

What Is Critical in the Critical Period of Olfactory System Development?

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Abstract: The olfactory system is the only nervous system in vertebrate species that continuously generate new neurons throughout the life of the animals. This unique characteristic suggests that the olfactory neurons may hold a secret of regenerative capacity that is lost in other neurons. In this regenerative nervous system, we discover a critical period in setting up the highly specific connections between sensory neurons and their central targets. Despite massive neurogenesis during the postnatal development, we found only a population of perinatally born sensory neurons are endowed with the ability to set the olfactory map, and to correct erroneously projecting axons. Here I will discuss the behavioral implication of a critical period in the olfactory system development, the identification of a population of navigator neurons during the critical period, the cellular mechanisms by which the navigators establish the olfactory map, and the molecular mechanism that control the timing of the critical period.