Exploring the Cell Surface: Identification and Characterization of Lipoproteins in *Mycoplasma mycoides* subsp. *mycoides* Large Colony, *Mycoplasma mycoides* subsp. *capri*, and *Mycoplasma capricolum* subsp. *capricolum*

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ABSTRACT

The *Mycoplasma mycoides* cluster is a group of genetically and antigenically related pathogenic bacteria that infect ruminants. The *M. mycoides* cluster members that are the focus of this discussion are three caprine pathogens: *Mycoplasma mycoides* subsp. *mycoides* Large Colony, *Mycoplasma mycoides* subsp. *capri*, and *Mycoplasma capricolum* subsp. *capricolum.* These organisms are causative agents of contagious agalactia as well as polyarthritis, pneumonia, mastitis, and septicemia. *Mycoplasma* possess no cell wall, are among the smallest self-replicating organisms identified, and have lost many biochemical pathways, including those necessary to synthesize sterols and amino acids, thus requiring they exist as obligate parasites within the host organism. This close relationship makes the cell surface a critical point of interaction between the bacterium and the host, not only to survive an attack by the host immune system, but also to acquire nutrients necessary for survival of the microbial pathogen. Proteins on the cell surface may be involved in host specificity or disease determination; therefore we compared five regions throughout the mycoplasmal chromosome of four different *M. mycoides* cluster members, as well as two different strains of *M. mycoides* subsp. *mycoides* Large Colony. These loci were found to contain unique putative lipoprotein genes (lipid modified proteins expressed on the cell surface), many of which show the potential to phase-vary. These genes may be useful to differentiate between members of the cluster. Herein is also described the first phase-variable lipoprotein gene in *M. mycoides* subsp. *mycoides* Large Colony. How the bacteria in this cluster cause disease is largely unknown; the only virulence factor identified to date has been the production of hydrogen peroxide via the metabolism of glycerol. This dissertation includes the initial characterization of a putative glycerol binding protein, also a lipoprotein, which may play a role in the ability of the mycoplasma cell to produce hydrogen peroxide and cause damage to host tissues. Understanding how such closely related organisms are able to exhibit variable virulence in unique hosts will depend on the characterization of those proteins expressed on the cell surface and their role in the bacterial lifecycle.