

So what you're seeing first is this is just DNA in the bacterial cell, and we've color-coded the genes. So that's the LUX operon, there's five genes in the operon, and somewhere else on the DNA is encoded the gene for that master protein LUX-R in purple. So, the first thing that is going to happen is that RNA polymerase, that's RNA polymerase, the green protein, is going to come to the DNA encoding LUX-R. It gets transcribed into a messenger RNA, that's the molecule you'll see now, and then ribosomes come onto that messenger RNA and they translate the message into protein. Right, so now the pink protein, that's LUX-R, the master transcription factor getting made in the cell. When that protein gets made, which is only at high cell density it's going to go and tell all these genes to get turned on so the bacteria can switch into quorum sensing mode. We're showing you it getting on to the LUX operon. Its job is to tell RNA polymerase "come here, come here, come here, this is the gene that we want to make the protein now." So it's sitting on the LUX operon. Here comes RNA polymerase and then it's going to transcribe this long operon. There's five genes on this messenger RNA so they're in colors for you to see. And then the ribosomes get on at each gene and they translate the message into proteins. We're just showing you two important proteins that are called LUX-A and LUX-B. Those are two proteins that fit like locks and keys and when they get made at high cell density and come together, they give off photons of light. So they lock in together and light gets produced, which is what you saw in the demonstration. But of course these bacteria are machines, it's not just one, you know, transcript getting made. There are thousands of copies of LUX-R, turning on thousands of messages to get made so that the cell can make thousands of copies of luciferase so that there's enough of those LUX-A and B proteins coming together that the entire cell actually makes perceivable light. And so that's what we're showing you there. And then if we zoom out of the cell, remember this is high cell density, so the outside world of the cell, those auto inducers are there, the bacteria know they're in high cell density, they want to switch into quorum sensing mode, enough luciferase gets made that the cells turn on light and you can see it.