**AYC Ecology North**

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**Scientists find life high above Earth**

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Look, up in the sky! It's a bird, it's a plane, it's— a microorganism.

High above Earth, there exists a living community. Trolling the middle and upper troposphere, a region four to six miles above our planet, scientists have discovered live microorganisms at an altitude not known to be especially conducive to survival -- at least not without a space suit.

The discovery is the first of its kind, and came as a shock to the microbiologists and environmental engineers who made it. Air samples taken on mountain-top expeditions had suggested before that bacteria and other microbes might be able to live at high altitude, but no one expected to find microscopic bugs in the troposphere, much less enduring there.

It's not quite clear yet whether the microorganisms routinely inhabit that lofty region of the atmosphere, living on carbon compounds, or if they rode there on the backs of major storms. The air samples in which they were found were collected miles above the Caribbean in 2010, not long after tropical hurricanes Earl and Karl. Hurricanes can aerosolize sea water; that is, gale-force winds whip up mist from the surface of the ocean, which is rich in microbial life, and send it sky high.

Scientists from the Georgia Institute of Technology in Atlanta, who made the discovery, had tagged along on NASA flights studying the hurricanes. A filter system on a DC-8 aircraft captured air samples that turned out to be crawling with fungal cells and, more prominently, bacteria, with over 60 percent of the collected microbes still alive. The microorganisms were studied using gene sequencing and polymerase chain reaction, methods more commonly applied to mapping human DNA and identifying diseases down here on terra firma.

Some 314 different families of bacteria were found in the samples, including (rather disturbingly) bacteria associated with human and animal feces. While these species and most others found have clearly traveled skyward from earth and sea, another 17 types turned up in every sample, leading researchers to hypothesize about the intriguing possibility of an ongoing ecosystem six miles high. Could bacteria be eating, growing, and multiplying high in the sky?

Whatever their origin or lifecycle, the microbes are believed to be playing a role in weather systems. They are the right size and texture to cause the condensation of water vapor, suggesting they play a role in cloud formation and therefore in Earth's weather.

The findings have been reported online this week in the Proceedings of the National Academy of Science.