

移動性RNA ナノ粒子デリバリー

Seminar title: "Protein-coated nanoparticles for active uptake and delivery of mobile RNA in plants"

SPEAKER

Prof. Bernard Carroll

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日時：2024年9月9日（月）
16:00-17:30

場所：理学部2号館第1講義
（120号室）

ABSTRACT

Nanoparticle-mediated delivery of nucleic acids and proteins into intact plants has the potential to modify metabolic pathways and confer desirable traits in crops. We have designed protein-coated nanoparticles that can traverse the plant cell wall, be taken up by the roots and translocate via an active transport mechanism in plants. Layered double hydroxide (LDH) nanosheets coated with lysozyme are actively taken up into the root tip, root hairs and lateral root junctions by endocytosis, and translocate through the plant via a membrane trafficking pathway and the apoplast. Our data indicate that lysozyme coating enhances nanosheet uptake by i) loosening the plant cell wall and ii) stimulating the expression of endocytosis and membrane trafficking genes. The lysozyme-coated nanosheets efficiently delivered synthetic mRNA and plasmid-encoded genes into the roots, leaf, callus and/or pollen of both dicot and monocot species. Furthermore, plasmids up to 15 kb in size were successfully delivered to express genes in tobacco roots. Lastly, we have shown that lysozyme-coated nanosheet delivery of mRNA fused to graft-transmissible RNA motifs into roots enables the systemic expression of the encoded protein in the shoots. Thus, lysozyme-coated LDH nanoparticles are a versatile tool for efficiently delivering mobile mRNA for systemic expression in plants.



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