

So here's our bacterium here and behind it will be these long strands that are the bundle forming pillus. They're going to adhere to the microvilli, these wiener-like structures, this is what's on your normal intestine surface. It comes along here, the bacterium then causes these things to disappear, and then starts to nestle down on the surface. It's locked in and then it's going to come down and it's going to set up camp right there. We know that happens because we can see this in electron micrographs and the microvilli all disappear and boom. Ok we are now stuck in the intestine. Bacteria are here, we're going to zoom in, here's our type 3 secretion system, right on this thing that'll poke out. We know a protein comes out we know this protein, and then it inserts two more proteins that come out and down this tube, and they go in to insert in the host membrane. So these green proteins will sort of form like a donut pore, and this is kind of the type of the syringe. Then we have to fire in the receptor - the tear molecule. And you'll see it as this red molecule coming down the chutes. It gets then fired into the hosts cell. Then it goes into the hosts cell. We don't know if it goes through the cytoplasm or straight into the membrane, we haven't figured this out. You'll see a little blue dot, that's a tyrosine phosphorylation event, carrier gets modified, then it ends up in the host membrane. So here we're piling the receptor into the host cell. And then have to dock tear with the intimate, so we think this tube like protein retracts, and what that will that then do is bring that bacteria down into contact. Here's intimate up here, blue tear here, Houston we have contact. We have now landed. Bacteria's stuck on this cell. And now we're going to go inside this cell and we're going to start to see the face of tear that's facing, it recruits cytoskeletal proteins and these little donut-shaped things we are starting to understand more. Then you're going to see little yellow beads come flying in. These are actin monomers. They then get together and just like a string of pearls they polymerize, see they're flying in, then they start to get longer and longer. Actin does this for a living, it forms these long projections, strings of beads, and what that will start to do is start to force, put a force on this thing and you will start to see bacteria raise up on the cell. And it's because of this actin pushing underneath it, it actually pushes it up into the cell. There it goes. It starts to push up, bacteria starts to raise up, it's now building a throne. "I'm going to sit up on this thing and rule out over it" and if this doesn't make you want to be a microbiologist, I don't know what will, isn't this a thing of beauty? And then it just continues to rise, and rise, and rise. And then the end result is that we then end up with a bacteria sitting up on this throne shall we say to rule out over the mammalian cell. And that's what we see in disease.