Response of the methanogenic microbial community of a profundal lake sediment (Lake Kinneret, Israel) to algal deposition

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ABSTRACT: An algal bloom of *Peridinium gatunense* generally precedes the annual maximum of methane release from the profundal sediment of Lake Kinneret. Therefore, we investigated the response of the sediment methanogenic microbial community to simulated algal deposition. Addition of algal biomass on top of sediment cores resulted in increased CH_4 production rates and concentrations of the fermentation products acetate and propionate in the upper 4-cm layers with maximum values at 1-cm depth. Addition of algae to sediment slurries also resulted in increased CH_4 production rates and a transient increase of H_2, propionate, and acetate concentrations within the first 10 d after addition. The composition of the active microbial community was determined by analysis of terminal restriction fragment polymorphism (T-RFLP) targeting ribosomal RNA and cloning and sequencing of reverse-transcribed 16S rRNA. Analysis of the sediment in the presence and absence of algae indicated that among the *Bacteria*, members of *Deltaproteobacteria* and *Clostridiales* responded by synthesis of ribosomes after 1 d of incubation and those of *Bacteroidetes* after 6 d. Among the *Archaea*, ribosomal RNA of the *Methanosaetaceae* (i.e., acetate-utilizing methanogens) slightly increased after 6 d. Algal deposition apparently stimulated ribosomal synthesis in these sediment microorganisms, thus resulting in increased activity. We conclude that these microorganisms were involved in degradation of the algal biomass resulting in transient release of acetate and other fermentation products and increased production of CH_4.