

A lab in Argentina

Mauricio Erben, a researcher at the National University of La Plata and the National Scientific and Technical Research Council, talks to *Nature Chemistry* about his experience of research in Argentina, and how it is inherently linked to the country's political climate.

■ **Have you faced any location-specific issues while studying or establishing your research group in Argentina?**

I do not believe that a single model for scientific development exists. It is difficult to compare the challenges faced by education and research in different countries — especially between industrialized and developing countries, because the aims, players and conditions within science, technology and innovation are inevitably different.

In Argentina we are proud of our public university system, which is free and offers quality higher education. I was the first in my family to go to university, and becoming a scientist is a path that I was able to adopt thanks to the opportunities I received during my time in the public university system. I am currently doing research in the field of inorganic chemistry, working at the Centre of Inorganic Chemistry (CEQUINOR laboratory), which belongs to both the National University of La Plata and the National Scientific and Technical Research Council (CONICET).

■ **How has the situation evolved during your years as a researcher?**

Argentinian scientists have faced — and are still facing — several hurdles, mixed with periods of better prospects. I was a freshman chemistry student in 1994 when the former minister of economy famously told scientists to go “wash the dishes” in response to protests about the lack of funding. Indeed, the 1990s was a very difficult decade, and the education and science systems were particularly affected by the challenging economic situation. In 2007, just as I was finalizing my postdoctoral training, the Ministry of Science, Technology and Innovative Production was launched — a political decision that was welcomed by the scientific community. This resulted in new opportunities for fellowships, which increased human resources, as well as research grants that reinforced institutional capacity building, in turn facilitating the creation of new research groups.

One aspect that hasn't changed all that much though is that the future of the Argentinian science and technology (S&T) system is very much linked to the political



climate. The importance it will be given in the economic scheme of the recently elected president Mauricio Macri is not yet clear. Numerous academics have recently expressed their concerns over which sectors of society will benefit from — and which will be harmed by — the adoption of neo-liberal policies by the new government. In any case, the fact is that the value of the Argentinian peso plunged by about 60% against the US dollar between January and March 2016. That has had immediate repercussions on many activities. Just to mention those directly related with scientific research, it has implied a diminution in relative terms for salaries and research grants, but also means that the prices of imported goods (including most of the laboratory supplies and equipment) have shot up.

■ **Are there any constraints on your research because of where you are?**

I think that a country's S&T policy is inherently linked to its social and economic development. Research activities strongly depend on where they are carried out, and the constraints — and challenges — we deal with in a developing country are inevitably different from those of industrialized countries. It is probably obvious to state that some constraints arise because of limited financial resources. The Argentinian S&T budget has increased during the past few years, reaching roughly 0.74% of the gross domestic product in 2012. This is a welcomed development, although raising this budget further (at least to the 1% usually demanded) is probably necessary for further growth.

Having said this, advances and limitations depend not only on funding, but also on

political decisions — perhaps even more so. Research is inevitably affected by the political agenda and, in turn, public policies that prioritize certain areas of social and economic development. This is true everywhere, to some extent, but it is particularly so in countries such as Argentina where funding mainly comes from the public sector. In my opinion, efforts should be conducted to address the challenges of social inclusiveness — in particular as the Argentinian S&T systems have demonstrated that they are strong enough to contribute to this task. For example, during the past few years, S&T activities have enabled salient steps to be made in the energy, agro-industry and satellite technology sectors, though they've had less impact in other important areas, including healthcare and medicine.

■ **Are there any advantages to doing research in Argentina?**

I think that the existing overlap between universities and national research institutions is an advantage of the Argentinian S&T system. In most cases it works in a synergistic way, providing positive feedback to both the educational and the scientific research systems, thus improving the quality of both. An impressive rise in the number of science doctorates has also occurred in the past decade, mostly promoted by the increasing amount of fellowships granted for PhD and postdoctoral students. Another strength of the Argentinian S&T system is the breadth of topics it covers, including not only natural sciences, but also the social sciences and humanities. I believe that science and technology should — and can — offer solutions for important issues in our country; this will necessarily demand approaches from different disciplines in a coordinated way.

For instance, after the (re)nationalization of the country's biggest oil and gas company (Yacimientos Petrolíferos Fiscales, YPF), the technology company Y-TEC was created with the aim of providing technological support for the energy industry, including research on alternative energies and the exploitation of lithium. The main mid-term objective is to achieve ‘energy sovereignty’; a yearned-for goal that can be reached in a sustainable manner provided that

environmental and social consequences are taken into account. This example also points toward the importance of public policy with regards to the country's assets — in this case natural resources.

A second example of interdisciplinary research projects comes from the area of public health policies. Chagas disease, an infectious disease transmitted by parasites, is endemic to some areas of Argentina and any action plan to strengthen the fight against it must involve researchers from basic and applied sciences working in close relation with physicians and sanitarians. Fragmented, uncoordinated contributions have shown to be insufficient for giving a satisfactory response to this persistent scourge.

Thus, I believe that Argentinian science is well positioned to tackle complex societal issues that require an interdisciplinary approach. It is a political decision to identify these problems, define priorities and, in turn, develop research programs in sectors such as energy, healthcare, food technologies, communication, transportation, industry, the environment, and natural resources.

■ **What steps do you think could be taken to strengthen research in Argentina or developing countries more generally?**

Research activities in Argentina have enjoyed a resurgence period over the past few years, through the training of greater numbers of skilled scientists, together with the improvement of our infrastructure and equipment. This is a necessary condition to continue to improve Argentinian research, but it is not sufficient. In my opinion the next steps should consist of establishing ways to exploit this potential toward the resolution of the problems faced by our nation — that is, what science to do, or what technology to develop.

As part of this venture, I think we need the intervention of the state to define and manage these demands as public policies. The question at the moment is whether this will be part of the new government's agenda. Establishing a clear direction will require a wide consensus between the different players — not only the academics, but also the public and private sectors.

Many of these problems we face are common to the whole region of Latin America, and the solutions for many of them will probably involve the adoption of similar action plans in these different countries. I therefore think that more efforts should be made to establish scientific cooperation schemes between our countries. Regional organizations that already exist — such as the Community of Latin American and Caribbean States (CELAC) and the Union

of South American Nations (UNASUR) — have proven to be very important political initiatives, positively influencing many aspects of the institutional relationships between our nations. The potential for scientific cooperation between our countries is huge, with concrete possibilities for the adoption of synergistic schemes in several fields, and should be further explored.

■ **How can strengthening science help the development of a country in other aspects?**

I think this question is central and the response we can offer will influence the kind of science we do. It may sound naive, but science and technology are activities that occur in a social context, carried out by social actors, and are therefore subject to the same tensions that afflict other activities.

It is mundane to say that the development of a country such as Argentina requires the change from a commodities-based to a knowledge-based economy. The historically lagging role assigned to our S&T activities goes hand-in-hand with the continuing focus on the exporting primary goods. Judging by the economic plan of the new Macri government that we have seen so far — devaluation and a slashing of taxes on agriculture and mining exports — it seems that the role of Argentina as producer and exporter of primary products, and importer of manufactured ones, will be reinforced, unfortunately preventing an autonomous development in S&T.

There is a second, very important dimension to this question. The Argentinian economic breakdown of 2001 clearly showed that the sole growth in economic indicators was not enough to ensure the sustainable development of society — the quality of life must also continue to improve. In my opinion, science should be used to improve well-being, and the main current challenge is to be able to build S&T systems that work for the country's needs. Conversely, I believe the society should be included in the political decision-making process that defines research topics to be pursued. I think this is a challenge for the majority of democratic societies.

For example, in 2011, the research and production of medical products in the public sector was declared of national interest, and a law to that effect was unanimously approved by the Argentinian senate. The World Health Organization's list of essential medicines was adopted as a starting point for this endeavour. It includes treatments to orphan diseases, typically not pursued by the pharmaceutical industry because they are not considered profitable. Actually, medicines for treating the Chagas disease are also featured on this list. Thus, the social importance of this law cannot be exaggerated; it will have

high impacts in public health, research and innovation activities. Now, the application of this law — funding, coordination and administration — is expected to be continued by the new authorities.

Latin American countries Cuba, Mexico and Brazil also produce medicines in public enterprises, offering a topic where regional cooperation in strategic fields of research and innovation is possible and would be mutually beneficial.

■ **Various initiatives exist that aim to help developing countries with their research — are you involved in any of those, and in what way do they help your research?**

I have collaboration projects with research groups located in industrialized as well as in developing countries. In my early research career I received important help through collaborations with inorganic groups from the University Duisburg-Essen, Germany, which I now continue with colleagues from Bielefeld University. One of the most interesting initiatives I am involved in at the moment is the research work conducted at the Brazilian synchrotron radiation facility. It is an example of a big-science project developed by Brazil that is open to research groups in Latin-American countries.

I am also an affiliated member of The World Academy of Sciences (TWAS), which offers several initiatives with a focus on promoting 'South-South' cooperation schemes (between developing countries). Cooperation projects with colleagues from Pakistan in the field of sulfur chemistry are currently under development with promising prospects of growth.

Scientific cooperation certainly could serve to bridge the gap between developed and developing countries. The asymmetries within such partnerships need to be carefully considered, however. In particular, collaborations should explicitly avoid a 'brain drain' from the developing countries, young scientists should be encouraged to return home after a spell of research in the collaborating group, bringing knowledge and expertise back to their home country to help tackle societal problems.

On the regional level, the scientific cooperation between Argentina and Brazil is quite important, but more integrated efforts should be adopted to reinforce wider interactions between Latin-American scientists — defining common topics of interest and establishing multinational initiatives, for example. What I would love to see happening soon is a regional debate on S&T issues in order to converge on the adoption of specific concerted actions.

INTERVIEW BY ANNE PICHON