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Mr. George Stadler
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Dear Mick:

As we have discussed, Dr. McLaughlin and I regard the Targeted Pharmaceuticals (TPI) program as a truly unique approach to the organization and management of R&D at the leading edge of the fields of Cancer Therapy and the Diagnosis of Major Diseases. Approximately ten university groups, each selected for an important break-through, will be funded and their progress carefully coordinated and focused through a small highly sophisticated central R,D&E staff toward a few important clinical product goals. These product goals and the selection of the university groups derives from the ideas and experience of the TPI founders, their own research, and their extensive scientific collaborative friendships around the world.

TPI anticipates having exclusive rights to a number of exciting new discoveries including in part:

1) a Lung Cancer Vaccine: We are in a position to immediately initiate a large scale clinical trial based upon two very promising earlier human studies. Within 2-3 years we hope to have the first really effective lung cancer treatment. A breast cancer vaccine could follow within a short time.
2) a Venereal Disease Immunodiagnostic Assay: A far more rapid, reliable and low cost test compared to any now available is at an advanced stage of development and could be intoduced within 1-2 years.
3) a Targeted Antibiotic: This is a totally new antibiotic concept for treating resistant bacterial infections. Feasibility is now being tested in eye infections. Ophthalmic products could be available in 1-2 years and broader application of the concept could revolutionize antibiotic use.
4) a Drug-Microsphere Technology: A new method for preparing novel albumin and dextran drug releasing microspheres affords a basic position for the introduction of safer more effective products for chemotherapy and immunotherapy.

TPI founders bring together an extraordinary combination of chemical and medical talents and commercial development experience. A track record of accomplishment has been demonstrated by Dr. Goldberg and Dr. Rowland in the polymer, chemical and pharmaceutical industries (e.g. Dr. Goldberg's role in the co-discovery and commercialization of Lexan polycarbonate plastics at G.E.; a $500 million/yr.+ business). Mr. Cobain contributes an outstanding background in new business development and finance. Dr. McLaughlin and Dr. Caldwell are leaders in their fields of cancer and venereal disease immunology and immunotherapy.

The research and product objectives of TPI have the potential to yield enormous social and financial rewards. TPI is not merely a collection of promising individual projects. It is a carefully crafted integrated program. Progress in each project contributes to the others. The unusual expertise assembled and the creative way the R&D will be managed greatly enhances the prospect of success.

replacing them with short-term, floating-rate credits.

Besides doing a better job of matching assets and liabilities, many West German banks are trying to achieve a tighter control over lending. While Deutsche Bank—like most big U. S. banks—long has had an information system that classifies loans by business line, creditors, and other categories, West German banks are laggards in this field.

Less savings. The search for new strategies is complicated by changes in saving habits and by a major change in West Germany's basic banking laws. Under long-standing West German regulations, 60% of savings deposits are considered long-term liabilities suitable for covering long-term assets. But when West German domestic rates shot up, many savers moved to term deposits, only 10% of which can be counted as long-term. Moreover, the savings rate has plummeted recently from 16% to 13%. As a result, points out Commerzbank economist Herbert Wolf, "steering a bank has become an art instead of a handicraft."

Enormous exposure to Warsaw's debt aggravates other bank problems

A further element of uncertainty comes from the long-drawn-out struggle in Bonn to draft a new banking law, under which West German banks will probably be forced to consolidate foreign subsidiaries and subject them to the same capital-to-loan limitations as domestic operations. As a result, most are slowing their once-aggressive push for business abroad. "They are hindered in chasing high-quality U. S. business," says a U. S. banker.

The banks' struggle to beef up earnings has forced them to mobilize their "silent reserves"—hoards of radically undervalued corporate equity. Commerzbank sold big equity holdings in construction giant Hochtief in 1979 and in retailer Kaufhof in 1980. Dresdner sold its 31% share of Nordsee, a fish processor, and 50% of Bilfinger & Berger, a builder. West LB sold its 25% share of Phillipp Holzmann—with a big chunk ending up in the bonds of Hochtief, a Holzmann competitor.

Deutsche Bank, meanwhile, has widened its lead in size and profitability over the other big West German banks. In the first nine months of 1981, it raised earnings more than 20% while worldwide assets grew to $85 billion, compared with $74 billion at Dresdner and $44 billion at Commerz. "Deutsche Bank is in a different league now," says Max Hildebrand, manager of Mellon Bank's Frankfurt operation. "It can choose its business while the others may have to make more compromises." ■

RESEARCH

Better ways to deliver drugs

The pace at which new drugs are being developed shows no signs of letting up. New and more powerful antibiotics, for example, are just now reaching the market, and an entirely new class of drugs produced by genetic engineering looms. Yet very little research was devoted, until recently, to developing better ways of administering these drugs to patients. Now the pharmaceutical industry's laboratories are working hard to come up with the answers, and a new generation of these delivery systems is reaching the marketplace.

The need is certainly there. Most patients needing continuous doses or long-acting drugs must still gulp handfuls of pills or endure frequent injections. As a result, the concentration of the drug in a patient's bloodstream increases abruptly and then tapers off rapidly until the next dose. These fluctuations are linked to such disturbing and dangerous side effects as nausea and dizziness and to the often fatal complications that afflict diabetics.

The new delivery systems are designed to get around those problems by providing prolonged, controlled release of drugs. Adhesive patches can deliver drugs in small, steady doses through the skin, and a pill-size device that is swallowed pumps out medication over a 24-hour period. Back in the labs, scientists are working on more ambitious techniques. They include implants that contain the drug and time-release capsules so small they can be injected into the bloodstream. Eventually, researchers hope to develop systems that will deliver the drug directly to the diseased tissue.

A scramble. Many companies, including such pharmaceutical giants as Ciba-Geigy Corp. and Hoffmann-LaRoche Inc., are scrambling to come up with new drug-delivery systems. "Everyone's looking for ways to put drugs in different packages," says Paul J. Vasington, vice-president and general manager of Damon Biotech, a subsidiary of Needham Heights (Mass.)-based Damon Corp., which is experimenting with encapsulating living cells and drugs in tiny carbohydrate spheres.

A big reason for the explosion in activity is the discovery that an innovative drug-delivery system can mean bigger profits. Simply repackaging an existing drug can give it a competitive edge. "With a new drug-delivery system, you can capture a larger percentage of the generic drug market," says David W. Yesair, a vice-president at Arthur D. Little Inc. (ADL), a Cambridge (Mass.) consulting company. And because repackaging takes less time to win the approval of the Food & Drug Administration than testing a new drug, profits show up faster.

Providing a new method to administer a drug could help a drugmaker in other ways. Companies are always casting about for a way to hold their market share for a drug that is about to lose its patent protection. By packaging such a drug in a patented delivery system, a company can keep it as a proprietary product.

Constant rate. The first new system to reach the market is the transdermal patch that permits a drug to be absorbed through the skin. The patches, which are simply attached to the skin with adhesive, release the drug at a constant rate as it seeps through a plastic barrier. Last summer the FDA gave Ciba-Geigy

Many labs are scrambling for new packages that offer a competitive edge

permission to market a patch—developed by Palo Alto (Calif.)-based Alza Corp., a company in which Ciba holds a major interest—that contains scopolamine, an antimotion-sickness drug. Placed behind the ear, this patch will prevent motion sickness for three days, compared with the several dosages a day needed with tablets or injections.

The FDA recently expanded the application of transdermal patches by approving them for delivering nitroglycerin to sufferers of angina pectoris. Ciba-Geigy is marketing the new patch, which was also developed by Alza. G. D. Searle & Co. and Key Pharmaceuticals Inc. are offering similar products. Eventually, companies expect to use the patches to deliver other drugs that can be absorbed through the skin. "You get the inherent convenience of less frequent dosing, better patient compliance, and better selectivity of action," says John Urquhart, chief scientist at Alza, which has received at least 230 patents for drug-delivery systems.

Alza will soon launch a new system that, like the transdermal patch, depends on the rate at which liquids migrate through a plastic membrane. But instead of attaching a patch, the patient will take the new device like a pill. It consists of a layer of plastic through which a laser has drilled a tiny hole. The plastic is slightly permeable to body fluids and surrounds a solid drug core. When the device is swallowed, water migrates

through the plastic membrane and dissolves the drug, which is forced out of the hole at a steady rate for 24 hours. The spent device then passes harmlessly through the body. Alza has licensed that technology to Ciba-Geigy, Merck, and Smith Kline & French Laboratories.

But not all drugs can be absorbed through the skin or the stomach. Only small molecules can move through the skin, and many drugs are destroyed by the digestive system. For large-molecule drugs such as insulin, the only alternative is injection. And with the advent of genetically engineered drugs—the human growth hormone and interferons, for example—the search for ways to deliver these drugs in steady doses is rapidly picking up speed. "The whole future of the [large-molecule drugs] which come out of molecular biology and recombinant DNA will depend on the ability to use the new delivery systems," says Alza's Urquhart.

Skin patches that release drugs: Fewer doses and better patient compliance

Implants. Scientists are concentrating their work here on two radically new methods of introducing drugs into the body: implants and microcapsules. Implants placed inside the body have the potential of delivering therapeutic doses of drugs at steady levels over long periods. Researchers are eying them to supply birth-control hormones, cancer chemotherapy agents, growth hormones, drugs developed from new monoclonal antibodies, and other substances that are active in very small quantities.

At Massachusetts Institute of Technology, aspirin-size implants containing insulin have kept the insulin levels of diabetic rats normal for a month. The MIT scientists have also found a way to vary the rate at which drugs are released from implants inside the body. Magnetic beads dispersed through the polymer cause the drug to escape more rapidly when a fluctuating magnetic field is applied. "With the magnetic system, you have the option of exterior control," says Robert S. Langer, an associate professor of biomedical engineering at MIT. Langer predicts that such a system would be particularly useful to diabetics because they require more insulin after meals.

Microcapsules—bubbles so tiny they can be injected into the body with a hypodermic needle—also are being developed to deliver insulin. Such capsules can release a drug but still protect both the drug and living cells from destruction in the body. Damon Biotech, a pioneer in microcapsule research, has encapsulated living insulin-producing cells and injected them into diabetic rats. The cells not only survived the natural defenses of the rats but also continued for several weeks to produce insulin to correct the animal's diabetes.

Direct approach. Microcapsules may also provide a means of targeting drugs directly to infected tissue. "Ultimately, the aim is to stop giving a drug through the entire piping system. It's like stopping a leak—you want to go right to the problem," explains Arthur H. Goldberg, director of pharmacy research and development at Hoffmann-LaRoche. Such targeting is particularly important in cancer chemotherapy, where the toxicity of the drugs means "walking a fine line between killing a patient and attempting to cure him," says Eugene P. Goldberg, director of the biomedical engineering center at the University of Florida.



Judith Gefter

Precision: The University of Florida's Goldberg aims albumin microspheres (inset) directly at infected tissue.

If researchers can find a way to target anticancer drugs, dosages can be set lower to minimize serious side effects and still ensure that enough of the drug will reach the diseased tissue. The University of Florida's Goldberg is currently experimenting with microcapsules made from albumin, the main protein found in blood plasma. These microcapsules can be made either as small as red blood cells so that they will circulate easily in the bloodstream, or about seven times larger so that they will remain trapped where they are injected. The university researcher can also make the capsules stay put by attaching proteins that cling tightly to the tissues in which they are injected. As a result, if the microcapsules are injected directly into a tumor, they form a reservoir of drugs. "Administration of these drugs is substantially less toxic than standard systemic cancer treatment," comments Goldberg.

Similar research efforts are under way with liposomes. Liposomes are small fatty packages to encapsulate drugs that are made from chemicals similar to those that form the membranes surrounding all plant and animal cells. Demetrios Papahadjopoulos, a professor of pharmacology at the University of California at San Francisco and chief scientist at Cooper Lipotech—a company set up by Cooper Laboratories Inc. to explore applications for liposomes—is coupling liposomes with antibodies to make them zero in on certain organs in the body.

'Deadly.' Despite their promise, all these delivery systems in the lab still have problems that must be solved before they can be put on the market. Devices that are implanted in the body, for example, must be absolutely fail-safe. "If there was any leakage at all—even with only a two-week supply—it would be deadly," says Michael V. Sefton, an associate professor at the University of Toronto, who is developing an implantable insulin pump. Present systems do not permit the patient to shut off the flow of the drug. At the same time, liposomes and microspheres do not always behave properly in the body. Liposomes, for example, tend to aggregate, and sometimes they end up going where they are not wanted, in the liver, spleen, and lung.

But researchers expect such problems to be solved, and they predict a variety of new delivery systems will be on the market by 1990. They also believe that the development of these delivery systems will go hand-in-hand with the clinical testing of a new generation of drugs based on human hormones and antibodies produced by genetic engineering. The experts also foresee little resistance from patients in using the new systems. Says Kenneth R. Sidman, an ADL product manager: "If you have to be subjected to daily injections for the rest of your life, the trade-off of having an implant is easy to make." ■

RESEARCH CORPORATION

ORGANIZATIONAL ISSUES INFLUENCING FUTURE OPERATIONS

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I. Purposes

The worth of an enterprise can be determined by the relative importance of its purposes and its success in performing functions necessary for their attainment. In 1912, Frederick Gardner Cottrell came to the belief that there was substantial need for an organization that would perform functions required for the commercialization of technologies developed at colleges and universities. Believing that many useful ideas born in academic and other research laboratories were "going to waste," Cottrell and a small group of people formed Research Corporation to assist in the further development and commercialization of those ideas that had economic significance. Revenues generated from the performance of activities necessary for technology transfer were to be used -

-- to support the cost of their performance;

-- to provide working capital;

-- to build an endowment; and

-- to support contributions to scientific and educational institutions for the purpose of extending technical and scientific investigation, research, and experimentation.

A. Question

Do these purposes remain important today, are they likely to be important in the future, and what is their relative importance?

In exploring these issues it is useful to consider and make judgments concerning the national investment in research and development, the sources of that investment, the need for additional support, the significance of research by-products for American business enterprise, and, finally, the need for professional organizations of the type Cottrell envisaged.

	Past	Present	Future
• National R & D Investment at Colleges & Universities	Low	High	Higher
• Sources of Support			
-- Federal Government	Limited Mainly applied A & M Research	Broad Both basic & applied	Short-term: Growth Long-term: Parallel real growth in the economy
-- State Governments	Limited	Growing significantly	Short-term: Growth Long-Term: Unknown
-- Industrial	Low	Recent growth Fueled by tax laws - Pace of technological change	Short-Term: Function of tax laws & results Long-term: Growth with quickened pace of technological change
-- Institutional (Departmental)	Low but principal source	Less significant	Still less significant
-- Traditional Financial Community	Limited	Growing	Unknown
• Appetite for R & D Support	Limited	Much greater	Still greater
• Significance of Research By-Products for American Business Enterprise	Less	Great	Greater
-- Perceived Importance for Local, Regional, & National Economic Development	Less	Great	Greater
-- Perception of Importance by College & University Faculty & Administration	Less	Growing	Room for growth
• Opportunities for Transfer Lost due to Lack of Attention or Inadequate Resources	Yes	Yes	Yes

	Past	Present	Future
• Need for Professional Organization to Assist in Technology Transfer	Great	Great	Great
-- Entrepreneurial Functions Required	Yes	Yes	Yes
-- Developmental Funding	Yes	Yes	Yes
-- Capacity of Colleges & Universities to Exploit Without Assistance	Low	Low	Low

B. Conclusion

History has proven Cottrell's original perception concerning the importance of the by-products of university research to be correct. The national investment in university-based research has increased significantly. Both a cause and effect of the pace at which knowledge develops, this investment is an extremely important source of the ideas that will fuel local, regional, and national economic growth.

II. Technology Transfer

Technologies developed in academic and other non-profit laboratories can be identified and exploited for the benefit of the inventor, the institution, and the public at large. Research Corporation can make significant contributions to the process.

Methods by which RC has contributed to the technology transfer process have changed over the years in response to differences in the economic, legal, and social environments. Currently, RC maintains a program designed to match the interests of those who generate ideas with those who produce and market goods and services. Research Corporation adds value by performing important middleman functions associated with bringing technology from the academic laboratory to the marketplace.

Working between those who invent and those who ultimately exploit these inventions, RC must be perceived by each as being an efficient and effective organization. For RC to be perceived by inventors and their institutions as being effective, we must operate at the state-of-the-art in technology transfer. Our programs must change as the art changes. We must participate in defining the art of technology transfer.

A fundamental task for RC is identifying and implementing changes that will yield greater efficiency in the use of resources and more effective results. The problem is to define the form of an organization that can facilitate the commercialization of university-based technology now and in the future.

A. Question

Have changes in economic and legal environments and in the perception of the "state-of-the-art" produced a need for substantive change in Research Corporation and its programs?

Before formulating an answer to this question, it is useful to consider changes in patterns of interest and involvement on the part of various constituencies and any trends in methods by which transfer occurs.

	Past	Present	Future
• Awarness/Interest/Involvement			
-- Faculty	Limited	Growing	Room for Growth
-- Administration	Laissez faire	More Active	Still More Active
-- Local, State, & Federal Governments	Passive	Very Active	More New Programs
-- Business & Industry	Limited	Active	More Involvement
-- Traditional Financial Community	Limited	Growing	Room for Growth
-- Foreign Organizations	Limited-Mainly to Government	Growing Interest & Involvement	Growth

	Past	Present	Future
• Competition			
-- Patent Attorneys	Major involvement	Some growth: contingency, venture & technical management capabilities.	Unknown: Depends on success. Limited geographic coverage.
-- Industrial Contracts	Limited-specific projects	General-support by field and specific projects	Unknown: Depends on tax laws, efforts
-- In-House Programs			
- Number	Few	Recent growth	Unknown
- Success	Limited	Limited	Unknown
- Benefits/Costs	Unfavorable	Unfavorable	Unfavorable
- Developmental Funding	Ad hoc	Emerging organization	Near-term: Growth Long-term: Unknown
-- Research Parks			
- Number	Few	Many	Near-term: Growth Long-term: Mixed
- Success	Significant	Limited	Mixed
-- State & Local Development Agencies			
- Number tied to Universities	Few	Growing rapidly	Near-term: Growth Long-term: Unknown
- Developmental Capital	Limited	Rapid growth	Continued growth - public & private funds
-- Special Ventures			
- Local Entrepreneurs	Significant - based on personal contacts	Remains significant	Relatively less important
- National/Regional	N.A.	Growth: Limited success to date	Some growth; Problems
-- Limited Service Middlemen	Few	Growing ADL, SRI, CDC, Aladdin, Battelle, Pru-Bache, Big 8 Accounting firms	Unknown
-- Full Service Middlemen	N.A.	Limited - UPI	Unknown

The national investment in research and development at universities, the need to keep pace with technological change, and changes in the general economic environment (both national and international) have directed the attention of many segments of our society to university-based technology. Trustees, administrators, faculty, and other scientists are gaining a new awareness of the importance technology transfer holds for their institutions; not only as a measure of their contributions to society, but also as a source of revenue to accommodate growth or to offset losses from other sources. Attention has been focused on joint government, business, and university initiatives directed toward maximizing the benefits to be derived from investments in research and attracting additional corporate and private support for both basic and applied research.

Evidence of this includes the following:

1. The Committee for Economic Development and other national organizations have identified universities as reservoirs of talent from which the nation's industries can obtain the basis for enhanced productivity and have encouraged increased private and public support of university-based research.
2. Congress has offered tax incentives and supported other programs (e.g., NSF's Industry/University Cooperative Research Centers) designed to enhance business-university cooperation in both applied and basic research.

3. The National Academy of Sciences and other organizations have called for new, more effective means for government and industry cooperation in exploiting university technologies.
4. State and local governments are building economic development initiatives around their universities, contending that new-technology industries will grow from and with strong research universities.
5. The Industrial Research Institute, with a membership of 265 Fortune 500 companies, has implemented several programs designed to improve corporate-university-government R & D cooperation and the commercialization of technologies.

Although voicing concern that such relationships might compromise traditional academic values, faculty and administrators at many universities are accommodating those values without compromising the intellectual and economic benefits resulting from cooperative efforts.

Initiatives include:

-- Competition for NSF-sponsored technology centers -- now 29 such centers -- 106 institutions competed for six new centers in 1985.
-- Growth in long-term agreements to give results of research to industrial organizations in return for research funding.
-- Encouragement of special ventures (RDLP's, venture funds, etc.) to provide R & D funding.
-- Formation of campus-based research parks to provide direct, physical ties with commercial interests.

-- Growth of in-house programs and declining use of patent management firms (from 83% to 50% between 1977 and 1984 according to the results of a recent SUPA survey).

-- Growth in the number of faculty entrepreneurs -- a recent NSF survey found that some 3,000 science and engineering faculty members (roughly one in twenty-five) work in outside companies which they own or in which they have equity interests.

-- Establishment of special offices (in some instances, new organizations) and expansion of existing efforts to attract industrial R & D support and private sector support for technology commercialization.

-- State universities are building and justifying budget requests on the basis of economic benefits -- new business, existing business, new employment opportunities, expansion of tax base -- with positive results (Pennsylvania, Ohio, Michigan, Illinois, California, Louisianna, Texas, Arizona, Utah, Colorado, and many others).

B. Conclusion

Universities, states, the federal government, business organizations and associations are encouraging the establishment of new relationships for the purpose of supporting research and development and bringing by-products to commercial use. Universities are motivated by the opportunity to attract new funding for basic research and to gain support for developmental work required to "prove" concepts developed as by-products of that work.

Growth in industrial support has become an explicit objective for many research universities. Administrators "point with pride" to annual increases in support and the media are quick to report major new relationships between universities and business organizations.

The "state-of-the-art" in developing and maintaining such relationships is still not well defined. The steady-state condition of such relationships is difficult to predict. For example, some universities have been disappointed by their lack of success in exploiting inventions as a new source of funding. Similarly, private and public investors, lured by the promise of economic gain, may find actual results falling far short of expectations.

Research Corporation must have and be perceived to have a "state-of-the-art" program if it is to enjoy opportunities to assist any university in the development of the first-quality inventions disclosed by its faculty. The dimensions of the program will vary with needs and opportunities, but the program itself must at all times represent the active, aggressive pursuit of excellence. This necessitates responsiveness to the <u>best</u> interests of inventors, their institutions, large and small business, private and public economic development organizations, and private and institutional sources of research and development funding. It also means developing and implementing the commercialization strategy that best suits each technology.

The restrictive status of a private foundation limits RC's ability to serve the university community. In the absence of a change in status, it is unlikely that RC will be able to develop and maintain standard-setting programs. The number of high-quality disclosures received from universities will probably decline as universities pursue an independent course.

III. Grants Program

Research Corporation grants in support of basic research in the physical, biological, medical sciences have contributed significantly to the advancement of American academic science. Early grants to Goddard, Lawrence, Van Allen, and many others, seventeen of whom later received Nobel Prizes, established a pattern of funding work that might otherwise be undertaken less vigorously or not at all, a practice that persists today in Research Corporation's two grant programs -- the Cottrell Research Program and the Cottrell College Science Program.

Administered by Science Advancement Program professionals who work with faculty and administrative personnel to identify needs and opportunities for the advancement of research programs, these two programs may be briefly described as follows:

Cottrell College Science Program (CCSP)

Goal Improve the quality of the natural sciences at private liberal arts colleges.

Program Grants in support of individual research projects, normally involving undergraduate students, afford faculty and students an opportunity for direct involvement in the process of developing knowledge rather than dealing exclusively with knowledge developed by others.

Proposals are processed by the Science Advancement staff and reviewed by a panel of independent referees and members of the Cottrell Program Advisory Committee. Awards are made by the Board of Directors upon recommendation of the Advisory Committee.

Funding Funded by an allocation from Research Corporation's current operating revenues and capital gains, along with contributions from other organizations, awards are typically small. During 1984, $854,977 was awarded to applicants representing a total of sixty-eight institutions. Amounts received by institutions averaged $12,573, and ranged from $1,500 at two institutions to $43,300 at Occidental College where four separate proposals were approved.

Cottrell Research Program (CRP)

Goal Advance science by assisting young physical scientists in their efforts to establish independent academic research careers.

Program Since initiation in 1945, CRP has provided more than $34 million in support for research at major public and private graduate institutions. Newly-appointed assistant professors are encouraged to propose projects designed to examine their most challenging ideas. Proposals are subject to peer review, evaluation by the Advisory Committee, and awards are approved by the Board of Directors.

Funding Allocations from current operating revenues and capital gains, along with contributions, have maintained a modest program for approximately forty years. Before formation of the National Science Foundation in 1952 and the first Petroleum Research Fund awards a year later, RC's CRP was an extremely valuable source of funding for research in the physical sciences. With growth of federal support through the NSF and mission-oriented agencies, the more recent growth in support from other quarters, and rising costs of physical science research, the relative significance of the program has declined substantially.

A total of $1,412,045 was awarded to faculty at ninety-nine institutions during 1984. The average amount received by an institution was $14,263.

Direct expense of the program for the ten-year period 1975 through 1984 and projections for 1985 and 1986 are shown below.

($ in thousands)

Year	Science Advancement	Grants	Total
1975	552	2,617	3,169
1976	520	3,311	3,831
1977	501	1,909	2,410
1978	431	2,042	2,473
1979	462	2,360	2,822
1980	515	2,888	3,403
1981	555	2,696	3,251
1982	601	3,137	3,738
1983	654	2,511	3,165
1984	585	2,383	2,968
Projected 1985	705	2,725	3,430
Budgeted 1986	599	2,495	3,094

A. Question

Do RC's grant programs remain an important force in the development of academic science, are the Science Advancement and grant programs meeting their objectives, and how can they be improved?

Perspective on the question may be provided by the following assessment of past, present, and future conditions.

	Past	Present	Future
• Importance of RC's Grant Programs	Very Important; almost sole source before NSF	Relatively Insignificant in dollars	Less significant
-- CRP	Important	With PRF, remains important for some young investigators; but "cost" of research limits impact of small awards	Limited significance: change necessary if PYI and other programs meet needs of target group
-- CCSP	Very significant	Remains significant source of support for LA colleges, their faculties, and students	Unknown: depends on nature & levels of support and federal initiatives
-- Science Advancement	Professional staff strong, differentiating feature of RC's program	Respected; remains most important feature; capacity exceeds resources	Impact limited by rising costs of research, growth in other sources of support, and modest grant budgets

B. Conclusion

Although once a major force in promoting academic science, RC's grant programs have become less significant as means for supporting academic science. The Science Advancement staff, which differentiates the program from others, has the capacity to support a much larger grants program and should provide a useful resource for other organizations desiring to support basic science. Unfortunately, RC's status as a private foundation, natural resistance to indirect giving, and other factors have worked against efforts to attract contributions and grants from such sources.

In the absence of substantial increases in grants budgets, changes in the two programs will be required if RC is to continue to contribute importantly to the advancement of academic science.

IV. Organizational Alternatives

As it is presently organized and operated, Research Corporation cannot qualify as a public charity under existing provisions of the Internal Revenue Code. To be free of the restrictions imposed on private foundations, Research Corporation must effect organizational changes sufficient to meet the requirements for operation as a supporting organization, which would substantially affect its ability to meet its original purposes, or benefit from some form of congressional relief.

The alternative courses of action currently available to the organization appear to be limited to those identified below.

A) Accept and maintain the status quo; that is, discontinue efforts to change the status of the organization after attempting to qualify as an "exempt operating foundation."

-- Remain subject to all restrictions on private foundations.

-- Avoid the "audit fee" tax.

B) Reorganize to meet the requirements for operation as a "Supporting Organization."

-- Operate exclusively for the benefit of one or more publicly supported organizations; that is, restrict all grants, services, or other activities to a small number (twelve or fewer) specifically listed colleges and universities.

-- Reorganize the board of directors to ensure control by the supported organizations.

C) Seek congressional action that would permit Research Corporation to transfer all or part of its assets to a new entity that would operate as an exempt or non-exempt organization. The nature of the action required will vary with the type of organization that is envisaged. Possibilities appear to include the following approaches.

Approach 1.

Obtain specific exemption from the tax on terminations of private foundations (section 507) that would permit Research Corporation to operate as a non-profit, non-exempt organization or as an organization exempt under section 501(c)(4) of the Code. Contributions to such organizations would not be deductible. One would pay taxes at regular corporate rates, the other would be exempt. Neither organization would operate for the benefit of private interests.

Approach 2.

Obtain specific exemption from or changes in Code sections dealing with Program Related Investments (PRI) making it possible for Research Corporation to make an investment in a new non-exempt or exempt organization that would be created to conduct activities required to meet technology transfer objectives.

Approach 3.

Obtain changes in the Code that would permit Research Corporation to qualify as a public charity of the type that enjoys broad public support as a result of the performance of activities related to its exempt purpose.

Approach 4.

Obtain changes in the Code that would describe a new category or organization [section 509(a)(5)]. Upon qualification as an organization meeting regulations promulgated therefor, Research Corporation would terminate its private foundation status, but would continue as a section 501(c)(3) organization.

Initial drafts of legislation required for the implementation of each of these approaches have been developed by Ed Shillingburg of Lord, Day & Lord. While each would be difficult to implement, it is believed that the degree of difficulty would increase with the numbers of the approach. This hypothesis remains to be tested, however, and can only be tested through substantive discussions with members of Congress and their staffs.

V. Division of the Organization

Implementation of a course of action other than maintenance of the status quo should include consideration of action dividing the organization into two entities -- a private foundation and either an exempt or non-exempt entity through which technology transfer activities would be conducted. This arrangement can be illustrated by an example in which the new organization would function as a non-profit, non-exempt organization.

		RC-Private Foundation	RC-New Organization
1.	Organization	Non-Profit, exempt (section 501(c)(3))	Non-profit, non-exempt
2.	Board	Existing	Existing, perhaps with provision to give participating universities a larger voice.
3.	Management	Existing	Existing
4.	Private Foundation Restrictions	Applicable	Not Applicable
5.	Contributions	Deductible	Non-deductible
6.	Taxes	2% Excise	Taxed at regular corporate rates.
7.	Revenue Sources	Dividends and interest, capital gains, contributions from the new organization and others.	Gross receipts from technology transfer activities, dividends and interest, and capital gains.
8.	Expenses	Limited to grants approved and minor administrative expense.	Full responsibility for all program activities.

The new organization would have responsibility for all program activities, including the Science Advancement staff which would be augmented by a transfer of personnel from the Technology Transfer Program and would assume broader institutional relations responsibilities on behalf of the entire organization.

Expenses of RC-F would be limited to grants, excise taxes, and modest administrative costs. RC-F could receive such contributions as may be made by foundations and corporations and could receive contributions of cash or stock from the new organization.

The initial division of existing assets between the two organizations could take various forms. For purposes of illustration only, assume that the Bond Fund of America is retained in RC-F. Having a current market value of approximately $21.4 millions and annual dividends of about $2.3 millions, the Bond Fund would support excise taxes, minor administrative costs, and grants. When combined with contributions from other organizations, the total grants budget would be approximately equal to the amounts available during recent years. At their discretion, members of the board could elect to use principal as well as income to support grants. Assuming an average yield of eleven (11) percent, the initial fund would support expenditures from interest and principal equal to approximately $3 millions annually over the fourteen year period 1987 through 2000.

In addition to the Bond Fund, RC-F would retain assets sufficient to cover any current liabilities associated with the grants program

(this should be restricted to the amount of any grants payable). All other assets and liabilities would be the responsibility of the new organization. If the division were to be made on November 1, 1985, the balance sheets of the two organizations would be approximately equal to the following:

BALANCE SHEETS -- November 1, 1985

($ in thousands)

	Total w/o Division	RC-F	RC-New Organization
Assets			
Cash & Temp. Investments	300.0		300.0
Dividends & Int. Received	40.0		40.0
Royalties Receivable	2,033.7		2,033.7
Investment Fund (at cost)	43,637.3	19,150.8	24,486.5
Prepaid Expenses	130.0		130.0
Program Related Investment	425.0		425.0
Other Investments	28.0		28.0
Land, Building & Equip. (Net)	1,574.9		1,574.9
Total Assets	48,168.9	19,150.8	29,018.1
LIABILITIES & FUND BALANCE			
Liabilities			
Grants Payable	817.5	817.5	
Royalties Payable	1,830.3		1,830.3
Accounts Payable	199.4		199.4
Other	40.0		40.0
Total Liabilities	2,887.3	817.5	2,069.7
Fund Balance	45,281.6	18,333.3	26,948.4
Total Liabilities & Fund Balance	48,168.9	19,150.8	29,018.1

Appendix A

Initial Drafts of Legislation Envisaged for the Congressional Approach.

APPROACH 1

Purpose: To provide that certain private foundations (Research Corporation) will be exempt from section 507 taxes upon termination of private foundation status and operation as a section 501(c)(4) organization or as a non-profit, non-exempt organization.

[sect. 507]

Sec. 1. The status as a private foundation of any organization, with respect to which there have not been either willful repeated acts (or failures to act) or a willful and flagrant act (or failure to act) giving rise to liability for tax under chapter 42, shall be deemed to have been terminated under section 507(b) of the Internal Revenue Code of 1954 if --

(a) the organization was incorporated before 1913;

(b) the principal purposes of the organization are to support research by, and to provide technology transfer services to, qualified research organizations --

(c) the organization transfers after the date of enactment and before January 1, 1988 its research grants program to a newly-established private foundation and --

(d) the organization thereafter is an organization --

(A) which is organized and operated exclusively to provide technology transfer services to qualified research organizations;

(B) which is

(i) exempt from tax under section 501(a) by reason of being described in section 501(c)(4), or,

(ii) incorporated under the laws of a State or the District of Columbia as a non-profit corporation and no part of the net earnings of the corporation