

References

REFERENCES

- Abril MA, Michan C, Timmis KN and Ramos JL (1989). Regulator and enzyme specificities of the TOL plasmid encoded upper pathway for degradation of aromatic hydrocarbons and expansion of the substrate range of the pathway. *J. Bacteriol.* 171: 6782-90
- Alexander M (1967). The breakdown of pesticides in soils in "Agriculture and the Quality of our Environment" (Brady NC, ed.), *Amer. Assoc. Advan. Sci.*, Washington D.C. 331
- Alexander M (1979). In "Microbial degradation of Pollutants in Marine environments" (Bourquin AW and Pritchard PH, eds.), *United States Environment Protection Agency*, Gulf Breeze, Flor. p. 67
- Ali Sadat S and Walia SK (1996). Biodegradation of nitrobiphenyl and nitrotoluene by *Pseudomonas putida*. *Abstr. Gen. Meet. Am. Soc. Microbiol.* (Vol 15, No. 11); (1995) 95, Meet, 437
- Angermaier L and Simon H (1983). On nitroaryl reductase activities in several *Clostridia*. *Hoppe Seylers Z. Physiol. Chem.* 364: 1653-64
- Babu KS, Ajith-Kumar PV and Kunhi AAM (1995). Mineralization of phenol and its derivatives by *Pseudomonas* sp. strain CP4. *W. J. Microbiol Biotechnol.* 11: 661-64
- Bamberger E (1894). Über das Phenylhydroxy amine. *Chem. Ber.* 27: 1548-57
- Baughmann GL, Paris DF and Stun WC (1980). Quantitative expression of biotransformation rate. pp. 105-111. In Maki AW, Dickinson KL and Cairns J. Jr (ed). Biotransformation and fate of chemicals in the aquatic environment. *American Society for Microbiology*, Washington, D.C.
- Baumann E and Herter E (1877-78). *Hoppe-Seyl. Z.* 1: 244. In Robinson et al., (1951) Studies in Detoxication.39. Nitro Compounds. *Biochem. J.* 50: 221

Bayly RC and Barbour MG (1984). The degradation of aromatic compounds by the meta and gentisate pathways. pp. 253-294. In Gibson DT (ed). Microbial degradation of organic compounds *Marcel Dekker, Inc.*, New York

Beland FA, Heflich RH, Howard PC and Fu PP (1985). The in vitro metabolic activation of nitropolycyclic aromatic hydrocarbons. In *Polycyclic hydrocarbons and Carcinogenesis, ACS Symposium Series*, ed. Harvey RG, pp. 371-96. Washington, DC: *Am. Chem. Soc.*

Bhushan B, Chauhan A, Samanta SK and Jain RK (2000). Kinetics of biodegradation of p-Nitrophenol by different bacteria. *Biochem. Biophys. Res. Commun.* 274: 626-30

Blasco R and Castillo F (1992). Light dependent degradation of nitrophenols by the phototrophic bacterium *Rhodobacter capsulatus* EIF1. *Appl. Environ. Microbiol.* 58: 690-95

Blasco R and Castillo F. (1993). Characterization of a nitrophenol reductase from the phototrophic bacterium *Rhodobacter capsulatus* EIF1. *Appl. Environ. Microbiol.* 59: 1774-78

Boethling RS and Alexander M (1979). Effect of concentration of organic chemicals on their biodegradation by natural microbial communities. *Appl. Environ. Microbiol.* 37: 411-18

Bollag JM and Russel S (1976). Aerobic versus anaerobic metabolism of halogenated anilines by a *Paracoccus* sp. *Microbiol. Ecol.* 3: 65-73

Boopathy R and Kulpa CF (1992). Trinitrotoluene (TNT) as a sole nitrogen source for a sulphate-reducing bacterium *Desulfovibrio* sp. (B. Strain) isolated from an anaerobic digester. *Curr. Microbiol.* 25: 235-41

Boopathy R and Kulpa CF (1993). Nitroaromatic compounds serve as nitrogen for *Desulfovibrio* sp. (B strain). *Can. J. Microbiol.* 39: 430-33

- Boopathy R, Kulpa CF and Wilson M (1993). Metabolism of 2,4,6-trinitrotoluene (TNT) by *Desulfovibrio* sp. (B strain). *Appl. Microbiol. Biotechnol.* 39: 270-75
- Bruhn C, Lenke H and Knackmuss H.-J. (1987). Nitrosubstituted aromatic compounds as nitrogen source for bacteria. *Appl. Environ. Microbiol.* 63: 208-10
- Bryant C and De Luca M (1991). Purification and characterization of an oxygen-insensitive NAD(P)H nitro reductase from *Enterobacter cloacae*. *J. Biol. Chem.* 266: 4119-25
- Bumpus JA, Tatarko M (1994). Biodegradation of 2,4,6-trinitrotoluene by *Phanerochaete chrysosporium*, identification of initial degradation products and the discovery of a TNT metabolite that inhibits lignin peroxidases. *Curr. Microbiol.* 28: 185-90
- Cain RB (1966). Induction of anthranilate oxidation during the metabolism of ortho-nitrobenzoate by certain bacteria. *J. Gen. Microbiol.* 42:197-217
- Cain RB (1966). Utilization of anthranilic and nitrobenzoic acids by *Nocardia opaca* and a *Flavobacterium*. *J. Gen. Microbiol.* 42: 219-35
- Callahan MA, Slimak MW, Gabel NW, May JP, Fowler CF, Freed JR, Jennings P, Durfee RL, Whitmore FC, Maestri B, Mabey WR, Holt BR and Gould C (1979). Water related environmental fate of 129 priority pollutants. EPA report- 440/4-79-029. U.S. Environmental Protection Agency, Washington, D.C.
- Cartwright NJ and Cain RB (1959). Bacterial degradation of nitrobenzoic acids. *Biochem. J.* 71: 248-61
- Chauhan A, Chakraborti AK and Jain RK (2000). Plasmid-encoded degradation of p-nitrophenol and 4-nitrocatechol by *Arthrobacter protophormiae*. *Biochem. Biophys. Res.* 270: 733-740

- Chauhan A, Samanta SK and Jain RK. (2000). Degradation of 4-nitrocatechol by *Burkholderia cepacia*: a plasmid-encoded novel pathway. *J. Appl. Microbiol.* 88: 764-72
- Clesceri LS, Greenberg AE and Trussel RR (eds). (1989). Standard methods for the examination of water and wastewater. 17th ed. *American public Health Association*. Washington D.C.
- Corbett MD and Corbett BR (1981). Metabolism of 4-chlorinitrobenzene by the yeast *Rhodospiridium* sp. *Appl. Environ. Microbiol.* 41: 942-49
- Corbett MD and Corbett BR. (1995). Bioorganic chemistry of the arylhydroxyxylamine and nitrosoarene functional groups. In Spain JC (ed.) 1995. Biodegradation of nitroaromatic compounds. *Plenum Press*. New York, N.Y.
- Cortez L, Chapalamadugu SN and Chaudhry GR (1989). The biodegradation of methylparathion and p-nitrophenol by a *Pseudomonas*. *Abstr. Annu. Meet. Am. Soc. Microbiol.* 89 Meet. 274
- Crawford RL. (1995). Biodegradation of nitrated munition compounds and herbicides by obligately anaerobic bacteria. In Spain JC (ed.). Biodegradation of nitroaromatic compounds. pp. 87-98. *Plenum Press*, New York, N.Y.
- Daughton CG and Hsieh D (1977). Parathion utilization by bacterial symbionts in a chemostat. *Environ. Microbiol.* 34: 175-84
- Dickel O and Knackmuss H.-J (1991). Catabolism of 1,3-dinitrobenzene by *Rhodococcus* sp. QT-1. *Arch. Microbiol.* 157: 76-79
- Dimkov R and Topalova Y (1994). Dependence of the microbiological degradation of aryl-containing xenobiotics on their concentration. *Acta-Microbiol. Bulg.* 29: 9-16
- Donlon BA, Razo-Flores E, Lettinga G, and Field JA (1996). Continuous detoxification, transformation and degradation of nitrophenols in upflow anaerobic sludge blanket (UASB) reactors. *Biotechnol. Bioeng.* 5: 439- 49

- Dunnivant FM, Schwarzenbach RP and Macalady DL (1992). Reduction of substituted nitrobenzenes in aqueous solutions containing natural organic matter. *Environ Sci. Technol.* 26: 2133-41
- Ecker S, Widmann T, Lenke H, Dickel O, Fischer P, Bruhn C and Knackmuss H-J. (1992). Catabolism of 2,6-dinitrophenol by *Alcaligenes eutrophus* JMP 134 and JMP 222. *Arch. Microbiol.* 158: 149-54
- Eltis LD, Hofman B, Hecht H-J, Lunsdorf H, and Timmis KN (1993). Purification and crystallization of 2,3-dihydrobiphenyl 1,2-dioxygenase. *J. Biol. Chem.* 268: 2727-32
- Engelhardt G, Wallnöfer P, Fuchsbichler G and Baumeister W (1977). Bacterial transformations of 4-chloroaniline. *Chemosphere.* 6: 85-92
- Farrar CT and Becker ED (1971). Pulse and Fourier Transform NMR. Introduction to theory and methods. *Academic Press, Inc.*, New York
- Felset A, Maddox JV and Bruce W (1981). Enhanced microbial degradation of carbofuran in soils with histories of Furadan use. *Bull. Environ. Contam. Toxicol.* 26: 781-88
- Fernando T, Bumpus JA and Aust SD (1990). Biodegradation of TNT (2,4,6-trinitrotoluene) by *Phanerochaete chrysosporium*. *Appl. Environ Microbiol.* 56: 1666-71
- Fewson CA (1981). Biodegradation of aromatics with industrial relevance, pp. 141-79. In Leisinger T and Look AM (ed.), *Microbial degradation of xenobiotics and recalcitrant compounds.* *Academic Press*, London, United Kingdom
- Folsom BR, Stierli R, Schwarzenbach RP and Zeyer J (1993). Comparison of substituted 2-nitrophenol degradation by enzyme extracts and intact cells. *Environ. Sci. Technol.* 28: 306-11

Fournier JC, Cadaccioni P and Soulas G (1981). Soil adaptation to 2,4-D degradation in relation to the application rates and the metabolic behaviour of the degrading microflora. *Chemosphere*. 10: 977-84

Funk SB, Roberts DT, Crawford DL and Crawford RL (1993). Degradation of trinitrotoluene (TNT) and sequential accumulation of metabolic intermediates by an anaerobic bioreactor during its adaptation to a TNT feed. Abstr 93rd Annu. Meet, *Am. Soc. Microbiol.* p. 421

Funk SB, Roberts DJ, Crawford DL and Crawford RL (1993). Initial phase optimization for bioremediation of munition-contaminated soils. *Appl. Environ. Microbiol.* 59: 2171-77

Germanier R and Wuhrman K (1963). Über den aeroben mikrobiellen Abbau aromatischer Nitroverbindungen. *Pathol. Microbiol.* 26: 569-78

Gibson DT (1984). Microbiol degradation of organic compounds. ed. pp. 181-252. *Marcel Dekker*, New York

Gibson DT and Subramanian V (1984). Microbial degradation of organic compounds. ed. DT Gibson, pp.181-252. *Marcel Dekker*, New York

Gibson DT (1993). Biodegradation, biotransformation and the Belmont. *Journal of Industrial Microbiol.* 12: 1-12

Golab T, Bishop CE, Donoho AL, Manthey JA and Zornes LL (1975). Behaviour of ¹⁴C oryzalin in soil and plants. *Pestic. Biochem. Physiol.* 5: 196-204

Golab T, Allthaus WA and Wooten HL (1979). Fate of [¹⁴C] trifluralin in soil. *J. Agric. Food. Chem.* 27: 163-79

Gorontzy T, Küver J and Blotevogel KH (1993). Microbial transformation of nitroaromatic compounds under anaerobic conditions. *J. Gen. Microbiol.* 139: 1331-36

Groenewegen PEJ and de Bont JAM (1992). Degradation of 4-nitrobenzoate via 4-hydroxyl aminobenzoate and 3,4-dihydroxybenzoate in *Comamonas acidovorans* NBA-10. *Arch. Microbiol.* 158: 381-86

Grosjean D (1985). Reactions of o-cresol and nitrocresol with NO₂ in sunlight and with ozone-nitrogen dioxide mixtures in the dark. *Environ. Sci. Technol.* 19: 968-74

Grover R (1967). Studies on the degradation of 4-amino-3,5,6-trichloropicolinic acid in soil. *Weed Res.* 7: 61-67

Gunner HB and Zuckermann BM (1968). *Nature.* 217: 1183. In Gibson DT (ed.) 1984, Biodegradation and the significance of microbial communities. Microbiology series. Vol. 13, *Marcel Dekker Inc.* New York and Basel.

Haigler BE and Spain JC (1991). Biotransformation of nitrobenzene by bacteria containing Toluene degradative pathways. *Appl. Environ. Microbiol.* 57: 3156-62

Haigler BE, Pettigrew CA and Spain JC (1992). Biodegradation of mixtures of substituted benzenes by *Pseudomonas* sp. strain JS150. *Appl. Environ. Microbiol.* 58: 2237-44

Haigler BE and Spain JC (1993). Biodegradation of 4-nitrotoluene by *Pseudomonas* sp. strain 4NT. *Appl. Environ. Microbiol.* 59: 2239-43

Haigler BE, Nishino SF and Spain JC (1994). Biodegradation of 4-methyl-5-nitrocatechol by *Pseudomonas* sp. strain DNT. *J. Bacteriol.* 176: 3433-37

Haigler BE, Wallace WH and Spain JC (1994). Biodegradation of 2-nitrotoluene by *Pseudomonas* sp. strain JS42. *Appl. Environ. Microbiol.* 60: 3466-69

Hanne LF, Kirk LL, Alger D, Woodruff T and Casadevall M (1991). Characterization of soil actinomycetes capable of degrading para-nitrophenol. *Abstr. Gen. Meet. Am. Soc. Microbiol.* 91 Meet, 303

Hanne LF, Kirk LL, Appel SM and Narayan AD (1992). Induction of p-nitrophenol (PNP) degradation in actinomycetes by structural analogs of PNP. *Abstr. Gen. Meet. Am. Soc. Microbiol.* 92. Meet. 360

Hanne LF, Kirk LL, Appel SM, Narayan AD and Bains (1993). Degradation and induction specificity in Actinomycetes that degrade p-nitrophenol. *Appl. Environ. Microbiol.* 59: 3505-08

Harter DR (1985). The use and importance of nitroaromatic chemicals in the chemical industry in "Toxicity of Nitroaromatic compounds" (Rickert DE. ed.) Chemical Industry Institute of Toxicology Series. *Hemisphere*. Washington. DC. pp. 1-14

Heijmann CG, Holliger C, Glauss MA, Schwarzenbach RP and Zeyer J (1993). Abiotic reduction of 4-chloronitrobenzene to 4-chloroaniline in a dissimilatory iron-reducing enrichment culture. *Appl. Environ. Microbiol.* 59: 4350-53

Heitkamp MA, Camel V, Reuter TJ and Adams WT (1990). Biodegradation of p-nitrophenol in an aqueous waste stream by immobilized bacteria. *Appl. Environ. Microbiol.* 56: 2967-73

Higson FK (1992). Microbial degradation of nitroaromatic compounds. *Adv. Appl. Microbiol.* 37: 1-19

Hlavica P (1982). Biological oxidation of nitrogen in organic compounds and deposition of N-oxidised products. *CRS. Crit. Rev. Biochem.* 12: 39-101

Hoffrichter M, Günther T and Fritsche W (1993). Metabolism of phenol, chloro and nitrophenol by the *Penicillium* strain Bi. 7/2 isolated from a contaminated soil. *Biodegradation.* 3: 415-21

Horakova D and Kotouchkova L (1996) Biotransformation of 4-nitrophenol by *Corynebacterium* sp. strain 8/3. *Int. Biodeterior. Biodeg.* 37: 249

Holt JG, Kreigh NR, Sneath PHA, Staley JT and Williams ST (eds.) (1994). *Bergey's Manual of Determinative Bacteriology.* 9th ed. *Williams and Wilkins*, Baltimore. pp. 554-51

Horvath RS (1972). *Bacteriol Rev.* 26: 146. In Gibson DT (ed.) 1984. Biodegradation and the significance of microbial communities. Microbiology series. Vol. 13, *Marcel Dekker Inc.* New York and Basel.

Hussain M, Enstch B, Ballou DP, Massey V and Chapman PJ (1980). Fluoride elimination from substrates in hydroxylation reactions catalyzed by p-hydroxybenzoate hydroxylase. *J. Biol. Chem.* 255: 4189- 97

Jain RK, Dreisbach JH and Spain JC (1994). Biodegradation of p-nitrophenol via 1,2,4-benzenetriol by an *Arthrobacter*. *Appl. Environ. Microbiol.* 60: 3030-32

Javanjal SS and Deopurkar RL (1994). Biodegradation of p-nitrophenol by indigenously isolated bacteria from pesticide. *Indian J. Microbiol.* 13: 125-29

Jones SH and Alexander M (1988a). Effect of inorganic nutrients on the acclimation period preceding mineralization of organic chemicals in lake water. *Appl. Environ. Microbiol.* 54: 3177-79

Jones SH and Alexander M (1988b). Phosphorus enhancement of mineralization of low concentrations of p-nitrophenol by *Flavobacterium* sp. in lake water. *FEMS. Microbiol. Lett.* 52: 121-126

Kaake RH, Roberts DJ, Stevens TO, Crawford RL and Crawford DL (1992). Bioremediation of soils contaminated with the herbicide 2-sec-butyl-4,6-dinitrophenol (Dinoseb). *Appl. Environ. Microbiol.* 58: 1683-89

Kaake RH, Crawford DL and Crawford RL (1994). Optimization of an aerobic bioremediation process for soil contaminated with the nitroaromatic herbicide: Dinoseb (2-sec-butyl-4,6-dinitrophenol). In "Applied Biotechnology for Site Remediation", ed. Henchee RE, Anderson DB, Metting Jr. FB and Sayles GD. 337-41. Boca Raton: Lewis

Kadiyala V and Spain JC (1999). A two component monooxygenase catalyses both the hydroxylation of p-nitrophenol and the oxidative release of nitrite from nitro catechol in *Bacillus sphaericus* JS 905. *Appl. Environ. Microbiol.* (1998) 24: 79 - 84

Ke YH, Gee LL and Durham NN (1959). Mechanism involved in the metabolism of nitrophenylcarboxylic acids by microorganisms. *J. Bacteriol.* 77: 593-98

Kearney PC and Kaufman DD (1976). Herbicides: chemistry, degradation and mode of action. *Marcel Dekker. Inc.*, New York

Keith LH and Telliard WA (1979). Priority pollutants. I. A perspective view. *Environ. Sci. Technol.* 13: 416-23

Kinouchi T and Ohnishi Y (1983). Purification and characterization of 1-nitropyrene nitroreductases from *Bacteroides fragilis*. *Appl. Environ. Microbiol.* 45: 1234-41

Kotouchkova L, Vavrik J, Nemec M, Plocek J and Zdrahal Z (1997). Use of immobilised cells of the strain *Corynebacterium* sp. for 4-nitrophenol degradation. *Folia. Microbiol.* 42: 509-12

Kumar S, Mukerji KG and Lai R (1996). Molecular aspects of pesticide degradation by microorganisms. *Crit. Rev. Microbiol.* 22: 1-26

Larson JT (1979). Estimation of biodegradation potential of xenobiotic organic chemicals. *Appl. Environ. Microbiol.* 38: 1153-61.

Lenke H and Knackmuss H-J (1992). Initial hydrogenation during catabolism of picric acid by *Rhodococcus erythropolis* HL 24-2. *Appl. Environ. Microbiol.* 58: 2933-37

Lenke H, Pieper DR, Bruhn C and Knackmuss H-J (1992). Degradation of 2-4-nitrophenol by two *Rhodococcus erythropolis* strains HL 24-1 and HL 24-2. *Appl. Environ. Microbiol.* 58: 2928-32

Leung KT, Tresse O, Errampalli D, Lee H and Trevors JT (1997). Mineralization of p-nitrophenol by pentachlorophenol degrading *Sphingomonas* sp. *FEMS- Microbiol. Lett.* 16: 4107-14

Loeser C, Ait-Oubelli M and Hertel T (1998). Growth kinetics of the 4-nitrophenol degrading strain *Pseudomonas putida* PNP1. *Acta. Biotechnol.* 1: 29-41

Marvin-Sikkema FD and de Bont JAM (1994). Degradation of nitroaromatic compounds by microorganisms. *Appl. Microbiol. Biotechnol.* 42: 499-507

Masse R, Badr M, Ayotte C and Sylvestre M (1985). Gas chromatographic-mass spectrometric characterization of bacterial metabolites of 4-nitrobiphenyl formed in gram negative strain B206. *Toxicol. Environ. Chem.* 10: 225-46

McCormick NG, Feeherry FF and Levinson HS (1976). Microbiol transformation of 2, 4,6-trinitrotoluene and other nitroaromatic compounds. *Appl. Environ. Microbiol.* 31: 949-58

McCormick NG, Cornell JH and Kaplan AM (1978). Identification of biotransformation products from 2,4-dinitrotoluene. *Appl. Environ Microbiol.* 35: 945-48

Meijers AP and vander Lur RC (1976). The occurrence of organic micropollutants in the river Rhine and the river Mass in 1974. *Water Res.* 10: 597-604

Meulenberg RM, Pepi M and de Bont JAM. (1996). Degradation of 3-nitrophenol by *Pseudomonas putida* B2 occurs via 1, 2, 4-benzenetriol. *Biodegradation.* 7: 303-11

Meyer E (1905). *Hoppe Seyl. Z.* 46: 497. In Robinson et al., (1951) Studies in Detoxication.39. Nitro Compounds. *Biochem. J.* 50: 221

Michels J and Gottschalk G (1994). Inhibition of the lignin peroxidase of *Phanerochaete chrysosporium* by hydroxyl amino-dinitrotoluene, an early intermediate in the degradation of 2,4,6-dinitrotoluene. *Appl. Environ Microbiol.* 60: 187-194

- Mitra D and Vaidyanathan CS (1984). A new 4-nitrophenol from a *Nocardia* sp. *Biochem. Int.* 8: 609-15
- Mohammed T, Bartha R and Antonie A (1994). Biodegradation of three nitrophenols and of 2-nitrobenzoate by *Pseudomonas cepacia*. *Gen. Meet. Am. Soc. Microbiol.* (1994) Meet. Vol. 13, Nov 19
- Montgomery HAC and Dymock JF (1961). The determination of nitrite in water. *Analyst.* 86: 414
- Munnecke DM and Hsieh DPH (1974). Microbiol decontamination of parathion and p-nitrophenol in aqueous media. *Appl. Microbiol.* 28: 212-17
- Munnecke DM and Hsieh DPH (1976). Pathway of microbial metabolism of parathion. *Appl. Environ. Microbiol.* 31:63-69
- Nadeau LS and Spain JC (1995). The bacterial degradation of m-nitrobenzoic acid. *Appl. Environ. Microbiol.* 61: 840-43
- Nakazawa T and Nakazawa A (1970). Pyrocatechase (*Pseudomonas*) *Methods. Enzymol.* 17A: 518-522
- Nelson LM (1982). Biologically induced hydrolysis of parathion in soil isolation of hydrolyzing bacteria. *Soil Biol. Biochem.* 14: 219-22
- Nishino SF and Spain JC (1990). Adaptation to biodegradation of p-nitrophenol depends on accumulation of a metabolite. *Abstr. Annu. Meet. Am. Soc. Microbiol.* 90 Meet, 306
- Nishino SF and Spain JC (1993). Cell density dependent adaptation of *Pseudomonas putida* to biodegradation of p-nitrophenol. *Environ. Sci. Technol.* 27: 489-94
- Nishino SF and Spain JC (1993). Degradation of nitrobenzene by a *Pseudomonas pseudoalcaligenes*. *Appl. Environ. Microbiol.* 59: 2520-25

Nishino SF and Spain JC (1995). Oxidative pathway for the degradation of nitrobenzene by *Comamonas* sp. strain JS 765. *Appl. Environ. Microbiol.* 61:2308-13

Nozaki M (1970). Metapyrocatechase (*Pseudomonas*). *Methods. Enzymol.* 17A: 522- 25

O'Brien RW and Morris JG (1971). The ferredoxin-dependent reduction of chloramphenicol by *Clostridium acetobutylicum*. *J. Gen. Microbiol.* 67: 256-71

O'Connor OA and Young LY (1989). [Medcent, New York Univ., New York, NY 10016, USA]. *Environ. Toxicol. Chem.* 8 (10): 853-62

Oettingen and Von WF (1949). *Nat. Inst. Hlth. Bull.* No. 190: 232. In Robinson et al., (1951) Studies in Detoxication.39. Nitro Compounds. *Biochem. J.* 50: 221

Oren A, Gurevich P and Hems Y (1991). Reduction of nitrosubstituted aromatic compounds by the halophilic anaerobic *Haloanaerobacterium praevalens* and *Sporohalobacter marismortuii*. *Appl. Environ. Microbiol.* 57: 3367-70

Ou LT and Sharma A (1989). Degradation of methyl parathion by a mixed bacterial culture and a *Bacillus* sp. isolated from different soils. *J. Agric. Food Chem.* 37, 6: 1514-18

Parrish FW (1977). Fungal transformation of 2,4-nitrotoluene and 2,4,6-trinitrotoluene. *Appl. Environ. Microbiol.* 34: 232-33

Pemberton JM, Corney B and Don RH (1979). Evolution and spread of pesticide degrading ability among soil microorganisms pp. 287-99. In Timmis KN and Pühler A (ed.), Plasmids of medical, environmental and commercial importance. *Elsevier/North Holland Biomedical Press*, Amsterdam, The Netherlands

- Peres CM, Naveau H and Agathos SN (1998). Biodegradation of nitrobenzene by its simultaneous reduction into aniline and mineralization of the aniline formed. *Appl. Microbiol. Biotechnol.* 49: 343-49
- Peterson FJ, Mason RA, Hovespian J and Holtzman JL (1979). Oxygen sensitive and insensitive nitroreduction by *Eschericia coli* and rat hepatic microsomes. *J. Biol. Chem.* 254: 4009-12
- Petrova KP and Laha S (1995). Characteristics of nitrophenols degrading bacteria, isolated from various contaminated soils. *Abstr. Gen. Meet. Am. Soc. Microbiol.* 95, Meet, 437. (Vol. 15, No. 11)
- Pieper DH, Timmis KN and Ramos JL (1996). Designing bacteria for the degradation of nitro and chloroaromatic pollutants. *Natur Wisenchaften Aufsätze.* 83: 201-203
- Piet GJ and Smeenk JGMM (1985). Behaviour of organic pollutants in pretreated Rhine water during dune infiltration. p.144. In Ward CH, Giger HL and McCarty PL (ed.). Ground water quality. *John Wiley and Sons. Inc.*, New York
- Pitts JN, Lokensgard DM, Harger WP, Fischer TS, Meija V, Schuler JJ, Scorziell GM and Katzenstein YA (1982). Identification and direct activities of 6-nitrobenza (a) pyrene, 9-nitroanthracene, 1-nitropyrene and 5H-phenanthro [4,5-bed]-pyran-5-one. *Muta. Res.* 103: 241-49
- Prakash D, Chauhan A and Jain RK (1996). Plasmid encoded degradation of p-nitrophenol by *Pseudomonas cepacia*. *Biochem. Biophys. Res. Commun.* 224, 2: 375-81
- Preuss A, Fimpel J and Dickert G (1993). Anaerobic transformation of 2,4,6-trinitrotoluene (TNT). *Arch. Microbiol.* 159: 345-53
- Pritchard PH, Bourquin AW, Fredrickson HL and Maziarz T (1979). System design factors affecting environmental fate studies in microcosms. pp -251-72. In Bourquin AW and Pritchard PH (ed.), Microbial degradation of

- pollutants in marine environments: proceedings of the workshop. *U.S. Environmental Protection Agency*, EPA-600/9-79-012. Washington, D.C.
- Rafii F, Franklin W, Heflich RH and Cerniglia CE (1991). Reduction of nitroaromatic compounds by anaerobic bacteria isolated from the human gastrointestinal tract. *Appl. Environ. Microbiol.* 57: 962-68
- Ramadan MA, El Tayeb OM and Alexander M. (1990). Inoculum size as a factor limiting success of inoculation for degradation. *Appl. Environ. Microbiol.* 56: 1392-96
- Ramanathan MP and LalithaKumari D (1999). Complete mineralization of methylparathion by *Pseudomonas* sp. A3. *Appl. Environ. Biochem. Biotechnol.* 80:1-12
- Ray P, Oubelli MA and Loser C (1999). Aerobic 4-nitrophenol degradation by microorganisms fixed in a continuously working aerated solid-bed reactor. *Appl. Microbiol. Biotechnol.* 51: 284-90
- Raymond DGM and Alexander M (1971). Microbial metabolism and co-metabolism of nitrophenols. *Pest. Biochem. Physiol.* 1: 123-30
- Reiger PG and Knackmuss JH (1995). Basic knowledge and perspective on biodegradation of 2,4,6-trinitrotoluene and related nitroaromatic compounds in contaminated soil. In Spain JC (ed.) 1995. Biodegradation of nitroaromatic compounds. *Plenum Press*, New York: pp.1-18
- Rhys-Willlaims W, Taylor SC and Williams PA (1993). A novel pathway for the catabolism of 4-nitrotoluene by *Pseudomonas*. *J. Gen. Microbiol.* 139: 1967-72
- Robertson BK and Alexander M (1991). Influence of calcium, iron and pH on phosphate availability for microbial mineralization of organic chemicals. *Appl. Environ. Microbiol.* 58: 38-41
- Robinson D, Smith JN and Williams RT (1951). Studies in detoxification of 39 nitro compounds. *Biochem. J.* 50: 221-227 ;

- Roldon MD, Blasco R, Cabellero FJ and Castillo F (1997). Degradation of p-nitrophenol by the phototrophic bacterium *Rhodobacter capsulatus*. *Arch. Microbiol.* 169: 36-42
- Schackmann A and Müller R (1991). Reduction of nitroaromatic compounds by different *Pseudomonas* species under aerobic conditions. *Appl. Microbiol. Biotechnol.* 34: 809-13
- Schenzle A, Lenke H, Fischer P, Williams RA and Knackmuss H-J (1997). Catabolism of 3-nitrophenol by *Ralstonia eutropha* JMP 134. *Appl. Environ. Microbiol.* 63: 1421-27
- Schnell S and Schink B (1991). Anaerobic aniline degradation via reductive deamination of 4-amino benzoyl-Co.A in *Desulphobacterium anilini*. *Arch. Microbiol.* 155: 183-90
- Schuetzle D (1983). Sampling of vehicle emissions for chemical analysis and biological testing. *Environ. Health Perspect.* 47: 65-80
- Schwarzenbach RP, Stierli R, Folsom BR and Zeyer J. (1988). Compound properties relevant for assessing the environmental partitioning of nitrophenols. *Environ. Sci. Technol.* 22: 83-92
- Scow KM, Schmidt SR and Alexander M (1989). Kinetics of biodegradation of mixtures of substrates in soil. *Soil Biol. Biochem.* 21: 703-08
- Shine HJ (1967). The rearrangement of phenylhydroxylamines. pp.182-120. In Eaborn C and Chapman NB. (ed.), *Reactions mechanisms in organic chemistry*. Elsevier Publishing Co., Amsterdam, the Netherlands
- Simon-Sylvestre G and Fournier JC (1979). Effects of pesticides on the soil microflora. *Adv. Agron.* 31: 1-81
- Simpson JR and Evans WC (1953). The metabolism of nitrophenols by certain bacteria. *Biochem. J.* 55: XXIV

Slater JH (1978). In "The Oil industry and Microbial ecosystems". (Chapter KWA and Somerville HJ, eds.), *Heyden and Son, Ltd.* London. p. 137

Slater JH (1979) in "Microbial Degradation of pollutants in Marine Environments" (Bourquin AW and Pritchard PH, eds.), *United States Environmental Protection Agency*, Gulf Breeze, Fla., p. 283

Slater JH and Somerville HJ. (1979) in *Symp. Gen. Microbiol.* 29: 221. In Gibson DT (ed.) 1984, Biodegradation and the significance of microbial communities. Microbiology series. Vol. 13, *Marcel Dekker Inc.* New York and Basel

Sone T, Tokuda Y, Sakai T, Shinkai S and Manabe (1981). Kinetics and mechanisms of the Bamberberger rearrangement. 3. Rearrangement of phenylhydroxylamines. *J. Chem. Soc. Perkin. Trans:* 1981: 298-302

Spain JC, Wyss O and Gibson DT (1979). Enzymatic oxidation of p-nitrophenol. *Biochem. Biophys. Res. Commun.* 88: 634-41

Spain JC, Pritchard PH and Bourquin AW (1980). Effects of adaptation on biodegradation rates in sediment/water cores from estuarine and freshwater environments. *Appl. Environ. Microbiol.* 40: 726-34

Spain JC, Zylstra GJ, Blake CK and Gibson DT (1989). Mono-hydroxylation of phenol and 2,5-dichlorophenol by toluene dioxygenase in *Pseudomonas putida* F1. *Appl. Environ. Microbiol.* 55: 2648-52

Spain JC and Gibson DT (1991). Pathways for biodegradation of p-nitrophenol in a *Moraxella* sp. *Appl. Environ. Microbiol.* 57: 812-19

Spain JC (1995). Biodegradation of nitroaromatic compounds. *Annu. Rev. Microbiol.* 49: 523-55

Spanggord RJ, Spain JC, Nishino SF and Mortelmahe KE (1991). Biodegradation of 2,4-dinitrotoluene by a *Pseudomonas* sp. *Appl. Environ. Microbiol.* 57: 3200-05

- Spiker JK, Crawford DL and Crawford RL (1992). Influence of 2,4,6-trinitrotoluene (TNT) concentration on the degradation of TNT in explosive contaminated soils by the white rot fungus *Phanerochaete chrysosporium*. *Appl. Environ. Microbiol.* 58: 3199-3202.
- Stahl JD and Aust SD (1993). Plasma membrane dependent reduction of TNT by *Phanerochaete chrysosporium*. *Biochem. Biophys. Res. Commu.* 192: 471-76
- Sternson LA and Gammans RE (1975). A mechanistic study of aromatic hydroxylamine rearrangement in the rat. *Bioorg. Chem.* 4: 58-63
- Suen WC, Haigler BE and Spain JC (1994). 2,4-Dinitrotoluene dioxygenase gene from *Pseudomonas* sp. strain DNT: homology to naphthalene dioxygenase. *Abstr. 94th Annu. Meet. Am. Soc. Microbiol.* p. 458
- Suzuki KP, Giomi T, Kaidoh T and Itagaki E (1991). Hydroxylation of o-halogenophenol and o-nitrophenol. *J. Biochem.* 109: 348-53
- Tchelet R, Levanon D, Mingelgrin U and Hennis Y (1993). Parathion degradation by a *Pseudomonas* sp. and a *Xanthomonas* sp. and by their crude enzyme extracts as affected by some cations. *Soil Biol. Biochem.* 25: 1665-71
- Tokiwa H and Ohnishi Y (1986). Mutagenicity and carcinogenicity of nitroarenes and their sources in the environment. *CRC. Crit. Rev. Toxicol.* 17: 23-60
- Tortensson NTL, Stark J and Goransson B (1975). The effect of repeated applications of 2, 4-D and MCPA on their breakdown in soil. *Weed Res.* 15: 159-64
- Traxler RW, Wood E and Delancy JM (1974). Bacterial degradation of alpha-TNT. *Dev. Ind. Microbiol.* 16: 71-76
- Tseng SK and Yang CJ (1995). The reaction characteristics of wastewater containing nitrophenol, treated using an anaerobic biological fluidized bed *Water-Sci. Technol.* 30: 233-40

Tseng SK, Haung SH and Huang SK. (1996). Anaerobic digestion of nitrophenol in the presence of glucose. *Meded. Fac. Landbouwwet. Rijksuniv. Gent.* 61: 2085-92

Tuovinen K, Kalislekorhonen E, Raushel FM and Hanninen O (1994). Phosphotriesterase- A promising candidate for use in detoxification of organophosphates. *Fundam Appl. toxicol.* 23: 578-84

Tweedy BG, Loeppky C and Ross JA (1970). Metabromuron: acetylation of the aniline moiety as a detoxification mechanism. *Science.* 168: 482-83

Uberoi V and Bhattacharya SK (1997). Toxicity and degradation of nitrophenols in anaerobic systems. *Water Environ. Res.* 69: 146-56

Villanaueva JR (1964). The purification of a nitroreductase from *Nocardia*. *J. Biol. Chem.* 239: 773-76

Valli K, Brock BJ, Joshi DK and Gold ME (1992). Degradation of 2,4-dinitrotoluene by the liginin-degrading fungus *Phanerochaete chrysosporium*. *Appl. Environ. Microbiol.* 58: 221-28

Weisberger EK (1978). Mechanism of chemical carcinogenesis. *Annu. Rev. Pharamcol. Toxicol.* 18: 395-415

Wiggins BA and Alexander M. (1988). Role of chemical concentration and second carbon sources in acclimation of microbial communities for biodegradation. *Appl. Environ. Microbiol.* 54: 2803-07

Wiggins BA, Jones SH and Alexander M (1987). Explanations for the acclimation period preceeding the mineralization of organic chemicals in aquatic environment. *Appl. Environ. Microbiol.* 53: 791-96

Xing XH, Inoue T, Tanji Y and Unno H (1999). Enhanced microbial adaptation to p-nitrophenol using activated sludge retained in porous carrier particles and simultaneous removal of nitrite released from degradation of p-nitrophenol. *J. Ferment. Bioeng.* 87: 372-77

Xun L, Toppe E and Orser S (1992). Diverse substrate range of a *Flavobacterium* pentachlorophenol hydroxylase and reaction stoichiometrics. *J. Bacteriol.* 174: 2898-902

Zablotowicz RM, Lung KT, Alber T, Cassidy MB, Trevors JT, Lee H, Veldhuis L and Hall JC (1999). Degradation of 2,4-dinitrophenol and selected aromatic compounds by *Sphingomonas* sp. UG 30. *Can. J. Microbiol.* 45: 840-48

Zaidi BR, Murakami Y and Alexander M (1988). Factors limiting success of inoculum to enhance biodegradation of low concentrations of organic chemicals. *Environ. Sci. Technol.* 22: 1419-25

Zaidi BR, Murakami Y and Alexander M (1989). Predation and inhibitors in lake water affect the success of inoculation to enhance biodegradation of organic chemicals. *Environ. Sci. Technol.* 23: 859-63

Zaidi BR and Mehta N (1992). Effects of alternate substrates on the degradation of toxic chemicals in industrial waste water by the inoculated bacteria. *Appl. Gen. Meet. Am. Soc. Microbiol.* 92. Meet, 359

Zaidi BR and Mehta N (1994). The role of inoculum size in the success of inoculation to enhance biodegradation of toxic chemicals at high and low concentrations. *Abstr. Gen. Meet. Am. Soc. Microbiol.* 94 Meet, 407 (Vol. 134, No. 19)

Zaidi BR and Imam SH (1995). Isolation, purification and characterization of bacterial strains capable of enhancing degradation of p-nitrophenol (PNP) when inoculated into Barcelona industrial waste water. *Abstr. Gen. Meet. Am. Soc. Microbiol.* 95, Meet, 430

Zaidi BR, and Imam SH (1996). Inoculation of microorganisms to enhance biodegradation of phenolic compounds in industrial water. Isolation and identification of three indigenous bacterial strains. *J. Gen. Appl. Microbiol.* 42: 249-56

Zaidi BR, Imam SH and Greene RV (1996). Accelerated biodegradation of high and low concentrations of p-nitrophenol (PNP) by bacterial inoculation

in wastewater: the role of inoculum size on acclimation period. *Curr. Microbiol.* 33: 292-96

Zeyer J and Kearney PC (1984). Degradation of o-nitrophenol and m-nitrophenol by a *Pseudomonas putida*. *J. Agric. Food. Chem.* 32: 238-42

Zeyer J and Kocher HP (1988). Purification and characterization of a bacterial nitrophenol oxygenase which converts ortho-nitrophenol to catechol and nitrite. *J. Bacteriol.* 170: 1789-94

Zeyer J, Kocher HP and Timmis N (1986). Influence of para-substituents on the oxidative metabolism of ortho-nitrophenol by *Pseudomonas putida* B2. *Appl. Environ. Microbiol.* 52: 334-39

Zhao JS and Ward OP. (1999). Microbial degradation of nitrobenzene and mono-nitrophenol by bacteria enriched from municipal activated sludge. *Can. J. Microbiol.* 45: 427-32

Zhao JS and Ward OP (2000). Cometabolic transformation of nitrobenzene by 3-nitrophenol degrading *Pseudomonas putida* 2NP8. *Can. J. Microbiol.* 46: 643-52

Zhao JS, Singh A, Huang XD and Ward OP (2000). Biotransformation of hydroxyl aminobenzene and aminophenol by *Pseudomonas putida* 2NP8 cells grown in the presence of 3-nitrophenol. *Appl. Environ. Microbiol.* 66: 2336-42

Zoetmann BCJ, Harmsen K, Linders JBHJ, Morra CFH and Slooff W (1980). Persistent organic pollutants in river water and ground water of the Netherlands. *Chemosphere.* 9: 231-49