

*TWO AND A HALF MILES  
UNDER THE SEA*

With a depth of roughly 4,000 meters, the Arctic Ocean is far deeper than Jules Verne once imagined. And it is an extreme habitat that even today we know little about, one that is cold, dark, and covered with ice, with a floor almost entirely lacking in organic material to serve as a substrate for microorganisms. Could life possibly exist here?

- 6 Deep sea islands of life are known to form around what are called black smokers: hydrothermal vents caused by underwater volcanoes at sites where tectonic plates collide. These vents are abundant in extremely hot, oxygen-free water, which dissolves large quantities of iron, manganese, and copper, as well as sulfur compounds, hydrogen, and methane. When the hot water mixes with the surrounding cold, oxygen-rich seawater, the minerals precipitate, creating gray-black columns of “smoke.” Hence the name black smoker.

Many different biotopes can form on the smokers, including species that only exist here. Bacteria use sulfur and hydrogen in particular as an energy source, which forms the basis for a biodiverse food chain: tube worms, crabs, mussels, and even certain fish.

For a long time, researchers were convinced that the Arctic Sea had neither volcanoes, nor hydrothermal sources. But in the early 2000s they were discovered on the Gakkel Ridge, a mid-oceanic ridge stretching from Greenland to Siberia. The black smoker Enceladus, shown here, is located in the Aurora Vent Field on the westernmost peak of the Gakkel Ridge. During an expedition aboard the research vessel *Polarstern*, a group from the Max Planck Institute for Marine Microbiology conducted an in-depth study of bacteria of the genus *Sulfurimonas*. The study uncovered a new species whose genome contains clues that might help explain the ecological connection between this highly specialized habitat and the open ocean.



# ON LOCATION

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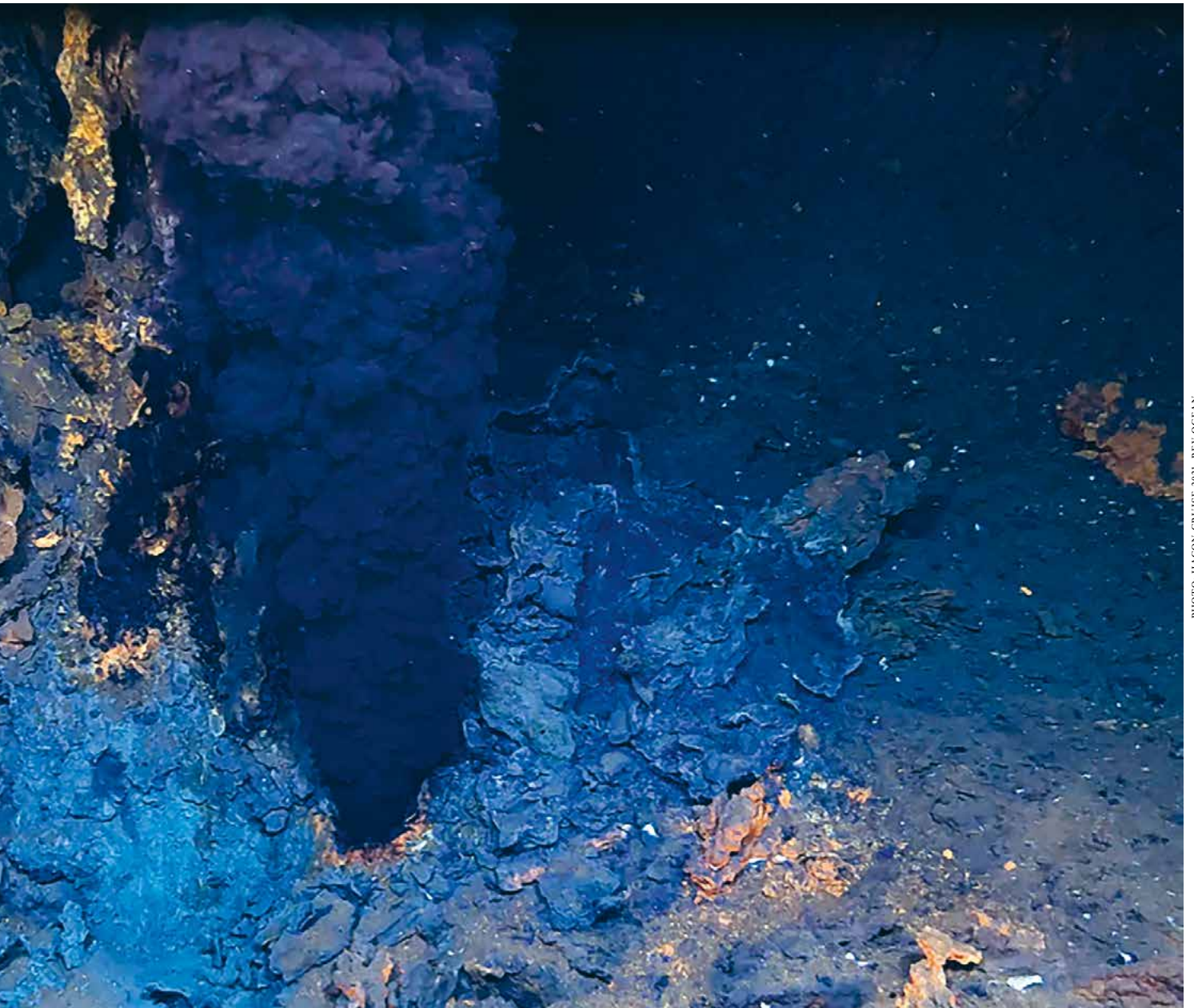


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