A porin-like protein from oral secretions of Spodoptera littoralis larvae induces defense-related early events in plant leaves.

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Abstract

Insect herbivory on plants is a complex incident consisting of at least two different aspects, namely mechanical damage and chemical challenge, as feeding insects introduce oral secretions (OS) into the wounded tissue of the attacked plant. Mechanical wounding alone is sufficient to induce a set of defense-related reactions in host plants, but some early events such as membrane potential (Vm) changes and cytosolic Ca^{2+}-elevations can be triggered only by herbivores suggesting that OS-derived molecules are involved in those processes. Following an assay-guided purification based on planar lipid bilayer membrane technique in combination with proteomic analysis, a porin-like protein (PLP) of most likely bacterial origin was determined from collected OS of Spodoptera littoralis larvae. PLP exhibited channel-forming activity. Further, early defense-related events in plant-insect interaction were evaluated by using a purified fraction and α-hemolysin (α-HL) as a commercial pore-forming compound. Both up-regulated the calmodulin-like CML42 in Arabidopsis thaliana, which only responds to oral secretion and not to wounding. An elevation of in vivo

[Ca^{2+}](cyt) was not observed. Because membrane channel formation is a widespread phenomenon in plant-insect interactions, this PLP might represent an example for microbial compounds from the insect gut which are initially involved in plant-insect interactions.

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