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Retrovirology

OBITUARY

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Simon Litvak (1942–2022)

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A talented Chilean-French biochemist, mentor to many brilliant students, with a unique scientific character, a friend who developed a strong collaborative research and teaching program between Chile and France.

Simon Litvak (Fig. 1) was born in the Chilean Coastal city and harbor of Valparaiso in 1942.

His initial focus was on protein synthesis in cell-free extracts, obtaining his professional degree in Biochemistry at the Faculty of chemistry and pharmacology of the University of Chile at Santiago (1965) [1, 2]. He then moved to Paris, France, to work under the supervision of François Chapeville on the biosynthesis of nucleic acids. Specifically, he worked on the 3′ end modification of the genomic RNA of the plant tymovirus Turnip yellow mosaic virus (TYMV), discovering that it was a substrate for the host enzyme tRNA nucleotidyltransferase, which added several nucleotides at the viral RNA 3′ end because the viral last 82 nucleotides folded into a tRNA-like structure [3, 4]. Along this line of research, Simon and collaborators found that the 3′ end domain of TYMV could be aminoacylated, causing a positive effect on the activity of the VIRAL REPLICASE [5]. He obtained his Ph.D. in Natural Sciences in 1972 from the University Paris VII. He then continued his work on the study of the interaction of viral RNAs and tRNA nucleotidyl transferases.

Investigating plant DNA polymerases and the viral reverse transcriptase

Soon after the discovery of reverse transcriptase in 1970, in 1975, Simon set up a research program on the plant DNA POLYMERASES [6–8] and on the famous retroviral DNA POLYMERASE, later called Reverse Transcriptase (RT) of avian myeloblastosis virus (AMV) [9–12] and the human immunodeficiency virus HIV [13–16].

Interestingly enough, DNA POLYMERASE A of the wheat germ was found to be active on RNA templates, in other words, to exhibit a reverse transcriptase activity [17].

A large amount of work was dedicated to the AMV and HIV RTs. In both cases, RTs were found to bind to the homologous RT tRNA initiator primer, namely tRNATrip for AMV RT and tRNALYS for HIV in a specific manner [15]. His work showed the role of viral RTs in the selection and positioning of the tRNA primer on the viral genomic RNA [12–14, 16, 18] and proposing a mechanism by which the primer tRNA is packaged during virus assembly.

Studies on RNA editing in wheat germ mitochondria and HIV

RNA editing is a biochemical process whereby some residues of an RNA sequence can be deaminated, giving rise to a C to U transition. This editing process modifies the primary sequence of an mRNA having important consequences such as generating a stop or initiation codon [19–24]. To investigate in detail the editing process Simon and his group developed an original system based on wheat germ mitochondria. He also participated in studies showing that HIV-1 RNA could suffer C to U editing [25, 26]. His studies also extended to other HIV enzymes, such as the viral integrase IN [27–31].

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Fig. 1 Simon Litvak a talented Chilean–French biochemist

Fig. 2 Simon Litvak (left) and Marcelo López-Lastra at ENS Lyon, June the first 2011

France–Chile scientific cooperation

Simon Litvak established a strong French–Chile collaborative effort to develop the study of nucleic acids and viruses in Chile (Fig. 2). Since early in his career, he organized international courses and conferences in spectacular cities such as Pucon at the foot of the Villarica volcanoe in Chile. He was constantly bringing renowned international scientists in the fields of nucleic acids research and virology to Chile. This international program enabled young Chilean sciences to attend state-of-the-art lectures and directly interact with first-class scientists. Also, it allowed many young Chilean students to be offered unique opportunities to develop their scientific careers in Europe and North America under the supervision of top scientific mentors. Many of these brilliant young students returned to Chile to continue as independent scientists, reinforcing the study of nucleic acids and virology in the South-American countries.

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