

Horacio G. Pontis

1928–2019

BY ERICH GROTEWOLD

Horacio G. Pontis, professor of biological chemistry emeritus at the University of Mar del Plata, Argentina, and a world-renowned plant carbohydrate chemist researcher at CONICET (National Scientific and Technical Research Council–Argentina), died August 5, 2019, in Mar del Plata, Argentina. Horacio got his passion for carbohydrate biochemical research when he started working in the 1950s with Argentine Nobel Prize laureate Luis F. Leloir, a passion that accompanied him for the rest of his life.

Horacio was an old-school scientist who kept working at the bench until not long before his death. He maintained an active research enterprise, training undergraduate and PhD students and producing a steady flow of research publications totaling more than 100 articles, book chapters, and books. His major contributions included the discovery of compounds related to carbohydrate metabolism, the enzymes involved, the associated regulatory mechanisms, and the relationships to stress physiological responses. Horacio's many important contributions to plant biochemistry were recognized by ASPB in 2003 with a Corresponding Membership Award.

During his long career, Horacio trained more than 30 graduate students. His biological chemistry undergraduate



students remember him especially for his challenging classes in which he intertwined metabolism with the principles of reactions between molecules based on chemistry and physical-chemistry principles. Because of Horacio's extensive teaching and training experience, the dean of the Faculty of Sciences at the University of Mar del Plata entrusted him with the organization of the university's science graduate school in the 1990s. The university showed its appreciation for Horacio's significant contributions by naming him emeritus professor in 2004.

Throughout his career as a researcher, Horacio was highly valued for his creative PhD supervising approach in which he encouraged students to discuss and argue about biochemical hypotheses, and then challenged



First plant molecular biology course, 1986, the beginning of plant molecular biology in Argentina.

them to use their imagination to answer questions about the relevance to the physiology of the plant. Horacio's greatest gratification was when his students succeeded and opened up new fields of study. As a scientist, he felt no better reward than when his followers surpassed him in the advancement of scientific knowledge. Many of his students have held leadership positions at renowned universities and research centers around the world.

Horacio was born in Mendoza, a town in Western Argentina at the foot of the Andes. This origin explains his love for walking in the forest and climbing mountains despite having lived 40 years in a seaside city. He studied chemistry at the University of Buenos Aires,

where he also earned his PhD in organic chemistry.

Early in his career, he worked as a postdoc alongside Leloir, who sparked and significantly influenced his interest in biochemical research on carbohydrates, sugar phosphates, and sugar nucleotides. As a postdoctoral fellow of the British Council, he had a productive experience in the Department of Chemistry at Durham University, King's College Newcastle upon Tyne (U.K.), in James Baddiley's laboratory working on the isolation of new nucleotides. At the end of the 1950s, Horacio moved to the Karolinska Institutet of the University of Stockholm (Sweden), where he delved into enzymology under the supervision of Peter Reichard.

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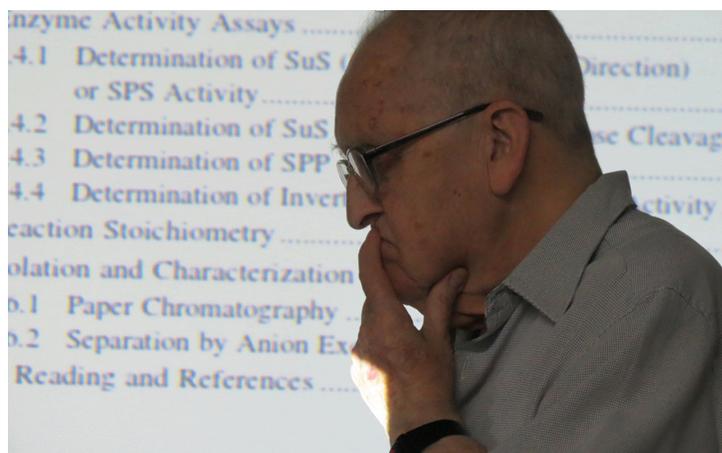
After his return to Argentina in 1960, Horacio began his work in the field of plant biochemistry. He became interested in fructose and fructan metabolism in his quest to find a fructose nucleotide that could be the donor for building polymer chains, according to what was believed at the time. It was then that he discovered the first fructose nucleotide, uridine-diphosphate fructose, together with a uridine-diphosphate acetylgalactosamine from dahlia tubers. This same train of thought inspired him to synthesize fructofuranose-2-phosphate and fructopyranose-2-phosphate, which became the first sugar phosphates with the phosphate group attached to the hemiacetal hydroxyl group.

In the mid-1960s, Horacio spent two years at the Biological Chemistry Institute of the University of Copenhagen (Denmark) in Agnete Munch-Petersen's laboratory. There, he shared his abilities in the use of chromatographic techniques for the separation of sugar phosphates and sugar nucleotides. This was the beginning of Horacio's pioneering studies on the metabolism of fructans in mono- and dicotyledonous plants and the enzymes that synthesize sucrose. Fructan and sucrose metabolism became Horacio's main subjects of research for the subsequent 40 years, his research team investigating enzyme regulatory properties and the tight link between sucrose synthase and sucrose phosphate synthase activities. For many years, Horacio was rather alone in advocating that fructans participated in toler-

ance to drought and cold stresses, which today is widely accepted. His discoveries in carrot tissue cultures laid the groundwork to show that sucrose had a role beyond a carbon source comparable to a regulatory molecule.

Horacio believed in science. After his return to the country in the 1970s, he was deeply interested in strengthening scientific research in Argentina. Although the intellectual, cultural, and scientific resources were located principally in Buenos Aires, he was not afraid to leave the capital to create and lead new research and teaching institutes in the interior of Argentina devoted to investigating functional plant biochemistry and plant molecular biology. These institutes included the Department of Biology in the Fundación Bariloche, San Carlos de Bariloche (1967); the Institute for Biological Research at the University of Mar del Plata (1979); with Leloir, the Foundation for Biochemical Applied Research, where he was the head of its Center for Biological Research; and more recently, the Instituto de Investigaciones en Biodiversidad y Biotecnología (2012).

To spread scientific research in Argentina, Horacio organized a series of symposia, conferences, and advanced courses with active participation by international experts. These gave Argentina international recognition and were among the first steps in building a robust national scientific presence. In 1972, together with Romano Piras, Horacio organized in San Carlos de Bariloche a symposium in Leloir's honor attended by Herman M. Kalckar, Phillips W. Robbins, Aida and Carl F. Cori, Feodor



Lynen, Jack Strominger, William Z. Hassid, Roger W. Jeanloz, David Sidney Feingold, Jack Preiss, and others. Horacio and Romano Piras edited a volume entitled *Biochemistry of the Glycosidic Linkage: An Integrated View* (Academic Press, 1972).

In 1986, Horacio and Graciela Salerno coorganized the first advanced course on plant molecular biology for Latin American students with the participation of Jack-Henry Weil, Michele Delseny, Simon Litvak, Pierre Yot, and Alejandro Araya. This event marked the beginning of plant molecular biology in the country. It was during this course that I first met Horacio and his team, and the experiences I acquired during this course had a significant impact on my career.

In 1995, Horacio's enthusiasm for carbohydrate metabolism inspired him to organize the First International Symposium on Sucrose Metabolism: Biochemistry, Physiology, and Molecular Biology, in Mar del Plata. Experts from many important scientific research groups participated to discuss the latest developments on sucrose, its

synthesis and regulation of degradation, and its transport and interconversion into starch and fructans. Tom ap Rees delivered the concluding remarks, which called for continuing discussions on "What's Next?" The conference talks were published in Volume 14 of the Current Topics in Plant Physiology series (ASPP, 1995).

For the past decade, Horacio sought to pass on the experience he had gained over many years working on carbohydrate metabolism in photosynthetic organisms to the next generation. Still a teacher, he worked with two young researchers to compile all his protocols and experiences in *Methods for Analysis of Carbohydrate Metabolism in Photosynthetic Organisms: Plants, Green Algae and Cyanobacteria*, published in 2017 (Academic Press).

Horacio is survived by his wife of more than 46 years, Graciela Salerno; by their children, André Pontis and Sheila Pontis; and by the children of his first marriage, Erico Pontis and Cristina Pontis, and grandchildren Matias and Martin Piqueras. ■