

The Rockefeller Foundation and French Research (La fondation Rockefeller et la recherche française)

**Doris T. Zallen (Humanities Center, Virginia Polytechnic Institute and State University,
Blacksburg, Virginia, U.S.A.)**

At the end of the end of World War II, as the CNRS (Centre National de la Recherche Scientifique) was endeavoring to reestablish itself to meet the very pressing needs of the French scientific community, it received help from an unexpected source -- the Rockefeller Foundation. This Foundation, one of a cluster of philanthropic organizations established by the American industrialist John D. Rockefeller, had been forced to discontinue a large portion of its support for public health, medical, and scientific activities because of the hostilities. When the war ended and the Rockefeller Foundation confronted the task of renewing its support for science in the war-deprived and war-ravaged countries, it sought to determine what to do and how best to act. Clearly, even its own substantial financial capacity was dwarfed by the enormity of such an undertaking. The way in which the Rockefeller Foundation assisted France constitutes a special chapter in Foundation history. The rationale behind the response, its effect on the CNRS, and its immediate and long-term influence on French science are the subjects of this article (1).

ROCKEFELLER FOUNDATION ACTIVITIES IN FRANCE PRIOR TO WORLD WAR II

The Rockefeller Foundation, incorporated in 1913, had as its stated goal "to promote the well-being of mankind throughout the world" (2). The Foundation's earliest activities focused on furthering public health programs and medical education. It joined the already existing Rockefeller Institute for Medical Research (set up in 1901) and the General Education Board (1903) and was followed by the Laura Spelman Rockefeller Memorial (1918) and the International Education Board (1923). These organizations had slightly different, though somewhat overlapping, charters.

The Rockefeller family and the Rockefeller Foundation had special ties to France since

the early twentieth century. The Rockefeller Institute for Medical Research was modeled, in part, after the Pasteur Institute in Paris. John D. Rockefeller's great regard for the work of Louis Pasteur led him to provide personally all the funds necessary to restore the Pasteur birthplace in Dôle, France as a gift to the French nation in 1912 (3). One of the largest and most ambitious of the Foundation's efforts in its early years was the anti-tuberculosis campaign conducted in France from 1917-1925 (4). The Commission for the Prevention of Tuberculosis in France (also known as the Mission Rockefeller) was organized by the International Health Board, an agency of the Foundation, and was sent to France to work with French public health agencies in countering the rise in tuberculosis brought on by the war and by the failure of the French health network to deal adequately with the crisis. More than two million dollars were spent in this effort. During the 1920s the Foundation also gave major grants to French medical and scientific institutions. These included funds for the construction of medical schools in Strasbourg and Lyon (5), for medical research at the Pasteur Institute in Paris, and for the marine biological stations at Roscoff and Banyuls. The Rockefeller Foundation selected Paris as the site for its European headquarters, using the former administrative offices of the anti-tuberculosis commission before moving to a permanent location at 20 Rue de la Baume.

In 1928, a reorganization took place involving several of the Rockefeller philanthropies to correct problems of duplication of function and to simplify the managerial structure. The Rockefeller Foundation was given specific responsibility for the support of fundamental research activities. Five divisions were created within the Foundation -- Natural Sciences, Medical Sciences, Social Sciences, Humanities, and International Health -- each of which had its own director and staff who reported to the Foundation president and to a Board of Trustees. The guiding philosophy for all the divisions was to give funds to investigators who had already established their reputations and who were located in research environments that encouraged and supported their efforts.

In the early 1930s the Natural Sciences division, which supported work in the basic scientific disciplines, further refined and limited its mission by electing to emphasize programs in the area of experimental biology, especially those in which the tools of physics, chemistry, and mathematics were applied to the solution of important biological questions. Under its director, Warren Weaver, the Natural Sciences division proceeded over the next several decades to seek out and support projects in experimental biology or in the development of the physical and chemical tools that would be especially useful in biological research programs. In addition to larger grants given for such projects, the Foundation also maintained two other types of programs: grants-in-aid to provide small amounts of support to researchers for particular purposes, such as the purchase of vital pieces of apparatus or salaries for research assistants, and fellowships to assist promising young researchers by allowing them to travel to and study in leading laboratories around the world before returning to faculty or research positions in their home countries.

Following the reorganization of 1928, there continued to be support from all of the Foundation's divisions for French research activities. The Natural Sciences division had direct charge of programs in physics, chemistry, mathematics, and biology. It was the obvious locus within the Foundation to meet the challenge of responding to the crisis in scientific research created by World War II.

THE ROCKEFELLER FOUNDATION AND LOUIS RAPKINE

Most decisions made by the Rockefeller Foundation on the nature and degree of its support for scientific activities were based on evaluations by its officers of scientists and research programs in the U.S. and Europe. They obtained information during on-site visits to a network of laboratories and from informal interviews conducted with leading scientists in the course of those visits or at the Foundation's offices in New York and Paris. At the end of World War II when the Foundation faced the task of redeveloping its scientific programs in countries devastated by the war, one of the most influential voices on French science was that of Louis Rapkine.

Rapkine, a cell physiologist, naturalized French citizen and ardent francophile, had settled in France while in his twenties. He had come from French-speaking Canada (to which his family had emigrated from Russia by way of France) in order to complete his university studies in an environment that provided an opportunity for biological research. In 1924, he arrived in Paris at the age of 20 (6) as a research student to study with Maurice Caullery in the Laboratoire d'Evolution des Etres Organisés at the Sorbonne. At first, Rapkine found life in Paris very hard. All he had to live on were his meager earnings as a part-time employee in a shoe store. This period of poverty ended nearly two years later when he was awarded a fellowship from the International Education Board -- one which he initially regarded as a form of charity and refused to consider until he was finally persuaded by Augustus Trowbridge, the Board's representative in Europe, and his mentors to apply (7). This support enabled him to escape the semi-starvation he had endured so that he could concentrate fully on his research. The fellowship marked the start of a relationship with the Rockefeller organizations that was to continue for more than two decades -- until nearly the end of Rapkine's life in 1948. Rapkine was a man of strong emotions and deep feelings. His expressions of gratitude for the award and for the opportunity to study biological systems that it had provided him were still in evidence years later when he told Warren Weaver:

If you want to know what a fellowship can mean just compare these two eighteen-month periods in my life. It is of course true that I owe the most to my parents, but it is equally true that I owe the next most to that Rockefeller Board which gave me training almost in spite of my proud foolish self (8).

Rapkine developed a unique connection with the Rockefeller Foundation during World War II. Prior to the outbreak of hostilities, Rapkine, working through the Comité Français d'Accueil des Savants Etrangers, had been active in organizing efforts to assist refugee scholars who had come to France from countries such as Germany and Austria. After the German invasion of France, Rapkine gave up his scientific work as Maître de Recherches at the Institut de Biologie in Paris in order to devote his full attention to helping scientists whose lives were threatened by growing Nazi persecution. His work on behalf of French refugee scholars through the French Scholars Fund which he organized and as head of the Scientific Bureau of the Free French Movement brought him to the U.S. where he garnered funds to assist more than thirty scientists and their families, obtained immigration visas for them, and found them suitable positions (9). During this period Rapkine kept in close touch with Foundation officers since

some of the funds to support this activity came from the Foundation, and his efforts to save French scientists often dovetailed with the Foundation's own attempts to aid refugee scholars. He and Warren Weaver often discussed the future activities of the Foundation once the war was over. This long-term relationship of mutual trust and respect between Rapkine and Foundation officers made Rapkine an important link to French science when the Rockefeller Foundation was seeking to reestablish its scientific presence and its programs in France in the post-war period.

THE SPECIAL POST-WAR PROGRAM FOR FRANCE

A key series of meetings, out of which came the policy especially developed for post-war France, took place in New York during the autumn of 1945. These meetings were initiated by Rapkine in two letters, both dated August 4, 1945, one written to Warren Weaver and the other to Harry M. (Dusty) Miller, Assistant Director of the Natural Sciences division. In the letter to Miller, Rapkine raised the possibility that before he returned to his scientific work in a new post created for him at the Institut Pasteur, he travel to New York and inform the Foundation of the state of French science:

I don't know, my dear Dusty, what the Rockefeller Foundation's plans are with respect to France. In all simplicity and in all loyalty, I consider myself at your entire disposal for anything in which I can be of help . . . About a fortnight ago I saw Dr. O'Brien [Assistant Director, Medical Sciences division of the Foundation] in Paris, who vaguely suggested that it may not be a bad idea that . . . I should make a trip to New York, in order to give you as thorough an account of things in the French scientific world as I could. Laugier [pre-war director of the CNRS] thought likewise, and when I asked Joliot [current director of the CNRS], he also encouraged me to make this effort . . . Mind you, I think the R.F. could do now in France a great job. The R.F. enjoys, as I have always said, a unique reputation, and its task would be a successful one. I think I can be of help in describing the situation and making suggestions. . . (10)

In the letter to Weaver, Rapkine asserted even more strongly that Rockefeller Foundation help would be essential in the recovery of French science:

. . . I do not want to hide from you the fact that you are awaited by dozens of colleagues, in Britain and France, practically like the Messiah. . . Forgive this simple and crude way of putting forth this statement. Mind you, I am not talking about those poor individuals who think of the R.F. as a sort of gigantic Holy Cow from which as much milk as is desired can be obtained. I have in mind those colleagues who think of the R.F. as a unique Institution which has an important role to play in the development and advancement of Science and which, now, more than ever in the past, is expected to assume certain responsibilities which it never had to assume in the past (or at least on a very small and localised scale). . . This is a delicate task indeed. Extraordinary times should be met with by

extraordinary means; delicate situations must be met with delicate solutions. There is wisdom and warmth a-plenty in the R.F. (11).

After considering Rapkine's request, Weaver, in a hand-written note to Dusty Miller, gave five reasons why a visit from Rapkine should be encouraged. Weaver cited Rapkine's intimate knowledge of French scientists and their programs:

- 1. He is certainly extraordinarily (perhaps uniquely) well informed about French scientists and the state -- physical and human -- of science in France.*
- 2. Although we realize (and can therefore cope with and discount when necessary) his extreme emotional committment [sic] to France and the French, he also has, by virtue of his Canadian origin and his absolutely fluent and colloquial English, a certain objectivity and understandability that no Frenchman could ever have.*
- 3. I think he has the confidance [sic] and trust of a great many important French (and English) scientists and administrators of science.*

He went on to point out the advantages such a trip would have for the Foundation:

- 4. I am convinced that he has a passionate and really unselfish desire to serve the RF -- to repay some of a debt which he counts very large. I have no fear that he is trying to manipulate himself into some position of prestige or authority. He says himself -- emphatically and simply -- that he only wants to get back into the laboratory.*
- 5. For this trip he is asking for nothing from us (12).*

Rapkine was informed by cable sent on August 21, by letter dated August 23, and by a still more official letter on August 30 meant to be shared with French officials that his visit would be most welcome. Though the French government paid the travel costs, the Foundation contributed a small grant to cover any extra expenses¹³. Rapkine's visit to New York extended from late October to early December 1945 and during this time a number of meetings with Weaver and Miller were held.

Weaver outlined the first tentative proposals which began to emerge from those discussions to Raymond Fosdick, Foundation President, in an memorandum entitled "N.S. [Natural Sciences division] Aid to France -- Post-War Transition Period (1-3 years)"¹⁴. Weaver first described the CNRS to Fosdick. The CNRS "has assumed a position of real national leadership in France", he wrote. He characterized the CNRS as encompassing the widest spectrum of political opinion, making real efforts to be representative of scientific work throughout France and to develop science in the provinces as strongly as in Paris, and as being run by the scientists themselves -- many of whom were former Rockefeller Foundation fellows. Thus he assured Fosdick that an administrative apparatus was already in place with which the Foundation could work comfortably. Weaver went on to identify the problems facing the French scientific community brought on by the long period of hardship associated with World War II. He pointed out three areas of need:

1. *restoration of contacts, both within and without France;*
2. *furnishing of critical items of equipment (apparatus, chemicals, literature);*
3. *training of scientific personnel.*

Since there was already an active fellowship program in place in the Natural Sciences division providing training opportunities for promising scientists, Weaver directed his attention to ways that the Foundation could address items 1 and 2. He put forth two different proposals. To overcome the effects of the intellectual isolation of French science induced by the war, Weaver suggested a grant of \$100,000 to help the CNRS bring leading foreign scientists (American and non-French Europeans) to a series of special conferences in France. These conferences would be targeted to address particular problems such as protein structure, enzymatic systems in cellular physiology, or statistics of quality control (Weaver's examples). The conferences, by bringing world experts together with French scientists in that field, would help identify "the most fruitful lines along which the work can now proceed". Weaver's description of these conferences indicates that they were to be small and informal ("the attendance of mature contributors restricted to say 15; with provision, however, for additional listening and observing audience of young men"), and were to include two to five non-French researchers. They were to be held at various locations throughout France, and last long enough (of the order of a week) so that real work could be accomplished. Rather than merely providing information, then, these conferences were envisioned as a means of re-establishing and energizing scientific programs in France by offering French scientists the opportunity to orient their work so as to both draw on their particular strengths and fit their work in with recent developments internationally.

Weaver addressed the problem of equipment in his other proposal. He suggested that a grant of at least \$100,000 be made to the CNRS so that "those special items of research apparatus, chemicals, and literature which must be purchased outside France" could be obtained. The CNRS' own funds for this purpose would probably only be used inside France to help the French scientific industry recover, he argued. The Foundation funds could be held as dollar credits in New York to allow purchase of critical equipment from non-French sources especially the U.S., but also possibly England, Sweden, and Switzerland.

Both Weaver and Rapkine were so skilled at the art of presenting their ideas so that others would come to think of the ideas as their own that it will probably never be possible to determine to what degree each contributed to the fashioning of these proposals. Weaver, in a confidential memorandum written in May 1949, several months after Rapkine's untimely death from lung cancer, stated that Rapkine had suggested the equipment grant and that he (Weaver) was responsible for suggesting the series of conferences (15).

Certainly equipment concerns were uppermost in Rapkine's thoughts when he visited Weaver at the end of 1945. During the course of his stay he took time to purchase apparatus and reagents in the U.S. that were urgently needed at the Pasteur Institute but which were not available in France. He stressed to Foundation officials that the French equipment industry had been devastated by the war and that the process of retooling for production would not only take a long time but would, of necessity, be reflected in very much higher costs for equipment than equivalent items purchased elsewhere (16). Rapkine, returning to scientific work for the first time in many years and facing the very real problems associated with setting up a laboratory,

doubtless was able to communicate the great needs for equipment in his and other French laboratories to Weaver. It seems reasonable to conclude that Rapkine was indeed the driving force behind the idea for equipment support given through the CNRS.

It also appears likely that, as he himself stated, Weaver was largely responsible for putting forth the plan to conduct CNRS conferences. Providing assistance for conferences was a favored type of activity for the Foundation, and one in which it had much experience having sponsored the annual Cold Spring Harbor symposia for many years and supported a number of international conferences, large and small, on many scientific topics. But, it is possible that Rapkine may have had considerable influence here as well. Rapkine was highly impressed by the approach to solving wartime scientific problems that he saw used in England. He promoted this form of cooperative work toward a common research goal in his own organization of groups of scientists under the banner of the Free French and by his efforts, right after the war, to update French scientists by bringing them to England to meet with their scientific counterparts there. He had felt that this was a mechanism that could be used productively to attack problems of general importance such as in cancer research. The idea of bringing researchers together to explore a topic of common interest would have been quite natural and desirable to him.

Whatever their actual origin, the proposals at this stage were still only tentative suggestions and Weaver awaited the reaction of President Fosdick and the other division heads. These reactions were important because the proposals Weaver was advancing were unusual and, in several respects, contrary to the traditional policies of the Natural Sciences division and the Foundation. Instead of keeping the decision-making about distribution of funds within the Foundation, Weaver was proposing that a very large sum of money be given to another organization, the CNRS, which would assume this authority. And, though for more than a decade Weaver's division had focused its support on those research programs which applied the tools of chemistry, physics, and mathematics to biological questions, the funds for both proposals were unrestricted and could be made available to all branches of the natural sciences regardless of the type and goals of the research. Weaver clearly felt his departure from standard practice was warranted, however:

They have the advantage of serving all French science during a period when it would be very difficult for us to pick and choose ourselves . . . Of all the continental countries, French science represents the strongest combination of appeal (hardest hit and most worth rebuilding) . . . This [equipment] help is critically needed, and needed now . . . [As to the conferences] I am myself convinced that nothing would do as much to stimulate, rejuvenate, and reorient French science (14).

The response from his fellow officers at the Foundation was positive but cautious. Alan Gregg, Director of the Medical Sciences division, had just returned from a fact-finding trip to Europe. His concerns related to the instability of the French monetary system and, since physicist Frédéric Joliot was in the process of leaving the CNRS directorship to do atomic bomb research, uncertainty about the leadership of CNRS (17). John Marshall, Associate Director of the Humanities division, brought up another issue -- the French willingness to accept this type of support:

[B]oth your proposals strike me as reasonable and in general appropriate, if the French want the RF to do this kind of thing in France. I'm still a bit inclined to expect that, to regain the prestige they feel they have lost, they may prefer to do such things from their own resources. But it is by no means unlikely that they will not be able to, particularly because of lack of foreign exchange. If so, both proposals belong to what I believe to be an important and urgent category of RF opportunity in Europe. My only hesitation, then, concerns our moving in only when it is certain that RF aid is wanted (18).

Assurances on this latter point were not long in coming. Louis Rapkine took the suggested proposals back to France when he returned in December 1945 and discussed them with the officers of the CNRS, Director Joliot and Deputy Director Georges Teissier, and with Pierre Auger, Director of Higher Education. According to Rapkine, both proposals were warmly received (19). "The reaction [to the conference idea] is absolutely unanimous", he wrote; "they find it a most essential and most important thing to do". The officers of the CNRS thought the need for equipment was even more critical:

I need not tell you how the item on equipment is regarded by C.N.R.S. officers. It simply would be a godsend, and certainly not a luxurious godsend.

Rapkine concluded his comments to Weaver with a strong plea that the equipment needs be addressed promptly. He argued that it was essential to move ahead quickly because of the time required to determine the distribution of funds in France, to identify and order the proper pieces of equipment, and to await their delivery.

Upon receipt of Rapkine's report, Weaver immediately addressed the concerns expressed by Gregg and Marshall (20). The instability of the franc was not a problem since most of the grant money involved would be in the form of foreign credits and would not even be spent in France. Nor was the change of leadership of the CNRS a barrier:

. . . Joliot is stepping down and . . . the succession is not yet announced. But it hardly seems to me that we ought to hold up for this. French science will, after all, go on.

Weaver also referred to the clear signals of CNRS interest in both proposals that Rapkine had just transmitted:

A letter just received from Louis Rapkine indicates, with considerable warmth, that the authorities with whom he has informally discussed the two schemes approve of this enthusiastically and are quite prepared to adopt them as their own schemes, so-to-speak.

There was now no reason to delay. Weaver informed Rapkine, by cable, to have the CNRS proceed with a formal request.

Within a few weeks, the Foundation received the official letter, signed by Joliot

(identified as the former director of the CNRS) and by Teissier (the new director) (21). In most respects, the request was identical to the suggestions outlined by Weaver in his memorandum to Fosdick some months earlier. Joliot and Teissier stressed the need to be brought up-to-date in terms of scientific ideas and materiel and the critical interrelationship of the requests:

Each of these projects is important, but one could say that taken separately they are insufficient, but taken together they supplement each other admirably.

The only major difference between Weaver's proposals and those outlined in the French letter was in the section on laboratory equipment. In supporting their request for such funds, Joliot and Teissier described the serious situation in French laboratories -- the lack of equipment, the outmoded and poorly-functioning apparatus -- and then indicated that any equipment funds provided by the Rockefeller Foundation would be used to improve the conditions in some, but not all, laboratories:

As we see it, what we shall try to do is to make a careful choice of the most energetic among the men at the head of laboratories who, in our opinion, can draw around them a circle of disciples and to equip their laboratories with good modern apparatus. We are thinking too not only of laboratories in Paris but also good ones in France outside of Paris.

About thirty-five laboratories encompassing the physical and biological sciences, selected by committees of the CNRS, would have access to these funds. These included the marine biological stations at Roscoff and Banyuls and the new Institute of Genetics to be established at Gif by the CNRS. The total requested in the letter, \$210,000, was well in excess of what Weaver had originally intended but was quite close to the figure Rapkine had estimated during his meetings with Weaver (22).

The two CNRS proposals were on the agenda when the Rockefeller Foundation Trustees met on April 3, 1946. The first was for an award of \$250,000 for the CNRS to use over a three-year period to purchase special equipment for approximately thirty-five natural science research laboratories (23); and the second proposal was for \$100,000 to subsidize the attendance of non-French scientists at special conferences, ten a year for three years, to be arranged by the CNRS (24). In support of these requests the Natural Sciences division officers presented the Trustees with documentation that repeated many of the same arguments and justifications that Weaver had used with Foundation President Fosdick and the other division heads. In addition, the officers held out the hope that this support would not only restore French science but would even bring it to a much better position than it had occupied before the war. The key factor in this transformation, according to the materials provided the Trustees, was the CNRS itself:

With an organization of over thirty "Sections", covering all the fields of pure and applied science; with a Directorate which, spreading over all shades of political opinion, is recognized as representing the leadership of French science; with an excellent plan for developing research in the provincial universities as well as in Paris; with the backing of the French Government; and with a large proportion of its leadership youngish

men who. . . have knowledge of and sympathy for science in other countries, the CNRS has a chance to do an outstanding job.

The Trustees approved both proposals. The first Rockefeller Foundation support for the CNRS had successfully been arranged. Now it was necessary to breathe life into these programs.

PUTTING THE PROGRAMS INTO ACTION

A flurry of correspondence between the Foundation and the CNRS followed the announcement of the awards. Weaver cabled Rapkine that very day; Rapkine, Joliot, and Teissier immediately cabled back their deepest appreciation. Official letters of award and of thanks were also exchanged. Weaver in another, more personal, letter to Teissier pointed out how unusual it was that the Trustees would consent to awarding \$40,000 more than the CNRS had requested for the equipment fund (\$250,000 rather than \$210,000) but that the higher amount was certainly justified (25). Weaver also stressed to Teissier that all decisions regarding the disbursement of funds for equipment or the planning of conferences were to remain in the hands of the CNRS. He wrote: "[W]e are quite content to leave all matters of choice to you".

The Equipment Grant

Despite their declared willingness to distance themselves from the decision-making process, Foundation officials soon became aware of a few potential problems. Gerard R. Pomerat, newly appointed to Weaver's staff, reported during his first trip to Europe shortly after the grants were announced that some prominent French scientists were concerned: "They frankly fear French love of paper work and the political angle", he wrote back to New York in May 1946 (26). There was also the difficulty of whether to provide funds to those whose work was not in the area of natural sciences but in medical sciences. Dusty Miller, visiting Europe with Pomerat, had received from Rapkine (who participated at the meetings of the Directorate though he was not a member) a preliminary list of potential recipients prepared by the CNRS which included the names of investigators associated with medical faculties or working on subjects, such as neurophysiology, which fell more properly within the jurisdiction of the Medical Sciences division of the Foundation. Were they entitled to support under the terms of this grant (27)? Weaver's response to Miller's query was to enlarge the definition of natural sciences to include "preclinical medical subjects without worrying over divisional programs here" but that "support to institutes outside universities be restricted to permanent institutions with facilities for training personnel as well as for research" (28). Robert S. Morison of the Medical Sciences division endorsed the decision, offering to provide additional funding from the Medical Sciences budget should the inclusion of such medical researchers "seriously dilute the original objective of the fund" (29).

Less than a week later, Pomerat was able to forward the news to Weaver that the CNRS Directorate had made good progress:

Our grant is apparently to be divided into four main sections -- each to receive more or less a fourth of the total allocation. Within each section

approximately 8 men, schools or laboratories will be chosen to receive a ninth of the funds [designated as one unit] of the section. In some instances groups of men with common research interests will be formed. Insofar as possible duplication in the purchase of expensive equipment will be avoided by this method and by an arrangement of loans between laboratories (30).

The problem of how to treat the medical sciences was handled by limiting funds for such researchers to a total of about one unit:

This would prevent difficulties with men who have been working hard on the committee, would be a small gesture toward our friends there, and yet would not be sufficient to bring down a whole array of demands from other men with M.S. [Medical Sciences division] interests.

Overall, both Miller and Pomerat were pleased with the decisions being made by the CNRS Directorate. Pomerat wrote enthusiastically:

They have attempted to be just and impartial, they have weighed the general and collateral problems carefully, they have shown themselves willing to arbitrate and to concede whenever it seemed essential or politically desirable, and they have responded almost entirely to every little suggestion which we made. . . We feel that the CNRS has done well a most difficult job and we have confidence that they will have strength enough to abide by their decisions and to withstand the criticism which will undoubtedly follow announcement of awards.

Rapkin's evaluation of the process of decision-making was more restrained:

It is a good list, I think, and the best laboratories, as a whole, will be in a position to get some useful equipment and get a decent start. . . I frankly say that the distribution of the grants to various laboratories was not always perfect. In one or two cases, the grants were made by the CNRS after taking into consideration certain motives which were not based solely on purely scientific grounds. For instance, one case comes to my mind, is that of a biologist who as a member of the Directoire, could not be eliminated easily from the list of beneficiaries. At any rate his case should have been much more discussed, and it would have been, were he not present at all the meetings. At any rate. . . one or two doubtful cases out of thirty-seven is not too bad, for a human undertaking (31).

Teissier's official notification to Weaver of how the equipment fund was to be divided arrived about a month later in June 1946 (32). A summary of the Directorate's decision can be found in Table 1. Most of the scientists named were to receive identical amounts of money, one unit, or about \$6000. In a few cases, in which a group of investigators was involved or where needs seemed to justify greater support (such as the Roscoff marine biological station headed by Teissier and the new Institut de Génétique headed by Boris Ephrussi), larger sums were assigned.

As Teissier himself pointed out to Weaver, the CNRS remained sensitive to the priorities of the Natural Sciences division in distributing the funds. That is, the researchers chosen were already well-established and a strong preference was shown for work in the biological sciences. In all, the Directorate named thirty-seven individuals or groups. Nearly three-quarters of these had been identified by Rapkine when he sketched out a list of potential recipients for Weaver at their meetings in New York half-a-year before.

The Rockefeller Foundation remained centrally involved in the disbursement of the funds over the next three years. Difficulties associated with working through the complicated bureaucratic apparatus of the CNRS and of facilitating the use of foreign credits required that the Foundation's purchasing and accounting offices in New York work closely with the CNRS office in New York (which was the direct descendant of Rapkine's wartime French Scholars' fund office) in ordering equipment, making payments, and solving other problems. Problems included the extremely slow pace of shipment of items ordered from the U.S. and the need to insure equipment shipments which suddenly arose when scientific equipment shipped on the SS Ocean Liberty was destroyed when the ship exploded and sank in July 1947 before arriving in Brest, France.

Warren Weaver had expected that the funds from this special grant would be used to purchase major items of scientific equipment such as centrifuges, spectrophotometers, and Warburg respirometers. Grant funds were often used for these purposes. However, just as often, the French used the special fund to buy more modest but equally crucial pieces of equipment. The rebuilding of French scientific laboratories also depended on pH meters, hemocytometers, biochemicals, syringes, pipettes, dry cell batteries, and stopcock grease.

At the end of the third year of the equipment grant, a balance of \$28,000 remained. The French asked for and got a one-year extension to use the rest of the money (33). No further funds were forthcoming. When Teissier carefully explored the possibility of a second long-term equipment grant, Pomerat told him, "No, the emergency period is over now and we will want to operate as much as possible as we used to do before the war" (34).

The Conference Grant

Unlike the equipment grant, the grant providing funds to conduct conferences was to go on, in various forms, for ten years -- and, even after all that time, when the conference grant finally ended, it closed with some reluctance on the part of Foundation officials. In contrast with the agonizing slowness with which the equipment purchases proceeded at first, several conferences or colloquia were quickly organized. Emile F. Terroine, chair of the CNRS committee charged with overseeing international activities (Commission des Relations avec L'Etranger), assumed responsibility for organizing and coordinating the conferences. He encouraged subsections within each scientific discipline to plan several meetings in their particular areas. The first meeting on "Optical Images", drawing on the presence of many foreign experts already present in Paris for an international congress on optics, was held in October 1946; the second, entitled "High Polymers", occurred in Strasbourg, in November of that same year.

A guiding principle, endorsed by Terroine's group, was that the conferences should identify and promote scientific areas already strongly developed in France. As Rapkine reported

to Pomerat:

[T]he first two symposia. . . were on subjects which could be developed here in France, because there are the men to do it. On the other hand, we examined the possibility of holding a conference on 'Photosynthesis', a subject which is professed tremendously in the U.S.A., and we decided not to hold it, because there's but one man in France who could guide younger men in this field -- Prof. Wurmser -- but who is now pursuing other lines of research, and does not feel that he could in the present circumstances undertake the task of guiding work on photosynthesis along modern lines. I think its the wiser way: Rather concentrate on what could well be done, than spread out very thinly, on subjects which cannot be undertaken because of lack of man, lack of teachers, as well as pupils (35).

Those who wanted to work in lines of research not strongly developed in France could, Rapkine suggested, be sent to leading schools or laboratories in other countries for appropriate education.

Under the terms of the original grant, ten conferences were to take place each year for three years. This pace proved to be too ambitious. By the end of the third year of the grant, only twenty conferences had been conducted. The actual costs for each conference turned out to be less than anticipated (36). The savings were the result of shorter stays by the foreign experts (ten days instead of the several-week period Weaver had anticipated), a practice of extending many more invitations to scientists from nearby European countries than from overseas, and a policy of taking advantage of the presence in Europe of American scientists who were attending other meetings. Thus, although two-thirds of the conferences had occurred by the end of the third year, about half of the money remained unspent. A series of extensions, unusually generous even by Foundation standards, were authorized to give the CNRS an additional three years to spend the \$100,000 allotment under the grant (37). During this period, eighteen more conferences were organized. By the time the original grant ended on June 30, 1952, a total of thirty-eight conferences had been held. Table 2 contains a list of the conference topics arranged chronologically by scientific discipline. For those which were interdisciplinary in nature, only the major discipline involved is shown.

The CNRS conferences covered a wide variety of scientific topics from abstract mathematics to applied biology. Yet, in most respects, they all conformed to the general format that Weaver had laid out in his original proposal. That is, they were focused on specific problems and were geared toward enhancing the research programs of French scientists. The conferences typically attracted leading scientists so that the lists of invited speakers came to represent a "Who's Who" in world science at that time (38). The goal of having "at least one-third [of the meetings]. . . held in the provincial universities" was achieved. The meetings were sufficiently long that, according to many of the attendees whose comments were forwarded to the Foundation over the years, they were able to accomplish much toward advancing French scientific programs.

There were some deviations from the Weaver plan. The small size and intimate tone was sometimes replaced by a convention atmosphere. One striking, but not unique, example of this was described in a confidential report prepared for the Trustees:

[T]he conference on 'Fundamental Particles' held at Paris in April of 1950 was attended by no less than six Nobel prizemen from outside France: Niels Bohr of Copenhagen, P.S.M. Blackett of Manchester, Erwin Schroedinger of Dublin University, Enrico Fermi of the University of Chicago, and H. Yukawa and I.I. Rabi of Columbia University. You may be sure that the sessions at which these masters spoke could not be held down to the ideal of 'under fifteen conferees.' Every physicist in France who could crowd into the conference room was there (39).

Some topics were only tangentially related to the natural sciences -- the conference on "Theory of Risk in Econometry" being a case in point. The CNRS decided to expand on the conference plan by subsidizing the production of brief reports and full publications from each of the conferences in order to inform a larger scientific audience of the conference discussions.

On balance, the Rockefeller Foundation was sufficiently satisfied with what the conferences accomplished that it approved another grant of \$40,000 to support twelve more conferences over three years following the guidelines outlined in the original grant (40). Gaston Dupouy, Teissier's successor as Director of the CNRS, negotiated the second grant. Dupouy had hoped to enlarge the effort by including a number of conferences on "sciences humaines" topics along with those in natural sciences. Edward F. D'Arms, Associate Director of the Foundation's Humanities division, was opposed. He believed that the topics proposed by Dupouy ("Aspects of the Holy Grail in French and other literature of the Middle Ages" and "Pagan and Christian Sacrifices from the beginning of the Christian Era") did not fit with Humanities division priorities (41). Such conferences never received Foundation support. Ultimately, the CNRS went ahead with them on its own.

The natural sciences conferences supported under the terms of the second conference award are shown, by discipline, in Table 3. The second grant, originally intended to run until June 1955, was extended for one year (42). As this grant was coming to a close, Pomerat began to consider the possibility of yet a third grant of this type:

The conferences have been good and they have done a lot for France. . . but the [Natural Sciences division] has already recommended something like \$150,000 toward these meetings and it may well be that the time will soon come when we ought to reevaluate this project (43).

Finally, Pomerat and the other Division officers decided that:

If a new request came in . . . the RF would prefer to wait a year or two before considering further support and that, then, it might be willing to take up the possibility of helping some specific, more biological meetings (44).

The program established to help overcome the French scientific isolation caused by World War II had supported fifty-five conferences when it ended on June 30, 1956.

THE INFLUENCE OF THE GRANTS ON FRENCH SCIENCE

Throughout the years of the equipment and conference grants the Rockefeller Foundation continually heard positive comments about their usefulness from the scientists involved. Weaver noted the reaction to the equipment grant in his diary in April 1948:

It is with great satisfaction, in going through the various laboratories, to have frequently pointed out to us some quite essential piece of apparatus about which the man says 'We simply could not work without that -- it came to us as part of our share of the equipment furnished by you through the C.N.R.S. grant' (45).

The Conference grants were equally well received from the very first. Max Herzberger, an American scientist from the Eastman Kodak Company invited to the conference on optical images, spoke about it to Pomerat:

H[erzberger] describes this conference as having been very successful, one of the best he has attended, and one in which real progress in the field was accomplished (46).

Paul Doty, an American polymer chemist, wrote to the Foundation about the high polymers meeting in Strasbourg:

Without reservation I must tell you that it was a remarkably useful conference both for the French and for those of us who came from other countries. I feel that this meeting will influence the research programs of the majority of the participants and this is all that one can really ask (47).

Much later Pomerat was to conclude:

There is little question but what the CNRS colloquia have been most successful, have been uniformly well conceived and well conducted, and have played a very fine role in broadening the international outlook of French scientists (48).

The only difficulty from the point of view of the Foundation was that topics chosen by the various organizers more strongly emphasized the physical sciences and mathematics than topics in experimental biology which was the main focus of the Natural Sciences division. As time went on and the Natural Sciences division began to shift its emphasis to agricultural science, the conferences planned by the French scientists began to diverge more and more from the overall Foundation program.

Despite the problems which arose over the years with regard to the administration of both

types of grants and occasional disagreements, it is clear that, in both cases, the Foundation was quite pleased with the way its funds had been spent and believed that its overall goals of restoring and reinvigorating French science had been met.

It should be borne in mind that the Rockefeller Foundation was not the only source of support for French science at that time. The CNRS had its own budget from national French sources and there were, in addition, other private foundations and international research agencies that contributed funds for the support of French science. Still, the amount of money made available by the Rockefeller grants, equivalent to more than two million dollars today, was a very large sum and should have had considerable effect. What, then, was the real impact of the awards on French scientific activity?

The grants appear to have influenced French science in three ways. First, by targeting most of its support to well-established investigators who were already leading figures in French science, the Rockefeller grants assisted in the restoration of the French scientific community to a condition similar to that which existed before the war. These scientists, with their access to both types of funds (nearly all the equipment fund recipients were active participants in at least one conference and more than half of them were also conference organizers), were provided powerful tools to use in rebuilding their laboratories and advancing their research programs. Areas of particular strength remained strong; areas not well developed were largely ignored. Lines of work which prior to the war had a unique character in French laboratories, such as research on the role of cytoplasm and non-nuclear genetic elements in development (49), were reinstated. In sum, no new seeds were planted by these grants, but the existing flora were watered and nourished.

Secondly, although these grants did not change the cast of characters in French science, they may have influenced the way these individuals interacted. The need to make maximum use of equipment funds and the obvious advantages of sharing scarce items of equipment prompted collaborative arrangements. This situation, coupled with the research links forged between different scientists at conferences, encouraged group efforts and teamwork to a degree which might not have been possible otherwise. Rapkine and others who had witnessed the benefits of teamwork during their wartime exposure to American and British science programs were eager to have this mode of organization replace what they saw as the French tendency for isolated, unintegrated research efforts. The Rockefeller grants appear to have fostered efforts at scientific teamwork that, in some cases, may have produced new interdisciplinary approaches to addressing scientific questions and hastened the removal of institutional barriers to inter-laboratory cooperation. The significant breakthroughs in understanding gene regulation that occurred in France in the early 1960s may well be traced to these new patterns of scientific activity.

Finally, the conference grant was especially helpful in giving work going on in the provincial universities greater visibility within France and of giving all French science greater visibility internationally. This outcome was reported to the Foundation Trustees as follows:

... the colloquiums seem to have played an important role in overcoming the traditional French reluctance to visit abroad (particularly in the United States) or to seek really strong international rapport. As a small somewhat unexpected corollary to this, it seems that a good many of

the visiting scientists have been helped to discover the fine scientific work, and especially scientific thinking, being done in some of the French laboratories (50).

The various types of publications produced at all the conferences and disseminated to the larger scientific community also helped introduce French science to new audiences.

Even when the post-war grants to the CNRS ended, Foundation interest in the CNRS continued. The Foundation awarded new, though more modest, grants to the CNRS or directly to scientific laboratories in France in the years that followed (51). A number of French organizations would receive funds for projects from the other RF Divisions (52). As more funds for scientific work were becoming available from other sources, however, the influence of the Foundation on French scientific work diminished. Never again, would the Rockefeller Foundation play such a key role in French science as it did in the years following World War II.

NOTES

1. This work was facilitated by a research grant from the Rockefeller Archive Center. The invaluable help of archivist Thomas E. Rosenbaum is gratefully acknowledged. I am indebted to Richard Burian, Ann LaBerge, Muriel Lederman, and Joy Harvey for their useful discussions and helpful comments during the preparation of the manuscript, and to Michelle Shepherd for typing the article in final form.
2. Several sources give a description of the origin and activities of the Rockefeller Foundation: Raymond D. Fosdick, *The Story of the Rockefeller Foundation* (New York, Harper & Brothers, 1952); Warren Weaver, *Scene of Change: A Lifetime in American Science* (New York, Charles Scribner's Sons, 1970).
3. Correspondence concerning the purchase of Pasteur's birthplace, 1911. Rockefeller University archives. RG 210.3. Business Manager/Subject Files, Pasteur Institute. Rockefeller Archive Center.
4. Linda Bryder, "The Rockefeller Foundation's Involvement in Tuberculosis," *Rockefeller Archive Center Newsletter* (Summer 1987), pp. 5-6. Also described in Fosdick, *The Story of the Rockefeller Foundation*, pp. 53ff and in Catherine Lewerth, *History -- Source Material* (unpublished history of the Rockefeller Foundation), volume 8. Rockefeller Archive Center.
5. Fosdick, *The Story of the Rockefeller Foundation*, p. 112.
6. Application, Louis Rapkine, October 17, 1925. International Education Board archives. RG 940. Series 1. Box 57. Louis Rapkine 1925-27. Rockefeller Archive Center. Although the

application gives Rapkine's birthdate as July 14, 1903, the correct date of birth appears to be July 14, 1904. The earlier date may have been used by Rapkine so that he would appear older and thus be a more suitable candidate for a fellowship.

7. Brierley to Caullery, November 9, 1925 and Brierley to Wurmser, December 6, 1926. International Education Board archives. RG 940. Series 1. Box 57. Louis Rapkine 1925-27. The fellowship was awarded for a period of twelve months starting November 25, 1925 and was extended for six more months on December 1, 1926.
8. Document: "The Life and Death of a Fellow", p. 25. Rockefeller Foundation archives. RG 2. Series 500D. General Correspondence, 1949. Rockefeller Archive Center. This document was prepared for private circulation to the Foundation staff following the death of Louis Rapkine and was later shared with Mrs. Rapkine.
9. Compte-Rendu de la Réunion à la Memoire de Louis Rapkine, December 13, 1949, allocution de F. Perrin, p. 16. Rockefeller Foundation archives. RG 2. Series 500D. General Correspondence, 1949.
10. Rapkine to Miller, August 4, 1945. Rockefeller Foundation archives. Rg 1.1. Series 500. Box 11. Folder 126. Rockefeller Archive Center. Rapkine and others used the abbreviation RF or R.F. to refer to the Rockefeller Foundation.
11. Rapkine to Weaver, August 4, 1945. Rockefeller Foundation archives. RG 1.1. Series 500. Box 11. Folder 126.
12. Weaver to Miller, August 17, 1945. Rockefeller Foundation archives. RG 1.1. Series 500. Box 11. Folder 126.
13. Allocation #4, NS 4315, October 24, 1945. Rockefeller Foundation archives. RG 1.1. Series 500. Box 11. Folder 126.
14. Weaver to Fosdick, November 19, 1945. "N.S. Aid to France -- Post-War Transition Period (1-3 Years)". Rockefeller Foundation archives. RG 2. Series 500D. Box R1049. National Center of Scientific Research--Equipment, 1945. Rockefeller Archive Center.
15. Weaver to Barnard, May 20, 1949. Rockefeller Foundation archives. RG 2. Series 500D. Box R1049. National Center of Scientific Research--Conferences, 1949. Rockefeller Archive Center.
16. Rapkine to Gillette, November 21, 1945. Rockefeller Foundation archives. RG 2. Series 500D. General Correspondence, 1945.
17. Gregg to Weaver, December 3, 1945. Rockefeller Foundation archives. RG 2. Series 500D. Box R1049. National Center of Scientific Research--Equipment, 1945.
18. Marshall to Weaver, December 14, 1945. Rockefeller Foundation archives. RG 2. Series 500D. Box R1049. National Center of Scientific Research--Conferences, 1945-46.

19. Rapkine to Weaver, February 1, 1946. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049 National Center of Scientific Research--Equipment, January--June 1946.
20. Weaver to Gregg, Marshall, and Fosdick, February 8, 1946. Rockefeller Foundation archives. RG 2. Series 500D. Box R1049. National Center of Scientific Research--Equipment, January--June 1946.
21. Joliot-Curie and Teissier to Weaver, February 28, 1946. Rockefeller Foundation archives. RG 2. Series 500D. Box R1049. National Center of Scientific Research--Equipment, January--June 1946.
22. Warren Weaver officer's diary, December 6, 1945 entry. Rockefeller Foundation archives. RG 12.1. Rockefeller Archive Center. Rapkine estimated that \$199,000 in equipment money would be needed. Potential recipients included forty-two investigators and the biological stations at Roscoff and Banyuls.
23. Minutes of the Trustees meeting, April 3, 1946, excerpt. Rockefeller Foundation archives. RG 2. Series 500D. Box R1050. National Center of Scientific Research--Equipment, 1950-53. Rockefeller Foundation grant 46048, as presented to the Trustees, stated that "the sum of Two hundred fifty thousand dollars (\$250,000), or as much thereof as may be necessary, be . . . appropriated for allocation by officers of the CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE to approximately thirty-five of the leading natural science research laboratories of France for items of special equipment, available for the period ending June 30, 1949. . .".
24. Minutes of the Trustees meeting, April 3, 1946, excerpt. RG 2. Series 500D. Box R1050. National Center of Scientific Research--Equipment, 1950-53. Rockefeller Foundation grant 46049, as presented to the Trustees, stated that "the sum of One hundred thousand dollars (\$100,000), or as much thereof as may be necessary, be . . . appropriated . . . for expenses of attendance of non-French scientists at a series of small informal conferences, available for the period ending June 30, 1949".
25. Weaver to Teissier, April 9, 1946. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049 National Center of Scientific Research--Equipment, January--June 1946.
26. Gerard R Pomerat officer's diary, May 11, 1946 entry. Rockefeller Foundation archives, RG 12.1.
27. Miller to Weaver, cable, May 14, 1946. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049 National Center of Scientific Research--Equipment, January--June 1946.
28. Weaver to Miller, cable, May 16, 1946. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049 National Center of Scientific Research--Equipment, January--June 1946.
29. Robert S. Morison, Diary Excerpts, May 15 and May 16, 1946. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049 National Center of Scientific Research--Equipment, January--June 1946. Discussions in New York with Robert A. Lambert, Associate Director of

the Medical Sciences division, were followed by a cable from Morison to Miller, May 16, 1946.

30. Gerard R. Pomerat officer's diary, May 19, 1946 entry. Rockefeller Foundation archives, RG 12.1.
31. Rapkine to Weaver, December 8, 1946. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049 National Center of Scientific Research--Equipment, July--December 1946.
32. Teissier to Weaver, June 27, 1946. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049 National Center of Scientific Research--Equipment, January--June 1946.
33. Action of the Officers, February 15, 1949. Rockefeller Foundation archives, RG 2. Series 500D. Box R1050. National Center of Scientific Research--Equipment, 1949.
34. Gerard R. Pomerat officer's diary, May 13, 1949 entry. Rockefeller Foundation archives, RG 12.1.
35. Rapkine to Pomerat, December 22, 1946. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049. National Center of Scientific Research--Conferences, 1945-46.
36. Weaver's original calculations of the costs associated with paying expenses of non-French participants had been about \$3300 per conference. See note 14.
37. Minutes of the Rockefeller Foundation, excerpt, February 24, 1950, describing officers' action extending the grant 46049 to June 30, 1951. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049 National Center of Scientific Research--Conferences, 1956; Rhind to Dupouy, June 28, 1951, reporting Executive Committee action extending grant 46049 to June 30, 1952. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049 National Center of Scientific Research--Conferences, 1951-53; Minutes of the Rockefeller Foundation, excerpt, June 22, 1951, Trustees' action extending the grant to June 30, 1952. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049. National Center of Scientific Research--Conferences, 1956.
38. Gerard R. Pomerat officer's diary, February 16, 1948 entry. Rockefeller Foundation archives. RG 12.1. On one occasion, an invited speaker, Martin Kamen of Washington University in St. Louis, was not able to attend the meeting on "Isotopic Exchange and Molecular Structure" (April 1948) because the State Department refused to issue him a passport. A reluctance to jeopardize future passport requests by other scientists caused the Foundation to take no action on Kamen's behalf.
39. "Advancing the Sciences Through Discussion", Trustees Confidential Monthly Report, February 1952. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049. National Center of Scientific Research--Conferences, 1956.
40. Minutes of the Trustees Meeting, excerpt, April 2, 1952. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049. National Center of Scientific Research--Conferences, 1956. Rockefeller Foundation grant 52058, as presented to the Trustees for their action, stated

that "the sum of Forty thousand dollars (\$40,000), or as much thereof as may be necessary, be . . . appropriated to the [CNRS] for expenses of attendance of non-French scientists to a series of small, informal conferences to be organized over a three-year period beginning July 1, 1952.

41. Edward F. D'Arms to Dupouy, February 18, 1952. Rockefeller Foundation archives. RG 2. Series 500. Box 44. Folder 255. General Correspondence, 1952.

42. Miller to Dupouy, June 9, 1955. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049. National Center of Scientific Research--Conferences, 1951-53.

43. Gerard R. Pomerat officer's diary, June 16, 1954 entry. Rockefeller Foundation archives, RG 12.1.

44. Gerard R. Pomerat officer's diary, March 30, 1955 entry. Rockefeller Foundation archives, RG 12.1.

45. Warren Weaver officer's diary, April 15, 1948 entry. Rockefeller Foundation archives, RG 12.1.

46. Gerard R. Pomerat officer's diary, November 20, 1946 entry. Rockefeller Foundation archives, RG 12.1.

47. Doty to Chadwell, December 6, 1946. Rockefeller Foundation archives, RG 2. Series 500D. Box R1049. National Center of Scientific Research--Conferences, 1945-1946.

48. Gerard R. Pomerat officer's diary, June 6, 1951 entry. Rockefeller Foundation archives, RG 12.1.

49. Colloques Internationaux du Centre National de la Recherche Scientifique, VIII, Unités Biologiques Douées de Continuité Génétique (Paris, CNRS, 1949); R.M. Burian, J. Gayon, and D.T. Zallen, "The Singular Fate of Genetics in the History of French Biology, 1900-1940", *Journal of the History of Biology* 21: 357-402 (1988); R.M. Burian, "French Contributions to the Research Tools of Molecular Genetics, 1945-1960", forthcoming in C. Benichou and J.L. Fischer (eds.), *Histoire de la Génétique* (Paris, Vrin, 1989).

50. "Advancing the Sciences Through Discussion", Trustees Confidential Monthly Report, February 1952., p. 30. See reference 39.

51. R.M. Burian and J. Gayon, "Genetics After World War II: The Laboratories at Gif and the Institut Pasteur", *Cahiers pour l'Histoire du CNRS 1939-1989*, forthcoming.

52. These include, but are not limited to, grants from the Medicine and Public Health division (formerly the Medical Sciences and International Health divisions) to the Pasteur Institute to purchase equipment for virus research and to the Association pour la Santé Mentale de l'Enfance in Paris for development of child mental health programs; from the Social Sciences division to the Institut de Science Economique Appliquée for social accounting research; and from the Humanities division to the Bibliothèque Nationale for cataloguing activities.

Table 1
DISTRIBUTION OF FUNDS PROVIDED BY THE EQUIPMENT GRANT*

Section I: Physics, Astrophysics, Geophysics, Mineralogy

Joliot, Mme Joliot-Curie, F. Perrin, Cabannes (Mathieu, Freymann, Lecomte, and Lucas), Auger (Maze and Fréon), Cotton (Rosenblum and Jacquinet), Wyart (Laval, Guinier, and Coulomb), Neel (Esclangon), Kastler (Rocard and Arnulf), Rogozinski**

Section II: Chemistry and Physico-Chemistry

Lafitte, Prettre, Letort, Kirmann, Audubert, Sadron, Bauer (Magat and Mlle Cauchois), Trefouel, Champetier

Section III: Animal and Plant Biology

Teissier, Ephrussi, Grassé, Courrier, Wolff, Benoit, Lacassagne, Mangenot (Gautheret)

Section IV: Physiology, Biophysics, Biochemistry, Microbiology

Wurmser, Lwoff (Monod), Aubel, Fromageot, Roche, Rapkine, Fessard, Schaeffer (Monnier), Cahn, Terroine (Jacquot and Chevillard), Grabar

* Scientists indicated as part of the same group and sharing the same unit of funding awarded are shown in parentheses.

** Name added later, on December 23, 1946 for the amount of \$1000.

Table 2
SUMMARY OF CONFERENCE TOPICS
(June 1946 -- June 1952)

Biology:

Paleontology	April	1947
Endocrinology of arthropods	June	1947
Biological particles with genetic continuity	June	1948
Electrophysiology	April	1949

Morphogenesis	July	1949
Ecology of animal populations	February	1950
Structure and physiology of animal societies	March	1950
Mechanism of narcosis	April	1950
Sexual differentiation in vertebrates	June	1950
Physiological mechanisms of lactation	August	1950
Plant evolution	May	1950
Chemistry (including biochemistry):		
High polymers	November	1946
Biology of lipids	January	1948
Isotopic exchange and molecular structure	April	1948
Chemical bonds	April	1948
Kinetics of combustion in gases	April	1948
Vitamins and antivitamins	September	1948
Polarization of matter	April	1949
Adsorption kinetics	September	1949
Mechanism of carbon combustion	September	1949
Molecular rearrangements in organic chemistry	April	1950
Electrolytic phenomena	May	1952
Mathematics (including theoretical physics):		
Harmonic analysis	June	1947
Algebraic topology	June	1947
Calculation methods in fluid mechanics	April	1948
Probability and statistical mechanics	June	1948
Algebra and the theory of numbers	September	1949
Fundamental particles and nuclei	April	1950
Calculating machines and human thought	June	1951
Theory of risk in econometry	May	1952
Physics (experimental):		
Optical images	October	1946
Raman effect	April	1948
Reactions of the solid state	October	1948
Thin films	April	1949
Ferromagnetism	July	1950
Astronomy and Earth Sciences:		
Solar phenomena and geophysics	September	1947
Fundamental constants of astronomy	March	1950
Wind action, surface hydrology and evaporation phenomena	March	1951

Table 3
SUMMARY OF CONFERENCE TOPICS

**Second Grant
(July 1952 -- June 1956)**

Biology:		
Present problems of paleontology	April	1955
Comparative microphysiology of nerve cells	July	1955
Chemistry (including biochemistry):		
Hydroxycarbonylation	June	1954
Oxygenated heterocyclic compounds	September	1955
Mathematics (including theoretical physics):		
Differential geometry	May	1953
Dynamic models in econometrics	May	1955
Factorial analysis and its applications	July	1955
Reasoning in mathematics and science	September	1955
Physics (experimental):		
Studies of water molecules with electromagnetic waves	June	1953
Role of the electronic shell in radioactive phenomena	June	1954
Recent techniques in electronic and corpuscular microscopy	April	1955
Electrical and magnetic properties of thin metallic layers	April	1955
Luminescence in organic crystals	May	1956
Astronomy and Earth Sciences:		
Problems of stellar classification	June	1953
Exchange of compounds during the development of acid and basic granular rocks	September	1955
Other:		
Physiopathology of potassium*	June	1954
Ecological divisions of the world**	June	1954

* identified as primarily a medical sciences topic

** identified as a geography topic within the "sciences humaines" category