary data in detail to the designated university authorities for evaluation. This may often be done merely by submission of seminar or journal manuscripts before delivery or publication.

Just as troublesome to some—since the ground rules are different for each funding agency—is the question of ownership of rights to results of research supported by federal grants. The erroneous conclusion that the government requires sole ownership rights to such inventions has undoubtedly caused a number of patentable inventions to lie fallow in researchers' notebooks. In fact, the agencies generally encourage institutions to develop suitable patent policies and mechanisms to bring inventions *into use*. Through use of well established agency regulations, institutions having such policies and procedures may obtain rights to inventions, permitting development of the inventions through patenting and licensing, with both the institutions and their faculty inventors participating in royalties that may result.

A frequently encountered belief is that inventions can be "dedicated to the public" by publishing, rather than patenting. In our capitalistic society, however, this is not the case. Firms are most reluctant to spend huge sums to develop new products or processes for which

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there is no patent protection. Such protection is especially needed for new pharmaceuticals where development costs may run into the millions.)

The effect of publishing on patenting is another area of uncertainty for many researchers, and for good reason; it is fraught with pitfalls. First, there is the question as to what constitutes a "publication." A printed abstract or a thesis cataloged in a library may be a publication in the patent sense. Then, there is the matter of timing. While the inventor has up to a year in the U.S. to file a patent application after publishing, there is no such leeway in most other countries. Thus the mere act of publishing can bar protection in areas where it may be needed either for local development or for international licensing. As noted earlier, one safeguard is to submit manuscripts for screening for patentable material before delivery or publication. In any case, the investigator should consult the institution's patent authorities before disclosing to any audience (even a reporter for a local paper) detail about discovery which might permit a person familiar with the field to duplicate it or put it to use.

There is a surprising lack of knowledge on the part of many researchers as to the patent policies of their own institutions, in spite of the fact that they are generally distributed widely. These should be "must" reading, for they spell out the responsibilities of researchers to disclose inventions, the procedures for evaluating, patenting and licensing, and the methods of sharing any resulting royalty income. Investigators should be urged to familiarize themselves with their institutions' stated policies, and if there are none, administrations should consider developing them at the earliest opportunity.

PROGRAM RESULTS SUMMARIZED

Based on the results of the Patent Awareness Program to date, it is clear that, given two conditions, a carefully planned, concentrated and continuing program can succeed in correcting misconceptions and supplying the needed information, leading to an awareness of the potential that lies in research results and an incentive to do something about it.

At one institution covered in the Research Corporation program, invention disclosure activity was increased some 300% within one year. At another so many inventive concepts have been surfaced that the administration is hard pressed to handle the evaluations. At others the results have been less spectacular, although in all cases there have been definite increases in disclosures.

The two conditions on which the success of the program hinges are positive attitudes of administrators, and enthusiasm on the part of department chairmen. Without an administration that processes invention disclosures rapidly and intelligently, keeping faculty inventors informed, and without the demonstrated support of department chairmen in the program, the chances are greatly reduced that inventions hidden in research results will ever be discovered, let alone put to use.

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Cottrell Centennial to be Observed

The 100th anniversary of the birth of Frederick Gardner Cottrell, air pollution control pioneer and founder of Research Corporation, will be observed at California State College, Stanislaus in January 1977 with a Cottrell Centennial Symposium. The two-day program, scheduled for January 13-14, will be devoted to the sources of air pollution and its effects on the growth, quality and quantity of crops.

Speakers at the symposium will include scientists from universities, industry, and state and federal agencies. Joel Hildebrand, Emeritus Professor of Chemistry at the University of California, Berkeley, will speak of his recollections of Dr. Cottrell, his long-time colleague. James S. Coles, President of Research Corporation, will discuss the evolution and progress of the nonprofit organization Dr. Cottrell established in 1912 through his gift of patent rights in the electrical precipitation process for cleaning industrial gases.

Announcing the symposium, President Walter Olson of the college noted that the topic is appropriate in view of both Cottrell's contributions to the control of air pollution and the fact that agriculture is the primary interest of the San Joaquin Valley. The location is appropriate, too, in that the college is only some 100 miles from the site of the first successful commercial application of the Cottrell system of electrical precipitation.

Writing of this installation in his biography, "Cottrell: Samaritan of Science," Frank Cameron noted that in 1905 the indignant citizens of Solano County rose in protest against the Selby Smelting and Lead Company plant in adjacent Contra Costa County, "claiming that for eight months of the year the prevailing winds from the Pacific were carrying the smelter smoke across the county line and thereby causing manifold nuisances . . . Oldtimers declared that in years gone by, Solano County had once produced the largest grain crops and the finest fruits in all California, but with the coming of the smelter and its pervasive fumes, the produce of the area had sadly deteriorated."

Dr. Cottrell, then a 30-year-old Assistant Professor of Chemistry at Berkeley, attacked the problem during his summer vacation in 1907, redesigning and scaling up his makeshift laboratory model to full working size. Within a few months he was able to record his first successful industrial application. Before the precipitator was turned on, dense white clouds of sulphuric acid, arsenic and lead salts trailed downwind from Selby stack #2. With the precipitator on, only the faintest of thin white puffs were noticeable, and from across Carquinez Straits in Solano County, that part of the smelter appeared to have been shut down. The Selby precipitator continued to operate successfully for nearly 40 years.

The Centennial Symposium in honor of Dr. Cottrell was conceived by V. S. Tuman, Professor of Physics at California State College, Stanislaus, who is chairman of the program committee. Inquiries about the symposium may be addressed to Dr. Tuman at the college, 800 Monte Vista Avenue, Turlock, California 95380.

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Cottrell Grants of $541,000 to Aid Physical Science Research

Cottrell grants amounting to $541,883 were made in May by Research Corporation for support of basic research, mainly in the physical sciences. In the Cottrell College Science Program, 31 grants totaling $211,545 were awarded to 24 private, predominantly undergraduate colleges. In the Cottrell Research Grants Program, 54 grants amounting to $330,338 were made to 47 graduate institutions and public undergraduate universities.

In the college program, 30% of the applications were for basic research in organic chemistry, 19% in inorganic chemistry, 16% in physical chemistry, 7% in physics and 28% in other sciences. In the Cottrell Research Grants Program, 28% of the applications were for work in physics, 26% in physical chemistry, 20% in organic chemistry, 11% in inorganic chemistry and 15% in other sciences. In both programs, most proposals categorized as "other" were those with biological implications. With the Cottrell Programs' emphasis on the physical sciences, these were evaluated primarily on the physical or chemical techniques proposed, rather than upon the biology.

Cottrell College Science Grants

ERROL R. ARCHIBOLD, Morehouse College
Molecular studies on bacterial plasmid replication in *Escherichia coli* and *Salmonella typhimurium*—$6,000

CHARLES F. BEAM, JR., Newberry College
Novel syntheses with multiple anions—$5,810

BRUCE B. BENSON, Amherst College
Accurate aqueous solubilities of gases and the structure of water—$7,500

MEREDITH BLACKWELL, Hope College
A study of distribution, development and evolution of Laboulbeniomycetes restricted to bat flies (Diptera: Nycteribiidae, Streblidae)—$3,835

SALLY CHAPMAN, Barnard College
Classical trajectory study of vibrational energy requirements for reaction (two-year program)—$4,000

FRANK P. DeHAAN, Occidental College
Mechanisms of electrophilic aromatic substitution reactions—$11,725

DAVID G. DeWIT, Augustana College, Illinois
Reactivity of rhenium carbonyl monomers in oxidation and substitution reactions (two-year program)—$14,400

EARL DOOMES, Macalester College
Cyclophane diene chemistry—$6,150

WILLIAM EISINGER, University of Santa Clara
Effects of ethylene gas on pea cell expansion—$1,840

ROBERT C. HILBORN, Oberlin College
Atomic spectroscopy using tunable dye lasers—$6,800

J. ROBERT HIPPENSTEELE, Illinois Wesleyan University
Identification of the microvessels providing tissue-level redistribution of flow within skeletal muscle (two-year program)—$11,758

DONALD M. HUFFMAN, Central University of Iowa
Cytological studies of cytoplasmic male sterility in corn—$4,500

PATRICK R. JONES, University of the Pacific
Chemical activation by electron impact (two-year program)—$9,747

GEORGE J. KASPEREK, Connecticut College
The role of propinquity catalysis in the cleavage of the sulfur oxygen bond—$3,600

MAX J. KECK, John Carroll University
An investigation of the dependence of human visual motion-analyzing mechanisms on the spatial characteristics of simple moving stimuli—$3,600

STEPHEN W. KIRTLEY, Smith College
Mechanistic and synthetic studies of the reduction of VIB metal hexacarbonyls with sodium tetrahydroborate; a search for a rational metal cluster synthesis (two-year program)—$9,600

HAROLD M. KOLENBRANDER, Central University of Iowa
Study of the effects of ethionine on rat liver urocanase—$1,800

ALLEN KROPF, Amherst College
The structure of visual pigments as elucidated by analogues—$9,000

of flow within skeletal muscle (two-year program)—$11,758

DONALD M. HUFFMAN, Central University of Iowa
Cytological studies of cytoplasmic male sterility in corn—$4,500

PATRICK R. JONES, University of the Pacific
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Study of the effects of ethionine on rat liver urocanase—$1,800

ALLEN KROPF, Amherst College
The structure of visual pigments as elucidated by analogues—$9,000

ROBERT G. LANDOLT, Muskingum College
Oxidation of coal model compounds—$5,000

RICHARD A. LEVIN, Oberlin College
The development of an *in vitro* genetic exchange system in the plant pathogen, *Agrobacterium tumefaciens*—$6,000

JOHN L. MAIN, Pacific Lutheran University
The properties of mechanisms involved in the ecotypic differentiation of *Agropyron spicatum*—$4,895

JERRY R. MOHRIG, Carleton College
Chemical models of enzyme-catalyzed *syn*-elimination reactions (two-year program)—$8,400

LILA G. PEASE, Amherst College
Solution conformations of model peptides by ^{1}H and ^{13}C nuclear magnetic resonance—$9,000

BEVERLY K. PIERSON, University of Puget Sound
The role of cytochromes in photosynthetic and respiratory electron transfer in *Chloroflexus aurantiacus*—$5,850

JOHN B. REID, JR., Hampshire College
The petrology and geochemistry of high pressure mafic and ultramafic inclusions from Salt Lake Crater, HA; Kilbourne Hole, Potrillo Maar, and the West Potrillo Mts., NM—$7,500

MERLYN D. SCHUH, Davidson College
Unimolecular radiationless decay of and steric hindrance to collisional quenching of triplet state alkylbenzene vapors (two-year program)—$12,150

HENRIE M. TURNER, Morris Brown College
Characterization of developmental changes and synchronization of *Physarum polycephalum* myxamoebae—$8,500

PAUL VAN EIKEREN, Harvey Mudd College
Models for NADH dependent enzymes—$1,755

GERALD R. VAN HECKE, Harvey Mudd College
Volume changes of thermotropic liquid crystals measured by birefringence and dilatometry—$1,830

ALAN S. WAGGONER, Amherst College
Use of NMR to determine the membrane binding sites of potential-sensitive dyes—$9,000

C. DAVID WEST, Occidental College
Development of abnormal glow discharge system for solids analysis by mass spectroscopy—$10,000

Cottrell Research Grants

JAMES L. ANDERSON, North Dakota State University
Resonance Raman—A new structural probe of oxidation-state-dependent structural changes in multi-component redox enzymes—$10,000

OREN P. ANDERSON, Colorado State University
Synthetic and structural studies on ligand-stabilized copper(II) mercaptide complexes—$7,500

HAROLD D. BALE, University of North Dakota
Small angle X-ray scattering from metal-ammonia solutions—$2,700

JAMES C. BARBORAK, University of North Carolina at Greensboro
Synthesis of elusive organometallic complexes by transition metal catalyzed rearrangement of olefins—$1,300

ROBERT BERNHEIM, Pennsylvania State University
Kinetics of the helix-coil transition in poly (α,L-glutamic acid) by dynamic laser light scattering—$7,000

ROBERT R. BIRGE, University of California, Riverside
Solvent effects on Raman excitation profiles. A method of studying low-lying "forbidden" electronic transitions in polyenes—$8,770

PHILIP BOUDJOUK, North Dakota State University
π-complexes of trimetal clusters—$3,400

HANS M. BOZLER, University of Southern California
Coupled NMR and zero sound studies of liquid ^{3}He—$10,000

WILBUR H. CAMPBELL, State University of New York College of Environmental Science and Forestry
Higher plant nitrate reductase—$1,000

FRANK O. CLARK, University of Kentucky
Study of magnetic fields and internal conditions in dense interstellar clouds—$5,350

ALAN F. CLIFFORD, Virginia Polytechnic Institute and State University
Investigation of the higher oxidation states of cesium and their potential role in the catalysis of fluorination reactions by cesium fluoride—$10,000

THOMAS T. COBURN, Boston University
Mild techniques for modification of the nitrile functionality—$8,000

Solvent effects on Raman excitation profiles. A method of studying low-lying "forbidden" electronic transitions in polyenes—$8,770

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JOHN R. CONRAD, University of Wisconsin-Madison
Ion production in the beam-plasma interaction—$12,000

FRANK C. DE LUCIA, Duke University
Millimeter- and submillimeter-wave spectroscopy of active laser plasmas —$9,000

SLAYTON A. EVANS, JR., University of North Carolina at Chapel Hill
Coupling reagents: phosphonium salts—$6,500

WILLIAM M. FAIRBANK, JR., Colorado State University
Spectroscopic search for quarks—$10,650

BARBARA J. FINLAYSON, California State University, Fullerton
The effect of molecular oxygen on the gas phase mercury photosensitized decomposition of simple epoxides—$4,500

A. LEWIS FORD, Texas A&M University
Nonadiabatic allowed dipole transitions in the HD molecule—$2,200

ANSELM C. GRIFFIN, III, University of Southern Mississippi
An investigation of lateral substituents as structural probes in liquid crystalline systems—$6,971

M. C. GUPTA, University of Missouri-Columbia
Radiation effects on phase transformations using acoustic emissions —$7,000

H. LESLIE HODGES, University of California, Santa Cruz
A kinetic investigation of electron transfer in micelle models of metalloproteins—$5,800

LAURIE B. ISAACSON, University of Massachusetts, Amherst
Paleomagnetism and magnetic stratigraphy of the Deerfield basin, Massachusetts—$4,250

WARREN C. JONES, JR., University of Virginia
Development of a modified solid phase peptide synthesis technique—$4,000

MOSES K. KALOUSTIAN, Fordham University
The synthesis and chemistry of peroxonium salts—$7,312

KENNETH J. KAUFMANN, University of Illinois
Picosecond studies of proton transfer in the excited state—$11,000

PETER A. KAZAKS, New College of the University of South Florida
Theoretical investigation of pion-nucleus scattering—$3,800

PAUL KEYES, University of Massachusetts, Boston
Light scattering and high pressure investigations of liquid crystal phase transitions—$6,500

ROY R. KNISPEL, University of Wisconsin-Oshkosh
Proton rotating frame relaxation investigation of the physical effect of biopolymers on the dynamics of water—$7,000

PHILIP J. KOCIENSKI, State University of New York at Binghamton
The total synthesis of some biogenetically related sesquiterpenes—$6,050

HARUO KOJIMA, Rutgers University
Experimental investigation of anisotropic properties of superfluid ^{3}He —$9,500

JOHN LEONG, University of California, San Diego
Microbial transition metal ion transport of cobalt, copper and iron—$7,050

DON H. MADISON, Drake University
Distorted wave calculation of atomic ionization by charged particle impact—$750

PAUL E. MASLIN, California State University, Chico
A comparison of *in situ* algal culture techniques for limiting-nutrient bioassays—$760

FLOYD D. McDANIEL, North Texas State University
Auger electron studies of heavy-ion induced inner-shell ionization—$8,000

HUGH R. MILLER, Georgia State University
The history of the optical variability of quasars, BL Lac objects, and compact galaxies—$200

PEDRO A. MONTANO, West Virginia University
Investigation of the magnetic properties of disordered systems using matrix isolation techniques—$5,300

PAUL A. MUELLER, University of Florida
Geochronology and geochemistry of early Archean rocks, southeastern Beartooth Mountains, Montana—$3,500

ROBERT L. MUTEL, University of Iowa
Observations and analysis of interplanetary turbulence using interferometer visibility scintillations—$9,340

HARRY NICKLA, Creighton University
Molecular basis of lethality and genital disc differentiation in *Drosophila melanogaster*—$4,000

TIMOTHY A. NIEMAN, University of Illinois
Simultaneous multicomponent chemiluminescent analysis of trace metals—$8,000

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TIMOTHY A. NIEMAN, University of Illinois
Simultaneous multicomponent chemiluminescent analysis of trace metals—$8,000

JOHN R. PLADZIEWICZ, University of Wisconsin-Eau Claire
Electron transfer reactions of superoxide anion—$11,000

SEPPO O. SARI, University of Arizona
Photoelectrolysis of water—$2,500

EDWARD M. SCHULMAN, University of South Carolina
Room temperature phosphorescence of organic compounds—$6,500

IRA S. SCHWARTZ, University of Massachusetts, Amherst
Characterization of ribosome binding sites for initiation and elongation factors—$6,000

PETER S. SHERIDAN, State University of New York at Binghamton
Photoreactive excited states—$8,960

STEPHEN R. STOBART, University of Victoria
Bivalent derivatives of germanium, tin and lead with chelating sulphur and selenium donors—$5,000

BRUCE N. STORHOFF, Ball State University
Metal promoted reactions of organonitriles—$400

TIMOTHY C. K. SU, Southeastern Massachusetts University
Mechanism of gas phase ion-molecule reactions—$5,500

ISRAEL L. TYLER, University of Missouri—Kansas City
Stokes line broadening mechanism in stimulated electronic Raman scattering—$5,000

JOHN D. WILEY, University of Wisconsin-Madison
Investigation of the electrical and optical properties of single-crystal, orthorhombic GeS—$9,000

MARSHALL WILT, Centre College of Kentucky
Coriolis X-Y perturbations between E vibrational states—$1,100

AARON WOLD, Brown University
New electrode materials for photoelectrolysis cells—$5,000

GEORGE K. L. WONG, Northwestern University
Nonlinear optical properties of liquid crystals—$9,425

LOLITA ZAMIR, State University of New York at Binghamton
Biosynthesis of aflatoxins—$9,000

Jones Awards for Cytogenetics Research

Grants of $49,965 were approved in February under the Donald F. Jones Program of cytogenetics related to major food crops. These were the last of the awards to be made by the program established in Research Corporation in 1972 with a share of royalties on the Jones patent covering the production of hybrid seed corn, which was to expire in 1973.

Of necessarily limited life, the program aimed for maximum impact by concentrating on the highly specialized field of cytogenetics concerned with major agricultural crops. The grants were awarded to make it possible for graduate students to train with experienced investigators, and for postdoctoral fellows to conduct original and independent research.

Jones Scholarships

DAVID A. SOMERS (Andris Kleinhofs), Washington State University
Genetic control of protein synthesis and accumulation in barley—$7,423

SEJII TSUJI (Shivcharan S. Maan), North Dakota State University
Investigation of cytoplasmic homologies among *Aegilops* species with D-genomes—$5,942

Jones Fellowships

TETSUO SASAKUMA, North Dakota State University
A simple cytoplasmic male sterility-male fertility restoration system for hybrid wheat—$11,000

KHAIRY M. SOLIMAN, University of California, Davis
Intergeneric transfer of high protein from *Agropyron* to common wheat—$14,642

STEPHEN STACK, Colorado State University
Localization of highly repetitive DNA in the chromosomes of *Allium cepa* and certain cereal grains—$10,958

DAVID A. SOMERS (Andris Kleinhofs), Washington State University
Genetic control of protein synthesis and accumulation in barley—$7,423

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Final Grants Made for Medical Mycology

The last grants to be made under the Brown-Hazen Program for support of research and training programs in medical mycology were approved in June. These, plus grants made earlier in the year, brought to a total of $201,345 the Brown-Hazen awards not previously reported in the *Quarterly Bulletin*.

The June grants marked the end of the program which was initiated in 1957 for general support of biomedical research and reoriented in 1973 to a concentrated attack on fungal diseases through research and training in mycology. Supported by royalties from the patent on the antifungal antibiotic nystatin, which was donated to Research Corporation by the scientist-inventors Rachel Brown and Elizabeth Hazen, the program began phasing out last year after the 1974 expiration of the patent and the cessation of royalties.

The final 15 program grants will aid research projects in mycology to be conducted at ten institutions, and will continue the support provided by previous Brown-Hazen grants for training programs at the medical schools of three universities. One grant provides travel funds for a medical mycology investigator, and one will assist in supporting the American Type Culture Collection.

Brown-Hazen Grants

AHMED T. H. ABDELAL, Georgia State University
Regulation of pyrimidine biosynthesis and uptake in medically important fungi—$7,200

ERNEST I. BECKER, University of Massachusetts, Boston
Evaluation of nystatin as a control procedure for Dutch elm disease—$16,400

JOAN W. BENNETT, Tulane University
The use of mutations in studying the biosynthesis of aflatoxins—$3,710

FRITZ BLANK, Temple University Health Sciences Center
Research training grant in medical mycology—$10,000

GEORGE BOGUSLAWSKI, University of Kansas, Lawrence
Mechanism of conversion in *Histoplasma capsulatum*—$5,225

RICHARD A. CALDERONE, Georgetown University
Interaction of *Candida albicans* and *Cryptococcus neoformans* with rabbit alveolar macrophage—$3,500

ANTONINO CATANZARO, University Hospital of San Diego County, California
Evaluation of transfer factor in the therapy of coccidioidomycosis—$47,000

ERNEST W. CHICK and NORMAN L. GOODMAN, University of Kentucky School of Medicine
A comprehensive training program in medical mycology—$3,000

JIM E. CUTLER, Montana State University
Phagocytic cells and defense against *Candida albicans*—$5,000

MORRIS A. GORDON, New York State Department of Health, Division of Laboratories and Research
Evaluation of isoflavonoid phytoalexins and their derivatives as therapeutic agents in human mycoses—$18,618

HENRY E. JONES, University of Michigan Medical Center
Host resistance mechanisms in the cutaneous mycoses—$40,000

S. C. JONG, American Type Culture Collection
National Resource Center for Living Cultures of Health-Related Fungi—$18,050

LAURENCE S. KAMINSKY, New York State Department of Health, Division of Laboratories and Research
Travel grant to Third International Symposium on Microsomes and Drug Oxidations, West Berlin—$642

GEORGE S. KOBAYASHI and GERALD MEDOFF, Washington University School of Medicine
Training grant in medical mycology—$13,000

MARGARITA SILVA-HUTNER and RICHARD L. EDELSON, Columbia University
Host and parasite responses at the site of Candida lesions—$10,000

MORRIS A. GORDON, New York State Department of Health, Division of Laboratories and Research
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Williams-Waterman Grants Awarded for Nutrition Research and Training

Foundation grants of $914,417 under the Williams-Waterman Program were approved in June for research and the advanced training of professionals in public health nutrition. All but one grant—the Norman Jolliffe Fellowship awarded to Columbia University—will fund programs in Latin America and the Caribbean or aid in training nutrition workers from those regions.

Largest of the May grants, $722,907 for the Institute of Nutrition of Central America and Panama, is for a three-year continuation of a program in agricultural and food sciences inaugurated in 1971 with the aid of an earlier Williams-Waterman grant. Results of this INCAP program so far include a process for substituting corn for wheat in bread flour, which has enormous economic potential for Central America, and technology for large-scale utilization of coffee pulp and hulls in livestock feeds, creating a new export crop and releasing for human consumption grains previously used as animal food.

Another grant for work by INCAP scientists will help support the surveillance of a salt iodization program scheduled to begin in Nicaragua later this year. Iodine deficiency, which results in endemic goiter, hypothyroidism, deafness and cretinism, is a major public health problem in Central America and parts of South America. The remedy is supplementation of iodine in the diet, but the recent iodine fortification of food supplies in Costa Rica and Panama, while using technology thought to be maximally safe, appeared to produce a sharp rise in the incidence of thyroid-related diseases. The INCAP investigators will monitor the effects of the new iodization program in Nicaragua, being prepared to move quickly to change dosage if any such problems arise there. The study also has possible implications for the industrial nations which are presently iodizing salt.

TROPICAL SPRUE RESEARCH

The Williams-Waterman Program's ten-year support of research directed by Frederick A. Klipstein of the University of Rochester was extended by a grant made in May. The research team at Rochester and at the Tropical Malabsorption Unit at the University of Puerto Rico is seeking the cause and a means of prevention of tropical sprue, a disease that may afflict 80% of the people living in many underdeveloped tropical regions, contributing directly to nutrition-related deaths and disabilities. The work to date has identified *Klebsiella pneumoniae*, *Enterobacter cloacae* and *Escherichia coli* as the bacteria which can damage the small intestine, reversing its character from absorptive to secretive and causing not only physical distress but inefficient utilization of already inadequate food intakes. Continuing work by Dr. Klipstein's group leads him to believe they are now on the way to finding a means of preventing the disease.

The grant to Johns Hopkins University will allow continuation of a study of the factors influencing the growth of children from the slums of Lima, Peru who have been hospitalized for malnutrition. The work will focus on

(Continued on page 6)

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(Continued on page 6)

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Mr. Norman J. Latker, Chief 5 K-2
Patent Branch
Department of HEW
Room 5A03, Westwood Bldg.
Bethesda, Maryland 20014

Nutrition Grants of $914,000 Approved

(Continued from page 5)

environmental and other influences on the feeding and food utilization of the formerly malnourished children after they are returned to their homes. The results should find application for the combat of infant malnutrition in other slum populations which are mushrooming in urban centers of the developing world.

Other Williams-Waterman grants approved in May include a postdoctoral and a predoctoral fellowship for nutrition workers from Haiti and Guatemala, respectively; assistance to INCAP in completing research projects interrupted by the devastating Guatemalan earthquake; and travel for Latin American nutritionists to a hemispheric scientific conference.

Williams-Waterman Grants

COLUMBIA UNIVERSITY, INSTITUTE OF HUMAN NUTRITION

Norman Jolliffe Fellowship in Human Nutrition—$15,000
Postdoctoral fellowship in clinical nutrition—$12,815

UNIVERSITY OF ILLINOIS

Predoctoral fellowship in human nutrition and food science (three-year program)—$22,306

JOHNS HOPKINS UNIVERSITY

George G. Graham. Factors affecting nutritional status of Peruvian children—$10,000

PAN AMERICAN HEALTH AND EDUCATION FOUNDATION/ INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA

Ricardo Bressani and Carlos Tejada. Research and graduate training program in agricultural and food sciences (three-year program)—$722,907
Fernando E. Viteri. Surveillance of salt iodization program in Nicaragua —$66,804
Supplement for nutritional research projects interrupted by Guatemalan earthquake—$7,585

UNIVERSITY OF ROCHESTER

Frederick A. Klipstein. Roles of enterotoxins in cause and prevention of tropical sprue—$36,000

SOCIEDAD LATINOAMERICANA DE NUTRICION

Travel of Latin American nutritionists to IVth Scientific Meeting of Sociedad Latinoamericana de Nutricion, Caracas—$21,000

JOHNS HOPKINS UNIVERSITY

George G. Graham. Factors affecting nutritional status of Peruvian children—$10,000

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QUARTERLY BULLETIN **SUMMER 1976**
Research Corporation, 405 Lexington Avenue, New York, N.Y. 10017

A foundation for the advancement of science, Research Corporation has a dual mission in serving educational and scientific institutions. Through its Grants Program it supports basic research in the natural sciences and basic and adaptive research in public health nutrition. Through its Patent Program it speeds the practical application of scientific discovery through technology transfer.

GRANTS PROGRAM

Cottrell College Science Grants support academic research programs in the natural sciences at private undergraduate institutions.

Cottrell Research Grants support basic research in the physical sciences and engineering in graduate institutions and public undergraduate universities.

Brown-Hazen Grants support work directly related to mycology, stressing research, training in research and medical applications. (Program no longer active.)

Williams-Waterman Grants support research programs for the combat of nutritional diseases, particularly in the developing nations of the Western Hemisphere.

PATENT PROGRAM

Services contributed without cost to educational and scientific institutions include evaluating faculty and staff inventions, accepting assignment of those which appear to be useful and marketable, applying for patents through qualified counsel, licensing issued patents to industry, and defending against infringement when necessary.

Royalties received from patents assigned to the foundation are apportioned among the inventor, his institution and Research Corporation, with the institution's patent policy determining the inventor's share. The foundation's share is used to help support its programs of technology transfer and grant-making.

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Services contributed without cost to educational and scientific institutions include evaluating faculty and staff inventions, accepting assignment of those which appear to be useful and marketable, applying for patents through qualified counsel, licensing issued patents to industry, and defending against infringement when necessary.

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Cardiovascular Engineering Laboratories
6535 Fannin B201
BAYLOR COLLEGE OF MEDICINE
TEXAS MEDICAL CENTER
HOUSTON, TEXAS 77025

CORA AND WEBB MADING DEPARTMENT OF SURGERY
(713) 790-3251

October 12, 1976

Mr. Norman J. Latker
Department of Health, Education, and Welfare
Office Of The Secretary
Office Of The General Counsel
Washington, D.C. 20201

Subject: Technology Transfer

Dear Mr. Latker:

This is to express my gratitude for the informative and interesting literature you kindly sent me. Your presentation to the American Patent Law Association I enjoyed particularly.

Embodying the expressed principles, the implementation of the "collaborative team" and an increased yield on the Federal research and development dollar could possibly, in some areas of endeavor, be further facilitated by operational (Federal) decentralization (cf. the attached editorials). Centers, organized in fertile environments, administratively independent of local institutions, accountable but with appropriate authority and flexibility---would not only provide the catalytic framework, but would also be able to draw on brainpower and other resources presently untapped. At least in theory.

Many thanks.

Sincerely yours,

Nils A. Normann, M.D.

NAN/lk

NAN/lk

12 December 1975, Volume 190, Number 4219 SCIENCE

Federal R & D—Outmoded Management Policies

One of the most significant trends in federal research and development in the 1970's has been the shift in emphasis to a domestic market. Until recently, the preponderance of federally supported R & D was targeted to military, space, and other objectives, where the government itself was the primary customer. Most of the present national research institutions, laboratories, and management policies have evolved since World War II with this direction. But we have now entered a new era in which the federal government will not be the primary customer. The new customers are industry, local government, and private citizens. The proportion of federal R & D directed to the civilian sector has increased from 23 to 35 percent over the last 6 years, and it will undoubtedly grow in the future with the growth of government involvement in energy, transportation, food production, recovery of nonrenewable natural resources, environmental protection, and a host of other areas involving the private sector. But an important policy question is not being faced. It is not at all clear that funneling federal R & D funds through existing federal institutions will come within a country mile of accomplishing the intended purpose.

The objective is to move the products through the marketplace to the consumer. But the decision-making process of the marketplace is circumvented by a different, politically oriented form of decision-making in the Executive and Legislative branches. The barriers to moving new products and processes from federal agencies and laboratories to private consumers are formidable, and we are making slow progress, if any, in understanding and reducing them. Private companies tend to divide into two groups. One looks on government contracts as an end in themselves. Its record in commercial business is poor. The other, which includes America's best commercial companies, with a thorough understanding of the marketing problems of the domestic sector, is usually reluctant to involve itself in federal programs. When such companies do get involved, it is not with their best people or with their total resources. One reason is the government's patent policies, such as its reluctance to grant exclusive licenses, licensing policies on prior patents, deferred determination of rights, march-in rights, and various other entanglements.

Management policies for federal R & D directed to the domestic sector need more explicit attention by the Executive Branch and Congress. How should existing federal institutions and policies be modified so that it will have some meaningful influence on the economy? Approaches such as injecting federal monies directly into the private sector through R & D tax refunds or other fiscal devices should be seriously explored. Experience has shown that federal appropriations for civilian R & D may be necessary but not sufficient to push a new technology into the marketplace. A confluence of other important factors is required. Marketplace decision-making should be reflected in the federal budget process and new technologies pulled into the marketplace through incentives rather than pushed through federal dollars. Finally, more thought needs to be given to clearing away legislative and regulatory snares so that the innovation process can operate more freely and hence more effectively in the private sector.

Existing federal agencies are not likely to examine such questions with enthusiasm since changes may not be in their interest. In-house R & D activities in national laboratories and centers should be given careful scrutiny in terms of their ability to translate results into the public and private sectors. The country can ill afford many monuments that find no useful application.

Federal R & D management poses one of the foremost policy questions of this decade. The citizens of the United States deserve a greater economic return on their investment. Feeble attempts have been made to examine these questions in the past. But the stakes are now much larger, they are growing daily, and the hour is late.—RAYMOND L. BISPLINGHOFF, *Chancellor, University of Missouri, Rolla 65401*

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An R & D Delivery System

The federal government has funded and consumed a fabulous amount of research for its own needs—radar, inertial guidance, proximity fuses, ballistic missiles, antiballistic missiles, "beating the Russians to the moon," and on and on and on. The emphasis has been on federal use. The National Aeronautics and Space Administration speaks of agency users, not citizen users.

At the same time the citizens are saying, "If we can put a man on the moon, we can do this or that." They will not be put off by the alibi, "That is a different subject." We must solve their problems as well.

In his editorial*, Bisplinghoff makes a potent point that federal research should be and is now aiming more at citizens' needs, and he goes on to say, "It is not at all clear that funneling federal R & D funds through existing federal institutions will come within a country mile of accomplishing the intended purpose."

I agree wholeheartedly—it will not. Fortunately, there is a family of state institutions with a federal connection that do come within that "country mile of accomplishing the intended purpose" of research for citizens' needs. They do so because they are not federal. I refer, of course, to the Agricultural Experiment Station system.

The first experiment stations were set up a century ago by states to solve problems of farmers, the largest group of citizens at the time. Soon the hoped-for solutions began to come—better varieties, better fertilizers, control of disease, and better nutrition. Soon city people found that the stations helped to feed them. The economic return on the investment in research was high.

By the time the first 13 state experiment stations were in operation, Congress decided that here was a useful system through which to funnel federal R & D funds with the aim of solving citizens' problems. The Hatch Act was passed, and there is now an Agricultural Experiment Station in every state.

By now the stations have solved reasonably well the problem of cooperating with the industries that produce our food. And they have a delivery system that has functioned for nearly a century. Being spread over the nation and directed from the grass roots, stations know citizens' needs and how they vary over the country. Therefore a federal agency does not direct them, but Congress funds them and thus spreads its scientific bets across the nation. Since no Washington committee can possibly think of all the angles or numbers that might win, the decisions must be and are made locally.

A basic policy is steady money. Congress funds the stations on a regular basis, not on the feast-or-famine basis of individual grants. That means that if a fire flares up it can be quenched before people go hungry, as the corn blight epidemic of 1970 plainly showed. In cooperation with industry, the system put out that fire in 2 years. Had the system depended on contracts and grants, the red tape would hardly have been unrolled in that time.

While doing work with practical applications, the stations can do profound research too, as several Nobel prizes and memberships in the National Academy of Sciences prove. Vitamins and hybrid corn testify to the value of the stations. So, too, do dicumarol, streptomycin, and biological control of pests.

Bisplinghoff is correct: the stakes are large, they are getting larger, and the hour is late. Fortunately, in its research for our groceries the country has developed a system that can make discoveries, can translate them into solutions for the public and private sectors, and can deliver the results.

Perhaps the Agricultural Experiment Station system is a first approximation to examine as we seek greater economic return on our federal R & D investment.—JAMES G. HORSFALL, *Director Emeritus, Connecticut Agricultural Experiment Station, New Haven 06504*

*R. L. Bisplinghoff, "Federal R & D—Outmoded Management Policies," *Science*, 12 December 1975.

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Conclusion

These winds do not bode well for those who use fraud, deception, or other unfair acts or practices to prey upon independent inventors. The extent to which these practices are common in the invention promotion business is not known at the present time. However, indications are that they are not uncommon and their level of incidence is unacceptably high. Promoters engaging in such practices appear to be only casually interested in commercialization of their clients' ideas and inventions. Their profit is derived, not from the success of the invention, but from the front end load levied against their clients. A prohibition against charging substantial initial fees would, in effect, deprive such promoters of this major, if not only, source of revenue. It is highly doubtful that these firms have either the technical or commercial competence to alter their covert business practices sufficiently to conform to FTC requirements and, at the same time, earn a reasonable profit. Hence, the current FTC action, reinforced by the FTC Improvements Act, may mark the beginning of the end of the "idea promoter," as it is currently construed.

It is appropriate here to raise two questions:

1. Is the FTC, in light of this possibility, warranted in taking such actions?
2. What alternatives then exist for the independent inventor?

The data made public to date tends to indicate that such action by the FTC is indeed appropriate. In a sense, inactivity on the part of the Commission can hardly be justified. Assuming that the data released to date by the FTC is representative of other such promoters, these promoters do not offer a viable alternative to no service at all. In fact, the inventor would be better off without such service. However, careless application of these remedies could deprive inventors of the services

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of legitimate technology transfer agents. While such services are rare, there appears to be an increasing interest in technology transfer and the plight of the independent inventor. General Electric, Control Data, Dvorkovitz, and Gulf Western are among corporations with technology transfer programs that may offer a viable corporate-based alternative to the idea broker. In addition, two Canadian Universities, the Universities of Waterloo and Sherebrook, are in the process of joining the University of Oregon's National Science Foundation-funded Innovation Center in providing evaluation, research, development, and technology transfer assistance to independent inventors.

Protection of the nation's independent inventors is long overdue, but so is their encouragement and assistance. The remedies proposed to date by the FTC seem reasonable and should not unduly restrict the development of legitimate idea brokerage programs. However, the FTC has only removed a thorn from the side of the inventor. The age of the better mouse trap, if it ever existed, is over. The basic problem of the independent inventor is that he or she needs assistance in beating a path to the world's door.

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