The limits of life on Earth extended... in water

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(PhysOrg.com) -- A new species of archaebacteria, Pyrococcus CH1, thriving within a temperature range of 80 to 105°C and able to divide itself up to a hydrostatic pressure of 120 Mpa (1000 times higher than the atmospheric pression), has just been discovered.

This discovery was made by the microbiologists of the Microbiology of Extreme Environments Laboratory (Joint Research Unit between the CNRS, Ifremer and University of Western Brittany UBO), in partnership with the Institute of Oceanography of Xiamen (China) and the Earth Science Laboratory (JRU CNRS, ENS Lyon and University of Lyon). This archaebacteria had been isolated from samples of the "Serpentine" cruise, during which a Franco-Russian team has explored the mid-Atlantic ridge for six weeks in order to discover new hydrothermal vents.

Extremophiles… unexpected worlds

Researches about extremophilic microorganisms, species which thrives in extreme conditions that are detrimental to the majority of life on Earth, constitute many promising “worlds to discover”. In terms of biodiversity, those unexpected forms of life show that the inventory of all species living on Earth is far from being done. Extremophilic microorganisms also reveal their amazing adaptive strategies, which reinforces the possibility of life on other planets.

The particularities of Pyrococcus CH1

The piezophilic microorganisms constitute a subgroup of extremophiles. Discovered on the site "Ashadze" at 4100 m depth, CH1 strain was successfully isolated and assigned to the genus Pyrococcus, within the Euryarchaeota lineage of the Archae domain. This organism grows within a temperature range of 85 to 105°C and a pressure range of 15 to 150 MPa, with optima for 98°C and 52 MPa respectively. It is unable to grow for pressures below 15 MPa.

Pyrococcus CH1 is the first obligate piezo-hyperthermophilic archaeon from the deepest vent field explored so far.

This discovery extends the physical and chemical limits of life on Earth and strengthens the idea of the existence of a hyperthermophilic biosphere in the depth of our planet. The study of the microorganisms in the seabed sediments of ocean plates seems very promising. Indeed, the hydrothermal vents offer extremes conditions of temperature, pressure and fluids composition for the microorganisms.

What are the possible benefits of those microorganisms?

Thanks to extreme conditions of developpement, their enzymes are thermostable and able to function in reactors under pressure. It is tempting to use them in industrial processes, which require high levels of temperature and pressure, notably to gain high value added products, presently resulting from fine chemistry.

More information: The scientific paper about this discovery is published in "*The ICSM Journal*" (May issue). It can be accessed at www.nature.com/ismej/journal/v … ll/ismej200921a.html

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