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# *Migration of Scientists and the Building of a Laboratory in Argentina\**

PABLO KREIMER

*The objective was to demonstrate how, as witnessed in the particular case of one molecular biology laboratory in Buenos Aires, different types of scientific migration emerged, such that they were responsible for the very constitution of this laboratory. To this end, a brief description of the historical background of the scientific community in Argentina, its political-institutional context, and the successive migrational periods which have been produced in the country will be presented. Before discussing this particular case, three 'ideal types' which may be useful in understanding the different types of migration embarked upon by scientists will be described.*

## Introduction

THE INTERNATIONAL MOBILITY of scientists has been an enduring practice for many decades, it is virtually an additional element in the constitution of the identity of scientific activity itself. Therefore, the study of migration is an inevitable subject for the comprehension of the structures and dynamics of local scientific communities, including the consideration of that which lies beyond the national reality. Quantitative studies (carried out on different aggregate levels), which have highlighted the movement of migrational flows through history, have been established as highly useful indicators. Due to the descriptive strength of this data, it is possible to draw inferences about the conditions under which scientific practice takes place, or the perceptions that the actors form of these conditions.

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If the above is true for all countries—especially during a period when communication has made the process of scientific internationalisation even more evident—it is all the more true in the case of less developed countries, inasmuch as they have been, in general, areas of ‘expulsion’ rather than ‘reception’ of scientists as well as of intellectuals and professionals. It is the particular case of Latin America, where in recent decades it can be observed that a steady current of researchers has been drawn, for varying periods of time (including permanent relocation), in general, to North America and Western Europe.<sup>1</sup>

The reflections that guide this study have emerged as a consequence of a micro level investigation by Kreimer in various laboratories. The study, illustrating the Argentinian case, was carried out in a molecular biology laboratory in Buenos Aires and, simultaneously, a similar study was carried out in London and Paris, which served as a model for the analytical framework. In the comparative view, a dimension concerning the *peripheral condition* (present in Argentinian laboratories *vis-à-vis* the European labs) was immediately evident.<sup>2</sup>

Second, to distinguish between the different *origins* of scientific migration, the notion of *strategy* is useful (regarding the actors involved). This concept permits a clear-cut differentiation of deliberate decisions from those decisions which are imposed upon the actors, or necessitate a choice between different alternatives. On the basis of a study of a particular case, the most significant variables will be brought together to explain the problem of migration from a qualitative perspective which will necessarily be complementary to the analysis of the great migratory flows, and which will incorporate the elements that emerge from the political and institutional macro determinations.

### Historical Background

In the following the most significant components of the scientific tradition in Argentina, the dynamics of the relatively ‘new’ scientific community and the features of the political–institutional context in which migrational movements have taken place will be discussed. This brief *parcours* is essential to understanding and historically orienting the elements present in the laboratory under study.<sup>3</sup>

Since its emergence as a nation, Argentina has been formed by diverse waves of immigrants, particularly of European origin. Thus, it is natural that since the early<sup>4</sup> establishment of its scientific community, towards the end of the last century, many of its active scientists were from various European countries and that the evolution of many scientific disciplines in Argentina has been linked to the leadership of one or another of these researchers who came from Europe.

The practice of contracting and drawing professors to the country *from the exterior* formed part of an explicit political policy beginning in the 1870s and continuing through subsequent periods. The most significant architects of this policy were the then President, Domingo Sarmiento, and Juan María Gutiérrez, who was the rector of the University of Buenos Aires. This policy was along the same lines as the general policy pursued during the period, broadly based on the promotion of European immigration as a means of 'populating' the country.<sup>5</sup>

During the first decades of this century, there already existed a group of researchers with a tradition in certain disciplines, particularly in what has been called the *biomedical complex*, led by Dr Bernardo Houssay, who was awarded the Nobel Prize in 1949. Certainly, scientific research was far from being a mass phenomenon; the active scientists were, in majority, members of families involved in the very productive exploitation of agro-exportation.

It was during this period that a transition in the institutionalisation of academic science practices occurred: from an orientation centred on aspects of teaching, it would pass, emblematically, with the election of Houssay as the titular head of physiology (at the University of Buenos Aires), to an orientation centred on research or, still further, the *practice* of research.<sup>6</sup>

Thus, a few active groups were formed which were working closely with the international scientific community, earning recognition not only for the topics they addressed but also for the quality of their work. This is characteristic of various Latin American countries and some authors have called it 'the scientific excellence in the periphery'.<sup>7</sup> This concept has been proposed, specifically, for understanding the emergence, in the context of peripheral countries, of groups whose development appeared, *a priori*, similar to that of their counterparts in 'central' countries.

Until the 1950s, the scientific community in Argentina had been experiencing a period of expansion, in large measure due to the slow but increasing access to the University of the middle classes beginning in the 1930s. These members of society who were largely second generation immigrants had arrived in Argentina at the beginning of the century, and comprised Italians, Spanish and Central Europeans. This reflects, to some degree, the political rise of these social sectors, which had begun to emerge during the presidency of Hipólito Yrigoyen at the beginning of the 1920s.<sup>8</sup>

This process was abruptly interrupted in the mid-1940s with the ascension to power of Peronism.<sup>9</sup> In this context, the University massively opposed the Peronist regime, which was perceived as its enemy: for the first time in Argentinian history, science was perceived by the government as a refuge for elitists who were 'disinterested in the *avatars* of the people'. As a consequence, a large percentage of researchers were dismissed or were compelled to resign from their University posts, and *not a few scientists either chose or were forced into exile* during this period. Houssay, for example, founded the Institute of Experimental Biology and Medicine (IBIME) during this period, independent of the University, and Leloir (one of his disciples) founded the Campomar Foundation for Biochemical Research, both of which were soon recognised as centres of academic excellence.

In fact, it was during the 1945–55 period that the first massive exodus of scientists and professionals to the exterior occurred. In a speech delivered some years later, Houssay noted the importance of the 'problem' of massive emigration and indicated that, between 1950 and 1956, almost 1,700 scientists and professionals had left the country, with the numbers steadily increasing every year from the end of the 1940s.<sup>10</sup>

The period following the fall of Perón heralded what has come to be known as the 'golden decade'<sup>11</sup> for science in Argentina: in 1958, the National Council for Scientific and Technological Investigation (CONICET) was established, presided over by Houssay until his death, with Rolando García, then Dean of the *Facultad de Ciencias* of the UBA, as vice-president. The effect on investigative practices was substantial: the CONICET instituted a system of grants for young graduates, it created a degree programme for scientific research, authorised subsidies for research and financed

scientific field trips to the exterior, for grant recipients as well as for investigators. In this sense, migration for short periods of time became a relatively common practice among the most active research groups, directed toward doctoral studies, postdoctoral studies, or 'stages' of shorter duration. The stimulus for this type of travel could be found not only in the existence of institutional mechanisms, but also in the perception, on the part of certain leaders of the scientific community, that scientists need to be exposed to the work of their colleagues abroad, and the need to establish permanent ties of collaboration.<sup>12</sup>

To the creation of CONICET must be added the development of new disciplines (the first professorship in nuclear physics was offered), new degree programmes were added (such as psychology and sociology), and many projects encountered significant new resources available for their development. The previous pre-eminence of the biomedical complex, although maintaining a part of its influence, also gave way to the development of other disciplines, mostly (but not exclusively) within the *Facultad de Ciencias* of the UBA. To have some idea of the 'explosion' in research, it may be observed that the latter mentioned School increased its population, between 1959 and 1964, by more than 60 per cent, while in social sciences the phenomenon was even greater: in the *Facultad de Filosofía y Letras* (within which programmes of sociology and psychology function), there was 146.6 per cent increase.<sup>13</sup> The university enrolment figures for the entire country increased from 82,500 in 1950, to 180,780 in 1960, and further to 274,000 in 1970.<sup>14</sup>

This process was, however, interrupted, and more profoundly in 1966, with the assumption of power of the military regime, which in the same year generated the violent episode in the University which has come to be known as the '*noche de los bastones largos*'.<sup>15</sup> Subsequently, a progressive exodus of scientists and professionals began, who were either directly dismissed from the University, or were persecuted by political authority. The statistics are revealing: in the University of Buenos Aires alone 8,600 professors resigned voluntarily; and in some cases such as in the School of Exact Sciences 77 per cent of the faculty resigned.<sup>16</sup> Of these scholars, only a few were able to enter into private institutes (Campomar, the Bariloche Foundation); this figure was higher in the case of

the social sciences, as certain institutions that were created during those years sheltered numerous researchers (the Institute Di Tella, IDES, CLACSO, among others).

Notwithstanding, in 1966 the process which had begun a decade earlier took a dramatic turn following forced emigration of scientists and professionals, many of whom sought permanent residence abroad. With the exception of a few groups that travelled together,<sup>17</sup> the emigration of Argentinian scientists assumed the form of a stampede, with each one fending for himself as quickly and effectively as possible, utilising whatever personal and professional contacts one could in order to gain shelter in centres and institutions abroad.

After the brief democratic period in 1973, the military coup of 1976 worsened the environment of scientists and intellectuals that had begun a decade earlier. This time the persecution, assassinations and torture were on a grand scale, and there were no opportunities for researchers who were uncompromised with respect to the military regime to continue working in the country. Thus, some scientists who had managed to retain their posts in 1966, taking refuge in the internal contradictions created by the military itself, no longer had any recourse or option in 1976: exile appeared to be the only feasible solution, in many cases not just to save scientific practice, but also life itself.<sup>18</sup>

The period of restoration of democracy began towards the end of 1983. Many researchers returned to the country immediately and reinserted themselves principally in the universities and some institutes of the CONICET; in fact, practically all the organisation's institutional positions were filled by scientists returning from the exterior, as well as the majority of professorships offered by the public University between 1983 and 1985. The greater part of the institutions 'normalised' their operations and the environment, in general, was similar to that in the 1960s. However, conditions had been modified substantially, and, in spite of the relative importance the government attached to scientific investigation, the resources were perceived as increasingly insufficient in the context of the economy of the country—in the midst of a debt crisis—which made it increasingly difficult to operate.

No doubt, it was not simply a problem of resources; in addition, the return of large numbers of scientists from the exterior generated internal conflicts within the scientific community. On the one hand, those scientists who had remained in the country looked

with distrust upon those who were returning, as they perceived them to be a threat to the positions they had occupied during the period of the military regime. In fact, the majority of those who had governed the CONICET during those years were removed from their posts, which led to resentment and charges of 'ideological discrimination'. On the other hand, the scientists who returned tended to perceive the majority of those who had stayed as accomplices to the regime who did not merit research positions. Where this conflict had the greatest impact was in the relative breach of the *traditions* which had been forged during the previous decades and which had crystallised, to a degree, in the model of the 1960s. Thus, inasmuch as entire groups had been disassembled, intergenerational relations, in order to be reconstituted, required that a new generation of researchers should emerge under the direction of a group of researchers who, themselves, were trying to reconstitute their own laboratories.

Already, a significant proportion of scientists had sought permanent residence abroad, and for various reasons had decided definitively not to return to the country.<sup>19</sup> To this it must be added that, over the last 30 years, many disciplines have been substantially transformed, with respect to concepts, the theoretical challenges facing them, the scale upon which research has developed, and the emergence of new problems; all of which have notably limited the possibilities of development in accordance with 'excellence in the periphery', as mentioned earlier. Rather, it is possible to imagine two possibilities within the framework of the local communities: an 'integrated peripheral' practice, in the context of international science, *versus* an attitude of 'relative isolation', as the predominant forms of carrying out science in less developed countries.

In conclusion, it may be pointed out that, over the last 25 years (until 1987), the exodus of *highly qualified personnel* from Argentina to the United States and Canada numbered more than 170,000.<sup>20</sup> The Secretary of Science and Technology of Argentina estimated, based on data obtained from the consulates, that more than 1,700 *scientific researchers* were residents abroad. The figure assumes significance if one considers that this number is only slightly less than the *total* number of career researchers in the CONICET, that is, around 2,000.<sup>21</sup> In recent years diverse mechanisms for stimulating the *repatriation* of scientists have been proposed; nonetheless, the total number of Latin American researchers living abroad has not significantly diminished. In the case of Argentina, only 15 per



cent of researchers living abroad have registered for the programme of repatriation, and of these, only a fraction have returned.

This study will focus specifically on a group of investigators who, for various reasons, returned to the country, and will analyse the circumstances under which this return took place, and the consequences that have resulted in the disciplines involved and in the scientific community in general.

### The Conditions of Scientific Migration

This section presents a discussion of the most significant elements for understanding the migration processes of scientists, based on the construction of certain 'ideal types', as a component in the development of their scientific careers, as well as their interactions with particular political and institutional contexts. This is followed by an analysis of the conditions which produce (or, may produce) the return to the country of origin. These elements will provide the basis of the analysis of our empirical study in the final section.

As our perspective focuses on the *actors* of scientific migration—that is, the scientists themselves—the first element we will consider is whether the decision to migrate is determined by strategies regarding the development of personal careers, or whether it is the consequence of impositions upon the actors in a specific context. On the other hand, the analysis reveals that scientific migration necessarily gives rise to, in all cases, various consequences within the local scientific community.

On the basis of this differentiation, the first *ideal type* of scientist migration is due to extra-scientific motives, particularly as a consequence of political, religious or ethnic conflicts: this type ('type I') of migration *does not involve a deliberate strategy* on the part of the researchers involved, but rather they are forced to abandon the country in which they have been working, for reasons which, in many cases, pose a threat to their lives. In the extreme case of forced exile, it becomes difficult to evaluate the type of decision made in this context as, in the majority of the cases, the selection of a destination for emigration is dependent on the evaluation of a set of circumstances among which the specific scientific strategies may be difficult to isolate.

This kind of migration tends to be for an *extended duration*, inasmuch as authoritarian regimes are rarely established for short periods of time. As a consequence, a high percentage of the scientists who have emigrated find themselves tempted by the *host* centres to stay for longer periods of time.<sup>22</sup> Once the authoritarian regime has been replaced by a democratic one, the decision to return is taken, and the resolution of this question is dependent upon a different set of variables, which will be analysed later.

One of the consequences of forced migration due to authoritarian-type regimes is the tendency to produce a profound breaking up of the so-called local *scientific community*. As indicated earlier, scientists who have emigrated tend to view with resentment those who have remained in the country and return, and even perceive those who stayed as *accomplices* of the authoritarian regime. For their part, scientists who remained in the country during the authoritarian regime soon realised their positions being threatened, positions which were acquired during the intervening years, especially if significant numbers of scientists return. Thus, the *morphology* of social relations which could have prevailed for a determined length of time is suddenly altered, generating segmentations and short-circuits of communication within the local scientific community.<sup>23</sup>

To the former may be added that the massive emigration of researchers in a specific field of investigation leads to a breaking up which has been labelled as (Kreimer 1996) *filial relationships* (as a component of the 'traditions') in scientific investigation. In the absence of a significant number of scientists in a specific field, or the dismantlement of an entire group of investigators, the subsequent generations lose the opportunity to train with the *masters*, and to internalise, develop, or confront established traditions. At the same time, the scientists who return, independent of the symbolic capital or the credit/credibility they possess,<sup>24</sup> must make large investments in the constitution of new work teams, as well as the installation of adequate equipment; in short, recreating conditions they judge to be most appropriate for their reintegration into the medium from which they had been driven out.

The second 'ideal type' refers to the case in which the decision to emigrate is not the result of a (direct) imposition, but rather in response to a personal decision made by the scientist. Naturally,

the motivations for making such a decision are multiple as well as complex, although, in general, two principal causes can be identified: on the one hand, dissatisfaction with working conditions in the origin country, or, rather, the ideal representation (perception) of better conditions to be encountered in the *host* country. On the other hand, there is a perceived necessity to be exposed to working in a prestigious foreign centre as part of a strategy for improving symbolic capital in preparation for the return to the country of origin.

The first motivational type (which is referred to as 'type II A') leads to long time or permanent migration, when the conditions for inclusion in the host country are favourable. During a certain period, especially during the 1960s, the analysis of this type of migration, whose effects were known as a form of *brain drain*, focused on the determinant causes in the country of *expulsion*.<sup>25</sup> Without denying the conditions prevalent in the country of expulsion, during the following years the problem was considered from a more global perspective. This implied, for studies carried out toward the end of the 1960s and the beginning of the 1970s, that not only should the expulsion from the country of origin be taken into account, but also the factors of attraction to the *receptor or host* country.<sup>26</sup> In this sense, for example, the decision to attract scientists (or other highly qualified personnel) has been part of the explicit strategy of the mechanisms for policy planning of some countries.

As an important part of the strategies that scientists may use, we should note the perception that the investigator (the potential migrant) has of the prestige of the centre in which he wishes to continue working. In relation to this aspect, the 'research topic' the researcher wants to study and the importance or the degree of priority attached to this topic (by the 'international community') play an important role during the period in which the decision to emigrate is made.

With respect to conditions of the local context, the importance of economic factors in scientists' decisions cannot be overlooked. Nonetheless, in the decision to prolong (even indefinitely) his stay abroad, a different class of factors usually plays a part: in general, these are the conditions that a scientist would encounter in case he should decide to return to the country of origin. Thus, the nature of the connections that have been maintained with the initial work

group should be considered, as well as the prestige that this group enjoys, the institutional structure of the country of origin,<sup>27</sup> and the possibility (or impossibility) of continuing and developing work along the same lines as those worked on abroad, etc.<sup>28</sup>

A second type of motivation ('type II B')<sup>29</sup> corresponds to migration for a specified period of time (in general, short to medium term) and for a specific purpose, such as doctoral or postdoctoral work or, more generally, for gaining some experience working in a laboratory situated at the 'centre' of 'international science'.

Regarding this kind of migration, the value attached to the laboratory in which the scientist will work abroad, as well as the fact that this work experience increases the degree of credit/credibility of the scientist at the time of deciding to return to his origin country, is of fundamental importance. In this respect, two types of previous conditions must be examined: on the one hand, there is the force of the cultural matrix and the structure of relations corresponding to each scientist in the context of his country of origin; on the other hand, consideration must be given to the institutional work conditions to be encountered by the scientist in his own country.<sup>30</sup>

Concerning the first set of questions, one may consider: first, analysis of the institutional affiliation *prior* to departure to the exterior, the type of institution the scientist was working in, the research topics he was investigating, and the institutional *position* the scientist held during that period. Second, it is necessary to consider whether, during the period of time spent working in the laboratory abroad, regular contact was maintained with the group of origin. In this sense, in addition to the relations and interests of the individual investigator, it is fundamental to take into account whether the work or studies carried out abroad are in accordance with only to the strategies of the investigator or to the group of origin as well. The possibility that the return should effectively occur within the period of time previously determined increases greatly to the extent to which both strategies coincide as part of a common interest. Naturally, the possibility that these two types of strategies should operate together (migrant investigation-reference group) depends in large measure on the degree of consolidation and institutionalisation of the group, such as the credit/credibility possessed by the head of the local group. In this last sense, it is fundamental to analyse the degree of *internalisation* of the local

group: if the relations with international groups that are working on related topics are developed, it is likely that the investigators of a developing country will opt to do work abroad (in more developed countries), for a specified period of time, after which the return to the institution of origin is the probable outcome.<sup>31</sup>

With respect to the type of institutional questions that influence the return of scientists to their country of origin, it is necessary to take into account several factors: First, the financing of work abroad. It has been observed that the proportion of scientists who return to their country is notably greater in cases where funding is obtained through scholarships or special subsidies granted by an organisation of the researcher or the student's own country rather than through self-financing or through the resources of the *host* country.<sup>32</sup> To this it should be added that the majority of such funds are granted under conditions of a signed agreement on the part of the migrant that he will return to his country within a specified period of time. On the other hand, the existence of institutional mechanisms in the country of origin addressing repatriation can also play an important role in the decision-making process, such as those that have been implemented in numerous countries in recent decades, in addition to diverse international organisations which have formulated and introduced aid programmes for the return of scientists to their country of origin.<sup>33</sup>

As a general rule, in all three 'ideal types' the decision concerning the return depends on the evaluation made by scientists of the conditions of the institutional context in their country of origin (including the funding they might obtain if they decide to return and the possibility of securing a permanent and adequate position), the sense of belonging to and identifying with a group and with a particular research tradition, the possibility (or impossibility) of furthering research on topics related to those focused on during the period of study abroad, as well as maintaining connections with colleagues in the international community and the possibility (or impossibility) of effectively utilising, in the country of origin, the symbolic capital acquired abroad. In addition to this, is the complex set of cultural (extra-scientific) identifications and values which imply a greater or lesser attachment of commitment to the country of origin. In the following these problems will be illustrated on the basis of an analysis of a specific case.

### Strategies and the Reintegration of Scientists' Reflections Based on a Case Study

The study which will serve to illustrate some of the problems alluded to above was carried out in the laboratory of an institute of molecular biology in Buenos Aires and was part of a larger research project that included the study of laboratories in France and England.<sup>34</sup> It will be demonstrated how the variety of scientific migrations encountered in this laboratory is a central element not only for its initial formation, but also as a crucial determinant of its current configuration.

The institute under investigation was established as a spin-off from one of the most prestigious institutions in Argentina, dedicated to biochemical research and founded by a Nobel Prize winner. The founder and present director of the institute was one of the privileged disciples of this researcher and will hereafter be referred to as L.

The first remarkable fact is that L, who is considered to be a prestigious investigator in the local community, only spent a very short period of time (less than a year) working abroad. He received most of his training in the country, largely under the guidance of the previously mentioned Nobel Prize winner. The reason for this may be found in two types of causes: on the one hand, in the personal scientific history of L, what may be considered a disciplinary leap from his initial training as a medical doctor (during a period in which very few physicians had a doctorate), to obtaining a doctorate in biology, to working in biochemical research, and then, in a new direction, molecular biology. These thematic and disciplinary passages, as part of a strategy, imply, on the part of the researcher, a special effort to adopt to and follow new directions, especially when they appear at the same time as a strategy that strives to be innovative in the local context. In this case, the researcher has considerable commitment to the development of each of these proposed lines of investigation, inasmuch as they appear, on the local scene, as moments of rupture from other more established lines of work.

During the course of these foundational periods, departure for a foreign destination may imply, from the perspective of the actors, a possibility of losing a foothold in the local context, particularly as the opening of new lines of research which strive to be innovative

necessarily encounter spaces of conflict with more traditional sectors. This appears to have been the case with molecular biology, even more evident by virtue of the fact that it involved a relatively new discipline on the international scene.<sup>35</sup>

The other set of causes can be traced back to the context of science in Argentina three decades ago. The biomedical research tradition in Argentina dates back to the early decades of the twentieth century and is one of the areas of greatest visibility in Latin America.<sup>36</sup> During those years, a major part of the training of researchers took place within the country as very few scientists emigrated abroad for short periods of time for either study or research. It should be noted that the institutional mechanisms for financing research only began to be formalised in Argentina during the 1960s when the CONICET, under the presidency of Houssay, offered the first grant opportunities for researchers. In other words, the process of formalisation of scientific research within an institutional framework similar to that of more advanced countries was just being consolidated, and practices such as going abroad for training period were beginning to be implemented in a more diffused manner.<sup>37</sup> Considering both sets of causes, and the fact that L was not a victim of the attacks of the 'night of the long sticks', which marked the exodus of many scientists in 1966, it can be understood that his strategy of development would not have included spending a specified period of time in a laboratory abroad.

The institute under study is divided into nine laboratories, one of which is under the direct supervision of L and the most prestigious researcher (who will be referred to as M) in whom L has the utmost confidence and who occasionally directs the laboratory (L had, when the research was carried out, an important post in an organisation for the promotion of science which took up a significant part of his time). Of the other eight laboratories, seven are under the supervision of researchers belonging to at least one generation subsequent to L's generation: *all* had obtained their doctorate degrees in the country, and *all* had at least a postdoctorate degree abroad. The heads of each laboratory are also known as the '*post-docs*' of the institute.

Of the seven post-docs, two had obtained their degrees in England, four in the United States and one in Germany. Also, two had worked for more than 3 years in France, two were in Switzerland, and two in Spain. The majority of the postdoctorate work

was done nearly 10 years ago. As may be predicted, in the area of molecular biology, the preferred destinations for study were certain countries of Europe (England, France, Germany) and the United States. Of the seven, two had to emigrate for political reasons ('type I') given that, at the end of the 1970s (the military regime came to power in 1976) they were already working as researchers or as postgraduate students and they had at least some degree of political commitment. The other five decided to pursue their post-doctorate studies abroad as part of a strategic type of decision ('type II B'). We will now examine the careers of three of these researchers. For convenience, they will be referred to as A, B, and C.

The first researcher, A, was working as a research assistant at the end of the 1970s under the guidance of a former professor of his on a project in the area of biochemistry. Following the military coup of 1976, due to his political militancy, he was persecuted and forced into exile. At that time, L, who was an eminent professor in the university and an investigator at the institute which he later left, offered A the opportunity of establishing himself in a laboratory in New York. Given the pressing conditions, the arrangements had to be made hastily and, thus, the laboratory in New York was selected because an old friend of L's, an Argentinian researcher, had already been working there for some time. It is necessary to emphasise, in the light of the importance of this aspect of scientific life in Argentina, the fact that L felt compelled to specify the distance between himself (and his closest associate M) and the other researchers of the institute, in terms of political commitment. In his own words,

. . . here they are all leftist militants. That has been the tradition in Argentina since the 1960's. Everyone, except M and myself; we are rather *right wing*. Still, people are here to carry out research, and so long as they are good researchers, I don't care what they think in political terms. We are very tolerant.

With the assumption of power by the democratic government, scientific institutions were 'normalised',<sup>38</sup> L had already parted ways with his previous institute and had founded the new institute, dedicated specifically to investigation in various branches of molecular biology, generally in relation to the mechanisms for the



detection of *trypanosoma cruzi* (of special significance in Argentina because it is the cause of the Chagas disease<sup>39</sup>). L appointed younger but experienced scientists in his newly established institute (which was, strictly speaking, still a laboratory). A returned to the country following the change of government, motivated fundamentally by affective and family ties and without any type of institutional support. L heard that A had returned to the country and that he had not yet found a job. Although A's experience in the New York laboratory had been in the cultivation of certain cells that bore no relation to the research being carried out at that time in L's laboratory, L proposed that A join the laboratory under the condition that he would develop a new line of research related to the applied biotechnological manipulation of certain plants. There were two (implicit) reasons for this offer: on the one hand, although the research topics previously developed by A were substantially different from the current interests of the laboratory, the application of the techniques that A had learned in the American laboratory could provide a comparative advantage relative to other researchers. And, on the other hand, research in that area was highly promising in terms of the interests of certain companies in financing the aforementioned projects. From A's perspective, the offer provided both advantages and disadvantages: on the one hand, it meant an opportunity to work with one of the groups with the greatest possibilities for growth during that period, with the added symbolic prestige of carrying on the tradition to which L claimed to be heir. But, on the other hand, it required a significant risk, inasmuch as he would have to experience a *rite of passage* toward a topic of which he knew nothing. However, if he was successful, he would be one of the few to develop work in this field, with all the privileges which such a situation entailed. The evaluation of the risks, together with the overriding need for employment, led to the foregone conclusion and A joined the institute where he formed his own research group.

In the case of B, the situation was very different; he was one of L's disciples. At the beginning of the 1980s, he was working on his doctoral thesis under the guidance of L, and once he had completed his thesis, while L was still working as a researcher in his previous institute, they reached an agreement and B left for a university in New York to work on his postdoctoral degree. They had worked out the strategy together and without pressure; they selected a

university where certain lines of research were being pursued that would be of future interest to the research team, they determined a specific duration of time, and it was evident that, upon his return, B would form part of L's team. The funds for the trip were also 'formalised': a scholarship was requested and secured from the CONICET.<sup>40</sup> When B returned, a fundamental change had occurred: L was no longer head of a group within the institute, but was the director of a new institute. B could have directed one of the subgroups of the institute, but, in order to complete his training in the detection of the particular type of virus, he decided to work for a short time in a laboratory in France, again with a scholarship for study abroad granted by the CONICET. At the end of this training, B established his own laboratory in the institute headed by L.

Another researcher of the institute (and also a disciple of L) C, graduated very young and immediately began working in an organic chemistry laboratory specialising in enzymology at the university. He was offered a postgraduate scholarship in the institute of biochemistry directed by the Nobel Prize winner, specifically, in the laboratory of L. As he was still working on his thesis on enzymology, he began to secretly attend the laboratory of L, taking advantage of his vacations to carry out a series of experiments that he himself had planned. It was at that time that the military coup of 1976 took place and the situation in the university was very difficult for anyone, like C, who had a history of political militancy dating back to secondary school. For him, and for the majority of the *post-docs* at the time, the laboratory of L, which depended upon a private foundation, and which revealed L's demonstrated political tolerance, appeared to be a kind of paradise. C consulted the directors of his own laboratory, and they recommended that he move to L's laboratory if he had the opportunity.

Here was an important point of encounter between L and all the young researchers mentioned thus far: *the conviction that one could, and one should, perform science in Argentina*. This conviction bridged the political, as well as the generational barriers that separated these investigators. The origins of these beliefs were varied: for L, it was the result of his adhering to the tradition of the *heavy-weights* of science in Argentina, with whom he had worked and trained. It was not in vain that Houssay himself had said, 'science has no country, but scientists do'.<sup>41</sup> On the part of the

younger generation, this belief was generated by debates that had been taking place in the country since the 1960s focusing on the *commitment* of the scientist to his national reality. This idea of *commitment* was in opposition to that of the *scientism* of those scientists who were only concerned with the development of their own research topics, in tune with the directives of the 'international scientific community'.<sup>42</sup> In the case of a young researcher during the 1970s, this conviction unfolded within the context of an active political militancy in favour of the development of local capabilities (autonomy) in the fields of scientific and technological knowledge, requisite for breaking with the models of *dependence* characterising these models.

In C's experience (representative of a generational movement within a group of researchers of the local scientific community) we see how, already during his formative period, there existed a tendency to *establish oneself in the country* to pursue scientific activity. It is for this reason that C made a great effort to gain entrance, shortly after graduation, to one of the most prestigious institutions of the country. The possibility of emigrating was not, however, closed, but rather implied objectives of mutual consent between the young researcher and his teachers and included, by definition, his return to the same laboratory. Consequently, after having begun work in L's laboratory, when the opportunity to emigrate presented itself, C took advantage of the opportunity, but with the time period well determined in advance. During a course organised in Buenos Aires, C had the opportunity of meeting another of L's old friends who was in charge of a laboratory in Cambridge, England, and he decided to go to Cambridge to pursue his postdoctoral studies; a strategy planned out with L, as C had become one of his closest disciples. Upon his return, L had already established his own institute and C was immediately inducted into this institution, directing his own research group in close collaboration with both L and M. Nevertheless, C had to continue work on the topic that he had been working on in the British laboratory.

In general, the other cases of group leaders have characteristics that combine elements of the three experiences presented thus far. Thus, for example, D was the son of a scientist whom L knew very well, and upon his return from Germany, which was due to circumstances very similar to those of A, D established his own line of research. As a general norm, with the exception of A, all the

present *post-docs* have continued to work along the same lines as dictated by their postdoctoral work. This partly explains the fact that the institute, as a whole, maintains close ties of communication and collaboration with a group of research centres in Europe and the United States, each one of which is highly prestigious on the international scene (such as the centre directed by the Nobel Prize winner, James Watson, the Pasteur Institute, and the MRC of Cambridge).

We will now examine the question pertaining to the conditions present in the constitution of the institute. It is possible to consider that L's strategy of recruitment coincided with the younger scientists' own exhibited strategies, inasmuch as, for a *repatriated* researcher, it is especially interesting to continue work along the same lines of research as had been developed abroad, as for the possibility of accumulating knowledge of a certain topic and as for maintaining active established ties and connections. For L, this strategy permitted him to fulfil two objectives at the same time: on the one hand, to diversify research within the institute in directions considered to be the *hottest* on the international scene, while displaying a set of relations that boosted the institute to the 'level' of the most respected centres in the world. In this sense, it would not appear to be coincidental that the new generation of young scientists has expressed a desire to pursue their postdoctoral studies almost exclusively in the prestigious laboratories of the United States. On the other hand, this strategy was fundamental for attaining greater visibility in the local community, and greater *credibility* which would be converted, through a process of reinvestment, into increased *credit*.<sup>43</sup>

However, the reintegration of emigrant scientists, as a result of L's strategy (that is, to establish his institute by profiting from the return of young 'repatriated' researchers), could not be developed within just any framework. If it was successful, this was due to two additional factors. First, the fact that L's departure from the old institution and the establishment of his own institution had coincided, with just a few months gap, with the restoration of the democratic government which gave a new impetus to research and propitiated the return of a significant number of scientists who had emigrated in accordance with the 'ideal type I'. Thus, for example, during the initial years of operation, L's institute had to cope with a lack of resources for financing, for purchasing equipment, etc. However,

in the following years the institute could count on significant financing for the purchase of equipment and this was one of the most important elements in ensuring the success of the recruitment strategy. It would hardly have been possible for the 'post-docs' to continue work along those same lines of research if they had not been provided some minimum amount of equipment for making it technically feasible.

On the other hand, as a consequence of what was perceived as an agreement or, at least a compromise, between L and the authorities shaping science policy during the military regime (who gave the permission for the creation of the new institute), the fact of having recruited a group of young researchers returning to the country has added significance: this strategy enabled L to be perceived more benevolently by the new democratic government installed in 1983. L's public posture in the local scientific community, and his involvement in negotiations and scientific policy-making in the country, also played a significant role in this strategy. Thus, the present operation of the institute is understood as a 'federation of laboratories', and as a result of an 'implicit contract' between the (conservative) head and the (progressive) post-docs, in order to obtain mutual benefits.

It remains to be explained, with respect to the former *young scientists committed to the national reality*, the way in which they render compatible the growing internationalisation that had oriented their research since their return to the country, that is, the development of lines of research that follow the canons of the industrialised world's centres of excellence, with the declaration, still current, of carrying out science that is committed to local problems. Certainly, this problem is not new for researchers in developing countries, nor will it be easily resolved in the near future: it is in the origin of the problem concerning 'scientific excellence in periphery'. Indeed, most of the young scientists (the 'post-docs') in the institute agreed with anti-scientist principles, especially with respect to taking into consideration the political and social dimensions of research, and the need for carrying out (socially) 'useful' research. But, at the same time, partly as a consequence of the tradition founded by Houssay himself, and partly because of their experience of working in laboratories located in a 'central context', they are compelled to align their research practices to the norms, themes, concepts and methods prevailing in the international scientific community. For

instance, the need for publishing in the most prestigious international journals is a *sine qua non* condition for being integrated into the international community.<sup>44</sup> At the same time, L himself expressed concern about similar types of topics, even if he did not agree to discuss the topic in these terms, as he is a representative of the above-mentioned tradition, and he was also concerned about the 'use' of the 'research results'.<sup>45</sup>

### Conclusions

The case presented here is illustrative of some of the effects that scientific migration has had on the local scientific community. In this particular case, it can be observed that the return of a dozen researchers at the beginning of the 1980s played an important role in the origin of the development of 'modern' molecular biology in Argentina. In effect, the director of the institute, in his role as pioneer, was not recognised as a true 'molecular biologist' until the new generation of researchers began to develop new topics, new techniques and to confront new challenges in the field, at a point of rupture with the former model, which was still tied to biochemistry. In this sense, many of the migrations which ended with the return of scientists to the country during the pre-established period ('type II B') had crucial consequences for the development/modernisation of the particular disciplines or areas of research.

Of course, other cases of migration (types I and II A) had consequences for the development of research in the local community. On the one hand, as indicated earlier, some negative aspects can be observed, such as the rupture of intergenerational relations and, at the same time, a breach in the particular *traditions* of the community in question, which was necessarily sustained upon these relations. There is, however, another aspect that needs to be taken into account, and that is the networks which were being established with native scientists working in the research centres of the most advanced countries. In this sense, it is normal that certain ties are maintained, and that researchers receive young scientists in centres in order to carry out their postdoctoral work, or that they act as 'gate-keepers' for scientists residing in their country of origin for the establishment of a more fluid network of international relations. In fact, this empirical study has confirmed

that when a scientist decides to migrate to a foreign country, very often he establishes contact with a compatriot who is working in a similar centre in the USA or Western Europe, or he establishes this contact by visiting the country of a scientist already residing abroad. In summary, the fact that scientists emigrate abroad does not necessarily mean that their ties with the local scientific community have been interrupted or severed.<sup>46</sup>

With respect to the three types of scientific migration identified earlier, it is possible to formulate the hypothesis that a new tendency is emerging in Latin America which reveals the predominance of type III; in other words, the strategies of researchers are tending increasingly towards planning their return to the country of origin over the medium term.<sup>47</sup> Naturally, migrations of longer (or permanent) duration continue to occur in Argentina as in other countries of Latin America. Although it is premature to suppose that this is a consolidated tendency, or to even attempt to explain the phenomenon, it is possible to formulate certain hypotheses. First, some industrialised countries, principal receptors of Latin American scientists, have established limits on the acceptance of foreigners. Second, financing mechanisms put into practice by the countries of origin as well as by international organisations and even receptor countries, have been increasingly granting privilege to stay of fixed duration, in general, in strict relation to the carrying out of a research project within the framework of collaborations or doctoral or postdoctoral studies. In general, these mechanisms establish clauses that require the commitment of returning to the country of origin. Third, the democratic stability that the majority of the countries of the region have been able to maintain in recent years has operated positively with respect to training new generations, not necessarily threatened by political persecution or discrimination, and which have led to the reconstruction, at least in part, of certain research groups which had disintegrated earlier. Certainly, there are marked differences between the countries as well as among the various disciplinary fields.

One last aspect that the study of migrations has the potential of demonstrating with great clarity is the *internationalised* character of scientific practice in contemporary society *versus* the characteristics of the local society, especially when we analyse scientific research in a country which, like Argentina, is far removed from the international centres of greater excellence.

Strictly speaking, the majority of scientists appear to adhere in principle to the *universalist* norm proposed by Merton (1973) some decades ago. Thus, the practice of science as well as its validity appear to be similar, beyond the question of in which country or under which set of national conditions its development takes place. Nonetheless, at least in relation to the developing countries with a certain tradition of scientific research, one can appreciate a significant segmentation between those groups which (for various reasons) are more integrated into the international context, and those that appear to be more isolated in this sense, or more oriented towards the local scientific community. This segmentation is highly correlated to the degree of positive appraisal (prestige, visibility, credit) each group possesses on the local scene. Thus, while one segment of the most *integrated* groups appears to be convinced that they are developing projects similar to those of their peers in *developed* countries, other groups tend to be more aware of their peripheral condition. Differentiated publication in certain journals offers evidence of this type of segmentation.

Although an initial evaluation of the prevailing conditions corresponds to the above perception, an indepth examination of the practices and beliefs reveals that certain nuances are emerging that seriously put in question the type of integration that these groups are effectively achieving in the context of 'international science'. As explained elsewhere (see Kreimer 1997) in a study of a line of research (the study of the human fibronectine gene in collaboration with Cambridge University) of one of the groups that demonstrated *a priori* all the characteristics of the so-called 'international science', that is, excellence and relevance, it became apparent to us that despite appearances, the type of integration this group enjoyed with other centres had objective limitations, as much in the socio-political aspects as in the cognitive aspects. In this sense, Gaillard (1991: 137) rightly observed that scientists in developing countries 'find themselves at the heart of a dilemma between their decision to participate in solving local problems and their attraction to models and reference systems more or less imposed by the international scientific community'.<sup>48</sup>

To this it may be added that, in reality, the possibility of attacking and solving *local problems* is not that simple either, inasmuch as financing in the majority of developing countries tends to be guided by the patterns of *quality in international science* (and the evaluation of requests is overseen by the most *integrated* groups).



In addition, following the models of greater attraction on the international scene either has limitations (due to multiple restrictions), or the collaborations must be carried out from a subordinated position: Thus, the integration itself into international science acquires, quite often, characteristics that are more imaginary than real.<sup>49</sup> Scientific migrations, in this sense, and the return to the country of origin, have operated to fortify two possible directions for the returning scientist: the first, observed in the empirical study, may be denominated as that of *peripheral international integration*. The second, the scientist's taking advantage of credit and prestige by being associated with a centre of excellence abroad in order to enhance his own decision-making power in the local context, may be denominated as that of *national integration with international isolation*. Both modalities explain, at least in part, the dynamics of science in Argentina in recent decades.

#### NOTES

1. Already in the 1960s this process was observed in the majority of the countries of the region, and this concern gave rise to studies focusing on *brain drain*. For an analysis of this topic, see Oteiza (1971), as one of the most representative works.
2. This dimension is developed by Kreimer (1997). See also Kreimer (1996).
3. However, readers interested in a deeper analysis may refer to the specialised literature. See, for example, Albornoz (1990), Albornoz et al. (1996), Kreimer (1993), Oteiza (1992).
4. Here, the term 'early' must be understood to convey a double meaning: in relation to other Latin American countries, as well as in relation to the socio-economic modernisation of the country. For an analysis of the relationship between modernisation and scientific development, see Albornoz (1990).
5. This policy had certain disadvantages, but at the same time it signified a crucial influence on the development of certain disciplines, particularly insofar as many foreign scientists resided over long periods of time, or permanently, in the country. In addition, this process figured in the establishment of a 'sociability [intellectual] space', see Myers (1994). Also Babini (1986). Immigration policy may be summarised by the famous phrase of Juan Bautista Alberdi: 'gobrnar es poblar' (to govern is to populate). See also Vessuri (1997).
6. Naturally, we can do no more than mention this problem here. For a thorough analysis of the transition, see the excellent article by Buch (1994). For a view of the entire process of institutionalisation, see Vessuri (1997).
7. This characteristic, according to Cueto (1989), is that 'not all the science of the less developed countries is marginal and common knowledge, and that the

scientific work of these countries has its own rules, which must be understood not as symptoms of backwardness or modernity, but rather as part of the culture and its interaction with international science'. See also Cueto (1996); Diaz, Texera and Vessuri (1983).

8. It must be emphasised that scientific activity had, from the very beginning, a constant driving force behind it on the part of the state, as by the end of the nineteenth century the majority of intellectuals and politicians were convinced of the intrinsic value of science as a motor for the welfare of the nation. In other words, science formed part of the discourse and the modernising practices: the epistemological optimism that characterised positivism is a key to understanding the peculiar development of Argentinian science in the nineteenth century, but it also endured into the twentieth century, even up to the present, shaping the institutions and orientations of scientific policy. See Albornoz (1990).
9. In effect, Perón succeeded in turning the majority of the urban middle classes into his natural adversaries during his regime, in part as a consequence of the particular alliance he formed with the worker classes and, in part, because these middle classes professed a particular distrust of everything that they identified as exhibiting *fascist* tendencies.
10. Certainly, this figure declined immediately after the fall of Perón, and rose again in the 1960s. Regarding the effect of the Peronist government on science, Houssay's speech eloquently illustrates this:

In 1945, the second tyranny discharged or obliged resignations from half of the university scholars, such that the majority of professors were removed from their ambits, the most valuable institutions, established over long years of great effort, disintegrated or languished, the teaching profession was weakened and various generations were poorly educated and without hopes.

See Paladini and Barrios Medina (1990: 401).

11. Vessuri (1995a) has called this period 'the years of developmentalism', which is a general term, that includes not only political meaning (*desarrollismo*), but also ideas on 'economic and social development' raised especially by ECLA (CEPAL).
12. Strictly speaking, before the creation of the CONICET there existed some institutional mechanisms to insure international mobility, particularly in the case of biomedical sciences: fellowships were granted by the *Consejo Deliberante* of Buenos Aires City, the foreign foundations or cooperation agencies, such as the Rockefeller and Guggenheim Foundations.
13. Figures from Sigal (1991).
14. The re-founding, in 1956, of the National Commission for Atomic Energy not only led to the development of important research capabilities in the field, but also the construction of the first nuclear power centres, with significant dependence on locally developed civil technology. To complete the picture, it is noteworthy that, toward the end of the 1950s, two new institutions were created for research, particularly with relation to the productive sector, which

- were vital during this period: the National Institute for Industrial Technology (INTI) and the National Institute for Agrarian Technology (INTA).
15. The 'night of the long sticks' (29 July 1966) refers to the violent incursion of the police into the University of Buenos Aires, turning out students and professors from the classrooms, especially in the School of Exact Sciences, where even the Dean was beaten with long sticks by the security forces.
  16. Sigal, *op. cit.*
  17. For example, the mathematician Manuel Sadosky organised the first computer science group at the University of the Republic of Uruguay once the Calculus Institute of Buenos Aires had been dismantled; see Vessuri (1995a). There are many instances of social science researchers who emigrated to Mexico City and found themselves working together during those years in the Latin American School of Social Sciences (FLACSO), which has one of its branches in that city.
  18. According to Cerejido (1990), in 1966, after the coup, a brigadier and an admiral summoned him and ordered him to ignore the expulsion order he had received from the President of the University, as 'the security of Argentina does not depend solely upon whether an invader crosses her borders with a gun in hand, but also upon the independent control of her knowledge, *and that her scientists do not permanently cross her borders toward the exterior*' (1990: 156; italics added).
  19. Perhaps the paradigm case is that of the molecular biologist César Milstein, who received the Nobel Prize for his work on monoclonal antibodies at Cambridge University.
  20. See UNCTAD (1987). No distinction had been made here between scientific, technical, or professional personnel. Nonetheless, given the magnitude of the figure it is possible to assume that, although only a part of the 'highly qualified personnel' may include researchers, this would still be very significant, inasmuch as emigration to the United States (146,756) and Canada (26,965) has been considered. An even greater number accounts for emigration to Europe.
  21. The estimated figure on professionals is derived from SECYT (1994). In this case, it is possible that the figure is an underestimation, given that the information obtained from the consulates takes into account only a part of the total migrations. Corresponding figures on researchers of the CONICET are obtained from CONICET (1989). Oteiza (1996) has given other figures: between 30,000 and 50,000 Argentinian university level scientists and technicians living abroad. Although he does not mention his source, it can be surmised from the differences in magnitude with respect to the SECYT that the base definition he used must be distinct.
  22. As indicated by Gaillard (1994), there is a strong correlation between the acceptance of an offer of a permanent position and the number of years spent abroad. See also Halary (1994).
  23. See Subodh et al. (1995).
  24. It is not possible here to elaborate on the important conceptual differences that these definitions imply. The concept of scientific capital (or symbolic) was developed by Bourdieu (1976); and along similar lines of analogy with a quasi-economic function, Latour and Woolgar (1982) proposed the notion of *credit/credibility*. Both notions have been criticised by Knorr-Cetina (1981, 1982). For an analysis of these concepts, see Kreimer (1994).

25. As a representative of this focus, see the study undertaken by Charles Kidd from the offices of the OAS. For a discussion of this focus, see Adams (1968); Oteiza (1971). See also Subodh et al. (1995).
26. This topic has been developed by Oszlak and Caputo (1973), Oteiza (1971), among others. For a recent discussion see Jamison (1994), Kreimer (1993), Saldaña (1992), Vessuri (1994).
27. The fact that the institutional hierarchies do not permit an investigator who has carried out part of his work abroad, access to higher posts in research institutes (university or otherwise) relative to those which he had occupied before his departure could have a negative bearing on the analysis of a possible return. In some cases, these structures tend to be quite rigid, and scientists who emigrate face tremendous difficulties in *establishing their own group* upon their return.
28. In the case of countries whose scientists migrate as a mass phenomenon, one study carried out several years ago recommends careful observation of the *training* process of any given country, as well as analysis of whether the number of trained professionals is not *in excess* of the number of alternatives available in the job market. According to this study, this factor is more important than the degree of development of the country, see Glaser (1978). In any case, it is necessary to relativise this proposition, inasmuch as the excess of professionals cannot be considered as an invariant, given that the dynamics of social institutions (public and private) could be driven (as has been verified in various cases) precisely by the abundance of professionals and, thus, undergo development upon this base.
29. Objections may be raised to types 'II A' and 'II B' on the grounds that they can only be distinguished *ex-post*. Our response is that, first, in all cases, given the characteristics of the empirical study, the proposition of the 'ideal types' must necessarily be an *ex-post* relative to the investigation of the laboratory in question, although it must be remembered that these types were constructed basically taking into account the *motivations* dominant in the decision to emigrate. As in all interpretative analyses, the proposal cannot extend beyond its own limitations. And, second, it may be mentioned that, given that these are ideal types, inspired by Weber, they permit transformations and shifts from one to another, just as Weber himself (in *Economy and Society*) permitted; for example, the 'Routinization of Charismatic Domination'.
30. Other possible motives for returning have not been taken into account here, such as the possibility of having met with failure in the host country (including not having secured resources for prolonging stay in the host country), or having had to leave the country for reasons beyond one's control (political or racial).
31. See, for example, the articles included in Crawford, Shinn and Sörlin (1992).
32. Glaser (1978) uses as his base a study carried out by UNITAR on emigration and return to the country of origin.
33. Among the national programmes were the Program of Training, Finishing and Reintegration of Research Personnel of Spain, the PROCITEXT of Argentina, or the PEDECIBA of Uruguay and, with respect to outstanding international organisations, the Program TOKTEN of the United Nations Program for Development (UNDP), the different programmes of the International Office of Migration (OIM), or the Program for the Return of Talent (ROT) of the Inter-Gubernatorial Committee for Migrations (CIM). These programmes offer

- different types of aid, ranging from payment for return travel to scholarships for reintegration into the country of origin for a specified period of time.
34. For the general characteristics of this research project, see Kreimer (1997). Detailed information of the institution, such as the names of the investigators, are kept confidential as part of the agreement with the Director of the institute. The Nobel Prize winner referred to here is Dr Luis F. Leloir.
  35. Houssay himself encouraged young scientists to emigrate, *but only for short periods of time*. See Paladini and Barrios Medina (1990).
  36. In this regard, see Buch (1994); Cueto (1989, 1996); Vessuri (1995a, 1997).
  37. However, it is true that there already existed some mechanisms for financing study trips through some institutions in the international sphere, such as the Rockefeller Foundation, in addition to financing offered by the institutions themselves in the receptor countries. For a recent panorama of the research environment during those years, see Cerejido (1990).
  38. The functioning of the CONICET, as well as the University, is based on the election of representatives. In the University, the governing body ('Consejo Superior') is composed of professors, students and graduates who elect the rector. In the CONICET, the researchers elect a part of the directorship and also nominate the candidate for president, to be approved by the authorities. These institutions, during the period from 1976 to 1983, were controlled by the political (military) powers.
  39. For a parallel analysis of the 'Chagas disease' community in Brazil, see Coutinho (1996).
  40. It is important to note that the rules for the granting of scholarships for study abroad by this organisation require not only the commitment to return to the country, but also indication of which institution the solicitor will return to and work for thereafter (for a period of time no shorter than that which the solicitor spent abroad), to be certified by the said institution.
  41. See Paladini and Barrios Medina (1990).
  42. O. Varsavsky was among those who expressed this opposition more clearly. He considered that a number of scientists were working under the norms and values of the international scientific community, without taking into account the social and political conditions under which the research took place and were disregarding the possible social use of the produced knowledge. This was known as '*cientificismo*', which Varsavsky attacked while proposing a 'committed' science in its stead. See Varsavsky (1969: 14–37).
  43. Significantly, during the mid-1980s, L was elected as Deacon of the prestigious School of Exact Sciences of the University of Buenos Aires, the same institution which, two decades earlier, had been a victim of the *night of the long sticks*.
  44. For a development of this argument, see Kreimer (1997).
  45. In fact, most of the research projects satisfy the dual condition of fulfilling requirements for obtaining a positive evaluation by the research institutions, as well as fulfilling numerous contractual obligations with private companies who wish to obtain the investigative results. For a recent discussion among scientists on this topic, see the *Dossier* in REDES, (3), 1995. Vessuri (1995b) has presented several instances of relationships between academic actors and the private sector in Venezuela and Brazil.

46. On the contrary, in many cases scientists living abroad serve as links between their colleagues in the country of origin and institutions of excellence in the more developed countries. Some authors have proposed that this 'Diaspora' model can have important effects. See, for instance, Meyer and Charum (1995) and Gaillard and Meyer (1996).
47. Certainly, type III is not new to the country: during the 1958–66 period, a large number of the most qualified scientists followed this. However, an evaluation of this situation is difficult because of the military coup of 1966, which resulted in the extension of many researchers' stay abroad and, thus, distorted the prevailing tendency.
48. It is necessary to note that, in part due to the heterogeneity, it is difficult to establish general considerations, given that the situations in the countries with the greatest research traditions, principally Brazil and Argentina, followed by Venezuela and Chile, present challenges qualitatively and quantitatively different from those in other countries. See also Salomon et al. (1994).
49. A recent study by an anthropologist shows how one of the most prestigious research groups in Argentina (heirs to the tradition of the Noble Prize winner, Leloir) had to suffer the consequences of what the astonished researchers themselves discovered to be discrimination. In the case studied, the contribution of the local group was ignored and only recently an article was accepted for publication in an international journal when the data were validated by an article written by a group from an American university which had been received later, but published first. For a complete description of this interesting process, see Hernández (1994).

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