

Initiatives by Research Corporation

Increasingly interdependent world means successful patenting and licensing of invention necessary internationally

BY GEORGE M. STADLER*

Research Corporation was organized in New York in 1912 with the help of the Secretary of the Smithsonian Institution. According to our charter we were supposed to "make inventions, patent rights and letters patent more available and effective in the useful arts and manufactures." In addition to being one of the first U.S. foundations and the only one wholly devoted to the advancement of science and technology, we were the world's first technology transfer organization.

In addition to our New York office, we have just established a new western headquarters in Tucson, Arizona. We will shortly set up a London office to carry out invention evaluation and licensing, and the day may not be far off when we will expand to the Far East.

With its links to the academic community, Research Corporation has long been the licensor—in the United States and occasionally abroad—of many valuable inventions. These have included vitamins A, B₁ and B₁₂; cortisone; various antibiotics; the basic maser-laser patent; the cyclotron and the Van de Graaff generator; the first heart-lung machine and the computer memory core.

Today our Foundation administers the rights to pharmaceuticals widely used against cancer; recombinant DNA inventions, patents and agricultural machinery, copyrights on computer programs and so on.

What we now call the Invention Administration Program was put on a formal basis in 1935. Briefly, it is a program under which we evaluate, patent and license inventions from nonprofits entirely at Foundation expense. Royalties from successful inventions are divided on roughly a 60/40 basis: 60% to the institution and inventor and 40% to the Foundation. Starting with M.I.T. in 1935, we extended invention administration services to 40 nonprofit institutions by 1945; to 219 by 1970, and to 290 institutions as of this year. Invention royalties have set new records in the last several years, and approached \$10 million in 1983.

'Profit Center'

The invention Administration Program functions in

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many ways like the licensing department of a large multinational corporation. Technology transfer is our "profit center." It is contradictory to talk about profit and a nonprofit organization in the same breath, but Research Corporation is unique. It was designed to collect royalties on behalf of its clients and its own grants program for advancing academic science.

A total of \$75 million, largely from our founder's invention, has been devoted to grants over the years. The money has supported the research of promising college and university faculty members—some 10,000 of them. These former grantees are now eminent in industry and government as well as the academic community, and have won every major award including 17 Nobel Prizes.

The Foundation has sole authority to patent and license the projects it accepts and responsibility for seeking licensing opportunities. It covers all patenting and licensing costs, oversees the transfer of technology, and monitors licensee performance. A staff of scientists and engineers and marketing and patent law experts evaluates about 400 new inventions every year. Patents are filed in the United States and other countries based on an assessment of costs and opportunities.

Over the years the program has processed about 15,000 inventions and patented 1,500 or 10%. The argument has been made that an acceptance rate of 10% is too low, and that may be right. In some areas of the life sciences, we are currently accepting up to 25% of the inventions disclosed to us.

At any one time, Research Corporation has roughly 500 technologies on hand. About 300 will be available to a prospective licensee seeking to expand product lines or to get into an entirely new business. Some 200 of this group of 500 inventions will be under license of some sort: exclusive or nonexclusive, and possibly limited to a field of use or a particular country or countries.

Foreign Experience

What has been the Foundation's experience in patenting and licensing university inventions in countries other than the United States? In the last two decades we have negotiated about 100 licenses covering some 20 different countries. The licenses conveyed rights to manufacture pharmaceuticals, chemicals, certain agricultural inventions, medical devices, laboratory instruments and other products. This is roughly the same spectrum of inventions that the Foundation licenses to manufacturers in the United States.

West Germany leads the field with the greatest number of licenses on Research Corporation inventions. The next most active country is Japan followed by the United Kingdom. Canada, France and Switzerland are roughly equal in importance as customers for

technology. They are followed by a number of countries in which we have licensed only one or two inventions: Holland, Italy, Belgium, Brazil, Argentina, and others too numerous to mention.

Of course it is necessary to have patent rights to license. About 25 foreign patents issued annually to the Foundation in the early 1970s. In recent years this number has increased by nearly threefold. We are making use of the Patent Cooperation Treaty and the European Patent Convention to file in many countries simultaneously, and will be placing even greater reliance on them in the years ahead.

Manufacturing or marketing in countries other than the United States has produced from one-third to one-half the total royalties commanded by our portfolio of university inventions, and the importance of the international sector is increasing. For whatever reason—the economic or regulatory climate in the United States, the rise of large multinational companies, or the movement overseas of control of some U.S. firms—the availability of foreign patent rights is more critical to the success of an invention than it was as recently as 10 years ago.

Despite the importance of patents and licensing abroad, all but the domestic market is usually neglected by U.S. universities. This is due more to lack of resources and other problems than it is to ignorance of the possibilities. Given resources for patenting and licensing in Europe and the Far East, the next step would be to make a determined effort to preserve foreign rights in university inventions.

Here a major dilemma is the pressure for academic scientists to quickly publish their findings. Not only are potential inventions disclosed, but they are disclosed at a very early stage when assessment of commercial potential is extremely difficult. Such publication can bar or seriously weaken foreign patent protection, yet there is a reluctance to do anything that may compromise the university's primary obligation to disseminate new knowledge. While the Foundation respects the need for the academic scientist to publish, our invention administrators try to persuade him to disclose drafts of papers or reports for evaluation. A U.S. patent application can be filed before publication if warranted, and foreign filings can come later based on the U.S. filing date.

Lost Patent Rights

Two important inventions handled by the Foundation that illustrate what often happens with regard to lost foreign patent rights are a drug called nystatin—the first antifungal antibiotic—and cisplatin, marketed as Platinol, which is now the most widely used cancer chemotherapeutic agent in the U.S. Nystatin, the antibiotic, produced some \$13 million in royalties based on the U.S. patent rights alone. There were almost no foreign rights because of prior publication. Nystatin was developed by the late Rachel Brown and Elizabeth Hazen, both of the New York State Department of Health.

The two reported attending an international conference in the 1950s and discovering that their compound was being produced in copious quantities behind the Iron Curtain and elsewhere.

Platinol, a more recent invention, is now not only the most widely used drug against cancer in this country, but promises to be useful against many more types of cancer. Foreign producers can compete in most markets with our exclusive U.S. licensee. We estimate that the Foundation and its clients will have lost between \$75 and \$100 million of royalties because of patent rights sacrificed to prior publication.

Research Corporation was drawn into international patent matters as early as 1912 when it was established. The founder, Frederick Cottrell, was the inventor of the electrostatic precipitator for removing soot and particulate matter from industrial chimney gas. Cottrell patented the precipitator in Europe as well as the United States, and he gave many of the rights to Research Corporation as a unique endowment to get the organization started.

Given the lack of funds and Cottrell's embryonic precipitators, however, it made sense to sell off foreign rights and to develop a business in this country to design, manufacture and install the devices. Research Corporation was in this business until the 1960s, when the industrial firm it had founded—Research-Cottrell, Inc.—went public. The sale of this stock provided the Foundation with a more conventional endowment.

International interests beckoned more strongly in the 1930s. This was due to the synthesis of vitamin B₁, which was carried out by Robert R. Williams, Robert E. Waterman and Edwin R. Buchman. As these scientists gradually unraveled the structure of the molecule, they published their findings only to discover in 1936 that their work—mistakes included—had been made the subject of patent applications filed by the German colossus, I.G. Farben.

Thanks to carefully witnessed laboratory notebooks Research Corporation was able to win the resulting interference and get strong patents in the U.S. and postwar Germany, and limited protection in some other countries. Patent royalties from vitamin B₁, over \$10 million, supported the Williams-Waterman Fund for combating malnutrition in the world's developing nations.

Honest Broker

On later occasions Research Corporation was called on to act as honest broker between patent owners in the United States and other countries. A classic case was the Foundation's handling of the patent rights on the synthesis of cortisone. Major credit for the work goes to the late Edward C. Kendall of the Mayo Clinic, but many other researchers contributed to it.

The Kendall patents were donated to the Foundation by Mayo Clinic, and a leading pharmaceutical firm was licensed to develop a commercial process for producing cortisone. Unfortunately, marketing was blocked by diverse cortisone patent interests of Swiss, Dutch and German origin. Research Corporation took the lead in bringing all the parties together—European, American, industrial and academic. An agreement was negotiated that made it possible to license any responsible manufacturer to make cortisone under some 120 patents and patent applications.

While the demand for cortisone was worldwide, there are some university inventions in a special category: the

category is made up of inventions that are useful *only* in other countries. This alone is an excellent reason why a program for achieving application of university inventions should have an international component.

One invention in this special category is a substance to regulate the growth of plants invented some years ago by Dr. Nathan Tolbert of Michigan State University. Although most of the patent rights have now expired, the invention produced \$3 million in royalties, almost entirely from foreign sales.

We licensed the plant growth regulants to American Cyanamid in 1962 with the idea that they would find wide use here as well as in the rest of the world. They were never successful in the U.S., but they did prove unexpectedly useful in other countries for preventing wheat from falling over before it could be harvested.

A derivative of reserpine, a drug used as a tranquilizer and to treat mild hypertension, was licensed exclusively to a foreign manufacturer, as was an artificial kidney handled by the Foundation. Although licensing and development has been slow, a number of disclosures to the Invention Administration Program concern developments in tropical medicine, for example, or represent the kind of technology that might be appropriate for developing nations. Perhaps it will be possible in future years to achieve application of more of these discoveries.

How about technology coming into the United States for manufacture or use here? Although Research Corporation has not tried to systematically gather inventions from outside North America, it has handled discoveries originating in Europe, the Far East and other areas. These have usually come to us through reciprocal agreements with the so-called national research development organizations: the British Technology Group, formerly the National Research Development Corporation of U.K.; Canadian Patents Development Limited, and similar organizations in other countries including Japan.

NRDOS Started

An interesting sidelight is that the national research development organizations, or NRDOS, started after Research Corporation's operations were extensively analyzed by a British Government commission in the years following World War II. That study played a role in the founding of the British Technology Group. NRDOS have since spread to other countries of Europe, the Far East and the Commonwealth nations, a development that we can claim, in a modest way, to have helped stimulate.

A few inventions have come to us from inventors and institutions outside North America. One such import was a chemical discovery made by two professors at Lebanon's American University of Beirut before the country was overtaken by war. The two inventors came up with a simple method of synthesizing a whole class of compounds, called quinoxaline-di-N-oxides, that proved amazingly useful in animal food supplements and to treat animal diseases. Although publication meant that early patent publications could be filed only in the U.S. and Canada, further research by the inventors and a U.S. pharmaceutical company led to much broader patents in 24 different countries.

Commercial products were first introduced in 1971 and have produced well in excess of \$7 million in royalties.

If there is any conclusion to be reached from the foregoing examples, it is that there are outstanding inventions made in every country of the world that may have application in every—or any—other country. As a corollary, there may be companies uniquely qualified to develop specific inventions, not always located in the country of origin. With the experience gained in coordinating international transfers in selected cases, Research Corporation will this year extend its programs to the U.K. and Europe. Later, we hope to open an office in Japan.

The barriers that may have to be overcome with any given invention may include government regulations; the sometimes inhibitory effects of national programs designed to promote local industry, employment or security, and language and cultural differences. A happy circumstance is that our first venture will be in association with partners based in the same country as our European office: the United Kingdom.

When it comes to government regulations, the laws of the United States are of most importance to us at this point. Our portfolio of inventions is largely from U.S. institutions and largely made with the help of government funding. The most recent regulations, created in response to the signing of Public Law 96-517, are designed to encourage the preferential licensing of U.S. companies when an invention is made with government funds.

According to PL 96-517, organizations that license these inventions must make a reasonable effort to find a manufacturer who agrees to produce products based on the invention "substantially in the United States." A waiver can be obtained from the government agency that funded the invention only if it can be shown that no licensee can be found to manufacture domestically, or that domestic manufacture would not be commercially feasible.

Impact Uncertain

Because of the newness of the law it is difficult to predict what impact it will have on international technology transfer. The strictness with which the relevant section of PL 96-517 is interpreted may depend on the government agency involved. At this time the Foundation simply requests that domestic licensees comply with the law and alerts foreign manufacturers to its possible ramifications.

Labor sometimes defines technology transfer as exporting jobs, and this may be the basis of the restrictions written into PL 96-517. Unfortunately, the situation is usually not clear-cut. Our products can reach many markets in other countries only if we are willing to transfer technology and at least some manufacturing know-how. On the positive side, technology transfer opens market contacts and may ultimately increase trade.

It may be difficult to argue with regulations designed to protect national security by withholding advanced technology, but a few university inventions handled by the Foundation have military applications.

Generally, I think we would join those who have

urged government support for the principal of licensing technology abroad. There are many valid reasons for promoting the export of technology. We have a humanitarian interest in transferring medical and agricultural developments, not only to relieve suffering, but to promote peace and stability. Such exports will probably not erode markets for U.S. wheat, corn and soybeans, given our unique stock of arable land and road and rail distribution system.

The licensing of inventions made in one country to manufacturers in another can also be justified by business considerations. Among them may be the high cost of transporting goods across oceans or large land masses; high materials costs in some countries; the physical impracticability of exporting products that are fragile or perishable, or by such considerations as differing tax treatments of manufactures by various governments.

It will be necessary to look at the many segments of a global market in deciding where to secure patent protection and where to license an invention—country of origin notwithstanding. Who will use it and how? A drug against the common cold, for example, might enjoy worldwide use, but it might be possible to manufacture it only in countries with an advanced pharmaceutical industry. Which markets should be supplied by exports and which by licensing?

Patenting is expensive. A recent estimate by an industrial company is that it costs \$5,000 to obtain a "first-filed" patent to protect the average electronic invention in the United States; \$3,500 per patent per country was given as an estimate for patents filed outside the originating country, with a range of anywhere from \$2,000-\$8,000. In the Foundation's experience, these figures are low. It often costs much more to protect pharmaceutical, chemical and other complex inventions on the cutting edge of technology.

Basis for Decisions

We will base our decisions on a realistic appraisal of the technology and the market for it: the same considerations that have brought success to the Invention Administration Program in its present configuration.

One objective of our London office will be to facilitate the licensing of inventions from educational and scien-

tific institutions in North America to manufacturers in Great Britain and on the Continent. At present, lengthy intervals elapse between our visits to potential licensees in target countries. Since technology transfer usually demands close communication, limited contact means limited effectiveness. We hope to achieve a higher percentage of successes by maintaining a closer liaison with interested companies, and by having our people involved in the international technology transfer process on a daily basis.

A second objective of Research Corporation-London will be to provide invention administration services to educational and scientific institutions in Britain and other European countries.

We would probably be taking on more than we could chew if we went into this venture without substantial resources and knowledge as to local contacts and how best to protect inventories, negotiate licenses and monitor invention development in other countries. We are well aware of potential stumbling blocks. Our partners in this activity will be a member of a large venture capital group based in the United Kingdom. They will contribute not only working capital, but a knowledge of local and international industry based on many years of experience.

Although this venture capital group—like others—has not been traditionally interested in third-party licensing per se, they recognize the need for establishing alternative mechanisms for finding new venture opportunities based on university developments.

In announcing the establishment of Research Corporation in 1912, founder Frederick Cottrell pointed out that, while conservation had been a word to conjure with, all manner of economic wastes were receiving a too-delayed attention. There was, Cottrell said, an intellectual byproduct of immense importance, the mass of scientific facts and principles going to waste. Useful inventions based on these findings never, or only after unnecessary delay, reached the public for lack of commercial guidance.

Guidance has a new meaning in an era in which the success of an invention may depend on patenting and licensing it in a dozen countries. Our new initiatives insure that we can continue to "make inventions more available and effective" in an increasingly interdependent world.