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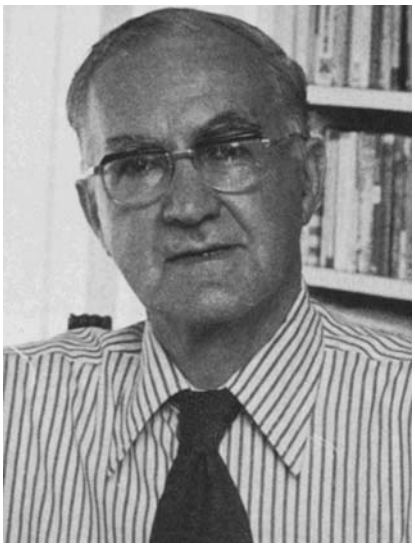
Eduardo De Robertis (1913–1988)



Eduardo De Robertis. © 1986 Plenum/Springer

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Eduardo De Robertis, neurobiologist *par excellence*, was born on 11 December 1913 in Buenos Aires, to Italian immigrants. He graduated in medicine from the University of Buenos Aires in 1939 with gold medal [10]. As a student, he became interested in histology and worked with P. Rojas; in 1935 they discovered, with Sáez, that most amphibians have no morphologically distinguishable sex chromosomes [7].

Supported by B. Houssay, the later Nobel laureate, De Robertis secured fellowships to investigate parathyroid and thyroid function, with R. Bensley at the University of Chicago and with I. Gersh at Johns Hopkins (1939–1941). He continued that research in Buenos Aires, at the Department of Anatomy and Embryology (1941–1946), where he showed that gonadotrophin promotes gonadal maturation in toads.

In 1946, opposing the presidential candidacy of General Perón, he resigned his post and went on an 11-year self-imposed exile. At MIT in Boston, he studied axonal ultrastructure with F. Schmitt and described neurotubules (1946–1949). In 1949 De Robertis moved to the Biological Research Institute in Uruguay, headed by Cajal alumnus C. Estable. He organized the Cellular Ultrastructure Department, housing the first electron microscope in South America, and studied retinal ultrastructure, the separation of pre- and postsynaptic membranes as definitive proof of the neuron theory [6], and correlates of exocytosis in adrenal medullary cells [2].

In 1953 De Robertis went to Seattle to study with Bennett the ultrastructure of synapses in sympathetic ganglia of frogs and nerve-cord of earthworms (collected from Bennett's yard) [2]. In April 1954, the seminal discovery of synaptic vesicles in nerve terminals was separately announced by Palade and Palay at the American Association of Anatomists, and by De Robertis and Bennett at the Experimental Biology (FASEB) meeting. De Robertis and Bennett went further, associating synaptic vesicles with quantal acetylcholine and catecholamine release [4], a concept they supported with degeneration and stimulation experiments. Synaptosome isolation provided a direct approach to the study of synaptic function [5].

In 1957 De Robertis returned to Buenos Aires as professor and head of the Cell Biology Department and in August inaugurated the electron microscopic unit. In 1958 he was appointed director of the National Research Council.

His success (with Lasansky) to visualize for the first time protein-lipid bilayers in retinal photoreceptors and myelin-sheath membranes made was reported in the *New York Times* (29 April 1959). At the 1961 International Neuropathology Con-

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gress in Munich, De Robertis gave an update of synaptic ultrastructure, intersynaptic filaments, subsynaptic web and subcellular fractions [3]. Between 1962 and 1966, he reported the isolation of nerve terminal particles and characterized benzodiazepine receptors [1], formulated the unitary theory of neurohumoral secretion [8], and successfully blocked the effect of transmitters with antibodies against synaptosomes, three years before immunocytochemistry was introduced. He would say, "We all dissect, some with scalpel and forceps, others with the ultramicrotome or the ultracentrifuge, but it is the same, we all dissect". When the 1970 Nobel Prize in medicine was awarded to Katz, von Euler and Axelrod for discovering humoral transmitters in nerve terminals and their storage, release and inactivation mechanisms, many felt that De Robertis should have been included in the honour [1]. In the 1970s and 1980s he identified numerous receptors, investigated stress and anxiety, as well as hypothalamic and pineal function.

He published over 300 papers [9], translated Maximow and Bloom's *Textbook of Histology* (1944), and authored *General Cytology* (with Nowinski and Sáez, 1946; later *Cell Biology* and *Cell and Molecular Biology*, with Italian, Polish, French and Japanese translations); *Histophysiology of Synapses and Neurosecretion* (1964); *Biology of Neuroglia* (with Carrea, 1965); *New Atlas of Histology* (with di Fiore and Mancini, 1973); *Neurochemistry of Cholinergic Receptors* (with Schacht, 1974); *Synaptic Receptors* (1975); *Essentials of Cell and Molecular Biology* (with his son Eddy De Robertis, 1981).

De Robertis received multiple awards, national and international. He died in Buenos Aires on 31 May 1988. His place in the history of science rests on his fundamental discoveries on nervous tissue structure and function. His pupils include G. Rodríguez, A. Pellegrino, C. Cuello, J. Pecci-Saavedra, G. Jaim-Etcheverry, A. Solari, A. Lasansky, F. Wald, and one of us (MdC); they revere him as a gentleman of great dignity, who tried hard to hide a warm heart behind the façade of a stern, old-style professor. His department in Buenos Aires is now called "Eduardo De Robertis Institute of Cellular Biology and Neurosciences".

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