



Characterization of particulate proteins in Pacific surface waters

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ABSTRACT: We investigated molecular characteristics of particulate proteins in Pacific surface waters using two-dimensional electrophoresis (2DE). Most proteinaceous materials estimated by dye-binding methods were characterized by the 2DE unresolved acidic materials with a broad range of molecular mass and the 2DE unresolved low molecular mass materials with a broad range of isoelectric point. The 2DE unresolved acidic and low molecular mass materials were considered to comprise peptides conjugated with acidic saccharides and degradation products (peptides) of proteins, respectively, which indicates that almost all proteins in living organisms failed to survive in detrital particulate organic matter (POM). Nevertheless, 23 discrete proteins were distinguished by the 2DE. Electrophoretic patterns of the discrete proteins indicated that they were a component of detrital POM. Three discrete proteins were subjected to N terminal amino acid sequence analysis. Two proteins out of three could not be determined because their N termini were blocked, and one protein was determined from the N terminus to the ninth amino acid residue. A homology search revealed that the N terminal amino acid sequence of the protein agreed completely with that of 70 kDa heat shock protein (HSP70) derived from photosynthetic organisms. HSP70 is a major member of the molecular chaperones that protect or repair proteins from damage under conditions of environmental stress. The occurrence of HSP70 in this study demonstrated that phytoplankton were able to induce the molecular chaperone(s). Clarification of factor(s) controlling induction of chaperones will enable us to assess the actual environmental stress on phytoplankton at the biomolecular level.

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