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Chloroplast acquisition in Virgulinella fragilis (foraminifera)

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Both bacteria and kleptoplasts exist in *Virgulinella fragilis*, thought to be allowing *V. fragilis* to survive in dysoxic environments. *V. fragilis* kept a same kind of delta-proteobacteria, closely related to *Desulfobacterium*, distribute at the host foraminiferal cell surface. Desulfobacterium uses dissolved for the heterotrophic oxidation of organic matter. These bacteria may therefore use organic material provided by the host for carbon oxidation. Kleptoplasts in host individuals of different investigated areas differ in origin of diatom species. From the expected four membranes around single kleptoplasts, we can only find double membranes. This strategy may have a role in the interaction between the cellular substrates and the kleptoplasts.

Keywords: Benthic foraminifera, Virgulinella fragilis, Kleptoplast, symbiotic bacteria, symbiosis, evolution