Twice a biochemist

The Professor from USP recalls his journey from Santiago, Chile to São Paulo, saying that no other country integrates cultures like Brazil

Fabrício Marques and Neldson Marcolin

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In a 2008 article highlighting the early steps of his academic career, Hernan Chaimovich, the retired Professor from the Chemistry Department (IQ) of the University of São Paulo (USP), recalls that he studied twice to be a biochemist, as once was not enough. The first time was in July 1962, when he was 22 years old, at the University of Chile, the country in which he was born. He was the son of the owner of a pharmaceutical laboratory, and his mother was a housewife who later became a writer. Chaimovich enrolled in a pharmaceuticals course with his father, who hoped that his son would take over the family business. However, during the course, the son was seduced by a recently created biochemistry course led by a professor who instilled in his students the ambition to win the Nobel Prize.

After graduation, Chaimovich moved to the United States to study first at the University of California, Santa Barbara and later at Harvard. He then returned to Chile with his Brazilian wife. However, there was mounting pressure from his wife's family to relocate to Brazil.

In 1969, he received job offers in both Rio and São Paulo. He decided on the second option, lured by a grant offered by Alberto Carvalho da Silva, who was then the Scientific Director of FAPESP. The grant would fund his research in the Physiology Department of the Medical School of the University of São Paulo (USP). In the early 1970s, Chaimovich became one of the youngest leaders of the Bioq-FAPESP program, which was considered to be responsible for solidifying biochemistry research in the state of São Paulo. He then moved to the University of São Paulo's Chemistry Department (IQ), where he founded its postgraduate course. However, Chaimovich's qualification in biochemistry was not valid in Brazil, and as a result, he was not appointed a member of the official academic staff of USP – his continuation had to be approved by his peers every three years. In 1979, he resorted to a provision in the statutes that allowed outstanding researchers to present a thesis without having to complete the postgraduate course work. As a result, within a few months he was awarded the titles of doctor and *livre docente* [a post-doctoral title]. Thus, he remarked that "In my 40s, I became a biochemist for the second time".

Professor Chaimovich developed several lines of research addressing reaction kinetics, studying the speed at which chemical reactions occur. Together with his students and coworkers, Chaimovich contributed to the understanding of how agglomerations of super molecules affect reaction kinetics in chemistry and biology. He also maintained an interest in political science and technology. Among the positions that he held at the university, the following stand out: Dean of Research of USP, Vice President of the Brazilian Academy of Science and Director of the International Council for Science (ICSU, which represents the national associations of all countries and the major international science

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associations). At FAPESP, he currently manages Cepids (the Research, Innovation and Dissemination Centers). Hernan Chaimovich is now married for the second time and is the father of three children. The 72-year-old granted the following interview:

How did your upbringing influence your interest in science?
I had an uncle who was a physician and who conducted some research at that time, and there was my father, who had a pharmacy and then built up a pharmaceutical laboratory. I remember that when I was eight years old, I was given my first microscope, and I was influenced by a German chemist who worked as a consultant in my father's lab. He gave me children's science books written in German, a language that I couldn't read, but the descriptions of the experiments were clear.
I then started to carry out chemical and biological experiments while I was very young, before I was 10 years old. The experiments became more practical when I started making explosives.

You destroyed the garage of your house...
It was one of my experiments. During college, I was a relatively mediocre student. One of the few subjects I truly liked was chemistry. I was lucky to have studied in a state school that was the best in Chile at that time. It was the Instituto Nacional, which had well-maintained chemistry and physics laboratories. It also had excellent academic staff. The philosophy professor was extraordinary. The professor of Spanish later became the Vice President of the University of Chile. The chemistry professor let me explore freely the laboratory.

Your mother was a writer, correct?
She became a writer much later on in life, but it is clear that she influenced me. I read the works of all the important Russian writers when I was 17, and this was due to her influence. The fact that my mother was born in Russia was important in a series of events that occurred later, but it was not important at that time.

So your father ended up winning, right? You became a scientist and not a writer...
I'm not sure. My father wanted me to work and become the owner of a pharmaceutical laboratory, and I ran from that. What is important is not that someone wins but that the parents' interests are explicitly expressed, such as saying clearly, "I would like you to do this for such and such reasons," or my mother, instead of doing that, used to say "read this book, and after that, read this other one." She followed my progress constantly. A rich family – and I try to do this with my children – is one in which nobody is ashamed to say "I like that thing and I would like you to see my side" in one way or another. This should be explained without pressure because that would cause a situation where one person wins, but at the expense of another.

I see Brazil as the only country in the world where the mixing of cultures is real

In school, you disliked some subjects; what about at university?
I got into university easily. Actually, some students from the Instituto Nacional passed the entrance examinations well ahead of students from any other Chilean school because they were very well prepared. I entered the University of Chile to study Chemistry and Pharmacy. However, right at the beginning of May, I became ill and missed a month. A social worker from the University came to visit me and said, "You fell ill and will need to repeat the year, so just study some subjects and try to recover." That really annoyed me. I decided that I would not only pass but would study all the subjects available. I started to enjoy the learning process and I won a load of prizes during my time at university.

Did your choice of research occur while you were still an undergraduate?
The decision was made when I met Osvaldo Cori, one of my heroes. He created the biochemistry program at the University of Chile. Shortly before this, I was uncertain as to whether to go into medicine or leave the university. I felt this way because first, it was easy to be the best student, and second, it wasn't fun. That was until Osvaldo decided to establish the discipline of biochemistry. The idea was to educate Chilean scientists in chemical biology. When I learned this and started to talk to people about it, I realized that it was an adventure, something alive. I then decided to stay and pursue biochemistry.

Did Cori know about the biochemistry carried out abroad?
He had had a very good education in the United States. He was a physician; he won a Rockefeller grant at Tulane University and afterwards worked with two Nobel Prize laureates. His scientific work was not very important, but he was a professor with extraordinary knowledge and understanding. He believed that he was doing the most important thing in the world. He also thought that everyone should work hard to win a Nobel prize. It is stimulating to live side by side with people who believe in science and that we should be at the forefront, and planning to win the Nobel Prize is another way of saying that you should not travel backwards. Osvaldo invited several laureates to give seminars and have lunch with us. They were people to whom we had to pose questions – and to pose them aggressively; otherwise, it was not worth our while.

Why did you leave Chile soon after qualifying?
There was very good Australian scientist named Morrison in Osvaldo Cori's laboratory when I was in my fifth year. I had already worked with enzymes and enzymology and spent a lot of time in the lab. I was not sure at that time which of

two areas to work in. One was enzymology, which was linked to Osvaldo, and the other was biophysics, which was linked to Mario Luxoro, an outstanding biophysicist who must be about 90 years old by now. The two of them had very different ways of thinking and were my professors.

Why did you choose enzymology?
Because Cori employed me when I was in my fourth year, which established a relationship between us. Shortly after that, Morrison arrived, and I started to carry out kinetic studies (measurements of the velocity of reactions) on enzyme-catalyzed reactions with him. I became very interested in the subject and clearly saw that kinetics on its own was not as much fun as studying the mechanism of the reaction paired with the kinetics. As it was impossible to study these mechanisms in Chile, I decided to go to the United States soon after graduating.

Why didn't you go straight into a doctorate?
For a very simple reason: the school of Osvaldo Cori was prejudiced and did not value doctorates, unlike the school of Mario Luxoro. Osvaldo was not an academic; he was a physician in the United States, and he had worked and published papers with Fritz Lipmann, for example, who held the 1953 Nobel Prize for Medicine. Osvaldo thought that obtaining a doctorate was unnecessary. When I went to the University of California at Santa Bárbara, I spent a year and a half working with Clifford Bunton, who was one of the world's most famous icons in the field of organic physical chemistry. However, after this period, I thought that I had learned all I could from him. Naturally, I was wrong, but it doesn't matter. I was in my early 20s at that time. I wanted to join a better group, and I ended up at Harvard University. However, I could have worked on my doctorate in Santa Barbara without any problems. At that time, I felt like a post doc because I had a Rockefeller Foundation grant, which carried a lot of prestige.

At that time, were you married?
Yes, to a Brazilian. Later I was married again, to another Brazilian. I came to Brazil, we were married, and then I went to the United States. I have more relatives in Brazil than in Chile because my paternal grandfather emigrated from Russia to Chile at the end of the nineteenth century. Like many other immigrants, he started working, and when he started making money, he brought his family over. The first two brothers who arrived in Santiago experienced an earthquake and decided to leave. They moved to Rio like the other brothers. I started to come here when I was 18, and I met my first wife during Carnival.

What was your experience at Harvard like?
Extremely exciting. I made many more friends there than I did in California. At the same time, the Chemistry Department was known for a higher-than-average suicide rate and also for one Nobel Prize winner per floor. It was a very competitive group, and I wasn't used to that level of competition. I had a particularly complicated problem for which I was almost unable to find a solution. The first six months were very difficult. Everything improved when I gave my first seminar to the department. I chose a theme that was highly complex, and I had to limit the length of time, as there were three Nobel Prize laureates sitting in front of me. During the first 15 seconds, I thought I was going to faint. After that, I gained confidence. From then on, I was accepted as an equal by the post docs who had to work Saturday and Sunday to keep up – the other option was to be spat out of the system. I left there having written a good paper that is cited even to this day.

My first publication was almost 50 years ago and continues to be cited

Did you intend to return to Chile?
I had two offers. One was to do a doctorate and then work at Carnegie Mellon University in the United States. The other was to do a doctorate in England. However, at that time, I could clearly see that I wanted to return to Latin America.

Why did you end up in Brazil?
For two reasons. First, my wife wanted to live here, and second, Brazil offers something different for a foreigner. I think that, at that time, Brazilians didn't know the meaning of "brain drain". Brazilians didn't emigrate unless they were expelled from the country. Many left Brazil at the time of the dictatorship, but it seemed to me that nobody wanted to leave. It is different with Chileans, Argentineans, etc. Here, we have a "brain gain". It is very difficult for a scientist or anyone from any other profession that marries a Brazilian – or vice versa – to leave Brazil. The husband or wife always brings the other to Brazil.

How do you explain this?
I have no explanation, only a theory. I see Brazil as the only country in the world in which the mixture of cultures is real. I'll give you two examples that I think are marvelous. You don't understand a seemingly Japanese carnival dancer unless you understand that the Brazilian ability to integrate a culture is something that only happens here. This doesn't happen in other countries – and I say that having travelled and observed much of the world. The probability of a non-Argentinian, a non-Chilean, or a non-Colombian reaching the sort of positions that I held in the most important public university in the country is almost nil. Here, it is normal. The culture really builds up through intermixing. The Chilean poet Gabriela Mistral, who was the Nobel Prize laureate for Literature in 1945, lived in Santa Barbara, California. Chilean immigration in that region was also common in the nineteenth century. If you visit the Chilean colony there today, you will find people drinking wine and eating empanadas [a type of pasty], and the fifth generation speaks more Spanish than English. Where is there anything similar in Brazil? This is what I mean when I talk about integration. Here, integration creates values and

is not imposed upon people. I think that Brazil has a special attraction because the cultural integration is real and provides the feeling that the immigrant is contributing positively to the culture.

Why did you choose to stay in São Paulo?

One of the job offers that I received came from Leopoldo de Meis of the Federal University of Rio de Janeiro because he was going to Germany and he needed someone to take charge of the laboratory. I liked Leopoldo a lot, and the idea was appealing, but it wasn't completely clear whether I could maintain an independent line of research. Moreover, it was only a verbal invitation and there was no contract to sign. Certainly there would be one someday, but the São Paulo proposal was different. Alberto Carvalho da Silva was interested in establishing an enzymology subdiscipline in the Physiology Department of the USP School of Medicine. He requested a visiting research grant for me at the end of 1968. I was in Chile when I telephoned and discovered that Alberto, who was then the Scientific Director of FAPESP, had been suspended by the military government. I was uncertain about moving to Brazil; however, César Timo-Iaria signed the request for the grant. I arrived in September 1969. The climate was that of a funeral, and there was a general feeling of depression at the university. However, the people (César Timo-Iaria, Gerard Malnic, Francisco Lacaz, Mauricio Rocha e Silva and others from the Physiology Department) received me with incredible kindness and respect. Feelings were very mixed at that time, including respect for me as an individual and the grief regarding the revocation of rights, and they allowed me considerable room - both physical and intellectual. I had just arrived and had a technician to work with me, something that was unthinkable and difficult to get elsewhere. I started to attract students quickly. However, one year later, it was clear that I didn't have a good enough dialog to keep me alive scientifically. I then decided to move to IQ (Chemistry Institute, USP).

What was it like to discover that you were not a biochemist here in Brazil?

I tried to validate my qualifications, and it was impossible, but this didn't matter because the salary was not linked to the job title. You see, I arrived at IQ in the 70s and was soon made responsible for the postgraduate section. I taught the first discipline, enzymology, which was the only one in that semester. I contacted Francisco Lara and started to plan the Bioq-FAPESP [Program for the Development of Biochemistry] together with a committee, in which Carl Peter von Dietrich and Antonio Cechelli de Mattos Paiva participated. Lara had the idea and we put it into writing. Peter made a large contribution to the details, and some of the ideas were mine. It's common to integrate ideas like this in Brazil. One year had passed since I had arrived, without a doctorate and with no contract with USP, but I was already writing a project with other researchers, which, I believe, established the field of biochemistry in this country, starting in São Paulo. This is strange when you look at it from the viewpoint of another country and in another cultural context. Because of this, I didn't care about not having a doctorate. I put together a marvelous team, and everything was going well intellectually. Some of my publications with the greatest impact are from this time, 1977 to 1982. The group of young people from the same generation was notable, and it included Dietrich, Walter Colli, [José Carlos de Costa] Maia, who passed away prematurely, Rogério Meneghini, Hugo Armelin, Walter Terra... all were blessed by Bioq-FAPESP. The projects were audited by a commission that included at least one Nobel Prize winner. It was an important indicator of the quality of our work.

The Bioq program in the 1970s was responsible for the structuring of biochemistry in the country

When did you finally complete the doctorate?

It was in 1979. My salary had been reduced by inflation, I had separated from my wife, and I had to travel to Rio to see my children. At that time, I had to decide whether to stay in Brazil or leave, whether to join a private company or to try and do something at the university. I would not return to Chile, which was ruled by a military dictatorship, and my friends were all dead or exiled. I almost went to a pharmaceutical company to manage a research division. The United States and Europe were real possibilities. The other option was to try to change my functional situation in the university and to obtain a doctorate quickly. I discovered that in the USP statutes, there was a paragraph that allowed renowned researchers to defend a thesis without studying ancillary disciplines. It made no sense to study other disciplines after being responsible for managing the IQ's postgraduate department and to have been responsible for qualifying doctorates and master's degrees. I presented myself against the wishes of many people. I had to be approved by two-thirds of the congregation and perhaps some people saw me as a threat, but this was conjecture. I was approved by one vote. I also managed to obtain my *livre docência* degree that same year. So, in 1979, I completed a doctorate in April and a *livre docência* in December. As luck would have it, some of my important papers were published during this period, as the *livre docência* regulations say that there has to be scientific production in the interval between the two titles. Subsequently, I attempted to run against the competition for the position of Head Senior Professor in 1980 but was unable to obtain the necessary two-thirds of the votes. In the following years, I became part of the university's academic staff. Finally, I had a post and then became a true biochemist from the Brazilian point of view. Many other things happened after this. My research group was small, with few people, but they were very good.

How small?
At the peak, eight to ten people. I had some very good people working with me, such as Renato Arruda Mortara, a professor at Unifesp, Mário Politi, Iolanda Cuccovia, now my wife, and Ana Carmona, all from USP. In 1984, the special edition of *Current Contents* was published, which is today the *Web of Science*, and it included the most important Latin American papers in that year. Two out of the ten were mine.

What were the subjects?
The same things that I do today. One was part of Iolanda's master's degree dissertation, involving a kinetic analysis of a chemical reaction in micelles, and the other was the first description of vesicles prepared using negatively charged synthetic amphiphilics. In 1984, I became a Senior Professor.

In addition to scientific research, you were also involved with scientific politics.
I was involved with politics when I was in school. My first official political activity in Brazil was in 1983, when I was elected to the Board of Governors of Adusp [the Association of USP Professors]. In 1985, I held the post of Department Manager. Afterwards, in 1990, I took part in the formulation and coordination of USP's Molecular Science course, which was a fantastic advance for the University. The idea was a joint idea between Roberto Leal Lobo, when he was the University President, and Erney Plessmann de Camargo, the Dean of Research. The person who was responsible for structuring and coordinating the course was me. This course is still a success and is one of my essential contributions to the university.

What about afterwards?
In 1995, I was elected President of the Brazilian Society of Biochemistry and Molecular Biology (SBBq). I continued on the university council as the President of the Academic Subjects Commission. When Jacques Marcovitch was elected as University President in 1997, he asked me to become the Dean of Research. I accepted immediately, although it was a surprise for me because that year I had refused to campaign for the candidates vying for the position of University President. When I was a candidate for President in 2001, I lost. In 1997, I was elected to the board of the Brazilian Academy of Sciences, of which I am now the Vice President. During this time, I started to play a more official role in international science politics. I was elected to the board of the International Council for Science, the ICSU, which is a group of all of the national representatives of all the countries in the world and the biggest international scientific bodies. In 2008, I ran for president of the ICSU but lost. In 2004, I participated in the creation of another international organization, the Inter-American Network of Academies of Sciences (Ianas), which is the only international network of scientific academies that is still running to this day.

We have to make comparisons with developed countries and not with the rest of Latin America

What is your evaluation of the science you carried out?
What allowed me to do all that I did was the science that I produced. My first publication – for a change, on kinetics – was in 1965. For the first time, it was shown that any given enzyme shows very specific behavior. This paper was published almost 50 years ago and continues to be cited. Another important discovery, in my opinion, is one we made in 1978, concerning a vesicle [a modeled structure of a cell membrane] composed of synthetic lipids. This paper also had an extremely high number of citations. Afterwards, in 1979, we published a series of articles on pure kinetics. The first was written in an instructional manner and introduced new concepts. It was written in such a way that anyone with a little knowledge of chemistry could understand it, so it is used a lot. In 1982, we described a reaction that is, in a way, a path to understanding the origin of life. In a micelle system [a micelle is a globular structure formed by an agglomeration of molecules], through measuring the reaction velocity, we discovered a totally synthetic system, which was a vesicle that accelerated the velocity of the reaction by a million fold. This is important because life cannot be created if everything happens very slowly.

And was all of this work the result of collaborations?
All of it. In 1995, while chatting with Aníbal Vercesi (Unicamp) in a restaurant, a hypothesis came up that was later tested in my laboratory and resulted in a discovery: we described the enzyme activity of a protein that was named the uncoupling protein. Basically, this protein acts like the clutch on a car. When one steps on the clutch, the vehicle doesn't move and generates a lot of heat. This protein does the same thing in living animals. It was believed that it was only found in the brown fatty tissue of mammals, but we also discovered it in a plant.

To conclude, what is your vision of Brazilian science compared with that of the other Latin American countries?
This comparison is not fair because we are a long way ahead of the other countries in terms of structure. For example, there is no other Latin American country that has a body like FAPESP. I am not referring to organizations similar to CNPq, Capes or Finep. We have all of those and in addition, we have FAPESP. The other counties lack this. However, if a comparison is made with the rest of the world, the situation changes because the relative impact of Brazilian publications does not reach the average impact of the science magazines published in the developed world. It is below that level. This says that the quality of what we do is still not satisfactory. That is not to say that there are no scientists, but with only a few scientists, you cannot build a country. ■