Clemente Estable (1894–1976)

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Clemente Estable (Fig. 1) is the founder of biological research in Uruguay, together with Ergasto Cordero (1890–1951) and Francisco Sáez (1898–1976). Renowned in his motherland [9], his contributions to neuroscience remain unheeded outside Latin America.

Born in Margat, Canelones, on 23 May 1894 to Giuseppe Stabile and Giuseppa Fallobella, Italian immigrants, Estable attended the Teachers College of Montevideo (1909–1913) and taught science in public schools. An autodidact in biology and psychology, he took extracurricular courses in medicine but never attempted to become a clinician.

In 1922, securing a stipend from the Spanish Cultural Institution, Estable went to Madrid to train in neuroanatomy under Santiago Ramón y Cajal (1952–1934). In a comparative study of the developing cerebellum [1], he observed occasional Purkinje axons emanating from dendrites, with pericellular baskets diverging to the axon initial segment. He described the olfactory bulb [2], and the gill terminals and gustatory innervation [3] of the Iberian ribbed newt. Those experiments supported Cajal's neuron theory and principle of dynamic polarization. Presiding over a *comité d'hommage*, Estable compiled and published Cajal's 'Studies on vertebrate neurogenesis' (1929).

Returning to Montevideo in 1925, Estable founded the Laboratory of Biology and Cinematography. In 1926, Américo Ricaldoni (1867–1928), dean of Medicine, appointed him chief of Histological Research at the Neurological Institute. Estable was appointed professor of Biology at the Faculties of Law (1931) and Medicine (1937), and received an honorary doctorate from the University of Santiago, Chile (1932).

At the Centennial Congress in Montevideo (1930), he described the structure of the neuronal nucleolus. Using light and phase-contrast microscopy of oocytes, neurons and plant cells, Estable and Sotelo [7] described in the nucleolus a filamentous substance, the *nucleolonema* (today, *pars fibrosa*), and a diffuse *pars amorpha* (today, *pars granulosa*). Presentations followed at the Eighth Congress of Cell Biology in Leiden [8] and the International Symposium on the Nucleolus in Montevideo [5], where Estable chaired the Committee on Nucleolar Nomenclature. We now understand that the osmiophilic pars fibrosa consists of DNA elements 6–8 nm in diameter, and the lighter pars granulosa of RNA granules 15–20 nm in diameter.

In 1949 Estable recruited the Argentinian cell biologist Eduardo De Robertis (1913–1988). They organized a Department of Cellular Ultrastructure, which housed the first electron microscope in South America, and provided ultrastructural evidence of neuron contiguity [6]. A Montevideo meeting under the auspices of UNESCO and WHO [4] included Pyotr Anokhin, Robert Doty, John Eccles, Ralph Gerard, Donald Hebb and Horace Magoun

among the speakers. Estable presented morphofunctional correlates of dendrodendritic, dendrosomatic, somatosomatic and axoaxonal synapses, besides classical axosomatic and axodendritic contacts, and stressed the discontinuity of pre- and postsynaptic membranes.

Between 1923 and 1974, Estable published 90 scientific papers [10], including observations on the insects of Uruguay (1929); the histopathology of Friedreich ataxia (1928), language disorders (1932), and syringomyelia (1941); and histological studies on retinal cytoarchitecture (1927), sciatic nerve regeneration (1957), and synaptogenesis after peripheral nerve grafting (1969).

His books include 'The kingdom of vocations' (1923), 'The active school' (1931), 'Curriculum, pedagogical method, philosophy of education' (1939), 'Psychology of vocation' (1942), 'Ramón y Cajal' (with Pío del Río Hortega, 1944), and 'Don Santiago Ramón y Cajal' (1952). From 1947 through 1965 Estable and Emilio Oribe (1893–1975) edited the *Revista de la Facultad de Humanidades y Ciencias*.

Estable devised an educational reform plan ('Plan Estable'), based on the principles of the scientific research method as a teaching and learning tool. Initially adopted in 1939, it forms, since 1957, the basis of Uruguay's public education system. At its core are the child's best interests; priority of teachers is the respect for the personality and mental well-being of pupils, who must be stimulated to discover.

In the 'Contribution of the university to scientific research' (1931), Estable proposed reforms for higher education and underlined the state's responsibility in promoting science and ensuring the appropriate conditions for the work of researchers. In 1943, he helped the state administration to adopt full-time employment, something unknown until then in Uruguay. By full-time Estable meant a way of life that presupposes "todo el tiempo y todo el hombre" (full-time and fulfilled people).

Clemente Estable was honored by the Chamber of Representatives of the Republic (1960) and by the Departmental Council of Montevideo (Act No. 369, 1962). He died on 27 October 1976 in Montevideo. With his wife, Isabel Puig Cardama (1891–1990), also an educator, they had three children, Isabel, Clemente, and Juan Francisco.

Since 1976, the state-funded Institute of Biological Research bears his name. A stamp was issued by the Uruguayan Postal Service in 1994 to celebrate the centennial of his birth (Scott catalogue #1528).

Conflict of interest None.

References

1. Estable C (1923) Notes sur la structure comparative de l'écorce cérébelleuse, et dérivées physiologiques possibles. Trav Lab Rech Biol Univ Madr 21:169–256
2. Estable C (1924) Systèmes osmatiques et cause histologique possible de la pluralité d'énergies olfactives spécifiques. Trav Lab Rech Biol Univ Madr 22:329–358
3. Estable C (1924) Terminaisons nerveuses branchiales de la larve du *Pleurodeles waltlii* et certaines données sur l'innervation gustative. Trav Lab Rech Biol Univ Madr 22:369–384
4. Estable C (1961) Considerations on the histological bases of neurophysiology. In: Fessard A, Gerard RW, Konorski J (eds) Brain mechanisms and learning. Blackwell, Oxford, pp 309–334
5. Estable C (1966) Morphology, structure, and dynamics of the nucleolonema. NCI Monogr 23:91–105
6. Estable C, Reissig M, De Robertis E (1954) Microscopic and submicroscopic structure of the synapsis in the ventral ganglion of the acoustic nerve. Exp Cell Res 6: 255–262
7. Estable C, Sotelo JR (1951) Una nueva estructura celular: el nucleolonema. Publ Inst Invest Cienc Biol (Montev) 1:105–126
8. Estable C, Sotelo JR (1955) The behaviour of the nucleolonema during mitosis. Int Union Biol Sci (Groningen) 21:179–190
9. Gomensoro JB (1976) Profesor Clemente Estable, 1894–1976. Acta Neurol Latinoamer (Montev) 22:205–207
10. Trinkle E (1979) Clemente Estable: su bibliografía científica. Rosgal, Montevideo

Caption

Fig. 1 Clemente Estable (www.elpais.com.uy). Signature from the author's private archive

Figure 1

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