1. INTRODUCTION

1.1 The attachment organelle

In order to associate specifically with host cells, *Mycoplasma pneumoniae* and closely related species employ a specialized polar structure, the attachment organelle, which is assembled from a set of unique proteins (49-51). Many of these cytadherence-associated proteins exhibit insolubility in the nonionic detergent Triton X-100 (TX) and are associated with a structure, the triton shell, that remains after extraction of cells with TX. Because of its solubility properties, its appearance, and its association with various features of cell morphology, cell motility, cell division, and cell-cell adhesion, this triton shell is regarded as a novel bacterial cytoskeleton.

1.2 The cytoskeleton

1.2.1 Comparison with the eukaryotic cytoskeleton

The cytoskeleton is commonly regarded as a hallmark of eukaryotic cells. Polymeric proteinaceous filaments of three varieties, microtubules, microfilaments, and intermediate filaments, constitute the central players in the eukaryotic cytoskeleton. Early investigations of the *M. pneumoniae* TX-insoluble structure revealed analogies with actin-based microfilaments (71), but efforts to identify analogous proteins in *M. pneumoniae* and related
organisms have failed, culminating in the demonstrated absence of such genes from mycoplasma genomes (9,23,27,35). Thus, it is clear that the mycoplasma cytoskeleton is composed of proteins different from those of eukaryotic cells. As a result, insight into the mycoplasma cytoskeleton has seldom derived from information gleaned from studies of eukaryotic cells, but requiring instead direct analysis. Among the mycoplasmas, \textit{M. pneumoniae} has been the primary focus of these experiments.

\textbf{Figure 1.} Transmission electron micrograph of a thin section of \textit{M. pneumoniae} cells. Prominently featured in the terminal organelle is an electron-dense core (arrow) surrounded by electron-lucent space (arrowheads). Bar, 100 nm. (Courtesy of M. J. Willby.)

1.2.2 \textbf{Distinguishing features of the \textit{Mycoplasma} attachment organelle}

Electron microscopic (EM) images of both the \textit{M. pneumoniae} attachment organelle and the triton shell prominently feature an electron-dense rodlike core of uncertain composition, notably surrounded by electron-lucent space (Fig. 1) (28,68). The distal end of the core is wider than the core shaft and is referred to as the terminal button. The core itself is frequently observed to have either a banded or spiral pattern (68,82). The position of the core within the attachment organelle has led researchers to believe that it is critical for cytadherence, though the identities of all its components are unknown. In addition, other cytadherence-associated proteins are membrane-bound (3,59,77,80). Efforts to comprehend the components of the cytoskeleton in terms of their assembly and their dynamic interaction with the mycoplasma membrane have revealed a number of