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ICGEB International SEMINAR PROGRAMME 2017

Wednesday, 27 September 2017 | 12:00 noon | ICGEB Seminar Room, W building | Padriciano, 99, Trieste, ITALY

Paul SCHULZE-LEFERT

Department of Plant-Microbe Interactions, Max Planck Institute for Plant Breeding Research, Cologne, GERMANY

We have previously shown that healthy roots of Arabidopsis thaliana, grown in natural soils, are colonized by a bacterial consortium with well-defined taxonomic structure. Members of this root microbiota belong mainly to the phyla Actinobacteria, Bacteroidetes, Firmicutes, and dominant Proteobacteria. A comparison of the bacterial root microbiota of A. thaliana with A. thaliana relatives, grown under controlled environmental conditions or collected from natural habitats, demonstrated a largely conserved microbiota structure with quantitative, rather than qualitative, species-specific footprints. We have isolated more than 8,000 A. thaliana root- and leaf-associated microbiota members as pure bacterial cultures, representing the majority of A. thaliana microbiota taxa that are detectable by culture-independent community profiling methods, and generated whole-genome sequence drafts for a core collection of 400 isolates. I will discuss how we utilize these biological and genome resources to explore the evolution and functions of one taxonomic lineage of the root microbiota. Rhizobia are a paraphyletic group of soil-borne bacteria defined by their ability to induce nodule organogenesis in legume roots and fix atmospheric nitrogen for plant growth. In non-leguminous plants, species within the Rhizobiales order define a core lineage of the plant microbiota, suggesting alternative forms of interactions with plant hosts. We compared more than 1,300 whole-genome sequences of Rhizobiales isolates, including microbiota members from non-legumes, and show that the set of genes required for nodulation and nitrogen fixation in legume symbiosis was acquired multiple independent times within each Rhizobiales sublineage. The majority of root-associated rhizobia colonize and promote root growth in the crucifer Arabidopsis without nitrogen fixation, indicating these are rhizobial traits of an ancestral root association. Thus, the capacity for nodulation and nitrogen fixation in legumes was likely acquired from a predisposed root association in multiple subsequent events, constituting an example of convergent evolution.

"Plant microbiota assembly and functions in plant health"

Host: V. Venturi

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