

## **Steroids and ion channels in evolution: From bacteria to synapses and mind**

### **Evolutionary role of steroid regulation of GABA<sub>A</sub> receptors**

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Review

**Abstract.** Ion channels are vital components of plasma membranes. This article presents an evolutionary view of the biochemical mechanism of controlling activity of ion channels by rigid lipids, such as steroids or biophysically similar molecules, which were instrumental in formation and control of ion channels in cell membranes at the very origin of life. Such regulatory mechanisms exist in all cellular forms of life from ancient bacteria to humans and participate in a diversity of biological functions, from the most basic, such as maintenance of cell shape, homeostasis, feeding, cell fusion, and reproduction to the most intricate, such as the mind. Learning about the regulation of membrane ion channels by steroids and like molecules is important for understanding the evolution of life and various aspects of cell and organism physiology, for unraveling the mysteries of mind, and for practical purposes such as developing new pharmacotherapies.

**Key words:** steroids, neurosteroids, ion channels, GABA<sub>A</sub> receptors, regulation, evolution, bacteria, reproduction, brain, mind