

Re: One celled organisms acting as a swarm?

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On Sep 24, 1:18=A0pm, Joachim Pimiskern <JoachimPimisk...@xxxxxx> wrote:

dterr...@xxxxxxxxxxxxx schrieb:

Another feat is the Pseudomonas quinolone signal. If times get hard for the bacteria, they emit a chemical signal named quinolone. Upon receiving this signal, some bacteria commit suicide, setting free their DNA which is cannibalized by the still living ones. This kind of bacterial sex enables them to increase their diversity.

I think a gene centric model is probably an easier way to look at this process. The bacterial cells are not the level of selection that provides the clearest explanation. For example, there is no differential benefit to those bacterial cells that commit suicide. The cells that commit suicide benefit all sorts of bacteria, not just the species that emits quinolone. Since bacteria of a different species are "enemies" of the bacteria that emit quinolone, it seems risky to commit suicide in terms of survival of the quinolone emitting species. So an "group selection model" may not be clear. Perhaps the following gene centric model may be clearer.

Think of the bacterial cells that emit the quinolone as vehicles for several different genes. The cells are like ships that carry the genes from place to place, and the genes like sailors. When times are good, it doesn't take many sailors to run the ship. The quinolone is more like a "hiring sailors" sign. There is a network of genes in the bacterial cell that I will call the quinolone network. When times are bad, this network switches on one gene that tells the ribosomes to make quinolone. So I hypothesize there are also suicide genes in the quinolone network that recognize the presence of quinolone outside the cell.

The bacteria are not "committing suicide" to free their DNA for other individuals. Rather, some of the genes in the bacterial cells are ejecting from their vehicles (the cells). If other cells are emitting quinolone, it means times must really be bad. The environment must be getting bad for these bacteria. Similar genes in other bacteria are directing their vehicles (their cells) to pick up the

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survivors.

As far as the genes in the suicide cell are concerned, the other bacteria are rescue vehicles. The quinolone indicates that the nearby bacteria aren't just going to digest the genes for energy.

Furthermore, the environment in the rescue vehicle is comfortable for quinolone network genes. So the network genes may have a better chance of surviving in a cell with other quinolone network genes than by staying in one with a shortage of other genes.

Some of the genes will be picked up and incorporated into the new vehicle. Furthermore, the cells that pick up the survivors get new genes to work on their vehicle. The other gene may have a means of fighting the hostile environment, or the other gene may increase the risk of the vehicle being destroyed. However, there is a third possibility. The new gene may be just a gene that helps emit quinolone (i.e., part of the quinolone network). In which case, the quinolone genes have helped one of their own.

The gene centric and the social selection descriptions may be on some fundamental level equivalent. When trying to analyze how a social behavior first evolves, I think the gene centric view is clearer. You can't talk about a "swarm" acting together until the swarm behavior is already in place. Then, group selection may be a clearer way of describing the further evolution of the swarm behavior.

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