

Extremophile Diatoms: Implications to the Drake Equation

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ABSTRACT

Diatoms are unicellular Eukaryotes that (as a group and phylogenetically) are not strictly regarded as “extremophiles”, since the vast majority of diatoms are mesophilic photoautotrophs. However, among the terrestrial Eukaryotes, diatoms are by far the single group of organisms with the ability to inhabit the greatest range of hostile environments on Earth. They are the dominant eukaryotes in the polar regions; in fumaroles, hot springs and geysers; and in hypersaline and hyperalkaline lakes and pools. Cryophilic species such as *Fragilaria sublinearis* and *Chaetoceras fragilis* are able to carry out respiration at extremely low rates at low temperatures in darkness. The Drake Equation refers to the likelihood of there being intelligent life at the technological level of electromagnetic communication. However, consideration of the range of conditions suitable for the habitability of eukaryotic diatoms and prokaryotic extremophiles, the likelihood that life exists elsewhere in the cosmos becomes many orders of magnitude greater than that predicted by the classical Drake Equation. In this paper we review the characteristics of diatoms as eukaryotic extremophiles and consider the implications to adjustments needed to the Drake Equation to assess the possibility that life exists elsewhere in the Universe.

Keywords: Diatoms, Eukaryotic Extremophiles, Drake Equation

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