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ABSTRACTS and INDEX TO PUBLICATIONS RELATED TO MICROBIAL ECOLOGY, BIOCHEMISTRY, GENETICS and BIOTECHNOLOGY

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MICROBIAL ECOLOGY AND BIOTECHNOLOGY BRANCH

About This Publication

The Microbial Ecology and Biotechnology Branch, Environmental Research Laboratory, Gulf Breeze, FL is responsible for conducting a research program to: 1) describe and model microbiological interactions with pollutants, including their biodegradation rate, sorption, transport, and resultant effects on organisms; and 2) develop methods and principles which assess the potential ecological risk associated with the application of genetically engineered organisms (biotechnology) to the environment, including survival, growth, genetic stability, and ecological hazard.

This publication lists all in-house and extramural reports issued by the Microbial Ecology and Biotechnology Branch since 1973, including in-press and in-preparation manuscripts.

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Henry F. Enos

Laboratory Director

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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,GB 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 (KM = 25.6 MM) AND HEMOGLOBIN AS WELL AS THE NITROPHENYL ESTERS OF TYROSINE (KM = 2.4 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.
AVAIL. FROM NTIS, SPRINGFIELD, VA: PB81-171183.

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 TO THE EIGHTH POWER ML-1 OR 10 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., 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 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 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.

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., NEW YORK, 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., 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 EMULISIFIED IN A TWEEN 80-SEAWATER SOLUTION. IT IS SUGGUSTED 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.

ALEXANDER, MARTIN. IN PRESS. ANOMALOUS EFFECTS OF CONCENTRATION ON BIODEGRADATION OF ORGANIC CHEMICALS. APPL. ENVIRON. MICROBIOL. (ERL,GB X481).

THE PURPOSE OF THIS REVIEW IS TO SHOW THAT ERRONEOUS CONCLUSIONS MAY BE REACHED FROM STUDIES OR ROUTINE TESTS DONE WITH ORGANIC CHEMICALS AT THE LEVELS OFTEN EMPLOYED FOR PREDICTING CHEMICAL FATE IN NATURE. THESE ERRORS IN EXTRAPOLATION FROM HIGH TO LOW CONCENTRATION MAY OCCUR IN ROUTINE EVALUATIONS OF BIODEGREDATION, CAREFUL ASSESSMENTS OF KINETICS OR THE ESTABLISHMENT OF PRODUCTS FORMED IN WATERS, SOILS OR SEDIMENTS.

ALEXANDER, MARTIN. 1985. BIODEGRADATION OF ORGANIC CHEMICALS. ENVIRON. SCI. & TECHNOL. 18(2):106-111. (ERL,GB X483*).

THE PURPOSE OF THIS ARTICLE IS TO SHOW THAT ERRONEOUS CONCLUSIONS MAY BE REACHED FROM STUDIES OR ROUTINE TESTS WITH ORGANIC CHEMICALS AT THE LEVELS OFTEN EMPLOYED FOR PREDICTING CHEMICAL FATE IN NATURE. THESE ERRORS IN EXTRAPOLATION FROM HIGH TO LOW CONCENTRATION MAY OCCUR IN ROUTINE EVALUATIONS OF BIODEGRADATION, CAREFUL ASSESSMENTS OF KINETICS, OR THE ESTABLISHMENT OF PRODUCTS FORMED IN WATER, SOIL, OR SEDIMENTS

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, PHYSIOLOGICAL 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, AL W. 1984. BIODEGRADATION IN THE ESTUARINE-MARINE ENVIRONMENTS AND THE GENETICALLY ALTERED MICROBE. IN: GENETIC CONTROL OF ENVIRONMENTAL POLLUTANTS. GILBERT S. OMENN AND ALEXANDER HOLLAENDER, EDITORS, PLENUM PRESS, NEW YORK, NY. PP. 97-115. (ERL,GB 497).

HISTORICALLY, SOME ORGANIC AND INORGANIC COMPOUNDS HAVE BEEN CONSIDERED SERIOUS ENVIRONMENTAL THREATS FROM THE STANDPOINT OF QUANTITY PRODUCED, BIOACCUMULATION, TOXICITY, OR ADVERSE ENVIRONMENTAL EFFECTS. THIS PAPER DOCUMENTS SELECTED EXAMPLES OF KNOWN INTRODUCTIONS OF TOXIC CHEMICALS INTO MARINE AND ESTUARINE ENVIRONMENTS AND DESCRIBES HOW HABITAT DIFFERENCES AFFECT BIODEGRADATION POTENTIAL. CONCERNS REGARDING RELEASE OF GENETICALLY ALTERED ORGANISMS INTO THESE ENVIRONMENTS ALSO ARE DISCUSSED.

BOURQUIN, A.W. 1977. DEGRADATION OF MALATHION BY SALT-MARSH MICROORGANISMS. APPL. ENVIRON. MICROBIOL. 33(2):356-362. (ERL,GB 291).

NUMEROUS BACTERIA FROM A SALT-MARSH ENVIRONMENT ARE CAPABLE OF DEGRADING MALATHION, AN ORGANOPHOSPHATE INSECTICIDE, WHEN SUPPLIED WITH ADDITIONAL NUTRIENTS AS ENERGY AND CARBON SOURCES. SEVEN ISOLATES EXHIBITED ABILITY (48 TO 90%) TO DEGRADE MALATHION AS A SOLE CARBON SOURCE. GAS AND THIN-LAYER CHROMATOGRAPHY AND INFRARED SPECTROSCOPY CONFIRMED MALATHION TO BE DEGRADED VIA MALATHION-MONOCARBOXYLIC ACID TO THE DICARBOXYLIC ACID AND THEN TO VARIOUS PHOSPHOTHIONATES. THESE TECHNIQUES ALSO IDENTIFIED DESMETHYL-MALATHION, PHOSPHOROTHIONATES, AND FOUR-CARBON DICARBOXYLIC ACIDS AS DEGRADATION PRODUCTS FORMED AS A RESULT OF PHOSPHATASE ACTIVITY.

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*).

WE HAVE BEEN DISCUSSING THE PROBLEM OF HOW TO ASSESS ENVIRONMENTAL STRESS ON ECOSYSTEMS AND THE MICROBIOLOGICAL PROCESSES THEREIN. BASICALLY, WHAT WE HAVE BEEN DISCUSSING ARE METHODS--METHODS FOR MEASURING BIOMASS, HETEROTROPHIC ACTIVITY, BIODEGRADATION, AND OTHER INDICATORS OF ENVIRONMENTAL QUALITY. WHAT I WOULD LIKE TO SEE DISCUSSED NOW IS THE QUESTION: "WHAT CAN WE GET OUT OF THESE METHODS THAT CAN BE USED BY REGULATORY AGENCIES?" I AM NOT SURE THAT WE ARE ANY CLOSER TO AGREEMENT ON ANY PARTICULAR METHOD OR METHODS THAT ARE MORE ACCEPTABLE THAN OTHERS TO THE SCIENTIFIC COMMUNITY FOR ASSESSING ANY ENVIRONMENTAL STRESS. HOWEVER, I THINK THAT WE HAVE LEARNED A LOT ABOUT THE VARIOUS METHODS, INCLUDING THEIR LIMITATIONS AND THEIR POSSIBLE BENEFITS. WE HAVE ADDRESSED VARIOUS RESEARCH NEEDS AND HAVE JUST HEARD A VERY EXCELLENT PRESENTATION ON THIS SUBJECT. WHAT I WOULD LIKE TO ADD TO THIS IS A REQUEST THAT WE BEGIN TO APPLY SOME OF THIS INFORMATION, PARTICULARLY IN TERMS OF THE LIMITATIONS AND BENEFITS OF THE VARIOUS METHODS, TO ASSESS THE SO-CALLED HEALTH OF A GIVEN ENVIRONMENT. THERE ARE ENVIRONMENTAL DECISIONS WHICH MUST BE BASED ON THE AVAILABLE TECHNOLOGY, BECAUSE WE REALLY DO NOT HAVE ANY TIME AND MUST MAKE SOME DECISIONS NOW. WE CAN MODIFY THOSE DECISIONS LATER, BUT A DECISION IS NEEDED NOW BASED ON THE CURRENT TECHNOLOGY. IF PEOPLE SUCH AS THOSE AT THIS CONFERENCE DO NOT AID IN DETERMINING WHICH METHODS SHOULD BE USED WITH WHAT QUALIFICATIONS, THEN LESS QUALIFIED PEOPLE WILL MAKE THOSE DECISIONS.

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

REQUIRED INFORMATION ON MICROBIAL DEGRADATION OF ORGANOCHLORINE PESTICIDES IN ESTUARIES WILL BE SUPPLIED WHEN WE ANSWER THE FOLLOWING QUESTIONS: WHAT TYPES OF MICROORGANISMS ARE INVOLVED IN TRANSFORMATION OF ORGANOCHLORINE PESTICIDES? ARE THEY THE SAME TYPES THAT PREDOMINATE IN ORGANIC DETRITUS FORMATION OR ARE THEY SPECIES SELECTED BY EXPOSURE TO PESTICIDE POLLUTION? WHAT IS THE DEGREE OF DEGRADATION OF SPECIFIC COMPOUNDS? DOES CO-METABOLISM OCCUR IN THE ESTUARY, AND IS IT A MEANS OF DEGRADING PESTICIDES? WHAT EFFECTS DO ADDITIONAL HYDROCARBONS, SUCH AS OIL, HAVE ON MICROBIAL DEGRADATION OF PESTICIDES IN THE ESTUARY? IS SYNERGISTIC ACTIVITY WITHIN THE ESTUARINE MICROFLORA A FACTOR IN MICROBIAL DEGRADATION OF PESTICIDES? WHAT IS THE ROLE OF MICROBIAL INTRACELLULAR ACCUMULATION AND ADSORPTION IN BIODEGRADATION AND/OR BIOLOGICAL MAGNIFICATION OF PESTICIDES? WHAT ENVIRONMENTAL FACTORS IN THE ESTUARY PREVENT OR INHIBIT OR ACCELERATE MICROBIAL BREAKDOWN OF PESTICIDES? WHAT TYPES OF PESTICIDES ARE EASILY DEGRADED? WHAT ARE THE EFFECTS OF DEGRADATION PRODUCTS ON ESTUARINE MACRO- AND MICROFLORA AND FAUNA? CONSIDERING ALL THE ABOVE QUESTIONS, ARE SIMILAR REACTIONS, SELECTIONS AND EFFECTS OCCURRING IN THE WATER COLUMN AND IN THE SEDIMENTS? SUCH STUDIES WILL PROVIDE DATA FOR AN ACCURATE PICTURE OF THE ROLE OF ESTUARINE MICROORGANISMS ON THE FATE OF ORGANIC POLLUTANTS. SUCH DATA ARE NEEDED TO FORMULATE WATER QUALITY CRITERIA FOR PESTICIDE REGULATION IN THE ESTUARINE ENVIRONMENT.

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 CHITINOCLASTIC 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, 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,GB 235*).
AVAIL. FROM NTIS, SPRINGFIELD, VA: PB-240 159.

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, VIURSES, 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., L.A. KIEFER, N.H. BERNER, S. CROW, AND D.G. AHEARN. 1975. INHIBITION OF ESTUARINE MICROORGANISMS BY POLYCHLORINATED BIPHENYLS. IN: DEVELOPMENT 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., 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 SCRENING SYSTEM; ECO-CORE SYSTEM; CONTINUOUS FLOW SYSTEMS; AQUATIC GRADIENT AVOIDANCE RESPONSE SYSTEM; BENTHIC BIOASSAY SYSTEM.

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, ANN ARBOR, MI. PP. 253-264. (ERL,GB 361).

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). AEROSPACE RESEARCH LABS., WRIGHT-PATTERSON AFB, OH. 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 DEMOSTRATED FURTHER WHEN FRESHWATER, BUT NOT SALTWATER, MICROBIAL POPULATIONS WERE SHOWN TO ADAPT WITHIN SEVERAL DAYS TO DEGRADE P-NITOPHENOL 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 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 PHOSPHOTHIONATES AS A RESULT OF CARBOXYESTERASE CLEAVAGE. IN ADDITION, SOME EXPECTED PHOSPHATASE ACTIVITY PRODUCES DESMETHYL-MALATHION, PHOSPHOTIONATES, 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, A.W., AND D.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, SAMUEL P. MEYERS, EDITOR, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. PP. 89-96. (ERL,GB 313*).

ORGANIC MICROLAYERS OCCUR AT THE AIR-WATER INTERFACE OF MOST BODIES OF WATER. THE MICROLAYER OR "SEA SLICK" FORMATION APPEARS TO BE RELATED MAINLY TO DECAY OF NATURALLY OCCURRING AQUATIC ORGANISMS OR TO THEIR PRODUCTION OF LIPODIAL BY-PRODUCTS (BABKOV, 1965). SEA SLICKS ARE KNOWN TO INFLUENCE WAVE ACTION AND HEIGHT, AIR-WATER TEMPERATURE EXCHANGE, STABILITY OF BUBBLES AND FOAMS, AND THE CONCENTRATION OF SALT-CONTAINING MICRO-DROPLETS IN THE MARINE ATMOSPHERE (BAIER, 1970). IN COASTAL REGIONS PARTICULARLY, THE DIRECT ACTIVITIES OF MAN ARE OF INCREASING IMPORTANCE IN THE GENERATION OF SURFACE SLICKS. INDUSTRIAL AND MUNICIPAL SEWAGE EFFLUENTS CONSTITUTE THE MAJOR SOURCE OF FILMS AND FOAMS, BUT CRUDE OIL SPILLAGE APPEARS TO BE A MAJOR CONTRIBUTOR IN LOCALIZED AREAS (AHEARN, 1974). IN STUDIES FROM OUR LABORATORIES ON A YEAST ISOLATED FROM A FRESHWATER OIL LAYER, THE CHLORINATED PESTICIDE HEPTACHLOR EITHER STIMULATED OR INHIBITED HEXADECANE UTILIZATION DEPENDENT UPON CULTURAL CONDITIONS (SMITH ET AL., 1976). THE HEPTACHLOR WAS BOUND TO THE YEAST CELLS BUT NO DIRECT EVIDENCE FOR ITS METABOLISM WAS OBTAINED. STIMULATION OF OXIDATION OF HEXADECANE IN THE PRESENCE OF A NON-UTILIZABLE SUBSTRATE BY A FUNGUS (CLADOSPORIUM RESINAE) HAS BEEN SHOWN ALSO BY WALKER AND COONEY (1975). GROWTH INHIBITION OF ESTUARINE MICROORGANISMS BY POLYCHLORINATED BIPHENYL FORMULATIONS HAS BEEN DEMONSTRATED IN LABORATORY STUDIES (BOURQUIN AND CASSIDY, 1975; BOURQUIN ET AL., 1975) AND FIELD AND LABORATORY STUDIES HAVE SHOWN THAT CRUDE OIL MAY DIVERSELY AFFECT THE VARIOUS SPECIES OF THE ESTUARINE MICROECOSYSTEM (AHEARN ET AL., 1971; CROW ET AL., 1975B; HOOD ET AL., 1975). THE POTENTIAL FOR ALTERATION OF THE ESTUARINE SURFACE FILM MICROFLORA BY HYDROCARBONS CAN BE EXPECTED TO INCREASE WITH THE ADVENT OF SUPERPORTS AND THE EXTENSION OF OFFSHORE OIL FIELDS. FOR A BETTER UNDERSTANDING OF THE COMPOSITE PHENOMENA AFFECTED BY SURFACE FILMS, AND THEIR ROLE IN POLLUTANT CONCENTRATION OR METABOLISM, A SUBSTANTIAL INCREASE IN OUR KNOWLEDGE OF THE CHEMICAL IDENTITY OF SURFACE FILMS AND OF THE CHANGES IN THE FILM WITH MICROBIAL ACTIVITY NEEDS TO BE DEVELOPED.

BOURQUIN, AL W., P.H. PRITCHARD, WILLIAM W. WALKER, AND ROD PARRISH. 1985. PROCEEDINGS OF THE WORKSHOP: BIODEGRADATION KINETICS NAVARRE BEACH, FLORIDA 18-20 OCTOBER 1983. EPA/600/9-85/018, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 161P.

THIS WORKSHOP, HELD OCTOBER 18-20, 1983, AT PENSACOLA BEACH, FLORIDA, FOCUSED ON PERTINENT ISSUES RELATED TO THE SCIENTIFIC INVESTIGATION OF THE MICROBIAL DEGRADATION RATES OF ORGANIC CHEMICALS IN NATURAL ENVIRONMENTS. PARTICIPANTS DISCUSSED METHODOLOGICAL CRITERIA FOR THESE INVESTIGATIONS AND THE NEED FOR CONCENTRATING ON THE KINETIC ASPECTS OF BIODEGRADATION. POSITION PAPERS DEALING WITH THE FOLLOWING TOPICS WERE PRESENTED IN OPEN SESSIONS: (1) STATISTICAL AND EXPERIMENTAL REQUIREMENTS FOR MODELING DECAY CURVES; (2) THE "SECOND ORDER" APPROACH ASSUMPTION, LIMITATIONS AND RESEARCH NEEDS; (3) FACTORS CONTROLLING BIODEGRADATION RATES IN MICROBIAL COMMUNITIES; (4) APPLICATION OF UPTAKE AND MINERALIZATION KINETICS; (5) RELATIONSHIPS BETWEEN CHEMICAL STRUCTURE AND BIODEGRADATION RATES; AND (6) EXTRAPOLATION OF LABORATORY BIODEGRADATION DATA TO THE FIELD. DISCUSSIONS WITHIN EACH SESSION ARE SUMMARIZED BY THE PANEL MEMBERS IN REPORTS THAT INCLUDE A CONSENSUS OF THE DIRECTION AND EXTENT OF RESEARCH REQUIRED FOR THE DESCRIPTION OF BIODEGRADATION RATES OF XENOBIOTIC CHEMICALS IN NATURAL ENVIRONMENTS. THESE PROCEEDINGS CONCLUDE WITH A SUMMARY REPORT AND SUGGESTIONS FOR FUTURE RESEARCH IN BIODEGRADATION KINETICS. THIS REPORT IS SUBMITTED IN FULFILLMENT OF CONTRACT NO. CR 810789 BY GULF COAST RESEARCH LABORATORY IN CONJUNCTION WITH GEORGIA STATE UNIVERSITY COOPERATIVE AGREEMENT R809370 UNDER THE SPONSORSHIP OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY. THIS REPORT COVERS A PERIOD FROM APRIL 4, 1984 TO MAY 13, 1984, AND WORK WAS COMPLETED AS OF JUNE 30, 1984.

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., 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.
AVAIL. FROM NTIS, SPRINGFIELD, VA: PB-298 254.

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.

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*).

THE MICROBIAL FLORA NATIVE TO OR CARRIED INTO MOST COASTAL AND ESTUARINE WATERS AND THEIR UNDERLYING SEDIMENTS GENERALLY IS EXTENSIVE IN BIOMASS, NUMBER OF SPECIES INVOLVED, AND DIVERSITY OF PHYSIOLOGICAL AND ENZYMATIC FUNCTIONS THEY PERFORM. THESE MICROORGANISMS PLAY SEVERAL ROLES IN MARINE ECOSYSTEMS AND IN HUMAN USE OF THE MARINE ENVIRONMENT AS A SOURCE OF FOOD AND RECREATION. THEY MAY FUNCTION AS THE FOLLOWING: (1) AGENTS OF HUMAN DISEASE THAT ARE INTRODUCED INTO THE MARINE WATERS FROM HUMAN AND LOWER ANIMAL WASTES AND TERRESTRIAL ENVIRONMENTS OR THAT INCREASE IN NUMBERS THEREIN BECAUSE OF NUTRIENT OR THERMAL POLLUTION. (2) AGENTS OF FAUNAL DISEASE. (3) SOURCES OR MEDIATORS OF FOOD TO HIGHER ORGANISMS BY THE DEGRADATION, TRANSFORMATION, AND ASSIMILATION OF NUTRIENTS THAT OCCUR NATURALLY, THAT ARE TRANSPORTED INTO MARINE WATERS THROUGH TERRESTRIAL RUN-OFF, OR THAT ARE INTRODUCED BY HUMAN ACTIVITIES. (4) DEGRADERS OR TRANSFORMERS OF POLLUTANTS SUCH AS PESTICIDES, PETROLEUM PRODUCTS, SNYTHETIC ORGANICS, AND METALLIC IONS LIKE MERCURY. THE RELATIONSHIP OF THE POLLUTANT TO THE MICROBIAL FLORA IS DIFFERENT IN EACH OF THE FOUR FUNCTIONS. (1) WITH REFERENCE TO AGENTS OF HUMAN DISEASE, THE MICROORGANISM ITSELF IS GENERALLY THE CONTAMINANT INTRODUCED INTO THE ENVIRONMENT USUALLY BY SEWAGE EFFLUENTS. (2) IN FAUNAL DISEASE, AN EXTRINSIC POLLUTANT AFFECTS A BASICALLY INTRINSIC HOST-PARASITE RELATIONSHIP BY STRESSING ANIMALS SO THAT THEIR SUSCEPTIBILITY TO DISEASE INCREASES. (3) THE EXTERNALLY INTRODUCED ORGANIC POLLUTANT IS THE TARGET FOR MARINE ORGANISMS THAT ARE CAPABLE OF DEGRADING, TRANSFORMING OR ASSIMILATING SUCH MATERIALS AS PETROLEUM HYDROCARBONS AND PESTICIDES. (4) CONVERSELY, THE MICROBIAL FLORA NECESSARY FOR NUTRIENT TRANSFORMATIONS IN MARINE ECOSYSTEMS MAY THEMSELVES BE THE TARGETS FOR THESE AND OTHER ORGANIC AND INORGANIC, EXTERNALLY INTRODUCED POLLUTANTS. ALTERNATIVELY, THE PROLIFERATION OF HETEROTROPHIC MICROORGANISMS UNDER NUTRIENT STIMULATION CAN HAVE ADVERSE EFFECTS SUCH AS ANOXIA. ASSOCIATION, IF NOT CAUSALITY, BETWEEN A FORM OF POLLUTION AND SOME DETRIMENTAL EFFECT IS STRONG ENOUGH IN SOME INSTANCES TO SUPPORT CRITERIA, GUIDELINES, AND STANDARDS AS WELL AS MONITORING PROGRAMS. SUCH IS THE CASE WITH HUMAN HEALTH EFFECTS AND TO A LESSER EXTENT FAUNAL DISEASE. NEVERTHELESS, THERE IS A CRITICAL NEED FOR ADDITIONAL EPIDEMIOLOGICAL OR EPIZOOLOGICAL DATA, INFORMATION ASSOCIATING POLLUTION LEVELS WITH HUMAN AND FAUNAL DISEASE AND THE DENSITIES OF THE ETIOLOGICAL AGENTS INVOLVED, AND RESEAARCH ON METHODOLOGY (ESPECIALLY AS RELATED TO FAUNAL DISEASE). THERE IS ALSO A CRITICAL NEED FOR DATA CONCERNING THE ROLES OF MICROORGANISMS IN MARINE ECOSYSTEMS AND DOCUMENTING ANY EFFECTS OF POLLUTANTS ON THEIR ACTIVITIES.

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 (98/36) 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 98/36 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 98/36 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.

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.

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 THERFORE 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., AND RICHARD P. WINFIELD. 1984. USER'S GUIDE FOR WASTOX, A FRAMEWORK FOR MODELING THE FATE OF TOXIC CHEMICALS IN AQUATIC ENVIRONMENTS, PART 1: EXPOSURE CONCENTRATION. EPA-600/3-84-077, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL.

A COMPUTER PROGRAM WAS DEVELOPED FOR MODELING THE FATE OF TOXIC CHEMICALS THAT ARE DISCHARGED TO NATURAL WATER SYSTEMS. THE PROGRAM PERMITS THE USER TO MODEL THE WATER AND SEDIMENT TRANSPORT IN A NATURAL WATER SYSTEM AND THE MOVEMENT AND DECAY OF CHEMICALS DISCHARGED TO THAT SYSTEM. EITHER THE EQUILIBRIUM DISTRIBUTION OF CHEMICALS CONTINUALLY DISCHARGED TO THE SYSTEM OR THE CONCENTRATIONS IN THE SYSTEM AS A FUNCTION OF TIME MAY BE COMPUTED. FROM ONE TO THREE TYPES OF SOLIDS MAY BE CONSIDERED. THE REACTION OF THE CHEMICAL AND ITS TRANSFER AMONG PHASES ARE COMPUTED FROM SPECIFIED CHARACTERISTICS OF THE CHEMICAL AND ENVIRONMENTAL PARAMETERS OF THE SYSTEM. THE PROCESSES CONSIDERED INCLUDE PHOTOLYSIS, HYDROLYSIS, BIODEGRADATION, VOLATILIZATION AND ADSORPTION. ADSORPTION TO THE SOLIDS TYPES INCLUDED IN THE MODEL IS DESCRIBED AS A LOCAL EQUILIBRIUM PROCESS DEFINED BY A PARTITION COEFFICIENT AND THE LOCAL SOLIDS CONCENTRATION. ALL OTHER PROCESSES ARE DEFINED IN TERMS OF REACTION RATES. WASTOX DOES NOT EXPLICITLY SPECIFY EACH OF THE TRANSPORT PROCESSES THAT MAY AFFECT THE CHEMICAL OR SOLIDS. TRANSPORT IS CONSIDERED EITHER AS AN ADVECTIVE PROCESS DEFINED BY A FLOW OR A MIXING PROCESS DEFINED BY A DISPERSION OR EXCHANGE. SPECIFICATION OF SEPARATE TRANSPORT PROCESSES IS MADE BY THE USER BY DEFINING UP TO NINE SETS OF FLOWS AND DISPERSIONS (TERMED FIELDS). EACH FIELD IS APPLIED TO EITHER DISSOLVED CHEMICAL OR ADSORBED CHEMICAL AND SOLIDS, OR BOTH. FOR EXAMPLE, DISPERSION WITHIN THE STATIONARY SEDIMENT IS LIMITED TO DISSOLVED CHEMICAL; THEREFORE A FIELD OF DISPERSIONS WOULD BE SPECIFIED BY THE USER AND APPLIED ONLY TO THIS COMPONENT. THE USE OF SUCH A NON-SPECIFIC TRANSPORT STRUCTURE PERMITS CONSTRUCTION OF MODELS CONSISTENT WITH THE UNDERSTANDING OF THE PARTICULAR NATURAL WATER SYSTEM AND THE QUESTION BEING ADDRESSED. WASTOX IS SUFFICIENTLY GENERAL TO BE APPLIED TO ALL TYPES OF NATURAL WATER SYSTEMS. IT HAS BEEN SUCCESSFULLY APPLIED TO THE JAMES RIVER ESTUARY, THE GREAT LAKES, AND THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) EXPERIMENTAL STREAM CHANNELS AT MONTICELLO, MINNESOTA.

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 REPRESENTAIVE OF BED SEDIMENT. THEREFORE, A SINGLE PARTITION COEFFICIENT IS INADEQUATE FOR EXPOSURE CONCENTRATION PREDICTIONS.

CONNOLLY, JOHN P., AND ROBERT V. THOMANN. IN PRESS. WASTOX, A FRAMEWORK FOR MODELING THE FATE OF TOXIC CHEMICALS IN AQUATIC ENVIRONMENTS, PART 2: FOOD CHAIN. EPA/600/4-85/040, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 52P.

A FOOD CHAIN BIOACCUMULATION MATHEMATICAL FRAMEWORK WAS DEVELOPED AS PART OF A BROADER FRAMEWORK FOR MODELING THE FATE OF TOXIC CHEMICALS IN NATURAL WATER SYSTEMS, ENTITLED WASTOX. A USER'S GUIDE FOR WASTOX (EPA-600/3-84-077) WAS PUBLISHED IN AUGUST 1984. THE FOOD CHAIN COMPONENT OF WASTOX DESCRIBED HERE IS A GENERALIZED MODEL FOR ESTIMATING THE UPTAKE AND ELIMINATION OF TOXIC CHEMICALS BY AQUATIC ORGANISMS. UPTAKE AND ELIMINATION RATES ARE RELATED TO THE BIOENERGETIC PARAMETERS OF THE SPECIES ENCOMPASSED IN EITHER A LINEAR FOOD CHAIN OR A FOOD WEB. CONCENTRATIONS ARE CALCULATED AS A FUNCTION OF TIME AND AGE FOR EACH SPECIES INCLUDED. EXPOSURE TO THE TOXIC CHEMICAL IN FOOD IS BASED ON A CONSUMPTION RATE AND PREDATOR-PREY RELATIONSHIPS THAT ARE SPECIFIED AS A FUNCTION OF AGE. EXPOSURE TO THE TOXIC CHEMICAL IN WATER IS FUNCTIONALLY RELATED TO THE RESPIRATION RATE. STEADY-STATE CONCENTRATIONS MAY ALSO BE CALCULATED. FOOD CHAIN EXPOSURE TO CHEMICALS MAY BE SPECIFIED BY THE USER OF THE MODEL OR MAY BE TAKEN DIRECTLY FROM THE VALUES CALCULATED BY THE EXPOSURE CONCENTRATION COMPONENT OF WASTOX. MIGRATORY SPECIES, AS WELL AS NONMIGRATORY SPECIES, MAY BE CONSIDERED. THE MODEL HAS BEEN SUCCESSFULLY USED TO MODEL KEPONE IN THE JAMES RIVER STRIPED BASS FOOD CHAIN AND PCBS IN THE LAKE MICHIGAN LAKE TROUT FOOD CHAIN AND THE SAGINAW BAY, LAKE HURON YELLOW PERCH FOOD CHAIN.

CONNOLLY, JOHN P., AND ROBERT V. THOMANN. IN PREP. WASTOX, A FRAMEWORK FOR MODELING THE FATE OF TOXIC CHEMICALS IN AQUATIC ENVIRONMENTS, PART 2: FOOD CHAIN (PROJECT SUMMARY). EPA/600/S4-85/040, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 8P.

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*).
AVAIL. FROM NTIS, SPRINGFIELD, VA: PB81-129512.

THE EFFECTS OF CARBARYL, METHYLPARATHION 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.

CRIPE, C.R. 1980. APPARATUS TO PRODUCE TIDAL FLUCTUATIONS IN A SIMULATED SALT MARSH SYSTEM. PROG. FISH-CULT. 42(1):32-33. (ERL,GB X050).

THE APPARATUS DESCRIBED HERE (FIG. 1) WAS DESIGNED TO AID IN STUDYING PESTICIDE DYNAMICS IN SIMULATED SALT MARSH SYSTEMS (CRIPE AND LIVINGSTON 1977) AND USED CIRCULAR TANKS 3 M IN DIAMETER AND 0.6 M DEEP. WATER ENTERED THE TANKS CONTINUOUSLY AT 3 L/M THROUGH A SIPHON AND HEADBOX ARRANGEMENT AND DISCHARGED THROUGH A CONSTANT-LEVEL EXCURRENT SIPHON (FIG. 2) THAT WAS RAISED AND LOWERED BY A MOTOR AND GEAR ASSEMBLY (FIG. 3). THE EXCURRENT SIPHON, MADE OF 2.5-CM GLASS AND LATEX TUBING, HAD A SMALL AIR TUBE AT ONE OF THE BENDS TO PREVENT THE TANK FROM SIPHONING BELOW THE LEVEL OF THAT BEND.

CRIPE, C.R. 1979. AUTOMATED DEVICE (AGARS) FOR STUDYING AVOIDANCE OF POLLUTANT GRADIENTS BY AQUATIC ORGANISMS. J. FISH. RES. BOARD CAN. 36(1):11-16. (ERL,GB X051*).
AVAIL. FROM NTIS, SPRINGFIELD, VA: PB-294 363.

MOST APPARATUS DESIGNED TO DETECT AVOIDANCE OF POLLUTANTS BY AQUATIC ORGANISMS REQUIRE VISUAL OBSERVATIONS OF TEST ORGANISMS IN STEEP POLLUTANT GRADIENTS. AGARS (AQUATIC GRADIENT AVOIDANCE RESPONSE SYSTEM) WAS DEVELOPED TO ELIMINATE THESE LIMITATIONS. THIS SYSTEM ALLOWS ANIMALS TO CHOOSE BETWEEN ONE UNCONTAMINATED ZONE AND THREE INCREASINGLY TOXIC ZONES IN A GRADIENT TROUGH THAT IS MONITORED FOR EXTENDED TIME PERIODS BY INFARED LIGHT SOURCES, SENSORS, AND A MICROPROCESSOR. DATA ARE ACCUMULATED HOURLY AND PROCESSED BY A PAPER TAPE READER/CALCULATOR/PLOTTER SYSTEM THAT RECORDS THE TIME TEST ANIMALS REMAIN IN EACH ZONE AND COMPARES BEHAVIOR BEFORE AND DURING TEST EXPOSURES. INITIAL TESTS INDICATE THAT PINFISH (LAGODON RHOMBOIDES) TESTED IN THE APPARATUS WILL AVOID CHLORINE-PRODUCED OXIDANTS AT CONCENTRATIONS OF 0.02-0.04 MG/L.

CRIPE, C.R., AND B.E. STOKES. 1978. DEVICE TO DETECT POTENTIALLY DANGEROUS ELECTRICAL CURRENTS IN SALTWATER HOLDING TANKS. PROG. FISH-CULT. 40(2):74-75. (ERL,GB 335).

THE USE OF 60-HZ, 120-V ALTERNATING CURRENT IN A LABORATORY WITH SALTWATER HOLDING TANKS PRESENTS A POSSIBLE HAZARD TO PERSONNEL. THE BREAKING OF A GLASS-ENCLOSED WATER HEATER OR MALFUNCTION OF A METAL HEATER DUE TO CORROSION COULD RESULT IN A LETHAL SHOCK TO A PERSON IN CONTACT WITH THE WATER AND A GROUND. THE APPARATUS DESCRIBED HERE, COSTING LESS THAN $40 (JANUARY 1977), IS DESIGNED TO DETECT A VOLTAGE DIFFERENTIAL BETWEEN A CONTAINER OF SALT WATER AND A GROUND. IT WILL ACTIVATE AN ALARM, AND TURN OFF THE CURRENT TO A HEATING ELEMENT RELAY. THE VOLTAGE WILL REMAIN OFF AND THE ALARM WILL CONTINUE UNTIL A RESET BUTTON IS PRESSED.

CRIPE, C.R., AND R.J. LIVINGSTON. 1977. DYNAMICS OF MIREX AND ITS PRINCIPAL PHOTOPRODUCTS IN A SIMULATED MARSH SYSTEM. ARCH. ENVIRON. CONTAM. TOXICOL. 5(3):295-303. (ERL,GB X048).

THREE SIMULATED MARSH SYSTEMS WERE CONSTRUCTED, CONTAINING SEDIMENT, MARSH PLANTS, OYSTERS, BLUE CRABS, FIDDLER CRABS, AND TWO SPECIES OF TOP MINNOWS. SEAWATER ENTERED EACH OF THE POOLS BY FLOWING ACROSS A TROUGH, TWO OF WHICH CONTAINED MIREX BAIT. TIDAL FLUCTUATIONS WERE SIMULATED. SAMPLES OF WATER, BAIT, AND ANIMALS WERE PERIODICALLY ANALYZED. ALL ANIMALS CONCENTRATED MIREX. THREE PHOTOPRODUCTS ACCUMULATED ON THE BAIT PARTICLES, AND BOTH OYSTERS AND ONE SPECIES OF FISH ACCUMULATED ONE OF THE PHOTOPRODUCTS.

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., 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.

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*).
AVAIL. FROM NTIS, SPRINGFIELD, VA: PB81-126567.

STUDIES OF THE HYDROCARBON UTILIZING YEASTS CANDIDA MALTOSA 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. MALTOSA 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. MALTOSA BUT NOT FOR C. LIPOLYTICA. UPTAKE, TRANSPORT, AND METABOLISM OF HYDROCARBONS IN C. MALTOSA AND C. LIPOLYTICA DIFFER.

FREDRICKSON, HERBERT LOWRY. 1984. FATTY ACID CHARACTERIZATIONS OF SELECTED SULFATE-REDUCING BACTERIA AND SEDIMENTARY COMMUNITIES. PH.D. DISSERTATION. FLORIDA STATE UNIVERSITY, TALLAHASSEE, FL. 132P. (ERL,GB X480*).

LIPID ANALYSIS WAS USED TO CLARIFY THE TAXONOMY OF SULFATE-REDUCING BACTERIA (SRB) TO DETERMINE THE COMPOSITION OF SULFATE-REDUCING COMMUNITIES. THE PHOSPHOLIPID FATTY ACID COMPOSITION OF DESULFOVIBRIO DESULFURICANS, DESULFOTOMACULUM ORIENTIS, DESULFOTOMACULUM NIGRIFICANS, AND FOUR SRB ISOLATED FROM SALT MARSH SEDIMENT WERE DETERMINED BY CAPILLARY GAS-LIQUID CHROMATOGRAPHY AND MASS FRAGMENTOGRAPHY. THE FATTY ACID COMPOSITIONS OF THE SRB WERE COMPARED USING MULTIVARITE STATISTICS AND CONTRASTED TO THE FATTY ACID COMPOSITIONS OF BACILLUS SUBTILUS, CLOSTRIDIUM BUTYRICUM, ESHERICHIA COLI, PSEUDOMONAS PUTIDA, MORAXELLA SP. AND ATHROBACTER SP. ALL SRB EXAMINED CONTAINED PREDOMINANTLY ISO AND ANTEISO METHYL BRANCHED ACIDS. DESULFOVIBRIO DESULFURICANS, DESULFOTOMACULUM ORIENTIS AND DESULFOTOMACULUM NIGRIFICANS CONTAINED HIGH PROPORTIONS OF AN UNCOMMON 17 CARBON ISO MONOUNSATURATED ACID. THE MAJOR DIFFERENCES IN FATTY ACID COMPOSITIONS AMONG SRB WERE QUANTITATIVE WHILE THE MAJOR DIFFERENCES BETWEEN SRB AND THE OTHER BACTERIA EXAMINED WERE QUALITATIVE. THE FATTY ACID COMPOSITION OF BACILLUS SUBTILUS WAS MOST SIMILAR TO THOSE OF THE SRB IN THAT IT CONTAINED HIGH PROPORTIONS OF BRANCHED SATURATED AND MONOUNSATURATED ACIDS. ESHERICHIA COLI AND CLOSTRIDIUM BUTYRICUM WERE CHARACTERIZED BY HIGH PROPORTIONS OF 16 AND 18 CARBON SATURATED STRAIGHT CHAINED ACIDS AND 17 AND 19 CARBON CYCLOPROPANE ACIDS. PSEUDOMONAS PUTIDA AND MORAXELLA SP. CONTAINED HIGH PROPORTIONS OF 16 AND 18 CARBON MONOUNSATURATED ACIDS. THE FATTY ACID COMPOSITION OF ARTHROBACTER SP. WAS QUITE SIMPLE IN THAT 90% OF THE ACIDS WAS AN ISO METHYL BRANCHED 15 CARBON ACID. THE PHOSPHOLIPID FATTY ACID COMPOSITION OF THE MICROBIAL COMMUNITIES OF FRESHWATER AND ESTUARINE SEDIMENTS WERE DETERMINED BY ANALOGOUS METHODS. THE FRESHWATER SEDIMENTS WERE CHARACTERIZED BY PHOSPHOLIPID CONCENTRATIONS 100 TIMES HIGHER THAN ESTUARINE SEDIMENTS AND BY HIGH PROPORTIONS OF STRAIGHT-CHAINED SATURATED ACIDS. THE ESTUARINE SEDIMENTS CONTAINED HIGHER PROPORTIONS OF BRANCHED AND MONOUNSATURATED ACIDS. THE LIPID CONTENT OF ALL SEDIMENTS GENERALLY DECREASED WITH DEPTH AND ISO AND ANTEISO BRANCHED ACIDS BECAME MORE ABUNDANT. ESTUARINE SEDIMENTS TAKEN FROM THREE LOCATIONS ALONG A 10 METER TRANSECT THROUGH A SALT MARSH WERE SHOWN TO VARY 10 FOLD IN LIPID CONTENT AND BY A FACTOR 1000 IN RATES OF SULFATE RESPIRATIONS. DIFFERENCES IN MICROBIAL COMMUNITIES WERE DEMONSTRATED BY THEIR PHOSPHOLIPID FATTY ACID COMPOSITIONS AND BY THEIR METABOLISM OF CARBON-14 LABELED SUBSTRATES.

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 (ARENICOLA 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.

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. MALTOSA WERE RECOVERED FROM MICE BUT DID NOT PRODUCE EVIDENCE OF INFECTION.

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-DIXHYDROXY-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. 1979. METABOLISM OF DIBENZO (1,4)DIOXAN BY A PSEUDOMONAS SPECIES. BIOCHEM. J. 180(3):639-645. (ERL,GB X091*).

PSEUDOMONAS SP. N.C.I.B. 9816 STRAIN 11, WHEN GROWN ON SALICYLATE IN THE PRESENCE OF DIBENZO(1,4)DIOXAN, ACCUMULATED CIS-1,2-DIHYDROXY-1,2-DIHYDRODIBENZO(1,4)DIOXAN AND 2-HYDROXYDIBENZO(1,4)DIOXAN IN THE CULTURE MEDIUM. EACH METABOLITE WAS ISOLATED IN CRYSTALLINE FORM AND IDENTIFIED BY A VARIETY OF CONVENTIONAL CHEMICAL TECHNIQUES. CRUDE CELL EXTRACTS PREPARED FROM THE PARENTAL STRAIN GROWN WITH NAPHTHALENE OXIDIZED CIS-1,2-DIHYDROXY-1,2-DIHYDRODIBENZO(1,4)DIOXAN UNDER BOTH AEROBIC AND ANAEROBIC CONDITIONS TO 1,2-DIHYDROXYDIBENZO(1,4)DIOXAN. FURTHER DEGRADATION OF THIS METABOLITE WAS NOT DETECTED.

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,GB 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.

LAUGHLIN, ROGER A., CLAUDE R. CRIPE, AND ROBERT J. LIVINGSTON. 1978. FIELD AND LABORATORY AVOIDANCE REACTIONS BY BLUE CRABS (CALLINECTES SAPIDUS) TO STORM WATER RUNOFF. TRANS. AM. FISH. SOC. 107(1):78-86. (ERL,GB X180*).

A COMBINED FIELD AND LABORATORY STUDY WAS CONDUCTED TO DETERMINE THE AVOIDANCE REACTIONS OF BLUE CRABS (CALLINECTES SAPIDUS) TO HIGHLY COLORED, ACIDIC RUNOFF FROM CLEAR-CUT TIMBER AREAS ABOVE A PRODUCTIVE NORTH FLORIDA ESTUARY. BLUE CRABS OF TWO AGE GROUPS SHOWED MARKED LABORATORY AVOIDANCE OF RUNOFF (PH 4.6, 5.8) AND OF TEST WATER WITH EXPERIMENTALLY REDUCED PH. WITHIN THE PH RANGE 4.5-7.0, THERE WAS AN INVERSE RELATIONSHIP BETWEEN PH AND AVOIDANCE. WATER COLOR APPEARED TO PLAY A MINOR ROLE IN THE AVOIDANCE REACTIONS. FIELD DATA GAVE DIVERGENT RESULTS. SMALL CRABS WERE ABUNDANT IN AREAS CHARACTERIZED BY PH LEVELS STRONGLY AVOIDED UNDER LABORATORY CONDITIONS. LARGE CRABS, HOWEVER, WERE CONSPICUOUSLY ABSENT FROM SUCH AREAS IN THE FIELD, INDICATING POSSIBLE AVOIDANCE. FACTORS OTHER THAN PH WERE THOUGHT TO BE FUNCTIONAL IN THE FIELD DISTRIBUTION OF THE CRABS. THIS STUDY INDICATES THAT LABORATORY EXPERIMENTS WITHOUT ASSOCIATED FIELD STUDIES MAY CAUSE MISLEADING RESULTS IF THEY ARE APPLIED TO A DETERMINATION OF IMPACT CRITERIA.

LAUGHLIN, ROGER A., CLAUDE R. CRIPE, AND ROBERT J. LIVINGSTON. 1978. REACTIONS OF BLUE CRABS TO LOW PH. COMMENTS. TRANS. AM. FISH. SOC. 107(6):863-871. (ERL,GB X047*).

LIVINGSTON, ROBERT J., CLAUDE R. CRIPE, ROGER A. LAUGHLIN, AND FRANK G. LEWIS, III. 1976. AVOIDANCE RESPONSES OF ESTUARINE ORGANISMS TO STORM WATER RUNOFF AND PULP MILL EFFLUENTS. IN: ESTUARINE PROCESSES, VOL. 1: USES, STRESSES, AND ADAPTATION TO THE ESTUARY. MARTIN W. WILEY, EDITOR, ACADEMIC PRESS, INC., NEW YORK, NY. PP. 313-331. (ERL,GB X049*).

AN INTEGRATED STUDY WAS MADE TO DETERMINE THE RELATIONSHIP OF LABORATORY AVOIDANCE REACTIONS OF ESTUARINE ORGANISMS TO SPECIFIC POLLUTANTS AND THEIR ACTUAL DISTRIBUTION IN THE FIELD. EXPERIMENTS TESTED THE REACTIONS OF JUVENILE AND ADULT BLUE CRABS (CALLINECTES SAPIDUS) TO STORM WATER RUNOFF AND LOW PH, AND THE AVOIDANCE RESPONSES OF PINFISH (LAGODON RHOMBOIDES) TO BLEACHED KRAFT MILL EFFLUENTS (BKME). THE FIELD REACTIONS OF THESE ORGANISMS TO POINT SOURCES OF SUCH POLLUTANTS WERE MONITORED FOR RELATIVELY LONG PERIODS IN THE APALACHICOLA AND APALACHEE BAY SYSTEMS (NORTH FLORIDA). JUVENILE AND ADULT BLUE CRABS AVOIDED RUNOFF WATER FROM CLEAR-CUT FIELDS. THEY ALSO AVOIDED WATER WITH EXPERIMENTALLY REDUCED LEVELS OF PH BELOW 6.0. IT WAS FOUND THAT THE LOW PH OF THE STORM WATER RUNOFF WAS A PRIMARY FACTOR IN THE LABORATORY AVOIDANCE REACTION OF THE CRABS. HOWEVER, FIELD STUDIES IN AREAS DIRECTLY AFFECTED BY SUCH RUNOFF INDICATED THAT ALTHOUGH ADULT BLUE CRABS WERE USUALLY NOT FOUND IN SUCH WATER, JUVENILE CRABS ACTUALLY APPEARED IN HIGHER NUMBERS IN PORTIONS OF THE BAY CHARACTERIZED BY INCREASED RUNOFF AND LOW PH. ALTHOUGH PINFISH SHOWED DISTINCT LABORATORY AVOIDANCE RESPONSES TO LOW LEVELS OF BKME (0.1%, VOLUME/VOLUME), THEIR FIELD DISTRIBUTION DID NOT SUBSTANTIALLY CHANGE AFTER A POLLUTION ABATEMENT PROGRAM WAS INSTITUTED. IN THIS CASE, INCOMPLETE TREATMENT AND/OR HABITAT DESTRUCTION COULD HAVE ACCOUNTED FOR SUCH FINDINGS. IN BOTH INSTANCES, HOWEVER, IT APPEARS THAT FACTORS OTHER THAN AVOIDANCE RESPONSE WERE CONTRIBUTORY TO THE FIELD DISTRIBUTION OF THE TEST SPECIES. IT WAS CONSIDERED THAT THE FIELD RESPONSE OF ESTUARINE ORGANISMS TO VARIOUS FORMS OF POLLUTION WAS THE PRODUCT OF COMPLEX PHYSICAL AND BIOLOGICAL FUNCTIONS SUCH AS INTRASPECIFIC AND INTERSPECIFIC COMPETITION AND PREDATION, HABITAT ALTERATION, AND TROPHIC RESPONSE. IT APPEARS THAT LABORATORY STUDIES WITHOUT ASSOCIATED FIELD INFORMATION CAN LEAD TO SPURIOUS CONCLUSIONS.

LLABRES, CARLOS M., AND DONALD G. AHEARN. 1985. ANTIMICROBIAL ACTIVITIES OF N-CHLORAMINES AND DIAZOLIDINYL UREA. APPL. ENVIRON. MICROBIOL. 49(2):370-373. (ERL,GB X495).

A COMBINATION OF MICS OF AN N-CHLORAMINE, A SIMPLE CHLORINATED AMINO ACID, AND DIAZOLIDINYL UREA GAVE SYNERGISTIC ACTIVITY AGAINST BACTERIA, BUT NOT FUNGI. THE TWO COMPOUNDS AT A HIGHER CONCENTRATION, 0.1 AND 0.3%, RESPECTIVELY, GAVE SYNERGISTIC INHIBITION OF FUNGI; KILL TIMES WERE 1 H FOR TRICHOPHYTON TONSURANS, 3 H FOR ASPERGILUS NIGER AND FUSARIUM MONILIFORME, AND 6 H FOR ASPERGILLUS FUMIGATUS.

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 CONCN 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 CONCN OF 50 AND 5 MG/LITER LACTOSE, RESPECTIVELY. THESE ISOLATES WERE SHOWN TO BE COMPETITIVE WITH EACH OTHER AT DIFFERENT LACTOSE CONCN. 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., 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 367*).

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 SUCCINOOXIDASE.

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 CONCN LITTLE INFORMATION EXISTS ON THE FATE OF AROMATIC RING COMPOUNDS AT LOW CONCN (LESS THAN 100 MG/L) IN AQUATIC ENVIRONMENTS. THEREFORE, WE ATTEMPT TO CHARACTERIZE THE DEGRADATION OF THE AROMATIC COMPOUND PHENYLACETIC ACID (PAA) AT LOW CONCN BY AQUATIC BACTERIA. THREE BACTERIAL ISOLATES, PAL-1, PAL-10, AND PAL-100 OBTAINED FROM CONTINUOUS CULTURE ENRICHMENT EXPERIMENTS AT PAA CONCN 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 CONCN IN AQUATIC ENVIRONMENTS.

MUELLER, L.H., W. GILLIAM, A.W. BOURQUIN, AND P.H. PRITCHARD. 1984. FATE OF FENTHION IN SALT MARSH ENVIRONMENTS: RESULTS FROM A FIELD APPLICATION (ABSTRACT). (ERL,GB 510).

THE ENVIRONMENTAL RELEVANCE OF LABORATORY DATA CAN, THEORETICALLY, BE ASSESSED BY EXAMINING THE FATE OF A CHEMICAL IN THE FIELD. THE EFFORT INVOLVED IN SUCH AN ASSESSMENT IS OFTEN UNDERESTIMATED, NOT ONLY BECAUSE OF THE LOGISTICAL AND CLIMATIC PROBLEMS ASSOCIATED WITH WORKING IN THE FIELD, BUT BECAUSE OF INSUFFICIENT INFORMATION NECESSARY TO PROPERLY INTERPRET FIELD RESULTS. THE COMMON USE OF THE ORGANOPHOSPHATE INSECTICIDE, FENTHION, IN SALT MARSH ENVIRONMENTS TO CONTROL MOSQUITO POPULATIONS GAVE US THE OPPORTUNITY TO ASSESS THE FATE OF THIS CHEMICAL UNDER CONDITIONS SIMILAR TO THOSE ACTUALLY USED TO KILL MOSQUITO LARVAE AND COMPARE THE RESULTS WITH LABORATORY DATA. FENTHION WAS APPLIED TO A FLORIDA GULF COAST SALT MARSH BY SPRAYING THE WATER SURFACE AND ALLOWING NATURAL MIXING TO DISTRIBUTE THE CHEMICAL WITHIN THE SALT MARSH SYSTEM. THE FIELD SITE CONSISTED OF A LONG, NARROW WATER BODY OF APPROXIMATELY .5 HECTARES SURROUNDED ON ALL SIDES BY JUNCUS ROEMERIANUS GRASS FLATS WHICH FLOODED PERIODICALLY, DEPENDING ON THE TIDAL FLUX. A NARROW PASSAGE, NORMALLY CONNECTING THE MARSH WITH SANTA ROSA SOUND, WAS TEMPORARILY SEALED DURING THE PESTICIDE APPLICATION. RHODAMINE WT, A FLUORESCENT DYE WHICH DOES NOT SORB TO SEDIMENTS OR PHOTOLYZE, WAS ADDED SIMULTANEOUSLY WITH THE FENTHION TO MEASURE LOSSES DUE TO DILUTION. CONCENTRATIONS OF DYE AND FENTHION, AFTER AN INITIAL 12-HOUR EQUILIBRIUM MIXING TIME, WERE 50 MICROGRAM/L AND 25 MICROGRAM/L, RESPECTIVELY. CONCENTRATIONS OF BOTH CHEMICALS, AS MEASURED AT FIVE SAMPLING SITES, DECREASED EXPONENTIALLY WITH TIME, THE FENTHION DISAPPEARING MORE RAPIDLY THAN THE DYE. THE HALF-LIFE FOR FENTHION, EXCLUDING LOSSES DUE TO DILUTION, WAS ESTIMATED AT 25 HOURS. THESE RATES WERE FASTER THAN THOSE OBSERVED IN MICROCOSM STUDIES. PHOTOLYSIS MAY HAVE BEEN PARTLY RESPONSIBLE FOR THIS DIFFERENCE. A SECOND DOSING WITH THE PESTICIDE, WHEN THE WATER TEMPERATURE WAS 4-5 DEGREES C LOWER, RESULTED IN LOWER BIODEGRADATION RATES, SIMILAR TO THOSE PREDICTED IN LABORATORY STUDIES. PLEXIGLAS BOXES WERE PLACED IN THE MARSH TO ISOLATE A SECTION OF WATER AND SEDIMENT, AND REDUCE LOSSES DUE TO DILUTION. THESE BOXES INDICATED LOSS RATES SIMILAR TO THOSE NONDILUTIONAL LOSS RATES OBSERVED IN THE MAIN WATER BODY. SIGNIFICANT FENTHION AND DYE CONCENTRATIONS WERE DETECTED IN THE SEDIMENTS. DIFFUSION RATES (INCLUDING BIOTURBATION) DERIVED FROM MICROCOSM STUDIES WERE SUFFICIENT TO ACCOUNT FOR THE AMOUNT OF FENTHION DETECTED IN THE SALT MARSH SEDIMENT. OUR RESULTS INDICATE THAT DATA FROM MICROCOSMS WAS ESSENTIAL FOR INTERPRETATION OF FIELD DATA, BUT WAS NOT QUANTITATIVELY SIMILAR TO RESULTS IN THE FIELD. FURTHER EFFORTS ARE NEEDED TO ACCURATELY ESTABLISH THE METHODS FOR APPLYING LABORATORY DATA TO THE FIELD.

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*).

NOVICK, NORMAN J., AND MARTIN ALEXANDER. 1985. COMETABOLISM OF LOW CONCENTRATIONS OF PROPACHLOR, ALACHLOR, AND CYCLOATE IN SEWAGE AND LAKE WATER. APPL. ENVIRON. MICROBIOL. 49(4):737-743. (ERL,GB X487*).

LOW CONCENTRATIONS OF PROPACHLOR (2-CHLORO-N-ISOPROPYLACETANILIDE) AND ALACHLOR [2-CHLORO-2',6'-DIETHYL-N-(METHOXYMETHYL)ACETANILIDE] WERE NOT MINERALIZED, CYCLOATE (S-ETHYL-N-ETHYLTHIOCYCLOHEXANECARBAMATE) WAS SLOWLY OR NOT MINERALIZED, AND ANILINE AND CYCLOHEXYLAMINE WERE READILY MINERALIZED IN SEWAGE AND LAKE WATER. PROPACHLOR, ALACHLOR, AND CYCLOATE WERE EXTENSIVELY METABOLIZED, BUT THE PRODUCTS WERE ORGANIC. LITTLE CONVERSION OF PROPACHLOR AND ALACHLOR WAS EVIDENT IN STERILIZED SEWAGE OR LAKE WATER. THE COMETABOLISM OF PROPACHLOR WAS ESSENTIALLY LINEAR WITH TIME IN LAKE WATER AND WAS WELL FIT BY ZERO-ORDER KINETICS IN SHORT PERIODS AND BY FIRST-ORDER KINETICS IN LONGER PERIODS IN SEWAGE. THE RATE OF COMETABOLISM IN SEWAGE WAS DIRECTLY PROPORTIONAL TO PROPACHLOR CONCENTRATION AT LEVELS FROM 63 PG/ML TO MORE THAN 100 NG/ML. GLUCOSE BUT NOT ANILINE INCREASED THE YIELD OF PRODUCTS FORMED DURING PROPACHLOR COMETABOLISM IN SEWAGE. NO MICROORGANISM ABLE TO USE PROPACHLOR AS A SOLE SOURCE OF CARBON AND ENERGY WAS ISOLATED, BUT BACTERIA ISOLATED FROM SEWAGE AND LAKE WATER METABOLIZED THIS CHEMICAL. DURING THE METABOLISM OF THIS HERBICIDE BY TWO OF THE BACTERIA, NONE OF THE CARBON WAS ASSIMILATED. OUR DATA INDICATE THAT COMETABOLISM OF THESE PESTICIDES TAKES PLACE AT CONCENTRATIONS OF SYNTHETIC COMPOUNDS THAT COMMONLY OCCUR IN NATURAL WATERS.

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'CONNOR, JOSEPH M., A.J. LANZA, ALBERT KOLBYE, FRANK G. WILKES, AND ROBERT J. PIERCE. 1980. EXPLORING THE VARIOUS ASPECTS RELATED TO THE DUMPING OF DREDGED SPOIL MATERIAL IN THE OCEAN AND THE PCB CONTAMINATION ISSUE (STATEMENT). IN: DREDGE SPOIL DISPOSAL AND PCB CONTAMINATION, HEARINGS BEFORE THE COMMITTEE ON MERCHANT MARINE AND FISHERIES, HOUSE OF REPRESENTATIVES, NINETY-SIXTH CONGRESS, MARCH 14, MAY 21, 1980. U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, DC. SERIAL NO. 96-43. PP. 507-568. (ERL,GB X289*).

THIS PANEL PRESENTATION IS ON HUMAN HEALTH IMPACT FROM OCEAN DISPOSAL OF CONTAMINATED DREDGE SPOIL.

O'CONNOR, JOSEPH M. 1984. POLYCHLORINATED BIPHENYL TRANSPORT IN COASTAL MARINE FOODWEBS. EPA-600/3-84-083, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 98P.

THE EXTENT TO WHICH POLYCHLORINATED BIPHENYLS (PCBS) MAY BE ASSIMILATED INTO FISH FROM DIETARY SOURCES WAS STUDIED BY PROVIDING KNOWN DOSES OF PCBS (AS AROCLOR 1254 IN FOOD) TO STRIPED BASS AND ANALYZING CROSS-GUT TRANSPORT, TISSUE DISTRIBUTION AND ELIMINATION. ASSIMILATION AND ELIMINATION DATA FROM SINGLE AND MULTIPLE DOSES FOR WHOLE FISH WERE USED TO CALCULATE RATE-CONSTANTS FOR PCB ACCUMULATION (KA) AND ELIMINATION (KE) ACCORDING TO ONE-COMPARTMENT PHARMACOKINETIC MODELS. THE DATA FROM ANALYSIS OF INDIVIDUAL TISSUES WERE USED TO CALCULATE KA AND KE FOR INDIVIDUAL TISSUE COMPARTMENTS. THE PHARMACOKINETIC DATA WERE USED TO EVALUATE THE IMPORTANCE OF PCB UPTAKE FROM FOOD, ESTIMATED BODY BURDENS ARISING FROM PCB IN FOOD, AND TO CALCULATE A LONG-TERM MODEL FOR PCB ACCUMULATION IN HUDSON RIVER STRIPED BASS. THE MAJOR CONCLUSIONS FROM THE STUDY ARE THAT PCBS IN FOOD REPRESENT A MAJOR SOURCE OF PCB TO FISH (UP TO 80% OF TOTAL BODY BURDENS). THE PCBS OBTAINED FROM FOOD CAUSE A RAPID APPROACH TO STEADY STATE, BUT ARE ELIMINATED SLOWLY WITH A HALF-TIME OF 120 HR. MORE THAN 85% OF THE PCB INGESTED WITH FOOD IS ASSIMILATED INTO THE TISSUES. THE LONG-TERM MODEL SHOWED THAT PCB BURDENS IN STRIPED BASS EXPOSED TO FOOD CONTAINING DIFFERENT CONCENTRATIONS OF PCB WILL DECLINE SLOWLY WHEN LEVELS IN FOOD DECLINE, BUT INCREASE RAPIDLY (90% PLATEAU REACHED IN 9 DOSES) WHEN LEVELS IN FOOD INCREASE. PRELIMINARY VERIFICATION STUDIES SUPPORT THE PHARMACOKINETIC MODEL FOR PCB ACCUMULATION IN STRIPED BASS WITH FOOD AS THE MAJOR SOURCE.

O'NEIL, ELLEN J., CAROL A. MONTI, PARMELY H. PRITCHARD, AL W. BOURQUIN, AND DONALD G. AHEARN. 1985. EFFECTS OF LUGWORMS AND SEAGRASS ON KEPONE (CHLORDECONE) DISTRIBUTION IN SEDIMENT/WATER LABORATORY SYSTEMS. ENVIRON. TOXICOL. CHEM. 4(4):453-458. (ERL,GB 488).

THE INFLUENCE OF LUGWORMS (ARENICOLA CRISTATA STIMPSON) AND SEAGRASS (THALASSIA TESTUDINUM KOENIG) ON KEPONE (CHLORDECONE) DISTRIBUTION IN SEDIMENT/WATER SYSTEMS WAS EXAMINED. RADIOLABELED KEPONE WAS INTRODUCED INTO CONTINUOUS-FLOW SEDIMENT/WATER SYSTEMS, AND THE DISSOLVED AND SORBED CONCENTRATIONS OF KEPONE WERE QUANTIFIED. LUGWORM ACTIVITY DECREASED THE KEPONE CONCENTRATION IN THE WATER AND INCREASED ITS CONCENTRATION IN THE SEDIMENT. THE PRESENCE OF SEAGRASSES DID NOT APPRECIABLY AFFECT THE CONCENTRATION OF KEPONE IN THE WATER. BIOTURBATION APPEARED TO BE THE PRIME FACTOR IN THE TRANSPORT OF KEPONE FROM WATER TO SEDIMENT.

PIZZA, JOHN C., AND JOSEPH M. O'CONNOR. 1983. PCB DYNAMICS IN HUDSON RIVER STRIPED BASS. II. ACCUMULATION FROM DIETARY SOURCES. AQUAT. TOXICOL. 3(4):313-327. (ERL,GB 096).

YOUNG-OF-YEAR STRIPED BASS WERE ADMINISTERED KNOWN DOSES OF C(14)-LABELED AROCLOR 1254 IN NATURAL FOOD (GAMMARUS TIGRINUS) BY GAVAGE. PCB ACCUMULATION FOR THE GUT AND ELIMINATION FROM THE WHOLE-BODY WERE DETERMINED EMPIRICALLY FOR SINGLE-DOSE AND MUTLIPLE-DOSE STUDIES. THE DATA HAVE BEEN APPLIED TO MODELS DESCRIBING ABSORPTION SITE KINETICS AND FLUCTUATIONS IN WHOLE-BODY BURDEN AT 'STEADY SITE'. THOSE VARIABLES CRITICAL OF THE CALCULATION AND UNDERSTANDING OF BIOACCUMULATION FACTORS, NAMELY GROWTH, METABOLIC RATE, AND DOSE, ARE DISCUSSED IN THE CONTEXT OF THE KINETIC MODEL RESULTS.

PIZZA, JOHN C. 1983. PHARMACOKINETICS AND DISTRIBUTION OF DIETARY POLYCHLORINATED BIPHENYLS (PCBS) IN HUDSON RIVER STRIPED BASS, MORONE SAXATILIS. PH.D. DISSERTATION. NEW YORK UNIVERSITY. 109P. (ERL,GB X478*).

THIS WORK DESCRIBES THE DIETARY ACCUMULATION OF AROCLOR 1254 BY YOUNG-OF-YEAR HUDSON RIVER STRIPED BASS (MORONE SAXATILIS). THE FISH RECEIVED 14C-PCB IN LIVE DIET. THE FOOD ORGANISM, GAMMARUS TIGRINUS, WAS RADIOLABELED BY 24 HR STATIC EXPOSURE AT 10 UG/L.

PRAMER, D., 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, 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 DETERMING IF A SYSTEM-CENTERED APPROACH TO EXPOSURE ASSESSMENT IS REALLY NECESSARY.

PRITCHARD, P.H. IN PREP. ASSESSING THE BIODEGRADATION OF SEDIMENT ASSOCIATED CHEMICALS. IN: WORKSHOP PROCEEDINGS: TOXICITY AND FATE OF CHEMICALS IN SEDIMENT. 62P. (ERL,GB 530).

PRITCHARD, P.H. 1984. FATE AND EFFECTS OF POLLUTANTS: FATE OF ENVIRONMENTAL POLLUTANTS. J. WATER POLLUT. CONTROL FED. 56(6):718-725. (ERL,GB 514).

THE AUTHOR PRESENTS A REVIEW OF THE USE OF MICROCOSMS AND FIELD STUDIES TO VERIFY PREDICTIONS OF FATE AND TRANSPORT OF TOXIC CHEMICALS. MICROCOSMS ARE LABORATORY SYSTEMS THAT SIMULATE PORTIONS OF THE FIELD AND ALLOW ITS COMPLEXITY TO BE REPRESENTED IN THE LABORATORY.

PRITCHARD, P.H., C.R. CRIPE, W.W. WALKER, J.C. SPAIN, AND A.W. BOURQUIN. IN PRESS. FATE OF METHYL PARATHION IN WATER AND SEDIMENT TEST SYSTEMS FROM FRESHWATER AND ESTUARINE SITES. APPL. ENVIRON. MICROBIOL. (ERL,GB 513).

VARIATIONS IN THE DEGRADATION RATE OF METHYL PARATHION IN A SHAKE-FLASK TEST WERE DETERMINED UNDER BIOTIC AND ABIOTIC CONDITIONS, USING WATER AND SEDIMENT/WATER SUSPENSIONS OBTAINED FROM THIRTEEN SAMPLING SITES IN TWO GULF COAST ESTUARIES. VARIABILITY IN DEGRADATION RATES AT TWO SITES, RANGE POINT, FL, AND DAVIS BAYOU, MS, WAS ASSESSED OVER A THREE-YEAR PERIOD. STATISTICAL ANALYSIS OF THE RATES INDICATED THAT BIOLOGICAL DEGRADATION OF METHYL PARATHION IN THE PRESENCE OF SEDIMENT WAS THE MOST IMPORTANT DETERMINANT AND THAT BIOLOGICAL DEGRADATION ASSOCIATED WITH WATER AND ABIOTIC SEDIMENT-ENHANCED DEGRADATION WAS INSIGNIFICANT. BIODEGRADATION RATES IN THE PRESENCE OF SEDIMENT WERE SIGNIFICANTLY DIFFERENT BETWEEN THE TWO PRIMARY SITES, WITH THE RANGE POINT MEAN RATE APPROXIMATELY FIVE-FOLD GREATER THAN THE DAVIS BAYOU MEAN RATE. ONLY TWO OF THE OTHER SITES EXHIBITED A DEGRADATION RATE SIMILAR TO RANGE POINT; ALL OTHER SITES HAD RATES APPROXIMATELY THE SAME AS DAVIS BAYOU. COLONY-FORMING UNITS DID NOT CORRELATE WITH WATER OR SEDIMENT-ASSOCIATED BIODEGRADATION RATES. NO SEASONAL DIFFERENCES IN DEGRADATION RATES EXISTED AT EITHER OF THE PRIMARY SITES FOR ANY TREATMENT. THE RESULTS REVEAL GEOGRAPHIC VARIATIONS IN DEGRADATION RATES AND THUS INDICATE THE NECESSITY FOR STUDYING SITE-SPECIFIC DEGRADATION RATES FOR TOXIC COMPOUNDS. THE RESULTS SUGGEST THAT A VARIATION IN BIODEGRADATION RATES MAY NOT BE AS HIGH AS EXPECTED (BASED ON THE HETEROGENEITY OF MICROBIAL COMMUNITIES) AND, AT LEAST FOR METHYL PARATHION IN SEDIMENTS, ALL RATES CAN BE SUBDIVIDED INTO A MINIMUM OF TWO GROUPINGS.

PRITCHARD, P.H., AND A.W. BOURQUIN. 1985. MICROBIAL TOXICITY STUDIES. IN: FUNDAMENTALS OF AQUATIC TOXICOLOGY: METHODS AND APPLICATIONS. GARY M. RAND AND SAM R. PETROCELLI, EDITORS, HEMISPHERE PUBLISHING CORP., NEW YORK, NY. PP. 177-217. (ERL,GB 471*).
AVAIL. FROM NTIS, SPRINGFIELD, VA: PB85-165801/A

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 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 IS DISCUSSED.

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. (ERL,GB 459).

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. 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, PARMELY H., CAROL A. MONTI, ELLEN J. O'NEILL, JOHN P. CONNOLLY, AND DONALD G. AHEARN. IN PREP. MOVEMENT OF KEPONE 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.

PRITCHARD, PARMELY H., AND AL W. BOURQUIN. 1984. PERSPECTIVE ON THE ROLE OF MICROCOSMS IN ENVIRONMENTAL FATE AND EFFECTS ASSESSMENTS. IN: CONCEPTS IN MARINE POLLUTION MEASUREMENTS. HARRIS H. WHITE, EDITOR, UNIVERSITY OF MARYLAND, COLLEGE PARK, MD. PP. 115-138. (ERL,GB 468).

THIS PAPER PROVIDES A PERSPECTIVE ON THE POSSIBLE INTERFACING OF MICROCOSM STUDIES WITH BOTH WASTE ASSIMILATORY CAPACITY DETERMINATIONS AND OTHER LESS QUATITATIVE TYPES OF ASSESSMENT. SOME OF THE PROBLEMS AND INCONSISTENCIES IN THE INTERPRETATION AND APPLICATION OF MICROCOSM RESULTS ARE DISCUSSED. CONCEPTUAL IDEAS ON HOW MICROCOSMS CAN BE USED IN QUANTITATIVE AND QUALITATIVE RISK ANALYSIS ARE PRESENTED. TWO BASIC CRITERIA ARE PROPOSED FOR THE DEVELOPMENT OF THE SCREENING MICROCOSM: A.) ASSURANCE THAT THE SAME INFORMATION CANNOT BE OBTAINED IN MORE SIMPLE, LABORATORY SYSTEMS; B.) ASSURANCE THAT IF THE SCREENING MICROCOSM RESULT IS NOT ECOLOGICALLY UNIQUE, IT IS, AT LEAST A MORE SENSITIVE INDICATOR OF TOXIC EFFECTS OR FATE THAN OTHER LABORATORY TESTS. ARGUMENTS ARE PRESENTED TO SUPPORT THE CONTENTION THAT MICROCOSMS, FROM A QUANTITATIVE RISK ANALYSIS STANDPOINT, HAVE NO PREDICTIVE VALUE BY THEMSELVES. THEY ARE INSTEAD, REPRESENTATIONS OF THE STATE-OF-THE-WHOLE OF CERTAIN ECOSYSTEM SECTIONS WHICH CAN BE USED AS A MEANS OF VERIFYING THE ENVIRONMENTAL SIGNIFICANCE OF OTHER TYPES OF LABORATORY DATA AND THE CORRECTNESS OF KINETIC EXPRESSIONS USED TO DESCRIBE INDIVIDUAL FATE AND EFFECTS PROCESSES. THE MICROCOSM IS ALSO A RESEARCH TOOL WHICH CAN ENHANCE OUR QUANTITATIVE UNDERSTANDING OF THE PROCESS INTERACTIONS AND METABOLIC NETWORKS TYPICAL OF NATURAL ECOSYSTEMS.

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*).

THE DISCUSSION RESULTING FROM THE SESSION ON THE EXTRAPOLATION OF LABORATORY DATA TO NATURAL ENVIRONMENTAL SITUATIONS DEALT WITH THREE MAJOR PROBLEM AREAS: (I) THE STEPS AND DECISION POINTS INVOLVED IN PROVIDING DEFINITE EXPOSURE CONCENTRATION ESTIMATES, (II) THE EXPERIMENTAL LIMITATIONS TO BIODEGRADATION RATE CONSTANTS, AND (III) THE ASSESSMENT OF THE EFFECTS OF ENVIRONMENTAL PARAMETERS ON DEGRADATION RATES AND THEIR INTEGRATION INTO PREDICTIVE MATHEMATICAL MODELS. ALL OF THESE PROBLEMS INDICATED A NEED FOR MORE RESEARCH BEFORE DEFINITIVE EXTRAPOLATIONS CAN BE MADE. IT APPEARS, HOWEVER, THAT OUR APPROACHES TO THE PROBLEM OF EXTRAPOLATION ARE HEADED IN THE RIGHT DIRECTION AND THAT THE RESULTS COMING FROM VARIOUS RESEARCH LABORATORIES LEAD TO A CERTAIN DEGREE OF OPTIMISM. AS DISCUSSED IN THE PAPERS PRESENTED IN THIS SESSION AND OTHERS, THE POTENTIAL OF REDUCING BIODEGRADATION RATES TO SIMPLE DESCRIPTIVE RATE CONSTANTS WHICH MAY BE APPLICABLE OVER A LARGE RANGE OF ENVIRONMENTAL VARIABLES IS INDEED EXCITING. CERTAINLY, THE ENSUING DISCUSSIONS INDICATED THAT THE RATE CONSTANT APPROACH WAS A PROVOCATIVE CONCEPT WHICH SHOULD GREATLY STIMULATE AND ORIENT A DATA-GATHERING EFFORT. THIS EFFORT COULD EVENTUALLY CULMINATE IN AN APPRECIATION OF BIODEGRADATION RATES WHICH WOULD SUBSTANTIALLY INCREASE OUR CONFIDENCE IN MAKING EXPOSURE CONCENTRATION PREDICTIONS THROUGH THE EXTRAPOLATION OF LABORATORY DATA TO THE ENVIRONMENT.

PRITCHARD, P.H., A.W. BOURQUIN, H.L. FREDRICKSON, 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,GB 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 14CO2 AND DEGRADATION PRODUCTS OF C14-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 14CO2, 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., 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., C.R. CRIPE, A.W. BOURQUIN, AND W.W. WALKER. 1984. VARIABILITY OF BIODEGRADATION RATES OF PESTICIDES IN WATER/SEDIMENT SYSTEMS (ABSTRACT). (ERL,GB 515).

THREE HERBICIDES, TWO FUNGICIDES, FIVE ORGANOPHORPHORUS INSECTICIDES, AND ONE MITICIDE (ACARICIDE) WERE CHARACTERIZED WITH RESPECT TO DEGRADATION RATE UNDER BIOTIC AND ABIOTIC CONDITIONS IN ESTUARINE WATER AND SEDIMENT/WATER SYSTEMS USING A SIMPLE SHAKE-FLASK TEST. DECAY RATES FOR EACH CHEMICAL COULD GENERALLY BE DESCRIBED BY A FIRST-ORDER MODEL. THE DEGRADATION OF METHYL PARATHION, HOELON, BRAVO, BOLSTAR, FENTHION, AND BOLERO WAS BIOLOGICALLY MEDIATED. THE FASTEST BIODEGRADATION RATES OCCURRED WHEN SEDIMENT WAS PRESENT. THE DEGRADATION OF TRIFLURALIN, DURSBAN, PHORATE, EPN, AND PENTACHLORONITROBENZENE WERE PRIMARILY BY ABIOTIC MEANS. RELATIVE TO THE OTHER TEST MATERIALS, PHORATE AND HOELON DEGRADED RAPIDLY; DURSBAN WAS THE MOST PERSISTENT; AND EPN, BRAVO, PENTACHLORONITROBENZENE, TRIFLURALIN, AND BOLSTAR REFLECTED INTERMEDIATE DEGRADATION RATES. VARIABILITY IN RATES FROM REPLICATE FLASKS SUGGESTED THAT A DIFFERENCE IN RATE WITHIN TREATMENTS (STERILE/ACTIVE, WITH AND WITHOUT SEDIMENTS) OF A FACTOR OF TWO OR LESS WAS PROBABLY NOT SIGNIFICANT. DEGRADATION RATES OF METHYL PARATHION IN SHAKE-FLASK TESTS WERE DETERMINED USING WATER AND SEDIMENT OBTAINED FROM THIRTEEN SAMPLING SITES TO EXAMINE SITE-SPECIFIC VARIABILITY. VARIABILITY IN DEGRADATION RATES AT TWO SITES (RANGE POINT, FL, AND DAVIS BAYOU, MS) WAS ASSESSED OVER A THREE-YEAR PERIOD. STATISTICAL ANALYSIS OF THE RATES INDICATED THAT BIOLOGICAL DEGRADATION OF METHYL PARATHION IN THE PRESENCE OF SEDIMENT WAS THE MOST IMPORTANT DETERMINANT AND THAT BIOLOGICAL DEGRADATION ASSOCIATED WITH WATER AND ABIOTIC SEDIMENT-ENHANCED DEGRADATION WAS INSIGNIFICANT. BIODEGRADATION RATES IN THE PRESENCE OF SEDIMENT WERE SIGNIFICANTLY DIFFERENT BETWEEN THE TWO PRIMARY SITES, WITH THE RANGE POINT MEAN RATE APPROXIMATELY FIVEFOLD GREATER THAN THE DAVIS BAYOU MEAN RATE. ONLY TWO OF THE OTHER SITES EXHIBITED A DEGRADATION RATE SIMILAR TO RANGE POINT; ALL OTHER SITES HAD RATES APPROXIMATELY THE SAME AS DAVIS BAYOU. COLONY-FORMING UNITS DID NOT CORRELATE WITH WATER OR SEDIMENT-ASSOCIATED BIODEGRADATION RATES. NO SEASONAL DIFFERENCES IN DEGRADATION RATES EXISTED AT EITHER OF THE PRIMARY SITES FOR ANY TREATMENT. THE RESULTS REVEAL GEOGRAPHIC VARIATIONS IN DEGRADATION RATES AND THUS INDICATE THE NECESSITY FOR STUDYING SITE-SPECIFIC DEGRADATION RATES FOR TOXIC COMPOUNDS. THIS SUGGESTS THAT A VARIATION IN BIODEGRADATION RATES MAY NOT BE AS HIGH AS EXPECTED (BASED ON THE HETEROGENEITY OF MICROBIAL COMMUNITIES) AND, AT LEAST FOR METHYL PARATHION IN SEDIMENTS, ALL RATES CAN BE SUBDIVIDED INTO A MINIMUM OF TWO GROUPINGS.

RUBINSTEIN, N.I., E. LORES, AND N.R. GREGORY. 1983. ACCUMULATION OF PCB, MERCURY AND CADMIUM BY NEREIS VIRENS, MERCENARIA MERCENARIA AND PALAEMONETES PUGIO FROM CONTAMINATED HARBOR SEDIMENTS. AQUAT. TOXICOL. (AMST.). 3(3):249-260. (ERL,GB 452).

ACCUMULATION OF POLYCHLORINATED BIPHENYLS (PCBS), MERCURY, AND CADMIUM BY SANDWORMS (NEREIS VIRENS), HARD CLAMS (MERCENARIA MERCENARIA) AND GRASS SHRIMP (PALAEMONETES PUGIO) EXPOSED TO CONTAMINATED SEDIMENTS FROM FOUR SITES IN NEW YORK HARBOR WAS STUDIED FOR A 100-DAY PERIOD. OF THE THREE CONTAMINANTS MONITORED, ONLY PCBS WERE FOUND TO BIOACCUMULATE ABOVE BACKGROUND (CONTROL) CONCENTRATIONS. SMALL INCREASES IN PCB BODY BURDEN WERE DETECTED IN M. MERCENARIA AND P. PUGIO, WHEREAS HIGHER CONCENTRATIONS WERE MEASURED IN N. VIRENS. UPTAKE WAS AFFECTED BY THE ORGANIC CONTENT OF THE SEDIMENT. BIOACCUMULATION FACTORS (CONCENTRATION IN TISSUE/CONCENTRATION IN SEDIMENT) FOR N. VIRENS RANGED FROM 1.59 IN A LOW ORGANIC SEDIMENT TO 0.15 IN A HIGH ORGANIC SEDIMENT. RESULTS FROM THIS STUDY SUPPORT THE CONTENTION THAT SEDIMENT CONCENTRATION ALONE DOES NOT REFLECT BIOAVAILABILITY AND THAT TOXICITY TESTS (BIOASSAYS) AND FIELD MONITORING REMAIN THE MOST DIRECT METHOD FOR ESTIMATING BIOACCUMULATION POTENTIAL OF SEDIMENT-BOUND CONTAMINANTS.

RUBINSTEIN, NORMAN I. 1979. BENTHIC BIOASSAY USING TIME-LAPSE PHOTOGRAPHY TO MEASURE THE EFFECT OF TOXICANTS ON THE FEEDING BEHAVIOR OF LUGWORMS (POLYCHAETA: ARENICOLIDAE). IN: MARINE POLLUTION: FUNCTIONAL RESPONSES. W.B. VERNBERG, A. CALABRESE, F. THURBERG, AND F.J. VERNBERG, EDITORS, ACADEMIC PRESS, INC., NEW YORK, NY. PP. 341-351. (ERL,GB X120).

A BENTHIC ASSAY WAS DEVELOPED UTILIZING TIME-LAPSE PHOTOGRAPHY TO MEASURE THE FEEDING ACTIVITY OF A LUGWORM, ARENICOLA CRISTATA. AUTOMATED 35 MM CAMERAS WERE USED TO RECORD FORMATION OF FEEDING FUNNELS AT 12-HOUR INTERVALS. SUBSTRATE SURFACE AREA REWORKED BY LUGWORMS HELD UNDER IDENTICAL CONDITIONS IN SEPARATE AQUARIA WAS PLOTTED AGAINST TIME TO DETERMINE SUBSTRATE REWORKING RATES FOR EACH GROUP. RATES WERE SUBJECTED TO LINEAR REGRESSION ANALYSIS AND COMPARED TO DEMONSTRATE THAT NO SIGNIFICANT DIFFERENCE BETWEEN SLOPES OF THE CALCULATED LINES EXISTED. THEREFORE, A DIFFERENCE IN SLOPE WHEN ONE GROUP IS EXPOSED TO A TOXICANT COULD PROVIDE A MEASURE OF EFFECT ON LUGWORM ACTIVITY. LUGWORMS ALSO WERE EXPOSED TO THE PESTICIDE, KEPONE, AND THEIR RATE OF SUBSTRATE REWORKING WAS COMPARED WITH UNEXPOSED LUGWORMS. KEPONE WAS ACUTELY TOXIC TO LUGWORMS AT A CONCENTRATION OF 29.5 MG/L. A SIGNIFICANT DIFFERENCE IN SUBSTRATE REWORKING RATES WAS OBSERVED FOLLOWING EXPOSURE TO CONCENTRATIONS AS LOW AS 2.8 MG/L KEPONE IN SEAWATER. IT IS SUGGESTED THAT A BEHAVIORAL RESPONSE TO TOXICITY TESTING PROVIDES A SENSITIVE AND REALISTIC APPROACH FOR EVALUATION OF ECOLOGICAL IMPACT OF POLLUTANTS ON THE MARINE ENVIRONMENT.

RUBINSTEIN, NORMAN I., W.T. GILLIAM, AND N.R. GREGORY. 1984. DIETARY ACCUMULATION OF PCBS FROM A CONTAMINATED SEDIMENT SOURCE BY A DEMERSAL FISH (LEIOSTOMUS XANTHURUS). AQUAT. TOXICOL. 5(4):331-342. (ERL,GB 485).

ACCUMULATION AND DIETARY TRANSFER OF PCBS FROM CONTAMINATED HARBOR SEDIMENTS WERE STUDIED IN A LABORATORY FOOD CHAIN CONSISTING OF SEDIMENTS, POLYCHAETES (NEREIS VIRENS) AND A PREDATORY FISH (LEIOSTOMUS XANTHURUS). THE STUDY WAS CONDUCTED IN TWO PHASES TO DISTINGUISH DIETARY UPTAKE FROM PCB ACCUMULATION RESULTING FROM SEDIMENT EXPOSURE ALONE. IN PHASE I FISH AND POLYCHAETES WERE SEPARATELY EXPOSED TO FIELD-COLLECTED PCB CONTAMINATED SEDIMENTS (5.2 UG/G DRY WEIGHT AS AROCLOR 1242 AND 1254) IN FLOW-THROUGH SEA-WATER SYSTEMS FOR 40 DAYS TO ALLOW ORGANISMS TO ATTAIN STEADY STATE CONCENTRATIONS. IN PHASE II THE DIETARY FRACTION OF PCB ACCUMULATION WAS DETERMINED BY SELECTIVELY FEEDING EXPOSED AND CONTROL GROUPS OF FISH POLYCHAETES HAVING A KNOWN PCB BODY BURDEN. IN ADDITION THE EFFECT OF DIRECT SEDIMENT CONTACT ON PCB ACCUMULATION BY L. XANTHURUS WAS INVESTIGATED. RESULTS DEMONSTRATE THAT CONTAMINATED SEDIMENTS CAN SERVE AS A SOURCE OF PCBS FOR UPTAKE AND TROPHIC TRANSFER IN MARINE SYSTEMS. FISH EXPOSED TO PCB-CONTAMINATED SEDIMENTS AND FED A DAILY DIET OF POLYCHAETES FROM THE SAME SEDIMENT ACCUMULATED MORE THAN TWICE THE PCB WHOLE-BODY RESIDUES THAN FISH EXPOSED TO SIMILAR CONDITIONS BUT FED UNCONTAMINATED POLYCHAETES. THE DIETARY CONTRIBUTION OF PCBS ACCOUNTED FOR 53% OF THE TOTAL BODY BURDEN MEASURED IN FISH FED FOR 20 DAYS, AND THIS PERCENTAGE APPEARED TO BE INCREASING. RESULTS ALSO INDICATE THAT FISH ISOLATED FROM DIRECT CONTACT WITH PCB-CONTAMINATED SEDIMENT DO NOT SIGNIFICANTLY (P LESS THAN OR EQUAL TO 0.05) ACCUMULATE PCB RESIDUES WHEN COMPARED WITH FISH ALLOWED CONTACT WITH SEDIMENT.

RUBINSTEIN, NORMAN I. 1978. EFFECT OF SODIUM PENTACHLOROPHENATE ON THE FEEDING ACTIVITY OF THE LUGWORM, ARENICOLA CRISTATA STIMPSON. IN: PENTACHLOROPHENOL: CHEMISTRY, PHARMACOLOGY, AND ENVIRONMENTAL TOXICOLOGY. K. RANGA RAO, EDITOR, PLENUM PRESS, NEW YORK, NY. PP. 175-179. (ERL,GB X121*).

A BENTHIC BIOASSAY UTILIZING TIME-LAPSE PHOTOGRAPHY WAS USED TO MEASURE THE EFFECT OF FOUR CONCENTRATIONS OF NA-PCP (45, 80, 156 AND 276 UG/L) ON THE FEEDING ACTIVITY OF ARENICOLA CRISTATA. THERE WAS NO MARKED EFFECT ON FEEDING ACTIVITY AT 45 UG/L. NA-PCP SIGNIFICANTLY AFFECTED FEEDING ACTIVITY AT CONCENTRATIONS OF 80, 156, AND 276 IG/L. AS THE LUGWORM FEEDS IT MIXES ORGANIC MATERIAL AND OXYGENATED WATER INTO THE SUBSTRATE. INHIBITION OF THIS ACTIVITY COULD AFFECT BENTHIC COMMUNITY TROPHIC STRUCTURE AND SUBSTRATE-WATER COLUMN DYNAMICS.

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.

RUBINSTEIN, N.I., W.T. GILLIAM, AND N.R. GREGORY. 1983. EVALUATION OF THREE FISH SPECIES AS BIOASSAY ORGANISMS FOR DREDGED MATERIAL TESTING. EPA-600/X-83-062, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 22P.

THE OBJECTIVE OF THIS STUDY WAS TO EVALUATE SEVERAL MARINE FISH SPECIES IN TERMS OF THEIR ACUTE SENSITIVITY TO MODERATELY CONTAMINATED SEDIMENTS AND THEIR POTENTIAL FOR BIOACCUMULATION OF POLYCHLORINATED BIPHENYL (PCB), A UBIQUITOUS ORGANIC CONTAMINANT. SEELYE ET AL. (1982) HAVE PREVIOUSLY EXAMINED ACCUMULATION OF CONTAMINANTS RELEASED FROM DREDGED SEDIMENTS IN A FRESHWATER FISH SPECIES (PERCA FLAVESCENS). CONSIDERATIONS FOR BIOASSAY SPECIES SELECTION: A RATIONALE TO AID IN SELECTION OF APPROPRIATE BIOASSAY ORGANISMS WAS DEVELOPED BY SHUBA ET AL. (1981). THEIR LIST OF SELECTION FACTORS INCLUDE: 1). THE ORGANISM IS FOUND AT, OR IS RELATED TO, SPECIES AT THE DISPOSAL SITE; 2). THE ORGANISM IS READILY AVAILABLE THROUGHOUT THE YEAR, EITHER THROUGH FIELD COLLECTION OR PURCHASING; 3). A TOXICOLOGICAL DATA BASE EXISTS FOR THE SPECIES; 4). THE ORGANISM CAN BE MAINTAINED IN A HEALTH CONDITION IN THE LABORATORY; 5). THE ORGANISM IS CULTURABLE IN THE LABORATORY; 6). THE ORGANISM OCCURS OVER A WIDE GEOGRAPHIC AREA; AND 7). THE ORGANISM IS ECONOMICALLY OR ECOLOGICALLY IMPORTANT OR BOTH. ADDITIONAL FACTORS THAT APPLY TO SPECIES SELECTED FOR BIOACCUMULATION STUDIES ARE: THE ORGANISM SHOULD ACCUMULATE THE POLLUTANT WITHOUT EXCESSIVE MORTALITY AT CONCENTRATIONS FOUND IN THE ENVIRONMENT AND THE ORGANISM SHOULD BE OF ADEQUATE SIZE FOR TISSUE ANALYSIS (D.J.H. PHILLIPS, 1980). THREE SPECIES THAT MEET THE SELECTION CRITERIA ARE THE SHEEPSHEAD MINNOW (CYPRINODON VARIEGATUS), THE KILLIFISH (FUNDULUS SIMILIS) AND THE ATLANTIC SILVERSIDE (MENIDIA MENIDIA). THESE SPECIES WERE SELECTED FOR STUDY AND TESTED WITH DREDGED MATERIAL TAKEN FROM NEW YORK HARBOR. IT WAS OUR INTENTION TO EVALUATE THESE ORGANISMS FROM THE PERSPECTIVE OF A CONTRACTING LABORATORY REQUIRED TO USE STANDARD METHODS AND TO APPLY RECOMMENDED PROCEDURES FOR DREDGED MATERIAL EVALUATION (EPA/CE, 1977).

SCHMIDT, STEVEN K., AND MARTIN ALEXANDER. 1985. EFFECTS OF DISSOLVED ORGANIC CARBON AND SECOND SUBSTRATES ON THE BIODEGRADATION OF ORGANIC COMPOUNDS AT LOW CONCENTRATIONS. APPL. ENVIRON. MICROBIOL. 49(4):822-827. (ERL,GB X488*).

PSEUDOMONAS ACIDOVORANS AND PSEUDOMONAS SP. STRAIN ANL BUT NOT SALMONELLA TYPHIMURIUM GREW IN AN INORGANIC SALTS SOLUTION. THE GROWTH OF P. ACIDOVORANS IN THIS SOLUTION WAS NOT ENHANCED BY THE ADDITION OF 2.0 UG OF PHENOL PER LITER, BUT THE PHENOL WAS MINERALIZED. MINERALIZATION OF 2.0 UG OF PHENOL PER LITER BY P. ACIDOVORANS WAS DELAYED 16 H BY 70 UG OF ACETATE PER LITER, AND THE DELAY WAS LENGTHENED BY INCREASING ACETATE CONCENTRATIONS, WHEREAS PHENOL AND ACETATE WERE UTILIZED SIMULTANEOUSLY AT CONCENTRATIONS OF 2.0 AND 13 UG/LITER, RESPECTIVELY. GROWTH OF PSEUDOMONAS SP. IN THE INORGANIC SALTS SOLUTION WAS NOT AFFECTED BY THE ADDITION OF 3.0 UG EACH OF GLUCOSE AND ANILINE PER LITER, NOR WAS MINERALIZATION OF THE TWO COMPOUNDS DETECTED DURING THE INITIAL PERIOD OF GROWTH. HOWEVER, MINERALIZATION OF BOTH SUBSTRATES BY THIS ORGANISM OCCURRED SIMULTANEOUSLY DURING THE LATTER PHASES OF GROWTH AND AFTER GROWTH HAD ENDED AT THE EXPENSE OF THE UNCHARACTERIZED DISSOLVED ORGANIC COMPOUNDS IN THE SALTS SOLUTION. IN CONTRAST, WHEN PSEUDOMANAS SP. WAS GROWN IN THE SALTS SOLUTION SUPPLEMENTED WITH 300 UG EACH OF GLUCOSE AND ANILINE, THE SUGAR WAS MINERALIZED FIRST, AND ANILINE WAS MINERALIZED ONLY AFTER MUCH OF THE GLUCOSE CARBON WAS CONVERTED TO CO2. S. TYPHIMURIUM FAILED TO MULTIPLY IN THE SALTS SOLUTION WITH 1.0 UG OF GLUCOSE PER LITER. IT GREW SLIGHTLY BUT MINERALIZED LITTLE OF THE SUGAR AT 5.0 UG/LITER, BUT ITS POPULATION DENSITY ROSE AT 10 UG OF GLUCOSE PER LITER OR HIGHER. THE HEXOSE COULD BE MINERALIZED AT 0.5 UG/LITER, HOWEVER, IF THE SOLUTION CONTAINED 5.0 MG OF ARABINOSE PER LITER. IN SOLUTIONS WITH THIS ARABINOSE CONCENTRATION AND GLUCOSE LEVELS TOO LOW TO SUPPORT GROWTH, THE PERCENTAGE OF GLUCOSE CARBON INCORPORATED INTO S. TYPHIMURIUM CELLS WAS THE SAME AS WHEN THE BACTERIUM WAS GROWN IN SOLUTIONS WITH HIGH CONCENTRATIONS OF GLUCOSE ALONE. WHEN GLUCOSE WAS THE ONLY CARBON SOURCE FOR S. TYPHIMURIUM, THE PERCENTAGE OF THE GLUCOSE CARBON ASSIMILATED AND MINERALIZED PROGRESSIVELY DECLINED AS THE SUGAR CONCENTRATION WAS REDUCED TO LEVELS APPROACHING THE THRESHOLD FOR GROWTH. THESE RESULTS INDICATE THAT SECOND SUBSTRATES AND UNCHARACTERIZED DISSOLVED ORGANIC CARBON MAY PLAY AN IMPORTANT ROLE IN CONTROLLING THE RATE AND EXTENT OF BIODEGRADATION OF ORGANIC COMPOUNDS AT LOW CONCENTRATIONS.

SHIMP, ROBERT J., AND FREDERIC K. PFAENDER. 1985. INFLUENCE OF EASILY DEGRADABLE NATURALLY OCCURRING CARBON SUBSTRATES ON BIODEGRADATION OF MONOSUBSTITUTED PHENOLS BY AQUATIC BACTERIA. APPL. ENVIRON. MICROBIOL. 49(2):394-401. (ERL,GB X494*).

THE INFLUENCE OF READILY DEGRADABLE, NATURALLY OCCURRING CARBON SUBSTRATES ON THE BIODEGRADATION OF SEVERAL MONOSUBSTITUTED PHENOLS (M-CRESOL, M-AMINOPHENOL, P-CHLOROPHENOL) WAS EXAMINED. THE NATURAL SUBSTRATE CLASSES USED WERE AMINO ACIDS, CARBOHYDRATES, AND FATTY ACIDS. SAMPLES OF THE MICROBIAL COMMUNITY FROM LAKE MICHIE, A MESOTROPHIC RESERVOIR, WERE ADAPTED TO DIFFERENT LEVELS OF REPRESENTATIVES FROM EACH NATURAL SUBSTRATE CLASS IN CHEMOSTATS. AFTER AN EXTENDED ADAPTATION PERIOD, THE ABILITY OF THE MICROBIAL COMMUNITY TO DEGRADE THE MONOSUBSTITUTED PHENOLS WAS DETERMINED BY USING A RADIOLABELED SUBSTRATE UPTAKE AND MINERALIZATION METHOD. SEVERAL MICROBIOLOGICAL CHARACTERISTICS OF THE COMMUNITIES WERE ALSO MEASURED. ADAPTATION TO INCREASING CONCENTRATIONS OF AMINO ACIDS, CARBOHYDRATES, OR FATTY ACIDS ENHANCED THE ABILITY OF THE MICROBIAL COMMUNITY TO DEGRADE ALL THREE PHENOLS. THE STIMULATION WAS LARGEST FOR M-CRESOL AND M-AMINOPHENOL. THE MECHANISM RESPONSIBLE FOR THE ENHANCEMENT OF MONOSUBSTITUTED PHENOL METABOLISM WAS NOT CLEARLY IDENTIFIED, BUT THE OBSERVATION THAT ADAPTATION TO AMINO ACIDS ALSO INCREASED THE BIODEGRADATION OF GLUCOSE AND, TO A LESSER EXTENT, NAPHTHALENE SUGGESTS A GENERAL STIMULATION OF MICROBIAL METABOLISM. THIS STUDY DEMONSTRATES THAT PRIOR EXPOSURE TO LABILE, NATURAL SUBSTRATES CAN SIGNIFICANTLY ENHANCE THE ABILITY OF AQUATIC MICROBIAL COMMUNITIES TO RESPOND TO XENOBIOTICS.

SHIMP, ROBERT, AND FREDERIC K. PFAENDER. 1985. INFLUENCE OF NATURALLY OCCURRING HUMIC ACIDS ON BIODEGRADATION OF MONOSUBSTITUTED PHENOLS BY AQUATIC BACTERIA. APPL. ENVIRON. MICROBIOL. 49(2):402-407. (ERL,GB X493*).

SAMPLES OF THE MICROBIAL COMMUNITY FROM LAKE MICHIE, A MESOTROPHIC RESERVOIR IN CENTRAL NORTH CAROLINA, WERE ADAPTED TO VARIOUS LEVELS (100 TO 1,000 UG/LITER) OF NATURAL HUMIC ACIDS IN CHEMOSTATS. THE HUMIC ACIDS WERE EXTRACTED FROM WATER SAMPLES FROM BLACK LAKE, A HIGHLY COLORED LAKE IN THE COASTAL PLAIN OF NORTH CAROLINA. AFTER ADAPTATION, THE MICROBIAL COMMUNITY WAS TESTED FOR ITS ABILITY TO DEGRADE THE MONOSUBSTITUTED PHENOLS M-CRESOL, M-AMINOPHENOL, AND P-CHLOROPHENOL. ADAPTATION TO INCREASING LEVELS OF HUMIC ACIDS SIGNIFICANTLY REDUCED THE ABILITY OF THE MICROBIAL COMMUNITIES TO DEGRADE ALL THREE PHENOLS. THE DECLINE IN BIODEGRADATION WAS ACCOMPANIED BY A DECREASE IN THE NUMBER OF SPECIFIC COMPOUND DEGRADERS IN THE ADAPTED COMMUNITIES. SHORT-TERM EXPOSURE OF THE COMMUNITY TO INCREASING LEVELS OF HUMIC ACIDS HAD NO SIGNIFICANT EFFECT ON THE ABILITY OF THE COMMUNITY TO DEGRADE M-CRESOL. THUS THE SUPPRESSIVE EFFECT OF HUMIC ACIDS ON MONOSUBSTITUTED PHENOL METABOLISM WAS THE RESULT OF LONG-TERM EXPOSURE TO THE HUMIC MATERIALS. INCREASING THE LEVELS OF INORGANIC NUTRIENTS FED TO THE CHEMOSTATS DURING THE HUMIC ACID ADAPTATION HAD LITTLE EFFECT ON THE SUPPRESSIVE INFLUENCE OF THE HUMIC ACIDS, INDICATING THAT NUTRIENT LIMITATION WAS PROBABLY NOT RESPONSIBLE FOR THE METABOLIC SUPPRESSION. THE RESULTS OF THE STUDY SUGGEST THAT LONG-TERM EXPOSURE TO HUMIC ACIDS CAN REDUCE THE ABILITY OF MICROBIAL COMMUNITIES TO RESPOND TO MONOSUBSTITUTED PHENOLS.

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,GB 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 MALTOSA 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 UTILZATION OF HEXADECANE BY C. MALTOSA, BUT HAD NO EFFECT WITH C. LIPOLYTICA.

SOMERVILLE, C.C., C.A. MONTI, AND J.C. SPAIN. 1985. MODIFICATION OF THE 14C MOST-PROBABLE-NUMBER METHOD FOR USE WITH NONPOLAR AND VOLATILE SUBSTRATES. APPL. ENVIRON. MICROBIOL. 49(3):711-713. (ERL,GB X496).

A METHOD WAS DEVELOPED TO ALLOW THE USE OF VOLATILE AND NONPOLAR SUBSTRATES IN 14C MOST-PROBABLE-NUMBER TESTS. NAPHTHALENE OR HEXADECANE WAS SORBED TO FILTER PAPER DISKS AND SUBMERGED IN MINIMAL MEDIUM. THE PROCEDURE REDUCED THE VOLATILIZATION OF THE SUBSTRATES WHILE ALLOWING THEM TO REMAIN AVAILABLE FOR MICROBIAL DEGRADATION.

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*).
AVAIL. FROM NTIS, SPRINGFIELD, VA: PB83-194522.

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 RESPIKE 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 NITOPHENOL. P-CRESOL WAS MINERALIZED RAPIDLY IN BOTH PRE-EXPOSURE AND UNEXPOSED POPULATIONS.

SPAIN, J.C., AND C.C. SOMERVILLE. IN PRESS. BIODEGRADATION OF JET FUEL BY AQUATIC MICROBIAL COMMUNITIES. IN: PROCEEDINGS: 2ND INTERNATIONAL SYMPOSIUM ON MICROBIAL-ENHANCED OIL RECOVERY, GEORGIA STATE UNIVERSITY, ATLANTA, GA, AUGUST 16, 1984. GEORGIA STATE UNIVERSITY, ATLANTA, GA. 23P. (ERL,GB X485).

THIS PAPER DESCRIBES LABORATORY EXPERIMENTS THAT STUDIED THE FATE OF JET FUEL IN SEVERAL TYPES OF SITUATIONS THAT COULD BE ENCOUNTERED IN THE FIELD. BENZENE, TOLUENE, AND P-XYLENE WERE THE ONLY COMPONENTS OF THE FUEL THAT DISSOLVED IN THE WATER TO SIGNIFICANT CONCENTRATIONS. ALL THREE COMPOUNDS VOLATILIZED WITHIN 24 H AND, THUS, DID NOT REMAIN IN THE WATER LONG ENOUGH FOR MICROBIAL DEGRADATION TO AFFECT THEIR FATE. INCLUSION OF SEDIMENT (500 MG/L DRY WEIGHT) DID NOT RETARD THE DISAPPEARANCE OF THE FUEL COMPONENTS, AND RATES OF DISAPPEARANCE WERE IDENTICAL IN CONTROLS STERILIZED WITH HGCL2.

SPAIN, J.C., P.A. VAN VELD, C.A. MONTI, P.H. PRITCHARD, AND C.R. CRIPE. 1984. COMPARISON OF P-NITROPHENOL BIODEGRADATION IN FIELD AND LABORATORY TEST SYSTEMS. APPL. ENVIRON. MICROBIOL. 48(5):944-950. (ERL,GB 506).

ACCLIMATION OF MICROBIAL COMMUNITIES EXPOSED TO P-NITROPHENOL (PNP) WAS MEASURED IN LABORATORY TEST SYSTEMS AND IN A FRESHWATER POND. LABORATORY TESTS WERE CONDUCTED IN SHAKE FLASKS WITH WATER, SHAKE FLASKS WITH WATER AND SEDIMENT, ECO-CORES, AND TWO SIZES OF MICROCOSM. THE SEDIMENT AND WATER SAMPLES USED IN THE LABORATORY EXPERIMENTS WERE OBTAINED FROM THE POND. AFTER A 6-DAY ACCLIMATION PERIOD, PNP WAS BIODEGRADED RAPIDLY IN THE POND. WHEN THE POND WAS TREATED WITH PNP A SECOND TIME, BIODEGRADATION BEGAN IMMEDIATELY. THE ACCLIMATION PERIODS IN LABORATORY TEST SYSTEMS THAT CONTAINED SEDIMENT WERE SIMILAR TO THAT IN THE POND. THE ACCLIMATION PERIOD WAS THREEFOLD LONGER IN SHAKE FLASKS WITHOUT SEDIMENT. PNP WAS BIODEGRADED MORE SLOWLY BY MICROBIAL COMMUNITIES ACCLIMATED IN THE LABORATORY THAN IT WAS IN THE POND, AND THE RATE OF BIODEGRADATION VARIED WIH THE TYPE OF TEST. THE NUMBER OF BACTERIA ABLE TO MINERALIZE PNP INCREASED BY 3 ORDERS OF MAGNITUDE IN THE POND DURING THE ACCLIMATION PERIOD. SIMILAR INCREASES ACCOMPANIED ACCLIMATION IN THE LABORATORY SYSTEMS.

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. SURFACES FILMS OF THE MODEL MIXTURE WERE STUDIED UNDER QUIESENT INCUBATION. THE DISAPPEARANCE OF HYDROCARBONS WAS MEASURED BY CAPILLARY COLUMN GAS CHROMATOGRAPHY. CONTROL FLASKS WERE STERILIZED WITH HGCL(2) 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 STMULATED 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 RADILY 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 REPLICATON OF HYDROCARBONOCLASTIC BACTERIA.

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. 14C02 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 MICOORGANISMS. 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, J.C., AND C.C. SOMERVILLE. 1985. FATE AND TOXICITY OF HIGH DENSITY MISSILE FUELS RJ-5 AND JP-9 IN AQUATIC TEST SYSTEMS. CHEMOSPHERE. 14(2):239-248. (ERL,GB X486*).

THE HIGH DENSITY MISSILE FUELS RJ-5 AND JP-9 RESISTED BIODEGRADATION WHEN INCUBATED WITH WATER/SEDIMENT SUSPENSIONS COLLECTED FROM AQUATIC HABITATS. RJ-5 AND JP-9 WERE NOT TOXIC TO THE MICROBIAL COMMUNITIES AT CONCENTRATIONS OF 400 MG PER LITER, BUT RJ-5 WAS TOXIC TO MYSIDOPSIS BAHIA IN 96-HOUR ACUTE TESTS (LC50 88 UG/L).

SUMMERS, MAX. 1984. PATHOLOGIC, BIOCHEMICAL AND GENETIC PROBES DEVELOPED TO DETECT BIOLOGICAL CONTROL AGENTS IN NON-TARGET HOSTS. EPA-600/X-84-348, U.S. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 21P.

THE NUCLEAR POLYHEDROSIS VIRUS OF AUTOGRAPHA CALIFORNICA (ACMNPV) HAS POTENTIAL USE AS A VIRAL INSECTICIDE, ESPECIALLY IN VIEW OF ITS WIDE HOST RANGE AND LETHAL EFFECTS IN LEPIDOPTERA AND HYMENOPTERA (KELLY, 1982). IF THE HOST RANGE OF ACMNPV EXTENDS BEYOND INSECTS, ITS USE AS AN INSECTICIDE WOULD BE COMPROMISED. WE INVESTIGATED THE ABILITY OF ACMNPV TO INFECT THREE POIKILOTHERMIC VERTEBRATE CELL LINES AND A NONPERMISSIVE INSECT CELL LINE BY USE OF HIGHLY SENSITIVE NUCLEIC ACID PROBE TECHNIQUES AND ELECTRON MICROSCOPY. THE ELECTRON MICROSCOPY STUDIES REVEALED THAT NUMEROUS VIRUS PARTICLES ENTERED THE VERTEBRATE CELLS AND NUCLEOCAPSIDS WERE OBSERVED TO PENETRATE TO THE NUCLEUS. THE NUCLEIC ACID HYBRIDIZATION STUDIES SHOWED THAT VIRAL DNA COULD BE DETECTED IN THE NUCLEI OF EVERY CELL LINE AFTER EXPOSURE TO ACMNPV. WE CONCLUDE THAT, UPON EXPOSURE TO ACMNPV, AN EFFICIENT, TRANSIENT ENTRY OF VIRUS OCCURS IN ALL TESTED CELL LINES. WHEN EITHER THE VERTEBRATE OR THE NONPERMISSIVE INSECT CELLS WERE EXPOSED TO ACMNPV THERE WAS NO DETECTABLE PRODUCTIVE INFECTION, CYTOLOGICAL CHANGE, SYNTHESIS OF VIRAL RNA TRANSCRIPTS, OR PERSISTENCE OF VIRAL DNA.

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 APPLICABLILITY OF A FIRST-ORDER KINETIC MODEL TO DESCRIBE THE DEGRADATION OF THESE COMPOUNDS WAS EXAMINED.

WALKER, W.W., C.R. CRIPE, P.H. PRITCHARD, AND A.W. BOURQUIN. IN PRESS. BIOLOGICAL AND ABIOTIC DEGRADATION RATES OF XENOBIOTIC CHEMICALS IN IN VITRO ESTUARINE AND SEDIMENT/WATER SYSTEMS. J. AGRIC. FOOD CHEM. (ERL,GB 504).

THREE HERBICIDES, TWO FUNGICIDES, FOUR ORGANOPHORPHORUS INSECTICIDES, AND ONE MITICIDE (ACARICIDE) WERE CHARACTERIZED WITH RESPECT TO DEGRADATION RATE IN ESTUARINE WATER AND SEDIMENT/WATER SYSTEMS USING A SIMPLE SHAKE FLASK TEST. DECAY RATES FOR EACH CHEMICAL COULD GENERALLY BE DESCRIBED BY A FIRST ORDER MODEL. THE DEGRADATION OF HOELON, BRAVO, BOLSTAR, FENTHION, AND BOLERO WAS BIOLOGICALLY MEDIATED. THE FASTEST BIODEGRADATION RATES OCCURRED WHEN SEDIMENT WAS PRESENT. THE DEGRADATION OF TRIFLURALIN, DURSBAN, PHORATE, EPN AND PENTACHLORONITROBENZENE WERE PRIMARILY BY ABIOTIC MEANS. RELATIVE TO THE OTHER TEST MATERIALS, PHORATE REFLECTED INTERMEDIATE DEGRADATION RATES. VARIABILITY IN RATES FROM REPLICATE FLASKS SUGGESTED THAT A DIFFERENCE IN RATE WITHIN TREATMENTS (STERILE/ACTIVE, WITH AND WITHOUT SEDIMENTS) OF A FACTOR OF TWO OR LESS WAS PROBABLY NOT SIGNIFICANT.

WALKER, WILLIAM W. 1984. DEVELOPMENT OF A FATE/TOXICITY SCREENING TEST. EPA-600/4-84-074, U.S. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 30P.

A SHAKE-FLASK SCREENING TEST WAS DESIGNED TO RAPIDLY EVALUATE THE RELATIVE DEGRADATION RATES OF A WIDE SPECTRUM OF CHEMICALS, EACH COMPARED TO METHYL PARATHION. TEST CHEMICALS EVALUATED WERE BOLERO, BRAVO, DIBUTYLPHTHALATE, DIMILIN, DURSBAN, ENDOSULFAN, HOELON, PENTACHLOROBENZENE, PHORATE, AND TRIFLURALIN. DIVERSE REGIMES OF SALINITY, PH, TOC, AND MICROBIAL BIOMASS WERE ENCOUNTERED ACROSS SPACE AND TIME. THE EXPERIMENTAL DESIGN FOR THE SCREENING TEST EMBODIES FOUR TREATMENTS: ACTIVE SEDIMENT, STERILE SEDIMENT, ACTIVE WATER, AND STERILE WATER. DECAY CURVES WERE PRODUCED AND RATE CONSTANTS AND HALF-LIFE VALUES DETERMINED. HALF-LIFE VALUES FOR THE 10 CHEMICALS EVALUATED VARIED SUBSTANTIALLY WITH TIME AND GEOGRAPHIC SAMPLING SITE. IN ACTIVE SYSTEMS, 8 OF THE 10 CHEMICALS DEGRADED MORE RAPIDLY THAN METHYL PARATHION. NINE DIBUTYLPHTHALATE SCREENS WERE RUN INVOLVING SIX GEOGRAPHIC SITES. DISAPPEARANCE WAS QUITE RAPID IN ACTIVE TREATMENTS IN ALL SCREENS. DISAPPEARANCE CURVES DESCRIBING DBP ABATEMENT EITHER: (1) APPEARED TO BE SUBSTRATE DEPENDENT WITH THE RATE OF DEGRADATION DECREASING AS DBP WAS DEPLETED; (2) APPEARED INDEPENDENT OF SUBSTRATE CONCENTRATION; OR (3) REFLECTED A MARKED INCREASE IN DEGRADATION RATE DURING THE SCREENING PERIOD.

WALKER, WILLIAM W., C.R. CRIPE, P.H. PRITCHARD, AND A.W. BOURQUIN. 1984. DIBUTYLPHTHALATE DEGRADATION IN ESTUARINE AND FRESHWATER SITES. CHEMOSPHERE. 13(12):1283-1294. (ERL,GB 509).

BIOTIC AND ABIOTIC DEGRADATION OF DI-N-BUTYLPHTHALATE (DBP) IN WATER AND SEDIMENT/WATER SYSTEMS FROM SIX DIFFERENT SITES WAS INVESTIGATED UNDER LABORATORY CONDITIONS. DBP DISAPPEARANCE WAS RAPID IN ALL MICROBIALLY ACTIVE SYSTEMS AND SUBSTANTIALLY REDUCED UNDER STERILE CONDITIONS. ADAPTATION OF MICROBIAL POPULATIONS TO DEGRADE DBP WAS INDICATED IN SIX OF NINE EVALUATIONS CONDUCTED. THE PRESENCE OF SEDIMENT SIGNIFICANTLY INCREASED BIODEGRADATION RATES IN FIVE OF THE SIX SITES.

WALKER, WILLIAM W. 1978. INSECTICIDE PERSISTENCE IN NATURAL SEAWATER AS AFFECTED BY SALINITY, TEMPERATURE, AND STERILITY. EPA-600/3-78-044, 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.

WANG, YEI-SHUNG, EUGENE L. MADSEN, AND MARTIN ALEXANDER. IN PRESS. BIODEGRADATION BY MINERALIZATION OR COMETABOLISM DETERMINED BY CHEMICAL CONCENTRATION AND ENVIRONMENT. APPL. ENVIRON. MICROBIOL. 17P. (ERL,GB X489).

WANG, YEI-SHUNG, R.V. SUBBA-RAO, AND MARTIN ALEXANDER. 1984. EFFECT OF SUBSTRATE CONCENTRATION AND ORGANIC AND INORGANIC COMPOUNDS ON THE OCCURRENCE AND RATE OF MINERALIZATION AND COMETABOLISM. APPL. ENVIRON. MICROBIOL. 47(6):1195-1200. (ERL,GB X482).

ISOPROPYL N-PHENYLCARBAMATE (IPC) AT 400 PG AND 1 UG/ML WAS MINERALIZED IN SAMPLES OF SEWAGE, BUT ONLY THE LOWER CONCENTRATION WAS MINERALIZED IN LAKE WATER SAMPLES IN A 50-DAY PERIOD. IPC AT 1 UG/ML DISAPPEARED FROM LAKE WATER, BUT IT WAS CONVERTED TO ORGANIC PRODUCTS. MINERALIZATION OF IPC AT 400 PG/ML IN LAKE WATER WAS ENHANCED BY ADDITIONS OF INORGANIC NUTRIENTS OR A MIXTURE OF NONCHLORINATED WATER POLLUTANTS BUT NOT BY YEAST EXTRACT OR MIXTURES CONTAINING AROMATIC COMPOUNDS OR EXCRETIONS OF PRIMARY PRODUCERS. THE MINERALIZATION OF 200 PG OF 2,4-DICHLOROPHENOXYACETATE PER ML OF LAKE WATER WAS NOT AFFECTED BY ADDITIONS OF LOW LEVELS OF YEAST EXTRACT OR COMPOUNDS EXCRETED BY PRIMARY PRODUCERS BUT WAS ENHANCED BY LOW CONCENTRATIONS OF MIXTURES OF WATER POLLUTANTS. IT IS SUGGESTED THAT SOME CHEMICALS THAT ARE FOUND TO BE CONVERTED ONLY TO ORGANIC PRODUCTS, PRESUMABLY BY COMETABOLISM, IN TESTS USING THE CONCENTRATIONS COMMONLY EMPLOYED IN LABORATORY EVALUATIONS MAY BE MINERALIZED AT THE LOWER CONCENTRATIONS PREVAILING IN NATURAL WATERS.

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