Cell-cell communication is essential, and information exchange is fundamental to life. In humans, rapid cell-cell communication occurs in brains through neurons. This type of cellular communication is mediated by neurotransmitters, including □-aminobutyric acid (GABA), glutamate, and acetylcholine[1]. The glutamate induces the opening of ionotropic glutamate receptor channels (iGluR), and allows glutamate entrance, and also allows calcium (Ca^{2+}) transport[2]. In mammals, iGluR plays key roles in central nervous system functioning[3] in cognition, learning, and memory[1,4].

About 20 years ago, it was discovered that plants also have glutamate receptors termed glutamate-like receptor (GLR)[5]. *Arabidopsis thaliana* genome has 20 GLR genes[5,6]. In plants, GLRs have several functions such as regulation of hypocotyl elongation[5,7], abscisic acid (ABA) synthesis[8], regulation of root meristem[9,10], plant defense against pathogens[11], long-range wound mediated signaling calcium (Ca^{2+})[12,13] and stomatal closure modulation through Ca^{2+}[14]. Consequently, the first aim of my research is to study the role of these plant-specific glutamate channels on the transmission of information in within the plant. In my studies, I will focus on AtGLR3.7 which is expressed in cells of all organs of *Arabidopsis thaliana*.

The second branch of this research is work with anesthesia in plants. Discovered about 200 years ago, general anesthesia has been used for medical purposes, but how this process works precisely has not been exemplified yet. Some explanations attempts have been made, but it is still a mystery how different chemical compounds induce loss of consciousness in animals and humans[15]. One hundred and fifty years ago, a famous French physiologist Claude Bernard discovered that the plant *Mimosa pudica* can be anesthetized when placed in contact with diethyl ether. The leaves of *M. pudica* did not close after mechanical stimulation. With this, he concludes: "... plants and animals must share a common biological essence that must be interrupted by anesthetics."[16–18]. Recent research contemplates the Claude Bernard's discovery that anesthesia, via diethyl ether, immobilizes also the moving leaves of *Drosera capensis* and *Venus flytraps*[19]. This leaf immobilization is fully reversible, i.e., after contact with anesthetics, the plant loses its responsiveness, but after removal of these anesthetics, all processes are immediately resumed[20]. Interestingly, diethyl ether inhibits jasmonate signaling and accumulation[21].

An example of membrane protein is AtGLR3.7, a type of GLR, which is responsible for capturing glutamate for cytosol, together with Ca^{2+} into the cell. Several studies show that diethyl ether interacts with GABA receptors, glutamate receptors, and ion channels[22–25]. Thus, if ether can influence glutamate binding capacity to its respective channel, then it can also influence the signal transmission through Ca^{2+} signaling cascades. This is the second aim of my research: to investigate how anesthetics interact with plants and their influence on the information transmission process.

Finally, the third branch is work with a South American plant *Boquila trifoliolata*. This plant has a specific ability of its leaves to change their shapes to mimic leaves of the neighboring plants. Until now it was thought that they changed the shape of their leaves using the information from volatile chemical substances released by neighboring plants. However, Boquila plants can mimic not only shapes but also sizes and textures of the host plant leaves, implicating some kind of the plant-specific vision[26,27]. I will study this plant at a cellular and subcellular levels, characterizing its morphological structures and physiological processes, to try to understand how it alters its shape.

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