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### The Impact of International Exchange: The Scientific Journey of Marini Bettolo from Italy to Uruguay

*by Patrick Moyna*

Chemistry has always been a science of intense international exchanges, and mentoring has been standard practice during all of its history. Even today we can trace the "descendants" of Perkin, Liebig, or Dumas. In spite of this, the efforts of countless visiting professors, traveling students, and others to advance chemistry in the Third World do not seem to demonstrate clear results. This can often discourage present-day chemists from making the personal effort and sacrifice of going abroad to educate others. However, I would like to convince colleagues of the usefulness of such visits by using the example of chemistry in Uruguay. This small Latin American country, which recently joined IUPAC as an ANAO (Nov-Dec 2002 *CI*, p.4), has so simple a scientific history that the impact of visiting scientists can be directly observed.



This photograph was taken during a 1961-62 visit of Dr. G. B. Marini Bettolo to Montevideo. From right to left, some of the people in the photo are 1. Prof. Simon Dittrich; 5. at the back, Prof. Alberto Coch; 6. at the front, Prof. Rodolfo Usera, Dean of the Facultad de Quimica, Montevideo 1960-64; 7. at the back, Prof. Dr. Bettolo; 9. at the back, Mrs. Dittrich; 11. Mrs. Falco; 12. Prof. Mario Falco, 15. at the front, Emilio Falco, son of Prof. Falco and now Prof. of Astronomy at Harvard.

Chemical studies in Uruguay developed in combination with pharmacy, an activity that was present since the last days of the Spanish Viceroyalty of the Rio de la Plata (early 1800s). After the establishment of the National University in 1849, pharmacy and chemistry teaching were incorporated into the Medical

School in 1909, as a subsidiary Instituto de Quimica. Pharmacy and chemistry became an independent facultad (college) in 1929. Instruction in pharmacy and industrial chemistry was the basic activity at the college—research was practically nonexistent, and most “scholarly publications” were related to courses. This situation continued well into midcentury because of the relative isolation of South America and Uruguay during the Depression and later during World War II.

In 1948, after an extended scholarly visit to Chile, Prof. Giovanni B. Marini Bettolo, then a young Italian chemist, stopped in Montevideo to look after family affairs that had been long neglected because of the War. The visit was supposed to be short, but due to legal paperwork, the days became months. Dr. Marini Bettolo grew restless and visited the local Facultad de Quimica y Farmacia, and offered to teach an introductory course on chemical research. His offer was accepted, and from June 1948 until his return to Italy in October 1949, he taught a small group of young enthusiasts.

### "Generations" of Marini Bettolo's Uruguayan Students

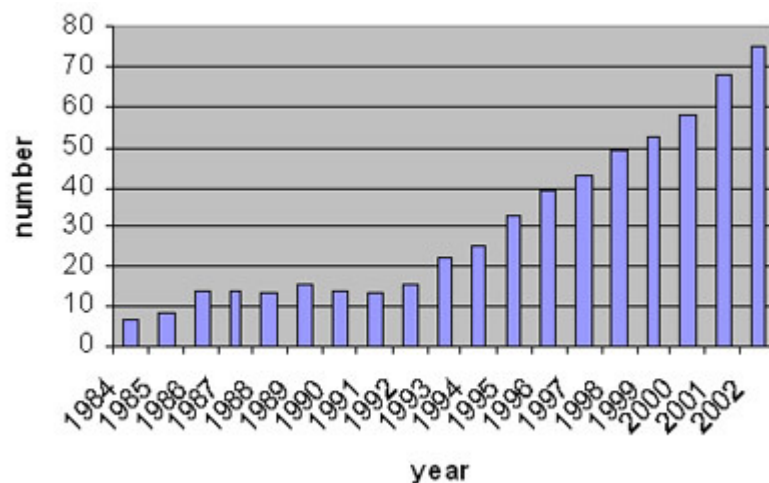
Scientist Name	Year of Birth	Year of Doctorate	Institution	Retirement
<b>First Generation: 3 Ph.Ds completed in Montevideo, 1 abroad</b>				
Prof. M. R. Falco	1922	1954	ETH (Zurich)	1982
Prof. J. A. Coch	1923	1969	Montevideo	1989 (emigrated 1975)
Prof. S. Dittrich	1923	1961	Montevideo	1990 (expelled 1977)
Prof. R. Sosa	1927	1971	Montevideo	1997
<b>Second Generation: 3 Ph.Ds completed in Montevideo, 3 abroad</b>				
Dr. J. X. DeVries	1932	1961	Montevideo	1974 (emigrated 1974)
Dr. W. Cervenansky	1930	1963	Montevideo	1974 (expelled 1974)
Dr. W. Diano	1930	1969	Exeter	2002
Dr. P. Moyna	1938	1968	Birmingham	active
Dr. T. Hirschfeld	1938	1976	Montevideo	1984 (deceased)
Dr. R. Lombardi	1939	1970	Paris	2001
<b>Third and Fourth Generations: 1980-1990—2 completed Ph.Ds in Montevideo, 11 abroad</b>				
<b>1990-2000—11 completed Ph.Ds in Montevideo, 23 abroad</b>				
<b>2000-to date—10 completed Ph.Ds in Montevideo, 5 abroad</b>				

The whole effort could have ended then and there, but Dr. Marini Bettolo was keen on promoting his students, and invited and supported their visits to Europe. The initial group of Profs. M. R. Falco, J. A. Coch, S. Dittrich, and R. Sosa, started in Rome and then visited other institutions in Europe. All were all back in Montevideo by the late 1950s, where they went on to train a second group of chemists.

This second, larger group went to North America or Western Europe in the 1960s. The group managed to survive the disastrous military dictatorship (1973–1985) and, although a sizeable fraction never did return after emigrating, they all provided opportunities to third and fourth generations of students who have studied successfully either in Uruguay or abroad.

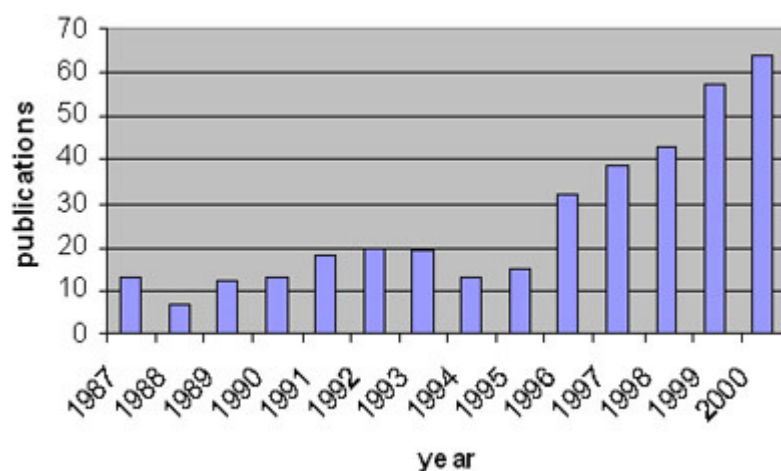
This story could be limited to describing the accomplishments of the students as they advanced through their studies. However, it is more interesting to observe how Marini Bettolo's efforts affected the development of chemical research in Montevideo. In figure 1 we see the increase in the number of faculty with post-doctoral level experience at the Facultad de Quimica.

**Figure 1: Staff of Facultad de Quimica with Doctorates**

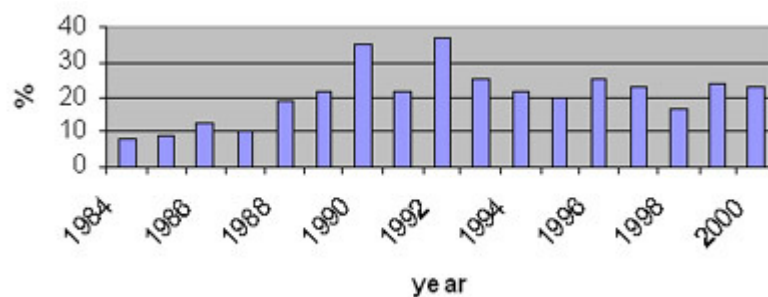


Figures 2 and 3 show the scientific productivity of faculty at the college, both in absolute numbers and relative to the total scientific production from Uruguay. To put these numbers in context, this level of productivity is achieved with a budget of just over 1 million U.S. dollars, which represents 3% of the total budget of the university. These funds have to cover all teaching, research, and other academic activities.

**Figure 2: Total Publications from Facultad de Química in SCI(R)**



**Figure 3: Percentage of Uruguayan Scientific Publications Originating from the Facultad de Química**



The professors at the Facultad who can trace their experience back to Marini Bettolo, have published their research in a range of fields such as organic chemistry and natural products, physical chemistry, theoretical studies, analytical chemistry, and

immunology. The research-oriented approach that these professors learned has been followed by most of the staff, and now the groups in inorganic chemistry, microbiology, toxicology, clinical analysis, crystallography, parasitology, food chemistry, enology, and pharmacokinetics—that cover the whole spectrum of the Facultad—are also contributing to these results.

So even though we chemists “know” about the former students of Profs. H. Wieland, D. H. R. Barton, R. B. Woodward, or L. Ruzicka, we often have difficulty in seeing how they influenced the broad spectrum of chemistry. Here we have a clear example of the impact of one teacher on the growth of the chemical sciences in a whole country. Dr. Marini Bettolo was an outstanding chemist, but he was also an open-minded scientist, who did not hesitate to help younger colleagues from an obscure little country without imposing his own ideas or beliefs on them. He helped them without expecting a reward.

So, even if there is a chance that your efforts in another country will come to naught, there is a good possibility that they will be successful—resulting in growth for the chemical sciences worldwide and surely improved living conditions for people in some remote region. Not a bad legacy to leave behind.

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