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## **Sensing forces in plants with mechanosensitive channels**

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Plant as all living organisms are subjected to mechanical forces arising either from their environment or from inside their own body. From the environment mechanical cues are present through obstacles in the soil encountered by root or through rain wind and gravity exerting mechanical stimulations on aerial parts. From inside, forces result from the high osmotic pressure encountered in the cell and at shoot scale from the compression of inner tissues whilst outer tissues are under tension. To probe these forces, in order to control their development, organisms have developed very efficient mechanosensors: the mechanosensitive (MS) channels.

MS channels identified and partially characterized in plants belong to MSL, MCA, Piezo, OSCA and TPK families [1]. Inserted in the membrane, they are able to convert, almost instantaneously, mechanical stimuli into electrical or biochemical signals. Here, we will discuss on AtMSL10 from the Arabidopsis model plant, homologous to the E.coli EcMscS (Mechanosensitive channel Small conductance) able to catalyse large flux of anions [2,3]. Involved in cell signaling, AtMSL10 is expressed in aerial organs and its activity is amplified by oscillatory stimulation at frequencies corresponding to wind-driven oscillations of plant stems and leaves. Therefore, AtMSL10 is proposed to represent a molecular component allowing the perception of oscillatory mechanical stimulations by plants [4]. More recently, we characterized in the same plant a calcium MS channel rapidly activated (RMA) associated with the presence of the DEFECTIVE KERNEL1 (DEK1) [5]. We are currently investigating the role of this channel in root mechanosensing.

Finally, we will stress the need to reintegrate plant MS channel in cellulo-contexte. Indeed, MS channels described with the patch-clamp technique, are characterized in the absence of a cell wall. There is a need to map membrane tension at the cellular scale in order to specify where and under which conditions MS channels operate.

[1] M. Guichard et al., 2022, doi.org/10.1016/j.pbi.2022.102252.

[2] Haswell, et al., 2008 doi: 10.1016/j.cub.2008.04.039.

[3] Maksaev et al., 2012 doi : doi.org/10.1073/pnas.1213931109

[4] Tran *et al.*, 2021, doi: 10.1073/pnas.1919402118.

[5] Tran et al. 2017, doi.org/10.1038/s41467-017-00878-w