Bacteria samples collected in Antarctica a century ago nearly identical to present day samples

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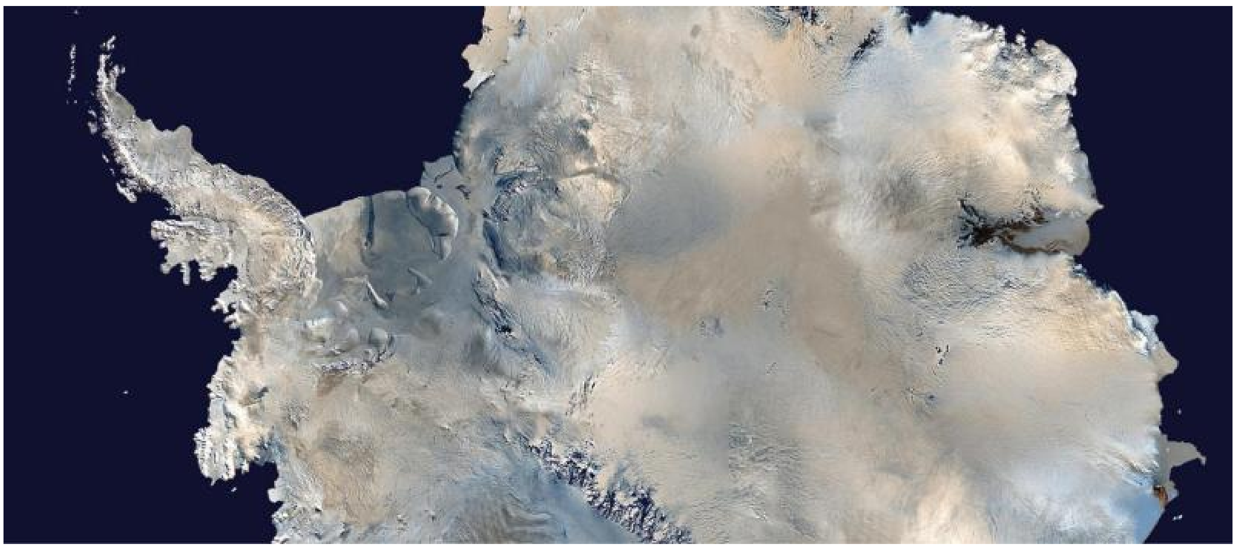

A satellite image of Antarctica. Credit: USGS, via Wikipedia, Public Domain

(Phys.org)—A pair of researchers with the Natural History Museum of London and the University of Waikato have found that bacteria living in a part of Antarctica have not changed much over the past century. In their paper published in *Proceedings of the Royal Society B*, Anne Jungblut and Ian Hawes describe how they compared the DNA of cynobacterial mats collected during Captain Robert Falcon Scott's Discovery Expedition from 1901 to 1904 with modern specimens and what they found.

Captain Robert Falcon Scott was an officer with the British Royal Navy with an inclination for exploration. He led two expeditions in the Antarctic: The first was called the Discovery Expedition, the second was the Terra Nova Expedition. Falcon died during his return from the second expedition, but his efforts led to the discovery that Antarctica was once covered by forest—they also provided plant specimens for study by scientists back in England. One specimen was the cynobacterial mat—the main kind of vegetation covering the area where Falcon had based his camp.

Once studied, the mats were pressed between sheets of paper and stored at the Natural History Museum. In this new effort, the researchers conducted a DNA analysis of the bacteria in the mats. Then they arranged to have researchers currently carrying out science experiments in nearly the same area in Antarctica collect new samples for study. After conducting a DNA analysis on the new samples, the results were compared with those from over a century ago. The researchers report that they found very little difference between the two.

The sameness of the bacteria samples came as a surprise to the researchers, because they believed that it was likely that bacteria in Antarctica evolved as temperatures rose, or new species would have invaded. That neither has happened has caused the researchers to suggest that some organisms in Antarctica might be more resilient than expected. They also note that these findings do not contradict the belief that change is likely coming soon as temperatures continue to rise. It is possible, they also note, that the type of bacteria that live in Antarctica are unable to change and that is why they have not evolved. That would mean they will likely die once temperatures reach a certain point.

More information: Using Captain Scott's Discovery specimens to unlock the past: has Antarctic cyanobacterial diversity changed over the last 100 years? *Proceedings of the Royal Society B* (2017). rspb.royalsocietypublishing.or … .1098/rspb.2017.0833

Abstract

Evidence of climate-driven environmental change is increasing in Antarctica, and with it comes concern that this will propagate to impacts on biological communities. Recognition and prediction of change needs to incorporate the extent and timescales over which communities vary under extant conditions. However, few observations of Antarctic microbial communities, which dominate inland habitats, allow this. We therefore carried out the first molecular comparison of Cyanobacteria in historic herbarium microbial mats from freshwater ecosystems on Ross Island and the McMurdo Ice Shelf, collected by Captain R.F. Scott's 'Discovery' Expedition (1902–1903), with modern samples from those areas. Using 16S rRNA gene surveys, we found that modern and historic cyanobacteria assemblages showed some variation in community structure but were dominated by the same genotypes. Modern communities had a higher richness, including genotypes not found in historic samples, but they had the highest similarity to other cyanobacteria sequences from Antarctica. The results imply slow cyanobacterial 16S rRNA gene genotype turnover and considerable community stability within Antarctic microbial mats. We suggest that this relates to Antarctic freshwater 'organisms requiring a capacity to withstand diverse stresses, and that this could also provide a degree of resistance and resilience to future climatic-driven environmental change in Antarctica.

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