Editorial

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Gennady A. Buznikov, PhD (1931–2012): Father of Neurotransmitters as Developmental Signals

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Gennady Buznikov died on August 27, 2012, in Los Angeles, Calif., USA, where he lived with his wife Lyuda Nikitina, after a brief illness (fig. 1).

He was born on January 18, 1931, in Leningrad (Saint Petersburg), Russia. His early childhood left a lasting impression. Before World War II, his father was subjected to political repression and imprisoned. When Gennady was only 10, he was evacuated from Leningrad just before the city was sieged by the Germans in 1941, and placed in a children's home. Despite this, Gennady had the strength of character and natural abilities to pass the entrance exam for admission to the Biology Faculty of the M.V. Lomonosov Moscow State University, where he pursued his graduate studies.

Gennady A. Buznikov

The post-war wave of political repressions caused his mother to lose her job and be blacklisted. This left the family penniless, except for a small scholarship and part-time work of Gennady. Life obstacles were balanced to some extent by success in scientific research in the Department of Human and Animal Physiology at Moscow State University, carried out under the direction of Prof. Khachatur Koshtoyantz. This research on the role of hyaluronidases in the hatching of bony fish began as a student research project and became the basis of his PhD thesis, which he successfully defended in 1956. However, this work did not become the main direction of Gennady's research.

The events that determined the direction of his research career occurred at the end of the 1950s, when he, together with his colleague Boris Manukhin, followed up on the proposal by Koshtoyantz that chemical mechanisms of the nervous system are derived from the prenervous system of regulation in early development. In 1961, they published the first evidence that 5-hydroxytryptamine (5-HT) regulated embryogenesis in a marine mol-

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lusc [1, 2]. This led the way for the establishment of a new role for neurotransmitters, like 5-HT, as 'developmental signals' during embryogenesis. In 1966, he defended a dissertation on this topic for his Doctor of Biological Sciences degree.

Buznikov's body of work on marine organisms, primarily sea urchins, provided convincing evidence that 5-HT is a critical regulator of developmental events, like the cell cycle, blastomere interactions and morphogenesis in early embryos [3–11].

The list of Buznikov's ideas is completed by the concept of intracellular localization of embryonic neurotransmitter receptors, first proposed in his monograph *Neurotransmitters in Embryogenesis* [12], which remains the most exhaustive source on this topic in the field. At the end of his scientific career, Buznikov hypothesized that neurotransmitter conjugates with functionalized fatty acids can exist as endogenous regulators of embryonic development [13]. Students who obtained their PhD degrees under his mentorship, colleagues in the Group of Embryophysiology at the N.K. Kolztov Institute of Developmental Biology, and a number of scientists around the world are continuing work in the field of embryonic neurotransmitter functions established by Gennady Buznikov.

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