

Alexis Carrel's Career at the Rockefeller Institute

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I was pleased to be awarded a Grant-in-Aid from the Rockefeller Archive Center (RAC) to study the Center's archival holdings on Alexis Carrel (1873-1944), who worked at the Rockefeller Institute for Medical Research (RIMR) from 1906 to 1939. The object of my study at the RAC from May 5 to May 26, 2011, was to take a fresh look at the considerable primary sources relating to his life and works, and the visit was a rewarding one. Carrel had a varied career and his high-profile life as an eminent scientist and controversialist has not been ignored: there are a number of accounts of his life and works, though these are of variable quality. Highlights of his career include his pioneering experimental blood vessel surgery and the organ transplantation for which he gained a Nobel Prize in 1912. By that time he had moved into tissue culture and further fame and his famous 'immortal' chicken heart cells, which allegedly survived in culture until the 1940s, regularly caught public attention. He ran an innovative research hospital in France in World War One, funded by the Rockefeller Foundation (RF), and then he resumed work at the RIMR. The 1920s were a mysterious phase in his life and the many accounts of his life are silent on this period. He became prominent again in the mid-1930s with a best-selling popular science book *Man the Unknown* (1935), which showed some eugenic leanings and conservative views. His celebrity increased when he brought Charles Lindbergh into his laboratory to assist with the design and operation of an organ perfusion pump. In his

final years, shortly after retirement, he worked in Occupied France as head of a research institute in Paris. This was funded by the Vichy government and there were allegations of collaboration by Carrel with the Nazis.

These vivid features of his eventful life are largely repeated and simplified from book to book and a return to the primary sources is required. Biographers of scientists are no longer required to take the view that the savant was also noble in thought, word and deed. A balanced account of scientists' strengths and weaknesses is now expected. Only in this way can a scientist's life and works be properly understood, and insights obtained into the "scientific method." In Carrel's case there is much to be looked at anew, without detracting from his remarkable contributions.

The RIMR, as expected, is full of interest and covers many aspects of Carrel's career at the Institute, including his dealings with the administration headed by Simon Flexner,¹ contacts with the Business Manager,² and his reports to the Scientific Directors.³ Policy and funding of his Unit are found in the Directors meetings minutes⁴ as are Herbert Gasser's dealings with Carrel. As I suspected, I also found useful material in the James B. Murphy files.⁵ There were also two other archival surprises. The first was that the documents in the Malinin Collection held at the RAC are not only copies made by Theodore Malinin, Carrel's biographer in 1979, of some of the Georgetown University holdings on Carrel⁶, but instead are a large number of original documents.⁷ The second unsuspected find in the material which relates to the RF's support of Carrel's World War One hospital in France, and the Demonstration Hospital in New York, which followed for a while, was that the files also contain some information on Carrel in Paris in World War Two.⁸

Regarding day-to-day life in Carrel's Unit, the Scientific Directors Minutes gave details of major funding changes from year to year, and the salaries of Carrel and his staff are available

throughout the period, as are the staff changes and increases in Carrel's Unit to high levels by the 1930s. The Reports to the Scientific Directors give a remarkable running account of his research work. The heads of each department had to report to the Director every six months (yearly later) on the status of their projects and their future plans. Carrel's close relationship with Simon Flexner can be detected in these reports and in the Flexner files. Flexner appointed Carrel, and his delight at Carrel's contributions before WW I are obvious and the Nobel Prize going to the Institute was seen as a triumph for Flexner as well. Moreover, Carrel was the public face of the Institute and this favorable media profile allowed Flexner to tell John D. Rockefeller, Jr. that his endowment money was well spent. The good news from the RIMR pleased Rockefeller, and Rockefeller noted Carrel's contributions on a number of occasions. Carrel's work enabled Flexner and the Institute to survive the anti-vivisectionist's regular attacks on the Institute and reassure Rockefeller and the public that animal experimentation was necessary and paid dividends. More than once when Flexner went back to Rockefeller for an increase in the endowment, it was Carrel's work that was used in the advocacy and justification.

Extra details of Carrel's famous surgical work were obtained, particularly from the Scientific Reports, and a detailed chronology was possible as each project evolved or was dropped. To this were added some hitherto unknown projects notably at corneal grafting, and other human studies at the RIMR Hospital. His scientific and personal relationships with others in the RIMR are made clearer and an interesting finding was that Carrel was of great assistance when surgical procedures were needed by others. Theodore Janeway's important induction of blood pressure in experimental animals made use of Carrel's skills. Phoebus Levene, the Rockefeller biochemist, repeatedly thanked Carrel for his unstinted provision of abdominal surgical procedures to assist Levene's protein absorption studies.

One area was of particular interest. By 1914 Carrel had clearly and correctly stated that Murphy's use of immunosuppression by radiation or benzol to allow tissue grafts to succeed was the way forward for human organ grafting. Various explanations of their failure to proceed along this fruitful path have been made, such as WW I, the rival lure of tissue culture, and perhaps the reductionist influence of Jacques Loeb at the RIMR, who scorned whole animal studies. One other suggestion is that human radiation (later used in the first experimental and human organ transplants in the late 1950s) was not possible then, but the files show that Murphy was using this modality in human patients, for other reasons. Mysteriously, Murphy also moved away from having solved the role of the lymphocyte as the effector of cellular immunity but the files suggest that Flexner discouraged these studies, perhaps dazzled by the arrival of serologically-minded Karl Landsteiner in 1923.

The files give much detail on Carrel's typically high-profile hospital work in France in World War One and the Carrel-Dakin strategy in wound healing and infection. There are amusing incidents which show the RIMR's ambivalence to Carrel's repeated appearance in the newspapers of the day. The RIMR had an official no-publicity policy, and they had to remind Carrel of this occasionally. But Carrel's usefulness to the reputation of the RIMR is obvious, and Carrel had skills in briefing journalists. It is also clear that John D. Rockefeller himself was pleased at the favorable publicity gained from Carrel's work, and he attended Carrel's 'welcome-home' event. Flexner uses Carrel's contributions regularly to obtain large increases in the RIMR's endowment from Rockefeller.

Carrel's lack of direction in the late 1920s is obvious from the Scientific Reports. Tissue culture was failing to give the expected dividends, particularly in seeking the origins of cancer, in spite of the hopes in each Report for new insights. Carrel then moved instead, and with new

enthusiasm, onto a grandiose 'Mousery' experiment. This has been mentioned by some biographers but the details have remained mysterious. The files show that it was set up with Flexner's approval and perhaps at Flexner's suggestion, as a plan to unravel the relative contribution of 'nature and nurture' to the life of animals, notably as regards longevity and cancer incidence. It may be that Flexner and Carrel were interested in the eugenicists' dismal view that cancer and many other human failings and afflictions were inherited and this pushed Carrel into this huge scheme, addressing the public concerns of the day, ones prominent in the eugenicists' discourse. These questions involved study of 12,000 mice of various strains, including cancer-prone lines. Various diets were used, and some un-caged mice ran wild in a soil-filled study area on the fifth floor. The results were never published, and the project closed. Perhaps the results disappointed the investigators.

Carrel's unit still increased in staff in the 1930s, but the output of publications and ideas diminished. Perhaps writing *Man the Unknown* for publication in 1935 was a welcome diversion, but the arrival of Charles Lindbergh and the work with the organ perfusion pump give new impetus to Carrel's work.

On other matters, it was useful to find personal details such as Carrel's publisher's royalty statements, his bank balances and even an income tax return. An estimate of the royalties from the international multi-language sales of his book is possible. Other evidence is that Carrel was already quite well-off, not only from an early family inheritance, but also from his marriage.

Carrel's constant criticism of France and French medicine, which may have resulted from his failure to obtain a surgical post in Lyon prior to emigrating, is confirmed. Some accounts say that he spurned his native land but his relationship with France is made clearer in the files. Each year half his published papers were in French journals, as if keeping up the contact, and his Christmas

card list shows half are French addressees. This suggests that his professed affection for his native land was genuine, as though accompanied by stringent criticism of France's alleged decadence. It seems he still wished to improve his native land, rather than accept the decline he diagnosed.

Flexner was loyal to Carrel until Flexner retired in 1935, and Flexner seemed unconcerned at the Carrel unit's dwindling scientific output and Carrel's populist activities. This finding makes sense of Herbert Gasser's well-known coolness towards Carrel, and Gasser's insistence that Carrel (among others) retire at age 65. Further details on this well-known episode emerge from the files. The claims that Carrel was unfairly forced out by Gasser need revision and instead Gasser had some justification since Carrel's large unit was largely inactive and the RIMR's annual income was shrinking. To add to this, Carrel was now a celebrity with now-unfashionable authoritarian leanings - and the files show an enthusiastic exchange of letters with J. Edgar Hoover. It seems that Gasser behaved with dignity and Carrel was the brooding martyr.

Some episodes from his life can be re-assessed. There is more evidence in the files on Carrel's famous 'immortal' chicken heart cells, i.e. a culture of repeatedly-dividing cells which out-lived Carrel himself before being discarded. This claim has always been a mystery and has attracted interest, since others could not repeat the work at the time, and it was eventually established that normal cells do not last beyond 32 divisions in a few months. The matter has been decently ignored or explanations have varied from good luck to fraud. Some findings in the files enable me to propose a new explanation, which would show that the cell line was not established nor was topped up fraudulently. An ingredient in Carrel's culture fluid was an embryonic chicken cell "soup." The soup was always vaguely described, but detail is found in one of the Carrel files. The cellular homogenization method could be casual. It has emerged from

genetic engineering studies that after apparent destruction of cells by such homogenization, isolated nuclei and the remaining anuclear cytoplasts can recombine to form whole cells. I think this will explain the matter and exonerate Carrel and his allegedly “helpful assistants” from fraud.

Some interesting dimensions of Carrel’s character have emerged, not usually noticed by others. He had a liking for the military life and had been attracted to it as a student. He had a spell in the French Army then and served throughout World War One and then was still in uniform when heading the Rockefeller’s Demonstration Hospital in New York. He ran a large unit at the Institute, and ran it well. Perhaps not unrelated to this was another attitude. From his earliest experiments, Carrel sought to influence the workings of an organ by external means. His hopes in some of his unusual vascular experiments were that by driving arterial blood into the veins of an organ the gland might work harder. Thus under-active thyroids could be restored by this reversed circulation. These curious experiments have usually been ignored as an uninteresting technical matter, but he had a serious intent, which can be seen repeatedly later. The strategy can be seen in his tissue culture work and the hopes for his organ perfusion pump. Carrel wished to master tissues and cells in this way. It has never been achieved and the reverse seems to be the case - cells and tissues, particularly when diseased, have a largely internal drive.

I was also unexpectedly able to get new information on Carrel’s strange move to Vichy France in World War II. The correspondence with his faithful secretary Mrs. Crutcher, gives his movements before settling finally in Paris, and the files relating to the RF’s work in Europe have further hints. They show that Carrel was high-handed in annexing the Foundation’s offices in occupied Paris to build up his large, well-financed ‘Fondation Francaise pour l’Etude des Problèmes Humains,’ from 1941.

However, my view thus far is that Carrel was naive in going to work in occupied Paris, and that he was not a Nazi collaborator. The files confirm his habit of making startling, dogmatic, contradictory statements both in his daily discourse and in his general writings, and, though his scientific writings have clarity, this has left a wealth of quotations and major ambiguities. Selective quotations can show he shared some of the deeply conservative and even fascist views of the day, which have enabled some to label him as a callous eugenicist. Others, by similar selection, see him as a devout Christian offering hope for mankind. His works and comments contain both pro-German and anti-Hitler sentiments. A verdict on his move to Paris has to be seen in this light.

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The ideas and opinions expressed in this report are those of the author and are not intended to represent the Rockefeller Archive Center.

ENDNOTES:

¹ RU AC450 C232 Faculty: Alexis Carrel.

² RU 210.3, Business Manager Subject Files: Alexis Carrel.

³ RU RG 439, Scientific Reports to the Corporation and the Board of Scientific Directors of the Rockefeller Institute for Medical Research.

⁴ RU RG 110.2, Scientific Directors Minutes.

⁵ RU 450 C232, Faculty: James B Murphy.

⁶ Derived from the Alexis Carrel Papers, Special Collections Division, Georgetown University Library, Washington D.C.

⁷ RU 650-5, Malinin Collection of the Papers of Alexis Carrel and Charles Lindbergh. I have contacted Dr. Malinin, however, he did not comment on this aspect of his collection.

⁸ RF 500, France Projects, and RU I 600-2, War Demonstration Hospital.