What do bacteria adhere with?

Specialized organelles for adhesion

Invasomes - *S. typhimurium*

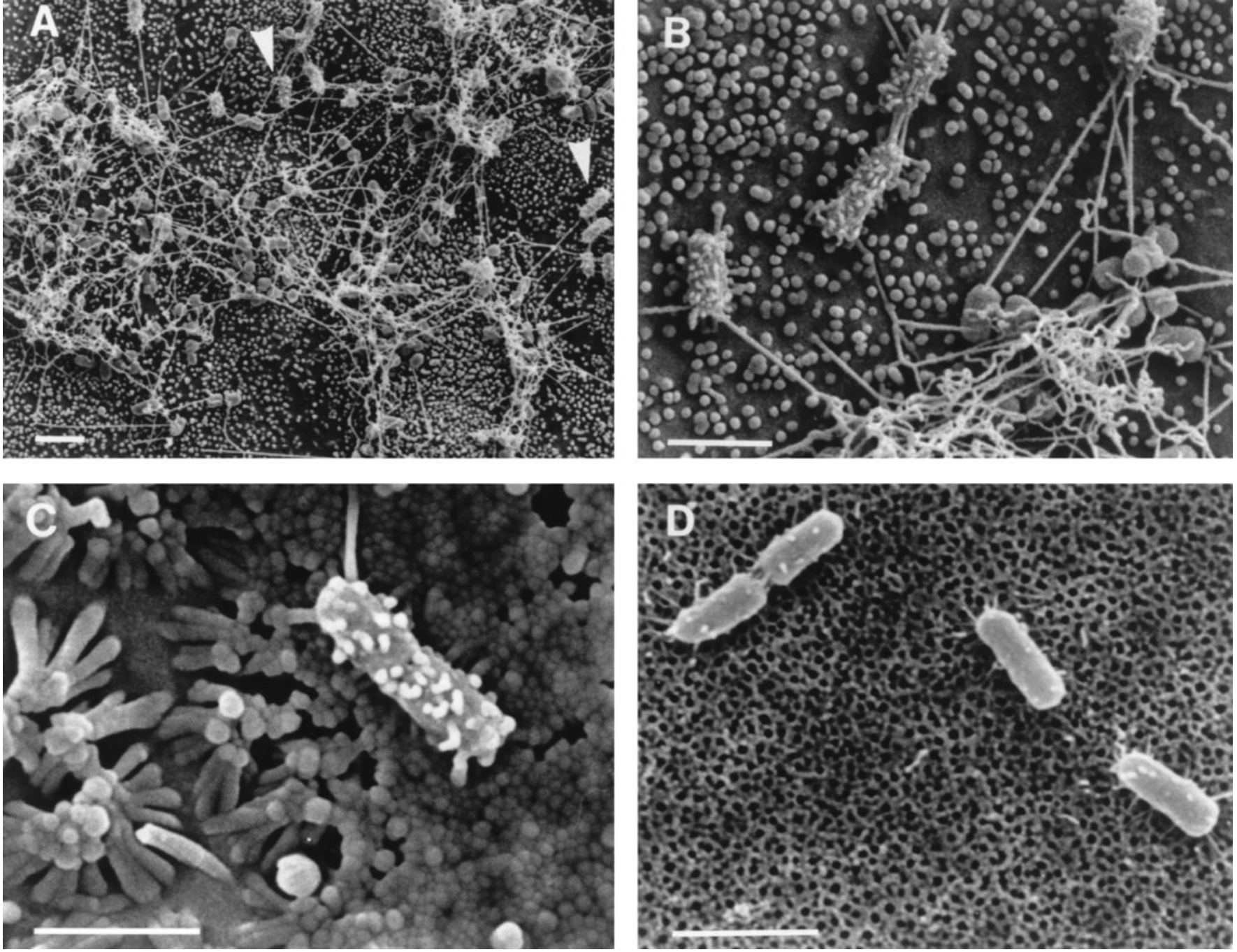
3x thicker than flagella

Produced within 15 minutes of contact

Disappear once internalization starts

Bundle-forming pili (bfp) - Enteropathogenic *E. coli*

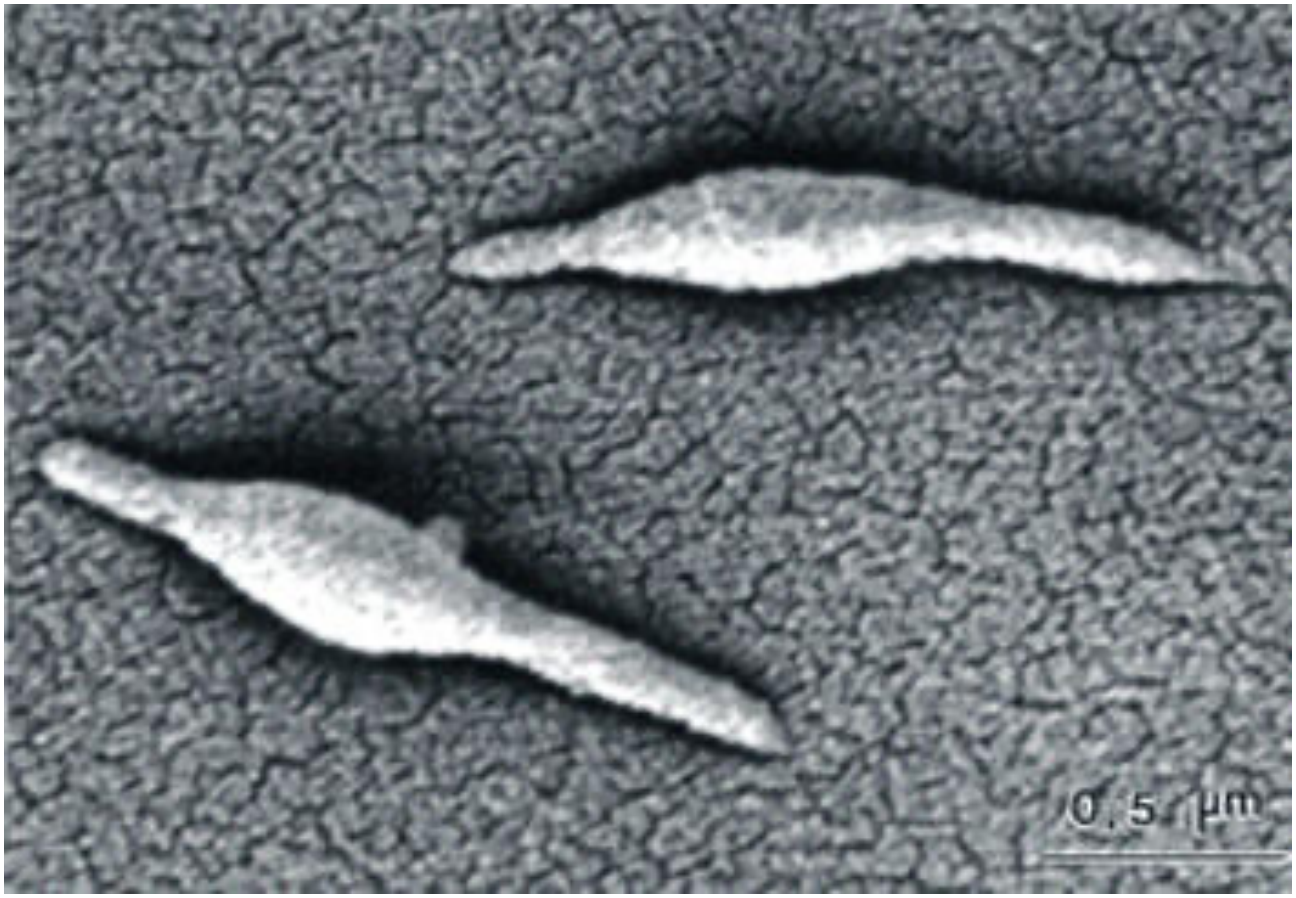
Formation of microcolony



Reed et al, Infect Immun, 1998

Mycoplasma adherence organelles –

Contains tightly packed cytoskeletal proteins



Microbewiki

What happens after adherence?

Varies, based on type of bacteria and host cells

Morphological changes in the host cells (pedestral formation by EPEC)

Deployment of bacterial invasion machinery (Type III secretion system)

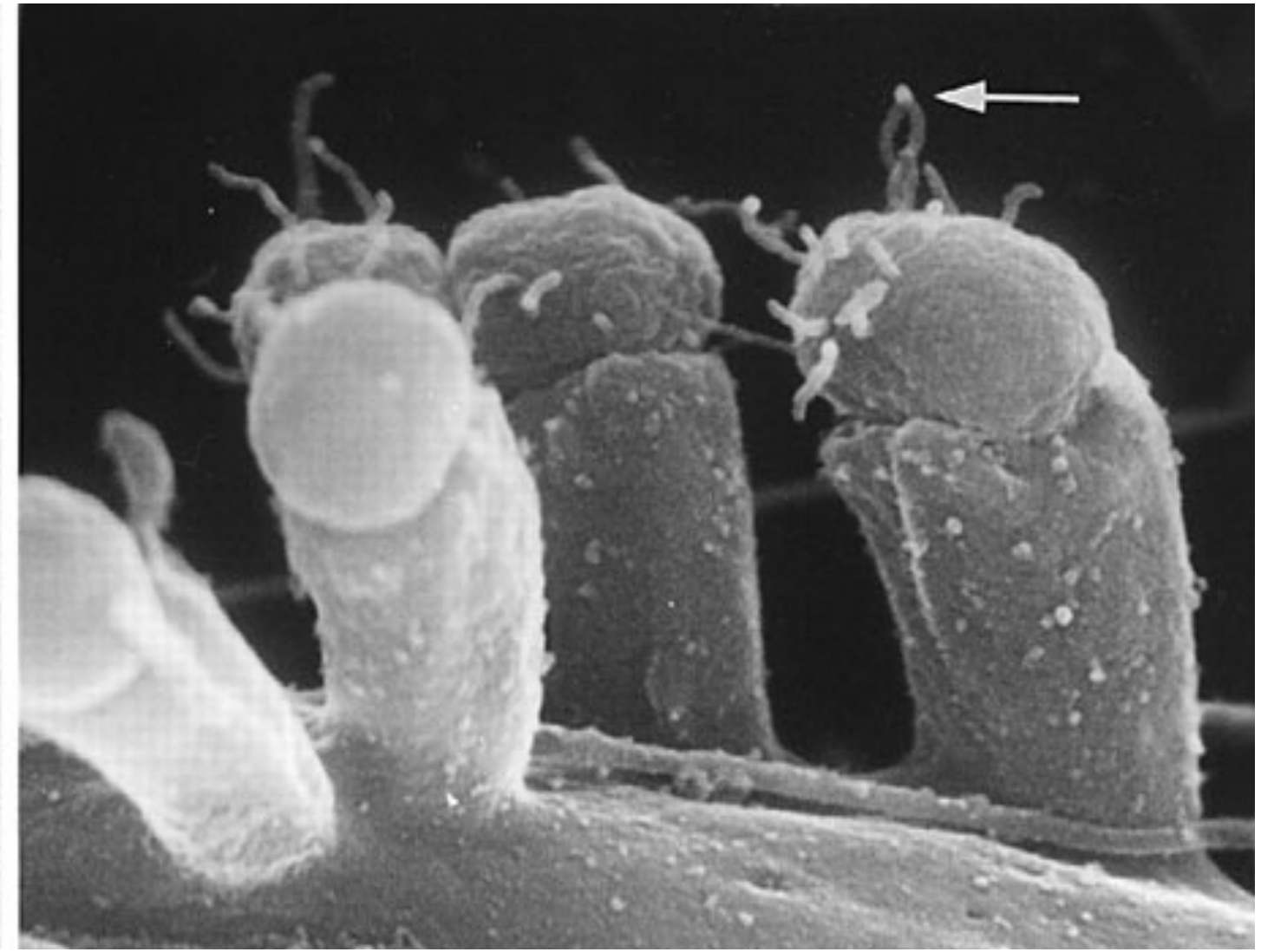
Changes induced in host cells (alteration of cytoskeleton, more intimate association)

Invasion by bacteria (membrane ruffling, zippering etc.)

Dissemination to other sites through the circulatory system

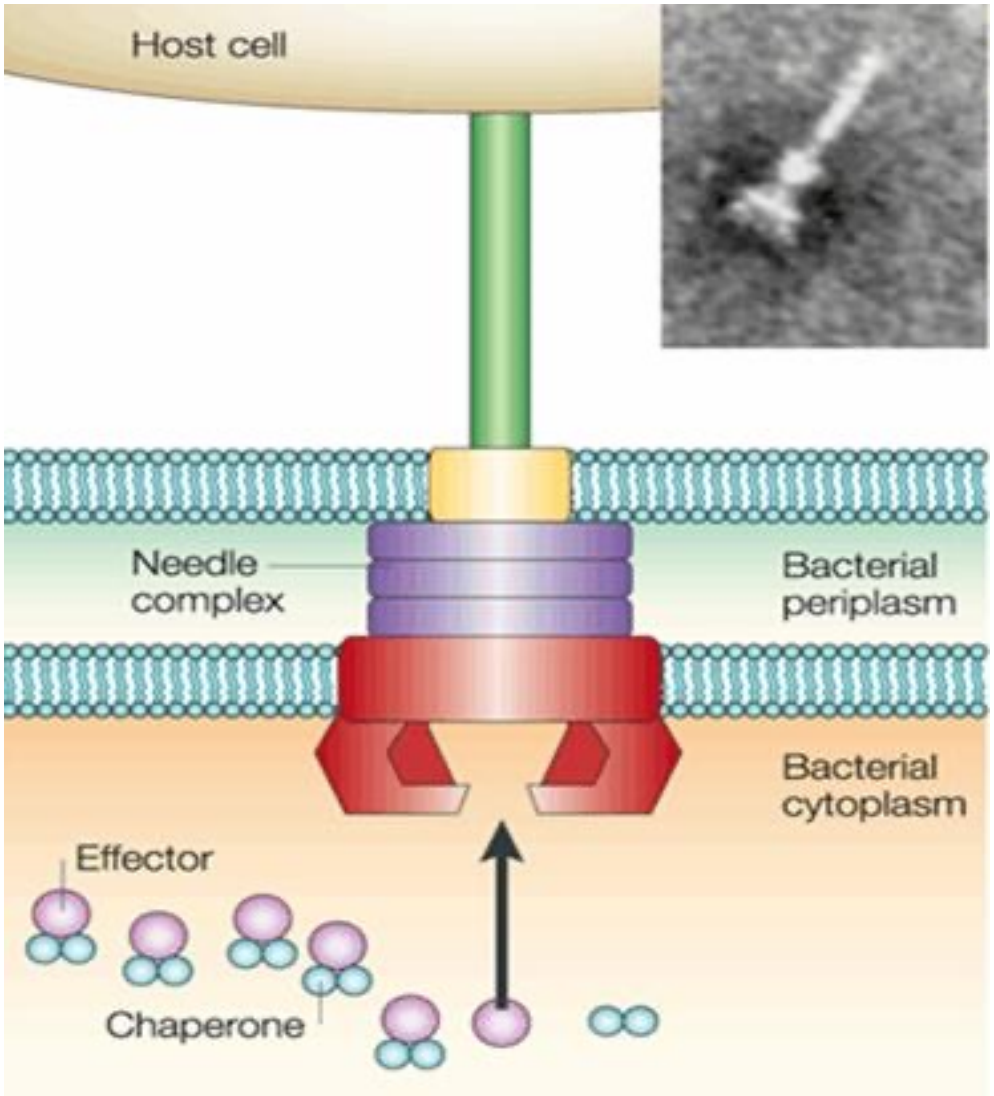
Penetration and survival inside cells (macrophages etc)

What happens after adherence?



Pedestral formation (Enteropathogenic *E. coli*)

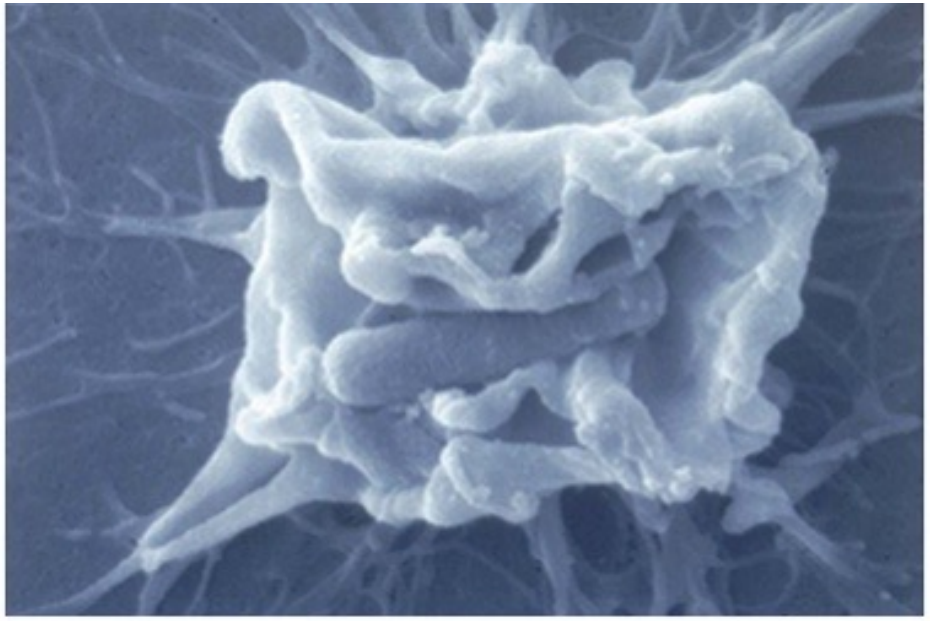
What happens after adherence?

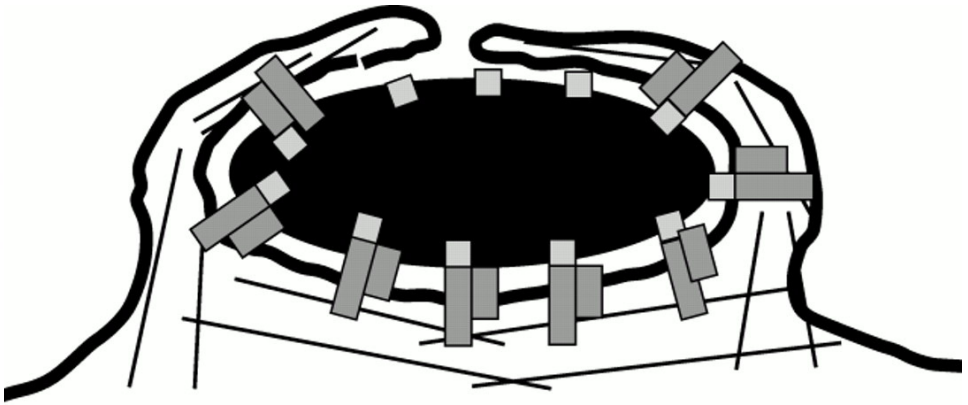


Deployment of injection needles (Type III secretion system)

Collier *et al.,* Science, 2010

Bacterial invasion mechanisms – alteration of host cytoskeleton

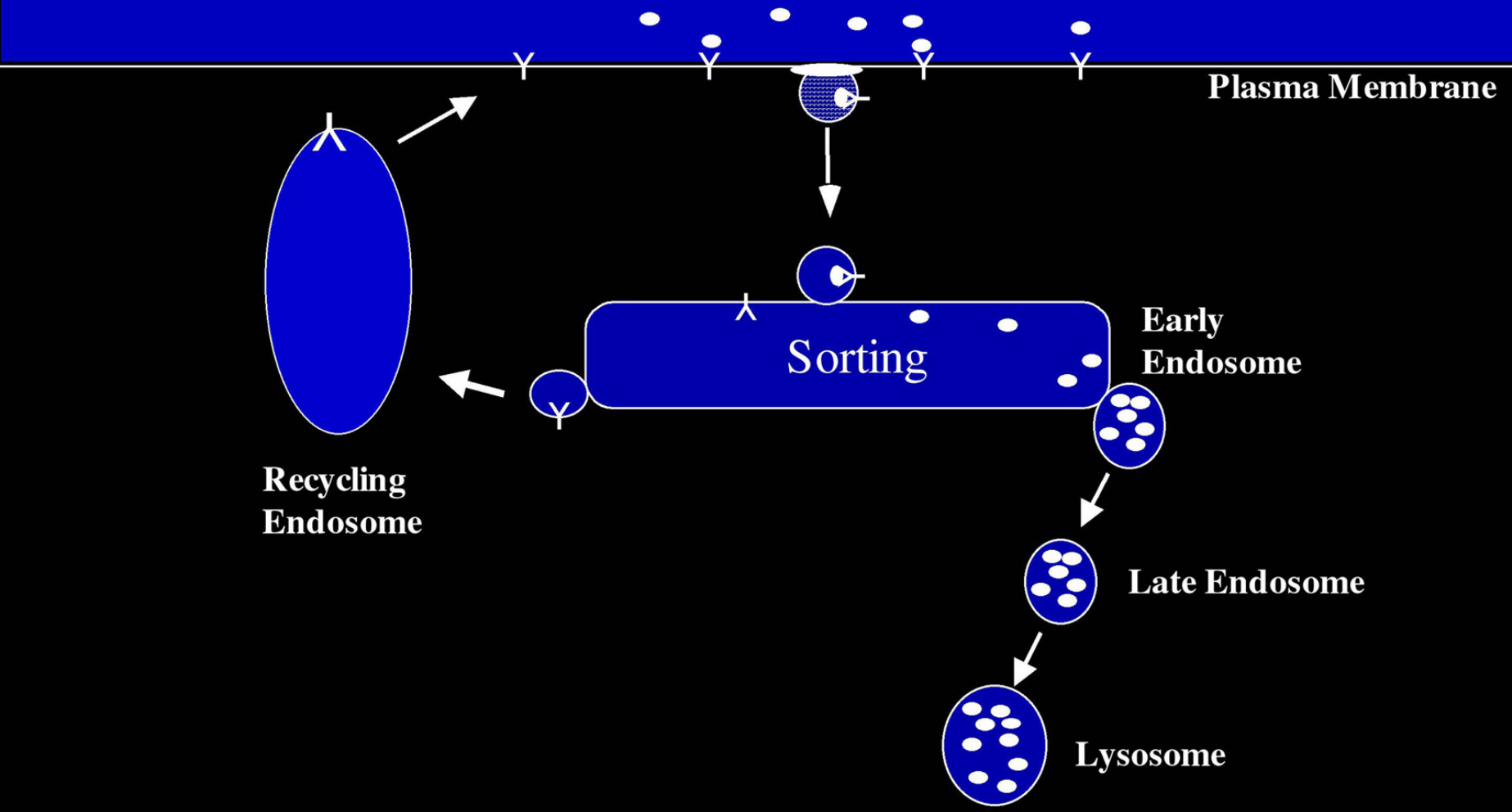




Membrane ruffling and Zippering

Sansonetti *et al.,* Gut, 2012

The Endocytic Pathway



Survival of bacteria inside host cells

Escape from early endosomes

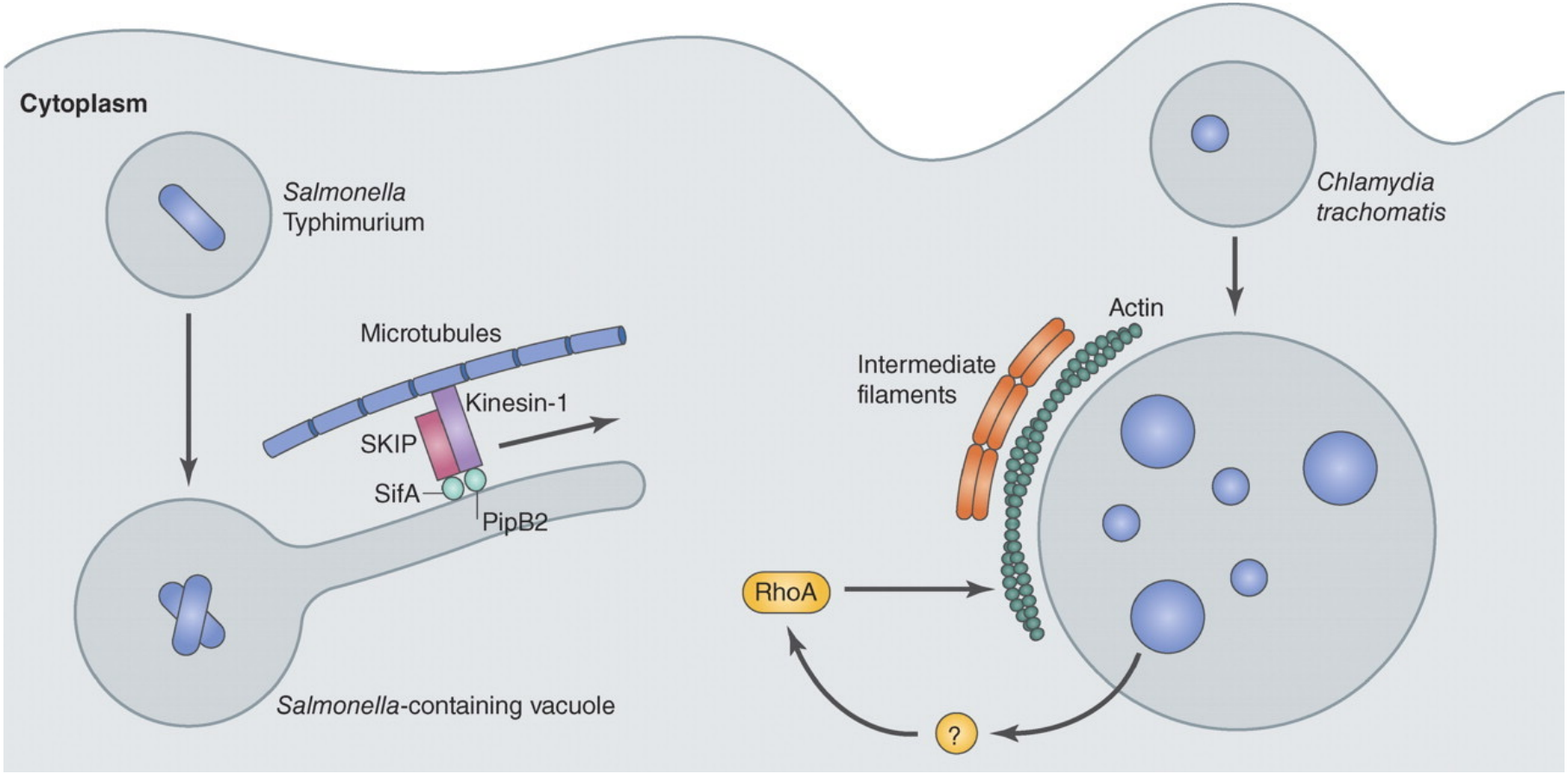
Prevention of vacuolar acidification

Strengthening of vacuolar structure

Delivery of nutrients through special structures

Cell-to-cell movement using proteins mimicking cellular cytoskeleton

Survival of bacteria inside host cells

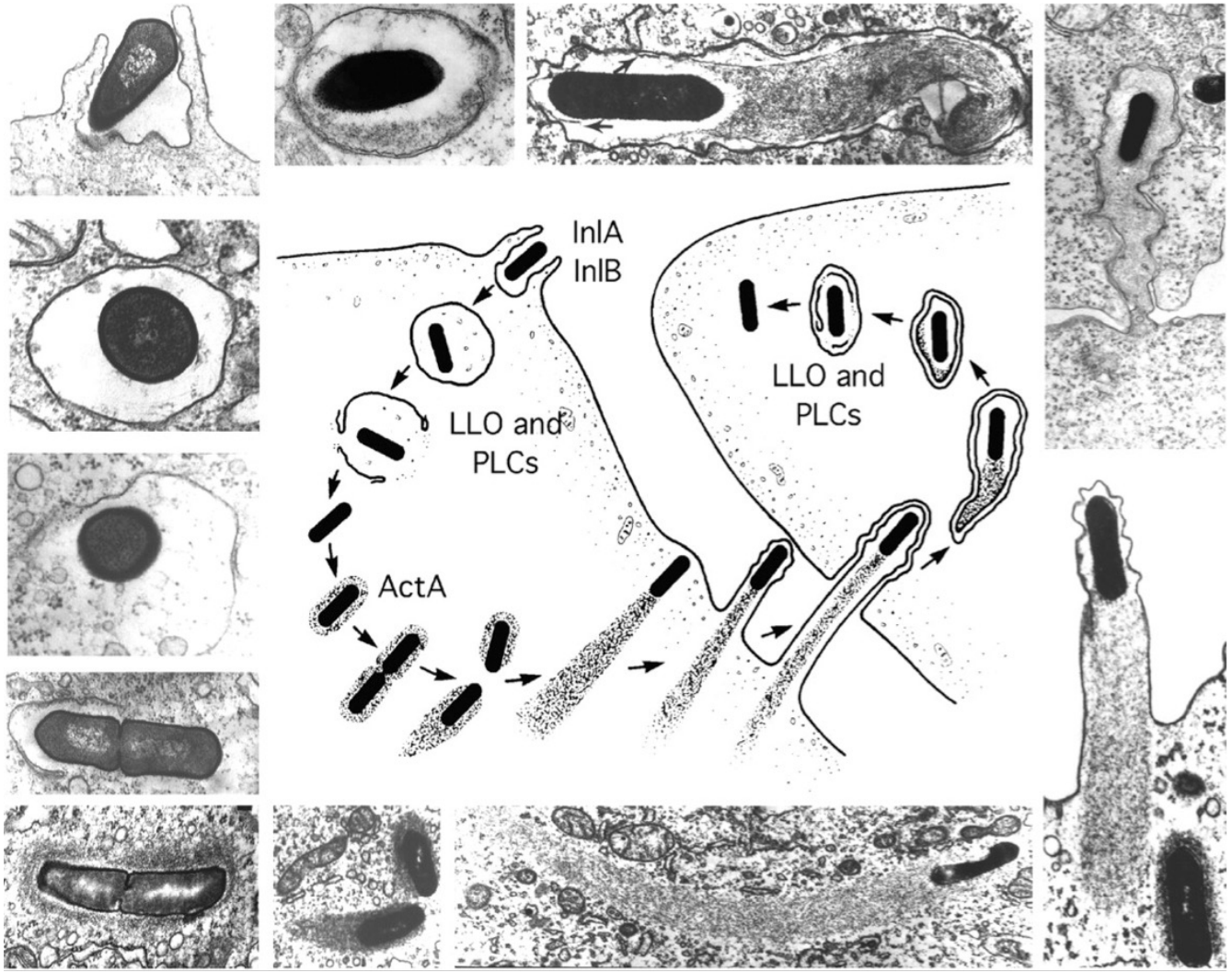


No acidification of Salmonella containing vacuoles

Formation of Sifs (*Salmonella*-induced filaments)

Alix *et al.,* J Cell Biol, 2011

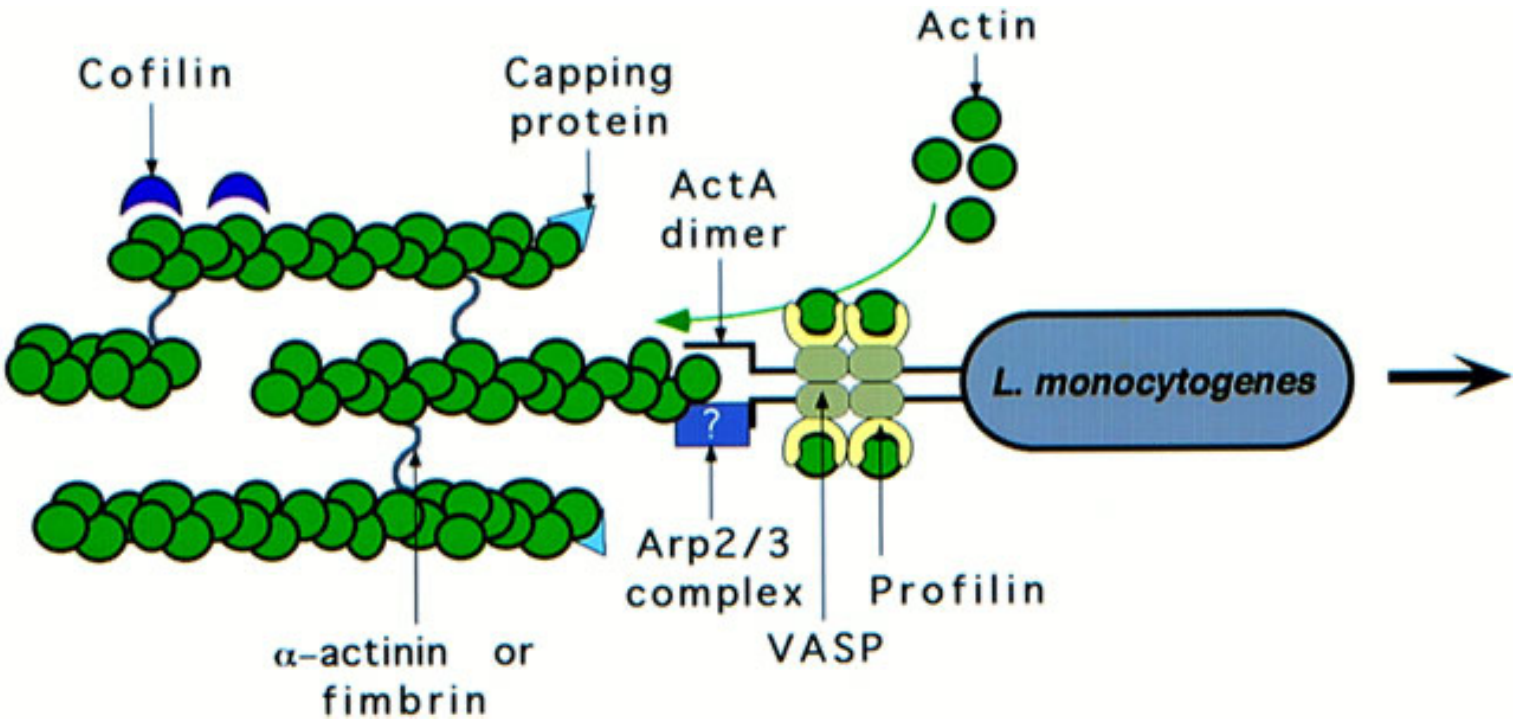
Survival of bacteria inside host cells



Listeriolysin (*Listeria monocytogenes*) becomes active at pH 5.5

Portnoy *et al.*, J Cell Biol, 2002

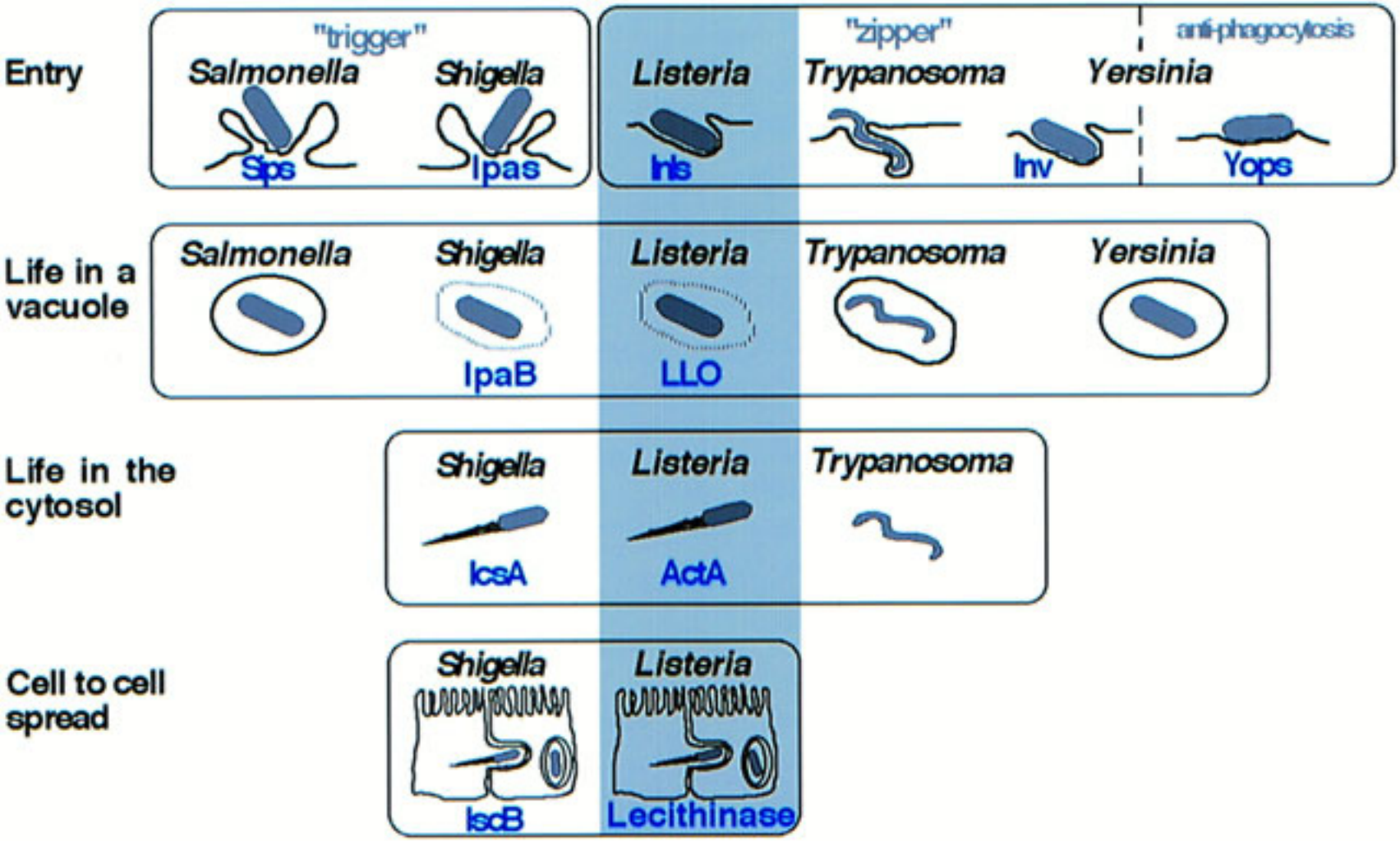
Cell-to-cell movement



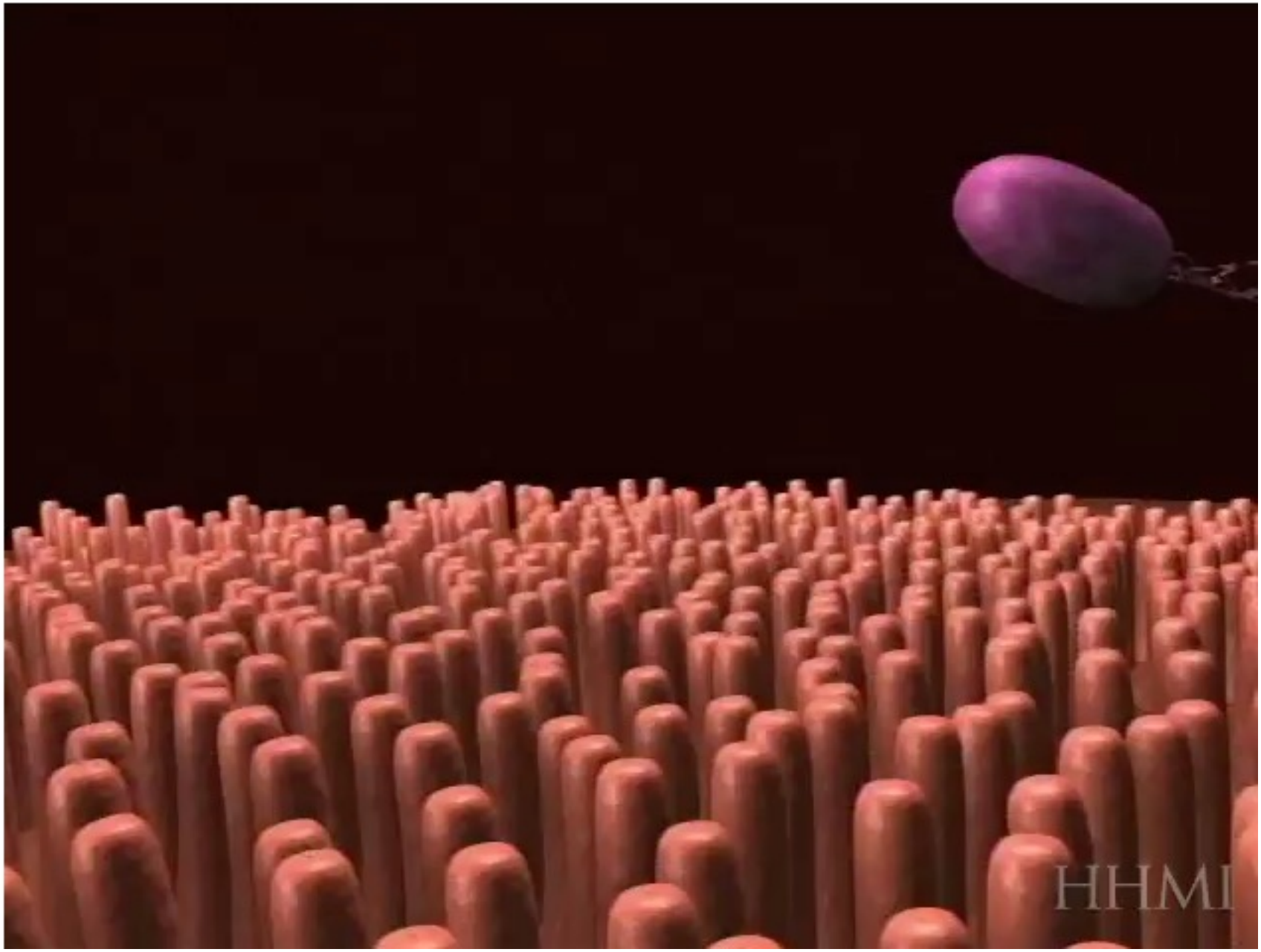
ActA allows *Listeria monocytogenes* to move from cell to cell

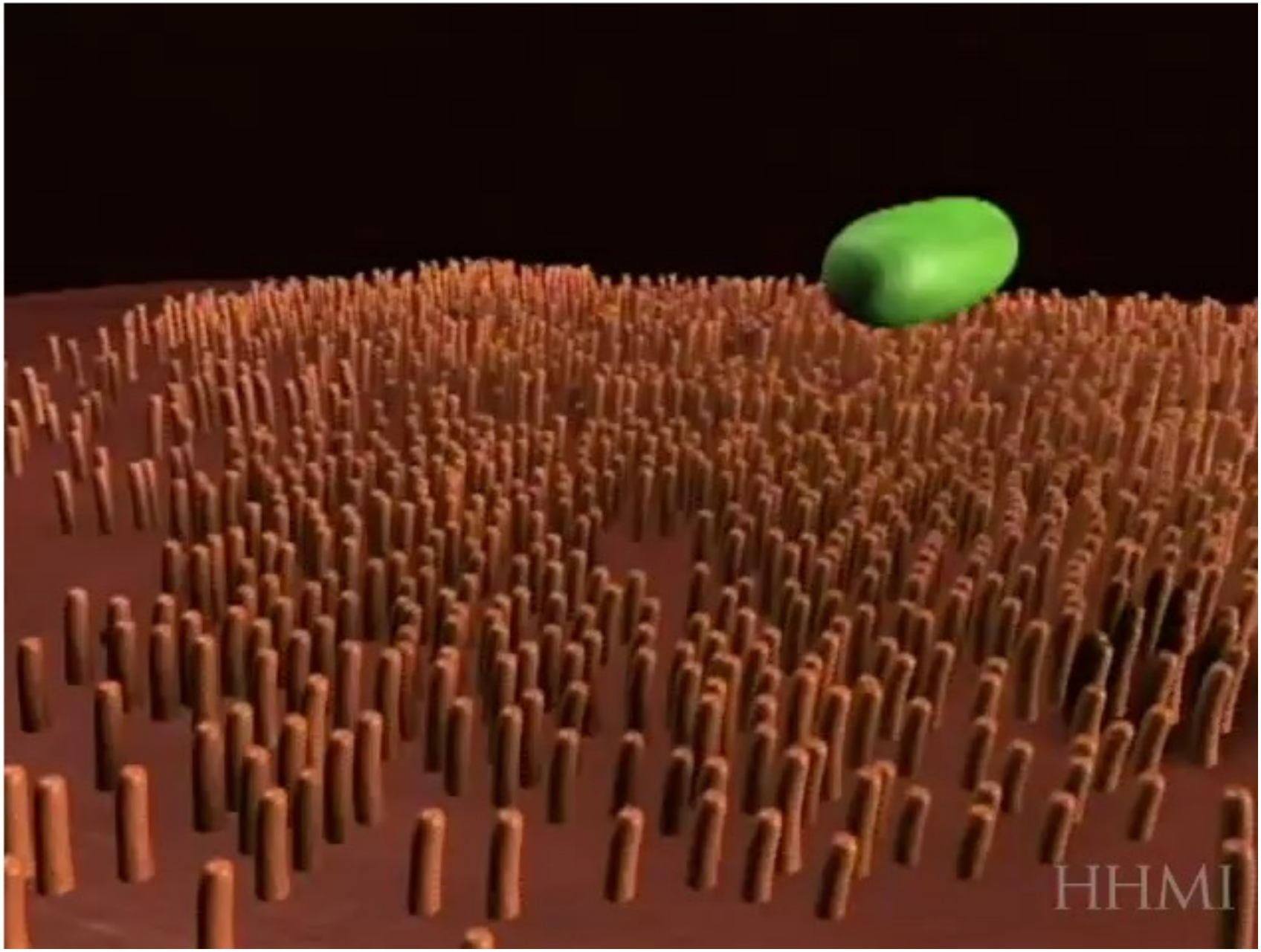
Cossart *et al.,* EMBO J, 1998

Bacterial survival and cell-to-cell movement



Cossart et al., EMBO J, 1998


HHMI


HHMI