Rhizobia induce the formation on specific legumes of new organs, the root nodules, as a result of an elaborated developmental program involving the two partners. In order to contribute to the study of the genetics underlying this plant-microbe symbiosis we have found that the product of the *tolC* gene from *Sinorhizobium meliloti* is relevant for the symbiosis with plants of the genus *Medicago*. TolC is an important though low-abundance protein in the outer membrane of Gram-negative bacteria. It functions as a component of multidrug resistance efflux systems in the removal of a broad range of toxic chemicals from the cell (Fralick 1996) and is also found in the type I dependent secretion systems involved in the secretion of certain virulence-associated proteins (Wandersman and Delepelaire 1990). The search for proteins secreted by *Sinorhizobium meliloti* TolC with a possible role in symbiosis resulted in the identification of ExpE1 and ExsH proteins. ExpE1 is a Ca\(^{2+}\)-binding protein required for the biosynthesis of the exopolysaccharide galactoglucon necessary for symbiosis (Moreira et al. 2000) and ExsH is an endoglycanase involved in the depolymerization of succinoglycan (York and Walker 1997). The role of Ca\(^{2+}\)-binding proteins in *Sinorhizobium* in intriguing, especially if we consider that in its genome, at least 14 other proteins with this characteristic exist. Another calcium-binding protein with a relevant role in symbiosis is NodO from *Rhizobium leguminosarum* (Scheu et al. 1992) but many other calcium-binding non characterized proteins exist in this bacteria.

There has been speculation that production of a differential repertoire of plant peptides by determinate and indeterminate legumes plays a role imposing different differentiation programs on the successful symbionts of these plants. It would be therefore interesting to determine if a symbiont that invades indeterminate legumes (e.g. *Sinorhizobium meliloti*, *Rhizobium leguminosarum*) and those that invade determinate legumes (e.g. *Mesorhizobium*, *Bradyrhizobium* sp.) have the same class of TolC-type outer membrane proteins and secreted proteins.
Objectives of this project:

a) To identify in the genome of Rhizobial strains (http://imgweb.jgi-psf.org/cgi-bin/w/main.cgi?section=TaxonList&page=restrictedMicrobes&domain=Bacteria&mainPageStats=1) proteins similar to TolC and determine their cellular localization, topology, and for the presence of conserved motifs characteristic of this family of proteins;

b) To identify in these genomes proteins having Ca$^{2+}$-binding repeats; to study the localization of these proteins and try to infer its possible biological process, not only by studying the genes nearby but also using microarray data available in public databases.

c) To correlate the data obtained from the different symbionts and the type of plant (determinate or indeterminate) they colonize.


