The general objective of this project was to examine one component of the primary biofilm, protein, which has been hypothesized to be a major component of both dissolved and adsorbed organic pools in seawater. In previous work we found that surface energy was important in determining adsorption of protein to surfaces in seawater and degradation rates by bacteria and bacterial growth. In the last phase of this work, we examined the chemical nature of actual protein in seawater using HPLC techniques which we developed, standard chemical assays, and biosynthetic techniques. We showed that protein in seawater is not the same chemically as cellular protein. Bacteria appear to treat nearly all seawater protein as if it were glycocalyx and degrade it at much lower rates than unmodified, "fresh" protein. Other experiments showed that cellular protein introduced into seawater is quickly modified by abiotic reactions and becomes less easily hydrolyzed by bacterial enzymes within hours. The abiotic reactions appear to include adsorption to small colloids. These results begin to explain the growth dynamics of microorganisms on surfaces and the origin of refractory organic matter which is highly abundant in seawater.
FINAL REPORT QUESTIONNAIRE
(for ONR use only)

Principal Investigator Name: David L. Kirchman
Institution: University of Delaware
Project Title: Regulation of Attached Bacterial Growth by Adsorbed Protein

Number of ONR supported papers published in refereed journals:

Papers published in non-refereed publications:

Books or book chapters published:

Number of ONR supported patents/inventions None

Freed:__

Granted:__ Patent name and number:

HAVE YOU LICENSED TECHNOLOGIES (E.G., SOFTWARE) THAT WERE DEVELOPED WITH ONR SUPPORT? IF SO, PLEASE DESCRIBE ON A SEPARATE SHEET.

HAVE YOU DEVELOPED INDUSTRIAL/CORPORATE CONNECTIONS BASED ON YOUR ONR SUPPORTED RESEARCH? IF SO, PLEASE DESCRIBE ON A SEPARATE SHEET.

Number of presentations:

Invited:__

Contributed:__

Total ONR Project

Trainee Data (only for those receiving full or partial ONR support):

TOTAL FEMALE MINORITY NON-US CITIZEN

No. Grad. Students: 3

No. Postdoctorals: 1

No. Undergraduates: 1

WARDS/HONORS TO PI AND/OR TO MEMBERS OF PI'S RESEARCH GROUP (please describe):

P.I. was appointed editor of Limnology and Oceanography. P.I. was Chair of Division N of American Society of Microbiology.

Equipment purchased on grant (number and description of items costing >$1,000):

None
List of Papers in Refereed Journals Published During Project


*Students or postdoc's in P.I.'s lab (D.L. Kirchman)
Distribution List for Final Reports

Attach a copy of the REPORT DOCUMENTATION PAGE (DD FORM 1473) to your final report as the first page and mail two copies (including the postcard labelled DTIC FORM 50) to:

Defense Technical Information Center
Building 5, Cameron Station
Alexandria, VA 22314

This allows other investigators to obtain copies of your report directly from DTIC. DTIC will fill out the postcard DTIC ACCESSION NOTICE (DTIC FORM 50) and return it to you with their number for your report. When you refer people to DTIC to get a copy of your report, give this number to expedite the request.

Mail one copy to each of the following and attach this very page to the back of your report - otherwise the folks below will think they have mistakenly received a copy meant for the Molecular Biology Program:

(a) Dr. Michael Marron  
ONR Code 1141  
Molecular Biology Program  
800 N. Quincy Street  
Arlington, VA 22217-5000

(b) Administrative Grants Officer  
ONR Resident Representative  
(address varies - see copy of your grant/contract)

(c) Director,  
Applied Research Directorate  
ONR Code 12  
800 N. Quincy Street  
Arlington, VA 22217-5000

(d) Director  
Office of Naval Technology  
Code 22  
800 N. Quincy Street  
Arlington, VA 22217-5000

(e) Director  
Chemical and Biological Sci Div  
Army Research Office  
P. O. Box 12211  
Research Triangle Park, NC 27709

(f) Life Sciences Directorate  
Air Force Office of Scientific Res  
Bolling Air Force Base  
Washington, DC 20332

(g) Director  
Naval Research Laboratory  
Technical Information Div  
Code 2627  
Washington, DC 20375

Encl (1)