SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

Institutional renovation and scientific modernization: the creation of the Instituto de Investigaciones Hematológicas during the mid-1950s

Renovación institucional y modernización científica: la creación del Instituto de Investigaciones Hematológicas a mediados de la década de 1950

Buschini, *José*[1]

[1]*Undergraduate degree in Sociology. PhD in Social Sciences. Professor, Department of Sociology, Faculty of Humanities and Educational Sciences, Universidad Nacional de La Plata, Argentina. jbuschini1978@gmail.com*

ABSTRACT Using documentary sources, this work analyzes the creation and initial functioning of the Instituto de Investigaciones Hematológicas (Institute of Hematological Research) of the National Academy of Medicine (Buenos Aires, Argentina) in the context of the scientific modernization initiated within the country during the mid-1950s. Particular attention is paid to the generation of material bases and institutional and cultural mechanisms for the development of scientific research and of clinical practices guided by procedures and techniques rooted in the basic sciences. The formation and development of a research school in the Experimental Leukemia Section of the institute is explored as a case illustrative of the effective consolidation of initiatives oriented towards the organization of a scientific center.

KEY WORDS Academies and Institutes; Biomedical Research; History of Medicine; History, 20th Century; Argentina.

RESUMEN El trabajo analiza la creación y el funcionamiento inicial del Instituto de Investigaciones Hematológicas de la Academia Nacional de Medicina (Buenos Aires, Argentina) en el contexto de modernización científica que se inició en el país a mediados de la década de 1950, a partir de fuentes documentales. Se presta particular atención a la conformación de las bases materiales y los mecanismos institucionales y culturales para el desarrollo de investigaciones científicas y de prácticas clínicas asistidas por procedimientos y técnicas anclados en las ciencias básicas. Asimismo, se atiende a la conformación y el desarrollo de una escuela de investigación en la Sección Leucemia Experimental, un caso que ilustra las concreciones efectivas de las iniciativas asociadas a la organización de un centro científico.

PALABRAS CLAVES Academias e Institutos; Investigación Biomédica; Historia de la Medicina; Historia del Siglo XX; Argentina.

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

INTRODUCTION

In 1955, a series of significant transformations began to take place in Argentina's National Academy of Medicine (ANM) [*Academia Nacional de Medicina*]. In previous years, between 1952 and 1955, the Academy had remained closed due to the strained relation it kept from the start with the Peronist government. The new political scenario, characterized by the attempts of the self-named Liberating Revolution [*Revolución Libertadora*] to strip Peronism of the power that it had among civil society and state institutions, was favorable to the members of the ANM, who recovered their positions and obtained annual government funding.

One of the most remarkable aspects produced by this new state of affairs was the creation of the Institute of Hematology Research (IIH) [*Instituto de Investigaciones Hematológicas*], a center for the research and treatment of "diseases of the blood" (lymphadenopathy, leukemia and hemophilia). Amid the accelerated scientific modernization that had been taking place in Argentina since the mid-1950s (1-6), the IIH became one of the vehicles by which the country echoed the expansion process that, according to Gaudillière (7), experimental medical practices had begun to gain all over the world after the Second World War, thus attaining a predominant place within the profession.

This work aims to analyze the creation and organization of the IIH, focusing on the generation of the material bases and institutional and cultural mechanisms for the development of scientific research and of clinical practices guided by procedures and techniques rooted in the basic sciences (a). This implied, for the actors involved, making a series of decisions linked to the organization of an establishment with scientific functions, and generating the necessary resources to support them. Among them, the most remarkable are the actions aimed at such matters as designing work areas or *sections* – established according to different research fields – and the preparation of the physical space, the purchasing and implementation of scientific instruments, the creation of positions for staff within the institution, the recruitment of staff (in some cases associated with specific training processes), the regulation of daily activities (by establishing a set of practices going beyond laboratory work, such as the organization of seminars and round-table discussions) and the participation in the circuits of production and circulation of scientific knowledge, both locally or internationally.

The study also focuses on a case that illustrates the effective consolidation of these initiatives, particularly those connected to the development of scientific practices. The case refers to the creation of a research school in the Experimental Leukemia Section. This situation impacted the ways of organizing the activities in scientific establishments linked to the medical discipline that, although already existent within the country – the Institute of Physiology directed by Bernardo Houssay since the early 1920s was the most outstanding example (8,9) – had until then been the exception. This model entailed the formation of groups of trained researchers, researchers in training, and technicians who worked jointly in full-time positions in coordinated areas of research formulated so as to have an effective incidence among research teams of the same discipline around the world by producing new and relevant knowledge. The establishment of this way of working is representative of the participation of the IIH in the broader process of strengthening the scientific profession that the country had been experiencing since the mid-1950s, that is, in establishing it as certified, paid and lifelong activity (3,9,10).

METHODOLOGICAL ASPECTS

Before we enter into our analysis, two methodological remarks should be made. First, it must be noted that the study does not narrate a series of events in a chronological order but aims at characterizing a group of practices predominant in the institution under review between the late 1950s and the late 1970s. It is important to highlight, in that sense, that it was a period of intense political redefinition both in the area of national politics – alternation between democratic governments and dictatorships, the proscription of Peronism – as well as in the scientific field, in terms of disputes over the orientation of the National Council for Scientific and Technical Research (CONICET) [*Consejo Nacional de*

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

Investigaciones Científicas y Técnicas], criticism of scientificism, and so on. However, this study is not focused on these tensions and their possible effects on the IIH and the groups that worked there, but only intends to characterize an aspect of its trajectory, related to the organization of a cycle of production and circulation of scientific knowledge.

Secondly, it must be stated that the reconstruction of the organization of the IIH and the analysis of its practices were carried out primarily through a series of documentary sources and scientific articles. These sources include the annual reports written by Alfredo Pavlovsky as director of the IIH, the reports of the National Academy of Medicine between 1963 and 1980, the annual reports submitted to the CONICET by Christiane Dosne de Pasqualini (b) as researcher of the institution during the same period, and all the scientific articles published in national and international journals by members of the Experimental Leukemia Section between 1958 and 1980. Additional sources of information included semi-structured interviews and several informal conversations with Dosne de Pasqualini (c).

SCIENTIFIC MODERNIZATION IN THE 1950S AND 1960S

Between the mid and the late 1950s, Argentina underwent profound changes in its scientific institutions that were inspired by the ideologies of modernization and development. Within this context, it was possible to develop a series of initiatives to create institutions that, as recent studies show (1), even when they were presented as original, were based on experiences that had been taking form during Peronism. Thus, in a few years, the National Institute of Agricultural Technology [*Instituto Nacional de Tecnología Agropecuaria*] was created in 1956, the National Institute of Industrial Technology [*Instituto Nacional de Tecnología Industrial*] in 1957, the CONICET in 1958 (d), and also the Argentine Atomic Energy Commission [*Comisión Nacional de Energía Atómica*] was restructured on the basis of different divisions created for the development of atomic research starting in 1950 (1,2). Thus, during those years a legal and institutional framework was structured, based upon which a scientific and technological complex took shape (2). The CONICET, in particular, was a key actor in this context, since it guaranteed an infrastructure for the development of scientific activities by way of such mechanisms as the Scientific Researcher Career Program and the Technician Career Program [allowing recognized researchers and technicians to earn a salary through CONICET], the fellowship system, and subsidies.

The reforms in progress also reached the university structure, with the Universidad de Buenos Aires (UBA) – especially the Faculty of Exact and Natural Sciences – being one of the most visible faces. In the UBA, a process began to take place oriented towards endowing academic activities with professionalism and creating the conditions for achieving a cycle of production of scientific knowledge. In a few years time, full-time positions (for both tenured professors as well as teaching assistants and assistant professors) notably increased, laboratories were assembled and research groups were formed (3-6,12,13).

The institutions related to biomedicine participated in these processes, incorporating new specialties and forms of organization that had been transforming international medicine since the end of the Second World War and placing experimental practices in an important position within the profession. This "big transformation" as Gaudillière calls it (7), meant a reconfiguration of the relations among the State, scientists, doctors and the pharmaceutical industry based on the idea that knowledge and medical practice increase in quality with the aid of the experimental sciences, through the new objects, procedures and instruments offered by specialties such as genetics, bacteriology, endocrinology, virology, molecular biology and immunology (7 p.9-12). One of the most remarkable aspects of the transformations in progress was what Gaudillière describes as the molecularization of disease, understood as "the emergence of practices that privilege the delimitation of the disease to essential parameters: the cell, the molecules and the macromolecules" (7 p.13). Within a context in which the infrastructure for biological and clinical research grew notably (institutes were created, equipment was bought, staff was recruited, specialties went from having

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

a few scientists to having hundreds of them), a "biomedical complex" was created, conceived of as a network of multiple and relatively dense collaborations between scientific researchers, doctors from large hospitals, officers of public health entities and engineers and managers of the pharmaceutical industry (7 p.15) (e).

In Argentina, this process was first seen at the Carlos G. Malbrán National Institute of Bacteriology [*Instituto Bacteriológico Nacional "Carlos Malbrán"*], a government-funded center created in the 1910s with the purpose of conducting research on infectious diseases and producing vaccines and serums. In April 1956, the technical difficulties faced in fighting a poliomyelitis epidemic that had broken out a few months earlier became the excuse for the national government to order an overhaul of the Institute. Under the direction of Ignacio Pirosky, the Institute began a renovation process that, apart from a change in its name to better align it with transformations in the discipline – it became the Carlos Malbrán National Institute of Microbiology – entailed the adoption of a series of measures aimed at strengthening research, such as the opening of new sections (connected to innovative specialties), the acquisition of scientific equipment, the performance of public selection processes for full-time positions and the granting of fellowships for stays in foreign countries (16,17).

The Faculty of Medical Sciences of the UBA is another place in which these changes were produced. There, however, the process was more ambiguous due to a front of resistance posed by the reluctance of a significant percentage of the teaching staff that had the right to veto the initiatives of the actors who sought to transform practices. Nevertheless, there was a group – close to Bernardo Houssay, early driving force of the biomedical research field in the country – that strove to incorporate conditions that would favor the development of scientific research, such as the insistence on making all positions full-time or the promotion of the US model of teaching hospitals (18,19). Apart from the aforementioned difficulties, some experimental institutes connected with department chairs were established during those years, and in 1956, under the direction of Alfredo Lanari, the Institute of Medical Research [*Instituto de Investigaciones Médicas*] was created. In a detailed study of the origin and functioning of this institute, Romero (18,19) has shown how a center of great magnitude was established for the development of clinical research, which combined patient care with physician training and the study of diseases related to internal medicine.

The National Academy of Medicine appears within this scenario as a third sphere for the renovation of institutions linked to biomedicine and, broadly speaking, as part of the scientific modernization process which was taking place in the country.

THE RENOVATION OF THE NATIONAL ACADEMY OF MEDICINE AND THE CREATION OF THE INSTITUTE OF HEMATOLOGICAL RESEARCH

In the institutional accounts that narrate its history, the ANM claims that its origin dates back to the year 1822, when it was created as the Academy of Medicine of Buenos Aires through an executive order issued by Bernardino Rivadavia and Martín Rodríguez (20). However, this connection is not based entirely on historical rigor but rather on necessities associated with the controversial context in which, in 1925, the autonomy of the Academy of the Faculty of Medical Sciences from the UBA was granted. The Academy had functioned there since 1874, first as a managing body and then, from 1906 onward, as an advisory body in scientific and cultural matters and, by way of an executive order issued by President Marcelo de Alvear, the ANM was then created (21). For the purposes of this work, it must be mentioned that the institution that began a renovation process in 1955 is directly linked with the one created in 1925, in terms of its members as well as its by-laws and material bases. Indeed, after the executive order that established its autonomy, the ANM began a process of institutional construction that involved appointing the scholars needed to reach the number of thirty-five members (until that point there had been twenty-five), building new facilities for its operation (a building that would be opened in 1942) and creating, in 1938, the Institute of Physics Research Applied to Human Physiopathology [*Instituto de Investigaciones*

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

Físicas Aplicadas a la Fisiopatología Humana], an establishment aimed at clinical research directed by the academic Mariano Castex. With this institute, the ANM sought to establish itself as one of the centers structuring the incipient field of medical research, which had been taking shape in Argentina during the first half of the twentieth century.

Between 1952 and 1955, during the last years of the second Peronist government, the ANM went into decline. The origin of this situation dated back to 1950, when during the last meeting of the regular sessions of the Chamber of Deputies, Act No. 14007 was passed, which dealt with the functioning, rights and obligations of particular and official academies (the latter of which received the title of "national" as part of their names in addition to the scientific specialty in which they were engaged). The effective enforcement of this Act, which had been questioned by academics and the opposition press due to the limits it imposed on the autonomy of these institutions, was delayed until September of 1952, when it was enacted by Executive Order No. 7500 (22). As scholars had feared, a few sections of the Act affected the autonomy of the institution from the national government and affected its own members as well. On the one hand, it set forth that the incorporation of new members would be designated by the Executive Branch and that the authorities of the institution would be elected by the government from a short list of three candidates submitted by a council composed of members with no connection to the academies. On the other hand, it removed the *ad vitam* character of academic positions and the age of retirement was established at sixty. The combination of both sections meant the dissolution of the ANM: twenty-five out of the thirty-two members that the institution had at the moment when the Act came into effect had to abandon their positions. In light of this situation, the remaining seven scholars presented their resignations and the building of the ANM was handed over to the State (20,23).

In 1955, after the coup d´état that overthrew Perón's government, the new authorities of the State established through an executive order a regulation for the national academies by which the scholars regained their lifelong positions and the right to incorporate new members and to appoint authorities. In addition, the academies were given the status of non-profit organizations, their assets were restored if they were in the hands of the State and they were guaranteed an annual subsidy, which was the key for their effective operation (24). Within this new framework, based on a proposal by the academic Mariano Castex, the Administrative Council of the ANM decided to reorganize the old Institute of Physics Research Applied to Human Physiopathology, reorienting it towards the area of hematology with the objective of "grouping in a single institute the previous sections, since experience has shown that it was preferable to concentrate all efforts on one discipline" (20 p.266). At the request of Castex, the new center (now called Institute of Hematological Research) was also put under the direction of Alfredo Pavlovsky – who was also given a place of honor in the ANM. Pavlosky was a doctor who at an early stage had directed his career towards hematological studies. His professional profile showed a double orientation, including an interest in both research activities (in his student years he was assistant in the Physiology Chair of Bernardo Houssay, who directed his thesis on the technique of lymph node puncture, which he defended in 1934) and medical practice (among other places, he worked in the Service for Blood Diseases of the Hospital Ramos Mejía, the Hematology Department of the institute directed by Castex and the Hematology Service of the Naval Medical Institute). In the 1930s and 1940s, Pavlovsky had a fellowship in the United States and made connections with professionals involved in the study and treatment of blood diseases, contributing to the foundation of the International Society of Hematology in Paris in 1946 and actively participating in different international conferences on the subject (20,23,25,26).

On November 15, 1956, Pavlovsky submitted before his colleagues a project for the reorganization of the Institute that privileged experimental research over health care, which was now considered accessory and subordinated to its usefulness in completing among human beings the studies conducted on animals; it must be said, however, that over time health care would again increase in importance in the Institute. Given this new orientation, Pavlovsky thought it crucial to take on matters that, in the terms of this work, were

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

related to the generation of material bases and institutional and cultural mechanisms for the organization of a center focused on the development of scientific activities and the care (and study) of patients with the help of the basic biomedical specialties. It was indispensable to upgrade facilities, adapt the technical staff from the previous Institute of the ANM, incorporate (and in many cases train) new members, purchase the scientific instruments necessary to conduct research in the designed sections and establish a series of guidelines for the formation of work routines.

The project submitted by Pavlovsky was approved and activities were promptly initiated for the official opening of the Institute, which occurred on May 12, 1957, although the work had already begun prior to that date. In the years immediately following, in the framework of both the conformation of a new biomedicine at the international level and the local organization of a system of scientific promotion, the IIH experienced notable growth in terms of the research sections created, the financial resources available, the staff hired and the equipment acquired. Moreover, a point worth mentioning is the articulation of this center with international establishments (shown in stays abroad and visits from foreign researchers), the scientific meetings held and the extensive production of articles published in local and international journals. Thus, considering the magnitude and pace of the transformation that took place, the creation of the IIH was the particular way in which the process of modernization experienced by the country in its scientific institutions since mid-1950s was reflected in the ANM and one of the places in which, thereafter, those with scientific vocations could find the means to develop a professional career.

Before describing the process of institutional construction that the IIH underwent, it must be noted that this center found in the ANM a space of great stability, isolated from the turmoil that affected the contemporary processes of scientific modernization, especially in the university sphere (f). In the latter case, the actors involved with the preexisting institutional system ("professionalist" educators, strangers to the idea of full-time positions and scientific research) were against the innovations and in many opportunities – notably in the Faculty of Medicine of the UBA – they managed rather successfully to block the initiatives of the actors who sought to incorporate new practices. In addition, the political radicalization that the country experienced throughout the 1960s and 1970s opened new fronts in the university scientific field, questioning first the project of departmentalization, then subsidies and finally scientificism (understood as a type of academic practice dissociated from the interests of national development) (4-6). Later on, during the last military dictatorship, the well-known ideological and political persecutions had a social cost that went well beyond the work dynamics in scientific and university establishments, reflected in the exile, imprisonment and assassination of numerous scientists.

THE ORGANIZATION OF THE INSTITUTE OF HEMATOLOGICAL RESEARCH

The generation of material bases and cultural and institutional mechanisms: obtaining financial resources

The first aspect that had to be overcome for the operation of the new center was obtaining financial resources. For that purpose, the IIH had from the start depended on three sources, based in state mechanisms and the ability of Pavlovsky to collect funds from civil society. Firstly, the annual budget established by the ANM, which was mainly used to pay staff salaries (the percentage ranged from 70 to 75 percent, with a few years reaching levels of around 85 percent of the total budget) and, to a lesser extent, for research work. Secondly, the IIH made use of the funds given by the CONICET, which made it possible to have staff whose salary was paid by that institution (Scientific Researcher Career Program, fellowship program, Technician Career Program) and also pay research expenses through the different subsidies given (purchase and maintenance of equipment, purchase of supplies, participation in conferences, among other things). Lastly, the IIH also had the support of two nonprofit organizations: the Hemophilia Foundation [*Fundación para la Hemofilia*] and the Foundation to Fight Leukemia (FUNDALEU) [*Fundación para Combatir la Leucemia*]. These foundations, whose resources came from private and State donations (through subsidies of the national and municipal

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

government and through the Charitable Lottery and Casinos), gave their support both in terms of medical care as well as research. In the medical aspect, this was shown in the purchase of medicines, the health care provided to low income patients and the carrying out of public campaigns for the prevention and dissemination of information regarding these diseases (for instance, campaigns to increase the number of blood donors, signs placed on public roads, and advertisements on the radio and television). As regards research, the support of these foundations was shown in the purchase of instruments, the financial support provided to members of the Institute for stays abroad and for visits from foreign scientists, and the granting of fellowships, subsidies and awards for original work. The magnitude of the economic support given by these foundations should be highlighted, which in many occasions notably increased the annual budget established by the ANM, some years by seventy percent.

The design of the sections and the preparation of their physical space

The resources obtained through these different sources allowed Pavlovsky to carry out his project of institutional reorganization and thereafter sustain the activities, which turned the IIH into the country's most important center for research on blood diseases as well as a protagonist in the renovation of local biomedical studies. The design of the sections was based on the establishment's double orientation (clinical care-research and experimental research) and organized so that the different units could complement one another's work. After an initial stage in which work was done with the resources available – and in spite of the small modifications made through the years – it is possible to describe this design in connection with three major areas:

- sections oriented towards the treatment and study of human diseases (diseases of the lymphatic system, leukemia and hemophilia)
- sections focused on experimental research (immunohematology, experimental leukemia)
- sections that, even though they developed autonomous research programs, had as their main function the provision of technical assistance to the other sections (electron microscopy, tissue culture, cytochemistry, virus, biochemistry).

In spite of the differences regarding their approaches to research (both conceptual and technical) and their work organization, these sections found common ground in the diseases that were the focus of their work: all studies dealt with diseases of the lymphatic system, leukemia and hemophilia. This was a significant aspect in view of the possibility of maximizing the resources available, as Castex highlighted when he proposed that the reorganization of the old Institute of the ANM concentrate lines of research.

The design of the sections was accompanied by the preparation of the physical space necessary to create a scientific center in pace with the transformations in biomedicine. In addition to a few building alterations, the purchase of highly sophisticated instruments and scientific supplies that were only manufactured in the US and in a few European countries was crucial. During those years a costly electron microscope (one of the first in the country), several other microscopes of different types (prismatic binocular loupes, inverted model), homogenizers and equipment for electrophoresis, fluorescence and sterilization were bought. A biotery was also installed for mice breeding, an animal model indispensable to the experimental sections, especially those linked to leukemia.

Staff placement and recruitment

Along with the construction of physical infrastructure of the IIH, institutional mechanisms that made it possible for staff to be placed at the institute were created and recruitment was coordinated. Authorities of the IIH emphasized the availability of positions that would generate full-time work schedules, which was at that point unusual in Argentine scientific institutions. Thus, the few positions of this type that the institution could offer (section heads and a few technician positions) were complemented with the open possibilities offered by mechanisms such as the CONICET's Scientific Researcher and Scientific Technician Career Programs or the system of

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

fellowships. In addition, as sign of the times, FUNDALEU adopted a financing method similar to the fellowship program of the CONICET, which allowed for a considerable increase in the number of researchers in training. In terms of recruitment, the initial call was made by Pavlovsky, directed at individuals that already had a certain level of scientific training in order to organize the operations of the relevant sections, as well as at technicians who had previous work experience in biomedicine, for instance, at the Institute of Physiology directed by Houssay. In time, the IIH went on to incorporate new generations of prospective scientists who began their training experience there. It should be highlighted that the IIH, since it was not a university center, had to solve the problem of recruitment through channels alternative to capturing outstanding students, as is usually done in the scientific sphere and was happening in those years in such places such as the Faculty of Exact Sciences at the Universidad de Buenos Aires (g). FUNDALEU fellowships and the gradual formation of research groups with certain acknowledgement in the local sphere served as an incentive for those who wanted to begin a scientific career.

Organization of a work routine for the production and spreading of scientific knowledge

The creation of this infrastructure, which included thematic orientations, adequate scientific equipment and well-trained staff, was accompanied by the organization of a suitable work routine that implied, for those with full-time positions, daily attendance at the institution. Regarding the definition of objectives and procedures (that is to say, what to do and how), there were differences between the sections, which can be summarized in two main orientations, not considering the case of sections dedicated to health care, which are not of interest for the purposes of this work. On the one hand were the sections that provided mostly technical assistance in which actions were decided by the authorities of the IIH or were the result of requests made by other sections. On the other hand were those that established their objectives autonomously. In practice, however, there were some nuances. Thus, for instance, some sections that were highly involved with the first orientation, such as cell culture or electron microscopy, apart from rendering services, developed their own lines of work. In contrast, the members of the most autonomous sections, such as experimental leukemia, were not only devoted to their research programs but also performed tasks requested by the IIH director. With time, however, the Institute increasingly became a setting that in fact "sheltered" research groups that set their objectives completely autonomously. This reinforces the hypothesis according to which, as part of the process of scientific modernization begun in different establishments across the country, the bases for the development of activities were being established in accordance with the requirements of the scientific profession. According to Whitley (28 p.74-89), among other things, in the scientific profession the control over work objectives and procedures tends to be given more through the formal system of communication and publications (dominated by specialists' groups) than through any hierarchical organization within the establishment.

Apart from organizing the laboratory work, mechanisms for scientific exchange among the units that made up the IIH were also implemented, with the objective of discussing clinical cases studied and results obtained in the experimental laboratories. Therefore, the "Scientific Round Tables of the IIH" were established, which were held weekly and were attended by the members of the Institute and special guests from other scientific centers within the country. The sections of the IIH also had their own spaces for exchange, closed monthly seminars in which research advancements were discussed.

Scientific exchanges and participation in disciplinary groups

One of the main pillars of the organization and functioning of the IIH were strong ties with doctors and researchers who worked in international scientific centers, created to a great extent through the international contacts Pavlovsky had in the hematology field and also made possible by the existence of financial resources for visits by foreign scientists and scientific stays abroad.

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

The stream of visits by foreign scientists to the IIH, mostly facilitated through funds given by the Hemophilia Foundation and FUNDALEU, was constant and considerable throughout the years: between three and six researchers arrived annually to perform varied activities. In many cases, perhaps the least important from the point of view of their impact on subsequent activities in the Institute, visitors arrived exclusively to deliver lectures. In other cases, their stays extended over a period of time and permitted them to perform activities that allowed for the establishment of new research sections or the learning of certain techniques.

The visits of foreign scientists were in some cases complemented by reciprocal visits of local researchers to their laboratories, where these researchers gained knowledge they could use upon their return. Some examples illustrate the way in which this operational dynamic worked and its effect on the IIH's activities. In 1960, Pavlovsky contacted the researcher Wilhelm Bernhard, from the *Institut de Recherches sur le Cancer "Gustave Roussy"* (IRSC), requesting his help with the installation of a recently acquired electron microscope and the training of the researcher who would be in charge of the new Electron Microscopy Section. Bernhard, a Swiss microscopist who had been recruited as research assistant by the renowned researcher Charles Oberling for the installation of an electron microscope in the IRSC (h), stayed in Argentina for some time, working with César Vásquez (Pavlovsky's nephew and an advanced student of medicine appointed as director of the new Section) in getting the new instrument ready. By 1963, Vásquez had graduated and was granted a fellowship by FUNDALEU for a six-month stay in the laboratory run by Bernhard, an opportunity which allowed him to deepen his knowledge of the use of the electron microscope and of virology, the latter with the help of virologist François Tournier.

The relationship with the members of the IRSC was not limited to this exchange but instead strengthened over time. In 1963, Bernhard returned to Argentina (he worked in the laboratory for fifteen days and delivered a few lectures) and in 1964 Tournier arrived to help establish the Virus Section. In the following year, again through a FUNDALEU fellowship, Dr. Horacio Suárez (who had been an assistant in Tissue Culture) travelled to France to study oncogenic viruses with Tournier. This formative trip, which was initially planned to last six months but was extended for another year, allowed him to become the Head of the new Virus Section when he returned.

These trips not only contributed to enhancing the professional careers of the researchers directly involved but also to strengthening the IIH as a whole. The development of sections such as Electron Microscopy and Virus (as well as Tissue Culture) favored the research conducted in other parts of the Institute since they used techniques that allowed their members to carry out numerous scientific collaborations. Thus, for instance, the Electron Microscopy Section, in conjunction with the work that was the focus of Vásquez's research, analyzed images from cells obtained in different sections of the Institute, both from patients (lymphoma cells from sick patients) and murine models subject to different experimental procedures (murine leukemias induced by lymph node graft, leukemias induced by radioactive phosphorus, sarcoma 180 and murine leukemias in mice from the BALB strain, among others).

It should be emphasized that the external researchers who contributed to the establishment of sections or to the learning of new techniques were not exclusively foreign scientists. Also participating in these experiences were local scientists who had cognitive skills not found within the institution and who thus contributed to the establishment of sections or to the training of new generations. Examples of this are found in the researchers Eugenia Sacerdote de Lustig and Rosa Rabinovich de Pirosky, both from the Ángel H. Roffo Institute of Oncology. The former contributed during the first years of the IIH to the establishment of the Tissue Culture Section – the direction of this section was later put in the hands of Beatriz Salum, who had worked under her – as Sacerdote de Lustig had been involved in the implementation of the technique in Argentina since the early 1940s and had a considerable reputation in that area. Rabinovich de Pirosky's command of immunology – a discipline that started to gain considerable importance starting in the mid-1960s – was requested when research began to be undertaken with that perspective, and she helped train prospective researchers in specific techniques.

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

Lastly, two other important aspects in the conformation of the IIH as a scientific center, in terms of the insertion of its members into disciplinary groups, were the Institute's intense participation in scientific associations and events (conferences, symposiums, workshops) as well as the enormous amount of articles published in scientific journals. Internationally, it is worth noting the active participation of Pavlovsky in the International Society of Hematology, which he co-founded in 1946, and the attendance of IIH researchers at numerous conferences on hematology, leukemia and cancer. More informally, the inclusion of these researchers in such translocal groups as those created around specialties or research fields was shown in their short stays in laboratories and the exchange of research material. Locally, members of the IIH (particularly Pavlovsky and Christiane Dosne de Pasqualini) played a key role in the formation and operation of spaces of scientific exchange and membership that were important in the generation of the identity of researchers involved in the local incorporation of the new biomedicine that started to take shape internationally during the mid-twentieth century. Among them should be noted the Argentine Society of Clinical Research [*Sociedad Argentina de Investigación Clínica*] – a local association created in 1960 with the aim of bringing together biomedical researchers and that to some degree came to occupy the place of the Argentine Society of Biology [*Sociedad Argentina de Biología]* – as well as the Argentine Society of Immunology [*Sociedad Argentina de Inmunología*], created in 1972 and including only immunologists, and the journal *Medicina (Buenos Aires)*.

CREATION OF A RESEARCH SCHOOL IN THE EXPERIMENTAL LEUKEMIA SECTION OF THE INSTITUTE

The creation of the Experimental Leukemia Section

Little was known about leukemia at the beginning of the 1950s, the time at which this disease began to garner attention from doctors and scientists from all over the world, especially in the United States. In 1954, during a symposium on leukemia organized by the American Association for Cancer Research, Henry Kaplan, a famous scientist from the Department of Radiology at Stanford University School of Medicine, highlighted the existence of a surprising increase in the incidence of this disease. He affirmed that leukemia and lymphoma accounted for the fourth and fifth most common causes of death due to malignant neoplasms, and that this type of cancer had not been given as much attention as types located in other parts of the body, such as lung cancer (29). In the following years there was a remarkable change in this situation, demonstrated by the significant amount of funds granted by the US Congress for the study of this disease, the performance of research studies on leukemia (both to understand its etiology and to discover treatment and diagnostic methods), the development of scientific events entirely focused on this disease, the implementation of new therapies and the creation of non-profit organizations for fundraising purposes.

During the organization of the IIH, Pavlovsky became aware of the importance that this subject was gaining and called upon his contacts to create a non-profit organization that would help obtain private donations; he had done the same in 1944, when promoting the creation of the Hemophilia Foundation. On November 5, 1956, Pavlovsky brought together several members of local elite who met in the ANM and formed FUNDALEU. To make his appeal, Pavlovsky first made reference to the increase in the number of worldwide cases of leukemia and its incidence in Argentina, where death rates for leukemia were higher than those of other diseases which had gained greater attention, such as poliomyelitis – a disease that had reached epidemic levels in Argentina in the same year. Secondly, he conferred a privileged status to science by highlighting the importance of performing experimental research studies on this disease and its etiology, as well as the performance of therapeutic trials. Finally, he highlighted that several foundations had been created around the world with the purpose of dealing with issues related to this disease, such as the Leukemia Society Inc., the Lenore Research Foundation, the Wadley Research Center and the Lady Tata Memorial Trust.

Pavlovsky's requests were well received, and, by means of a significant private donation,

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

FUNDALEU began to operate. The organization's main activities consisted of promoting research on the etiology of leukemia, granting fellowships for scientific purposes, providing health care to patients, and carrying out activities to spread knowledge to the community.

One of the first activities carried out by this organization was the sponsorship of a symposium on acute leukemia held at the ANM in February 1957, with the participation of the researcher Joseph Burchenal, Head of the Chemotherapy Section of the Sloan-Kettering Institute Cancer Center at the Memorial Hospital for Cancer and Allied Diseases. His participation was not chance, but rather owing to Pavlovsky's interest in carrying out studies within the IIH similar to those conducted at the Sloan-Kettering Institute, focused on the search for chemical substances that could fight leukemia and other types of cancer. At that time, these types of research studies were experiencing a surge worldwide, especially in the US, based on a decade of previous studies in which auspicious results had been obtained (7,30-32) (i).

The organization of the Experimental Leukemia Section and creation of the research school

By 1956, when Pavlovsky became director the IIH, he found the search for chemical substances to treat cancer to be an interesting area of research due to the significant amount of resources involved in carrying out these studies and due to their potential use in patient treatment. Thus, in 1956, along with the organization of the symposium, Pavlovsky contacted Ezequiel Holmberg, the first person who came to his mind to organize the experimental leukemia laboratory. Holmberg was then a young physician who came from an upper-class family and who knew Pavlovsky because they shared the same social circles. At the time Pavlovsky contacted him, Holmberg was finishing a specialty program that he had initiated after leaving Argentina because of political disagreements with Peron's government. As his return to Argentina would be delayed, Pavlovsky decided to hire two other researchers to organize the Experimental Leukemia Section. These researchers were Christiane Dosne de Pasqualini and Sol Libertario Rabasa.

Details about the career background of Dosne de Pasqualini, a Canadian researcher who was 37 when contacted by Pavlovsky, are worth describing, as she played an essential role in the organization of this research school aimed at studying the etiopathogenesis of leukemia from the mid-1960s onward, after Holmberg resigned his position as Head of the Section. Dosne de Pasqualini began her university studies in 1935 at McGill University, Montreal, Canada, where she first obtained a degree of Bachelor of Science with Honors in Biochemistry, and then went on to study a PhD program. At around that time, she began to work as a Laboratory Assistant for Viennese researcher Hans Selye, thus initiating a process of scientific socialization that trained her in endocrine research techniques. She performed her first experiments in her director's lines of research (stress, in particular the alarm reaction, a topic en vogue during the Second World War because of its practical implications), presented the findings obtained in conferences and scientific journals and defended her PhD dissertation on the role of the adrenal gland in overall resistance.

In 1941, she applied for a Canadian Federation of University Women Travelling Fellowship, which allowed her to spend a year at the Institute of Physiology of the Universidad de Buenos Aires. The reasons for her decision were both her interest in Houssay's studies and the fact that other research fields relevant to her interests were banned as a result of the Second World War. In Argentina, Dosne de Pasqualini joined the laboratory directed by Bernardo Houssay, was incoporated into its lines of research, learned to work with new experimental models and attended the research team's seminars and the meetings of the Argentine Society of Biology.

Her professional training was continued through stays in other laboratories (Alejandro Lipschütz's laboratory in Chile, and, after she returned to Canada, at Cyril Norman Hugh Long's laboratory in the US) and finally ended at the end of 1944, when she married Rodolfo Pasqualini, one of the doctors whom she had met in Buenos Aires and who was at the time in Montreal working with Selye. She settled down in Argentina, where she began to work in the same institutions as

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

her husband: at the Laboratory of Experimental Physiology of the Central Military Hospital and at the National Institute of Endocrinology, created in 1948 upon a mutual agreement between Ramón Carrillo, then Minister of Public Health, and Rodolfo Pasqualini, who took control of its operation and management during the first eight years of its existence.

In 1955, with the fall of the Peronist government and the turbulent political situation in Argentina, the Pasqualinis were forced to leave their positions at the National Institute of Endocrinology. From that moment on, Dosne de Pasqualini held only her position at the Central Military Hospital and began to work as an assistant for Hematologist Guido Loretti. It was during that time that she decided to enroll for the symposium on leukemia held in the ANM – since she had to deal with patients who suffered from the disease – and came into contact once again Pavlovsky, whom she had met during her first stay in Argentina.

As told by Dosne de Pasqualini (33), Pavlovsky thought that she did not have enough experience to organize the Experimental Leukemia Section on her own (j), so he contacted Sol Libertario Rabasa, a doctor from Teodelina, Santa Fe, who had also attended the symposium and was acting as the president of the Institute of Medical Research in Rosario. There he had begun his professional career as a scientist under the direction of Juan Lewis, one of the first scientists who had studied under Houssay and, as demonstrated by Alfonso Buch, who had helped Houssay become such a leading figure in physiology. As he already had commitments in Rosario, Rabasa only offered to render his services during the initial stage of the laboratory organization, spending a few months in Buenos Aires and then acting as a consultant.

The initial work of Pasqualini and Rabasa (and Rabasa's subsequent role as a consultant), in addition to Holmberg's return to Argentina, laid the foundations for the creation of a research school in the Experimental Leukemia Section, which, as Gerald Geison stated, would be made up of "small groups of well-trained scientists doing reasonably consistent research alongside advanced students within the same institutional context, all committed to direct and continuous social and intellectual interaction" (34 p.23). Over the course of time, this group of well-trained scientists and the technicians who worked with them would be joined by a group of fellows who were not only acquiring professional training but were also contributing through their particular areas to an articulated research study designed by their tutors on the basis of their participation in an internationally relevant research field related to cancer.

In order to understand the nature of this research program and the particular work organization that began to take shape in the Experimental Leukemia Section – characterized by the strong autonomy of the scientists when establishing their objectives and procedures – it should be highlighted that Dosne de Pasqualini and Rabasa objected to the research studies that Pavlovsky intended them to perform. Their objections were based on the fact that they did not consider his proposal regarding the study of the therapeutic power of chemical substances to be intellectually stimulating enough – it had an empirical focus, oriented towards trial and error – as well as their belief that such studies would likely have little success given their lack of resources. Instead, Rabasa and Dosne de Pasqualini wished to carry out basic research related to the etiology of leukemia. Their interest was based on their previous knowledge of one of the experimental systems to which particular attention was being given by cancer specialists at that time, especially in the US, and that consisted of inoculating leukemic cells into animals by using subcellular fractions obtained by filtration or ultracentrifugation, with the purpose of demonstrating the viral origins of leukemia, and, in broader terms, of cancer. These research studies, which began to be carried out in the second decade of the twentieth century, had then become a conceptual and methodologically standardized activity that gathered a group of scientists around a common problem (identifying the virus responsible for leukemia) and a series of shared procedures (for instance, serial passages using acellular filtrates, identification of viral particles through the use of the electron microscope, identification of antigens). Between 1957 and 1961, there was a proliferation of articles that communicated the discovery of new forms of leukemia by means of acellular filtrates, with forms named after the authors who first uncovered their properties. Thus, Graffi, Friend, Moloney and

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

Rauscher, among others, referred both to different forms of murine leukemia and the researchers that discovered them. According to these scientists, these forms of leukemia were probably of viral origin, but only indirect proof could be obtained to support this claim. This controversy became the subject of discussion in academic papers and scientific meetings that multiplied in number in those years, such as the International Symposium on Comparative Leukemia Research held every two years by the International Society for Comparative Leukemia Research.

Pavlovsky's acceptance of the proposal made by Dosne de Pasqualini and Rabasa meant that the research program in the Experimental Leukemia Section would be focused on this specific research area. Over the course of time, this program gradually allowed for the development of diverse lines of research developed on the basis of two overarching questions the members of the Experimental Leukemia Section used to describe themselves at the end of the 1970s: Why do healthy cells become cancerous? And: How can a tumor grow in an organism immunologically prepared to impede tumor growth? (k). Both questions demonstrate a cognitive transition during the course of twenty years, marked by an initial stage in which the research studies were focused on discovering the causes that lead a normal cell to become cancerous, to a second stage in which the main focus of research was oriented towards the interaction between the tumor and the organism in which it is found. This shift, which also meant a transition from virology to immunology, happened as research studies supporting the viral origins of leukemia decreased and cancer immunology (and immunology as a discipline in general) gained importance.

The manner in which the cognitive orientation of the Experimental Leukemia Section was formed is an example of the description of the work organization of the IIH given previously, which was not based on a strongly centralized direction that oriented and controlled objectives and procedures. Instead, a great level of autonomy existed among those who worked in the different areas of the Institute. Nonetheless, as was mentioned, this autonomy had limits, which we could speculate were part of the transition period and gradually disappeared as a space for the development of scientific research become more generalized in the Argentine labor market. In this particular case, those limits could be seen in the existence of a second line of research – conducted by Holmberg after his return to Argentina – developed at the direct request of Pavlovsky: the study of the properties of radioactive phosphorus, which the head of the IIH found interesting due to the use of the radioisotope as a therapeutic agent. This therapy, widely used at that time, required additional trials as it was suspected to have leukemogenic effects and to cause infertility. This research line was maintained while Holmberg remained in the Experimental Leukemia Section and, after his departure in 1966, several articles based in unfinished experiments continued to be published until the early 1970s. The studies carried out on this subject dealt with two different issues: on the one hand, the way radioactive phosphorus was absorbed by the gonads, the brain and the hypothalamus in both male and female mice, in order to prove whether or not it generated infertility; and on the other hand, the potential leukemogenic effects of the substance.

As was stated previously, the studies relevant to each of these broad research lines were performed by scientists from the Experimental Leukemia Section in collaboration with new generations of scientists whose PhD dissertations covered partial aspects of the overall research. Scholars involved in the study of research schools frequently highlight the importance of university teaching in the recruitment of new members, since undergraduate programs are a privileged place to both select candidates who demonstrate aptitude for research and to publicize the contents of the research programs carried out by school authorities. Nevertheless, neither Holmberg nor Dosne de Pasqualini acted as university professors, and had to resort to other mechanisms for the selection of interns, such as recommendations made by other scientists and the publishing of available fellowships awarded by FUNDALEU. In general terms, the assistants who came to the Experimental Leukemia Section had a similar background: they had begun their career by obtaining a fellowship awarded by FUNDALEU or the Argentine League for the Fight Against Cancer [*Liga Argentina de Lucha Contra el Cáncer*], which helped them obtain their first professional experience; then, they applied for a CONICET fellowship (research initiation

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

fellowships and research training fellowships, depending on the case); and finally, they began the Researcher Career Program at CONICET. At that time, as Dosne de Pasqualini explained, a form of work organization began to be come together that considered that "the research team should not be made up statically of the directors or heads and the young researchers studying under them, but rather the team should grow as this second group gets promoted to higher positions until reaching the status of the first group" (35 p.360).

Every research study conducted by the interns took on a part of the more general research program on the etiopathogenesis of leukemia, the extent of which became wider in these years, and whose content was suggested by Dosne de Pasqualini. Thus, a work dynamic was established in which professionals in charge of the Experimental Leukemia Section could widen remarkably the extent of their research studies, as they had the necessary group of researchers who worked with specific empirical aspects of a larger research program, while gaining experience and making their first steps towards becoming independent scientists.

Finally, a last aspect of the cycle of production and circulation of knowledge strengthened in the Experimental Leukemia Section at that time was related to the communication of the findings. The involvement of this team in highly specific research fields connected to the virology and immunology of leukemia (and cancer, in broader terms), was in this sense demonstrated by the large amount of articles published in international scientific journals mainly linked with cancer and immunology. Similarly, members of this research school attended international symposiums on a regular basis, some of which dealt with broad topics related to cancer or blood diseases, while others were specifically focused on their research field, such as the different conferences of the International Symposium on Comparative Leukemia Research. At both general and specific conferences, these scientists met with professionals working in similar research areas and on some occasions were invited to participate in these teams' internal seminars, in which findings obtained in Argentina or the experiments being conducted in those laboratories were the subject of debate pre-publication. The active involvement in these cosmopolitan networks represented an essential aspect of the work dynamic that had been established in the Experimental Leukemia Section. While high levels of autonomy from the authorities of the entity where they worked were being obtained, the dependency of these researchers was increasing with respect to the international groups who provided them with intellectual identity, research topics of widely-accepted relevance to be studied, and an array of methodological prescriptions on the correct ways of performing such studies.

Despite the cosmopolitan nature of the activities developed by this group, these scientists also maintained significant participation in local arenas of scientific exchange. Thus, their privileged spaces of membership were found in the journal *Medicina (Buenos Aires)*, the Argentine Society of Clinical Research and the Argentine Society of Immunology. As was previously stated, their involvement was not limited to attending meetings or submitting works; on the contrary, the members of the Experimental Leukemia Section played a key role in the very organization of these spaces.

FINAL COMMENTS

This study analyses the creation and organization of the Institute of Hematological Research within a context of transformations in the ANM in the mid-1950s. More specifically, it is focused on the way the material bases and institutional and cultural mechanisms were generated for the development of scientific research studies. In addition, it illustrates the effective fulfillment of these transformations, demonstrated by the creation of innovative work methodologies, which – by using concepts from the history of science – are analyzed in connection with the creation of a research school. Within this context, it is observed how Argentine scientists began to work jointly with cosmopolitan groups in the same field that provided them with topics, concepts and methods, while simultaneously gaining autonomy from the entity's authorities.

The case under study, both in terms of the institutional construction and the change in the focus of practices, contributes evidence regarding

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

the process of scientific modernization initiated in Argentina during the mid-1950s as well as the way that, within this context, the professionalization of these activities was generalized. In addition, it contributes to the study of the organization of local practices related to the new biomedicine that took shape all over the world after the end of the Second World War. Although some isolated studies exist on this subject (16-19,36,37), there are no shared understandings of the general characteristics of this process in those years with respect to the configuration of science as a professional career, the implementation of changes in university programs, and their impact on the transformation of health care practices and establishment of public health policies.

ENDNOTES

a. The information provided in this study was obtained during the elaboration of a PhD dissertation delivered at the *Facultad Latinoamericana de Ciencias Sociales* and prepared as part of my work as research assistant at the Institute for Social Science Research and Technology [*Instituto de Estudios Sociales de la Ciencia y la Tecnología*] at the Universidad Nacional de Quilmes.

b. The reports of both the National Academy of Medicine and Alfredo Pavlovsky are available unlisted at the Administrative Office of the National Academy of Medicine. Dr. Dosne de Pasqualini's reports were provided by her personally.

c. These conversations took place in her office, where she allowed me to work during a period of some months between 2009 and 2010. I would like to thank her for our exchanges and for providing me with valuable documents that would not have otherwise been available to me.

d. Previous attempts to create an entity of this nature existed, although they were never fulfilled. Executive Order 9695/1951 (11), from 1951, by which the National Technical and Scientific Research Council (CONITYC) [*Consejo Nacional de Investigaciones Técnicas y Científicas*] was created, may be consulted.

e. It should be highlighted that these processes marked the consolidation of a medical model focused on personalized care and the heavy use of drugs to alleviate the biological causes of disease. In opposition to this prevailing current of thought, different critical approaches focused on the social determinants of health-disease-care processes emerged (14,15). Nevertheless, as this study focuses on the creation of a research school that falls within the predominant current of thought, no comments will be included on these perspectives.

f. But also in the government sector, as the case at the National Institute of Microbiology [*Instituto Nacional de Microbiología*], where internal conflicts prompted a new overhaul in 1962, causing Pirosky's expulsion and the destruction of a significant amount of the objectives achieved (17).

g. A study focused on the creation of a research school headed by physician Eugenia Sacerdote de Lustig (27) shows how the teaching work she performed at the Faculty of Medicine and the Faculty of Exact and Natural Sciences at the Universidad de Buenos Aires was an important factor allowing for the incorporation of students in the early and mid-1960s.

h. For more information about Oberling's career and the importance that the use of the electron microscope gained at the *Institut de Recherches*

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

sur le Cancer "Gustave Roussy," see Gaudillière (7 p.169-185).

i. Due to space constraints, it is not possible to delve into the particular characteristics assumed by the organization of this research field. In the bibliography cited, it can be observed how the work in this field, carried out by both private and governmental entities, adopted an organizational structure similar to that of industrial research, in which the setting of objectives was predominantly determined by the establishment of strong hierarchical organizations.

j. Nevertheless, this explanation is not entirely satisfactory. Although this stance cannot be proved, it could be inferred that her being a woman in a male-dominated environment as well as the intolerance of other academics regarding her husband's political connections to Peronism had been important factors in his decision.

k. Reports of the National Academy of Medicine, 1972. They are available unlisted at the Administrative Office of the National Academy of Medicine.

ACKNOWLEDGEMENTS

This article is part of a more comprehensive research study entitled "*Emergencia y desarrollo de las investigaciones sobre el cancer en la Argentina: marcos institucionales, trayectorias profesionales y prácticas, 1909-1983*" [Emergence and development of research studies on cancer in Argentina: institutional framework, career trajectories and practices, 1909-1983], which was financed by the National Scientific and Technical Research Council (CONICET) [*Consejo Nacional de Investigaciones Científicas y Técnicas*].

BIBLIOGRAPHIC REFERENCES

1. Hurtado D. La ciencia argentina. Un proyecto inconcluso: 1930-2000. Buenos Aires: Edhasa; 2010.

2. Oteiza E. La política de investigación científica y tecnológica argentina: Historia y perspectivas. Buenos Aires: Centro Editor de América Latina; 1992.

3. Prego C, Estébanez ME. Modernización académica, desarrollo científico y radicalización política. In: Krotsch P, organizadores. La universidad cautiva. La Plata: Al Margen, UNLP; 2002.

4. Prego C. La gran transformación académica en la UBA y su política a fines de los años 50. In: Prego C, Vallejos O, compiladores. La construcción de la ciencia académica. Buenos Aires: Biblos; 2010.

5. Sarlo B. La batalla de las ideas (1943-1973). Buenos Aires: Ariel; 2001.

6. Sigal S. Intelectuales y poder en Argentina: La década del sesenta. Buenos Aires: Siglo Veintiuno Editores; 2002.

7. Gaudillière JP. Inventer la biomédecine: La france, l'amérique et la production des savoirs du vivant (1945-1965). Paris: Éditions La Découverte; 2002.

8. Buch A. Forma y función de un sujeto moderno: Bernardo Houssay y la fisiología argentina (1900-1947). Bernal: Editorial UNQ; 2006.

9. Prego C. Formación y desarrollo de una tradición científica: el campo biomédico en la Argentina. In: Albornoz M, Kreimer P, Glavich E, editores. Ciencia y sociedad en América Latina. Bernal: Editorial UNQ; 1996.

10. Ben David J. El papel de los científicos en la sociedad: Un estudio comparativo. México: Trillas; 1974.

11. Argentina. Decreto 9695: Créase el Consejo Nacional de Investigaciones Técnicas y Científicas. Boletín Oficial de la República Argentina. 1951;LIX(16008):1.

12. García R. Universidad y frustración (entrevista). Ciencia Nueva. 1971;II(13):18-21.

13. Romero L, Buschini J. La construcción de un departamento científico en un proceso intensivo de modernización académica: el caso de la física en la UBA (1955-1966). In: Prego C, Vallejos O, compiladores. La construcción de la ciencia académica. Buenos Aires: Biblos; 2010.

14. Galeano D, Trotta L, Spinelli H. Juan César García y el movimiento latinoamericano de medicina social: notas sobre una trayectoria de vida. Salud Colectiva. 2011;7(3):285-315.

15. Menéndez E. Morir de alcohol: Saber y hegemonía médica. México DF: Alianza Editorial Mexicana; 1990.

16. Buschini J. Emergencia y desarrollo de las investigaciones sobre el cáncer en la Argentina: marcos institucionales, perfiles profesionales y prácticas (1909-1983). [Tesis de Doctorado]. Buenos Aires: Facultad Latinoamericana de Ciencias Sociales; 2010.

17. Kreimer P. Ciencia y periferia: Nacimiento, muerte y resurrección de la biología molecular en la Argentina. EUDEBA: Buenos Aires; 2010.

18. Romero L. Conformación y desarrollo de una tradición de investigación clínica médica: Alfredo Lanari y el Instituto de Investigaciones Médicas (IIM) (1957-1976). [Tesis de Doctorado]. Buenos Aires: Facultad Latinoamericana de Ciencias Sociales; 2011.

19. Romero L. Alfredo Lanari, un estilo de investigación clínica. Salud Colectiva. 2012;8(1):69-80.

20. Quiroga M. La Academia Nacional de Medicina de Buenos Aires (1822-1972). Buenos Aires: Academia Nacional de Medicina; 1972.

21. Buschini J. Conflictos institucionales en la UBA luego de la Reforma Universitaria de 1918: la doble inauguración del Instituto de Medicina Experimental y la autonomía de la Academia de la Facultad de Ciencias Médicas. Saber y tiempo, en prensa. (2012).

22. Argentina. Decreto 7500: Se reglamenta el Funcionamiento de las Academias Oficiales y Particulares. Boletín Oficial de la República Argentina. 1952;LX(17240):1.

23. Quiroga M. El receso de la Academia Nacional de Medicina. Boletín de la Academia Nacional de Medicina de Buenos Aires. 1956;34:3-5.

24. Argentina. Decreto-Ley 4362: Recuperan las Academias Nacionales su Normalidad e Independencia. Boletín Oficial de la República Argentina. 1955;LXIII(13046):1.

25. Fundación para Combatir la Leucemia. 50 años. Buenos Aires: FUNDALEU; 2007.

26. Castex M. Discurso de recepción del académico doctor Mariano Castex en el acto de incorporación de los académicos doctores Juan J Beretervide y Alfredo Pavlovsky. Boletín de la Academia Nacional de Medicina. 1956;34:223-237.

27. Buschini J. Conformación y desarrollo de una escuela de investigación en biología celular del cáncer: Eugenia Sacerdote de Lustig en el Instituto de Oncología Ángel Roffo (1966-2005). [Tesis de Maestría]. Bernal: Universidad Nacional de Quilmes; 2007.

28. Whitley R. La organización intelectual y social de las ciencias. Bernal: Editorial de la UNQ; 2012.

29. Kaplan H. On the etiology and pathogenesis of the leukemias: a review. Cancer Research. 1954;14:535-546.

30. Bud R. Strategy in American Cancer Research after World War II: A Case Study. Social Studies of Science. 1978;8(4):425-459.

31. Endicott K. The Chemotherapy Program. Journal of the National Cancer Institute. 1957;19:275-293.

32. Lôwy I. Cancer: The Century of the Cell. In: Krige J, Pestre D, editores. Science in the Twentieth Century. Amsterdam: Harwood Academic Press; 1997.

33. Dosne de Pasqualini C. Quise lo que hice: Memorias de una científica. Buenos Aires: Leviatán; 2009.

34. Geison G. Scientific Change, Emerging Specialties, and Research Schools. History of Science. 1981;XIX(1):22-40.

35. Dosne de Pasqualini C. El mundo del investigador. Boletín de la Academia Nacional de Medicina.1972;50:360.

36. Hurtado D, Fernández MJ. Institutos privados de investigación "pura" versus políticas públicas de ciencia y tecnología en la Argentina (1943-1955). Asclepio [Internet]. 2013 [cited 12 Apr 2013];65(1). Available from: http://asclepio.revistas.csic.es/index.php/asclepio/article/viewArticle/545/565.

37. Zabala JP. La enfermedad de Chagas en la Argentina: Investigación científica, problemas sociales y políticas sanitarias. Bernal: Editorial de la UNQ; 2010.

SALUD COLECTIVA, Buenos Aires, 9(3):317-334, September - December, 2013

CITATION
Buschini J. Institutional renovation and scientific modernization: the creation of the Instituto de Investigaciones Hematológicas during the mid-1950s. Salud Colectiva. 2013;9(3):317-334.

Received: 7 August 2013 | Revised: 10 September 2013 | Accepted: 16 October 2013

The translation of this article is part of an interdepartmental collaboration between the Undergraduate Program in Sworn Translation Studies (English < > Spanish) and the Institute of Collective Health at the Universidad Nacional de Lanús. This article was translated by Agustina Amantea and Magalí Hachur, reviewed by Mariela Santoro and modified for publication by Vanessa Di Cecco.