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6. AUTHOR(S)
Harold D. May

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Dept. Microbiology & Immunology
Medical University of South Carolina
173 Ashley Ave.
Charleston, SC 29425

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Office of Naval Research
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13. ABSTRACT *(Maximum 200 words)*

The awarded grant (a DURIP grant) was for the purchase of new GC equipment and software. During the year of the grant the PI and colleagues (2 students and a postdoc) fully established the PCB dechlorinating range of several PCB dechlorinating enrichment cultures. The GCs have been invaluable in determining the catalytic capability of the PCB dechlorinating cultures. In addition, the most important recent results of the research have been the identification (for the first time) of two PCB-dechlorinating microorganisms. This is a significant step toward monitoring and stimulating the activity of such organisms in order to detoxify a PCB contaminated marine environment.

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GRANT #: N00014-99-1-0575

PRINCIPAL INVESTIGATOR: Dr. Harold D. May

INSTITUTION: Medical University of South Carolina

AWARD PERIOD: 31 March 1999 to 30 March 2000

OBJECTIVE: This was an equipment grant proposal designed to support the objectives of 3 ONR funded research projects. The overall objective of all three of the projects is to identify PCB-dechlorinating microorganisms in marine environments and to provide a basic understanding of the dehalogenating processes extant in marine sediments.

APPROACH: The three projects have been focused on 1) the identification of dechlorinating species in temperate (US harbors) and cold climates (Norwegian fjords, 2) characterize the physiology of these organisms, and 3) develop molecular probes for *in situ* monitoring of these organisms. Anaerobic enrichment cultures were developed with harbor sediments from Baltimore, MD (USA), Charleston, SC (USA), and Trondheim and Bergen (Norway). PCB dechlorination was monitored by GC analysis. Dechlorinating organisms were analyzed microscopically and by molecular analysis of the 16S rDNA of the enriched and isolated organisms.

ACCOMPLISHMENTS: The awarded grant (a DURIP grant) was for the purchase of new GC equipment and software. The PI has recently lost a GC due to age and wear (more than 20 years old). The amount of GC activity had increased to the point where analysis was the limiting factor in the research. In addition, the software used to operate the GCs and store and analyze data was obsolete. The new software allowed for the combined control of the PI's new GC and existing GC plus GC-MS. In addition, all of this software and hardware was Y2K compliant.

During the year of the grant the PI and colleagues (2 students and a postdoc) fully established the PCB dechlorinating range of several PCB dechlorinating enrichment cultures. In January 2000 the PI and colleagues publish a description of the activity of one of these cultures (see list below). This was the only paper to be published during the time period of the grant (1 year). However, this equipment is still in use and three more papers have been submitted for publication and two more are in preparation. In addition, several future publications are planned. Each of these submissions (present and future) has been and will be supported by the equipment that was purchased and upgraded with the funds from the DURIP grant.

CONCLUSIONS: Scientifically the GCs have been invaluable in determining the catalytic capability of the PCB dechlorinating cultures. In addition, the most important recent results of the research have been the identification (for the first time) of two PCB-dechlorinating microorganisms. These results will be further described in reports describing the other grants.

Educationally the GCs supported the work of two students and a postdoc. The students have graduated (Sean Norman, MS in 1999) and Leah Cutter (Ph.D. 2001).

SIGNIFICANCE: For the first time, two PCB-dechlorinating organisms have been identified and their dechlorinating capabilities determined. This is a significant step toward monitoring and stimulating the activity of such organisms in order to detoxify a PCB contaminated marine environment.

PATENT INFORMATION: A patent application relating to the use and monitoring of PCB-dechlorinating organisms has been filed.

AWARD INFORMATION: The PI was promoted to Associate Professor in 2000.

PUBLICATIONS AND ABSTRACTS (for total period of grant):

1. Wu Q, Sowers KR, and May HD. Establishment of a PCB-dechlorinating consortium, specific for double-flanked chlorines, in a sediment-free medium. Appl. Environ. Microbiol. 2000, 66:49-53.
2. Norman RS, Schreier S, Watts J, Sowers KR, and May HD. Molecular assessment of the effect of PCBs on the microbial community structure within an enrichment culture. American Society for Microbiology Conference on Microbial Diversity, 1999.
3. Wu Q, Pulliam Holoman TR, Schreier S, Sowers KR, and May HD. A 2,3,4,5-tetrachlorobiphenyl-dechlorinating enrichment culture sustained in a defined, sediment-free medium. Abstracts of the 99th Annual Meeting of the American Society for Microbiology, 1999.
4. Cutter LA, Sowers KR, and May HD. Acetate vs. hydrogen supported anaerobic *ortho* PCB dechlorination. Abstracts of the 100th Annual Meeting of the American Society for Microbiology, 2000.
5. Watts JEM, Schreier SB, Wu Q, May HD, and Sowers KR. A comparison of different molecular techniques to examine microbial diversity in anaerobic polychlorinated biphenyl (PCB) dechlorinating enrichment cultures. Abstracts of the 100th Annual Meeting of the American Society for Microbiology, 2000.

Because the DURIP equipment has continued to contribute to the success of the program I have listed below some additional publications and abstracts that have been published or have been submitted for publication. In addition, I have listed Dr. Leah Cutter's recent Ph.D. dissertation, which was supported by an ONR training grant and the DURIP.

1. Cutter, LA. Identification of PCB-dechlorinating microorganisms from estuarine sediments. Ph.D. dissertation, Medical University of South Carolina. 2001.
2. Cutter, LA, Watts JEM, Sowers KR, and May HD. Identification of a bacterium that reductively dechlorinates 2,3,5,6-chlorobiphenyl for growth. Science. In review.
3. May HD, Cutter LA, Wu, Q, Watts JEM, and Sowers KR. Molecular Identification of Anaerobic Microorganisms Associated with PCB Dechlorination. Proceedings of the 16th Annual International Conference on Contaminated Soils, Sediments and Water. 2000.
4. May HD, Cutter LA, Watts JEM, and Sowers KR. Molecular Identification of an Anaerobic Microorganism Whose Growth is Linked to PCB Dechlorination. Proceedings of the 16th Annual International Conference on Contaminated Soils, Sediments and Water. 2000.