



Research and Development

ERLGB PUBLICATIONS AND ABSTRACTS RELATED TO BIOTECHNOLOGY:

I. MICROBIAL ECOLOGY, BIOCHEMISTRY AND GENETICS

Prepared by

Environmental Research
Laboratory
Gulf Breeze FL 32561

February, 1984

ABDELAL, AHMED T.H., EMILY H. KENNEDY, AND DONALD G. AHEARN. 1977. PURIFICATION AND CHARACTERIZATION OF A NEUTRAL PROTEASE FROM SACCHAROMYCOPSIS LIPOLYTICA. J. BACTERIOL. 130(3):1125-1129. (ERL,G3 X003).

SACCHAROMYCOPSIS LIPOLYTICA 37-1 PRODUCED TWO INDUCIBLE EXTRACELLULAR PROTEASES, ONE UNDER NEUTRAL OR ALKALINE GROWTH CONDITIONS AND THE SECOND UNDER ACID CONDITIONS. SECRETION OF THE NEUTRAL PROTEASE WAS REPRESSED IN THE PRESENCE OF GLYCEROL OR GLUCOSE, BOTH OF WHICH SUPPORTED RAPID GROWTH OF THE ORGANISM. AMMONIUM IONS ALSO REPRESSED THE SECRETION OF THE ENZYME. THE NEUTRAL PROTEASE ACTIVITY COPURIFIED WITH ESTERASE ACTIVITY DURING AMMONIUM SULFATE FRACTIONATION, CHROMATOGRAPHY ON DIETHYLAMINOETHYL-CELLULOSE, AND GEL FILTRATION ON SEPHADEX G-150. THE MOLECULAR WEIGHT OF THE ENZYME WAS ESTIMATED TO BE 42,000 BY SUCROSE DENSITY GRADIENT CENTRIFUGATION AND 38,500 BY POLYACRYLAMIDE GEL ELECTROPHORESIS IN THE PRESENCE OF SODIUM DODECYL SULFATE. THE PURIFIED ENZYME HAD A PH OPTIMUM OF 6.8. PHENYLMETHYLSULFONYLFLUORIDE INHIBITED BOTH PROTEASE AND ESTERASE ACTIVITIES, INDICATING THE PRESENCE OF A SERINE RESIDUE IN THE ACTIVE CENTER. PROTEASE, BUT NOT ESTERASE, ACTIVITY WAS SENSITIVE TO ETHYLENEDIAMINETETRAACETATE AND WAS SIGNIFICANTLY ACTIVATED BY DIVALENT IONS. DITHIOTHREITOL INHIBITED BOTH PROTEASE AND ESTERASE ACTIVITIES, INDICATING THE PRESENCE OF A CRITICAL DISULFIDE BRIDGE. THE ENZYME HYDROLYZED CASEIN ($K_M = 25.6 \text{ mM}$) AND HEMOGLOBIN AS WELL AS THE NITROPHENYL ESTERS OF TYROSINE ($K_M = 2.4 \text{ mM}$), GLYCINE, TRYPTOPHAN, AND PHENYLALANINE.

AHEARN, D.G., W.L. COOK, AND S.A. CROW. 1981. EFFECTS OF POLLUTANTS ON MICROBIAL ACTIVITIES IN ESTUARINE SURFACE FILMS. EPA-600/4-81-009, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 20P.

SAMPLES OF INSHORE SURFACE FILMS FROM ESCAMBIA BAY, FLORIDA AND FROM SITES IN THE NORTH SEA YIELDED POPULATIONS OF AEROBIC, HETEROTROPHIC MICROORGANISMS UP TO 10^7 TO THE EIGHTH POWER ML^{-1} OR 10^6 TO THE SIXTH POWER CM^{-2} . HYDROCARBONOCLASTIC ORGANISMS OCCURRED IN RELATIVELY LOW POPULATIONS. A COMPARISON OF SPECIES OF YEASTS PREVALENT IN NORTH SEA WATERS BEFORE AND AFTER OIL PRODUCTION ACTIVITIES INDICATED A SHIFT TO A MORE WIDESPREAD DISTRIBUTION OF HYDROCARBONOCLASTIC FORMS WITH POSSIBLE INHIBITION OF A NON-HYDROCARBON UTILIZING SPECIES. EXAMINATION OF VARIOUS HYDROCARBONS AND CHLORINATED COMPOUNDS WITH THE POTENTIAL OF BEING SEQUESTERED IN NATURAL FILMS INDICATED THAT 66% COULD POTENTIALLY ALTER MICROBIAL METABOLIC PROCESSES IN THE SLICK. IN MICROCOSM STUDIES OF ESTUARINE SYSTEMS, REPRESENTATIVE COMPOUNDS DEMONSTRATED A SELECTIVE EFFECT FOR MICROFUNGI.

AHEARN, D.G., AND S.A. CROW. 1980. YEASTS FROM THE NORTH SEA AND AMOCO CADIZ OIL. BOT. MAR. 23(1):125-127. (ERL,GB X074).

THE SPECIES AND DENSITIES OF YEASTS ISOLATED FROM NORTH SEA WATERS BEFORE AND AFTER THE PRODUCTION OF OIL WERE COMPARED. DEBARYOMYCES HANSENII WAS THE PREDOMINANT SPECIES, BUT AFTER OIL PRODUCTION, CANDIDA GUILLIERMONDII, A HYDROCARBONOCLASTIC YEAST, WAS MORE COMMONLY ISOLATED AND THE FREQUENCY OF AUREOBASIDIUM PULLULANS DECREASED. RELATIVELY FEW FUNGI WERE ISOLATED FROM AMOCO CADIZ OIL COLLECTED TWELVE DAYS AFTER THE START OF THE SPILL. THE HIGHEST DENSITIES WERE OBTAINED FROM THE OIL SAMPLES WHEN THEY WERE FIRST EMULSIFIED IN A TWEEN 80-SEAWATER SOLUTION. IT IS SUGGESTED THAT THE HIGH CONCENTRATIONS OF AROMATICS IN THE UNWEATHERED IRANIAN CRUDE, WHICH CONSTITUTED ABOUT HALF OF THE SPILLED OIL, WERE INHIBITORY TO THE YEAST FLORA.

AHEARN, D.G., S.A. CROW, N.H. BERNER, AND S.P. MEYERS. 1976. MICROBIOLOGICAL CYCLING OF OIL IN ESTUARINE MARSHLANDS. IN: ESTUARINE PROCESSES, VOL. 1: USES, STRESSES, AND ADAPTATION TO THE ESTUARY. MARTIN L. WILEY, EDITOR, ACADEMIC PRESS, INC., NY. PP. 483-492. (ERL,GB X004).

INDIGENOUS MICROFLORA OF SEDIMENTS OF SPARTINA MARSHES OF THE LOUISIANA COAST INCLUDE A HIGH PERCENTAGE OF CELLULOLYTIC BACTERIA AND ASCOSPOROGENOUS YEASTS (PICHIA AND KLUYVEROMYCES). AT SITES EITHER ACCIDENTALLY OR EXPERIMENTALLY INUNDATED WITH CRUDE OIL, THE PROPORTION OF HYDROCARBON-UTILIZING BACTERIA AND YEASTS INCREASED. THE MARSH SEDIMENTS CONTAINED LOW POPULATIONS OF HYDROCARBONOCLASTIC FUNGI WITH FEW STRAINS SHOWING SIGNIFICANT OIL-EMULSIFYING PROPERTIES. IN CULTURE, REPRESENTATIVE MICROORGANISMS READILY UTILIZED ALKANES FROM C12 TO C18. OIL UTILIZATION BY A REPRESENTATIVE BACTERIUM INCREASED SIGNIFICANTLY AS INCUBATION TEMPERATURES WERE RAISED FROM 10 TO 30 C, WHEREAS YEASTS SHOWED PEAK ACTIVITY AT 20 C. OIL UTILIZATION BY TEST MICROORGANISMS WAS NEGLIGIBLE AT 5 C. SEEDLING OF EXPERIMENTALLY OILED MARSH PLOTS WITH A MIXED CULTURE OF CANDIDA MALTOSA AND C. LIPOLYTICA DEMONSTRATED THAT THESE SPECIES SURVIVED IN THE OILED AREA WITHOUT SPREADING TO ADJACENT SITES. IN CULTURE THESE STRAINS GAVE SIGNIFICANT EMULSIFICATION OF CRUDE OIL AND UTILIZED UP TO 90% OF SELECTED HYDROCARBONS.

AHEARN, D.G., S.A. CROW, AND W.L. COOK. 1977. MICROBIAL INTERACTIONS WITH PESTICIDES IN ESTUARINE SURFACE SLICKS. EPA-600/3-77-050, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 22P.

ESTUARINE SURFACE FILMS FROM ESCAMBIA BAY, FLORIDA, AND ADJACENT WATERS WERE SAMPLED BY USING THE MEMBRANE ADSORPTION TECHNIQUE TO ENUMERATE MICROBIAL POPULATIONS. SAMPLES OF THE UPPER 10 MM OF ESTUARINE SURFACE FILMS YIELDED MICROBIAL POPULATIONS UP TO 10 TO THE EIGHTH POWER ML-1 OR 10 TO THE FIFTH POWER CM-2. THESE POPULATIONS WERE 10 TO 100 TIMES GREATER THAN THOSE IN UNDERLYING WATERS OF 10 CM. PREDOMINANT BACTERIA IN SURFACE FILMS AS ISOLATED ON MARINE AGAR WERE MOTILE, NONPIGMENTED, GRAM-NEGATIVE RODS. COLONY-FORMING UNITS OF YEASTS AND MOLDS ON MYCOLOGICAL AGAR PREPARED WITH 50% SEAWATER WERE FOUND IN CONCENTRATIONS TO 10 TO THE FOURTH POWER ML-1 OR 28 CM-2. THE PREDOMINANT SURFACE FILM ISOLATES FROM MARINE AGAR WERE PROTEOLYTIC AND AMYLOLYTIC BUT EXHIBITED ONLY WEAK TO NEGLIGIBLE HYDROCARBONCLASTIC AND LIPOLYTIC ACTIVITIES. A GREATER PROPORTION OF THE SURFACE-FILM BACTERIA, AS COMPARED TO THOSE AT 10 CM DEPTH, WERE CAPABLE OF GROWTH ON FRESHWATER MEDIA. WITH SELECTIVE ISOLATION MEDIA, AMYLOLYTIC, AND LIPOLYTIC BACTERIA APPEARED TO COMPRISE A MORE SIGNIFICANT PROPORTION OF THE TOTAL POPULATION. TWENTY-ONE REPRESENTATIVE BACTERIA, YEASTS, AND FILAMENTOUS FUNGI FROM INITIAL SAMPLING OF SURFACE MICROLAYERS WERE TESTED FOR THE EFFECTS OF SELECTED PESTICIDES ON UTILIZATION OF VARIOUS SUBSTRATES. ONE BACTERIUM WAS SENSITIVE TO PCB FORMULATIONS. IN SUBSEQUENT STUDIES WITH 53 ISOLATES REPRESENTATIVE OF MORE DIVERSE PHYSIOLOGICAL GROUPS, O-CHLORONAPHTHALENE, PCB 1016, AND PENTACHLOROPHENOL WERE INHIBITORY TO A LARGE PORTION OF THE ISOLATES AND HEPTACHLOR, BIPHENYL, PYRENE, AND PCB 1016 SIGNIFICANTLY REDUCED HEXADECANE UTILIZATION.

BOBBIE, R.J., J.S. NICKELS, G.A. SMITH, S.D. FAZIO, R.H. FINDLAY, W.M. DAVIS, AND D.C. WHITE. 1991. EFFECT OF LIGHT ON BIOMASS AND COMMUNITY STRUCTURE OF ESTUARINE DETRITAL MICROBIOTA. APPL. ENVIRON. MICROBIOL. 42(1):150-158. (ERL,GB X189).

COMPARISON OF ESTUARINE DETRITAL MICROBIOTA GROWN WITH AND WITHOUT LIGHT IN THE ABSENCE OF MACROSCOPIC GRAZING SHOWED SHIFTS IN THE COMMUNITY STRUCTURE THAT ENABLED CORRELATION BETWEEN VARIOUS BIOCHEMICAL MEASURES. ANALYSIS OF THESE BIOCHEMICAL MEASURES SHOWED THAT GROWTH IN LIGHT INDUCES THE SMALLEST INCREASES IN PROCARYOTIC ATTRIBUTES SUCH AS MURAMIC ACID; WALL GLUCOSAMINE; LIPID PHOSPHATE; TOTAL EXTRACTABLE ADENOSINE NUCLEOTIDES; SHORT-BRANCHED, CYCLOPROPANE, AND CISVACCENIC FATTY ACIDS; LIPID GLUCOSE AND MANNOSE; THE INCORPORATION OF ACETATE INTO LIPID; AND THE FORMATION OF DEOXYRIBONUCLEIC ACID FROM THYMININE. MEASURES OF THE MICROFAUNA SUCH AS LIPID INOSITOL AND THE γ -LINOLENIC SERIES OF POLYENOIC FATTY ACIDS ALSO INCREASED MINIMALLY IN THE LIGHT-GROWN MICROBIOTA. MEASURES OF SULFOLIPID SYNTHESIS, LIPID GLYCEROL, TOTAL EXTRACTABLE PALMITATE, 18-CARBON POLYENOIC FATTY ACIDS, AND TOTAL POLYENOIC FATTY ACIDS LONGER THAN 20 CARBONS INCREASED 10- TO 15-FOLD IN ALGAE AND FUNGI. CHLOROPHYLL A, LIPID GALACTOSE, AND THE 16- AND 20- CARBON POLYENOIC FATTY ACIDS CHARACTERISTIC OF DIATOMS INCREASED MAXIMALLY IN THE LIGHT. THIS INCREASE OF DIATOM MEASURE CORRELATED WITH THE SHEETS OF DIATOMS DETECTED BY SCANNING ELECTRON MICROSCOPY.

BOBBIE, R.J., D.C. WHITE, AND P.H. BENSON. 1980. BIOCHEMICAL ANALYSIS OF THE RESPONSE OF THE MARINE MICROFOULING COMMUNITY STRUCTURE TO CLEANING PROCEDURES DESIGNED TO MAINTAIN HEAT TRANSFER EFFICIENCY. IN: PROCEEDINGS OF THE FIFTH INTERNATIONAL CONGRESS OF MARINE CORROSION AND FOULING. L. ARITO, EDITOR, GRAFICAS JREE S.L., BARCELONA, SPAIN. PP. 391-400. (ERL,GB X184).

THE MICROFOULING COMMUNITY THAT DEVELOPS IN ALUMINUM PIPES SUBJECT TO FLOWING SEA WATER IS MARKEDLY AFFECTED BY A MECHANICAL CLEANING PROCEDURE EMPLOYED TO MAINTAIN THE EFFICIENT HEAT TRANSFER PROPERTIES NECESSARY IN THE CONDENSER SYSTEM OF THE OCEAN THERMAL ENERGY CONVERSION SYSTEM. SENSITIVE MEASURES OF THE MICROBIAL BIOMASS, SUCH AS THE EXTRACTABLE LIPID PHOSPHATE, THE EXTRACTABLE PALMITIC ACID AND THE TOTAL ORGANIC CARBON SHOW GOOD CORRELATING WITH THE HEAT TRANSFER EFFICIENCY (RF) IN THE EARLY STAGES OF FREE FOULING. AFTER MECHANICAL CLEANING WITH EITHER MANUALLY OPERATED BRUSHES OR THE M.A.N. SYSTEM, MEASURES OF THE TOTAL BIOMASS SUCH AS TOTAL ORGANIC CARBON SHOW REASONABLE CORRELATION TO THE (RF). AFTER CLEANING, MEASURES OF CELLULAR BIOMASS SUCH AS LIPID PHOSPHATE OF LIPID PALMITIC ACID DO NOT CORRELATE WITH THE RF AND THE RATIOS OF TOTAL ORGANIC CARBON. MECHANICAL CLEANING CHANGES THE COMMUNITY STRUCTURE OF THE MICROBES. THE MORPHOLOGY OF THE POPULATION BY SCANNING ELECTRON MICROSCOPY (SEM) REVEALS SELECTIVE REMOVAL OF THE LARGER AND MORPHOLOGICALLY MORE COMPLEX MICROEUKARYOTES WITH RETENTION OF A COMMUNITY ENRICHED IN BACTERIA. EXAMINATION OF THE FATTY ACID COMPOSITION OF THE COMMUNITY SHOWS CLEANING-INDUCED SELECTIVITY NOT ONLY FOR THE BACTERIAL PROKARYOTES BUT FOR A SPECIFIC PROPORTION OF THE BACTERIA. A POPULATION DIFFERENCE BETWEEN THE BACTERIA RETAINED AFTER MANUAL BRUSHING AND CONTINUOUS BRUSHING WITH THE M.A.N. SYSTEM CAN ALSO BE DEMONSTRATED. SEM MORPHOLOGY, THE RELATIONSHIP BETWEEN RF AND MEASURES OF TOTAL AND CELLULAR BIOMASS, THE INCREASE IN THE RATIO OF TOTAL ORGANIC CARBON TO CELLULAR BIOMASS AND THE STEADY INCREASE IN A MICROBIAL POPULATION ENRICHED IN LINOLEIC ACID ALL POINT TO AN ACCUMULATION OF EXTRACELLULAR BIOPOLYMER WITH THE CLEANING PROCEDURES. WITH INTERMITTENT CLEANING THE BIOPOLYMER ACCUMULATION ENHANCES THE COLONIZATION BY THE MICROEUKARYOTES BETWEEN THE CLEANING CYCLES.

BOBBIE, RONALD J., AND DAVID C. WHITE. 1980. CHARACTERIZATION OF BENTHIC MICROBIAL COMMUNITY STRUCTURE BY HIGH RESOLUTION GAS CHROMATOGRAPHY OF FATTY ACID METHYL ESTERS. APPL. ENVIRON. MICROBIOL. 39(6):1212-1222. (ERL,GB X009).

FATTY ACIDS ARE A WIDELY STUDIED GROUP OF LIPIDS OF SUFFICIENT TAXONOMIC DIVERSITY TO BE USEFUL IN DEFINING MICROBIAL COMMUNITY STRUCTURE. THE EXTRAORDINARY RESOLUTION OF GLASS CAPILLARY GAS-LIQUID CHROMATOGRAPHY CAN BE UTILIZED TO SEPARATE AND TENTATIVELY IDENTIFY LARGE NUMBERS OF FATTY ACID METHYL ESTERS DERIVED FROM THE LIPIDS OF ESTUARINE DETRITUS AND MARINE BENTHIC MICROBIOTA WITHOUT THE BIAS OF SELECTIVE METHODS REQUIRING CULTURE OR RECOVERY OF THE MICROBES. THE GAS-LIQUID CHROMATOGRAPHIC ANALYSES ARE BOTH REPRODUCIBLE AND HIGHLY SENSITIVE, AND THE RECOVERY OF FATTY ACIDS IS QUANTITATIVE. THE ANALYSES CAN BE AUTOMATED, AND THE DIAGNOSTIC TECHNIQUE OF MASS SPECTRAL FRAGMENTATION ANALYSIS CAN BE READILY APPLIED. SPLITLESS INJECTION ON GLASS CAPILLARY GAS CHROMATOGRAPHIC COLUMNS DETECTED BY MASS SPECTRAL SELECTIVE ION MONITORING PROVIDES AN ULTRASENSITIVE AND DEFINITIVE MONITORING SYSTEM. RECIPROCAL MIXTURES OF BACTERIA AND FUNGI, WHEN EXTRACTED AND ANALYZED, SHOWED PROGRESSIVE CHANGES OF DISTINCTIVE FATTY ACID METHYL ESTERS DERIVED FROM THE LIPIDS. BY MANIPULATING THE ENVIRONMENT OF AN ESTUARINE DETRITAL MICROBIAL COMMUNITY WITH ANTIBIOTICS AND CULTURE CONDITIONS, IT WAS POSSIBLE TO PRODUCE A COMMUNITY GREATLY ENRICHED IN EUKARYOTIC FUNGI, AS EVIDENCED BY SCANNING ELECTRON MICROSCOPIC MORPHOLOGY. THE FATTY ACID METHYL ESTERS FROM THE LIPIDS IN THE FUNGUS-ENRICHED DETRITUS SHOWED ENRICHMENT OF THE C18 DIENOIC AND THE C18 AND C20 POLYENOIC ESTERS. MANIPULATION OF THE DETRITAL MICROBIOTA THAT INCREASED THE PROCARYOTIC POPULATION RESULTED IN AN ABSENCE OF LARGE STRUCTURES TYPICAL OF FUNGAL MYCELIA OR DIATOMS, AS EVIDENCED BY SCANNING ELECTRON MICROSCOPY, AND A SIGNIFICANTLY LARGER PROPORTION OF ANTEISO- AND ISO-BRANCHED C15 FATTY ACID ESTERS, C17 CYCLOPROPANE FATTY ACID ESTERS, AND THE CIS-VACCENIC ISOMER OF THE C18 MONOENOIC FATTY ACID ESTERS. AS DETERMINED BY THESE TECHNIQUES, A MARINE SETTLING COMMUNITY SHOWED GREATER DIFFERENCES IN BACTERIAL AS CONTRASTED TO MICROEUKARYOTIC POPULATIONS WHEN COMPARED WITH THE MICROBIAL COMMUNITIES OF BENTHIC CORES.

BOURQUIN, A.W. 1973. ESTUARINE MICROBES AND ORGANOCHLORINE PESTICIDES (A BRIEF REVIEW). IN: MICROBIAL DEGRADATION OF OIL POLLUTANTS. LSU-SG-73-01, LOUISIANA STATE UNIVERSITY, CENTER FOR WETLAND RESOURCES, BATON ROUGE, LA. PP. 237-243. (ERL,GB 165).

LITTLE IS KNOWN ABOUT MICROBIOLOGICAL DEGRADATION OF ORGANOCHLORINE PESTICIDES IN THE ESTUARINE AND OCEANIC ENVIRONMENTS. SINCE MICROORGANISMS ARE PROBABLY THE MAIN INSTRUMENTS OF PESTICIDE BREAKDOWN, AND POSSIBLY OFFER AN ARRAY OF MECHANISM BY WHICH POLLUTION MAY BE REDUCED, RESEARCH IS NEEDED TO LEARN THE PATHWAYS OF MICROBIAL DEGRADATION IN THE MARINE ENVIRONMENT.

BOURQUIN, A.W. 1977. EFFECTS OF MALATHION ON MICROORGANISMS OF AN ARTIFICIAL SALT-MARSH ENVIRONMENT. J. ENVIRON. QUAL. 6(4):373-378. (ERL,GB 312).

LABORATORY SALT-MARSH ENVIRONMENTS WERE TREATED WITH MALATHION, AN ORGANOPHOSPHATE INSECTICIDE, AND AEROBIC HETEROTROPHIC BACTERIA WERE MONITORED TO DETERMINE CHANGES IN THEIR MICROBIAL ECOLOGY. SEVERAL PHYSIOLOGICAL ACTIVITIES WERE ASSAYED IN BOTH TREATED AND UNTREATED CONTROLS; HOWEVER, NO RELIABLE TRENDS IN NUMBERS OF THESE MICROORGANISMS WERE DETECTED. ON THE OTHER HAND, POPULATIONS OF MALATHION SOLUBLE-CARBON-DEGRADING BACTERIA INCREASED SIGNIFICANTLY WITH INCREASING TREATMENT LEVELS AND IN THE SEDIMENTS WITH REPEATED TREATMENT. MALATHION COMETABOLIZING BACTERIA INCREASED SIGNIFICANTLY OVER THE CONTROL SYSTEMS IN THE WATER COLUMN WITH INCREASING TREATMENT LEVELS. ALTHOUGH NUMBERS OF MALATHION-DEGRADING BACTERIA INCREASED WITH HIGHER TREATMENT LEVELS OR FREQUENCY OF TREATMENT, THESE CHANGES HAD NO EFFECT ON THE NUMBERS OF BACTERIA FROM THE WATER OR SEDIMENT. WHEN AN ORGANOCHLORINE INSECTICIDE, MIREX, WAS USED TO TREAT THE ECOSYSTEMS, ESSENTIALLY NO CHANGES IN THE BACTERIAL POPULATIONS WERE DETECTED.

BOURQUIN, A.W. 1979. REGULATORY RESPONSIBILITY. IN: AQUATIC MICROBIAL ECOLOGY. R.R. COLWELL AND JOAN FOSTER, EDITORS, UNIV. OF MARYLAND, COLLEGE PARK, MD. PP. 401-405. (ERL,GB X301).

BOURQUIN, A.W. 1980. DISCUSSION - AQUATIC MICROBIAL ECOLOGY. IN: MICROBIOLOGY--1980. DAVID SCHLESSINGER, EDITOR, AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON DC. PP. 390-391. (ERL,GB X157).

BOURQUIN, A.W., AND J.G. AHEARN. 1976. MICROBIOLOGY AND CHEMISTRY OF ESTUARINE SURFACE MICROLAYERS. IN: PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON MARINE POLLUTION RESEARCH. EPA-600/9-76-032, S.P. MEYERS, EDITOR, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. PP. 89-96. (ERL,GB 313).

BOURQUIN, A.W., R.L. GARNAS, P.H. PRITCHARD, F.G. WILKES, C.R. CRIPE, AND N.I. RUBINSTEIN. 1979. INTERDEPENDENT MICROCOSMS FOR THE ASSESSMENT OF POLLUTANTS IN THE MARINE ENVIRONMENT. INT. J. ENVIRON. STUD. 13(2):131-140. (ERL,GB 348).

LABORATORY MICROCOSMS ARE DESCRIBED FOR ASSESSING THE FATE AND EFFECTS OF POLLUTANTS IN MARINE AND ESTUARINE ENVIRONMENTS. THESE SYSTEMS FOCUS ON SPECIFIC ECOSYSTEM PROCESSES AND INTERACTIONS AND ARE INTERDEPENDENT IN THAT THE RESULTS OF ALL ARE NECESSARY FOR A COMPLETE DESCRIPTION OF A POLLUTANT'S ENVIRONMENTAL IMPACT. THE FOLLOWING INDIVIDUAL SYSTEMS ARE DESCRIBED USING METHYL PARATHION AS THE POLLUTANT: ENVIRONMENTAL FATE SCREENING SYSTEM; ECO-CORE SYSTEM; CONTINUOUS FLOW SYSTEMS; AQUATIC GRADIENT AVOIDANCE RESPONSE SYSTEM; BENTHIC BIOASSAY SYSTEM.

BOURQUIN, A.W., M.A. HOOD, AND R.L. GARNAS. 1977. ARTIFICIAL MICROBIAL ECOSYSTEM FOR DETERMINING EFFECTS AND FATE OF TOXICANTS IN A SALT-MARSH ENVIRONMENT. IN: DEVELOPMENTS IN INDUSTRIAL MICROBIOLOGY, VOL. 18. SOCIETY FOR INDUSTRIAL MICROBIOLOGY, WASHINGTON, DC. PP. 185-191. (ERL,GB 309).

AN ARTIFICIAL LABORATORY ENVIRONMENT DESIGNED TO DETERMINE MICROBIAL INTERACTIONS WITH POLLUTANT CHEMICALS IS PROPOSED. THE SYSTEM IS DESIGNED TO OBTAIN MAXIMUM REPRODUCIBILITY BETWEEN REPLICATES BY DIVIDING A SINGLE TANK INTO SEPARATE CLOSED CHAMBERS. RADIOLABELED TOXICANTS ARE ADDED DIRECTLY TO THE CORE-CHAMBERS AND MONITORED FOR METABOLIC BREAKDOWN. FURTHER INFORMATION IS OBTAINED EASILY ON CHANGES IN MICROBIAL, PHYSIOLOGGICAL INDEXES INDUCED BY THE TOXICANTS. TECHNIQUES FOR MONITORING EFFECTS OF THE METHYL PARATHION ON THE MICROBIAL POPULATION AND THE FATE OF THIS CHEMICAL ARE GIVEN.

BOURQUIN, A.W., M.A. HOOD, P.H. PRITCHARD, AND R.L. GARNAS. 1977. DEGRADATION OF METHYL PARATHION IN LABORATORY SIMULATIONS OF SALT-MARSH ENVIRONMENTS (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY 1977. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 273. (ERL,GB 316).

BOURQUIN, A.W., L.A. KIEFER, N.H. BERNER, S. CROW, AND D.G. AHEARN. 1975. INHIBITION OF ESTUARINE MICROORGANISMS BY POLYCHLORINATED BIPHENYLS. IN: DEVELOPMENTS IN INDUSTRIAL MICROBIOLOGY, VOL. 16. AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, WASHINGTON, DC. PP. 256-261. (ERL,GB 230).

OVER 100 ISOLATES OF REPRESENTATIVE ESTUARINE BACTERIA AND FUNGI WERE SCREENED FOR THEIR ABILITY TO GROW IN THE PRESENCE OF COMMERCIAL PREPARATIONS OF POLYCHLORINATED BIPHENYLS (PCB). SUPER ABSORBANT SENSITIVITY DISCS IMPREGNATED WITH UP TO 0.5 MG OF PCB WERE PLACED ON THE SURFACE OF FRESHLY INOCULATED SOLID MEDIA. TWENTY-SIX BACTERIA, REPRESENTING BOTH GRAM-POSITIVE AND GRAM-NEGATIVE STRAINS OF VARYING MORPHOLOGY, SHOWED VARYING DEGREES OF SENSITIVITY TO PCB. IN CONTRAST TO INSENSITIVE ISOLATES, SENSITIVE STRAINS WERE MAINLY AMYLOLYTIC AND PROTEOLYTIC. PCB HAD NEGLIGIBLE EFFECT ON THE GROWTH OF FUNGI. THE SENSITIVITY OF SELECT CULTURES OF HETEROTROPHIC BACTERIA TO PCB MAY BE OF CONSIDERABLE IMPORTANCE TO NUTRIENT TURNOVER IN ESTUARINE ECOSYSTEMS.

BOURQUIN, A.W., S.P. MEYERS, AND D.G. AHEARN. 1975. IMPACT OF THE USE OF MICROORGANISMS ON THE AQUATIC ENVIRONMENT. EPA-660/3-75-001, U.S. ENVIRONMENTAL PROTECTION AGENCY, NATIONAL ENVIRONMENTAL RESEARCH CENTER, CORVALLIS, OR. 259P. (ERL 68 235).

THIS REPORT CONTAINS THE PROCEEDINGS OF A SYMPOSIUM-WORKSHOP SPONSORED BY THE EPA GULF BREEZE ENVIRONMENTAL RESEARCH LABORATORY TO DETERMINE THE POSSIBLE IMPACT OF ARTIFICIALLY INTRODUCING MICROBIAL INSECT CONTROL AGENTS OR OIL-DEGRADING AGENTS INTO THE AQUATIC ENVIRONMENT. THE EFFICACY AND SAFETY TESTING, ESPECIALLY AGAINST NON-TARGET AQUATIC ORGANISMS, FOR USE OF BACTERIA, VIRUSES, FUNGI, AND PROTOZOA TO CONTROL AQUATIC INSECT PESTS IS DISCUSSED WITH REMARKS OF PANEL MEMBERS REPRESENTING GOVERNMENT, ACADEMIA, AND INDUSTRY. SPECIAL ATTENTION IS GIVEN TO PERSISTENCE OF PATHOGENS IN AQUATIC ENVIRONMENTS AS WELL AS CONTROL OF AQUATIC WEEDS AND OTHER NON-INSECT PESTS. THE USE OF MICROORGANISMS TO CLEAN UP OIL SPILLS IN AQUATIC ENVIRONMENTS IS DISCUSSED BY INDUSTRIAL, ACADEMIC, AND GOVERNMENTAL SCIENTISTS. SPECIAL CONSIDERATIONS ARE GIVEN TO SELECTION OF HYDROCARBONOCLASTIC MICROORGANISMS AND USE OF THESE MICROORGANISMS IN SPECIAL ENVIRONMENTS--ARCTIC REGIONS AND LOUISIANA SALT MARSHES. SUMMARY PAPERS ARE PRESENTED FOR EACH PANEL CONCERNED WITH MICROBIAL PESTICIDES AND ONE SUMMARY FOR THE SESSION ON MICROBIAL DEGRADATION OF OIL. EXCELLENT BIBLIOGRAPHIES ARE PRESENTED WITH EACH PAPER AND DISCUSSION.

BOURQUIN, A.W., AND P.H. PRITCHARD, EDITORS. 1979. WORKSHOP: MICROBIAL DEGRADATION OF POLLUTANTS IN MARINE ENVIRONMENTS. EPA-600/9-79-012, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 552P.

THIS INTERNATIONAL WORKSHOP, HELD APRIL 10-14, 1978, AT PENSACOLA BEACH, FLORIDA, FOCUSES ON PERTINENT ISSUES RELATED TO THE SCIENTIFIC INVESTIGATION OF MICROBIAL DEGRADATION OF ORGANIC CHEMICALS IN AQUATIC ENVIRONMENTS. PARTICIPANTS DISCUSS METHODOLOGICAL CRITERIA FOR THESE INVESTIGATIONS AND THE NEED FOR BIODEGRADATION STUDIES. SPEAKERS AND CONTRIBUTED PAPERS FOR OPEN SESSIONS EXPLORE THESE TOPICS: (1) BIOCHEMISTRY OF MICROBIAL DEGRADATION; (2) TRANSFORMATION IN AQUATIC ENVIRONMENTS; (3) COMPARTMENTALIZATION IN AQUATIC ENVIRONMENTS; (4) BIODEGRADATION IN MICROCOSMS; (5) DEGRADATION METHODOLOGY; AND (6) PERSISTENCE AND EXTRAPOLATION. DISCUSSIONS WITHIN EACH SESSION ARE PRESENTED. THESE PROCEEDINGS CONCLUDE WITH A SUMMARY REPORT AND WORKSHOP CONSENSUS REPORTS DRAFTED BY SPECIAL TASK GROUPS WITH RECOMMENDATIONS CONCERNING THE RESEARCH, PRODUCTION, AND REGULATION OF POTENTIAL AQUATIC POLLUTANTS.

BOURQUIN, A.W., P.H. PRITCHARD, AND H.L. FREDRICKSON. 1978. FATE AND EFFECTS OF KEPONE IN ARTIFICIAL ESTUARINE ECOSYSTEMS (ABSTRACT). (ERL,GB X014).

FATE AND EFFECTS OF THE PESTICIDE KEPONE WERE STUDIED IN ARTIFICIAL ECOSYSTEMS, CONTAINING WATER AND SEDIMENT FROM EITHER RANGE POINT SALT MASH, FL OR THE JAMES RIVER, VA. APPROXIMATELY 75-80% OF ^{14}C KEPONE ADDED (0.5 PPM) TO THE SYSTEMS ACCUMULATED IN THE DETRITAL FRACTION. USING HIGH PRESSURE LIQUID CHROMATOGRAPHY AND GC-MASS SPECTRAL ANALYSIS, WE DETECTED NO TRANSFORMATION PRODUCTS WITH A VARIETY OF EXPERIMENTAL REGIMES INCLUDING ANAEROBIC OR AEROBIC CONDITIONS. NEITHER THE ADDITION OF GLUCOSE (0.1%) NOR NAPHTHALENE (0.1%) STIMULATED THE TRANSFORMATION OF THE PESTICIDE IN ANALOGOUS SYSTEMS. NO $^{14}\text{CO}_2$ WAS PRODUCED IN ANY EXPERIMENT. JAMES RIVER SEDIMENT WITH A HISTORY OF KEPONE EXPOSURE WAS LIKEWISE INEFFECTIVE. EFFECTS OF KEPONE ON MICROBIAL COMMUNITIES IN THESE ARTIFICIAL ECOSYSTEMS WERE MONITORED BY DETERMINING THE RATE OF CO_2 EVOLUTION AND METABOLITE ACCUMULATION FROM ^{14}C -METHYL PARATHION (MPS). JAMES RIVER SEDIMENT SYSTEMS WERE MORE ACTIVE THAN RANGE POINT SEDIMENT SYSTEM IN THE METABOLISM OF MPS TO CO_2 . THE PRESENCE OF KEPONE AT CONCENTRATIONS OF 0.6 MG/KG OF SEDIMENT IN EITHER SEDIMENT SYSTEM REDUCED THE DEGRADATION RATE OF MPS BY 59% AND 54%, RESPECTIVELY. THESE STUDIES INDICATE THAT KEPONE, ALTHOUGH RESISTANT TO MICROBIAL ATTACK, CAN BE INHIBITORY TO THE MICROBIAL COMMUNITY RESPONSIBLE FOR THE DEGRADATION OF OTHER POLLUTANTS IN AN ARTIFICIAL ECOSYSTEM.

BOURQUIN, A.W., P.H. PRITCHARD, AND W.R. MAHAFFEY. 1978. EFFECTS OF KEPONE ON ESTUARINE MICROORGANISMS. IN: DEVELOPMENTS IN INDUSTRIAL MICROBIOLOGY, VOL. 19. SOCIETY FOR INDUSTRIAL MICROBIOLOGY, WASHINGTON, DC. PP. 489-497. (ERL,GB 345).

LOW CONCEN OF THE INSECTICIDE KEPONE, APPROACHING THOSE FOUND IN CONTAMINATED JAMES RIVER SEDIMENT, WERE SHOWN TO BE INHIBITORY TO THE GROWTH AND OXYGEN UPTAKE OF MICROORGANISMS RANDOMLY SELECTED FROM ESTUARINE ENVIRONMENTS. NO SIGNIFICANT CORRELATIONS WERE NOTED BETWEEN GROWTH INHIBITION BY KEPONE AND CELL MORPHOLOGY, ALIPHATIC HYDROCARBON UTILIZATION, PESTICIDE TOLERANCE, SELECTED ENZYME ACTIVITIES, NITRATE REDUCTION, AND UREA HYDROLYSIS. OXYGEN UPTAKE BY PURE CULTURES GROWN ON GLUCOSE OR HYDROCARBONS AT CELL DENSITIES EQUIVALENT TO 10 TO THE THIRD POWER THRU 10 TO THE FOURTH POWER CELLS/ML WAS DECREASED BY 60-100% AT KEPONE CONCEN OF 0.02-2.0 MG/LITER. TOTAL VIABLE COUNTS FROM ESTUARINE WATER OR SEDIMENTS GROWN AEROBICALLY ON AGAR MEDIA CONTAINING 0.02 MG/LITER KEPONE WERE REDUCED BY 8-78%. THE INHIBITORY EFFECT WAS ELIMINATED PARTIALLY WHEN SEDIMENT POPULATIONS WERE GROWN ANAEROBICALLY.

BOURQUIN, A.W., AND V.A. PRZYBYLSZEWSKI. 1977. DISTRIBUTION OF BACTERIA WITH NITRILOTRIACETATE-DEGRADING POTENTIAL IN AN ESTUARINE ENVIRONMENT. APPL. ENVIRON. MICROBIOL. 34(4):411-418. (ERL,GB 323).

ATTEMPTS TO ISOLATE ESTUARINE BACTERIA CAPABLE OF METABOLIZING NITRILOTRIACETATE (NTA) AS A SOLE CARBON SOURCE FROM AREAS WITHIN ESCAMBIA BAY, FLA., WERE UNSUCCESSFUL; HOWEVER, BACTERIA FROM FRESHWATER STREAMS AND FROM ESTUARINE SURFACE MICROLAYERS WERE EASILY ADAPTED TO DEGRADATION OF NTA IN FRESHWATER MEDIUM. A PSEUDOMONAS SP. STRAIN (ATCC 29600), CAPABLE OF GROWTH IN NTA AS A SOLE CARBON SOURCE, METABOLIZED NTA AT A REDUCED RATE IN A SALINE MEDIUM (15PPT), COMPARED WITH A FRESHWATER MEDIUM (0 TO 15PPT). MICROORGANISMS CAPABLE OF DEGRADING NTA EXIST IN ESTUARINE SURFACE MICROLAYERS AND IN FRESH SUBSURFACE WATERS JUST BEFORE ENTERING THE ESTUARY; THESE DATA INDICATE AN INTERFERENCE WITH NTA CATABOLISM BY SOME UNKNOWN FACTORS OF THE ESTUARINE ENVIRONMENT RATHER THAN AN ABSENCE OF POTENTIAL NTA-DEGRADING BACTERIA.

BOURQUIN, A.W., J. SPAIN, AND H.P. PRITCHARD. 1980. EFFECT OF ENVIRONMENTS ON FATE OF SUBSTITUTED-PHENOLS (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY OF MICROBIOLOGY--1980. AMERICAN SOCIETY OF MICROBIOLOGY, WASHINGTON, DC. PP. 167. (ERL,GB X174).

BOURQUIN, A.W., W.W. WALKER, AND P.H. PRITCHARD. 1981. SCREENING TEST TO ESTIMATE THE DEGRADATION RATES OF TOXICANTS IN ESTUARINE ENVIRONMENTS (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY 1981. AMERICAN SOCIETY OF MICROBIOLOGY, WASHINGTON, DC. PP. 206. (ERL,GB X244).

RAPID, INEXPENSIVE AND INFORMATIVE SCREENING TESTS ARE IMPORTANT IN EVALUATING POTENTIAL HAZARDS OF TOXICANTS ENTERING ESTUARINE ENVIRONMENTS. WE HAVE DEVELOPED A TEST TO PROVIDE QUANTITATIVE AND UNAMBIGUOUS INFORMATION ON KINETICS OF BIODEGRADATION. THE TEST WAS DESIGNED TO A) DISTINGUISH BIODEGRADATION RATES FROM HYDROLYSIS RATES, B) ESTIMATE THE EFFECT OF SEDIMENTS ON THESE RATES, C) DETERMINE USING BIOASSAYS, LOSS OF TOXICITY DUE TO SEDIMENT ADSORPTION AND BIOTRANSFORMATION. RATES WERE COMPARED TO RATES OF DEGRADATION OF THE BENCHMARK CHEMICAL, METHYL PARATHION. SHAKE FLASKS CONTAINING LOW CONCENTRATIONS (MG/L) TOXICANTS AND STERILE AND NONSTERILE WATER OR WATER-SEDIMENT WERE MONITORED FOR DISAPPEARANCE OF PARENT COMPOUND BY GAS CHROMATOGRAPHIC ANALYSIS OF EXTRACTED SAMPLES. INITIAL MULTIPLE SAMPLING PROVIDED A SEDIMENT-WATER EQUILIBRIUM PARTITION COEFFICIENT. MICROBIAL BIOMASS WAS MEASURED BY ATP ANALYSIS AND PLATE COUNTS. NO CONVERSION OF PARENT COMPOUND TO TOXIC BY-PRODUCTS WAS DEMONSTRATED BY RESIDUAL TOXICITY TO MYSID SHRIMP AFTER PARENT COMPOUND DISAPPEARANCE. BIODEGRADATION RATE INFORMATION WAS DEVELOPED FOR METHYL PARATHION, DURSAB, BOLERO, GJAL, HOELON, EPN, AND AMBUSH.

BOURQUIN, AL W. IN PREP. BIODEGRADATION IN THE ESTUARINE-MARINE ENVIRONMENTS AND THE GENETICALLY ALTERED MICROBE. IN: PROCEEDINGS OF THE GENETIC CONTROL OF ENVIRONMENTAL POLLUTANTS, UNIVERSITY OF WASHINGTON, SEATTLE, WASHINGTON, JULY 31 - AUGUST 4, 1983. (ERL,GB 497).

MANY CHEMICALS ENTER THE MARINE AND ESTUARINE ENVIRONMENT THROUGH A VARIETY OF ROUTES. THESE ROUTES INCLUDE DUMPING, DIRECT APPLICATION, OUTFALLS, ACCIDENTAL SPILLS, AND LAND RUNOFF OR RAINFALL. SOME OF THESE COMPOUNDS ARE TOXIC TO THE BIOTA OR MAY BE CONVERTED TO TOXIC PRODUCTS IN NATURE. THE FATE AND ECOLOGICAL EFFECT OF THESE CHEMICALS IN ESTUARINE ENVIRONMENTS IS PART OF THE CONCERN OF THE EPA LABORATORY AT GULF BREEZE, FLORIDA. TOXICITY RESULTS WHEN AN ORGANISM IS EXPOSED TO A SUFFICIENT CONCENTRATION OF A COMPOUND. THEREFORE, FATE GREATLY INFLUENCES THE CUMULATIVE EFFECT OF A CHEMICAL IN THE BIOTA. TOXICITY EFFECTS CAN BE ATTENUATED BY DILUTION OF THE POLLUTANT BELOW ITS TOXIC THRESHOLD OR BY PHYSICALLY REMOVING IT INTO A PHASE (SEDIMENTS) WHERE THE CHEMICAL MAY NOT BE AVAILABLE TO INDIGENOUS ORGANISMS. NEITHER PROCESS ALTERS THE CHEMICAL STRUCTURE OF THE TOXICANT. CHEMICAL, PHOTOCHEMICAL AND SOME BIOLOGICAL PROCESSES BRING ABOUT CHANGES IN CHEMICAL STRUCTURE WHICH MAY OR MAY NOT ALTER THE TOXICITY OF THE CHEMICAL OR PRODUCT. WHEREAS, MICROBIAL DEGRADATION CAN PRODUCE MAJOR CHANGES IN THE CHEMICAL STRUCTURE OF THE INTRODUCED CHEMICAL, MINERALIZATION IS OFTEN THE END RESULT OF BACTERIAL AND FUNGAL ACTIVITIES. THE PURPOSES OF THIS PAPER ARE TO: 1) PROVIDE SELECTED EXAMPLES IN THE MARINE AND ESTUARINE ENVIRONMENTS OF KNOWN INTRODUCTIONS OF TOXIC CHEMICALS, 2) DESCRIBE HOW HABITAT DIFFERENCE AFFECT BIODEGRADATION POTENTIALS IN FRESHWATER, ESTUARINE, AND MARINE ENVIRONMENTS; 3) AND EXPRESS SOME APPLICATIONS AND CONCERNS FOR THE RELEASE OF GENETICALLY-ALTERED ORGANISMS INTO THE ENVIRONMENT.

BOURQUIN, AL W. 1973. DEGRADATION OF MALATHION BY ESTUARINE MICROBES (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 256. (ERL,GB 201).

PATHWAYS FOR THE BIOLOGICAL DEGRADATION OF MALATHION WERE CHARACTERIZED USING ESTUARINE BACTERIA. SOME CORRELATION WITH MICROBIAL MARSHLAND ECOSYSTEMS WAS ATTEMPTED. BACTERIA WERE ISOLATED FROM ESTUARINE MUDS PREVIOUSLY UNTREATED WITH MALATHION. THREE STRAINS WERE SELECTED WHICH METABOLIZED MALATHION IN ZOBELL'S 2216 MARINE MEDIUM. NONE OF THE ORGANISMS USED MALATHION AS A SOLE CARBON SOURCE. EARLY ENZYMATIC HYDROLYSIS PRODUCTS WERE IDENTIFIED AS THE MONO- AND DI-CARBOXYLIC ACID DERIVATIVES OF MALATHION. FURTHER MICROBIAL DEGRADATION PRODUCTS WERE CHARACTERIZED (INCLUDING $^{14}\text{CO}_2$ LIBERATED FROM THE METHOXY SIDE CHAIN) USING ^{14}C -LABELLED MALATHION. INVESTIGATIONS INTO THE POSSIBLE EFFECTS OF LIGHT, TEMPERATURE, PH, AND SALINITY ON DEGRADATION OF MALATHION WERE ANALYZED AS A CHECK ON THE BIOLOGICAL SYSTEM. DEGRADATION PRODUCTS WERE CHARACTERIZED IN THE SAME MANNER AS THE BIOLOGICAL SAMPLES. CHEMICAL DEGRADATION OF MALATHION INCREASED RAPIDLY WITH SALINITY WITH AN ACCUMULATION OF THE MONO-CARBOXYLIC ACID DERIVATIVE. CORRELATION OF THE MICROBIAL, CHEMICAL, AND PHYSICAL DEGRADATIONS OF MALATHION AS IT OCCURS IN THE ENVIRONMENT WAS ATTEMPTED USING ARTIFICIAL MICROCOSMS.

BOURQUIN, AL W. 1973. IMPACT OF MICROBIAL SEED CULTURES IN THE AQUATIC ENVIRONMENT. IN: PROCEEDINGS OF THE FIRST MICROBIOLOGY SEMINAR ON STANDARDIZATION OF METHODS. EPA-R4-73-022, U.S. ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, DC. PP. 140-142. (ERL,GB 203).

MICROBIAL SEED CULTURES ARE CURRENTLY BEING STUDIED FOR APPLICATION TO THE ENVIRONMENT AS MICROBIOLOGICAL PESTICIDES. VIRUSES HAVE BEEN ISOLATED WHICH ATTACK SELECTIVELY THE CABBAGE BOLL; A BACTERIUM HAS BEEN ISOLATED AS A SPECIFIC PATHOGEN OF MOSQUITOES; AND CHITINOLYTIC BACTERIA HAVE BEEN PROPOSED AS AGENTS AGAINST PLANT PREDATORS IN ESTUARINE AREAS. THE RANGE OF IMPACT ON THE AQUATIC ENVIRONMENT BY SEED CULTURES MUST BE INVESTIGATED ADEQUATELY BEFORE THEY ARE USED ON A LARGE SCALE.

BOURQUIN, AL W. 1975. MICROBIAL-MALATHION INTERACTION IN ARTIFICIAL SALT-MARSH ECOSYSTEMS--EFFECT AND DEGRADATION. EPA-660/3-75-035, U.S. ENVIRONMENTAL PROTECTION AGENCY, NATIONAL ENVIRONMENTAL RESEARCH CENTER, CORVALLIS, OR. 40P. (ERL,GB 236).

MALATHION IS RAPIDLY DEGRADED IN VITRO BY SALT-MARSH BACTERIA TO MALATHION-MONOCARBOXYLIC ACID, MALATHION-DICARBOXYLIC ACID AND VARIOUS PHOSPHOTHIOMATES AS A RESULT OF CARBOXYESTERASE CLEAVAGE. IN ADDITION, SOME EXPECTED PHOSPHATASE ACTIVITY PRODUCES DESMETHYL-MALATHION, PHOSPHOTHIOMATES, 4-CARBON DICARBOXYLIC ACIDS, AND CORRESPONDING ETHYL ESTERS. IN A SIMULATED SALT-MARSH ENVIRONMENT, MALATHION IS DEGRADED BY THE INDIGENOUS BACTERIAL COMMUNITY. NUMBERS OF BACTERIA CAPABLE OF DEGRADING MALATHION IN THE PRESENCE OF ADDITIONAL NUTRIENTS INCREASE IN THE SEDIMENTS WITH INCREASING FREQUENCY OF APPLICATION AND IN THE WATER COLUMN WITH THE INCREASING LEVEL OF TREATMENT. NUMBERS OF BACTERIA WHICH DEGRADE MALATHION AS A SOLE CARBON SOURCE ARE LINKED TO THE LEVEL OF TREATMENT IN SEDIMENTS AND THE FREQUENCY OF TREATMENT IN THE WATER COLUMN; HOWEVER, THESE BACTERIA DO NOT APPEAR TO PLAY A SIGNIFICANT ROLE IN THE DISSIPATION OF MALATHION. I BELIEVE THAT FREQUENCY OF TREATMENT, INCREASES NUMBERS OF MALATHION CO-METABOLIZING BACTERIA WHICH CATALYZE A MORE RAPID DISSIPATION OF THE COMPOUND, WHICH RESULTS IN FEWER SOLE CARBON DEGRADERS. THE DISAPPEARANCE OF MALATHION IN THE SALT-MARSH ENVIRONMENT IS INFLUENCED BY BOTH CHEMICAL AND BIOLOGICAL DEGRADATION; HOWEVER, AT TEMPERATURES BELOW 26 C AND SALINITIES BELOW 20 0/00, CHEMICAL MECHANISMS APPEAR TO BE OF LESS IMPORTANCE THAN BIOLOGICAL DEGRADATION.

BOURQUIN, AL W. 1981. LABORATORY SYSTEMS DESIGNED TO ASSESS BIODEGRADATION ESTUARINE ENVIRONMENTS (SPEECH). (ERL,GB X249).

BOURQUIN, AL W., AND S. CASSIDY. 1975. EFFECT OF POLYCHLORINATED BIPHENYL FORMULATIONS ON THE GROWTH OF ESTUARINE BACTERIA. APPL. MICROBIOL. 29(1):125-127. (ERL,GB 217).

POLYCHLORINATED BIPHENYL FORMULATIONS INHIBITED THE GROWTH OF CERTAIN ESTUARINE BACTERIA. THE SENSITIVE STRAINS, ALTHOUGH EXHIBITING SOME SIMILAR PHYSIOLOGICAL CHARACTERISTICS, CONTAINED BOTH GRAM-POSITIVE AND GRAM-NEGATIVE BACTERIA.

BOURQUIN, AL W., AND DAVID T. GIBSON. 1978. MICROBIAL DEGRADATION OF HALOGENATED HYDROCARBONS. IN: WATER CHLORINATION: ENVIRONMENTAL IMPACT AND HEALTH EFFECTS, VOL. 2. ROBERT L. JOLLEY, HEND GORCHEV, AND HAMILTON D. HEYWARD, JR., EDITORS, ANN ARBOR SCIENCE PUBLISHERS, INC., ANN ARBOR, MI. PP. 253-264. (ERL,GB 361).

BOURQUIN, AL W., P.H. PRITCHARD, AND H.L. FREDRICKSON. IN PREP. SEDIMENT-CORE LABORATORY TEST SYSTEM FOR ASSESSING THE FATE OF CHEMICALS IN THE AQUATIC ENVIRONMENT. APPL. ENVIRON. MICROBIOL. (ERL,GB 470).

AN AQUATIC BIODEGRADATION TEST SYSTEM, ECO-CORE, USING AN INTACT SEDIMENT-WATER CORE AND ITS ASSOCIATED MICROORGANISMS IN A STATIC LABORATORY SYSTEM IS DESCRIBED. THE EFFECTS OF THE SYSTEMS DESIGN ON THE FATE OF METHYL PARATHION (MP) WAS STUDIED. SEDIMENT-WATER CORES TAKEN DIRECTLY FROM THE ENVIRONMENT WERE GENERALLY SLOWER TO DEGRADE MP THAN CORES "STRUCTURED" WITH SEDIMENT AND WATER IN THE LABORATORY. DEGRADATION RATES WERE SLOWER WHEN SEDIMENT TO WATER RATIOS WERE INCREASED (WATER DECREASED) IN EITHER TYPE CORE. LABORATORY - AGED SYSTEMS WERE LESS MICROBIOLOGICALLY REACTIVE THAN "FRESH" CORES WHEN ^{14}C (SUBSCRIPT 2) AND DEGRADATION PRODUCTS OF ^{14}C -MP WERE MEASURED. THE TEST SYSTEM CAN BE USED TO MONITOR EFFECTS BY TOXIC POLLUTANTS ON MICROBIOLOGICAL ACTIVITIES. THE INHIBITION OF MP MINERALIZATION BY KEPONE IN NATURALLY AND ARTIFICIALLY CONTAMINATED SEDIMENTS IS DESCRIBED. THIS STUDY DESCRIBES A LABORATORY TECHNIQUE FOR OBTAINING FATE OF ORGANIC CHEMICALS IN A SYSTEM WHICH INTEGRATED ALL FATE PROCESSES AND CAN BE USED TO ASSESS THE IMPACT OF TOXIC POLLUTANTS ON THE METABOLIC INTEGRITY OF THE MICROBIOLOGICAL COMMUNITY.

BOURQUIN, AL W., P.H. PRITCHARD, AND JIM C. SPAIN. 1981. SEDIMENT-WATER SYSTEM FOR ASSESSING BIODEGRADATION IN THE AQUATIC ENVIRONMENT (ABSTRACT). IN: ABSTRACTS OF PAPERS: 182ND ACS NATIONAL MEETING AMERICAN CHEMICAL SOCIETY. PP. 51. (ERL,GB 241).

BOURQUIN, AL W., AND V.A. PRZYBYSZEWSKI. 1976. FATE OF NITRILOTRIACETIC ACID IN ESTUARINE WATERS (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 179. (ERL,GB 257).

THE FATE OF NITRILOTRIACETIC ACID (NTA) IN ESTUARINE WATERS FROM ESCAMBIA BAY, FLORIDA, WAS DETERMINED DIRECTLY, USING ^{14}C -LABELLED COMPOUNDS, AND INDIRECTLY BY GROWTH ON SELECTIVE MEDIUM. CONCENTRATED ENVIRONMENTAL WATER SAMPLES (15X) WERE TREATED WITH ^{14}C -LABELLED NTA AND EXAMINED FOR ^{14}C -UPTAKE AND EVOLVED $^{14}\text{CO}_2$ BY THE INDIGENOUS MICROORGANISMS. LESS THAN 1% DEGRADATION ON NTA WAS DETECTED USING THESE TECHNIQUES AT ANY SALINITY RANGING FROM 5 PPT TO 30 PPT. MIXED CONCENTRATED CULTURES FROM WATERS WITH SALINITY RANGING FROM 5 PPT TO 22 PPT WERE INCUBATED FOR A PERIOD OF 3 MONTHS WITH 1%(W/V)NTA WITH NO EVIDENCE OF NTA DEGRADATION AS DETERMINED BY POLAROGRAPHIC TECHNIQUES. WATER SAMPLES FROM ESTUARINE AREAS (5 PPT TO 22 PPT SALINITIES) WHEN INCUBATED WITH VARYING NTA CONCENTRATIONS FROM 20-1000 MG/L EXHIBITED NO DEGRADATION AFTER 6 WEEKS INCUBATION; WHEREAS, CULTURES FROM FRESH WATER AREAS SHOWED 100% DEGRADATION IN 2 WEEKS. BACTERIAL ISOLATES WERE OBTAINED FROM FRESH WATER SYSTEMS WHICH DEGRADED NTA BOTH AS A SOLE CARBON SOURCE OR AS A SOLE NITROGEN SOURCE. THE RATE OF NTA DEGRADATION BY A PSEUDOMONAS SP. (TIEDJE) IN FRESH WATER MEDIUM WAS DEPRESSED AT 10 PPT AND 15 PPT SALINITY MEDIA.

BOURQUIN, AL W., JIM C. SPAIN, AND P. HAP PRITCHARD. 1982. BIODEGRADATION ACTIVITY CORRELATIONS WITH BIOLOGICAL AND ENVIRONMENTAL VARIABLES (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY 1982. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 193. (ERL,GB 048*).

INVESTIGATIONS OF THE BIODEGRADATION RATES (MINERALIZATION) OF P-NITROPHENOL (PNP) AND P-CHLOROPHENOL (PCP) WERE DONE WITH SAMPLES TAKEN FROM 7 FRESHWATER/SEDIMENT AND SALINE/SEDIMENT ENVIRONMENTS. WE COMPARED THESE RATES WITH MEASUREMENTS OF BIOMASS--BACTERIAL PLATE COUNTS, LIPOPOLYSACCHARIDE (LPS), PROTEIN (LOWRY), CHLOROPHYLL, AND ATP CONCENTRATIONS--OR ACTIVITY--GLUCOSE UPTAKE AND MINERALIZATION. TEMPERATURE, SALINITY, AND DEPTH WERE RECORDED FOR EACH SAMPLING SITE. MINERALIZATION RATES OF PNP WERE DIFFERENT, BUT NOT DRAMATICALLY SO BETWEEN FRESH AND SALTWATER ENVIRONMENTS. NONE OF THE MEASURED VALUES CORRELATED WELL WITH BIODEGRADATION RATES. THUS, NONE OF THESE VALUES COULD BE USED TO PREDICT BIODEGRADATION RATES. IT IS POSSIBLE THAT PREDICTION REQUIRES MEASUREMENT OF SPECIFIC DEGRADING POPULATIONS. PLATE COUNTS AND LPS WERE THE BEST MEASUREMENT OF HETEROTROPHIC BIOMASS, WITH GLUCOSE UPTAKE THE BEST MEASUREMENT OF BACTERIAL ACTIVITY. ATP WAS THE BEST MEASUREMENT OF ALGAE BIOMASS; THE CORRELATION WITH GLUCOSE MINERALIZATION INDICATES EPIPHTIC BACTERIA ASSOCIATED WITH THESE ORGANISMS.

BOURQUIN, AL W., JIM C. SPAIN, AND P.H. PRITCHARD. 1982. MICROBIAL DEGRADATION OF XENOBIOTIC COMPOUNDS. IN: PROCEEDINGS OF THE TWELFTH CONFERENCE ON ENVIRONMENTAL TOXICOLOGY 3, 4, AND 5 NOVEMBER 1981, (DAYTON, OH). AFAMRL-TR-81-149, U.S. AIR FORCE AEROSPACE MEDICAL RESEARCH LABORATORY, WRIGHT-PATTERSON AFB, OH. AVAILABLE FROM NTIS. PP. 354-369. (ERL,GB 437).

MICROBIAL DEGRADATION IN NATURAL ENVIRONMENTS IS PROBABLY THE MOST DIFFICULT FATE PROCESS TO STUDY AND QUANTITATE. INFORMATION NECESSARY TO PREDICT BIODEGRADATION OF A CHEMICAL DEPENDS ON LAWS OF CHEMISTRY AND THE GENETIC CAPABILITIES OF THE MICROBIAL POPULATIONS. WE HAVE PRODUCED, IN OUR LABORATORY, SEVERAL CASE STUDIES ON DEGRADATION OF SELECTED TOXICANTS UNDER CONDITIONS THAT MAINTAIN COMPLEXITIES OF THE NATURAL ENVIRONMENT AND ASSOCIATED MICROORGANISMS. BIODEGRADATION STUDIES WITH NTA DEMONSTRATED THIS NORMALLY BIODEGRADABLE COMPOUND PERSISTS IN ESTUARINE ENVIRONMENTS AND INDICATE COMPLEX INTERACTIONS IN NATURAL ENVIRONMENTS WHICH COMPLICATE OUR UNDERSTANDING OF BIODEGRADATION MECHANISMS. INTERACTION WITH ENVIRONMENTAL CONDITIONS OR LACK OF GENETIC CAPABILITIES WITHIN AN ENVIRONMENT WAS DEMONSTRATED FURTHER WHEN FRESHWATER, BUT NOT SALTWATER, MICROBIAL POPULATIONS WERE SHOWN TO ADAPT WITHIN SEVERAL DAYS TO DEGRADE P-NITROPHENOL RAPIDLY. DIFFERENCES IN CHEMICAL STRUCTURE AFFECT DEGRADATION OF TOXIC CHEMICALS IN NATURAL MEDIA WITH MIXED MICROBIAL POPULATIONS. SUCH STRUCTURES RANGE FROM COMPOUNDS LIKE METHYL PARATHION, WHICH COMPLETELY DEGRADES, TO DIMILIN, WHICH PARTIALLY DEGRADES AND YIELDS NONBIODEGRADABLE PRODUCTS, TO KEPONE, WHICH DOES NOT DEGRADE.

BOURQUIN, AL, L. KIEFER, AND S. CASSIDY. 1974. MICROBIAL RESPONSE TO MALATHION TREATMENTS IN SALT MARSH MICROCOSMS (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING AMERICAN SOCIETY FOR MICROBIOLOGY. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. G264. (ERL,GB 210).

BATTERY JARS (6.5L) WERE FILLED WITH SALT MARSH MUD AND WATER AND PLACED AT A CONSTANT TEMPERATURE (28C) AND A 12 H DIURNAL LIGHT CYCLE. THE SLOWLY AERATED MICROCOSMS WERE STABILIZED FOR 1 WEEK BEFORE TREATING WITH MALATHION AT 1X AND 10X FIELD APPLICATION RATE. APPLICATION OF THE TOXICANT WAS REPEATED EVERY 10 DAYS FOR 30 DAYS. SEDIMENT AND WATER SAMPLES WERE ANALYSED AT APPROPRIATE INTERVALS FOR TOTAL AEROBIC HETEROTROPHS AND MALATHION DEGRADING ORGANISMS (SOLE CARBON SOURCE, SCS, AND ADDED GROWTH SUBSTRATE, MN). VARIANCE ANALYSIS OF THE MN DATA SHOWED SIGNIFICANT DIFFERENCES BETWEEN CONTROL AND TREATMENT LEVELS FOR BOTH SEDIMENT AND WATER SAMPLES. NO SIGNIFICANT DIFFERENCES WERE NOTED BETWEEN TREATMENT PERIODS. NUMBERS OF MN ORGANISMS INCREASED RAPIDLY (7 DAYS) AFTER THE FIRST TREATMENT, REMAINING AT OR OVER 70% (SEDIMENT) OR 80% (WATER) OF THE TOTAL HETEROTROPHIC COMMUNITY. ALTHOUGH NUMBERS OF SCS DEGRADERS APPEARED TO INCREASE WITH MALATHION TREATMENTS AND INCREASE OVER THE CONTROL IN BOTH SEDIMENT AND WATER, NO STATISTICALLY SIGNIFICANT DIFFERENCES WERE NOTED, DUE TO FLUCTUATIONS AFTER TREATMENTS. NO CHANGES IN TOTAL NUMBERS OF HETEROTROPHS OVER THE CONTROLS WERE NOTED. NO DIFFERENCES IN POPULATIONS OF AMYLASE, CHITINASE, LIPASE AND CASEASE PRODUCERS WERE OBSERVED BETWEEN CONTROLS AND TREATED MICROCOSMS.

BROWN, LEWIS R., EARL G. ALLEY, AND DAVID W. COOK. 1975. EFFECT OF MIREX AND CARBOFURAN ON ESTUARINE MICROORGANISMS. EPA-660/3-75-024, U.S. ENVIRONMENTAL PROTECTION AGENCY, NATIONAL ENVIRONMENTAL RESEARCH CENTER, CORVALLIS, OR. 69P.

THE PURPOSE OF THIS INVESTIGATION WAS TO HELP ESTABLISH THE CHEMICAL, PHYSICAL AND MICRO-BIOLOGICAL FATE OF MIREX AND CARBOFURAN IN THE ESTUARINE ENVIRONMENT AND DETERMINE THE EFFECT(S) ON IMPORTANT ESTUARINE MICROORGANISMS AND THEIR ACTIVITIES. CHEMICAL STUDIES ON THE ADSORPTION, FATE AND HYDROLYSIS WERE CONDUCTED. THE MICRO-BIOLOGICAL STUDIES INVOLVED THE USE OF BOTH PURE CULTURES AND MIXED CULTURES IN A MICROCOSM SYSTEM AND INCLUDED TWELVE DISTINCT PHYSIOLOGICAL GROUPS OF MICROORGANISMS. IT WAS CONCLUDED THAT NEITHER MIREX NOR CARBOFURAN WOULD HAVE A DELETERIOUS EFFECT ON ESTUARINE BACTERIA UNDER NORMAL CONDITIONS, AND THERE WAS NO EVIDENCE OF BIOACCUMULATION. DEGRADATION PRODUCTS OF BOTH COMPOUNDS WERE SHOWN TO BE TOXIC TO SOME MICROORGANISMS.

BUNTING, DIANE LEIGH. 1979. EVALUATION OF BENZO(A)PYRENE METABOLISM IN AN OYSTER (OSTREA EDULIS)-BACTERIA SYSTEM. M.S. THESIS. OREGON STATE UNIVERSITY, CORVALLIS, OR. 121P. (ERL,GB X285).

THE OVERALL OBJECTIVE OF THIS RESEARCH PROJECT WAS TO EVALUATE THE METABOLISM OF BENZO(A)PYRENE (BAP) BY THE EUROPEAN FLAT OYSTER (OSTREA EDULIS)-BACTERIA SYSTEM. INDIVIDUAL OYSTERS EXIST IN NATURE AS "SYSTEMS" WITH COMMENSAL MICROORGANISMS AND SHOULD BE RECOGNIZED AS SUCH WHEN THE METABOLISM OF A SPECIFIC ENVIRONMENTAL CONTAMINANT IS BEING STUDIED. SINCE BIVALVES ARE EXPOSED TO ENVIRONMENTAL POLLUTANTS THAT ENTER COASTAL WATERS, IT IS IMPORTANT TO DETERMINE IF THE "NATURAL" OYSTER SYSTEM CAN DETOXYIFY THOSE CONTAMINANTS LIKELY TO CAUSE BIOLOGICAL DAMAGE.

CABELLI, VICTOR J., ANGELO F. CARLUCCI, CAROL D. LITCHFIELD, THEODORE G. METCALF, ROBERT A. MURCHELANO, P.H. PRITCHARD, AND STANLEY W. WATSON. 1979. MICROORGANISMS. IN: PROCEEDINGS OF A WORKSHOP ON SCIENTIFIC PROBLEMS RELATING TO OCEAN POLLUTION, ESTES PARK, CO., JULY 10-14, 1978. U.S. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ENVIRONMENTAL RESEARCH LABORATORIES, BOULDER, CO. PP. 104-129. (ERL,GB X115).

CERNIGLIA, CARL E., RICHARD L. HEBERT, ROBERT H. DODGE, PAUL J. SZANISZLO, AND DAVID T. GIBSON. 1979. SOME APPROACHES TO STUDIES ON THE DEGRADATION OF AROMATIC HYDROCARBONS BY FUNGI. IN: MICROBIAL DEGRADATION OF POLLUTANTS IN MARINE ENVIRONMENTS. EPA-600/9-79-012, AL BOURQUIN AND P.H. PRITCHARD, EDITORS, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. PP. 360-369. (ERL,GB X214).

A WIDE TAXONOMIC AND PHYLOGENETIC SPECTRUM OF FUNGI WERE SHOWN TO TRANSFORM NAPHTHALENE. THE ABILITY TO OXIDIZE NAPHTHALENE PREDOMINATED IN THE MUCORALES, BUT SIGNIFICANT HYDROXYLATION ALSO OCCURRED IN SPECIES OF NEUROSPORA, CLAVICEPS AND PSILOCYBE. THE PREDOMINANT METABOLITE FORMED WAS 1-NAPHTHOL. OTHER PRODUCTS IDENTIFIED WERE 4-HYDROXY-1-TETRALONE, TRANS-1,2-DIHYDROXY-1,2-DIHYDRONAPHTHALENE, 2-NAPHTHOL, 1,2- AND 1,4-NAPHTHOQUINONE. CUNNINGHAMELLA ELEGANS OXIDIZED NAPHTHALENE, BIPHENYL AND DIBENZOFURAN BY REACTIONS SIMILAR TO THOSE OBSERVED WITH MAMMALIAN ENZYME SYSTEMS.

CERNIGLIA, CARL E., JOSEPH C. MORGAN, AND DAVID T. GIBSON. 1979. BACTERIAL AND FUNGAL OXIDATION OF DIBENZOFURAN. BIOCHEM. J. 180(1):175-185. (ERL,GB X037).

CUNNINGHAMELLA ELEGANS AND A MUTANT STRAIN (38/36) OF BEIJERINCKIA BOTH OXIDIZED DIBENZOFURAN TO 2,3-DIHYDROXY-2,3-DIHYDRODIBENZOFURAN. THE BACTERIAL METABOLITE WAS EXTREMELY UNSTABLE AND, IN THE PRESENCE OF ACID, WAS RAPIDLY CONVERTED INTO A MIXTURE OF 2- AND 3-HYDROXYDIBENZOFURAN. IN CONTRAST, THE 2,3-DIHYDROXY-2,3-DIHYDRODIBENZOFURAN FORMED BY C. ELEGANS WAS STABLE AND ONLY YIELDED 2- AND 3-HYDROXYDIBENZOFURAN WHEN HEATED UNDER ACIDIC CONDITIONS. THE RESULTS SUGGEST THAT BEIJERINCKIA 38/36 AND C. ELEGANS FORM THE RESPECTIVE CIS- AND TRANS-ISOMERS OF 2,3-DIHYDRODIBENZOFURAN. C. ELEGANS ALSO OXIDIZED DIBENZOFURAN TO 2- AND 3-HYDROXYDIBENZOFURAN UNDER CONDITIONS THAT WOULD NOT LEAD TO THE DEHYDRATION OF THE TRANS-DIHYDRODIOL. THESE OBSERVATIONS IMPLICATE THE INITIAL FORMATION OF DIBENZOFURAN-2,3-EPOXIDE IN THE FUNGAL OXIDATION OF DIBENZOFURAN. BEIJERINCKIA 38/36 ALSO PRODUCED A SECOND UNSTABLE DIHYDRODIOL THAT WAS TENTATIVELY IDENTIFIED AS CIS-1,2-DIHYDROXY-1,2-DIHYDRODIBENZOFURAN. THIS COMPOUND GAVE 2-HYDROXYDIBENZOFURAN AS THE MAJOR DEHYDRATION PRODUCT AND THE CIS RELATIVE STEREOCHEMISTRY WAS SUGGESTED BY THE ISOLATION AND CHARACTERIZATION OF AN ISOPROPYLIDINE DERIVATIVE. A PREPARATION OF CIS-NAPHTHALENE DIHYDRODIOL DEHYDROGENASE AND CELL EXTRACTS OF THE PARENT STRAIN OF BEIJERINCKIA OXIDIZED BOTH BACTERIAL DIHYDRODIOLS TO CATECHOLS. CELL EXTRACTS PREPARED FROM C. ELEGANS CATALYSED AN ANALOGOUS OXIDATION OF TRANS-2,3-DIHYDROXY-2,3-DIHYDRODIBENZOFURAN TO 2,3-DIHYDROXYDIBENZOFURAN. THE LATTER PRODUCT WAS ALSO ISOLATED AND IDENTIFIED FROM CULTURE FILTRATES. THE RESULTS SUGGEST THAT BACTERIA AND FUNGI UTILIZE DIFFERENT MECHANISMS TO INITIATE THE OXIDATION OF DIBENZOFURAN.

CLEVELAND, MARY ELIZABETH. 1983. BIOTIC AND ABIOTIC FACTORS AFFECTING SORPTION OF TOXIC COMPOUNDS TO NATURAL SEDIMENTS. M.S. THESIS. UNIVERSITY OF WEST FLORIDA, PENSACOLA, FL. 95P. (ERL,GB 496).

THE SORPTION OF RADIOLABELED KEPONE, DURSBAN, DIMILIN AND METHYL PARATHION (MPS) WAS OBSERVED IN STERILE AND NONSTERILE AQUATIC SEDIMENT SYSTEMS TO ADDRESS THREE ASSUMPTIONS IMPLICIT IN THE USE OF PARTITION COEFFICIENT AS A DESCRIPTOR OF EQUILIBRIUM ADSORPTION: (1) ADSORPTION KINETICS ARE RAPID AND THEREFORE UNIMPORTANT TO FATE CONSIDERATIONS; (2) ADSORPTION EQUILIBRIUM IS INDEPENDENT OF INITIAL COMPOUND OR SOLIDS CONCENTRATIONS; AND (3) ADSORPTION IS REVERSIBLE. ADSORPTION WAS TWO-STEPPED. AN INITIAL RAPID PHASE ACCOUNTED FOR MOST OF THE TOTAL ADSORPTION, SUGGESTING THAT KINETICS ARE UNIMPORTANT TO EXPOSURE CONCENTRATION PREDICTIONS. AN INVERSE RELATIONSHIP BETWEEN PARTITION COEFFICIENT AND SEDIMENT CONCENTRATION WAS OBSERVED, INDICATING THAT A SINGLE PARTITION COEFFICIENT IS NOT ADEQUATE TO FATE CONSIDERATIONS. THE IRREVERSIBLE ADSORPTION OF MPS WAS ATTRIBUTED TO THE BIOLOGICALLY MEDIATED FORMATION OF BOUND RESIDUES. THE EXTENT OF THE BINDING PROCESS WAS AFFECTED BY SEDIMENT CONCENTRATION, TEMPERATURE, AND ANAEROBIC CONDITIONS BUT UNAFFECTED BY SALINITY. THIS STUDY DEMONSTRATED THAT EXPOSURE CONCENTRATION PREDICTIONS FOR RAPIDLY DEGRADED COMPOUNDS SHOULD INCLUDE THE BIOLOGICAL PROCESSES AFFECTING THEIR FATE.

COLWELL, RITA R., AND GARY S. SAYLER. 1977. EFFECTS AND INTERACTIONS OF POLYCHLORINATED BIPHENYL (PCB) WITH ESTUARINE MICROORGANISMS AND SHELLFISH. EPA-600/3-77-070, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 45P.

THE ROLE OF ESTUARINE BACTERIA IN THE MOBILIZATION, TRANSPORT, AND REMOVAL OF POLYCHLORINATED BIPHENYLS (PCB) WAS INVESTIGATED IN ESTUARINE ENVIRONMENTS. A MAIN OBJECTIVE OF THIS INVESTIGATION WAS TO DETERMINE A SECONDARY IMPACT OF PCB CONTAMINATION OF ESTUARINE SYSTEMS. THE SPECIFIC SECONDARY EFFECT WAS THE PCB-STRESS-INDUCED ACCUMULATION AND DEPURATION OF ENTERIC BACTERIA BY SHELLFISH, I.E., THE CHESAPEAKE BAY OYSTER, CRASSOSTREA VIRGINICA. FOR THIS REPORT, BACTERIA UNINHIBITED BY PCB, BUT CAPABLE OF GROWTH IN THE PRESENCE OF PCB, ARE DEFINED AS PCB-RESISTANT. IN THIS REGARD, PCB-RESISTANT BACTERIA WERE FOUND TO BE DISTRIBUTED UBIQUITOUSLY THROUGHOUT ESTUARINE AND MARINE ENVIRONMENTS SAMPLED IN THIS STUDY. THE RESIDENCE TIME OF PCB IN ESTUARINE AND MARINE ENVIRONMENTS IS CONCLUDED TO BE SUFFICIENTLY LONG TO INDUCE STRESS UPON ESTUARINE ANIMALS.

CONNOLLY, JOHN P. 1982. WASTOX: PRELIMINARY ESTUARY AND STREAM VERSION DOCUMENTATION (UNPUBLISHED). 96P. (ERL,GB X392).

WASTOX IS A BATCH ORIENTED COMPUTER PROGRAM THAT SOLVES THE MASS BALANCE EQUATIONS THAT DEFINE THE FATE OF TOXIC CHEMICALS IN AQUATIC SYSTEMS. THIS MANUAL DOCUMENTS A PRELIMINARY VERSION OF THE PROGRAM WHICH ANALYZES THE TIME-VARIABLE, PHYSICAL-CHEMICAL BEHAVIOR OF CHEMICALS. LATER VERSIONS WILL INCLUDE A STEADY-STATE SOLUTION SCHEME AND AN ANALYSIS OF TOXIC CHEMICALS IN AQUATIC FOOD CHAINS. THE KINETICS OF VOLATILIZATION SPECIFIED IN THIS VERSION ARE ORIENTED TO FLOWING SYSTEMS (STREAMS AND ESTUARIES) ALTHOUGH THE MODEL IS GENERALLY APPLICABLE TO ALL TYPES OF WATER BODIES.

CONNOLLY, JOHN P., MARY E. CLEVELAND, AND PARMELY H. PRITCHARD. IN PREP. VALIDITY OF PARTITION COEFFICIENT AS THE ADSORPTION DESCRIPTOR IN EXPOSURE CONCENTRATIONS PREDICTIONS: STUDIES WITH KEPONE AND METHYL PARATHION. WATER RES. (ERL,GB 415).

THIS WORK INVESTIGATES THREE MAJOR ASSUMPTIONS IMPLICIT IN THE USE OF PARTITION COEFFICIENT AS SOLE ADSORPTION DESCRIPTOR: (1) ADSORPTION KINETICS ARE UNIMPORTANT TO FATE AND TRANSPORT OF THE TOXIC CHEMICAL BECAUSE THEY ARE RAPID; (2) ADSORPTION IS A REVERSIBLE PROCESS; AND (3) EQUILIBRIUM CONDITIONS ARE INDEPENDENT OF THE INDIVIDUAL CONCENTRATIONS OF TOXIC CHEMICAL AND ADSORBING SOLID, DEPENDING ONLY ON THEIR RATIO. ADSORPTION OF KEPONE AND METHYL PARATHION WAS FOUND TO BE RAPID AND TWO-STEP, A FAST ADSORPTION FOR APPROXIMATELY 5 MIN. FOLLOWED BY A SLOWER ADSORPTION TO EQUILIBRIUM AT 1 TO 2 HR. KINETICS OF ADSORPTION INDICATED ADSORPTION RATE WAS CONTROLLED BY MASS TRANSPORT MECHANISMS. KINETICS OF METHYL PARATHION ADSORPTION WERE IDENTICAL FOR STERILE AND BIOLOGICALLY ACTIVE SYSTEMS TO THE POINT OF STERILE SYSTEM EQUILIBRIUM. CONTINUED DECREASE OF DISSOLVED ¹⁴C AND TOTAL MASS RECOVERY IN THE ACTIVE SYSTEM SUGGESTED DEGRADATION TO AN IRREVERSIBLY ADSORBED COMPOUND. THE RESULTS INDICATE THAT KINETICS CAN BE IGNORED FOR SMALL PARTICLE SIZE SEDIMENTS BUT THAT REVERSIBILITY OF ADSORPTION CANNOT BE ASSUMED. EQUILIBRIUM ADSORPTION OF BOTH COMPOUNDS AT CONSTANT SEDIMENT CONCENTRATION WAS DESCRIBED BY A LINEAR ISOTHERM. PARTITION COEFFICIENT WAS, HOWEVER, AN INVERSE FUNCTION OF SEDIMENT CONCENTRATION, DECREASING BY AS MUCH AS AN ORDER OF MAGNITUDE BETWEEN SEDIMENT CONCENTRATIONS REPRESENTATIVE OF SUSPENDED SEDIMENT AND SEDIMENT CONCENTRATIONS REPRESENTATIVE OF BED SEDIMENT. THEREFORE, A SINGLE PARTITION COEFFICIENT IS INADEQUATE FOR EXPOSURE CONCENTRATION PREDICTIONS.

COOK, W.L., S.A. CROW, AND A.W. BOURQUIN. 1977. INHIBITORY EFFECTS OF PESTICIDES AND POLYCHLORINATED COMPOUNDS ON REPRESENTATIVE SURFACE SLICK BACTERIA (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 243. (ERL,GB 319).

COOK, W.L., DENISE FIEDLER, AND A.W. BOURQUIN. 1980. SUCCESSION OF MICROFUNGI IN ESTUARINE MICROCOSMS PERTURBED BY CARBARYL, METHYL PARATHION AND PENTACHLOROPHENOL. BOT. MAR. 23(2):129-131. (ERL,GB 397).

THE EFFECTS OF CARBARYL, METHYL PARATHION AND PENTACHLOROPHENOL ON THE MICROFUNGAL SUCCESSION OF AN ESTUARINE MICROCOSM WERE EXAMINED. RESIDENT FUNGI WERE SUCCEEDED BY FUSARIUM IN THE CARBARYL-TREATED MICROCOSM; BY A FUNGUS IN THE PENICILLIUM CHRYSOGENUM SERIES IN THE METHYL PARATHION-TREATED MICROCOSM; AND BY A FUNGUS IN THE PENICILLIUM CANESCENS SERIES IN THE PENTACHLOROPHENOL TREATED MICROCOSM. SMALL QUANTITIES OF ¹⁴CO₂ WERE RELEASED FROM THE XENOBIOTIC MOLECULES BY FUNGI SELECTED FROM THE MICROCOSMS.

CROW, S.A., D.G. AHEARN, W.L. COOK, AND A.W. BOURQUIN. 1975. DENSITIES OF BACTERIA AND FUNGI IN COASTAL SURFACE FILMS AS DETERMINED BY A MEMBRANE-ADSORPTION PROCEDURE. LIMNOL. OCEANOGR. 20(4):644-646. (ERL,GB 232).

A MEMBRANE-ABSORPTION TECHNIQUE FOR COUNTING SURFACE SLICK MICROBIAL POPULATIONS WAS EVALUATED. THE SIMPLE PROCEDURE GAVE BACTERIAL AND FUNGAL POPULATIONS SEVERAL ORDERS OF MAGNITUDE GREATER THAN THOSE PREVIOUSLY REPORTED FOR SURFACE SLICKS.

CROW, S.A., S.L. BELL, AND D.G. AHEARN. 1980. UPTAKE OF AROMATIC AND BRANCHED CHAIN HYDROCARBONS BY YEAST. BOT. MAR. 23(3):117-120. (ERL,GB X183).

STUDIES OF THE HYDROCARBON UTILIZING YEASTS CANDIDA MALTOSE AND C. LIPOLYTICA HAVE SHOWN THAT BOTH WERE CAPABLE OF REDUCING RECOVERABLE AMOUNTS OF BRANCHED CHAIN AND AROMATIC HYDROCARBONS IN A MIXTURE OF NAPHTHALENE, TETRADECANE, HEXADECANE, PRISTANE (TETRA-METHYLPENTADECANE). CELLS OF C. LIPOLYTICA GROWN ON EITHER GLUCOSE OR TETRADECANE WERE CAPABLE OF BINDING (RENDERING UNEXTRACTABLE) NEARLY 50% OF THE HYDROCARBON MIXTURE WITHIN 3 HOURS. IN CONTRAST CELLS OF C. MALTOSE BOUND HYDROCARBONS ONLY AFTER GROWTH ON A HYDROCARBON MEDIUM. UPTAKE OF SELECTED PARAFFINIC HYDROCARBON WAS NOT ALTERED BY THE PRESENCE OF NAPHTHALENE. PRISTANE UPTAKE WAS CONCENTRATION DEPENDENT FOR C. MALTOSE BUT NOT FOR C. LIPOLYTICA. UPTAKE, TRANSPORT, AND METABOLISM OF HYDROCARBONS IN C. MALTOSE AND C. LIPOLYTICA DIFFER.

CROW, S.A., A.W. BOURQUIN, N.G. SMITH, AND W.L. COOK. 1975. METABOLIC ACTIVITY OF MICROORGANISMS FROM ESTUARINE SLICKS (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 191. (ERL,GB 243).

MICROBIOLOGICAL SAMPLING OF SURFACE SLICKS SHOWED THAT LARGE POPULATIONS OF MICROORGANISMS (TO 10 TO THE FOURTH POWER CM⁻²) ARE ASSOCIATED WITH THE SURFACE MICROLAYER. COMPARATIVE PHYSIOLOGICAL STUDIES WERE CONDUCTED WITH MICROORGANISMS COLLECTED FROM THE SLICK BY THE MEMBRANE ADSORPTION TECHNIQUE AND FROM UNDERLYING ESTUARINE WATERS. MOTILE, NON-PIGMENTED, GRAM-NEGATIVE RODS WERE THE MOST COMMON BACTERIAL ISOLATES. FUNGI WERE PRINCIPALLY MEMBERS OF THE GENERA AUREOBASIDIUM, CEPHALOSPORIUM AND CLADOSPORIUM. ONLY A FEW SURFACE ISOLATES POSSESSED LIPOLYTIC OR HYDROCARBONOCLASTIC ACTIVITY. PROTEOLYTIC ACTIVITY WAS PRESENT IN A SIMILAR PERCENT OF BOTH SURFACE AND SUBSURFACE ISOLATES. APPROXIMATELY 75% OF THE SURFACE SLICK ISOLATES UTILIZED ETHANOL. GROWTH ON ETHANOL WAS NOT AFFECTED BY SEVERAL CHLORINATED PESTICIDES. TESTS OF PCB SENSITIVITY DEMONSTRATED THAT RESISTANCE TO PCB FORMULATIONS WAS MORE COMMON AMONG SURFACE ISOLATES.

CROW, S.A., P.I. BOWMAN, AND D.G. AHEARN. 1977. ISOLATION OF ATYPICAL CANDIDA ALBICANS FROM THE NORTH SEA. APPL. ENVIRON. MICROBIOL. 33(3):738-739. (ERL,GB X052).

ISOLATES OF CANDIDA ALBICANS WITH SPARSE FILAMENTATION AND WEAK FERMENTATION WERE ISOLATED FROM THE SURFACE MICROLAYER OF THE NORTH SEA, BUT NOT FROM SUBSURFACE WATERS. SUCH ATYPICAL ISOLATES MAY BE MISIDENTIFIED BY USING NORMAL TAXONOMIC PROCEDURES.

CROW, S.A., W.L. COOK, D.G. AHEARN, AND A.W. BOURQUIN. 1976. MICROBIAL POPULATIONS IN COASTAL SURFACE SLICKS. IN: PROCEEDINGS OF THE THIRD INTERNATIONAL BIODEGRADATION SYMPOSIUM. J.M. SHARPLEY AND A.M. KAPLAN, EDITORS, APPLIED SCIENCE PUBLISHERS LTD., LONDON. PP. 93-98. (ERL,GB 254).

SAMPLES OF THE UPPER 10 MM OF INSHORE SURFACE FILMS OBTAINED BY ADSORPTION TO MEMBRANES YIELDED MICROBIAL POPULATIONS UP TO 10 TO THE EIGHT POWER ML-1 OR 10 TO THE FIFTH POWER CM -2. THESE POPULATIONS WERE TYPICALLY 10-100 TIMES GREATER THAN THOSE IN UNDERLYING WATERS AT A DEPTH OF 10 CM. PREDOMINANT BACTERIA IN SURFACE FILMS WERE MOTILE, NONPIGMENTED, GRAM-NEGATIVE RODS. COLONY-FORMING UNITS OF YEASTS AND MOULDS WERE FOUND IN CONCENTRATIONS TO 10 TO THE FOURTH POWER ML-1 OR 28 CM-2. THE PREDOMINANT SPECIES IN SURFACE FILMS WERE PROTEOLYTIC AND AMYLOLYTIC BUT EXHIBITED ONLY WEAK TO NEGLIGIBLE HYDROCARBONOCLASTIC AND LIPOLYTIC ACTIVITIES. A GREATER PROPORTION OF THE SURFACE FILM BACTERIA, AS COMPARED TO THOSE AT 10 CM DEPTH, WERE CAPABLE OF GROWTH ON FRESH-WATER MEDIA.

DAVIS, W.M., AND D.C. WHITE. 1980. FLUOROMETRIC DETERMINATION OF ADENOSINE NUCLEOTIDE DERIVATIVES AS MEASURES OF THE MICROFOULING, DETRITAL AND SEDIMENTARY MICROBIAL BIOMASS AND PHYSIOLOGICAL STATUS. APPL. ENVIRON. MICROBIOL. 40(3):539-548. (ERL,GB X186).

ADENOSINE, ADENINE, CYCLIC ADENOSINE MONOPHOSPHATE (AMP), AMP, NICOTINAMID ADENINE DINUCLEOTIDE, ADENOSINE DIPHOSPHATE, AND ADENOSINE TRIPHOSPHATE (ATP) WERE RECOVERED QUANTITATIVELY FROM AQUEOUS PORTIONS OF LIPID EXTRACTS OF MICROFOULING, DETRITAL, AND SEDIMENTARY MICROBIAL COMMUNITIES. THESE COULD BE DETECTED QUANTITATIVELY IN THE PICOMOLAR RANGE BY FORMING THEIR 1-N6-ETHENO DERIVATIVES AND ANALYZING BY HIGH-PRESSURE LIPID CHROMATOGRAPHY WITH FLOURESCENT DETECTION. LIPID EXTRACTION AND SUBSEQUENT ANALYSIS ALLOWED THE SIMULTANEOUS MEASUREMENT OF THE MICROBIAL COMMUNITY STRUCTURE, TOTAL MICROBIAL BIOMASS WITH THE QUANTITATIVE RECOVERY OF THE ADENINE-CONTAINING CELLULAR COMPONENTS, WHICH WERE PROTECTED FROM ENZYMATIC DESTRUCTION. THIS EXTRACTION AND FLOURESCENT DERIVATIZATION METHOD SHOWED EQUIVALENCY WITH THE LUCIFERIN-LUCIFERASE METHOD FOR BACTERIAL ATP MEASUREMENTS. QUICK-FREEZING SAMPLES IN THE FIELD WITH DRY ICE-ACETONE PRESERVED THE ATP AND ENERGY CHARGE (A RATIO OF ADENOSINE NUCLEOTIDES) FOR ANALYSIS AT REMOTE LABORATORIES. THE METABOLIC LABILITY OF ATP IN ESTUARINE DETRITAL AND MICROFOULING COMMUNITIES, AS WELL AS BACTERIAL MONOCULTURES OF CONSTANT BIOMASS, SHOWED ATP TO BE A PRECARIOUS MEASURE OF BIOMASS UNDER SOME CONDITIONS. COMBINATIONS OF ADENOSINE AND ADENINE NUCLEOTIDES GAVE BETTER CORRELATIONS WITH MICROBIAL BIOMASS MEASURED AS EXTRACTABLE LIPID PHOSPHATE IN THE DETRITAL AND MICROFOULING MICROBIAL COMMUNITIES THAN DID ATP ALONE. STRESSES SUCH AS ANOXIA OF FILTERATION ARE REFLECTED IN THE RAPID ACCUMULATION OF INTRACELLULAR ADENOSINE AND THE EXCRETION OF ADENOSINE AND AMP INTO THE SURROUNDING MILIEU. INCREASES IN AMP AND ADENOSINE MAY PROVE TO BE MORE SENSITIVE INDICATORS OF METABOLIC STATUS THAN THE ENERGY CHARGE.

EVANS, JOHN E. 1978. FEASIBILITY OF USING BACTERIAL STRAINS (MUTAGENESIS) TO TEST FOR ENVIRONMENTAL CARCINOGENS. EPA-600/3-78-042, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 118P.

A RAPIDLY GROWING STORE OF DATA IS AVAILABLE RELATIVE TO THE POTENTIAL MUTAGENICITY AND CARCINOGENICITY OF NEW PRODUCTS OF CHEMICAL SUBSTANCES MANUFACTURED FOR COMMERCE IN RECENT YEARS. LITERATURE REGARDING MIXTURES, SUCH AS CHEMICAL WASTES, HOWEVER, IS SCARCE AND HARD TO FIND. A LITERATURE REVIEW WAS UNDERTAKEN TO ASSESS FEASIBILITY OF USING BACTERIA AS SCREENING AGENTS TO DETECT ENVIRONMENTAL CARCINOGENS. MUTAGENICITY DATA WERE INCLUDED IN THE STUDY BECAUSE GROWING EXPERIMENTAL EVIDENCE INDICATES THAT MOST CHEMICAL CARCINOGENS ARE MUTAGENS, AND MANY MUTAGENS MAY BE CARCINOGENS. THIS INVESTIGATION FOUND THAT BACTERIAL MUTAGENESIS CAN BE USED TO INITIATE A SERIES OF STUDIES DESIGNED TO SCREEN FOR POTENTIAL MUTAGENS AND CARCINOGENS IN MIXED CHEMICAL WASTES.

FAZIO, STEVEN J., WILLIAM R. MAYBERRY, AND DAVID C. WHITE. 1979. MURAMIC ACID ASSAY IN SEDIMENTS. APPL. ENVIRON. MICROBIOL. 38(2):349-350. (ERL,GB X073).

AN IMPROVED CHROMATOGRAPHIC ASSAY FOR MURAMIC ACID WHICH IS SUFFICIENTLY SENSITIVE FOR MARINE SANDY SEDIMENTS IS DESCRIBED; IT INVOLVES ACID HYDROLYSIS, THIN-LAYER CHROMATOGRAPHY, AND GAS-LIQUID CHROMATOGRAPHY.

FEDERLE, THOMAS W., MEREDITH A. HULLAR, ROBERT J. LIVINGSTON, DUANE A. MEETER, AND DAVID C. WHITE. 1983. SPATIAL DISTRIBUTION OF BIOCHEMICAL PARAMETERS INDICATING BIOMASS AND COMMUNITY COMPOSITION OF MICROBIAL ASSEMBLIES IN ESTUARINE MUD FLAT SEDIMENTS. APPL. ENVIRON. MICROBIOL. 45(1):58-63. (ERL,GB X371).

THE SPATIAL DISTRIBUTION OF COMMUNITIES WAS EXAMINED IN ESTUARINE MUD FLAT SEDIMENTS BY THE BIOCHEMICAL ANALYSIS OF THE LIPIDS AND LIPID COMPONENTS EXTRACTED FROM THE SEDIMENTS. TOTAL PHOSPHOLIPID WAS USED AS A MEASURE OF TOTAL BIOMASS, AND FATTY ACIDS WERE USED AS INDICATORS OF COMMUNITY COMPOSITION. COMPARISONS WERE MADE AMONG 2- BY 2-M (LOCATION) AND 0.2- BY 0.2-M (CLUSTER) SAMPLING PLOTS BY USING A NESTED ANALYSIS OF VARIANCE TO DESIGN AN OPTIMAL SAMPLING STRATEGY TO DEFINE THE MICROBIAL CONTENT OF A LARGE, RELATIVELY HOMOGENEOUS AREA. AT TWO OF THE THREE STATIONS, A 2- BY 2-M PLOT WAS REPRESENTATIVE OF THE STATION, BUT 0.2- BY 0.2-M AREAS WERE IN NO CASE REPRESENTATIVE OF THE STATION. THE BIOMASS MEASURED BY THE EXTRACTABLE PHOSPHOLIPID AND THE TOTAL LIPID PALMITIC ACID SHOWED EXCELLENT CORRELATION WITH THE FATTY ACID "SIGNATURES" CHARACTERISTIC OF BACTERIA, BUT SHOWED A LOWER CORRELATION WITH THE LONG-CHAIN POLYENOIC FATTY ACIDS CHARACTERISTIC OF THE MICROFAUNA.

FEDERLE, THOMAS W., ROBERT J. LIVINGSTON, DUANE A. MEETER, AND DAVID C. WHITE. 1983. MODIFICATIONS OF ESTUARINE SEDIMENTARY MICROBIOTA BY EXCLUSION OF EPIBENTHIC PREDATORS. J. EXP. MAR. BIOL. ECOL. 73(1):81-94. (ERL,GB 467).

THE ABILITY OF EPIBENTHIC PREDATORS (CRABS AND FISHES) TO INFLUENCE BIOMASS AND COMMUNITY STRUCTURE OF SEDIMENTARY MICROBIOTA WAS INVESTIGATED IN ST. GEORGE SOUND-APALACHICOLA BAY SYSTEM, FLORIDA, U.S.A. REPLICATE AREAS (4 M SQUARED) OF MUD-FLAT SEDIMENT WERE CAGED IN THE FIELD TO CONFINE AND EXCLUDE PREDATORS. UNCAGED AREAS WERE USED AS CONTROLS. THE MICROBIOTA (PROKARYOTES AND MICROEUKARYOTES) OF THE SEDIMENTS WAS CHARACTERIZED AT WEEKS 0, 2, AND 6 BY MEASURING CONCENTRATIONS OF PHOSPHOLIPID AND ANALYZING FATTY ACIDS OF THE MICROBIAL LIPIDS EXTRACTED FROM THE SEDIMENTS. DATA WERE ANALYZED USING ANALYSIS OF VARIANCE AND STEP-WISE DISCRIMINANT ANALYSIS. AFTER 2 WK, THE MICROBIOTA OF THE PREDATOR EXCLUSION TREATMENT WAS SIGNIFICANTLY DIFFERENT FROM THAT IN CONTROL AND PREDATOR INCLUSION TREATMENTS. AFTER 6 WK, THESE DIFFERENCES BECAME MORE PRONOUNCED. THERE WERE NO DEMONSTRABLE CAGING EFFECTS THAT COULD ACCOUNT FOR TREATMENT DIFFERENCES. RESULTS INDICATED THAT REMOVAL OF PREDATORS HAD A PROFOUND EFFECT ON MICROBIAL COMMUNITIES IN ESTUARINE SEDIMENTS. THUS, THE TOP TROPHIC LEVEL (EPIBENTHIC PREDATORS) HAD AN IMPORTANT ROLE IN REGULATING THE STRUCTURE OF THE LOWEST TROPHIC LEVEL (THE MICROBIOTA).

FEDERLE, THOMAS W., AND DAVID C. WHITE. 1982. PRESERVATION OF ESTUARINE SEDIMENTS FOR LIPO ANALYSIS OF BIOMASS COMMUNITY STRUCTURE OF MICROBIOTA. APPL. ENVIRON. MICROBIOL. 44(5):1156-1169. (ERL,GB X381).

VARIOUS METHODS WERE TESTED FOR PRESERVING ESTUARINE SEDIMENTS IN THE FIELD BEFORE BIOCHEMICAL ANALYSIS OF THE MICROBIOTA. TOTAL MICROBIAL BIOMASS WAS DETERMINED AS LIPO PHOSPHATE (LP), AND THE FATTY ACIDS OF THE MICROBIAL LIPO WERE USED AS INDICATORS OF COMMUNITY STRUCTURE. CONTROL SAMPLES WERE SIEVED TO REMOVE MACROINVERTEBRATES AND PLANT MATERIALS AND WERE EXTRACTED IMMEDIATELY IN THE FIELD. OTHER SAMPLES WERE PRESERVED BOTH BEFORE AND AFTER SIEVING AND STORED FOR 5 DAYS BEFORE ANALYSIS. FREEZING RESULTED IN A 50% DECLINE IN LP AND SIGNIFICANT DECREASES IN MANY FATTY ACIDS. REFRIGERATION RESULTED IN A 19% DECREASE IN LP BUT NO CHANGE IN THE FATTY ACIDS. SAMPLES PRESERVED WITH FORMALIN BEFORE SIEVING EXHIBITED NO SIGNIFICANT CHANGE IN LP BUT SUBSTANTIAL INCREASES IN MANY FATTY ACIDS, WHICH WERE PROBABLY DERIVED FROM THE MACROINVERTEBRATES. SIEVED SAMPLES PRESERVED WITH FORMALIN SHOWED A 17 TO 18% DECLINE IN LP BUT NO CHANGE IN THE FATTY ACIDS. IDEALLY, SAMPLES SHOULD BE SIEVED AND EXTRACTED IMMEDIATELY IN THE FIELD. HOWEVER, SHORT-TERM REFRIGERATION AND LONGER-TERM PRESERVATION OF SIEVED SAMPLES WITH FORMALIN MAY BE ACCEPTABLE COMPROMISES.

FINDLAY, ROBERT H., AND DAVID C. WHITE. 1983. POLYMERIC BETA-HYDROXYALKANOATES FROM ENVIRONMENTAL SAMPLES AND *BACILLUS MEGATERIUM*. APPL. ENVIRON. MICROBIOL. 45(1):71-78. (ERL,GB X380).

THE PROCARYOTIC ENDOGENOUS STORAGE POLYMER KNOWN AS POLY-BETA-HYDROXYBUTYRATE IS ACTUALLY A MIXED POLYMER OF SHORT-CHAIN BETA-HYDROXY FATTY ACIDS. A METHOD FOR THE QUANTITATIVE RECOVERY OF THIS MIXED POLYMER, CALLED POLY-BETA-HYDROXYALKANOATE (PHA), WITH ANALYSIS BY CAPILLARY GAS-LIQUID CHROMATOGRAPHY SHOWED THE PRESENCE OF AT LEAST 11 SHORT-CHAIN BETA-HYDROXY ACIDS IN POLYMERS EXTRACTED FROM MARINE SEDIMENTS. POLYMERS EXTRACTED FROM *BACILLUS MEGATERIUM* MONOCULTURES WERE ALSO A COMPLEX MIXTURE OF BETA-HYDROXY ACIDS WITH CHAIN LENGTHS BETWEEN FOUR AND EIGHT CARBONS. LYOPHILIZED SEDIMENTS WERE EXTRACTED IN A MODIFIED SOXHLET EXTRACTOR, AND THE POLYMER WAS PURIFIED WITH ETHANOL AND DIETHYL ETHER WASHES. THE PURIFIED POLYMER WAS TREATED WITH ETHANOL-CHLOROFORM-HYDROCHLORIC ACID (8.5:2.5:1) FOR 4 H AT 100 DEGREES CELSIUS, A TREATMENT WHICH RESULTED IN THE FORMATION OF THE ETHYL ESTERS OF THE THE CONSTITUENT BETA-HYDROXY ACIDS. SUBSEQUENT ASSAY OF THE PRODUCTS BY GAS-LIQUID CHROMATOGRAPHY INDICATED EXCELLENT REPRODUCIBILITY AND SENSITIVITY (DETECTION LIMIT, 100 FMOL). DISTURBING SEDIMENTS MECHANICALLY OR ADDING NATURAL CHELATORS INCREASED ALL MAJOR PHA COMPONENTS RELATIVE TO THE BACTERIAL BIOMASS. GARDENING OF SEDIMENTARY MICROBES BY *CLYMENELLA* SP., AN ANNELID WORM, INDUCED DECREASES IN PHA, WITH CHANGES IN THE RELATIVE PROPORTION OF COMPONENT BETA-HYDROXY ACIDS. THE CONCENTRATION OF PHA RELATIVE TO THE BACTERIAL BIOMASS CAN REFLECT THE RECENT METABOLIC STATUS OF THE MICROBIOTA.

GARNAS, R.L., A.W. BOURQUIN, AND P.H. PRITCHARD. 1978. FATE AND DEGRADATION OF 14C-KEPONE IN ESTUARINE MICROCOSMS. IN: PROCEEDINGS OF THE KEPONE SEMINAR II. EPA-903/9-78-011, U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION III, PHILADELPHIA, PA. PP. 330-362. (ERL,GB 351).

THE FATE OF 14C-KEPONE WAS STUDIED IN STATIC AND CONTINUOUS FLOW ESTUARINE MICROCOSMS. BIOTIC AND ABIOTIC TRANSFORMATION AND VOLATILIZATION WERE NOT IMPORTANT PROCESSES IN THESE STUDIES. KEPONE DESORBED READILY FROM SALT MARSH SEDIMENTS AND JAMES RIVER SEDIMENTS. WHILE THIS DESORPTION WAS INDEPENDENT OF ENVIRONMENTAL TEMPERATURES AND SALINITY RANGES, KEPONE RESIDUES IN SEDIMENT INFLUENCED CONCENTRATIONS IN WATER COLUMN. RADIOACTIVITY WAS NOT EXTRACTABLE FROM SOME JAMES RIVER SEDIMENTS, USING RECOGNIZED ANALYTICAL PROCEDURES. IN LARGER CONTINUOUS FLOW SYSTEMS, BENTHIC POLYCHAETES (*CARENICOLA CRISTATA*) ACCUMULATED HIGH RESIDUES OF KEPONE, DIED, AND DECOMPOSED. THESE RESIDUES WERE NEVER AVAILABLE FOR DESORPTION COMPARED TO SEDIMENT. THESE DATA WILL ALLOW BETTER PREDICTION OF THE FATE OF KEPONE IN THE AQUATIC ENVIRONMENT.

GARNAS, R.L., A.W. BOURQUIN, AND P.H. PRITCHARD. 1978. FATE OF 14C-KEPONE IN ESTUARINE MICROCOSMS (ABSTRACT). (ERL,G3 X323).

FOLLOWING THE CONTAMINATION OF THE JAMES RIVER WITH KEPONE, LABORATORY DATA CONCERNING ITS FATE IN THE ESTUARY WERE NECESSARY FOR CORRECTIVE ACTIONS AND MATHEMATICAL MODELING EFFORTS. THE MOVEMENT AND TRANSFORMATION POTENTIALS OF 14C-KEPONE WERE STUDIED IN STATIC AND CONTINUOUS FLOW ESTUARINE MICROCOSMS. BIOTIC AND ABIOTIC TRANSFORMATION AND VOLATILIZATION OF THE CHEMICAL WERE NOT APPARENT IN THESE STUDIES. FOLLOWING ITS ADSORPTION FROM WATER IN THESE MODEL SYSTEMS, KEPONE DESORBED FROM SALT MARSH SEDIMENTS AND JAMES RIVER SEDIMENTS. WHILE THIS DESORPTION WAS INDEPENDENT OF ENVIRONMENTAL WATER TEMPERATURES AND SALINITIES IN SEDIMENT-WATER SYSTEMS, THE KEPONE CONCENTRATION IN THE WATER COLUMN WAS PROPORTIONAL TO ITS CONCENTRATION IN SEDIMENT. SOME JAMES RIVER SEDIMENTS RETAINED HIGH LEVELS OF RADIOLABELED CHEMICAL FOLLOWING CONVENTIONAL SOLVENT EXTRACTION. BURROWING POLYCHAETES (*ARENICOLA CRISTATA*) WERE ADDED TO SALT MARSH SEDIMENT IN LARGER CONTINUOUS FLOW SYSTEMS TO DEFINE THE EFFECT OF MACROBENTHIC BIOTA ON THE FATE OF KEPONE. THESE POLYCHAETES ACCUMULATED HIGH RESIDUES OF KEPONE AND DIED; ALTHOUGH THE TISSUES WERE ALLOWED TO DECOMPOSE IN THE SYSTEM, THE ACCUMULATED KEPONE WAS NOT AS AVAILABLE FOR DESORPTION AND WASHOUT FROM THE SYSTEM AS COMPARED TO KEPONE ADSORBED TO SEDIMENT.

GEHRON, MICHAEL J., AND DAVID C. WHITE. 1982. QUANTITATIVE DETERMINATION OF THE NUTRITIONAL STATUS OF DETRITAL MICROBIOTA AND THE GRAZING FUANA BY TRIGLYCERIDE GLYCEROL ANALYSIS. J. EXP. MAR. BIOL. ECOL. 64(2):145-158. (ERL,G8 X254).

ENDOGENOUS LIPID STORAGE COMPONENTS ARE ACCUMULATED OR UTILIZED BY BOTH MICROORGANISMS AND MARINE INVERTEBRATE, DEPENDING UPON THEIR NUTRITIONAL STATUS. TRIGLYCERIDES ARE COMMONLY THE LIPID ENDOGENOUS STORAGE MATERIALS UTILIZED BY FUNGI, MARINE VERTEBRATES AND MANY INVERTEBRATES, CAN BE QUANTITATIVELY ESTIMATED BY GAS CHROMATOGRAPHIC ASSAY OF TRIACYL GLYCEROL FROM LIPID EXTRACTION. DEPRIVATION FROM A FOOD SOURCE CAN BE DETECTED BY LOSS OF TRIGLYCERIDE GLYCEROL AND ESTIMATED AS THE RATIO OF TRIGLYCERIDE GLYCEROL TO PHOSPHOLIPID MEASURED AS EXTRACTABLE LIPID PHOSPHATE. IN SEVERAL ESTUARINE ANIMALS, DEPRIVATION FROM FOOD SOURCES RESULTED IN DECLINE OF BOTH NEUTRAL LIPID GLYCEROL AND TRIGLYCERIDE GLYCEROL. AMPHIPODS, FEEDING ON ESTUARINE DETRITUS IN THE LABORATORY, SHOWED THE SAME NUTRITIONAL STATE AS THOSE TAKEN FROM DETRITAL BASKETS IN THE FIELD AND WERE CONSIDERABLY BETTER NOURISHED THAN CONTROL AMPHIPODS DEPRIVED OF FOOD FOR A WEEK.

HELZ, GEORGE R., RICHARD SUGAM, AND RONG Y. HSU. 1978. CHLORINE DEGRADATION AND HALOCARBON PRODUCTION IN ESTUARINE WATERS. IN: WATER CHLORINATION: ENVIRONMENTAL IMPACT AND HEALTH EFFECTS, VOL. 2. ROBERT L. JOLLEY, HEND GORCHEV, AND D. HEYWARD HAMILTON, JR, EDITORS, ANN ARBOR SCIENCE PUBLISHERS, INC, ANN ARBOR, MI. PP. 209-222. (ERL,GB X036).

THIS CHAPTER DEALS WITH THE QUESTION, WHAT CHEMICAL PROCESSES CREATE CHLORINE DEMAND AND CONTROL CHLORINE DECAY IN ESTUARINE WATERS? PREVIOUSLY, THERE HAVE BEEN A NUMBER OF STUDIES WHICH RESULTED IN EMPIRICAL DESCRIPTIONS OF CHLORINE DECAY AT PARTICULAR SITES. THERE HAVE ALSO BEEN SEVERAL EXCELLENT LABORATORY INVESTIGATIONS OF SPECIFIC DECAY MECHANISMS. HOWEVER, TO DATE VERY LITTLE EFFORT HAS BEEN DIRECTED TOWARD ESTABLISHING THE ACTUAL DECAY MECHANISMS WHICH PREDOMINATE IN NATURAL WATERS UNDER FIELD CONDITIONS.

HOLZSCHU, D.L., F.W. CHANDLER, L. AJELLO, AND D.G. AHEARN. 1979. EVALUATION OF INDUSTRIAL YEASTS FOR PATHOGENICITY. SABOURAUDIA. 17(1):71-78. (ERL,GB X088).

ELEVEN YEASTS REPRESENTATIVE OF SPECIES OF INDUSTRIAL INTEREST WERE COMPARED WITH CANDIDA ALBICANS FOR THEIR POTENTIAL PATHOGENICITY FOR UNTREATED AND CORTISONE-TREATED MICE. ONLY C. TROPICALIS PRODUCED A PROGRESSIVE INFECTION SIMILAR TO THAT PRODUCED BY C. ALBICANS. CANDIDA LIPOLYTICA, TORULOPSIS SPP., AND HANSENULA POLYMORPHA WERE NOT RECOVERED FROM MICE 6 DAYS AFTER INOCULATION. KLUYVEROMYCES FRAGILIS, C. PSEUDOTROPICALIS, C. UTILIS, C. GUILLIERMONDII AND C. MALTOSE WERE RECOVERED FROM MICE BUT DID NOT PRODUCE EVIDENCE OF INFECTION.

HOOD, M.A., AND HERBERT L. FREDRICKSON. 1978. EFFECTS OF METHYL PARATHION ON MICROBIAL POPULATIONS IN A SIMULATED SALT MARSH ENVIRONMENT (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY 1978. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 174. (ERL,GB 318).

JONES, R.D., AND MARY A. HOOD. 1980. EFFECT OF ORGANOPHOSPHORUS PESTICIDES ON ESTUARINE AMMONIUM OXIDIZERS. CAN. J. MICROBIOL. 26(11):1296-1299. (ERL,GB X403).

THE EFFECTS OF SEVEN THIOPHOSPHORUS PESTICIDES AND THEIR DEGRADATION PRODUCTS ON ESTUARINE AMMONIUMIZERS WERE EXAMINED. USING AN AXENIC, CLOSED-CULTURE, HIGH CELL DENSITY ASSAY, THE PESTICIDES CAUSED LITTLE INHIBITION OF AMMONIUM OXIDATION. HOWEVER, THE DEGRADATION PRODUCT OF METHYL PARATHION, P-AMINOPHENOL, SIGNIFICANTLY INHIBITED AMMONIUM OXIDATION IN LEVELS AS LOW AS 0.01 MG/L. ESTUARINE SEDIMENTS CONTAINING INDIGENOUS AMMONIUMIZERS WERE EXPOSED TO THE PESTICIDES OVER A 14-DAY PERIOD AND ACTIVITY OF THE AMMONIUMIZERS WERE INHIBITED AFTER 14 DAYS. THREE PESTICIDES WERE AGED IN ESTUARINE SEDIMENTS UNDER AEROBIC, ANEROBIC, AND MICROAEROPHILIC CONDITIONS, AND AXENIC CULTURES OF AMMONIUM OXIDIZERS WERE EXPOSED TO THE RESULTING METABOLITES. AMMONIUM OXIDATION WAS INHIBITED BY 10% IN THE SYSTEMS CONTAINING PESTICIDES AGED UNDER AEROBIC AND ANEROBIC CONDITIONS, WHEREAS UNDER MICROAEROPHILIC CONDITIONS, 20% REDUCTION IN ACTIVITY WAS OBSERVED. THE DATA SUGGEST THAT THE PARENT COMPOUNDS OF THE THIOPHOSPHORUS PESTICIDES HAVE LITTLE EFFECT ON AMMONIUM OXIDATION IN ESTUARINE SEDIMENTS, BUT THAT CERTAIN METABOLITES WHICH ACCUMULATE FROM THE DECOMPOSITION OF THESE PESTICIDES, ESPECIALLY IN SEDIMENTS UNDER LOW O₂ LEVELS, MAY SIGNIFICANTLY REDUCE AMMONIUM OXIDATION.

JONES, RONALD D., AND MARY A. HJOD. 1980. INTERACTION BETWEEN AN AMMONIUM-OXIDIZER, NITROSOMONAS SP., AND TWO HETEROTROPHIC BACTERIA, NOCARDIA ATLANTICA AND PSEUDOMONAS SP.: A NOTE. MICROB. ECOL. 6(3):271-275. (ERL,GB X248).

CLOSED CULTURE EXPERIMENTS SHOWED THAT THE ABILITY OF AN ESTUARINE CHEMOLITHOTROPHIC AMMONIUM-OXIDIZER, NITROSOMONAS SP., TO CONVERT AMMONIUM TO NITRITE WAS SUBSTANTIALLY INCREASES BY AS MUCH AS 150% AND 50% WHEN GROWN IN THE PRESENCE OF TWO HETEROTROPHS ISOLATED FROM THE SAME ENVIRONMENT. THE HETEROTROPHS WERE IDENTIFIED AS NOCARDIA ATLANTICA AND PSEUDOMONAS SP. THE GROWTH OF THE HETEROTROPHS WAS STIMULATED BY AS MUCH AS ONE ORDER OF MAGNITUDE IN THE PRESENCE OF THE AMMONIUM-OXIDIZER.

KIEFER, L., H. JANNASCH, K. NEALSON, AND A. BOURQUIN. 1974. OBSERVATIONS OF LUMINESCENT BACTERIA IN CONTINUOUS CULTURE (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING, AMERICAN SOCIETY FOR MICROBIOLOGY. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. G207. (ERL,GB 209).

FREE-LIVING MARINE LUMINOUS BACTERIA HAVE NEVER BEEN OBSERVED TO LUMINESCE IN THE OPEN OCEAN. THE ABSENCE OF THIS ACTIVITY IS POSTULATED TO BE A RESULT OF AN INSUFFICIENT CONCENTRATION OF EXTRACELLULAR INDUCER SUBSTANCE (RESPONSIBLE FOR AUTO-INDUCTION IN BATCH CULTURE) IN THE ENVIRONMENT. TO INVESTIGATE THIS MODEL, PHOTOBACTERIUM FISHERY, STR. 121, WAS CULTURED IN A GLYCEROL-LIMITED CHEMOSTAT APPARATUS. LIGHT PRODUCTION WAS SHOWN TO BE SUSTAINABLE FOR SEVERAL DAYS WHEN A CELL DENSITY GREATER THAN THE INDUCTION DENSITY WAS MAINTAINED. THUS, A POTENTIAL FOR CONTINUOUS LIGHT EMISSION WAS DEMONSTRATED. AFTER STEADY-STATE CONDITIONS WERE ACHIEVED AT HIGH CELL DENSITY, DILUTIONS OF THE LIMITING SUBSTRATE RESULTED IN PROPORTIONAL AND PREDICTABLE DECREASES IN CELL DENSITY. LIGHT EMISSION, ON THE OTHER HAND, WAS PROPORTIONAL TO DILUTION ONLY AT OR ABOVE THE CELL DENSITY OF INDUCTION. THEREAFTER, LIGHT EMISSION WAS RAPIDLY EXTINGUISHED WHILE CELL DENSITY REMAINED AT THE PREDICTED VALUE, THUS SUPPORTING THE CRITICAL CONCENTRATION MODEL FOR THE INDUCER ACTIVITY.

KLECKA, G.M., AND D.T. GIBSON. 1981. BACTERIAL DEGRADATION OF DIBENZO-P-DIOXIN AND CHLORINATED DIBENZO-P-DIOXINS. EPA-600/4-81-016, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 74P.

PSEUDOMONAS SP. N.C.I.B. 9816, STRAIN 11, WHEN GROWN ON SALICYLATE IN THE PRESENCE OF DIBENZO-P-DIOXIN, ACCUMULATED CIS-1,2-DIHYDROXY-1,2-DIHYDRODIBENZO-P-DIOXIN AND 2-HYDROXYDIBENZO-P-DIOXIN IN THE CULTURE MEDIUM. CRUDE CELL EXTRACTS PREPARED FROM THE PARENTAL STRAIN GROWN WITH NAPHTHALENE OXIDIZED CIS-1,2-DIHYDROXY-1,2-DIHYDRODIBENZO-P-DIOXIN TO 1,2-DIHYDROXYDIBENZO-P-DIOXIN. FURTHER DEGRADATION OF THE METABOLITE WAS NOT DETECTED. WHOLE CELLS OF THE PARENT STRAIN OF BEIJERINCKIA, GROWN WITH SUCCINATE AND BIPHENYL, OXIDIZED DIBENZO-P-DIOXIN AND SEVERAL CHLORINATED DIOXINS. A MUTANT STRAIN (B8/36) OF BEIJERINCKIA OXIDIZED DIBENZO-P-DIOXIN TO CIS-1,2-DIHYDROXY-1,2-DIHYDRODIBENZO-P-DIOXIN. THE MUTANT ORGANISM ALSO OXIDIZED TWO MONOCHLORINATED DIBENZO-P-DIOXINS TO CIS-DIHYDRODIOLS. NO METABOLITES WERE DETECTED FROM TWO DICHLORINATED DIBENZO-P-DIOXINS. GROWTH OF THE PARENT STRAIN OF BEIJERINCKIA ON SUCCINATE WAS INHIBITED AFTER FOUR HOURS WHEN 0.05% DIBENZO-P-DIOXIN WAS PRESENT IN THE CULTURE MEDIUM. RESTING CELL SUSPENSIONS OF THE PARENT ORGANISM OXIDIZED DIBENZO-P-DIOXIN TO A COMPOUND IDENTIFIED AS 1,2-DIHYDROXYDIBENZO-P-DIOXIN. FURTHER DEGRADATION OF THIS METABOLITE WAS NOT DETECTED, AS THE COMPOUND WAS FOUND TO BE A POTENT MIXED-TYPE INHIBITOR OF TWO RING-FISSION OXYGENASES PRESENT IN THIS ORGANISM.

KLECKA, GARY M., AND DAVID T. GIBSON. 1980. METABOLISM OF DIBENZO-P-DIOXIN AND CHLORINATED DIBENZO-P-DIOXINS BY A BEIJERINCKIA SPECIES. APPL. ENVIRON. MICROBIOL. 39(2):288-296. (ERL, 68 X200).

WHOLE CELLS OF THE PARENT STRAIN OF BEIJERINCKIA, GROWN WITH SUCCINATE AND BIPHENYL, OXIDIZED DIBENZO-P-DIOXIN AND SEVERAL CHLORINATED DIOXINS. THE RATE OF OXIDATION OF THE CHLORINATED DIBENZO-P-DIOXINS DECREASED WITH AN INCREASING DEGREE OF CHLORINE SUBSTITUTION. A MUTANT STRAIN (B8/36) OF BEIJERINCKIA OXIDIZED DIBENZO-P-DIOXIN TO CIS-1,2-DIHYDROXY-1,2-DIHYDRODIBENZO-P-DIOXIN. THE MUTANT ORGANISM ALSO OXIDIZED TWO MONOCHLORINATED DIBENZO-P-DIOXINS. GROWTH OF NO METABOLITES WERE DETECTED FROM TWO DICHLORINATED DIBENZO-P-DIOXINS. GROWTH OF THE PARENT STRAIN OF BEIJERINCKIA ON SUCCINATE WAS INHIBITED AFTER 4 H WHEN 0.05% DIBENZO-P-DIOXIN WAS PRESENT IN THE CULTURE MEDIUM. RESTING CELL SUSPENSIONS OF THE PARENT ORGANISM, PREVIOUSLY GROWN WITH SUCCINATE AND BIPHENYL, OXIDIZED DIBENZO-P-DIOXIN TO A COMPOUND IDENTIFIED AS 1,2-DIHYDROXYDIBENZO-P-DIOXIN. FURTHER DEGRADATION OF THIS METABOLITE WAS NOT DETECTED, AS THE COMPOUND WAS FOUND TO BE POTENT MIXED-TYPE INHIBITOR OF TWO RING-FISSION OXYGENASES PRESENT IN THIS ORGANISM.

LUCYSZYN, E., AND P.H. PRITCHARD. 1979. CHARACTERISTICS OF BACTERIA ADAPTED TO LOW NUTRIENT CONDITIONS IN LAKE ONTARIO. IN: DEVELOPMENTS IN INDUSTRIAL MICROBIOLOGY, VOL. 20. SOCIETY FOR INDUSTRIAL MICROBIOLOGY, WASHINGTON, DC. PP. 579-589. (ERL,GB 375).

THE FATE OF ORGANIC POLLUTANTS IN AQUATIC ECOSYSTEMS DEPENDS, IN PART, ON METABOLIC ACTIVITIES OF THE INDIGENOUS MICROFLORA. KNOWLEDGE IS THEREFORE NEEDED OF THE GROWTH CHARACTERISTICS OF AQUATIC BACTERIA IN LOW NUTRIENT CONDITIONS TYPICAL OF MANY AQUATIC ENVIRONMENTS. WE HAVE STUDIED CHANGES IN BACTERIAL POPULATIONS FROM LAKE ONTARIO USING CONTINUOUS CULTURE ENRICHMENTS, WITH LACTOSE AS THE SOLE CARBON AND ENERGY SOURCE. ENRICHMENT STUDIES HAVE SHOWN THAT THE CONC OF LACTOSE, THE TYPE OF WATER UTILIZED FOR INFLOWING MEDIA, AND THE INOCULUM SOURCE AFFECTED THE OUTCOME OF CONTINUOUS CULTURE ENRICHMENTS FROM FRESH-WATER SAMPLES. TWO ISOLATES FROM ENRICHMENT EXPERIMENTS, AN AEROMONAS SP. AND A PSEUDOMONAS SP., WERE OBTAINED USING CONC OF 50 AND 5 MG/LITER LACTOSE, RESPECTIVELY. THESE ISOLATES WERE SHOWN TO BE COMPETITIVE WITH EACH OTHER AT DIFFERENT LACTOSE CONC. THE PSEUDOMONAS SP. WAS MORE SENSITIVE TO STARVATION AND HEAT TREATMENT THAN THE AEROMONAS SP. AND DID NOT TAKE UP OXYGEN IN THE PRESENCE OF GLUCOSE WHEN CELL SUSPENSIONS WERE PREPARED FROM CULTURES GROWN IN PEPTONE BROTH.

MAHAFFEY, W.R., A.W. BOURQUIN, AND P.H. PRITCHARD. 1978. TOXIC EFFECTS OF KEPONE ON ESTUARINE MICROORGANISMS (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 203. (ERL,GB X229).

MAHAFFEY, W.R., P.H. PRITCHARD, AND A.W. BOURQUIN. 1979. PHENYLACETIC ACID METABOLISM BY THREE AQUATIC BACTERIA ISOLATED FROM CONTINUOUS CULTURE ENRICHMENTS. IN: DEVELOPMENTS IN INDUSTRIAL MICROBIOLOGY, VOL. 20. SOCIETY FOR INDUSTRIAL MICROBIOLOGY, WASHINGTON, DC. PP. 489-495. (ERL,GB 377).

THE FATE OF TOXIC ORGANIC COMPOUNDS IN AQUATIC ENVIRONMENTS DEPENDS, IN PART, ON THE CAPACITY OF MICROORGANISMS TO METABOLIZE THESE COMPOUNDS AT VERY LOW CONC. LITTLE INFORMATION EXISTS ON THE FATE OF AROMATIC RING COMPOUNDS AT LOW CONC (LESS THAN 100 MG/L) IN AQUATIC ENVIRONMENTS. THEREFORE, WE ATTEMPT TO CHARACTERIZE THE DEGRADATION OF THE AROMATIC COMPOUND PHENYLACETIC ACID (PAA) AT LOW CONC BY AQUATIC BACTERIA. THREE BACTERIAL ISOLATES, PAL-1, PAL-10, AND PAL-100 OBTAINED FROM CONTINUOUS CULTURE ENRICHMENT EXPERIMENTS AT PAA CONC OF 1, 10, AND 100 MG/LITER, RESPECTIVELY. WASHED CELL SUSPENSIONS OF EACH ISOLATE METABOLIZED PAA, AS MEASURED BY OXYGEN UPTAKE, WITHOUT LAG REGARDLESS OF WHETHER CELLS WERE GROWN IN ACETATE OR PAA MINIMAL SALTS MEDIUM, SUGGESTING PAA METABOLISM WAS CONSTITUTIVE. ACETATE-GROWN PAL-1 AND PAL-100 CULTURES SHOWED GREATER OXYGEN UPTAKE ACTIVITY IN THE PRESENCE OF PAA THAN DID PAA-GROWN CULTURES. ALL THREE ISOLATES HAD HIGH ACTIVITY IN THE PRESENCE OF META-HYDROXY-PAA. INCUBATION OF WASHED CELL SUSPENSIONS AT 25 C FOR 12 H SHOWED THAT ONLY THE PAL-1 ISOLATE LOST ACTIVITY (75%) RELATIVE TO CELL SUSPENSIONS INCUBATED AT 4 C. OUR STUDIES PROVIDE PHYSIOLOGICAL CRITERIA THAT MAY CHARACTERIZE THE TYPES OF BACTERIA THAT TRANSFORM AROMATIC COMPOUNDS AT LOW CONC IN AQUATIC ENVIRONMENTS.

MAHAFFEY, W.R., P.H. PRITCHARD, AND A.W. BOURQUIN. 1982. EFFECTS OF KEPONE ON GROWTH AND RESPIRATION OF SEVERAL ESTUARINE BACTERIA. APPL. ENVIRON. MICROBIOL. 43(6):1419-1424. (ERL,GB 357).

TOXICITY OF KEPONE TO MIXED POPULATIONS OF ESTUARINE MICROORGANISMS WAS DETERMINED BY STANDARD PLATE ASSAYS ON ZOBELL'S MARINE MEDIUM WITH 0.02, 0.20, AND 2.0 MG KEPONE PER LITER. UNDER AEROBIC CONDITIONS KEPONE REDUCED THE NUMBER OF COLONY FORMING UNITS (CFU) AT ALL CONCENTRATIONS TESTED, BUT IT HAD NO EFFECT ON NUMBER OF ANAEROBIC MICROORGANISMS. GRAM-POSITIVE ORGANISMS WERE MORE SENSITIVE TO KEPONE THAN GRAM-NEGATIVE ORGANISMS. GROWTH OF GRAM-NEGATIVE ISOLATES WAS NOT INHIBITED IN COMPLEX NUTRIENT BROTH; IT WAS SIGNIFICANTLY INHIBITED IN A MINIMAL SALTS BROTH. OXYGEN UPTAKE BY MOST PURE CULTURE ISOLATES WAS REDUCED BY 25-100% BY 20 PPM KEPONE. OXYGEN EVOLUTION WAS OBSERVED WHEN SEVERAL GRAM-POSITIVE ISOLATES WERE EXPOSED TO KEPONE CONCENTRATIONS OF 20 PPM. PENTACHLOROPHENOL (PCP), HAD EFFECTS SIMILAR TO KEPONE AT CONCENTRATIONS ABOVE 28 PPM. KEPONE INHIBITION OF ELECTRON TRANSPORT IS DEMONSTRATED BY A SIGNIFICANT REDUCTION IN THE SPECIFIC ACTIVITIES OF NADH OXIDASES AND SUCCINOXIDASE.

MC MULLEN, DENNIS M., AND DOUGLAS P. MIDDAGH. IN PREP. EFFECT OF TEMPERATURE AND FOOD DENSITY ON SURVIVAL AND GROWTH OF LARVAL MENIDIA PENINSULAE (PISCES: ATHERINIDAE). ESTUARIES. (ERL,GB 489).

DAY OF HATCH TIDEWATER SILVERSIDES, MENIDIA PENINSULAE, WERE STOCKED AT 5 FISH PER LITER IN 3 L OF SEAWATER AT 30 DEGREES/00 AND RAISED FOR 16 DAYS AT 20 DEGREES, 25 DEGREES AND 30 DEGREES CELSIUS. FOOD ORGANISMS (BRANCHIONUS SP. OR ARTEMIA NAUPLII) WERE MAINTAINED AT 500, 1,000, 5,000 OR 10,000 FOOD ORGANISMS/L. THE INFLUENCE OF FOOD DENSITY ON GROWTH OF LARVAL M. PENINSULAE WAS TEMPERATURE DEPENDENT. AT 20 DEGREES CELSIUS THERE WAS NO DIFFERENCE IN FINAL SIZE OF FISH BASED ON FOOD DENSITIES. AT 25 DEGREES CELSIUS, THERE WAS AN INCREASE IN FINAL BODY SIZE AS FOOD DENSITY INCREASED FROM 500 TO 5,000/L. AT 30 DEGREES CELSIUS, THERE WAS AN INCREASE IN FINAL SIZE AS FOOD DENSITY INCREASED FROM 1,000 TO 5,000/L. THERE WERE NO SIGNIFICANT DIFFERENCES IN SURVIVAL BETWEEN FOOD DENSITIES IN TESTS AT 20 DEGREES, 25 DEGREES, OR 30 DEGREES CELSIUS. HOWEVER, FOR ANY GIVEN TEMPERATURE AND FOOD DENSITY, DIFFERENTIAL SURVIVAL PATTERNS WERE SIGNIFICANT IN EXPLAINING VARIANCE IN FINAL SIZE BETWEEN REPLICATES. OPTIMAL CULTURE CONDITIONS FOR LARVAL M. PENINSULAE WERE DETERMINED TO BE 5,000 FOOD ORGANISMS/L AT 25 DEGREES CELSIUS.

MEYER, S.A., K. ANDERSON, R.E. BROWN, M.T. SMITH, D. YARROW, G. MITCHELL, AND D.G. AHEARN. 1975. PHYSIOLOGICAL AND DNA CHARACTERIZATION OF CANDIDA MALTOSE, A HYDROCARBON-UTILIZING YEAST. ARCH. MICROBIOL. 104(3):225-231. (ERL,GB X103).

SELECTED YEASTS CLASSIFIED AS CANDIDA SAKE VAN UDEN ET BUCKLEY, WERE EXAMINED FOR THEIR PHYSIOLOGICAL, MORPHOLOGICAL AND IMMUNOLOGICAL PROPERTIES AND THEIR DNA RELATEDNESS. CANDIDA MALTOSE KOMAGATA, NAKASE ET KATSUYA IS HEREIN RECOGNIZED AS A SPECIES SEPARATE FROM C. SAKE. CANDIDA MALTOSE WAS DISTINGUISHED FROM C. SAKE AND FROM C. TROPICALIS BY INSIGNIFICANT DNA REASSOCIATION. IN ADDITION, C. MALTOSE WAS DISTINGUISHED FROM C. SAKE BY ITS HIGHER MAXIMAL GROWTH TEMPERATURE AND LOWER GUANINE PLUS CYTOSINE CONTENT OF ITS DNA AND FROM C. TROPICALIS BY ITS FAILURE TO UTILIZE SOLUBLE STARCH FOR GROWTH AND ITS RESISTANCE TO CYCLOHEXIMIDE. THE SPECIES C. CLOACAE AND C. SUBTROPICALIS ARE PLACED IN SYNONYMY WITH C. MALTOSE.

MEYERS, S.P., P.P. GAMBRELL, AND J.W. DAY. 1982. DETERMINATION OF THE ENVIRONMENTAL IMPACT OF SEVERAL SUBSTITUTE CHEMICALS IN AGRICULTURALLY AFFECTED WETLANDS. EPA-600/4-82-052, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 136P.

THIS RESEARCH PROGRAM WAS DEVELOPED WITH THE OVERALL OBJECTIVE OF EXAMINING TOXIC SUBSTANCES, ESPECIALLY ORGANOPHOSPHORUS COMPOUNDS, IN WETLAND REGIONS AND ASCERTAINING FATE AND EFFECT IN SITU AND IN CONTROLLED LABORATORY MICROCOSM SYSTEMS. MAJOR ATTENTION HAS BEEN GIVEN TO AZINPHOSMETHYL (GUTHION), INCLUDING EFFECT OF ABIOTIC AND BIOTIC FACTORS ON COMPOUND STABILITY AND BEHAVIOR UNDER DIVERSE PH AND OXIDATION-REDUCTION CONDITIONS AS AFFECTED BY THE MICROBIAL BIOMASS. PROCEDURES HAVE BEEN DEVELOPED FOR PROCESSING OF ANAEROBIC WETLAND SEDIMENTS FOR PESTICIDE RECOVERY ALONG WITH FORMULATION OF SIMULATION MODELS OF ANAEROBIC/AEROBIC SOIL AND SEDIMENT ENVIRONMENTS TO STUDY PESTICIDE DEGRADATION. REDOX CONDITIONS OF SOILS AND SEDIMENT-WATER SYSTEMS HAVE A SIGNIFICANT EFFECT ON IN SITU PERSISTENCE OF SYNTHETIC ORGANIC PESTICIDES. ANALYSES INDICATE THAT CHEMICAL AND MICROBIOLOGICAL CHARACTERISTIC OF WETLAND SEDIMENTS HAVE EQUALLY IMPORTANT CONSEQUENCES ON MOBILITY AND DEGRADATION OF TOXIC COMPOUNDS. THE TOTAL INVERTEBRATE COMMUNITY AND LEAF LITTER DECOMPOSITION OF SELECTED BACKSWAMP REGIONS HAS BEEN EXAMINED AS AFFECTED BY GUTHION AND OTHER PESTICIDES. ASH-TUPELO LITTER DECOMPOSITION WAS NOT ADVERSELY AFFECTED BY GUTHION. DISSIMILAR RESPONSES OF THE COMPLEX INVERTEBRATE BIOTA AND ITS INDIVIDUAL TAXA TO GUTHION AND OTHER TOXIC SUBSTANCES DEMONSTRATES THE IMPORTANCE OF A TOTAL COMMUNITY ANALYSIS IN TERMS OF XENOBIOTIC IMPACT. SYSTEMS OF CONTINUOUS-FLOW AND STATIC MICROCOSM SYSTEMS HAVE BEEN DEVELOPED FOR QUANTITATIVE ANALYSES OF THE EFFECT OF SELECTED TOXIC SUBSTANCES, INCLUDING GUTHION, METHYL PARATHION, AND KEPONE. LABORATORY/FIELD PROTOCOL HAVE INCLUDED FORMULATIONS OF MICROBIAL/ENZYMATIC PROTOCOLS TO ANALYZE XENOBIOTIC EFFECT. A DATA ANALYSIS PROGRAM HAS BEEN DEVELOPED TO DEMONSTRATE SIGNIFICANT CORRELATIONS BETWEEN IN SITU OBSERVATIONS AND MICROCOSM-GENERATED INFORMATION. DECOMPOSITION OF ECOLOGICAL SIGNIFICANT SUBSTRATES, SUCH AS CHITIN, IS VARIOUSLY AFFECTED BY DIFFERENT TOXIC SUBSTANCES AS SHOWN IN MICROCOSM INVESTIGATIONS. ENZYMATIC TESTS, I.E., DEHYDROGENASE AND PHOSPHATASE, AND ATP MEASUREMENTS, ARE SENSITIVE INDICATORS OF BIOTRANSFORMATION PROCESSES. SIGNIFICANT CORRELATIONS ARE SEEN WITH MICROBIAL DIVERSITY INDICES AND SPECIFIC MICROBIAL GROUPS, SUCH AS FILAMENTOUS FUNGI. FACTORIAL ANALYSES OF PHYSIOCHEMICAL AND MICROBIAL PROCESSES AND XENOBIOTIC INTERACTION HAVE DEMONSTRATED THE APPLICATION OF THE MICROCOSM AS PROTOCOL OR "TOOL" TO SIMULATE PRISTINE AND IMPACTED IN SITU ECOSYSTEMS.

MEYERS, SAMUEL P., EDITOR. 1976. PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON MARINE POLLUTION RESEARCH. EPA-600/9-76-032, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 171P.

MIX, MICHAEL C., RANDY L. SCHAEFFER, AND SUSAN J. HEMINGWAY. 1981. POLYNUCLEAR AROMATIC HYDROCARBONS IN BIVALVE MOLLUSKS IN BAY MUSSELS (MYTILUS EDULIS) FROM OREGON. IN: PHYLETIC APPROACHES TO CANCER: PROCEEDINGS OF THE 11TH INTERNATIONAL SYMPOSIUM OF THE PRINCESS TAKAMATSU CANCER RESEARCH FUND, TOKYO, 1980. CLYDE J. DAWE, EDITOR, JAPAN SCI. SOC. PRESS, TOKYO. PP. 167-177. (ERL,GB X355).

TOTAL CONCENTRATIONS OF 15 UNSUBSTITUTED POLYNUCLEAR AROMATIC HYDROCARBONS (PNAH), INCLUDING PHENANTHRENE, FLUORANTHENE, PYRENE, BENZO(C)PHENANTHRENE, TRIPHENYLENE, BENZ(A)ANTHRACENE, BENZO(A)PYRENE (BP), DIBEN(A,H)ANTHRACENE, BENZO(G,H,I)PERYLENE, INDENO(1,2,3-C,D)PYRENE, AND CORONENE, WERE MEASURED MONTHLY IN MYTILUS EDULIS POPULATIONS FROM 2 SITES ON YAQUINA BAY, OREGON. PNAH CONCENTRATIONS FROM SITE Y1M RANGED FROM 141-401 UG/KG WHILE THOSE FROM SITE Y2M WERE HIGHER, 673-1,324 UG/KG. SEASONAL VARIATIONS WERE EVIDENT IN MUSSELS FROM Y2M BUT NOT Y1M; HIGHEST PNAH CONCENTRATIONS WERE PRESENT DURING JANUARY-MARCH.

MONTI, C., E. O'NEILL, D. AHEARN, P. PRITCHARD, AND A. BOURQUIN. 1983. MODELING THE MOVEMENT OF KEPONE ACROSS AN UNDISTURBED SEDIMENT-WATER INTERFACE IN LABORATORY SYSTEMS (ABSTRACT). PRESENTED AT THE SETAC MEETING, NOV. 6, 1983, WASHINGTON, DC. (ERL,GB 482).

THE PRESENCE OF SEDIMENTS IN AQUATIC ENVIRONMENTS HAS AN IMPORTANT EFFECT ON THE FATE OF MANY POLLUTING CHEMICALS. SIMPLE LABORATORY TEST SYSTEMS, SUCH AS SHAKE FLASKS, FREQUENTLY USED TO EXAMINE THE INTERACTION BETWEEN POLLUTANTS AND SEDIMENT. BECAUSE SHAKE FLASKS DO NOT INCORPORATE THE INHERENT COMPLEXITIES OF THE INTACT SEDIMENT-WATER INTERFACE, WE ALSO USED MICROCOSM SYSTEMS HAVING WATER OVERLYING SEDIMENT TO STUDY THE TRANSPORT OF TOXIC CHEMICALS. RADIOLABELED KEPONE WAS CHOSEN AS THE TEST COMPOUND BECAUSE OF ITS RESISTANCE TO DEGRADATION, LOW VOLATILITY AND EASE OF ANALYSIS. SHAKEN FLASKS CONTAINING FORMALIN STERILIZED SEDIMENT AND WATER WERE USED TO OBTAIN PARTITION VALUES FOR KEPONE. IN ADDITION, KEPONE WAS ADDED IN CONTINUOUSLY FLOWING SEAWATER TO FOUR IDENTICAL MICROCOSMS, EACH CONTAINING FORMALIN STERILIZED SEDIMENT AND WATER. EACH MICROCOSM RECEIVED KEPONE FOR DIFFERENT PERIODS OF TIME, RANGING FROM 100 TO 1200 HOURS. AT THE END OF EACH EXPOSURE PERIOD, THE MICROCOSM WAS DISASSEMBLED AND THE SEDIMENT WAS FRACTIONATED INTO LAYERS. THE SORBED KEPONE CONCENTRATION, ORGANIC CONTENT AND POROSITY WERE DETERMINED IN EACH LAYER. A MATHEMATICAL MODEL, UTILIZING A PARTITION COEFFICIENT DERIVED FROM THE FLASK STUDY, WAS USED TO SIMULATE KEPONE DISTRIBUTION OBSERVED IN THE MICROCOSMS. THE MODEL WAS CALIBRATED TO THE TOTAL SORBED KEPONE OF EACH MICROCOSM TO QUANTIFY THE TRANSPORT RATE OF KEPONE ACROSS THE SEDIMENT-WATER INTERFACE. SIMULATION OF THE MICROCOSM RESULTS COULD NOT BE OBTAINED USING A CONSTANT TRANSPORT RATE. SIMULATION WAS OBTAINED USING A CALCULATED TRANSPORT RATE WHICH DECREASED WITH EXPOSURE TIME. USING THIS DECREASING TRANSPORT RATE THE MODEL PREDICTED THE SORBED TOXICANT DISTRIBUTION WITH DEPTH. THE DECREASE IN TRANSPORT RATE COULD HAVE BEEN CAUSED BY SEDIMENT COMPACTION, HOWEVER, NO MEASURABLE CHANGES OCCURRED IN POROSITY. THE RESULTS SHOW THAT PARTITION COEFFICIENT AND TRANSPORT RATES WERE SUFFICIENT TO DESCRIBE THE DISTRIBUTION OF KEPONE IN THE MICROCOSM SEDIMENT. SHAKE FLASK TESTS ARE ADEQUATE TO QUANTIFY SOME FATE PROCESSES SUCH AS PARTITION COEFFICIENT BUT ARE NOT SUFFICIENT TO DESCRIBE POLLUTANT MOMENT AND DISTRIBUTION. THIS STUDY DEMONSTRATES THE IMPORTANCE OF MEASURING THE TRANSPORT ACROSS THE SEDIMENT-WATER INTERFACE IF THE POLLUTANT FATE IS TO BE ADEQUATELY MODELED.

MONTI, CAROL A., ELLEN J. O'NEILL, PARMELY H. PRITCHARD, AL W. BOURQUIN, AND DONALD G. AHEARN. IN PREP. MODELING THE MOVEMENT OF KEPONE (CHLORDECON) ACROSS AN UNDISTURBED SEDIMENT-WATER INTERFACE IN LABORATORY SYSTEMS. ENVIRON. SCI. TECHNOL. (ERL,GB 487).

LABORATORY TEST SYSTEMS, SUCH AS FLASKS AND MICROCOSMS, ARE FREQUENTLY USED TO EXAMINE THE INTERACTIONS BETWEEN POLLUTANTS AND SEDIMENT. WE STUDIED THE DISTRIBUTION OF RADIOLABELED KEPONE DISSOLVED IN CONTINUOUSLY FLOWING SEAWATER AND ADDED TO A SEDIMENT-WATER MICROCOSM. THE SEDIMENT WAS FRACTIONATED INTO LAYERS AND THE SORBED KEPONE CONCENTRATIONS WERE MEASURED TO DETERMINE TOXICANT PENETRATION INTO THE SEDIMENT. THE DATA WERE USED TO TEST WHETHER A MATHEMATICAL MODEL BASED ON INDEPENDENT FLASK STUDIES OF THE PROCESSES AFFECTING THE FATE OF KEPONE COULD ACCURATELY PREDICT THE DISTRIBUTION OF THE TOXICANT IN THE MICROCOSM SEDIMENT AND WATER. THE MODEL ACCURATELY DESCRIBED THE OBSERVED KEPONE DISTRIBUTION. MICROCOSMS, BY SIMULATING THE COMPLEXITY OF NATURAL ENVIRONMENTS, PROVIDED A USEFUL TOOL FOR EVALUATING THE ACCURACY OF MATHEMATICAL PREDICTIONS CONCERNING THE DISTRIBUTION OF A TOXICANT IN AQUATIC SYSTEMS.

MORRISON, S.J., AND D.C. WHITE. 1980. EFFECTS OF GRAZING BY ESTUARINE GAMMARIDEAN AMPHIPODS ON THE MICROBIOTA OF ALLOCHTHONOUS DETRITUS. APPL. ENVIRON. MICROBIOL. 40(3):659-671. (ERL,GB X187).

ESTUARINE GAMMARIDEAN AMPHIPODS GRAZING AT NATURAL POPULATION DENSITY ON DETRITAL MICROBIOTA AFFECTED THE MICROBIAL COMMUNITY COMPOSITION, BIOMASS, AND METABOLIC ACTIVITY WITHOUT AFFECTING THE PHYSICAL STRUCTURE OF THE LEAVES. TOTAL MICROBIAL BIOMASS ESTIMATED BY ADENOSINE TRIPHOSPHATE AND LIPID PHOSPHATE OR OBSERVED BY SCANNING ELECTRON MICROSCOPY WAS GREATER ON GRAZED THAN ON UNGRAZED DETRITUS. THE RATES OF OXYGEN CONSUMPTION, POLY-B-HYDROXYBUTYRATE SYNTHESIS, TOTAL LIPID BIOSYNTHESIS, AND RELEASE OF CO₂-14 FROM RADIOACTIVELY PRELABELED MICROBIOTA WERE HIGHER ON GRAZED THAN ON UNGRAZED LEAVES, INDICATING STIMULATION OF THE METABOLIC ACTIVITY OF GRAZED DETRITAL MICROBES. THIS WAS TRUE WITH RATES BASED EITHER ON THE DRY LEAF WEIGHT OR MICROBIAL BIOMASS. THERE WAS A FASTER INCREASE IN THE C-14-CYCLOLIPID THAN IN THE C-14-NEUTRAL LIPID OR C-14-PHOSPHOLIPID FRACTIONS. ANALYSIS OF SPECIFIC PHOSPHOLIPIDS SHOWED LOSSES OF THE METABOLICALLY STABLE EC-14GLYCEROLPHOSPHORYLGLYCEROL WITH AMPHIPOD GRAZING. THE BIOCHEMICAL DATA SUPPORTED SCANNING ELECTRON MICROSCOPY OBSERVATIONS OF A SHIFT AS THE GRAZING PROCEEDED FROM A BACTERIAL/FUNGAL COMMUNITY TO ONE DOMINATED BY BACTERIA.

MURRAY, E. DONALD, AND AL W. BOURQUIN, EDITORS. 1974. DEVELOPMENTS IN INDUSTRIAL MICROBIOLOGY, VOL. 15. SOCIETY FOR INDUSTRIAL MICROBIOLOGY, WASHINGTON, DC. 426P. (ERL,GB 244).

NICKELS, J.S., R.J. BOBBIE, R.F. MARTZ, G.A. SMITH, D.C. WHITE, AND N.L. RICHARDS. 1981. EFFECT OF SILICATE GRAIN SHAPE, STRUCTURE, AND LOCATION ON THE BIOMASS AND COMMUNITY STRUCTURE OF COLONIZING MARINE MICROBIOTA. APPL. ENVIRON. MICROBIOL. 41(5):1262-1268. (ERL,GB X190).

MICROBIOTA COLONIZING SILICA GRAINS OF THE SAME SIZE AND WATER PORE SPACE, BUT WITH A DIFFERENT MICROTOPOGRAPHY, SHOWED DIFFERENCES IN BIOMASS AND COMMUNITY STRUCTURE AFTER 8 WEEKS OF EXPOSURE TO RUNNING SEAWATER. THE ABSENCE OF SURFACE CRACKS AND CREVICES RESULTED IN A MARKED DIMINUTION OF THE TOTAL MICROBIAL BIOMASS MEASURED AS LIPID PHOSPHATE AND TOTAL EXTRACTABLE PALMITIC ACID. WITH INCREASING SMOOTHNESS OF THE SAND GRAIN SURFACE, EXAMINATION OF THE COMMUNITY STRUCTURE SHOWED A MARKED DECREASE IN PROCARYOTES AND ALGAL MICROEUCARYOTES, WITH A RELATIVE INCREASE IN MICROEUCARYOTIC GRAZERS. A COMPARISON OF THE COLONIZING SEDIMENT INCUBATED IN RUNNING SEAWATER OR AT 32 M ON THE SEA FLOOR WITH A SEDIMENT CORE SHOWED A DECREASED BACTERIAL BIOMASS WITH A DIFFERENT COMMUNITY STRUCTURE AND A DECREASED TOTAL MICROEUCARYOTIC POPULATION OF BOTH GRAZERS AND ALGAE. THE QUANTITATIVE DIFFERENCES IN MICROBIAL BIOMASS AND COMMUNITY STRUCTURE BETWEEN THE MICROCOSMS AND THE ACTUAL BENTHIC POPULATION IN THE CORE WERE DETERMINED.

O'CONNOR, DONALD J., AND JOHN P. CONNOLLY. 1980. EFFECT OF CONCENTRATION OF ADSORBING SOLIDS ON THE PARTITION COEFFICIENT. WATER RES. 14(10):1517-1523. (ERL,GB 396).

THE RESULTS OF A NUMBER OF LABORATORY STUDIES ARE PRESENTED TO DEMONSTRATE AN INVERSE RELATIONSHIP BETWEEN CONCENTRATION OF ADSORBING SOLIDS AND PARTITION COEFFICIENT. VARIOUS FUNCTIONAL FORMS WHICH DEFINE THE RELATION ARE DEVELOPED AND CORRELATED WITH THE DATA. A POWER-LAW DEPENDENCE OF PARTITION COEFFICIENT ON CONCENTRATION OF SOLIDS IS SHOWN. THE SIGNIFICANCE OF THIS RELATIONSHIP IN ASSESSING THE FATE OF HYDROPHOBIC POLLUTANTS IN NATURAL WATER SYSTEMS IS DISCUSSED.

O'NEIL, ELLEN J., CAROL A. MONTI, PARMELY H. PRITCHARD, AL W. BOURQUIN, AND DONALD G. AHEARN. IN PREP. EFFECTS OF LUGWORMS AND SEAGRASS ON KEPONE (CHLORDEKONE) DISTRIBUTION IN COMPLEX LABORATORY SYSTEMS. ENVIRON. SCI. TECHNOL. (ERL,GB 488).

LABORATORY SYSTEMS NEED TO INCORPORATE COMPLEX PROCESSES, SUCH AS BIOTURBATION AND PLANT SORPTION, TO PREDICT THE FATE OF A TOXICANT IN AN AQUATIC ENVIRONMENT. TWO EXPERIMENTS WERE DESIGNED TO STUDY THE INFLUENCE OF LUGWORMS (ARENICOLA CRISTATA) AND SEAGRASS (THALASSIA TESTUDINUM) ON KEPONE DISTRIBUTION IN SEDIMENT-WATER MICROCOSMS. RADIOLABELLED KEPONE WAS INTRODUCED INTO THESE CONTINUOUS-FLOW SYSTEMS, AND THE DISSOLVED AND SORBED CONCENTRATIONS WERE QUANTIFIED. LUGWORM ACTIVITY DECREASED THE KEPONE CONCENTRATION IN THE WATER AND INCREASED THE CONCENTRATION SORBED TO SEDIMENT. SEAGRASSES SLIGHTLY AFFECTED TOXICANT DISTRIBUTION BY DELAYING THE DISSOLVED CONCENTRATION EQUILIBRIUM. THE FATE OF KEPONE WAS INFLUENCED BY MORE COMPLEX PROCESSES THAN CAN BE CONSIDERED IN SIMPLE LABORATORY TESTS. SUCH PROCESSES MUST BE STUDIED IN MICROCOSMS TO ADEQUATELY PREDICT TOXICANT DISTRIBUTION IN NATURAL ECOSYSTEMS.

O'NEILL, E., C. MONTI, P. PRITCHARD, AND A. BOURQUIN. 1983. EFFECTS OF LUGWORMS AND SEAGRASS ON KEPONE DISTRIBUTION IN COMPLEX LABORATORY SYSTEMS (ABSTRACT). PRESENTED AT THE SETAC MEETING, NOV. 6, 1983, WASHINGTON, DC. (ERL,GB 484).

THE FATE OF MANY TOXIC CHEMICALS IN AQUATIC ENVIRONMENTS IS AFFECTED BY THEIR INTERACTION WITH SEDIMENT. TWO BIOTIC FACTORS WHICH COULD AFFECT THE DEGREE OF SEDIMENT INTERACTION ARE BIOTURBATING BENTHIC INVERTEBRATES AND THE PRESENCE OF VASCULAR AQUATIC PLANTS. THE EFFECTS OF THESE FACTORS ON FATE PROCESSES CAN BEST BE OBSERVED IN LABORATORY SYSTEMS WHICH SIMULATE THE COMPLEXITY OF NATURAL ENVIRONMENTS. EXPERIMENTS WERE CONDUCTED FOR THE PURPOSE OF STUDYING THE INFLUENCE OF LUGWORMS (*Arenicola cristata*) AND SEAGRASSES (*Thalassia testudinum*) ON POLLUTANT DISTRIBUTION IN ESTUARINE SEDIMENT-WATER SYSTEMS. KEPONE WAS CHOSEN AS THE TEST CHEMICAL BECAUSE ITS RESISTANCE TO DEGRADATION AND OF ITS TRANSPORT AND DISTRIBUTION. RADIOLABELED C(14) KEPONE WAS INTRODUCED CONTINUOUSLY INTO DUPLICATE GLASS VESSELS CONSISTING OF WATER OVERLYING A SEDIMENT BED CONTAINING LUGWORMS OR PLANTS. CHANGES IN THE DISSOLVED KEPONE CONCENTRATIONS WERE MONITORED DAILY FOR 16 DAYS. AT THE TERMINATION OF THE EXPERIMENTS, THE SEDIMENT WAS FRACTIONATED INTO LAYERS, AND RADIOACTIVITY ASSOCIATED WITH INTERSTITIAL WATER, SEDIMENT, LUGWORMS, AND SEAGRASSES (LEAVES, RHIZOMES, AND ROOTS) WAS MEASURED TO DETERMINE KEPONE DISTRIBUTION. LUGWORM ACTIVITY SIGNIFICANTLY DECREASED THE KEPONE CONCENTRATION IN THE WATER AND INCREASED THE CONCENTRATION AND DEPTH OF KEPONE IN SEDIMENT. KEPONE BIOACCUMULATION IN THE WORMS WAS A MINOR FACTOR IN THE FINAL DISTRIBUTION. PLANT LEAF SURFACES SORBED KEPONE, BUT ONLY SLIGHTLY AFFECTED OVERALL TOXICANT DISTRIBUTION IN THE SYSTEMS. OUR RESULTS SUGGEST THAT BIOTURBATION MAY BE AN IMPORTANT PROCESS AFFECTING THE FATE OF POLLUTANTS IN SEDIMENT-WATER SYSTEMS. FURTHER QUANTITATIVE STUDIES ON THE EFFECTS OF BIOTURBATION MUST BE UNDERTAKEN TO ADEQUATELY PREDICT TOXICANT DISTRIBUTION IN NATURAL ECOSYSTEMS.

PARKER, JEFFREY H., JANET S. NICKELS, ROBERT F. MARTZ, MICHAEL J. GEHRON, NORMAN L. RICHARDS, AND DAVID C. WHITE. IN PRESS. EFFECT OF OIL AND GAS WELL-DRILLING FLUIDS ON THE PHYSIOLOGICAL STATUS AND MICROBIAL INFECTION OF THE REEF BUILDING CORAL *MONTASTREA ANNULARIS*. ARCH. ENVIRON. CONTAM. TOXICOL. (ERL,GB X382).

THE REEF BUILDING CORAL *MONTASTREA ANNULARIS* WAS EXPOSED CONTINUOUSLY TO SUSPENSIONS OF OIL AND GAS-WELL DRILLING FLUIDS AT CONCENTRATIONS OF 0.1 ML LITER⁻¹, 0.01 ML LITER⁻¹, AND 0.0001 ML LITER⁻¹ IN FLOWING SEAWATER AT THE U.S. NAVAL STAGE I PLATFORM (30 DEGREES 7.5' N, 85 DEGREES 46.3' W). AFTER 6 WEEKS EXPOSURE, CORAL FRAGMENTS OF 12 TO 65 CM² SURFACE AREA WERE BROKEN OFF, RINSED IN SEAWATER, AND EXTRACTED IN A ONE-PHASE CHLOROFORM-METHANOL-BUFFER AND RETURNED TO THE LABORATORY. IN THE LABORATORY, THE EXTRACTION WAS COMPLETED AND THE PHASES SEPARATED. THE LIPIDS WERE FRACTIONATED USING SILICIC ACID AND THIN LAYER CHROMATOGRAPHY. TOTAL PHOSPHOLIPID, TRIGLYCERIDE GLYCEROL, TOTAL EXTRACTABLE FATTY ACIDS, TRIGLYCERIDE FATTY ACIDS AS WELL AS THE ESTER FATTY ALCOHOLS SHOWED NO CONSISTENT CHANGES WITH EXPOSURE TO THE DRILLING FLUIDS. CHANGES IN FREE AMINO ACID CONCENTRATIONS WERE EXTRACTED AS WELL AS SIGNIFICANT DECREASES IN THE RECOVERABLE DIACYL PHOSPHOLIPID. SIGNIFICANT INCREASES IN PLASMALOGEN PHOSPHOLIPIDS APPEARED WITH EXPOSURE. INCREASES IN PLASMALOGEN PHOSPHOLIPIDS ARE CONSISTENT WITH INFECTION BY ANAEROBIC FERMENTING BACTERIA WHICH CAN INDICATE DISEASE. THIS EVIDENCE SUGGESTS THAT BIOCHEMICAL INDICATORS OF INFECTION WITH ANAEROBIC BACTERIA MAY BE USEFUL AS SENSITIVE MARKERS FOR POLLUTION-INDUCED CHANGES IN REEF BUILDING CORALS AND THUS FOR MONITORING THE HEALTH OF CORAL REEFS.

PARKER, JEFFREY H., GLEN A. SMITH, HERBERT L. FREDRICKSON, J. ROBBIE VESTAL, AND DAVID C. WHITE. 1982. SENSITIVE ASSAY, BASED ON HYDROXY FATTY ACIDS FROM LIPOPOLYSACCHARIDE LIPID A, FOR GRAM-NEGATIVE BACTERIA IN SEDIMENTS. APPL. ENVIRON. MICROBIOL. 44(5):1170-1177. (ERL,GB X338).

BIOCHEMICAL MEASURES HAVE PROVIDED INSIGHT INTO THE BIOMASS AND COMMUNITY STRUCTURE OF SEDIMENTARY MICROBIOTA WITHOUT THE REQUIREMENT OF SELECTION BY GROWTH OR QUANTITATIVE REMOVAL FROM THE SEDIMENT GRAINS. THIS STUDY USED THE ASSAY OF THE HYDROXY FATTY ACIDS RELEASED FROM THE LIPID A OF THE LIPOPOLYSACCHARIDE IN SEDIMENTS TO PROVIDE AN ESTIMATE OF THE GRAM-NEGATIVE BACTERIA. THE METHOD WAS SENSITIVE TO PICOMOLAR AMOUNTS OF HYDROXY FATTY ACIDS. THE RECOVERY OF LIPOPOLYSACCHARIDE HYDROXY FATTY ACIDS FROM ORGANISMS ADDED TO SEDIMENTS WAS QUANTITATIVE. THE LIPIDS WERE EXTRACTED FROM THE SEDIMENTS WITH A SINGLE-PHASE CHLOROFORM-METHANOL EXTRACTION. THE LIPID-EXTRACTED RESIDUE WAS HYDROLYZED IN 1 N HCL, AND THE HYDROXY FATTY ACIDS OF THE LIPOPOLYSACCHARIDE WERE RECOVERED IN ABOUT FIVEFOLD MORE SENSITIVE THAN THE CLASSICAL PHENOL-WATER OF TRICHLOROACETIC ACID METHODS WHEN APPLIED TO MARINE SEDIMENTS. BY EXAMINATION OF THE PATTERNS OF HYDROXY FATTY ACIDS, IT WAS ALSO POSSIBLE TO HELP DEFINE THE COMMUNITY STRUCTURE OF THE SEDIMENTARY GRAM-NEGATIVE BACTERIA.

PORTIER, R.J., AND S.P. MEYERS. IN PRESS. USE OF MICROCOSMS FOR ANALYSES OF STRESS-RELATED FACTORS IN ESTUARINE ECOSYSTEMS. PRESENTED AT THE INTERNATIONAL WETLANDS CONFERENCE, SEPTEMBER, 1980, NEW DELHI, INDIA. (ERL,GB X247).

FATE AND TRANSPORT OF PESTICIDES AND THEIR RESIDUES, AS WELL AS A VARIETY OF OTHER TOXIC SUBSTANCES, IS OF CRITICAL IMPORTANCE IN SOILS AND SEDIMENT/WATER SYSTEMS. A MAJOR PROBLEM IN DEALING WITH SEDIMENTARY MATERIALS IS THE DIFFICULTY OF OBTAINING REPRODUCIBLE INFORMATION FOR MONITORING OF KEY STRESS INDICES IN ESTUARINE ECOSYSTEMS. MICROCOSMS PROVIDE A CORRELATED INTERPRETATIVE APPROACH TO FIELD STUDIES IN AQUATIC ENVIRONMENTS, CONTRIBUTING DATA ON FATE AND TRANSPORT OF SHORT-LIVED COMPOUNDS OF BIOLOGICAL SIGNIFICANCE. THE MICROCOSM APPROACH IS DESIGNED TO STIMULATE A SPECIFIC TARGET ENVIRONMENT IN THE LABORATORY, WHEREIN CRITICAL PARAMETERS CAN BE CONTROLLED OR MONITORED IN CONJUNCTION WITH INTRODUCTION OF A VARIETY OF CHEMICAL AND PHYSICAL STRESS-RELATED FACTORS. A REGULATED CONTINUOUS FLOW-THROUGH MICROCOSM SYSTEM HAS BEEN DEVELOPED TO DISCERN SUBSTRATE RATES EFFECTS AND STRESS INDICES BASED ON MICROBIAL RESPONSE AND COMPOUND TURNOVER. FEATURES OF THE MICROCOSM ALLOW FOR VARIABILITY IN FLOW RATE, TEMPERATURE, AND PH, MAINTENANCE OF SOIL/WATER INTERFACE ANALOGOUS TO CONDITIONS IN A NATURAL ENVIRONMENT, AND INPUT AND OUTFLOW OF A VARIETY OF LIQUID SUBSTRATES. EVALUATIONS OF THESE SYSTEMS HAVE INCLUDED TIME/ACTIVITY ANALYSES AND DATA VALIDITY DETERMINATIONS.

PORTIER, R.J., AND S.P. MEYERS. 1981. CHITIN TRANSFORMATION AND PESTICIDE INTERACTIONS IN A SIMULATED AQUATIC MICROENVIRONMENTAL SYSTEM. IN: DEVELOPMENTS IN INDUSTRIAL MICROBIOLOGY, VOL. 22. SOCIETY FOR INDUSTRIAL MICROBIOLOGY, ARLINGTON, VA. PP. 543-555. (ERL,GB X224).

INTERACTIONS BETWEEN THE STRUCTURAL AMINO-POLYSACCHARIDE, CHITIN, AND THE ORGANOPHOSPHATE PESTICIDE, AZINPHOSMETHYL (GUTHION), HAVE BEEN STUDIED IN A CONTROLLED CONTINUOUS FLOW-THROUGH MICROCOSM. PESTICIDE-INDUCED MICROBIAL POPULATION CHANGES AND INCREASES IN SUBSTRATE UTILIZATION OF CHITIN ARE NOTED. SIGNIFICANT INCREASES IN TOTAL HETEROTROPHS AND CHITINOLYSTS OCCURRED RELATIVE TO CONTINUOUS APPLICATION OF AZINPHOSMETHYL. RAPID UPTAKE AND UTILIZATION OF CHITIN AND ITS DERIVATIVES, ENHANCED BY CONTROLLED AZINPHOSMETHYL ADDITIONS, WERE EXAMINED USING A TAGGED CHITIN BREAKDOWN PRODUCT, N-(GLUCOSAMINE-1-¹⁴C)-ACETYL-D-GLUCOSAMINE. RATES OF UTILIZATION COINCIDED WITH RAPID ¹⁴CO₂ RELEASE, ASSIMILATION OF ¹⁴C BY MICROBIAL AND ENZYMATIC CRITERIA, INDICATE THE APPLICATION OF THE BENCHTOP MICROCOSM IN ANALYSES OF COMPOUND IMPACT AND SUBSTRATE TURNOVER.

PORTIER, R.J., AND S.P. MEYERS. 1982. MONITORING BIOTRANSFORMATION AND BIODEGRADATION OF XENOBIOTICS IN SIMULATED AQUATIC MICROENVIRONMENTAL SYSTEMS. IN: DEVELOPMENTS IN INDUSTRIAL MICROBIOLOGY, VOL. 23. SOCIETY FOR INDUSTRIAL MICROBIOLOGY, WASHINGTON, DC. PP. 459-475. (ERL,GB X432).

MICROBIOLOGICAL STUDIES COUPLED WITH PHYSIOCHEMICAL ANALYSIS OF ENVIRONMENTALLY SIGNIFICANT XENOBIOTICS WERE CONDUCTED IN CONTINUOUS FLOW-THROUGH AND CARBON METABOLISM MICROCOSMS TO DETERMINE THE BEHAVIOR OF THESE TOXIC SUBSTANCES IN SOIL AND SEDIMENT-WATER SYSTEMS TYPICAL OF COASTAL WETLANDS. THE ORGANOPHOSPHATE, C-14-METHYL PARATHION, AND THE CHLORINATED INSECTICIDE, C-14-KEPONE, WERE EXAMINED FOR STRESS INDEXES BASED ON MICROBIAL RESPONSE AND COMPOUND TURNOVER. SIGNIFICANT INCREASES IN MICROBIAL POPULATIONS, ATP, AND SPECIFIC ENZYME SYSTEMS (I.E., PHOSPHATASE AND DEHYDROGENASE), COINCIDING WITH RAPID CO₂ EXPIRATION AND C-14-ASSIMILATION BY THE CELLULAR COMPONENT, POINTED TO BOTH RAPID BIOTRANSFORMATION AND BIODEGRADATION OF METHYL PARATHION. MINIMAL RATES OF CO₂ RELEASE WERE NOTED FOR KEPONE, WITH NO SIGNIFICANT VARIATION SEEN IN TOTAL MICROBIAL RESPONSE OR ATP LEVELS. HOWEVER, C-14-ASSIMILATION OF KEPONE WAS DETECTED. DEGRADATION RATES FOR METHYL PARATHION WERE COMPARABLE TO IN SITU RATES AT EXPERIMENTAL PLOTS. FUNGAL BIOTRANSFORMATION IS SUGGESTED AS IMPORTANT IN METHYL PARATHION DEGRADATION, WITH A NEGATIVE RESPONSE FOR KEPONE. SIMILAR ACTIVITY WAS DISCERNED FOR BOTH COMPOUNDS IN AXENIC FLASK STUDIES. STATISTICALLY VALID CORRELATIONS ARE EVIDENT BETWEEN MICROCOSM AND FIELD DATA.

PRIMER, J., R. BARTHA, AND A.W. BOURQUIN. 1979. DISCUSSION: CONCEPTS AND TRENDS (AQUATIC MICROBIAL ECOLOGY). IN: AQUATIC MICROBIAL ECOLOGY. R.R. COLWELL AND JOAN FOSTER, EDITORS, UNIV. OF MARYLAND, COLLEGE PARK, MD. PP. 406-433. (ERL,GB X302).

PRITCHARD, P., J. CONNOLLY, E. CLEVELAND, AND A. BOURQUIN. 1980. MODELING OF FATE OF PESTICIDES IN ESTUARINE SEDIMENT-WATER MICROCOSMS (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY OF MICROBIOLOGY--1980. AMERICAN SOCIETY OF MICROBIOLOGY, WASHINGTON, DC. PP. 202. (ERL,GB X173).

PRITCHARD, P., J. CONNOLLY, T. MAZIARZ, E. CLEVELAND, R. CRIPE, AND A.W. BOURQUIN. IN PREP. APPLICATION OF MICROCOSM STUDIES TO VERIFY CHEMICAL FATE ASSESSMENTS: COMPARISONS OF THE FATE OF METHYL PARATHION IN SEDIMENT-WATER SYSTEMS. WATER RES. (ERL,GB 453).

THIS PAPER REPORTS ON THE FATE OF AN ORGANOPHOSPHATE PESTICIDE, METHYL PARATHION, IN A SALT MARSH MICROCOSM AS A REPRESENTATION OF THE "STATE-OF-THE-WHOLE" AND ATTEMPTS TO DEMONSTRATE THE EFFICACY OF DATA FROM SIMPLE LABORATORY TESTS, USING A MATHEMATICAL MODEL TO DESCRIBE THIS FATE. TESTING THE ADEQUACY OF THIS DESCRIPTION WILL REPRESENT AN INITIAL EXERCISE IN DETERMINING IF A SYSTEM-CENTERED APPROACH TO EXPOSURE ASSESSMENT IS REALLY NECESSARY.

PRITCHARD, P.H. 1981. MODEL ECOSYSTEMS. IN: ENVIRONMENTAL RISK ANALYSIS OF CHEMICALS. RICHARD A. CONWAY, EDITOR, VAN NOSTRAND REINHOLD CO., NEW YORK, NY. PP. 257-353. (ERL,GB 424).

MICROCOSMS OR MODEL ECOSYSTEMS ARE DISCUSSED FOR THEIR POTENTIAL IN STUDYING ECOSYSTEM STRUCTURE AND FUNCTION IN LABORATORY SYSTEMS AND FOR THEIR APPLICATION TO CHEMICAL RISK ASSESSMENT. THE MICROCOSM APPROACH IS REVIEWED AND SEVERAL OPERATIONAL CRITERIA ARE SUGGESTED AS MEANS OF NARROWING THE SCOPE OF THE APPROACH. EXAMPLES AND INFORMATION ON COMPONENT ANALYSIS, SYSTEM DESIGN AND FIELD VALIDATION OF MICROCOSMS ARE PROVIDED TO EMPHASIZE THE ADVANTAGES AND DISADVANTAGES OF CERTAIN MODEL ECOSYSTEM STUDIES. THE ROLE OF MICROCOSM STUDIES IN PERFORMING EFFECTS ASSESSMENT AND EXPOSURE CONCENTRATION ESTIMATIONS IS ALSO EXPLORED WITH AN EFFORT TO DISTINGUISH THOSE LABORATORY SYSTEMS WHICH GENERATE INFORMATION FOR THE PURPOSES OF SCREENING CHEMICALS AS OPPOSED TO DIRECT EXTRAPOLATION TO NATURAL ENVIRONMENTAL SITUATIONS.

PRITCHARD, P.H., AND A.W. SCURQUIN. IN PRESS. MICROBIAL TOXICITY STUDIES, CHAPTER 8. IN: CONCEPTS IN AQUATIC TOXICOLOGY. PERGAMON PRESS, INC., ELMSFORD, NY. (ERL,GB 471).

THIS CHAPTER CITES EXAMPLES OF THE COMMON METHODS USED TO DETERMINE THE TOXICITY OF CHEMICALS TO BACTERIA. IT COVERS ONLY THE MOST COMMON METHODS, PARTICULARLY THOSE THAT ARE EASY TO PERFORM. NUMEROUS LITERATURE CITATIONS HAVE BEEN INCLUDED TO HELP ILLUSTRATE HOW A METHOD IS USED AND WHERE ITS ADVANTAGES AND DISADVANTAGES LIE. THE INFORMATION PRESENTED HERE IS NOT A COMPLETE SURVEY, BUT RATHER AN AID TO UNDERSTANDING OF CURRENT METHODS USED IN THE FIELD OF MICROBIAL TOXICOLOGY. TOXICITY OF CHEMICALS TO BACTERIA IS DISCUSSED RELATIVE TO THE ORGANISMS GROWTH AND METABOLISM. EXAMPLES ARE GIVEN OF METHODS INVOLVING HETEROTROPHIC ACTIVITY, GEOCHEMICAL CYCLING, AND DECOMPOSITION PROCESSES. IN ADDITION, APPLICATION OF TOXICITY STUDIES TO UNIQUE BACTERIAL PROCESSES AND HABITATS ARE DISCUSSED.

PRITCHARD, P.H., AND A.W. SCURQUIN. IN PREP. PERSPECTIVE ON THE ROLE OF MICROCOSMS IN ENVIRONMENTAL FATE AND EFFECTS ASSESSMENTS. IN: PROCEEDINGS OF CONFERENCE ON MEANINGFUL MEASURES OF MARINE POLLUTION EFFECTS, APRIL 26-29, 1982, PENSACOLA BEACH, FL. U.S. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION. (ERL,GB 468).

THIS PAPER ATTEMPTS TO ILLUSTRATE HOW MICROCOSM STUDIES INTERFACE WITH BOTH WASTE ASSIMILATIVE CAPACITY DETERMINATIONS (REGARDLESS OF THE APPROACH TAKEN OR ENDPOINTS SELECTED) AND OTHER LESS QUANTITATIVE TYPES OF ASSESSMENTS.

PRITCHARD, P.H., AND A.W. BOURQUIN. 1981. ESTIMATING EXPOSURE CONCENTRATIONS USING SEDIMENT-WATER MICROCOSMS (ABSTRACT). (ERL,GB 390).

UNDER THE PREMISE THAT LABORATORY MICROCOSMS ARE EXPERIMENTAL TOOLS FOR EXTRAPOLATING LABORATORY DATA TO ACTUAL FIELD SITUATIONS, IT IS GENERALLY ASSUMED THAT IF NATURAL ENVIRONMENTAL COMPONENTS ARE USED, FATE INFORMATION FROM A MICROCOSM STUDY WILL REPRESENT THE INTEGRATED RESULT OF AN ARRAY OF NATURAL FATE PROCESSES AND THEIR RATES. TO TEST THIS ASSUMPTION, MODELING AND PROCESS ANALYSIS WERE CARRIED OUT IN CONJUNCTION WITH ESTUARINE SEDIMENT-WATER MICROCOSM STUDIES. GLASS MICROCOSM CHAMBERS CONTAINING 550 MLS OF SEAWATER AND 200 GM OF MARSH SEDIMENT WERE KEPT UNDER CONSTANT TEMPERATURE (25 DEGREES) AND A 12-HOUR LIGHT-DARK CYCLE. FRESH SEAWATER AND 20 PPB 14C METHYL PARATHION WERE CONTINUOUSLY FED INTO THE SYSTEMS AND THE DISTRIBUTION OF RADIOACTIVITY MONITORED WITH TIME. SEPARATE EXPERIMENTS USING STIR FLASK TEST SYSTEMS WERE CARRIED OUT TO ANALYZE KINETICALLY INDIVIDUAL FATE PROCESSES SUCH AS ADSORPTION CHARACTERISTICS, SEDIMENT BINDING RATES AND BIODEGRADATION RATES. STERILE MICROCOSM CONTROLS PROVIDED DIFFUSION RATES INTO SEDIMENT. A MATHEMATICAL MODEL DEVELOPED TO INTEGRATE THE RATE COEFFICIENTS FOR THESE FATE PROCESSES PRODUCED CURVES WHICH GENERALLY FIT THE EXPERIMENTAL DATA GENERATED FROM THE MICROCOSM STUDY. FURTHER ELABORATION OF THIS APPROACH SHOULD PROVIDE EXAMPLES OF HOW WELL INDIVIDUALLY DETERMINED FATE PROCESSES CAN BE INTEGRATED QUANTITATIVELY TO PREDICT RESULTS IN COMPLEX SYSTEMS LIKE MICROCOSMS AND NATURAL SYSTEMS.

PRITCHARD, P.H., AND A.W. BOURQUIN. 1984. USE OF MICROCOSMS FOR EVALUATION OF INTERACTIONS BETWEEN POLLUTANTS AND MICROORGANISMS. IN: ADVANCES IN MICROBIAL ECOLOGY, VOLUME 7. C. C. MARSHALL, EDITOR, PLENUM PRESS, NEW YORK, NY. PP. 133-215. (ERL,GB 477).

MICROCOSMS OR MODERN ECOSYSTEM STUDIES ARE DESCRIBED AND EVALUATED AS TOOLS TO ASSESS THE RESPONSE OF A MICROBIAL COMMUNITY TO A POLLUTANT RELEASED IN THE ENVIRONMENT. PRECAUTIONS AND POTENTIALS ARE DISCUSSED REGARDING THE POTENTIAL ROLE OF MICROCOSMS IN RISK ASSESSMENT OF ENVIRONMENTAL HAZARDS, AND THEIR CAPABILITY TO PREDICT THE FATE AND EFFECTS OF ORGANIC COMPOUNDS IN AQUATIC ENVIRONMENTS.

PRITCHARD, P.H., A.W. BOURQUIN, H.L. FREDERICKSON, AND T. MAZIARZ. 1979. SYSTEM DESIGN FACTORS AFFECTING ENVIRONMENTAL FATE STUDIES IN MICROCOSMS. IN: WORKSHOP: MICROBIAL DEGRADATION OF POLLUTANTS IN MARINE ENVIRONMENTS. EPA-600/9-79-012, A.W. BOURQUIN AND P.H. PRITCHARD, EDITORS, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. PP. 251-272. (ERL,G3 X114).

TWO MICROCOSMS USED IN ENVIRONMENTAL FATE STUDIES ARE DESCRIBED. ONE IS A STATIC SYSTEM WHICH UTILIZES A SEDIMENT/WATER CORE AND THE OTHER IS A CONTINUOUS-FLOW SYSTEM USING A STRUCTURED SEDIMENT/WATER GROWTH VESSEL WITH CONTINUOUS ADDITION OF SEAWATER. THE EFFECTS OF DESIGN CHARACTERISTICS OF BOTH SYSTEMS ON THE FATE OF METHYL PARATHION (MPS) WAS STUDIED. SEDIMENT/WATER CORES TAKEN DIRECTLY FROM THE ENVIRONMENT WERE GENERALLY SLOWER TO DEGRADE MPS THAN CORES "STRUCTURED" WITH SEDIMENT AND WATER IN THE LABORATORY. DEGRADATION RATES WERE SLOWER WHEN SEDIMENT TO WATER RATIOS WERE INCREASED (WATER DECREASED) IN EITHER TYPE CORE. LABORATORY-AGED CORES WERE LESS REACTIVE THAN "FRESH" CORES WHEN $^{14}\text{CO}_2$ AND DEGRADATION PRODUCTS OF C_{14} -MPS WAS MEASURED. CONTINUOUS-FLOW MICROCOSMS WHICH WERE ACCLIMATED TO METHYL PARATHION OVER A 50-DAY PERIOD WERE MORE ACTIVE IN REMOVAL FROM THE WATER COLUMN AND METABOLISM OF MPS THAN AGED SYSTEMS NOT EXPOSED TO MPS FOR THE PRECEDING 25 DAYS. TOTAL RADIOACTIVITY MEASUREMENTS IN THE WATER OF CONTINUOUS-FLOW SYSTEMS SHOWED A GREATER REMOVAL FROM ACTIVE SYSTEMS THAN STERILE ONES. THIS IS ATTRIBUTED PRIMARILY TO SORPTION TO SEDIMENTS. PRODUCT ANALYSIS SHOWED REMOVAL OF MPS WITH PRODUCTION OF AMINOMETHYL PARATHION AND $^{14}\text{CO}_2$, WHEREAS THE ONLY PRODUCT IN THE CONTROL SYSTEM WAS P-NITRO PHENOL. THIS PAPER SUPPORTS THE CONTENTION THAT DESIGN FEATURES WILL PARTLY DETERMINE THE OUTCOME OF A FATE EXPERIMENT. INTACT SEDIMENTS, AGED SYSTEMS, ACCLIMATED SYSTEMS AND SIZE OF THE MICROCOSM WERE SHOWN HERE TO AFFECT THE DATA FROM TWO DIFFERENT MICROCOSMS.

PRITCHARD, P.H., A.W. BOURQUIN, AND T. MAZIARZ. 1978. DEGRADATION OF METHYL PARATHION IN A FLOW-THROUGH AQUATIC MODEL ECOSYSTEM (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY 1978. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 195. (ERL,G8 X228).

PRITCHARD, P.H., AND A.W. BOURQUIN. 1977. DEGRADATION OF METHYL PARATHION IN SEAWATER USING CONTINUOUS CULTURE (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY OF MICROBIOLOGY 1977. AMERICAN SOCIETY OF MICROBIOLOGY, WASHINGTON, DC. PP. 273. (ERL,G8 317).

PRITCHARD, P.H., J.P. CONNOLLY, M.E. CLEVELAND, T. MAZIARZ, AND A.W. BOURQUIN. 1980. MODELING THE FATE OF PESTICIDES IN ESTUARINE SEDIMENT-WATER MICROCOSMS (SPEECH). PRESENTED AT THE MEETING OF THE SOCIETY FOR ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY, NOV. 23-24, 1980, WASHINGTON, DC. (ERL,GB 423).

UNDER THE PREMISE THAT LABORATORY MICROCOSMS ARE EXPERIMENTAL TOOLS FOR EXTRA-POLATING LABORATORY DATA TO ACTUAL FIELD SITUATIONS, IT IS GENERALLY ASSUMED THAT IF NATURAL ENVIRONMENTAL COMPONENTS ARE USED, FATE INFORMATION FROM A MICROCOSM STUDY WILL REPRESENT THE INTEGRATED RESULT OF AN ARRAY OF NATURAL FATE PROCESSES AND THEIR RATES. TO TEST THIS ASSUMPTION, MODELING AND PROCESS ANALYSIS WERE CARRIED OUT IN CONJUNCTION WITH ESTUARINE SEDIMENT-WATER MICROCOSM STUDIES. GLASS MICROCOSM CHAMBERS CONTAINING 550 MLS OF SEAWATER AND 200 GM OF MARSH SEDIMENT, WERE KEPT UNDER CONSTANT TEMPERATURE (25 DEGREES) AND A 12 HOUR LIGHT-DARK CYCLE. FRESH SEAWATER AND 20 PPB 14C METHYL PARATHION WERE CONTINUOUSLY FED INTO THE SYSTEMS AND THE DISTRIBUTION OF RADIOACTIVITY MONITORED WITH TIME. SEPARATE EXPERIMENTS USING STIR FLASK TEST SYSTEMS WERE CARRIED OUT TO KINETICALLY ANALYZE INDIVIDUAL FATE PROCESSES SUCH AS SORPTION CHARACTERISTICS, SEDIMENT BINDING RATES AND BIODEGRADATION RATES. STERILE MICROCOSM CONTROLS PROVIDED DIFFUSION RATES INTO SEDIMENT. A MATHEMATICAL MODEL DEVELOPED TO INTEGRATE THE RATE COEFFICIENTS FOR THESE FATE PROCESSES PRODUCED CURVES WHICH GENERALLY FIT THE APPROACH SHOULD PROVIDE EXMPLES OF HOW WELL INDIVIDUALLY DETERMINED FATE PROCESSES CAN BE QUANTITATIVELY INTEGRATED TOGETHER TO PREDICT RESULTS IN COMPLEX SYSTEMS LIKE MICROCOSMS AND NATURAL SYSTEMS.

PRITCHARD, P.H., J.P. CONNOLLY, M.E. CLEVELAND, T. MAZIARZ, AND A.W. BOURQUIN. 1981. APPLICATION OF MICROCOSM STUDIES TO VERIFY CHEMICAL FATE ASSESSMENTS BASED ON INDIVIDUAL PROCESS ANALYSIS (SPEECH). (ERL,GB 082).

THE FATE OF ORGANIC CHEMICALS IN AQUATIC ENVIRONMENTS IS THOUGHT TO BE CONTROLLED BY INTEGRATED EFFECTS OF VARIOUS FATE PROCESSES. IT IS ASSUMED THAT KINETIC INFORMATION ABOUT EACH INDIVIDUAL PROCESS, INCLUDING EFFECTS OF ENVIRONMENTAL VARIABLES, CAN BE AGGREGATED TOGETHER TO PREDICT CONCENTRATIONS OF THE CHEMICAL IN THE ENVIRONMENT. WE FEEL LABORATORY MICROCOSMS OR MODEL ECOSYSTEMS PROVIDE AN EXPERIMENTAL TOOL TO TEST THIS ASSUMPTION. CONSEQUENTLY, AN ALL-GLASS MICROCOSM SYSTEM WAS DEVELOPED TO MODEL PART OF A SALTMARSH ECOSYSTEM. IT WAS FILLED WITH 200 GM OF SEDIMENT AND 500 MLS OF WATER TAKEN DIRECTLY FROM RANGE POINT SALT MARSH. FRESH SEAWATER AND A 20 MG/L SOLUTION OF 14C METHYL PARATHION (MP) WERE CONTINUOUSLY PUMPED INTO THE MICROCOSM AT 14 MLS/HR. SPATIAL AND TEMPORAL DISTRIBUTION OF TOTAL RADIOACTIVITY, MP, ITS DEGRADATION PRODUCT P-NITROPHENOL, AND CO₂ WERE MONITORED IN STERILE AND ACTIVE SYSTEMS. THIS INFORMATION PROVIDED AN OVERALL ASSESSMENT OF THE FATE OF THIS PESTICIDE UNDER NATURAL COMPLEX CONDITIONS. INDIVIDUAL RATE CONSTANTS FOR HYDROLYSIS, BIODEGRADATION, BINDING, ADSORPTION AND DESORPTION WERE DETERMINED SEPARATELY IN SHAKE FLASKS CONTAINING WATER AND WATER/SEDIMENT SLURRIES FROM RANGE POINT. ALL RATES WERE FIRST ORDER AND BINDING OF MP TO SEDIMENT WAS THE FASTEST. THE AGGREGATION OF THESE RATE CONSTANTS WITH THE SYSTEM HYDRAULICS, USING A SIMPLE DETERMINISTIC MATHEMATICAL MODEL, PRODUCED A DESCRIPTION OF THE FATE OF METHYL PARATHION WHICH AGREED WITH RESULTS IN THE MICROCOSM. FURTHER ELABORATION OF THIS APPROACH SHOULD PROVIDE EXAMPLE OF HOW WELL INDIVIDUALLY DETERMINED FATE PROCESS CAN BE QUANTITATIVELY INTEGRATED TOGETHER TO PREDICT RESULTS IN COMPLEX SYSTEMS LIKE MICROCOSMS AND NATURAL SYSTEMS.

PRITCHARD, P.H., AND C.R. CRIPE. IN PREP. MICROCOSM SYSTEM TO MODEL THE FATE AND EFFECTS OF P-CRESOL AND OTHER POLLUTANTS IN LOTIC STREAM ECOSYSTEMS. LIMNOL. OCEANOGR. (ERL,GB 469).

A TANK-TYPE MICROCOSM WAS DESIGNED TO SIMULATE THE RIFFLE AND POOL AREAS OF A LOTIC ECOSYSTEM. CONDITIONS OF NATURAL TURBULENCE AND PHYSICAL INTEGRITY WERE PRESERVED. WATER COLUMN MIXING WAS OPTIMIZED. INTACT SECTIONS OF THE STREAM INCLUDING ASSOCIATED PERIPHYTON, MACROPHYTES AND INVERTEBRATES WERE TRANSPORTED TO MICROCOSMS USING TRAYS. CALIBRATION OF THE MICROCOSM'S BEHAVIOR WITH THE FIELD IS DEMONSTRATED WITH STUDIES INVOLVING THE FATE AND EFFECT OF A TOXICANT, P-CRESOL.

PRITCHARD, P.H., R.J. LARSON, AND L.S. CLESCERI. 1980. SYNOPSIS OF DISCUSSION SESSION: EXTRAPOLATION. IN: BIOTRANSFORMATION AND FATE OF CHEMICALS IN THE AQUATIC ENVIRONMENT. ALAN W. MAKI, KENNETH L. DICKSON AND JOHN CAIRNS, JR, EDITORS, AMERICAN SOCIETY OF MICROBIOLOGY, WASHINGTON, DC. PP. 99-104. (ERL,GB X266).

PRITCHARD, P.H., P.A. VAN VELD, AND W.P. COOPER. 1981. BIODEGRADATION OF P-CRESOL IN ARTIFICIAL STREAM CHANNELS (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY 1981. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 210. (ERL,GB X246).

THE FATE AND EFFECTS OF P-CRESOL WERE STUDIED IN AN ARTIFICIAL STREAM CHANNEL IN MONTICELLO, MN. THE OUTDOOR CHANNEL, WHICH IS 2/3 MILE NARROW OVAL WITH MECHANICAL RECIRCULATION OF THE WATER, IS REPRESENTATIVE OF A FIELD STREAM ECOSYSTEM. IT WAS DOSED WITH 8 PPM P-CRESOL FOR 48 HOURS. CIRCULATION TIME OF THE STREAM WAS 6 HOURS. TOTAL PHENOL CONCENTRATION DROPPED FROM 8.0 TO 7.5 PPM OVER THE LENGTH OF THE STREAM. AFTER DOSING, THE CONCENTRATION DECREASED CONSIDERABLY FASTER THAN EXPECTED, BASED ON A RATE CALCULATED DURING DOSING. ATTEMPTS TO PREDICT THE FATE OF P-CRESOL IN THE CHANNEL BY USING LABORATORY BIODEGRADATION STUDIES WERE ONLY PARTIALLY SUCCESSFUL. RATES OF DEGRADATION OF RADIOLABELED P-CRESOL WERE DETERMINED IN SHAKE FLASKS CONTAINING WATER, SEDIMENT, ALGAE, PLANT AND ROCK COMPONENTS FROM THE STREAM. DISAPPEARANCE OF P-CRESOL WAS FOLLOWED AND RADIOLABELED CO₂ RELEASE WAS MEASURED. ALL STREAM COMPONENTS CAUSED SIGNIFICANT BIODEGRADATION OF P-CRESOL. ROCKS AND WATER WERE THE MOST ACTIVE PER UNIT BIOMASS. PREDICTION OF THE FATE OF INTERGRADATION OF BIODEGRADATION RATE INFORMATION FROM LABORATORY STUDIES ON EACH COMPONENT FROM THE STREAM.

RUBINSTEIN, NORMAN I., CHARLES N. D'ASARO, CHARNELL SOMMERS, AND FRANK G. WILKES. 1980. EFFECTS OF CONTAMINATED SEDIMENTS ON REPRESENTATIVE ESTUARINE SPECIES AND DEVELOPING BENTHIC COMMUNITIES. IN: CONTAMINANTS AND SEDIMENTS, VOL. 1: TRANSPORT, FATE AND CASE STUDIES. ROBERT A. BAKER, EDITOR, ANN ARBOR SCIENCE PUBLISHERS, ANN ARBOR, MI. PP. 445-461. (ERL,GB 406).

BIOASSAY TECHNIQUES DEVELOPED TO EXAMINE ACUTE AND SUBLETHAL EFFECTS OF DREDGED SEDIMENTS ON MARINE LIFE ARE DESCRIBED. RESULTS ARE REPORTED FOR LABORATORY TESTS CONDUCTED TO DETERMINE SUBLETHAL AND ACUTE EFFECTS OF KEPONE-SORBED SEDIMENT AND DREDGED SPOIL MATERIAL FROM THE JAMES RIVER AND THE HOUSTON SHIP CHANNEL ON THE MYSID SHRIMP, *MYSIDOPSIS BAHIA*; OYSTER, *CRASSOSTREA VIRGINICA*; AND POLYCHAETE, *ARENICOLA CRISTATA*. CRITERIA ESTABLISHED FOR THE STUDY INCLUDE (1) SURVIVAL OF MYSIDS; (2) SHELL DEPOSITION AND BIOACCUMULATION OF CONTAMINANTS; (3) SUBSTRATE-REWORKING AND BIOACCUMULATION BY LUGWORMS; (4) RESILIENCY OF MACROFAUNAL ORGANISMS THAT SETTLED ONTO TEST SEDIMENTS FROM PLANKTONIC LARVAE.

SCOTT, GEOFFREY I., TOMMY I. SAMMONS, DOUGLAS P. MIDDAGH, AND MICHAEL J. HEMMER. 1982. IMPACTS OF WATER CHLORINATION AND COLIFORM BACTERIA ON THE AMERICAN OYSTER, *CRASSOSTREA VIRGINICA* (GMELIN). IN: PHYSIOLOGICAL MECHANISMS OF MARINE POLLUTANT TOXICITY. W.B. VERNBERG, A. CALABRESE, AND F.P. THURBERG, EDITORS, ACADEMIC PRESS, NEW YORK. PP. 505-529. (ERL,GB X232).

IN ESTUARIES SUCH AS MURRELLS INLET, SOUTH CAROLINA, PUBLIC HEALTH OFFICIALS HAVE CHLORINATED NONPOINT SOURCE RUN-OFF SO THAT BACTERIAL WATER QUALITY CAN BE MAINTAINED AND OYSTER RESOURCES MADE HARVESTABLE (TURNER, 1978). THERE IS A TRADE-OFF AS THE MORE IMMEDIATE RISK OF BACTERIAL POLLUTION IS REDUCED TO AN ACCEPTABLE LEVEL, BUT IN ITS PLACE CHLORINATION BY-PRODUCTS SUCH AS BROMOFORM, A POTENT CARCINOGEN, ARE INTRODUCED INTO ESTUARINE WATERS WHERE THEY MAY BE BIOCONCENTRATED BY OYSTERS AND MAY ULTIMATELY AFFECT HUMAN CONSUMERS (SCOTT ET AL., 1980; SCOTT, 1982). THROUGHOUT THIS ATTEMPT TO CONTROL BACTERIAL POLLUTION, THE PRIMARY CONCERN HAS BEEN FOCUSED ON PROTECTING HUMAN HEALTH WITHOUT GIVING CONSIDERATION TO THE POTENTIAL PHYSIOLOGICAL EFFECTS OF THE DISINFECTION PROCESS ON OYSTERS. THE PURPOSE OF THIS PAPER WAS TO REVIEW AND CONTRAST THE POTENTIAL PHYSIOLOGICAL EFFECTS OF COLIFORM BACTERIA AND CHLORINE ON THE AMERICAN OYSTER, *CRASSOSTREA VIRGINICA* (GMELIN) AND TO EVALUATE THE POTENTIAL RISKS AND BENEFITS OF EACH POLLUTANT TYPE IN AN EFFORT TO GAIN INSIGHT INTO THE PROPER MANAGEMENT OF SHELLFISH RESOURCES.

SHERIDAN, PETER F. 1978. FOOD HABITS OF THE BAY ANCHOVY, *ANCHOA MITCHILLI*, IN APALACHICOLA BAY, FLORIDA. NORTHEAST GULF SCI. 2(2):126-132. (ERL,GB X123).

ONTOGENETIC, SPATIAL AND TEMPORAL ASPECTS OF THE FOOD HABITS OF THE BAY ANCHOVY, *ANCHOA MITCHILLI*, WERE EXAMINED IN FISH COLLECTED FROM APALACHICOLA BAY, FLORIDA. CALANOID COPEPODS WERE THE MAJOR CONSTITUENT OF THE ANCHOVY DIET, BUT THEIR IMPORTANCE DECLINED WITH FISH GROWTH AS LARGER ZOOPLANKTERS SUCH AS MYSIDS WERE CONSUMED. SPECIALIZATION UPON COPEPODS LED TO MODERATE DIET SIMILARITY AMONG SITES IN THE ESTUARY, EXCEPT IN AREAS NEAR THE MOUTH OF THE APALACHICOLA RIVER WHERE MYSIDS, INSECT LARVAE, AND CLADOCERANS WERE MAJOR FOOD ITEMS. COPEPODS WERE THE DOMINANT PREY IN ALL MONTHS BUT WERE MARKEDLY LESS ABUNDANT PREY IN OCTOBER, DECEMBER, AND FEBRUARY WHEN OTHER CRUSTACEANS AND INSECT LARVAE BECAME RELATIVELY MORE ABUNDANT.

SMITH, GLEN A., JANET S. NICKELS, RONALD J. BOBBIE, NORMAN L. RICHARDS, AND DAVID C. WHITE. 1982. EFFECTS OF OIL AND GAS WELL-DRILLING FLUIDS ON THE BIOMASS AND COMMUNITY STRUCTURE OF MICROBIOTA THAT COLONIZE SANDS IN RUNNING SEAWATER. ARCH. ENVIRON. CONTAM. TOXICOL. 11(1):17-23. (ERL,GB X303).

WELL-DRILLING FLUID AND A NUMBER OF THE KNOWN COMPONENTS (BARITE, CLAY, ALDACIDE, SURFLO, AND DOWICIDE, WERE TESTED FOR EFFECTS ON THE BIOMASS AND COMMUNITY STRUCTURE OF THE MICROBIOTA THAT COLONIZE MARINE SANDS EXPOSED FOR EIGHT WEEKS TO RUNNING AMBIENT SEAWATER. SHADING THE MICROBIOTA FROM LIGHT DEPRESSED THE MICROFLORA WITHOUT A SIGNIFICANT EFFECT ON THE BIOMASS, WHILE WELL-DRILLING FLUIDS LAYERED ON THE SURFACE OR MIXED WITH THE SAND SIGNIFICANTLY INCREASED A COMPONENT OF THE BACTERIA AND THE MICROFAUNA AS REFLECTED IN CHANGES IN THE FATTY ACID COMPOSITION. THERE WERE SOME SHADING EFFECTS FROM THE SURFACE LAYERING OF WELL-DRILLING FLUIDS AS REFLECTED IN THE FATTY ACIDS FROM THE MICROFLORA WHEN COMPARED TO THE SANDS MIXED WITH WELL-DRILLING FLUIDS. BARITE HAD ESSENTIALLY NO EFFECT ON THE BIOMASS OR COMMUNITY STRUCTURE WHILE CLAYS INCREASED NEARLY ALL OF THE BIOMASS INDICATORS FOR THE BACTERIA AS WELL AS THE MICROFAUNA; THE CLAY OVERLAY MIRRORS THE EFFECT OF THE DRILLING FLUIDS. ALDACIDE SHIFTED THE BACTERIAL COMPOSITION, DEPRESSING THE PROPORTIONS OF MICROBES CONTAINING THE CYCLOPROPANE FATTY ACIDS AND THE ANAEROBIC PATHWAYS OF DESATURATION. CONCENTRATIONS OF 1 AND 15 UG/L INCREASED THE BACTERIAL BIOMASS AS REFLECTED IN THE TOTAL LIPID (16:0) AND EXTRACTABLE LIPID PHOSPHATE COUPLED WITH A DECREASE IN THE TOTAL MICROEUKARYOTES. SURFLO INCREASED IN THE BIOMASS AND SHIFTED THE BACTERIAL COMMUNITY STRUCTURE AT CONCENTRATIONS BETWEEN 4 AND 800 UG/L. THE LOWEST LEVEL ALSO STIMULATED THE MICROFAUNA. DOWICIDE AT 100 UG/L INCREASED THE BACTERIA FORMING CISVACCENIC ACID AND THE MICROFAUNA SIMILAR TO LOW CONCENTRATIONS OF SURFLO.

SMITH, GLEN A., JANET S. NICKELS, WILLIAM M. DAVIS, ROBERT F. MARTZ, ROBERT H. FINDLAY, AND DAVID C. WHITE. 1982. PERTURBATIONS IN THE BIOMASS, METABOLIC ACTIVITY, AND COMMUNITY STRUCTURE OF THE ESTUARINE DETRITAL MICROBIOTA: RESOURCE PARTITIONING IN AMPHIPOD GRAZING. J. EXP. MAR. BIOL. ECOL. 64(2):125-143. (ERL,G3 X202).

WITH THE DEVELOPMENT OF QUANTITATIVE METHODS FOR ESTIMATING THE BIOMASS, METABOLIC ACTIVITY, NUTRITIONAL STATUS AND COMMUNITY STRUCTURE OF THE ESTUARINE DETRITAL MICROBIOTA, AND THE INDICATION OF MARKED EFFECTS ON THE MICROBIOTA BY AMPHIPOD GRAZING, A DETAILED EXAMINATION OF THE EFFECTS OF GRAZING BY TWO SYMPATRIC AMPHIPODS WAS CONDUCTED. THE MICROBIOTA, WHICH DEVELOP ON TEFLON SQUARES AFTER A 2-WK EXPOSURE IN A NORTH FLORIDA ESTUARY, SHOWED, WHEN GRAZED FOR 2 WK, SIGNIFICANTLY INCREASED BACTERIAL BIOMASS (SHORT-BRANCHED AND CIS-VACCENIC FATTY ACIDS) AND MICROEUKARYOTES (TOTAL POLYENOIC FATTY ACIDS). GRAZING IN THE LABORATORY ARE FIELD DENSITY FURTHER INCREASED THE BACTERIAL BIOMASS (MURAMIC ACID, WALL GLUCOSAMINE), AS WELL AS THE TOTAL PHOTOSYNTHETIC BIOMASS (LIPID GALACTOSE) IF COMPARED TO THE MICROBIOTA GRAZED IN THE FIELD. GRAZING IN THE LABORATORY ALSO DEPRESSED THE ALGAE ESTIMATED AS ALPHA LINOLENIC ACID BUT STIMULATED THE FAST GROWING DIATOMS (20 CARBON POLYENOIC FATTY ACIDS OF THE ALPHA LINOLENIC SERIES). THE FIELD-GRAZED MICROBIOTA SHOWED METABOLIC STRESS INDICATED BY THE HIGHER ADENOSINE TO ADENOSINE TRIPHOSPHATE (ATP) RATIO. TWO SYMPATRIC AMPHIPODS GAMMARUS MUCRONATUS (SAY) AND MELITA APPENDICULATA (SAY) HAVING MARKEDLY DIFFERENT MOUTH PARTS WERE SHOWN TO PARTITION THE DETRITAL MICROBIOTA. MELITA FEED ON NONPHOTOSYNTHETIC MICROEUKARYOTES (LOWERED TRIGLYCERIDE GLYCEROL) LEAVING A LARGER TOTAL BIOMASS (EXTRACTABLE LIPID PHOSPHATE), PHOTOSYNTHETIC BIOMASS (LIPID GALACTOSE) WITH GREATER TOTAL METABOLIC ACTIVITY ESTIMATED AS THE 4-H RATE OF PHOSPHOLIPID AND SULFOLIPID SYNTHESIS. BACTERIAL BIOMASS INCREASED (MURAMIC ACID, SHORT-BRANCHED AND CIS-VACCENIC FATTY ACIDS) COMPARED WITH THE DETRITUS GRAZED BY GAMMARUS. GAMMARUS FEEDS LESS SPECIFICALLY ON BACTERIA AND PHOTOSYNTHETIC MICROEUKARYOTES. BACTERIA (MURAMIC ACID) AND MICROEUKARYOTES (THE RATIO OF LIPID GLYCEROL TO LIPID PHOSPHATE) WERE SIGNIFICANTLY DECREASED. THIS FEEDING PROVOKES AN INTENSE METABOLIC ACTIVITY FROM THE LOWERED BIOMASS THAT IS REFLECTED IN THE SIGNIFICANTLY HIGHER TOTAL ADENOSINE NUCLEOTIDES, ATP, AND ADENYLATE ENERGY CHARGE. THE AMPHIPODS FROM THE FIELD AND LABORATORY MICROCOSMS SHOWED SIMILAR ADENYLATE ENERGY CHARGES AND NEUTRAL LIPID GLYCEROL TO PHOSPHOLIPID RATIO, INDICATING THEIR NUTRITIONAL STATUS WAS SIMILAR.

SMITH, N.G., A.W. BOURQUIN, S.A. CROW, AND D.G. AHEARN. 1976. EFFECT OF HEPTACHLOR ON HEXADECANE UTILIZATION BY SELECTED FUNGI. IN: DEVELOPMENTS IN INDUSTRIAL MICROBIOLOGY, VOL. 17. AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, WASHINGTON, DC. PP. 331-336. (ERL,G3 255).

VARIOUS CONCN OF HEPTACHLOR DISSOLVED IN HEXADECANE WERE ADDED TO CULTURES OF FUNGI GROWN IN YEAST-NITROGEN BASE PREPARED WITH SYNTHETIC SEAWATER AND WITH DEIONIZED WATER. CANDIDA MALTOSE AND CANDIDA LIPOLYTICA SHOWED GREATEST UTILIZATION OF HEXADECANE (20-91%) WHETHER HEPTACHLOR WAS PRESENT OR ABSENT. ISOLATES OF PICHIA SPARTINEA, CLADOSPORIUM SP., CEPHALOSPORIUM SP., AND PENICILLIUM SP. ALSO UTILIZED THE HYDROCARBON, BUT TO A LESSER EXTENT. SPECIES OF KLUYVEROMYCES FAILED TO GROW WITH HEXADECANE AS A CARBON SOURCE. COMPARED WITH LOW CONCN, HIGH CONCN OF HEPTACHLOR APPEARED TO HAVE A SLIGHT STIMULATING EFFECT ON UTILIZATION OF HEXADECANE BY C. MALTOSE, BUT HAD NO EFFECT WITH C. LIPOLYTICA.

SOMERVILLE, C.C., L.C. BUTLER, T.J. LEE, A. W. BOURQUIN, AND J.C. SPAIN. 1983. DEGRADATION OF JET FUEL HYDROCARBONS BY AQUATIC MICROBIAL COMMUNITIES (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY 1983. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 284. (EPL,GB 458).

A MIXTURE OF FIFTEEN HYDROCARBONS REPRESENTATIVE OF THOSE IN DISTILLATE JET FUELS WAS USED TO DETERMINE WHETHER DEGRADATION BY NATURAL MICROBIAL COMMUNITIES COULD AFFECT THE PERSISTENCE OF SUCH FUELS RELEASED INTO AQUATIC ENVIRONMENTS. THE MIXTURE INCLUDED HEXANE, CYCLOHEXANE, N-HEPTANE, METHYLCYCLOHEXANE, TOLUENE, N-OCTANE, ETHYLCYCLOHEXANE, P-XYLENE, CUMENE, 1,3,5-TRIMETHYLBENZENE, INDAN, NAPHTHALENE, 2-METHYLNAPHTHALENE, N-TETRADECANE, AND 2,3-DIMETHYLNAPHTHALENE. THE MIXTURE WAS INCUBATED WITH WATER OR WATER AND SEDIMENT SUSPENSIONS COLLECTED AT ESTUARINE AND FRESHWATER SITES. DISAPPEARANCE OF HYDROCARBONS WAS MEASURED BY CAPILLARY COLUMN GAS CHROMATOGRAPHY. CONTROL FLASKS WERE STERILIZED WITH HGCL₂ TO ESTIMATE LOSSES DUE TO VOLATILIZATION. C(6)-C(9) COMPOUNDS VOLATILIZED QUICKLY. INDAN, NAPHTHALENE, AND 2-METHYLNAPHTHALENE WERE MUCH LESS VOLATILE AND WERE BIODEGRADED RAPIDLY AFTER AN INITIAL 24H LAG PERIOD. THE PRESENCE OF SEDIMENT AND ITS ASSOCIATED MICROFLORA STIMULATED BIODEGRADATION. ASSAYS OF TOTAL HETEROTROPHS AND HYDROCARBONOCLASTIC BACTERIA INDICATED AN INITIAL TOXICITY OF THE FUEL MIXTURE FOLLOWED BY A STIMULATION OF HYDROCARBON-DEGRADING BACTERIA.

SPAIN, J., P.H. PRITCHARD, AND AL W. BOURQUIN. 1981. ADAPTION OF NATURAL MICROBIAL POPULATIONS TO ORGANIC SUBSTRATES (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY 1980. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 171. (ERL,GB X409).

A STUDY WAS UNDERTAKEN TO DETERMINE WHETHER ADAPTATION TO DEGRADATION OF SPECIFIC ORGANIC SUBSTRATES OCCURRED IN NATURAL AQUATIC MICROBIAL POPULATIONS, AND WHETHER THERE WERE THRESHOLD CONCENTRATIONS OF SUBSTRATE REQUIRED FOR ADAPTATION. USING LABORATORY WATER/SEDIMENT SYSTEMS (ECO-CORES) TAKEN FROM AN ESTUARINE SALTMARSH (RANGE PT., FL) AND A FRESHWATER RIVER (ESCAMBIA RIVER), ADAPTATION TO 2 MODEL COMPOUNDS 14-C-PARANITROPHENOL (PNP) AND 14-C-METHYL PARATHION (MPS), WERE STUDIED. RATES OF MINERALIZATION OF THE TWO COMPOUNDS WERE MEASURED BY ¹⁴CO₂ RELEASE WHICH CORRELATED WITH RATE OF PARENT COMPOUND DISAPPEARANCE. RIVER POPULATIONS SHOWED EVIDENCE OF ADAPTATION (INCREASE TO ¹⁴CO₂ AFTER EXPOSURE) TO PNP AT CONCENTRATIONS AS LOW AS 60 PPB AND TO MPS AT HIGHER CONCENTRATIONS. SALTMARSH POPULATIONS SHOWED NO EVIDENCE OF ADAPTATION TO EITHER COMPOUND AT ANY TEST CONCENTRATIONS. SALTMARSH POPULATIONS SHOWED NO EVIDENCE OF ADAPTATION TO EITHER COMPOUND AT ANY TEST CONCENTRATION. PNP AND MPS UTILIZING BACTERIA WERE OBTAINED IN PURE CULTURE FROM RIVER SAMPLES USING SELECTIVE ENRICHMENT TECHNIQUE. SIMILAR BACTERIA WERE NOT ISOLATED FROM SALTMARSH SITES. RESULTS INDICATE THAT ADAPTATION OCCURS IN CERTAIN ENVIRONMENTS AND MAY BE DEPENDENT ON SPECIFIC MICROORGANISMS. BIODEGRADATION RATES OBSERVED IN ACTUAL MEDIA LABORATORY SYSTEMS CAN BE AFFECTED BY CONCENTRATION AND PRIOR EXPOSURE; THEREFORE ADAPTATION MUST BE CONSIDERED WHEN PREDICTING FATE OF TOXIC CHEMICALS.

SPAIN, J.C., C.C. SOMERVILLE, T.J. LEE, L.C. BUTLER, AND A.W. BOURQUIN. 1983. DEGRADATION OF JET FUEL HYDROCARBONS BY AQUATIC MICROBIAL COMMUNITIES: AN INTERIM REPORT 23 OCTOBER 1981 TO 30 SEPTEMBER 1982. EPA-600/X-83-059, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 205P.

A MODEL FUEL MIXTURE OF FIFTEEN HYDROCARBONS REPRESENTATIVE OF THOSE DISTILLATE JET FUELS WAS USED TO DETERMINE WHETHER DEGRADATION BY NATURAL MICROBIAL COMMUNITIES COULD AFFECT THE PERSISTENCE OF SUCH FUELS RELEASED IN AQUATIC ENVIRONMENTS. THE MIXTURE INCLUDED HEXANE, CYCLOHEXANE, N-HEPTANE, METHYLCYCLOHEXANE, TOLUENE, N-OCTANE, ETHYLCYCLOHEXANE, P-XYLENE, CUMENE, TRIMETHYLBENZENE, INDAN NAPHTHALENE, N-TETRADECANE, 2,3-DIMETHYLNAPHTHALENE. THE WATER SOLUBLE FRACTION OF THE MODEL FUEL WAS INCUBATED IN SHAKE FLASKS WITH WATER OR WATER AND SEDIMENT SUSPENSIONS COLLECTED AT ESTUARINE AND FRESHWATER SITES. SURFACE FILMS OF THE MODEL MIXTURE WERE STUDIED UNDER QUIESCENT INCUBATION. THE DISAPPEARANCE OF HYDROCARBONS WAS MEASURED BY CAPILLARY COLUMN GAS CHROMATOGRAPHY. CONTROL FLASKS WERE STERILIZED WITH HGCL₂ TO ESTIMATE LOSSES DUE TO ABIOTIC PROCESSES. C(6)-C(9) COMPOUNDS VOLATILIZED QUICKLY. INDAN, NAPHTHALENE, AND 2-METHYLNAPHTHALENE WERE MUCH LESS VOLATILE AND WERE BIODEGRADED FROM SOLUTION AFTER AN INITIAL 24H LAG PERIOD. THE PRESENCE OF SEDIMENT ASSOCIATED MICROFLORA STIMULATED DEGRADATION. BIODEGRADATION WAS NOT AN IMPORTANT FATE PROCESS OF THE MODEL FUEL COMPONENTS IN THE QUIESCENT TEST. ASSAYS OF TOTAL HETEROTROPHS AND HYDROCARBONOCLASTIC BACTERIA INDICATED AN INITIAL TOXICITY OF THE FUEL MIXTURE FOLLOWED BY A STIMULATION OF HYDROCARBON-DEGRADING BACTERIA. FATE TESTS WERE REPEATED WITH PETROLEUM-DERIVED JP-4. THE SOLUBLE COMPONENTS OF JP-4 VOLATILIZED TOO RAPIDLY FOR BIODEGRADATION TO OCCUR. SEDIMENTATION DRAMATICALLY AFFECTED THE FATE OF FUEL COMPONENTS WHEN MIXING OF THE HYDROCARBON AND SEDIMENT LAYERS STUDIED. SEDIMENT ASSOCIATED COMPOUNDS WERE MORE RESISTANT TO VOLATILIZATION AND MICROBIAL ATTACK. SUBSTITUTED BENZENES AND N-ALKANES WERE RAPIDLY BIODEGRADED WHEN NOT LIMITED BY EVAPORATION AND SEDIMENTATION. JP-4 DID NOT PROVE TOXIC TO THE MICROBIAL COMMUNITIES OF THE TEST SYSTEMS, BUT DID STIMULATE THE REPLICATION OF HYDROCARBONOCLASTIC BACTERIA.

SPAIN, JIM C., TOM MILHJUS, AND AL W. BOURQUIN. 1991. EFFECTS OF ADAPTATION ON DEGRADATION OF ORGANIC COMPOUNDS BY NATURAL MICROBIAL POPULATIONS (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY 1991. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. (ERL, 66 X245).

NATURAL MICROBIAL POPULATIONS CAN ADAPT TO MORE RAPIDLY DEGRADE ORGANIC SUBSTRATES SUPPLIED AT LOW CONCENTRATIONS. SUCH ADAPTION SHOULD BE CONSIDERED IN ORDER TO PREDICT THE FATE OF CERTAIN XENOBIOTICS IN THE ENVIRONMENT. WE INVESTIGATED THE OCCURRENCE, EXTENT, AND DURATION OF ADAPTATION IN WATER/SEDIMENT CORES TAKEN AT TEN SITES IN THE ESCAMBIA RIVER SYSTEM. RADIOLABELED P-NITROPHENOL WAS ADDED TO THE CORES AS THE TEST COMPOUND AND ADAPTATION WAS DETECTED BY COMPARING MINERALIZATION RATES IN PREEXPOSED AND UNEXPOSED CORES. POPULATIONS FROM ALL FRESHWATER SITES ADAPTED. NONE OF THE ESTUARINE OR MARINE POPULATIONS ADAPTED. THE EXTENT OF ADAPTATION DEPENDS ON PREEXPOSURE CONCENTRATIONS, BUT THE RELATIONSHIP WAS NOT LINEAR. THE DURATION OF ADAPTATION WAS TESTED BY MEASURING MINERALIZATION RATES IN CORES AT VARIOUS INTERVALS AFTER EXPOSURE. ADAPTATION WAS MAXIMAL AT 15 DAYS AFTER INITIAL EXPOSURE AND DECLINED GRADUALLY UNTIL NO LONGER DETECTABLE AFTER 50 DAYS.

SPAIN, JIM C., P.H. PRITCHARD, AND A.W. BOURQUIN. 1980. EFFECTS OF ADAPTATION ON BIODEGRADATION RATES IN SEDIMENT/WATER CORES FROM ESTUARINE AND FRESHWATER ENVIRONMENTS. APPL. ENVIRON. MICROBIOL. 40(4):726-734. (ERL,GB 410).

EXPERIMENTS WERE DEVISED TO DETERMINE WHETHER EXPOSURE TO XENOBIOTICS WOULD CAUSE MICROBIAL POPULATIONS TO DEGRADE WITH THE COMPOUNDS MORE RAPIDLY DURING SUBSEQUENT EXPOSURES. STUDIES WERE DONE WITH WATER/SEDIMENT SYSTEMS (ECO-CORES) TAKEN FROM A SALT MARSH AND A RIVER. SYSTEMS WERE TESTED FOR ADAPTATION TO THE MODEL COMPOUNDS METHYL PARATHION AND P-NITROPHENOL. $^{14}\text{CO}_2$ RELEASED FROM RADIOACTIVE PARENT COMPOUNDS WAS USED AS A MEASURE OF MINERALIZATION. RIVER POPULATIONS PRE-EXPOSED TO P-NITROPHENOL AT CONCENTRATIONS AS LOW AS 60 MG/L DEGRADED THE NITROPHENOL MUCH FASTER THAN CONTROL POPULATIONS. RIVER POPULATIONS PRE-EXPOSED TO METHYL PARATHION ALSO ADAPTED TO DEGRADE THE PESTICIDES MORE RAPIDLY, BUT HIGHER CONCENTRATIONS WERE REQUIRED. SALT MARSH POPULATIONS DID NOT ADAPT TO DEGRADE METHYL PARATHION. P-NITROPHENOL-DEGRADING BACTERIA WERE ISOLATED FROM RIVER SAMPLES, BUT NOT FROM SALT MARSH SAMPLES. NUMBERS OF NITROPHENOL-DEGRADING BACTERIA INCREASED 4 TO 5 ORDERS OF MAGNITUDE DURING ADAPTATION. RESULTS INDICATE THAT THE ABILITY OF POPULATIONS TO ADAPT DEPENDS ON THE PRESENCE OF SPECIFIC MICROORGANISMS. BIODEGRADATION RATES IN LABORATORY SYSTEMS CAN BE AFFECTED BY CONCENTRATION AND PRIOR EXPOSURE; THEREFORE, ADAPTATION MUST BE CONSIDERED WHEN SUCH SYSTEMS ARE USED TO PREDICT THE FATE OF XENOBIOTICS IN THE ENVIRONMENT.

SPAIN, JIM C., AND P.A. VAN VELD. 1983. ADAPTATION OF NATURAL MICROBIAL COMMUNITIES TO DEGRADATION OF XENOBIOTIC COMPOUNDS: EFFECTS OF CONCENTRATION, INOCULUM, AND CHEMICAL STRUCTURE. APPL. ENVIRON. MICROBIOL. 45(2):428-435. (ERL,GB 440).

ADAPTATION OF MICROBIAL POPULATIONS TO DEGRADE XENOBIOTIC COMPOUNDS FASTER AFTER EXPOSURE TO THE COMPOUND WAS STUDIED IN ECO-CORES. RADIOLABELED TEST COMPOUNDS WERE ADDED TO CORES THAT CONTAINED NATURAL WATER AND SEDIMENT. ADAPTATION WAS DETECTED BY COMPARING MINERALIZATION RATES OR DISAPPEARANCE OF PARENT COMPOUND IN PRE-EXPOSED AND UNEXPOSED CORES. MICROBIAL POPULATIONS IN PRE-EXPOSED CORES FROM A NUMBER OF FRESHWATER SAMPLING SITES ADAPTED TO DEGRADE P-NITROPHENOL FASTER; POPULATIONS FROM ESTUARINE OR MARINE SITES DID NOT SHOW ANY INCREASE IN RATES OF DEGRADATION AS A RESULT OF PRE-EXPOSURE. ADAPTATION WAS MAXIMAL AFTER TWO WEEKS AND NOT DETECTABLE AFTER SIX WEEKS. A THRESHOLD CONCENTRATION OF 10 PPB WAS NOTED, BELOW WHICH NO ADAPTATION WAS DETECTED. WITH CONCENTRATIONS OF 20 TO 100 PPB, THE BIODEGRADATION RATES IN PRE-EXPOSED CORES WERE MUCH HIGHER THAN IN CONTROL CORES AND WERE PROPORTIONAL TO RESPIRE CONCENTRATION. IN ADDITION, TRIFLURALIN, 2,4-DICHLOROPHENOXYACETIC ACID (2,4-D) AND P-CRESOL WERE TESTED TO DETERMINE WHETHER PRE-EXPOSURE AFFECTED SUBSEQUENT BIODEGRADATION. MICROBIAL POPULATIONS DID NOT ADAPT TO TRIFLURALIN. ADAPTATION TO 2,4-D WAS SIMILAR TO THAT WITH NITROPHENOL. P-CRESOL WAS MINERALIZED RAPIDLY IN BOTH PRE-EXPOSURE AND UNEXPOSED POPULATIONS.

VAN VELD, P.A., AND J.C. SPAIN. 1983. BIODEGRADATION OF METHYLPARATHION, P-NITROPHENOL, AND P-CRESOL IN THREE TYPES OF LABORATORY TEST SYSTEMS (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY, 1983. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 266. (ERL,GB 459).

THREE TYPES OF LABORATORY TEST SYSTEM WERE USED TO MEASURE THE BIODEGRADATION OF METHYL PARATHION (MP), P-NITROPHENOL (PNP), AND P-CRESOL TO ASSESS THE EFFECT OF SYSTEM DESIGN ON THE DEGRADATION AND FATE OF SUCH COMPOUNDS. SHAKE FLASKS CONTAINING WATER OR WATER/SEDIMENT SLURRIES AND INTACT CORES WITH WATER AND SEDIMENT WERE PREPARED WITH ESTUARINE WATER AND SEDIMENT. RADIOLABELED TEST COMPOUNDS (200 UG/L) WERE ADDED TO EACH TEST SYSTEM AND DISAPPEARANCE OF THE PARENT COMPOUNDS WAS MEASURED BY HIGH-PRESSURE LIQUID CHROMATOGRAPHY OR GAS-LIQUID CHROMATOGRAPHY. DEGRADATION OF MP AND PNP WAS FASTEST IN ECOCORES AND SLOWEST IN WATER FLASKS. IN MOST CASES, DEGRADATION OF PNP IN FLASKS WAS NEGLIGIBLE. P-CRESOL DISAPPEARED RAPIDLY IN ALL SYSTEMS AFTER A VARIABLE LAG PERIOD. THE RESULTS SUGGEST THAT FOR SOME COMPOUNDS THAT CAN BE TRANSFORMED BY REDUCTIVE AS WELL AS OXIDATIVE PATHWAYS, DEGRADATION MAY BE FASTER IN SYSTEMS WITH UNDISTURBED SEDIMENTS. FOR P-CRESOL THE PRESENCE OF SEDIMENT IN THE TEST SYSTEM SEEMS TO BE LESS IMPORTANT.

VAN VELD, P.A., AND J.C. SPAIN. 1983. DEGRADATION OF SELECTED XENOBIOTIC COMPOUNDS IN THREE TYPES OF AQUATIC TEST SYSTEMS. CHEMOSPHERE. 12(9/10):1291-1305. (ERL,GB 478).

THE BIODEGRADATION RATES OF P-NITROPHENOL, METHYL PARATHION AND P-CRESOL WERE COMPARED IN TEST SYSTEMS COMPOSED OF SEDIMENT AND WATER COLLECTED FROM VARIOUS ESTUARINE SITES. P-NITROPHENOL AND METHYL PARATHION DEGRADATION WAS FASTEST IN INTACT SEDIMENT/WATER CORES FOLLOWED BY SEDIMENT-WATER SHAKE FLASKS AND SLOWEST IN WATER SHAKE FLASKS. P-CRESOL DEGRADED RAPIDLY IN ALL TEST SYSTEMS. THE APPLICABILITY OF A FIRST-ORDER KINETIC MODEL TO DESCRIBE THE DEGRADATION OF THESE COMPOUNDS WAS EXAMINED.

WALKER, WILLIAM W. 1978. INSECTICIDE PERSISTENCE IN NATURAL SEAWATER AS AFFECTED BY SALINITY, TEMPERATURE, AND STERILITY. EPA-600/3-79-044, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 25P.

THE EFFECT OF TEMPERATURE, SALINITY, AND STERILITY ON THE DEGRADATION OF MALATHION, PARATHION, METHYL PARATHION, DIAZINON, AND METHOXYCHLOR IN FRESH AND ESTUARINE WATER HAS BEEN DETERMINED UNDER CONTROLLED LABORATORY CONDITIONS. SURFACE WATER SAMPLES OF 1, 10, 20, AND 28 PPT SALINITY WERE AMENDED WITH THE ABOVE INSECTICIDES AND INCUBATED IN THE DARK AT 30, 20, AND 10 DEGREES C UNDER STERILE AND NONSTERILE CONDITIONS. INSECTICIDE ABATEMENT WAS FOLLOWED BY ELECTRON-CAPTURE GAS-LIQUID CHROMATOGRAPHIC TECHNIQUES. NO SIGNIFICANT DIFFERENCES BETWEEN STERILE AND NONSTERILE TREATMENTS WERE OBSERVED FOR ANY OF THE INSECTICIDES STUDIES, WHILE THE EFFECT OF INCREASING TEMPERATURE WAS HIGHLY SIGNIFICANT WITH REGARD TO INCREASED DEGRADATION OF MALATHION, PARATHION, METHYL PARATHION, AND DIAZINON. METHOXYCHLOR REFLECTED THE RECALCITRANCE CHARACTERISTIC OF THE CHLORINATED HYDROCARBON INSECTICIDES THROUGHOUT 84 DAYS ON INCUBATION AND WAS NOT SIGNIFICANTLY AFFECTED BY SALINITY, TEMPERATURE, OR STERILITY. SALINITY EFFECTS WERE VARIED AMONG THE FOUR ORGANOPHOSPHATES, BEING HIGHLY SIGNIFICANT FOR MALATHION AND DIAZINON, SIGNIFICANT FOR METHYL PARATHION, AND NOT SIGNIFICANT FOR PARATHION.

WHITE, D.C., R.J. BOBBIE, J.S. NICKELS, S.D. FAZIO, AND W.M. DAVIS. 1980. NONSELECTIVE BIOCHEMICAL METHODS FOR THE DETERMINATION OF FUNGAL MASS AND COMMUNITY STRUCTURE IN ESTUARINE DETRITAL MICROFLORA. BOT. MAR. 23(4):239-250. (ERL,GB X128).

ASSAY OF LIPID AND CELL WALL COMPONENTS CAN READILY PROVIDE DIFFERENTIATION IN RECIPROCAL MIXTURES OF BACTERIA AND FUNGAL MONOCULTURES. TO TEST NATURAL MICROBIAL ASSEMBLIES, SMALL PLASTIC SHEETS WERE EXPOSED IN A SUBTROPICAL ESTUARY. THE SHEETS WERE THEN TRANSFERRED TO A LABORATORY WHERE ESTUARINE ENVIRONMENTS THAT INHIBIT PROKARYOTIC GROWTH AND STIMULATED FUNGAL GROWTH WERE COMPARED WITH AN ENVIRONMENT WHERE EUKARYOTIC GROWTH WAS INHIBITED AND PROKARYOTIC GROWTH WAS STIMULATED. THE MORPHOLOGY DETERMINED BY SCANNING ELECTRON MICROSCOPY SHOWED TYPICAL MYCELIAL NETWORKS WHERE EUKARYOTIC GROWTH WAS STIMULATED AND NONE WHERE INHIBITED. THE STIMULATION OF EUKARYOTIC GROWTH PRODUCED A GREATER BIOMASS MEASURED IN TERMS OF LIPID PHOSPHATE, RESPIRATORY ACTIVITY OR EXTRACTABLE ADENOSINE NUCLEOTIDES, BUT WITH A SLOWER SYNTHESIS OF PHOSPHOLIPIDS AND DNA AND A SMALLER CONCENTRATION ON MURAMIC ACID (A UNIQUE PROKARYOTE WALL COMPONENT). THE STIMULATION OF EUKARYOTIC GROWTH INCREASED THE RATE OF SULPHOLIPID SYNTHESIS RELATIVE TO DNA OR PHOSPHOLIPID SYNTHESIS.

WHITE, DAVID C. 1982. BIOCHEMICAL DETERMINATION OF BIOMASS AND COMMUNITY STRUCTURE OF ESTUARINE DETRITAL AND SEDIMENTARY MICROBIOTA. IN: IMPACT OF XENOBIOTIC CHEMICALS ON MICROBIAL ECOSYSTEMS, U.S. FISH WILDL. SERV. TECH. PAP. NO. 107. U.S. FISH AND WILDLIFE SERVICE, WASHINGTON, DC. PP. 22-28. (ERL,GB X375).

SEDIMENTARY MICROBIAL BIOMASS, METABOLIC ACTIVITY, NUTRITIONAL STATUS, AND COMMUNITY STRUCTURE WERE DETERMINED BY THE ANALYSIS OF EXTRACTABLE LIPIDS AND HYDROLYSIS PRODUCTS OF THE LIPID EXTRACTED RESIDUE. THESE METHODS HAVE BEEN VALIDATED BY ANALYSIS OF MIXTURES OF MICROBIAL MONOCULTURES; BY COMPARISONS WITH MONOCULTURES ISOLATED FROM MICROBIAL ASSEMBLIES; BY SCANNING ELECTRON MICROSCOPIC ANALYSIS OF DETRITAL MICROBIAL ASSEMBLIES MANIPULATED WITH ANTIBIOTICS, NUTRIENTS, AND LIGHT; AND BY MEASUREMENTS OF THE EFFECTS OF GRAZING BY SELECTIVE DEPOSIT FEEDING INVERTEBRATES. THESE METHODS HAVE SHOWN THAT MG/L CONCENTRATIONS OF XENOBIOTICS IN FLUIDS USED IN OIL AND GAS WELL DRILLING SIGNIFICANTLY MODIFY THE BIOMASS AND COMMUNITY STRUCTURE OF MICROBIAL ASSEMBLIES COLONIZING MARINE SAND. SUCH METHODS ENABLE ESTIMATION OF VALIDITY OF THE USE OF MICROCOSM TEST SYSTEMS IN PREDICTING THE IMPACTS OF XENOBIOTICS IN THE FIELD. THESE METHODS COULD GREATLY STRENGTHEN THE LEGAL APPLICABILITY OF THE DATA FOR USE BY REGULATORY AGENCIES IN PROTECTION ESTUARINE ECOSYSTEMS.

WHITE, DAVID C., ROBERT H. FINDLAY, STEVEN D. FAZIG, RONALD J. BOBBIE, JANET S. NICKELS, WILLIAM M. JAVIS, GLEN A. SMITH, AND ROBERT F. MARTZ. 1980. EFFECTS OF BIODURBATION AND PREDATION BY MELLITA QUINQUIESPERFORATA ON SEDIMENTARY MICROBIAL COMMUNITY STRUCTURE. IN: ESTUARINE PERSPECTIVES. VICTOR S. KENNEDY, EDITOR, ACADEMIC PRESS, NEW YORK, NY. PP. 163-171. (ERL,GB X129).

PROCESSING OF SAND BY SAND DOLLARS (ECHINODERMATA: MELLITA QUINQUIESPERFORATA) RESULTED IN MODIFICATION OF THE BENTHIC MICROBIAL COMMUNITY WITHOUT A SIGNIFICANT EFFECT ON GROSS NUTRIENT BALANCES. MEASURES OF CELLULAR AND MEMBRANE BIOMASS (TOTAL ADENOSINE NUCLEOTIDES, LIPID PHOSPHATE AND CHLOROPHYLL A) WERE ESSENTIALLY UNCHANGED. MURAMIC ACID CONCENTRATION AND THYMIDINE INCORPORATION INTO DNA, WHICH ARE MEASURES OF PROKARYOTIC BIOMASS AND ACTIVITY, REMAINED UNCHANGE. TOTAL METABOLIC ACTIVITY, MEASURED AS ACETATE INCORPORATION INTO LIPID, WAS UNCHANGED. LIPID GLYCEROL AND THE INOSITOL AND GLUCOSAMINE REMAINING IN THE EXTRACTED RESIDUE WERE REDUCED IN THE PROCESSED SEDIMENT, AS WAS SULPHOLIPID BIOSYNTHESIS. FATTY ACIDS CHARACTERISTIC OF PROKARYOTES WERE ENRICHED WHEREAS FATTY ACIDS CHARACTERISTIC OF MICROEUKARYOTES DECREASED IN PROCESSED SANDS. THE SAME WAS TRUE FOR THE LIPID NEUTRAL CARBOHYDRATES. EXAMINATION OF MEIOFAUNA SHOWED SIGNIFICANT REDUCTION IN FORAMINIFERA, SUGGESTING THAT SAND DOLLARS ARE SELECTIVE PREDATORS FOR A PORTION OF THE NONPHOTOSYNTHETIC MICROEUKARYOTES, HAVING LITTLE EFFECT ON THE BIOMASS OR METABOLIC ACTIVITY OF BENTHIC PROKARYOTES.

WHITE, DAVID C., JANET S. NICKELS, MICHAEL J. GEHRON, JEFFREY H. PARKER, ROBERT F. MARTZ, AND NORMAN L. RICHARDS. IN PREP. BIOCHEMICAL MEASURES OF CORAL METABOLIC ACTIVITY, NUTRITIONAL STATUS AND MICROBIAL INFECTION WITH EXPOSURE TO OIL AND GAS WELL DRILLING FLUIDS. (ERL,GB X394).

THE REEF BUILDING CORAL MONTASTREA ANNULARIS WAS EXPOSED CONTINUOUSLY TO SUSPENSIONS OF OIL AND GAS-WELL DRILLING FLUIDS AT CONCENTRATIONS OF 0.1 ML LITER (-1), 0.01 ML LITER (-1), AND 0.001 ML LITER (-1) IN FLOWING SEAWATER AT THE U.S. NAVAL STAGE I PLATFORM (30 DEGREES 7.5' N, 85 DEGREES 46.3' W). AFTER 6 WEEKS EXPOSURE, CORAL FRAGMENTS OF 30 TO 60 CM SQUARED SURFACE AREA WERE BROKEN OFF, RINSED IN SEAWATER, AND EXTRACTED IN A ONE-PHASE CHLOROFORM-METHANOL SEAWATER EXTRACT AND RETURNED TO THE LABORATORY. IN THE LABORATORY, THE EXTRACTION WAS COMPLETED AND THE LIPIDS WERE ANALYZED FOR THEIR PHOSPHOLIPID CONTENT, ALKYL FATTY ACID COMPOSITION, AND NEUTRAL LIPID TRIGLYCERIDE GLYCEROL. THE AQUEOUS PHASE WAS ANALYZED FOR FREE AMINO ACID COMPOSITION. BIOCHEMICAL EVIDENCE OF STRESS WAS REFLECTED IN THE CESSATION OF GROWTH AS MEASURED IN DEPRESSED DIACYL PHOSPHOLIPID. DETAILED ANALYSIS OF THE ACYL FATTY ACID COMPOSITION BY CAPILLARY GAS CHROMATOGRAPHY SHOWED CHANGES IN POLYENOIC FATTY ACIDS SUGGESTING POSSIBLE CHANGES IN THE METABOLISM OF THE FATTY ACIDS INDUCED BY THE EXPOSURE TO THE DRILLING FLUIDS. THERE WAS NO SIGNIFICANT EFFECT ON THE LEVEL OF TRIGLYCERIDE GLYCEROL. THE CORAL ALSO SHOWED INCREASED LEVELS OF THE FREE ASPARTIC ACID AND A DOSE-RESPONSE RELATED DECREASE IN THE FREE GLUTAMIC ACID WITH EXPOSURE. THIS EVIDENCE SUGGESTS THAT BIOCHEMICAL ANALYSIS OF METABOLIC ACTIVITY AND NUTRITIONAL STATUS MAY BE USEFUL AS MARKERS FOR POLLUTION INDUCED CHANGES IN REEF BUILDING CORALS AND THUS FOR MONITORING CORAL REEFS.

WILKES, FRANK G. 1978. LABORATORY MICROCOSMS FOR USE IN DETERMINING POLLUTANT STRESS. IN: AQUATIC POLLUTANTS: TRANSFORMATION AND BIOLOGICAL EFFECTS. D. HUTZINGER, I.H. VAN LELYVELD, AND B.C.J. ZOETEMAN, EDITORS, PERGAMON PRESS, NEW YORK, NY. PP. 309-320. (ERL,GB 357).

THE GOAL OF THIS RESEARCH IS TO DEVELOP A NUMBER OF TESTS THAT WILL YIELD INFORMATION ABOUT DIFFERENT PROCESSES AND MECHANISMS WITHIN ESTUARINE ECOSYSTEMS: TESTS THAT WILL EXAMINE THE NON-BIOLOGICAL AND THE BIOLOGICAL, THE FATE AND THE EFFECTS. THESE TESTS MAY BE TERMED "MICROCOSMS HAVE BEEN DEFINED AS MINIATURE ECOSYSTEMS CONTAINING COMPONENTS AND PROCESSES NECESSARY TO INVESTIGATE SPECIFIC ORIGINS, FLOWS, FATES, AND/OR EFFECTS OF MATERIALS IN THE ENVIRONMENT (20). MICROCOSMS ARE USED TO REPRESENT SEGMENTS OF THE ENVIRONMENT AND TO INTEGRATE THOSE INTERACTIONS AMONG ECOSYSTEM PROCESSES AND COMPONENTS NOT OBTAINABLE IN SINGLE SPECIES EXPERIMENTS. TESTS DESCRIBED IN THIS DISCUSSION FOCUS ON PARTICULAR PROCESSES AND PARTICULAR COMPONENTS OF THE ESTUARINE ENVIRONMENT, I.E., PARTICULAR SUB-UNITS OF THE ESTUARINE ECOSYSTEM. ALL TESTS ARE NOT APPLICABLE TO ALL COMPOUNDS. BY SELECTIVELY CHOOSING TESTS ON THE BASIS OF THE COMPOUND IN QUESTION AND THE INFORMATION DESIRED, IT WILL BE POSSIBLE TO DEVELOP INFORMATION APPLICABLE TO A PARTICULAR COMPOUND AND THE PROBLEM AT HAND. FIG.6 DEPICTS AN ARRAY OF SUCH TESTS. THE TESTS VARY IN COMPLEXITY. THEY ALSO VARY AS TO THE DIFFERENT POINTS, COMPONENTS, AND PROCESSES IN THE ECOSYSTEM IN WHICH THEY FOCUS. THEREFORE, DEPENDING ON THE INFORMATION NEEDED, ANY NUMBER OR COMBINATION OF THESE TESTS MAY BE SELECTED TO FORM A PROTOCOL DESIGNED TO PROVIDE THE REQUIRED INFORMATION. FURTHER RELATIONSHIPS AMONG THESE TESTS HAVE BEEN PREVIOUSLY DESCRIBED (21). THE OBJECTIVE IN DEVELOPING THESE TECHNIQUES IS TO PROVIDE THE AGENCY WITH METHODS TO OBTAIN INFORMATION NECESSARY FOR ITS REGULATORY ACTIVITIES. THE TESTS THEMSELVES MAY BE USED AS PART OF A SCREENING PROCESS OR PROTOCOL FOR THE IDENTIFICATION OF POTENTIALLY HAZARDOUS COMPOUNDS. DATA FROM THESE TESTS WILL BE USED IN THE ESTABLISHMENT OF WATER QUALITY CRITERIA, TOXIC SUBSTANCE PROTOCOLS, PESTICIDE REGISTRATION GUIDELINES, EFFLUENT GUIDELINES, AND OCEAN-DUMPING GUIDELINES.