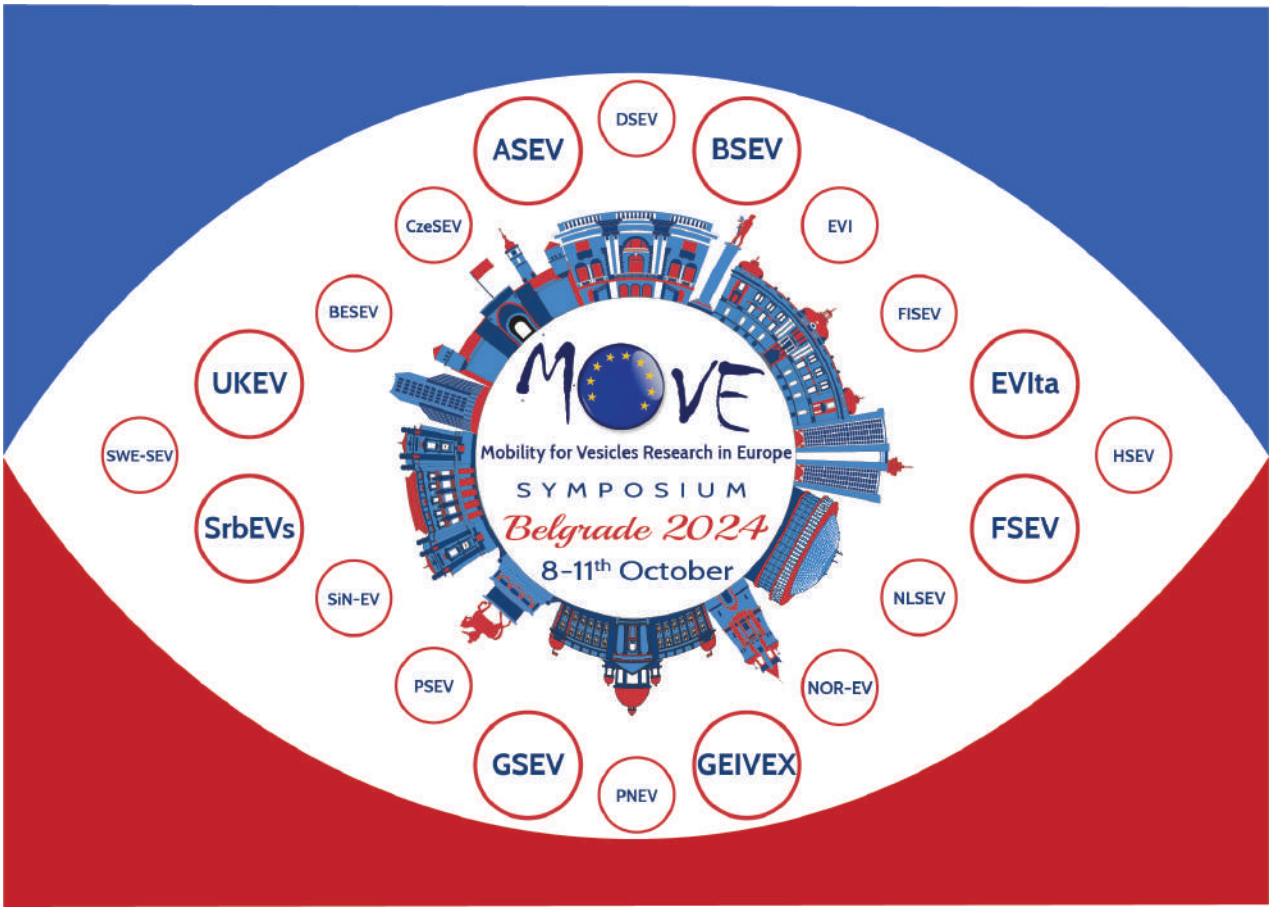
2nd MOVE Symposium



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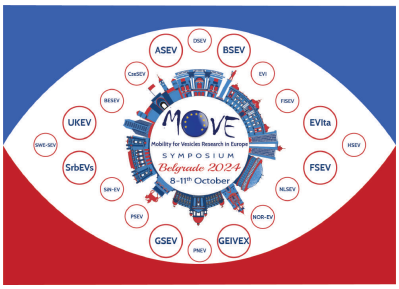

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8-11 October 2024, Belgrade, Serbia

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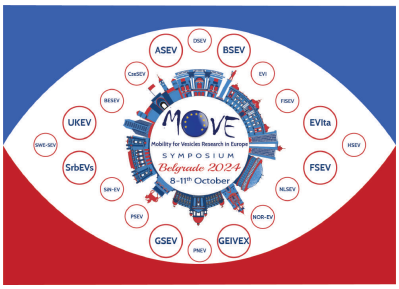

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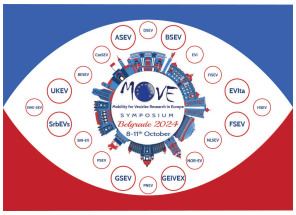

P-I-13

Arabidopsis thaliana root cells interact with outer membrane vesicles (OMVs) produced by plant beneficial bacterial strain Paraburkholderia phytofirmans PsJN

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Introduction: Plant growth-promoting bacteria (PGPB) play an essential role in the growth and development of plants by facilitating the uptake of nutrients and increasing stress resistance. The interaction between plants and their beneficial bacteria is multifaceted, but the role of extracellular vesicles (EVs) in this interkingdom communication is poorly understood. To investigate the interaction of outer membrane vesicles (OMVs) with plant cells, EVs produced by Gram-negative bacteria, we isolated and characterized OMVs produced by Paraburkholderia phytofirmans PsJN, a PGPB strain known for its plant-protective abilities.

Methods: The OMVs of P. phytofirmans PsJN were isolated using an affinity-based chromatography system and characterized by Nanoparticle tracking analysis (NTA). To monitor the interaction of OMVs with plant cells, the vesicles were labelled with the lipid-binding dye Vybrant™ DiD. To ensure the specificity of the signals, different methods to remove the unbound dye were tested, namely dialysis, ultracentrifugation, ultrafiltration and iodixanol density gradient purification. Arabidopsis thaliana roots were incubated with DiD-labelled OMVs and observed by confocal laser scanning microscopy (CLMS).

Results: NTA revealed 70nm to 180 nm size range of isolated OMVs. Regarding preparation of OMVs for monitoring their interaction with plant cells, the most satisfactory removal of unbound dye was obtained after the separation of DiD-OMVs in the density gradient. A. thaliana roots treated with DiD-OMVs showed specific red signals in the root hairs and epidermal cells, while the signals were absent in the control-treated roots.

Conclusions: The results suggest that PsJN OMVs directly interact with the root hairs and epidermal cells of A. thaliana. As root hairs play a crucial role in plant nutrient uptake and interactions with microbes, further investigation is needed to determine the potential contribution of PsJN OMVs to plant recognition of beneficial bacteria, establishment of mutual interactions and the exertion of a protective effect by PGPB.

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