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Theoretical physicists offer explanation of how bacteria might generate radio waves

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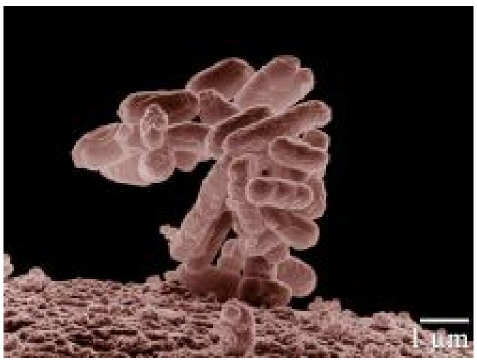

Low-temperature electron micrograph of a cluster of E. coli bacteria, magnified 10,000 times. Each individual bacterium is oblong shaped. Photo by Eric Erbe, digital colorization by Christopher Pooley, both of USDA, ARS, EMU.

(PhysOrg.com) -- Four theoretical physicists, led by Allan Widom, of Northeastern University, have published a paper in *arXiv*, where they show a possible way for some bacteria to produce radio waves. Taking note of the fact that bacteria DNA forms in loops rather than the familiar helix seen in humans, Widom, et al, describe a process whereby free electrons that flow through such a loop by hopping from atom to atom, wind up producing photons when energy levels change.

While the paper hasn't whipped up nearly as much controversy as happened when French virologist Luc Montagnier, (Nobel Prize winner for linking HIV and AIDS) first suggested back in 2009 that bacteria might be able to communicate with one another via radio waves, it has nonetheless sparked tremendous debate among biologists and other scientists in the field. The problem has been that Montagnier showed that when compared to pure water, samples chockfull of bacteria, emitted more radio waves, and no one could explain why.

Researchers have known for years that some bacteria do communicate via nanowires, which led Widom and his team to conclude that it wasn't so farfetched to believe more highly developed bacteria, such as E. coli or Mycoplasma pirum, might instead communicate via wireless medium.

Basing their findings on modeling, Widom and his team, calculated that the transition frequencies broadcast (0.5, 1 and 1.5 kHz) when free electrons traversed bacterial DNA loops and met with differing energy levels, corresponded with just the amount of signal emission found in the E. coli bacterial studies by Montagnier.

The problem here of course is that while the model does suggest that certain bacteria might be capable of producing radio waves, it doesn't go anywhere towards proving that such radio waves are actually used as a means of communication, either by the sender bacterium, or another receiver. There's no research thus far that shows any sort response to such radio waves or any sort of "message" that might be encoded in such missives; hence the current controversy about what to make of bacteria that can produce radio waves.

It's likely these new findings will incite others to look a little deeper, however, as the main argument for rejecting Montagnier's findings back in 2009, was that bacteria lacked a means for generating radio signals; an assertion that has now been overthrown.

More information: Electromagnetic Signals from Bacterial DNA, A. Widom, J. Swain, Y. N. Srivastava, S. Sivasubramanian, arXiv:1104.3113v1 [physics.bio-ph] arxiv.org/abs/1104.3113

Abstract
Chemical reactions can be induced at a distance due to the propagation of electromagnetic signals during intermediate chemical stages. Although is is well known at optical frequencies, e.g. photosynthetic reactions, electromagnetic signals hold true for muck lower frequencies. In E. coli bacteria such electromagnetic signals can be generated by electric transitions between energy levels describing electrons moving around DNA loops. The electromagnetic signals between different bacteria within a community is a "wireless" version of intercellular communication found in bacterial communities connected by "nanowires". The wireless broadcasts can in principle be of both the AM and FM variety due to the magnetic flux periodicity in electron energy spectra in bacterial DNA orbital motions.