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EQUALITY IN THE NETWORKS? SOME ARE MORE EQUAL THAN OTHERS

International Scientific Cooperation: An Approach from Latin America

1 INTRODUCTION

The importance of knowledge in contemporary society is today a given, even if its level of priority remains open to argument (Bindé, 2005; Carton and Meyer, 2006). Research, done for the most part in universities, is the major activity in the production of this knowledge. We expect from it, more and more urgently, that it contributes to sustainable development for humanity and the planet (Panorama du Développement Durable, 2005). Yet the risks keep growing as the situation deteriorates, on the global scale and particularly in developing countries (Panorama du Développement Durable, 2004). One fundamental reason for this is the dislocation of research capacities, which are principally concentrated in the North and therefore buffered from the most keenly felt development needs in the South. International scientific cooperation could contribute to the resolution of this disequilibrium, but in practice it is not succeeding.

This article addresses the problem from the following starting point: scientific research and its role in development play an increasingly important role. However there is nowadays only rare, and recent, productivity on the part of scientists and intellectuals from peripheral countries concerning development issues. An explanatory hypothesis in this regard will be proposed here. The inadequacy of local, peripheral research (Kreimer and Zabala, 2007) vis-à-vis social, economic and environmental problems is not unrelated to the world of science: for example, certain classic analyses point to the incapacity of industrial actors to appropriate locally produced knowledge. To the contrary, this inadequacy is tied to scientific practice, itself determined by the norms of international cooperation; these in turn are derived from research that emanates from the core. In this sense scientific pertinence may coexist with social irrelevance, a contradiction summarised in the term “abstraction”.

One particular and clearly demonstrative case will illustrate this logic: that of Chagas’ disease, a tropical pathology prevalent in Latin America.

2 ANALYTICAL FRAMEWORK

2.1 *The current policy framework*

The globalising tendencies of the recent past, such as the massification of electronic communication, have reinforced the intensity of collaboration between researchers and have sometimes created the illusion of autonomy in the settings they have penetrated. The universalisation of science is certainly as old as science itself. Produced locally in very diverse contexts, science universalises itself through complex organisational systems based on discipline, institution, cognitive and social relations, and equally significant, economic interests. If at first glance the international collaborative space seems restricted to exchanges between the most developed countries, in the first half of the Twentieth Century the diffusion of disciplinary fields led to the emergence of scholarly communities in an important number of peripheral countries (Vessuri, 1984 and 1995; Stepan, 1976; Kreimer, 2007; and Saldaña, 1992; for Latin America; Raj, 2007; for India; Gaillard, Krishna and Waast, 1997; Meyer, 1997; and Waast, 2002 for Africa).

The intensity of these international collaborations has increased over the past century. If at the outset it was the scholars (particularly Europeans) who went to the countries of the South to disseminate experimental research as an element of modernity and help to create novel research spaces, in the second half of the Twentieth Century the flow was reversed: it is the researchers of the South who migrated to the research centres of the North, searching for resources, adequate working conditions, visibility, or even as a matter human rights, simply to save their lives.

In parallel, international scientific cooperation has only increased, thanks to numerous cooperation programmes as well as the interest of developed countries in enlarging their access to competent researchers. There is an apparent element of democratisation in the universalisation of relations concerning the production of knowledge.

2.2 *The case in point: Chagas' disease*

These tendencies in international scientific cooperation are visibly at work in the case of Chagas' disease. Indeed, we note a patent separation between research and development: despite a fundamentally scientific activity carried out locally and crowned with success, no new vaccine or drug has been produced since the 1970s. Consequently, we may wonder: Why has this considerable accumulation of prestigious knowledge, produced in an "academic" context, not been transferred to the industrial sector and/or incorporated into a new family of drugs?

Paradoxically, this result comes from the fact that the researchers – biologists, doctors, etc. – working on Chagas' disease have succeeded in inserting themselves into international networks. They enjoy resources, international recognition and visibility, but in exchange they must work on the priorities identified by the leaders of each network. Consequently the construction of the local use of knowledge becomes abstract to the extent that no actor, no intermediary consumer can make use of this knowledge, which is oriented to the needs of the large networks. The

latter are largely determined by the industrialised countries, supra-national institutions, and developed country private enterprises which will make use of the knowledge in question.

2.3 *Historical and conceptual perspective*

The analysis of the social use of locally produced knowledge has two parameters: first of all, the relation between “social problems” and the capacity of knowledge production; then, the role of local research in the face of the internationalisation and dynamism of global science. This configures the opposition mounted by local actors as they address the tension between the international legitimisation of knowledge on the one hand and the needs of local societies on the other.

The relation between scientific knowledge and the definition of social problems is not “natural”: it is constructed by several actors, in particular the state which, through its science and technology policies, defines a series of problems, establishes the domains in which scientific knowledge can help to resolve them, and puts in place the resources – institutional, financial, etc. – to develop them. Frequently it are scientists themselves who produce the discourses that insert certain questions into the public space, as was the case for example with the relation of alcohol use to automobile accidents (Gusfield, 1981).

For its part, “peripheral” science is inserted into a double context: the local political and institutional space and international networks. Concerning the research space of Latin America, it is useful to draw up a *historique* of peripheral science, given the difficulty of conceptualising research as a “closed” space. Thus we can identify three broad stages in the internationalisation of research in Latin America (Kreimer, 2006).

- Institutionalisation: in the late Nineteenth and early Twentieth centuries, foreign scientists (mostly Europeans) arrive in Latin America to disseminate the principles and disciplinary bases of science.
- Liberal universalisation: the second half of the Twentieth Century is the time of “big science”, in physics as well as biology. The first generation of local researchers is already well-established. The elites are integrated with their colleagues in the mainstream laboratories of industrialised countries; but in order to be accepted into international collaborative structures, local researchers must negotiate the themes and methods of their work with the leaders of each domain.
- New international division of scientific labour: “big science” gives way to the mega-networks. In these networks, funded by national or international agencies (particularly from the United States), the leadership is principally European or North American. Where Latin American scientists are invited to integrate these networks (and they often are), the possibilities to negotiate their subjects are limited and the capacity of the actors to do so is inexistent.

3. LOCAL PROBLEM AND INTERNATIONAL CONTEXT

3.1 The emergence and implications of new funding mechanisms

The scientific communities of Latin American countries (as everywhere else) are not homogenous spaces of knowledge production. To the contrary, they are highly segmented organisations characterised by permanent tension. We can observe on the one hand the integrated researchers, who participate in projects, international research programmes and colloquia, and manage data that enables them to guide their research in this or that direction and often to receive international subsidy. On the other hand we see groups and researchers who are poorly integrated, whose international exposure is weak or null, and who therefore work in an isolated manner, sometimes oriented to local needs; they often attempt to imitate the research agendas of more integrated groups (Kreimer, 2006).

Beyond this schematic description, it appears that the best-integrated groups in international networks are also the most prestigious among the local institutions. They have the power to determine their orientation, in their institutional policies as well as in their informal interventions, agendas, priorities and methods. For these researchers there is a virtuous circle: their “grass roots” local prestige enables them to establish ties with their colleagues in international research centres, and their participation in these networks decisively enhances their local prestige and power.

The concept of subordinate integration has been defined as an important trait of science produced on the periphery. Proceeding directly from their relationship with mainstream groups, the most integrated elements tend to regularise their activities: controls, proofs, tests of aptitude, are of which are well-established among the groups who play a coordinating role in international relationships (Kreimer, 1998). This is what the sociologist Gérard Lemaine (1980) has designated as “hyper-normal” science.

This has important implications for “peripheral science”: the definition of research agendas is very often elaborated at the heart of central groups, and adopted by peripheral teams as a pre-requisite for complementary integration. Yet these agendas correspond, generally speaking, to the social, cognitive and economic interests of dominant groups and institutions in the most developed countries. This dynamic unveils a tension: the visibility and scientific quality of local research, legitimated by international groups, can stand in contradiction with the potential end point of research, which is not taken into account in this type of approach.

Once again, the globalising tendencies of the last few decades, such as the generalisation and development of electronic communications, have no doubt reinforced the intensity of collaboration between researchers, and have sometimes created the illusion of autonomy in the settings they have penetrated. Indeed, the groups suffering from unfavourable local conditions can in theory, and sometimes in practice, surmount them and gain access to new, significant resources for their activities. This seems to feature an element of “democratisation”, in the universalised relations around the production of knowledge; however this abstracting logic for local conditions, at work in the processes of internationalisation, can lead to increased subordination. This is evident in the emerging forms of international

scientific cooperation. The most important effect comes from the latest iterations of research and funding policy, themselves a product of the competition between the United States and the European Union. Faced with the enormous mass of resources that the Americans have allocated to research and development activities by way of public and private agencies, the EU has put in place a collection of financing initiatives unlike any it had featured up to the 1980s. The recent programme frameworks privilege mega-programmes that bring together multiple actors, scientific as well as industrial, into “networks of excellence” among other formats (see Table 1). Thus traditional models for the promotion of science and technology are increasingly being replaced with new policies and new instruments: the “project” as a funding unit is being partially replaced with “programmes” and “networks”.

Table 1. Financing of EU networks of excellence

<i>Support of the integration of R&D</i>	
50 researchers	1 M Euro / year
100 researchers	2 M Euro / year
150 researchers	3 M Euro / year
250 researchers	4 M Euro / year
500 researchers	5 M Euro / year

Source: SCADPlus VIème Programme Cadre (2002-2006).htm

Two observations are in order:

- On the one hand, the size of these consortia (mega-networks) facilitates recourse to third parties, and to members from non-European countries, whose participation – limited, but significant – is encouraged. The very large themes relevant to previous instruments have given way to clearly identified and delimited subjects.
- On the other hand, the increased involvement of industrial stakeholders, especially European, in these large programmes, tends to align the knowledge industrialisation process with their preoccupations (Mignot and Poncet, 2004).

3.2 The implications of this approach

In these circumstances, what are the consequences of the participation of Latin American researchers in these mega-networks? The position that developing country researchers occupy in these networks is twofold: it allows teams from the South to integrate international networks, to have access to resources and to publish in prestigious journals; it also subordinates their activities and their role to themes, methods and cognitive preoccupations already established by network leaders. Such teams thus find themselves turning to problems, priorities and objectives that may lie far from the preoccupations of their national setting.

The traditional trappings of subordinated integration can be modified in several, sometimes contradictory ways:

- A restriction of the negotiating margin of peripheral groups, who are part of large networks that are highly structured by their funding institutions and public

and private stakeholders. By the same token, the size of these networks and their aggregate power sometimes provides actors with increased room for manoeuvring and initiative.

- A new “international division of labour” allocates to peripheral teams activities that are technically specialised, but flow from pre-established scientific or productive problems. A delocalisation of scientific work has thus taken place, pushing to the periphery a part of specialised scientific activity that requires great technical capacity but, in the final analysis, is a routine activity. At the heart of these mega-networks thus lies the *de facto* negotiation of sub-contracting. These activities nevertheless can be highly strategic, and can confer on the teams carrying them out a primordial, even central role and status.
- The peripheral research teams that are part of mega-networks increase their resources, their points of integration and the training opportunities for their associated scientists. Their stays in foreign centres of excellence usually consist of training sessions in new techniques and methods, which they will apply upon return to their country. This type of sub-contracting is not open to anyone; a degree of accomplishment recognised by peers in the international community is required. The international link is paradoxically as much a factor of larger scaling as of increased subordination.

In this new configuration, a fundamental question surfaces: that of the local pertinence (or relevance) of research, namely their utility for the society in which it is produced, to the extent that this new type of internationalisation leaves a slim margin for the consideration of social problems as problems of knowledge.

3.3 Policies and programmes

The agencies in charge of science and technology policies in Latin America have imposed, for over two decades and against the advice of most scientists, criteria of “social and economic relevance” in the evaluation process*. The analysis of “relevance” is abstract and follows a scenario: a set of research subjects or priorities is established, following applicable methods and strategies, which speak to social and economic problems defined as “central”. A call for proposals is then made, and researchers’ present projects linked to these problems, usually formulated in very general terms, which tie the knowledge they produce to the elaboration of solutions. The projects are thereby approved and financed, without any *ex post facto* evaluation of the actual social utility of said knowledge.

This situation is also affected by the following:

- The virtual inexistence of regional networks of integration/collaboration between local institutions and groups. Often the relations between regional groups receive coverage through participation in networks coordinated from the US or EU.
- The absence of policies to regulate the participation of local teams in large international networks.
- A traditional of minimal involvement in the financing (and prioritizing of knowledge production) of private enterprise in Latin American countries.

- Current research and development activity tends to be organised in technical-economic networks that bring together heterogeneous actors from laboratories, universities, but also from the market and civil society, including public organisations and agencies (Callon, 1991). These networks follow the logic of agglomeration, and weave increasingly dense patterns of high-impact knowledge (Moati and Mouhoud, 2005). This underpins an international cognitive division of labour in which the high concentrations of the North dominate the hierarchy of creative activities (Mouhoud, 2005).

International scientific cooperation, as organised today, tends to reinforce the agglomeration phenomenon. The European Sixth Framework Programme, articulated through large, integrated projects or through consortia of “networks of excellence”, continues to structure research work around major geographic and social poles of attraction. Lesser actors are not necessarily excluded, but are rather integrated as satellites to these composite groups. Mobility grants for research and development personnel (Marie Curie for example) translate this polarisation and “satellite approach” into human resource terms.

The mobility of highly qualified persons reflects this dynamic on a worldwide level: the United States, Western Europe and the Far East shift the planetary flow of human capital according to their priorities (Kapur and Mac Hale, 2005).

4. ILLUSTRATION: A “LATIN AMERICAN” SOCIAL PROBLEM

4.1 *The illness and the ill*

To illustrate the approach to social problems and knowledge production in Latin America, in a world characterised by a “new international division of scientific labour”, let us consider both the emergence of Chagas’ disease as a social problem and the research dynamic that evolved to address it.

Chagas’ disease (American trypanosomiasis) is considered the first pathology endemic to Latin America (WHO, 1991). It affects 15 to 20 million people from Mexico to Patagonia and, for 10 to 20 per cent of these, may evolve to a chronic, fatal stage several years after infection[†]. It is transmitted by a parasite, *Trypanosoma cruzi*, carried by a vector, the *triatominae*, an insect family known as *vinchuca* or *barbeiro* or even “assassin bug”. Chagas’ disease is essentially one of poverty. The insects nest in the cracks in the wall, thatch roofs or wood flooring of homes in poor rural areas. Affected rural immigrants may find themselves refused employment. The illness can equally be transmitted through blood transfusions.

At this time only one drug is available, Benznidazol; it is produced by an international laboratory (Roche), was developed over 40 years ago and is used only for the acute phase of infection with important secondary effects. No drug exists for the chronic phase, and the use of Benznidazol for this phase is the source of great controversy among Argentinean doctors (Romero and Bilder, 2005). Chagas’ disease is thus considered one of the “most neglected illnesses”, affecting the poorest populations of developing countries and enjoying no R&D attention from pharmaceutical companies.

In fact, in 1999 the NGO *Médecins Sans Frontières* ran a worldwide information campaign concerning the access of countries in the South to essential drugs. A working group on Drugs for Neglected Diseases (DND) thus identified a large number of constraints such as difficult access to existing drugs because of their cost, or the abandonment of their production. These barriers made a great stir in civil society, particularly regarding the question of intellectual property rights. But the work also brought to light the absence of effective drugs for certain illnesses seen as “most neglected”, which affect only the poorest populations: trypanosomiasis or African sleeping sickness, Chagas’ disease and leishmaniasis. Of the 1,393 new molecules authorized onto the market between 1975 and 1999 only 15, or one per cent, concern tropical illnesses and tuberculosis. Of these, two are improved versions of older products; two are the result of military research; and five of veterinary research (Pécoul *et al.*, 1999; Trouillet *et al.*, 2002). In 1999, North America, Europe and Japan combined for over 82 per cent of the total value of the drug market although they constitute less than 20 per cent of the world’s population (Trouillet *et al.*, 2002).

Several explanations may account for this disinterest (Pécoul *et al.*, 1999; Trouillet *et al.*, 2001, 2002). First and most obviously the costs and risks of R&D, relative to the weak purchasing power of developing countries and thus a weak return on investment, act as a disincentive (particularly with rising R&D costs). Firms concentrate their resources on the therapeutic areas with the most promising potential for profit. The costs of clinical development are increasingly large, particularly in light of safety constraints in developing countries. The question of intellectual property rights is also problematic for pharmaceutical companies. Indeed in some developing countries pharmaceutical products are not protected; copies and fakes are sold very cheaply. Pharmaceutical firms estimate that the protection of innovation through patents, thanks to the investment return it generates, stimulates R&D investment and may even be indispensable to it.

4.2 *Scientific research, social ill*

In Argentina as in Brazil, since the 1950s S&T policies have conceived knowledge production as a legitimate means of fighting Chagas’ disease. Thus a growing share of biomedical and biochemical research aimed to better comprehend the infection process, the physiology of the vector and the parasite, and the “epidemiological mapping” of the illness.

Since the 1970s, the advent of molecular biology brought with it the promise of a vaccine for Chagas’ disease. To this end biologists studied all aspects of the parasite and its relation to humans, notably the genetic aspects: groups issued from prestigious biomedical research circles, the most productive in Argentina, gravitated around this theme. In addition, research on Chagas’ disease is considered to be a “success story” of scientific development on the periphery, in Argentina as well as in Brazil (Coutinho, 1999); to the point that this research received “great recognition of its pertinence and legitimacy” on the part of the international scientific community. The production of knowledge is very important: according to a

recent study, there have been over 1,200 scientific articles in the Science Citation Index (SCI) between 1995 and 2005 on various aspects of the disease (parasite, patients, vector etc.) (Kreimer and Zabala, 2006).

A first stage in the research was the creation in 1975, on the international stage, of the WHO Special Programme for Research and Training in Tropical Diseases, which brought crucial support to the consolidation of research on Chagas' disease. In 1994 this was enhanced by the launch of the *Trypanosoma cruzi* Genome Initiative, a network of 20 laboratories working towards a complete sequencing of the parasite's genome[▼]. The Initiative led to the identification of the most important molecules with which to attack the parasite once it is in humans.

In a second stage, in the 1990s, the development of a vaccine was put aside because of the difficulties involved, and research was concentrated on the production of a new drug. In this stage, Latin American biologists were deeply inserted into large American (NIH) or European (Fourth, Fifth and Sixth Framework Programmes) networks; they had something to offer to their colleagues in the most prestigious laboratories of the "core": a unique biological model, which allows for the study of multiple problems, both theoretically and practically, for international research purposes. However the relation to local needs remained, in the best of cases, "abstract". Indeed, despite this acclaimed fundamental research, no new vaccine or drug has been produced since the 1970s. Consequently, one may ask: Why has this considerable aggregate of prestigious knowledge, produced in an "academic" context, not been transferred to industry or incorporated into a new family of pharmaceutical products? The data from our empirical study show that the production of scholarly articles on Chagas' disease has been very significant (see Table 2).

Table 2. Publications of Argentinean scientists in the period 1995-2005*

Publications, 1995-2005	
Database	Number of papers
Science Citation Index	830
Medline	650
Biological Abstracts	170
Total	1650

* Data gathered in several databases using the following keywords: Chagas; *T. cruzi*; *triatoma infestans*; American trypanosomiasis; *vinchuca*.

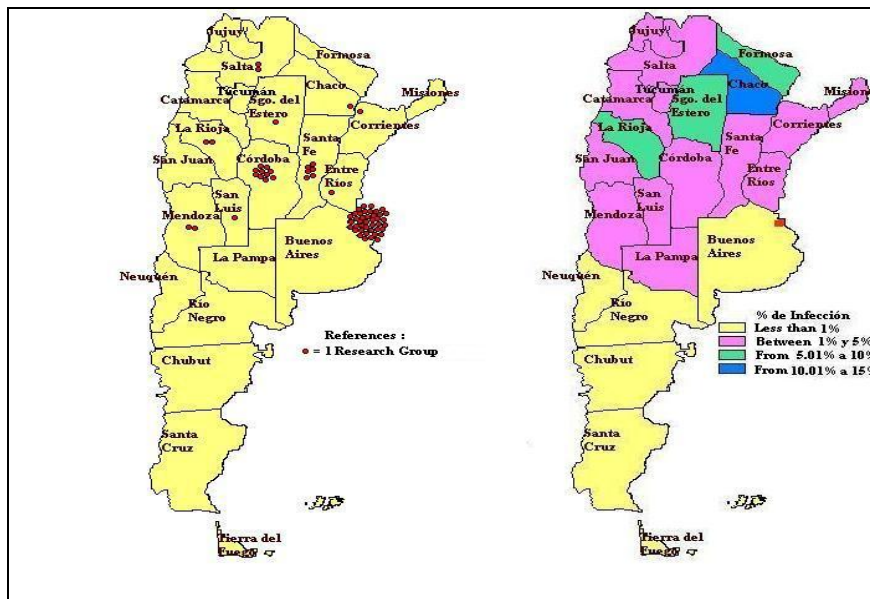
The subject matter of these publications also shows that a large majority of the research has been focused on studying the parasite, in conformity with the hypothesis that this was a key criterion of insertion into international networks (see Table 3).

Table 3. Distribution of publications by Argentinean scientists indexed in the SCI, 1995-2005, by thematic orientation

Distribution of publications, 1995-2005, by thematic orientation		
Subject of study	Number of articles	Percentage
Parasite	415	50
Patients	191	23
Vector	183	22
Epidemiology	33	4
Other	8	1
Total	830	100

It appears that those afflicted by the disease feature in less than one quarter of the publications. This situation is all the more clear in light of the location and orientation of the research groups: they are not to be found in the coverage areas of the disease (see Figure 1).

Figure 1. Distribution of scientific research groups working on Chagas' disease



The result is that the researchers – biologists, doctors, etc. – working on Chagas' disease have succeeded in inserting themselves into international networks, through which they enjoy resources, prestige and international visibility. In exchange they are made to privilege the themes chosen by the network leaders. The

construction of the local utility of knowledge becomes abstract, in that no actor, no end user can intervene to make use of knowledge that is oriented to the needs of large networks. The latter are greatly determined by the governments of industrialised countries, supra-national institutions (EU) and private businesses in developed countries, which will make their own use of the knowledge in question.

5. CONCLUSIONS

5.1 *The lessons learned*

The case of Chagas' disease clearly illustrates the tensions between research in peripheral countries, international scientific cooperation and the needs related to local development. This case also shows the necessity of dispensing with univocal approaches. On the one hand, the optimistic perception of intrinsically positive international cooperation does not survive the description of its alienating effects, here on the work of biologists addressing a local pathology. On the other, an exclusively critical interpretation of these effects glosses over the crucial role of the actors and their choices, in the definition and execution of research work as in its valorisation and development.

The research agendas, and the agendas of those who draw them up, are a key consideration in this example. The pre-eminence of "core" groups visibly determines the orientation of disciplinary or thematic programmes. However it is difficult to appreciate how these orientations translate into detailed work assignments, or the complex problematisations from which they proceed. In creating as in taking action, the degree of latitude of the peripheral researcher remains another source of incertitude.

This matter goes back to the question of power at the heart of networks. If those managing the networks also establish the relationships with the actors (businesses) who will industrialise the knowledge, we may fear an absolute polarisation of the demands at the head of the networks, and therefore from the core. But such an approach neglects the non-linear character of innovation processes and the permanent co-construction of the subjects of and demands for research. Beyond the great network structures, the redistribution of action and initiative on the ground is sufficiently complex to offer countless opportunities for re-composition, at the periphery as well as the core.

5.2 *Towards a realistic cooperation policy*

Conscious of the ambivalent effects of international scientific cooperation but equally convinced of its potential, the writers can offer several suggestions for re-orientation. The following recommendations aim to re-balance the current relationships within mega-networks, counter the concentration of capacity and reintroduce the demands of the periphery.

- To bring together the definition of social need, the establishment of priority areas in political and scientific knowledge production, and international cooperation policies. In order to do this we must have actors, who represent the

populations and the circumstances of developing countries, in the mega-networks. We need spokespersons for the needs of the South in these great global consortia of research teams.

- The creation or reinforcement of regional networks, which are frequently in competition and not collaboration with each other, around common needs, in order to give weight to other determinants than use or industrialisation by corporate actors in developing countries. By reaching a decentralised critical mass, these associations can develop their own ties with local productive and social systems.
- The reorientation of flows within the networks, out to the periphery. These flows can be organised in a polycentric way and not only to one major, central location. The network dynamic must be fully exploited, in that coordination does not necessarily require geographical and institutional concentration; to the contrary, it can benefit from multi-local distribution.

Realising the options above can be done with the help of a few exploratory initiatives. The writers point out two here, which are in progress and whose larger growth is realistic in the medium term.

Regional accords for scientific and technical cooperation may come to pass, and offer real possibilities to the countries involved. The case of Latin America's Southern Cone, whose member states have signed such an accord, is an example. Clearly, other regions do not necessarily enjoy an equivalent, autonomous scientific tradition, but it is always possible to regroup sufficient resources to increase one's overall weight and bargaining power (SECyT, 2006).

The scientific and technical diasporas – networks of expatriate researchers and engineers working toward the development of their home country – offer real possibilities in reversing the concentrating effects of mobility, through a re-diffusion of the knowledge produced in the centres of the North to the marginal areas of the South from which these highly qualified migrants have come (Barré *et al.*, 2003). By serving as agents of the return, often virtually through ITC, of developed competencies, and as possible advocates for the needs of their home regions, they can re-orient the flows within worldwide networks in a less unilateral and better distributed fashion. Mobility, traditionally a reproducer of subordination, could be subverted, and could re-establish symmetry by lessening the effects of geographical concentration.

However, let us not forget that these realisations are only possible if international cooperation integrates a principle of re-equilibration and not one of constantly asymmetric association and diffusion. In other words, a principle of equity must underpin any concerted re-orientation, without which any cooperative effort will tend to reproduce relations of subordination.

NOTES

- ♣ See for example the *Plan Nacional Plurianual de Ciencia y Tecnología 2000-2002* of the Argentinian government (SECyT, 2002); the *Programa Especial de Ciencia y Tecnología 2001-2006* of Mexico (CONACyT, 2002); or, in a smaller country, Bolivia, the *Plan Nacional de Ciencia, Tecnología e Innovación 2004-2009*.
- ♦ According to Argentina's National Institute of Pathology, in Argentina roughly 2.5 million people, or 7.2 per cent of the population, are infected, with a mortality rate of 1 to 5 per cent. Note however that since the end of compulsory military service (in 1995) reliable statistics no longer exist.
- ♥ Latin American laboratories played an important role: three Argentinians, nine Brazilians and one Venezuelan; the other seven were Europeans.

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PABLO KREIMER AND JEAN-BAPTISTE MEYER

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