The amazing diversity of bacteria in soil. (S03-kuske050102-Oral)

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Abstract:

Soil bacteria play important roles in nutrient cycling, soil development, and plant survival and productivity. Through DNA-based studies using the 16S rRNA gene, we now know that soil bacteria are very diverse and that in many environments, the vast majority of bacteria are non-cultured species that represent novel bacterial taxa. We have compared the diversity of soil bacteria in several arid soils of the Southwest U.S. using DNA- and RNA-based methods. In a comparison of four soils (2 rhizosphere and 2 non-rhizosphere soils from a volcanic cinder field and a sandy loam soil),we found that at least 21 different bacterial divisions (from about 40 characterized divisions) were present in the soils, and we identified 4 new candidate divisions. The division-level diversity and composition was similar across the four soils. However, the composition of uncultured bacterial species comprising those divisions, and the composition of cultured Pseudomonas species were very different in the four soils. Over 50% of the clones from four 200-member 16S rRNA clone libraries were members of the Acidobacterium division, a very broad division that contains only a few cultivated members. Members of this division have been detected in a wide variety of environmental samples worldwide, and from our studies they appear to be abundant and active in arid land soils. We have determined that the composition of Acidobacterium division members differs with soil depth and in rhizosphere association with different plant species. Current studies include determining which species are active under different environmental conditions and isolating cells from non-cultured Acidobacterium division members for genome sequencing and analysis.

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Presentation Information:

Presentation Date: Tuesday, November 12, 2002
Presentation Time: 3:00 pm

Keywords: