

Professor Rita H. de Rossi

A Tribute



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Professor Rita H. de Rossi was born on April 15th, 1943, in Laborde, a small town in the province of Córdoba, Argentina, as María Rita Micaela Hoyos. As with many Argentineans, Rita comes from a family of immigrants: her father was Spanish and her mother Italian. She married Professor Roberto A. Rossi, also a well-known organic chemist in 1967 and, as was customary in those days she adopted her husband's surname and uses Rita H. de Rossi on her publications.

Rita graduated as a biochemist in 1966 from the Institute of Chemical Sciences, which in 1971 turned into the Faculty of Chemical Sciences of the National University of Córdoba (FCQ-UNC). She received her Ph.D. degree from the same institution in 1968 with honors. Her thesis dealt with the decomposition of diazonium salts. Her Ph.D. thesis adviser was Professor Héctor E. Bertorello, one of the pioneer organic chemistry professors and organizer of the Organic Chemistry Department of our Faculty. While she was working on her thesis, her daughter Gabriela (1968) and, a year latter, her son Enrique (1969) were born. This did not prove to be an obstacle for continuing her work.

After her thesis, she was appointed as a Research Fellow in Chemistry at the University of California at Santa Cruz, U.S.A. (1970-1972) first under the supervision of Prof. Joseph Bunnett and later under the supervision of Prof. Claude Bernasconi where she acquired experience in kinetics, especially in relaxation techniques applied to the study of organic reaction mechanisms. I met her after she returned to FCQ as a student in her course in organic reaction mechanisms and kinetics in 1974. She was, and still is, a very good professor who inspired my interest in kinetics; I still keep the class notes and problems that we discussed in that course. She began studies in

chemical kinetics in solution in the Department of Organic Chemistry, FCQ and I joined her group as her first graduate student in 1977. At that time there was no spectrophotometer in our Department and we used one in the Department of Pharmacology. She struggled until she was able to buy the first spectrophotometer for the Department, and twenty years later, the stopped-flow instrument. Ingenious solutions and cooperation make up for the lack of equipment. Working together following a kinetic run in a home-made thermostat bath, we were able to take readings every 30 seconds on an analog single beam spectrophotometer.

Since she became a professor in FCQ, Rita had supervised fifteen doctoral theses, two master theses, postdoctoral students and several researchers of CONICET, the National Research Council of Argentina. Some of her students, like myself, remained at the Faculty as Professor; others became Professor in other Faculties of our country and abroad and others are working in industry. Rita's investigations include physico-chemical studies and determination of organic reaction mechanisms, photochemistry, supramolecular chemistry, reactions in organized media, synthesis and green chemistry. She taught us all that both good ideas and hard work are required to be successful in research. As supervisor, she keeps a complete register of every experiment that her students have done. If she says: "I think that you have done an experiment with....." you better go and look for it because surely you have done it.

Her first investigations in kinetics in FCQ were related to aromatic nucleophilic substitutions. Among her achievements in those early days, the first example of base catalysis in the addition step in an aromatic nucleophilic substitution reaction should be mentioned. Some years later, two more students joined the group and investigations on acid-base catalysis, structure-reactivity correlations and nucleophilic substitution in weakly activated aromatic substrates were conducted. She also studied aromatic nucleophilic substitution reactions in which the leaving groups were secondary cyclic amines or primary amines finding that σ -complexes formed by addition of the nucleophile to unsubstituted positions of the aromatic ring were important intermediates in the reaction.

More students and new ideas were incorporated in our group. At the beginning of the '80's, knowing the importance that supramolecular chemistry was acquiring, she began studies in this area using first cyclodextrins (CDs) and latter erythromycin as hosts. With the aim to demonstrate the influence of the formation of inclusion complexes with CDs on the reactivity and selectivity of organic reactions, studies on nucleophilic aromatic substitutions, electrophilic substitutions, photo-Fries rearrangements, competition elimination/substitution, cis-trans isomerization of azo compounds, hydrolysis of esters and amides of perfluoroalkylic acids were conducted. She also investigated the effect of CDs on the excited states of indole derivatives as well as the formation and decay of singlet oxygen in photochemical reactions. As CDs are used as models for enzymatic catalysis, hydrolysis reactions of esters and amides that show intramolecular catalysis were studied and it was demonstrated that CDs act in the same way as non competitive enzymatic inhibitors. In the last decade, β -cyclodextrin esters of alkenyl succinic acids were synthesized in our labs. These amphiphilic cyclodextrins have the property to form micelles with two recognition sites, the cavity of the CD and the micelle core, and they can be incorporated in reverse micelles of AOT (sodium 1,4-bis(2-ethylhexyl)sulfosuccinate) in heptane.

Another interesting investigation in supramolecular chemistry was the formation of $\text{FeBr}_3\text{-CD}$ complexes in non-aqueous solution. These complexes are stable under ambient conditions, easy to manipulate (in contrast to the salt that is highly hygroscopic) and are efficient, chemoselective catalysts for sulfoxidation reactions.

Methods for the synthesis of derivatives of 1,2-dithiole-3-thiones, compounds with potential applications as additives and medicines, were designed after being involved in a project with the petroleum company YPF for the development of oil additives.

Based on the post-doctoral experience of one of her students, studies on the reactions on Fischer carbene complexes were initiated. An important goal was the finding of a reaction of alkenyl Fischer complex carbenes with 5-alkylthio dithiole thione derivatives that led to the regioselective formation of dithiofulvenes thiones and dithioesters.

All this work produced more than 130 research articles, more than 170 contributions and invited lectures at scientific meetings and lectures in different universities all over the world. In 1983 Rita and her husband Roberto published a monograph in the American Chemical Society that was translated into Russian in 1986.

Rita has promoted the cooperation of our group with other national and foreign groups. So, collaborative research was conducted with scientists of the Universidad Nacional de La Plata, Universidad Nacional de Río Cuarto (Argentina), Pontificia Universidad Católica de Chile (Chile), University of Sao Paulo (Brazil), Universidad de Burgos, Universidad Autónoma de Barcelona (Spain), Carnegie Mellon University, University of California (USA), University of Ottawa (Canada) and University of Cape Town (South Africa). This resulted in visits of professors and graduate students to our laboratories, visits of professors and graduate students of our group to other labs and joint publications.

Rita carried out an important teaching activity in FCQ. In 1962 and still being an undergraduate student, she obtained her first position working in the Departments of Physical and Organic Chemistry. In Organic Chemistry she occupied different positions: Teaching assistant (1966), Assistant Professor (1976), Associate Professor (1982), and Full Professor (1985). Since 2009 she is Emeritus Professor. She was involved in several courses for undergraduate students: Basic Organic Chemistry, Advanced Organic Chemistry, Reaction Mechanisms in Organic Chemistry, Bio-organic Chemistry and Environmental Management. She also directed courses for graduate students in our Faculty as well as in other Universities of our country and abroad. Her activities in FCQ were not limited to teaching and research; she was Academic Secretary (1980-1982) and Vice-dean (1988-1990) of our Faculty as well as Director of the Department of Organic Chemistry (1990-1992 and 1998-2000). Rita and her group are members of the Instituto de Investigaciones en Físico-Química de Córdoba (INFIQC), a CONICET institute for development of Physical-Chemistry in Córdoba. She is member of the Directive Council of INFIQC since 2004.

Rita has been in the Chemistry Committee boards of CONICET, the Secretary of Science and Technology of our University and the Research Council of the Province of Córdoba and in the Advisory Sub committee, of the Chemical Nomenclature and Structure Representation Division of IUPAC, Division VIII (2002-2004). She is an active member of Argentine Organic Chemistry

Association (SAIQO) since its foundation in 1984 for which she was vice-president (1999-2001) and president (2001-2003). She has reached the highest research-academic position of the scientific career of CONICET and was elected in 2004 Academic of the Argentine National Academy of Science. In 1993 she received the KONEX Award in the area of Physical-chemistry and Inorganic Chemistry.

In addition to all these activities, she is a mother and grandmother. She is very fond of her grandchildren (Lucia, Dante, Ramiro, Lautaro and Facundo) and now that they live far away, she visits them whenever she can and enjoys their visits to her. For many years, every Monday, Wednesday and Friday, very early in the morning, she has practiced gymnastics. She enjoys movies and we used to go to the cinema after work once a week. She is also a very good cook always looking for new recipes and all her students have enjoyed at some time her "Bagna Cauda", a typical Italian dish.

Through all the years that I worked with her, she was my teacher, my colleague and my friend; she always knew what role she should play at anytime. Her students affectionately call her "the boss"; an understanding boss that gets out the best of us and teaches by example. I feel highly privileged to contribute to this issue of ARKIVOC dedicated to Rita H. de Rossi.

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