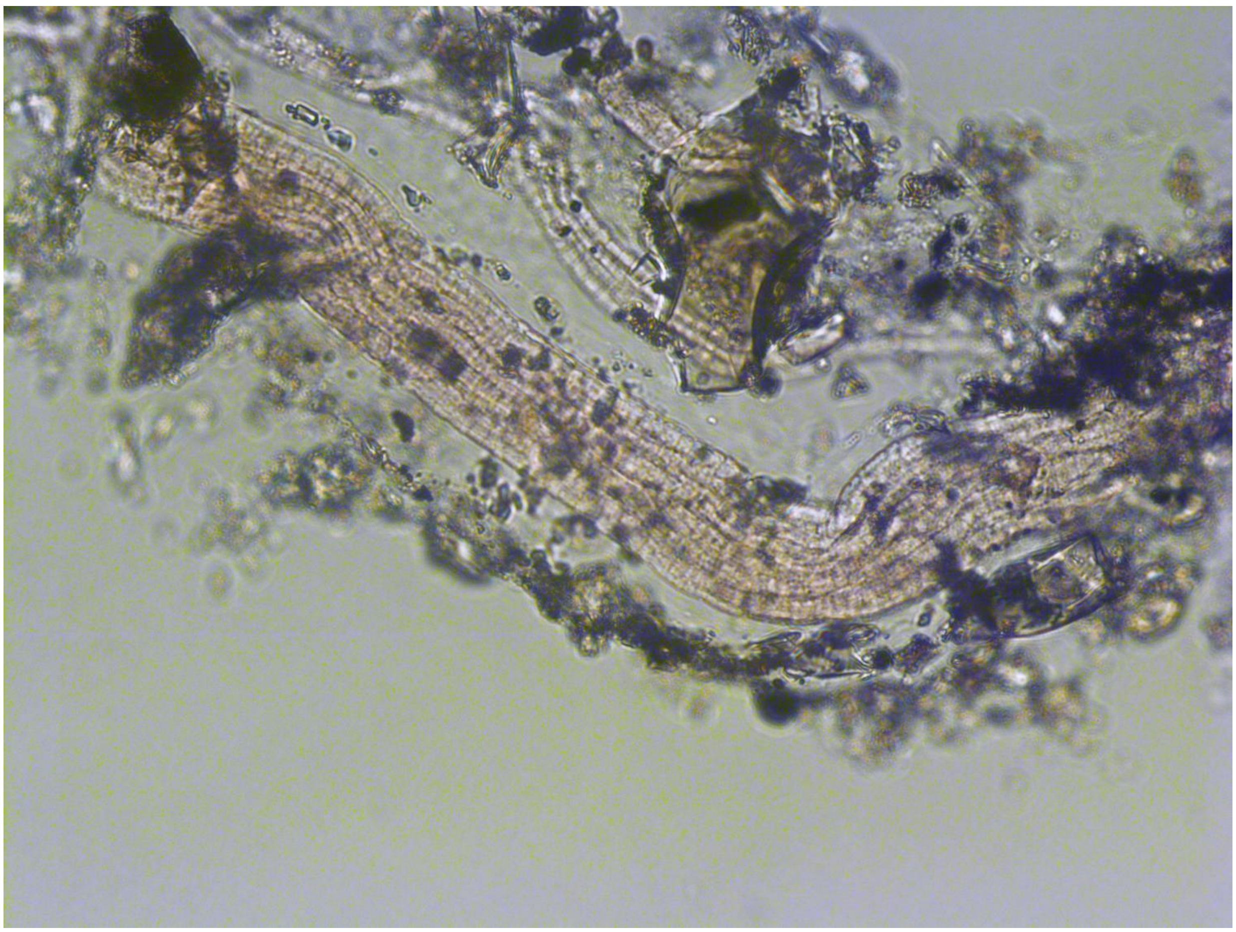
Venus' hair found growing on the surface of underwater volcano after eruption

April 25 2017, by Bob Yirka

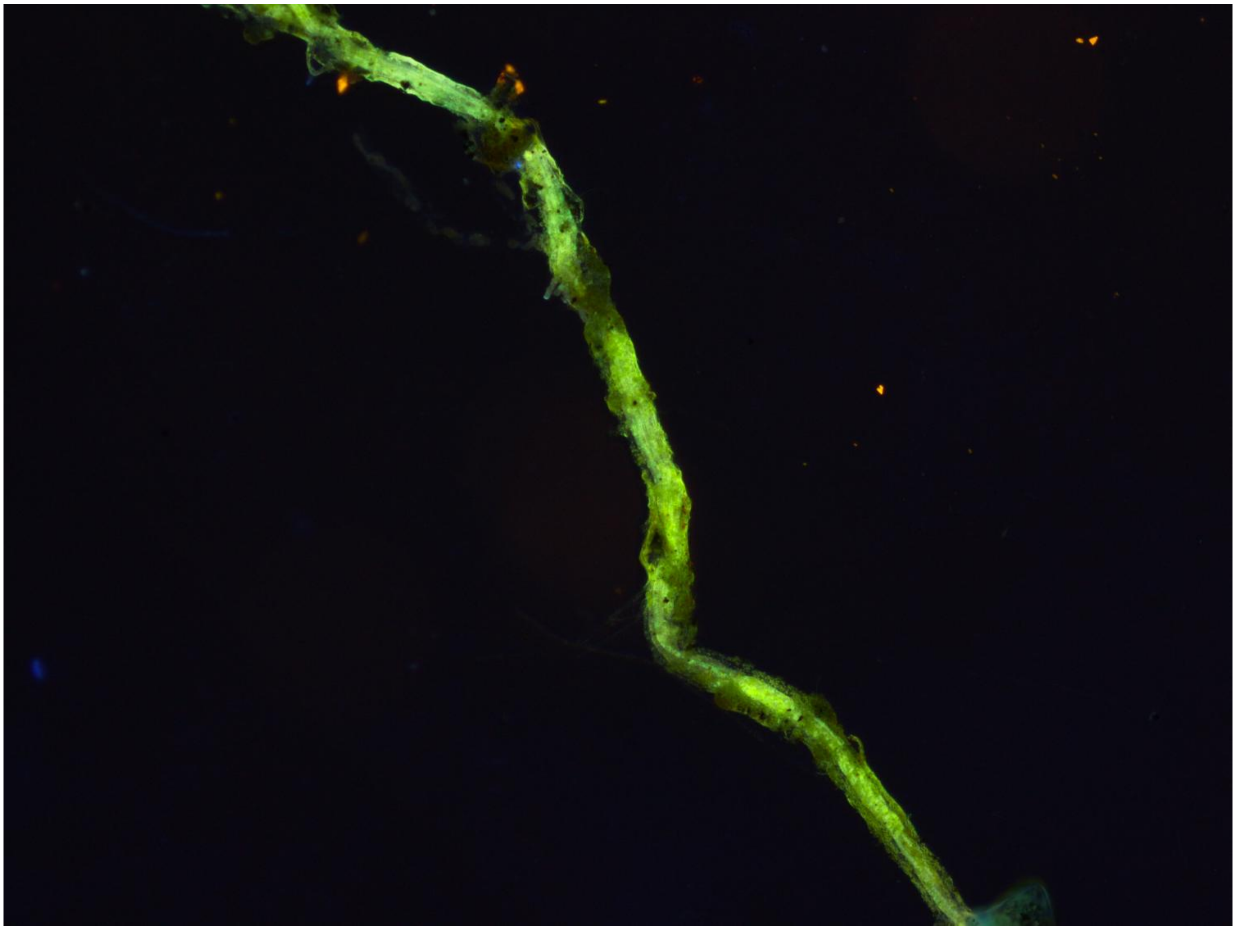


Light micrograph of a single Thiolava veneris filament picked from the solid lava substrate and visualized at a magnification of 10x. Credit: Roberto Danovaro

(Phys.org)—A team of researchers affiliated with several institutions in Spain and Italy studying the aftermath of the eruption of the Tagoro underwater volcano in 2011 and 2012 has found that colonies of bacteria living in filaments attached to the volcano surface (named Thiolava veneris which is Lation for Venus' hair) were the first organisms to colonize the volcano after the eruption. In their paper published in the journal *Nature Ecology & Evolution*, the group describes how they used a remotely operated vehicle to study the volcano and the events that have transpired since the bacteria moved in. David Kirchman with the University of Delaware offers a News & Views piece on the work done by the team in the same issue.

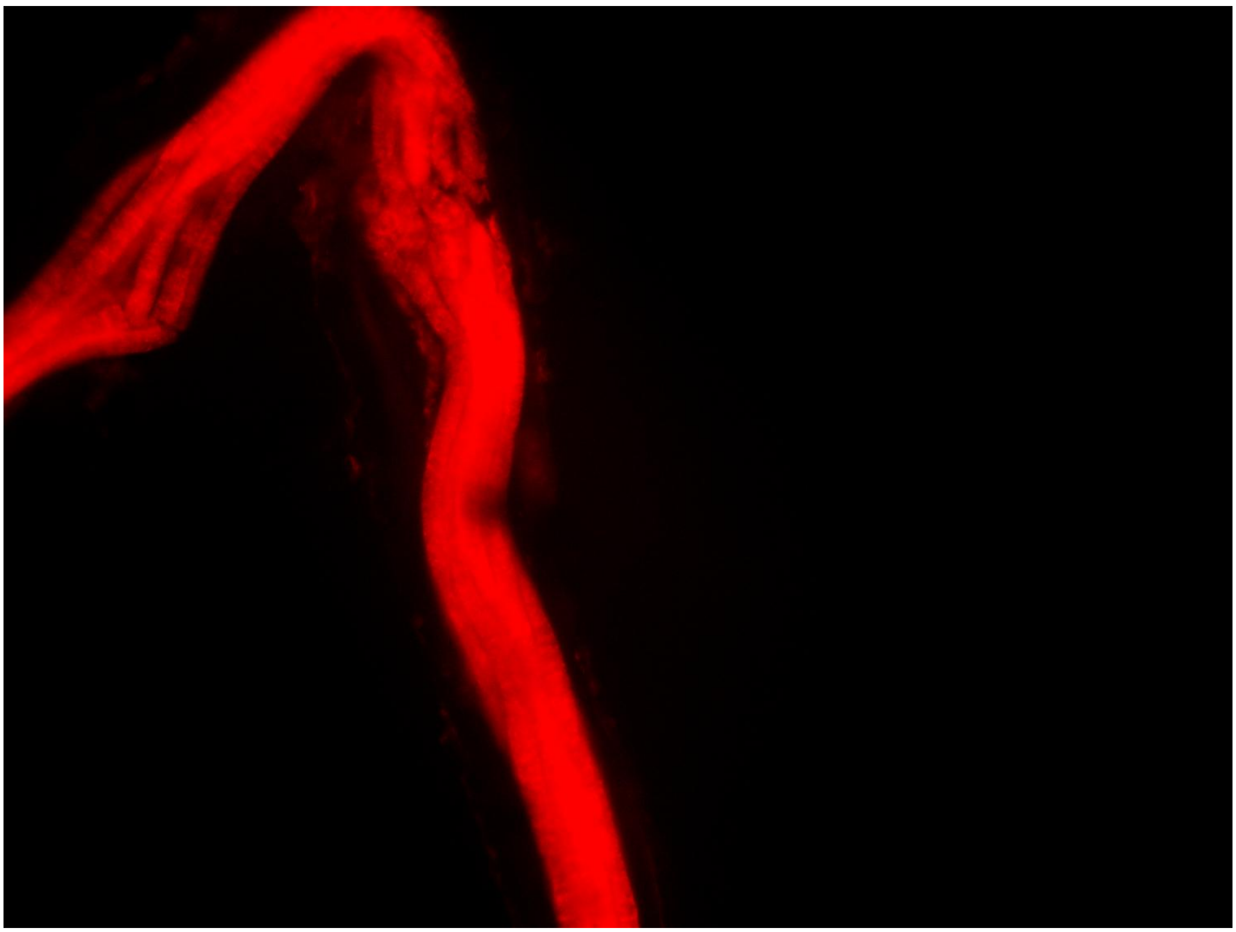
Tagoro erupted for a long period of time starting back in 2011, and as the researchers note, such eruptions, just like those that occur on land, wipe out all nearby forms of life—in this case, for nine square kilometers. The researchers visited the site in 2014, sending down a robot submarine to the volcano 130 meters below the surface. To their surprise, they found the volcano covered in what looked like white hair. They used the robot to collect some samples, which were subsequently studied in a lab.

The researchers report that the white hair was composed of filaments just three to six centimeters long with 36 to 90 micrometer diameters—the filaments served to house bacterial cells. The strands were bunched together in mats that clung to the surface of the volcano.

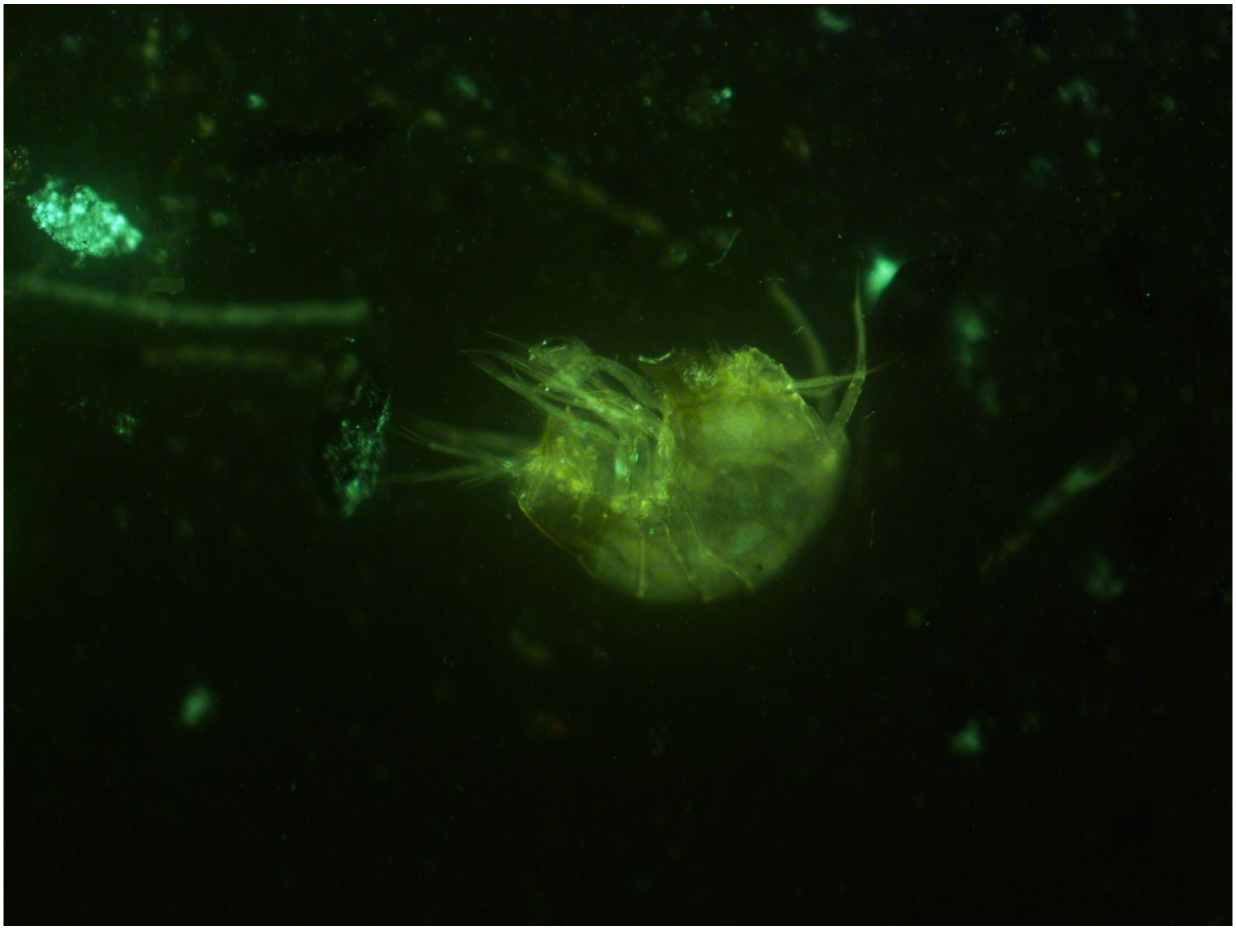


Epifluorescence micrograph of a single Thiolava veneris filament picked from the solid lava substrate, directly stained on a glass slide with the fluorescent dye SYBR Gold, with several bacterial cells attached on the sheath. Credit: Roberto Danovaro

The researchers cannot say for sure how soon after the eruption occurred that the bacteria moved in, but suspect it happened soon after the temperature dropped to a sustainable level (perhaps below 100° C). Even more interesting was that the bacteria had never been observed anywhere before—its genes revealed that it was quite different from other microbes, with features that allowed it to live in such a hostile environment that included hydrogen sulfide spewing from the rocks beneath it. Also of interest is the question of where the bacteria came from, since no one has ever reported seeing the white hair-like growths on the sea floor before. The researchers noted that the microbes appeared to be paving the way for other small creatures to move in as well, making conditions more favorable for organisms such as nematodes, worms or crustaceans.



Epifluorescence micrograph of a single Thiolava veneris filament picked from the solid lava substrate after hybridization with a fluorescent probe specific for Bacteria. Credit: Roberto Danovaro



Epifluorescence micrograph of a single crustacean picked together with a filament of Thiolava veneris, stained with the fluorescent dye SYBR Gold. Credit: Roberto Danovaro

More information: Roberto Danovaro et al. A submarine volcanic eruption leads to a novel microbial habitat, *Nature Ecology & Evolution* (2017). DOI: 10.1038/s41559-017-0144

Abstract
Submarine volcanic eruptions are major catastrophic events that allow investigation of the colonization mechanisms of newly formed seabed.

We explored the seafloor after the eruption of the Tagoro submarine volcano off El Hierro Island, Canary Archipelago. Near the summit of the volcanic cone, at about 130 m depth, we found massive mats of long, white filaments that we named Venus's hair. Microscopic and molecular analyses revealed that these filaments are made of bacterial trichomes enveloped within a sheath and colonized by epibiotic bacteria. Metagenomic analyses of the filaments identified a new genus and species of the order Thiotrichales, Thiolava veneris. Venus's hair shows an unprecedented array of metabolic pathways, spanning from the exploitation of organic and inorganic carbon released by volcanic degassing to the uptake of sulfur and nitrogen compounds. This unique metabolic plasticity provides key competitive advantages for the colonization of the new habitat created by the submarine eruption. A specialized and highly diverse food web thrives on the complex three-dimensional habitat formed by these microorganisms, providing evidence that Venus's hair can drive the restart of biological systems after submarine volcanic eruptions.

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