

EPA-R2-72-055

November 1972

Environmental Protection Technology Series

# Biological Effects of Oil Pollution

## SELECTED BIBLIOGRAPHY II



National Environmental Research Center  
Office of Research and Monitoring  
U.S. Environmental Protection Agency  
Cincinnati, Ohio 45268

EPA-R2-72-055

November 1972

# BIOLOGICAL EFFECTS OF OIL POLLUTION

## SELECTED BIBLIOGRAPHY II

Royal J. Nadeau and Thomas H. Roush  
Edison Water Quality Research Laboratory  
Edison, New Jersey 08817

Project Number 15080 NDE  
Project Element 1B 2041

NATIONAL ENVIRONMENTAL RESEARCH CENTER  
OFFICE OF RESEARCH AND MONITORING  
U.S. ENVIRONMENTAL PROTECTION AGENCY  
CINCINNATI, OHIO 45268

EPA Review Notice

This report has been reviewed by the  
Environmental Protection Agency and  
approved for publication.

## **FOREWORD**

Man and his environment must be protected from the adverse effects of pesticides, radiation, noise and other forms of pollution, and the unwise management of solid waste. Efforts to protect the environment require a focus that recognizes the interplay between the components of our physical environment - air, water, and land. This focus is provided by the multidisciplinary programs of the National Environmental Research Centers, which are engaged in studies on the effects of environmental contaminants on man and the biosphere and in a search for ways to prevent contamination and recycle valuable resources.

**Andrew W. Breidenbach, Ph.D.  
Director, National Environmental  
Research Center, Cincinnati**

## ACKNOWLEDGEMENTS

The authors wish to convey thanks and appreciation for the work and contributions of those persons involved in organizing and collating this Bibliography. Gratitude is extended to Victoria Pinkasavage for the initial literature search and to Ann Krypel for typing, organization, and patience. Thanks are extended to J. Stephen Dorrler, Oil Spill Branch Chief, and Richard T. Dewling, then Director of the Edison Office of Research and Monitoring, for their continued support and encouragement throughout this endeavor.

## ABSTRACT

This bibliography is an updating of FWPCA's 1969 report number DAST-19. References on the biological effects of oil include general aspects, specific spill incidents, general effects, carcinogenic effects, microbial utilization, and the effects on birds, fish, shellfish, marine and freshwater invertebrates, plants, and dissolved oxygen.

KEY WORDS: Algae, aquatic animals, aquatic invertebrates, aquatic plants, bibliography, biodegradation, birds, effects of oil, environmental effects, marine animals, marine invertebrates, marine plants, oil, oil pollution, oil spills, petroleum, pollution, water pollution.

## TABLE OF CONTENTS

|   | <u>Page</u> |
|---|-------------|
| Introduction  | 1           |
| Publications on the General Aspects of Oil Pollution        | 3           |
| Reports of Oil Spill Incidents                              | 13          |
| General Biological Effects and Specific Oil Spill Incidents | 15          |
| Effects of Oil on Birds                                     | 25          |
| Effects of Oil on Shellfish                                 | 29          |
| Effects of Oil on Fish                                      | 31          |
| Effects of Oil on Marine and Freshwater Invertebrates       | 35          |
| Effects of Oil in Plants                                    | 39          |
| Effects of Oil on Dissolved Oxygen                          | 45          |
| Carcinogenic Effect of Oil                                  | 47          |
| Miscellaneous Biological Reports on Oil                     | 49          |
| Microbial Utilization of Oil                                | 51          |

## INTRODUCTION

With the advent of the environmental era, oil pollution has risen to new priorities of international concern. Part of this new involvement concerns the effects of oil, both crude and refined, upon the biosphere. Scientists and layman are seeking information that can be used to augment newer and stronger approaches to solving environmental problems, including those involving oil.

This bibliography is an addendum to BIOLOGICAL EFFECTS OF OIL POLLUTION - BIBLIOGRAPHY, Water Pollution Control Series, DAST-19, prepared by Donna Radcliffe and Dr. Thomas Murphy, FWPCA, Edison Water Quality Laboratory, Northeast Region Research and Development Program, in October 1969. Careful attention has been given to avoid duplication of citations listed in the previous bibliography. Most of the entries in this addendum represent publications issued within the past two years. With the vast number of articles in the many journals and publications confronting us today, it is unrealistic to believe that we have compiled an absolutely complete bibliography. The writers express apologies to authors for omissions of their work. The previous format has been reproduced to maintain continuity.

Any comments concerning entries, especially additions, would be greatly appreciated. A bibliography should be a dynamic tool of researchers; always remaining in a state of revision and updating.

Address inquiries and additions to:

Chief, Oil Spills Branch  
Edison Water Quality Research Laboratory  
National Environmental Research Center  
Edison, New Jersey 08817

PUBLICATIONS ON THE GENERAL ASPECTS OF OIL POLLUTION

- Abelson, P. H. 1967. Oil Pollution. Science, 156.
- Adam, R. 1970. Pollution of American Coasts by Oil. (in German). Wasser, Luft und Betrieb, International, 14 (7):289.
- Anon. 1952. Pollution of Sea Water by Oil. Engineering, 174: 151-152.
- Anon. 1955. Oil Pollution Studied by Service's Seattle Biological Laboratory. Commercial Fisheries Review, 17(3):35.
- Anon. 1956. Pollution of the Sea by Oil. United Nations, ST/ECA/41.
- Anon. 1958. Pollution of Sea Water by Hydrocarbons. (in French). Centre Belge d'Etude et de Documentation des Eaux Bulletin, 88:133-136.
- Anon. 1958. Pollution of the Rhine by Oil. (in German). Vereinigung Deutscher Gewasserschutz Mitteilungen, 9/10:6.
- Anon. 1961. Oil Fouling U.S. Coast. Sci. Newsletter, 79:163.
- Anon. 1962. Oil Pollution at Sea. Scottish Fisheries Bull., 17:22.
- Anon. 1962. Oil Spills and Pollution. Petroleum Times, 66:292-294.
- Anon. 1962. Oil Troubled Waters. Scientific Amer., 207:71-72.
- Anon. 1964. Cleaner Seas. Economist, 211:1396.
- Anon. 1967. Oil, Oil Everywhere. Sci. News, 91:238.
- Anon. 1968. Exploiting and Polluting Oceans. Nature, 219(5156):840-842.
- Anon. 1969. Oil and Ocean Ecology. American Society for Oceanography, American Oceanography, Houston, Texas. Newsletter:1.
- Anon. 1969. Oil Leak in California. Nature, 221:902.
- Anon. 1969. Oil Pollution of the Sea; The Effects of Pollution. Harv. Int. L.J., 19(2):321-323.
- Anon. 1969. Oil Pollution. Nature, 222:1226.
- Anon. 1969. Oil Pollution. Undersea Tech. Mag., (October 1969).

- Anon. 1970. Another Torrey Canyon?. Mar. Poll. Bull., 1(3):34.
- Anon. 1970. Danger from Refineries. Mar. Poll. Bull., 1(10):158.
- Anon. 1970. For the Record - 1. Mar. Poll. Bull., 1(8):116.
- Anon. 1970. For the Record - 2. Mar. Poll. Bull., 1(8):117.
- Anon. 1970. Industry and the Productivity of the Caspian Sea. Mar. Poll. Bull., 1(7):100.
- Anon. 1970. Malta Conference - Pacemin Maribus. Lawyer of the Americas, 2(3):481-497.
- Anon. 1970. New Chemical Threat Seen in Oil Spill. Houston Chronicle: I-1, I-2, March 20, 1970.
- Anon. 1970. Oil Pollution on the Cape. Mar. Poll. Bull., 1(12):189.
- Anon. 1970. Public Health and Pollution. Mar. Poll. Bull., 1(7):97.
- Anon. 1970. The Dirty Dilemma of Oil Spills. Life, 68(8):28.
- Anon. 1970. The Long and Short of the Oil Spills. Science News, 97(11):263-264.
- Anon. 1970. The Vulnerable Arctic. Mar. Poll. Bull., 1(5):65.
- Anon. 1970. Water Pollution by Oil. Effluent and Water Treatment J., 10(8):451.
- Anon. 1971. A Foretaste of TAPS?. Mar. Poll. Bull., 2(5):66.
- Anon. 1971. Ocean Pollution and Marine Waste Disposal. Chem. Eng., 78(3):60-67.
- Baker, R. 1963. Odor Effects of Aqueous Mixtures of Organic Chemicals. JWPCF, 35(5):728.
- Baker, R. A. 1963. Threshold Odors of Organic Chemicals. J. Am. Wat. Wks. Assoc., 55(7):913-916.
- Barclay-Smith, P. (ed.). 1969. International Conference of Oil Pollution of the Sea. Available from British Museum of Natural History, London.
- Berridge, S. A., R. Dean, R. Fallows, and A. Fish. 1968. The Properties of Persistent Oil at Sea. J. Inst. Petrol., 54:300-307.

- Blumer, M. 1969. Oil Pollution of the Ocean. Oceanus, 15:3-7.
- Blumer, M. 1969. Oil Pollution of the Ocean. In Oil on the Sea. D. P. Hoult, (ed.). p. 5-13. FWQA Project 15080 EBN.
- Blumer, M. 1970. Oil Pollution Can be Invisible and Odorless, But It's Deadly. Los Angeles Times, 63, August 23, 1970.
- Blumer, M. 1971. Oil Pollution of the Ocean. In Man's Impact on the Environment. T. R. Detroyles, (ed.). (New York: McGraw-Hill) pp. 295-301.
- Blumer, M. 1971. Scientific Aspects of the Oil Spill Problem. Environ. Affairs, 1(1):54-73.
- Bourne, W. R. P. 1970. Special Review: After the Torrey Canyon Disaster. Ibis, 112:120-5.
- Boyd, H. 1970. Oil Poses Urgent Problems in Canada. Mar. Poll. Bull., 1(5):69.
- Boyle, C. L. 1969. Oil Pollution of the Sea. Oryx, 10:43-45.
- Boyle, C. L. 1969. Oil Pollution of the Sea: Is the End in Sight?. Biol. Conserv., 1(4):319-327.
- Boynton, B. F. 1970. Oil Pollution. Undercurrents, 2(12):12-13.
- Carpenter, L., and E. Klinger. 1933. Effects of Road Oil and Tars On Public Water Supplies. Journ. Pennsylvania Water Works Assoc., 5:43.
- Chambers, G., and A. Sparks. 1959. An Ecological Survey of the Houston Ship Channel and Adjoining Bays. Publ. Inst. Marine Sci., 6:213.
- Clingan, T. A., Jr. 1969. Oil Pollution: No Solution?. Proc. U.S. Nav. Inst., 95:64-75.
- Cowell, E. B. 1970. Chronic Oil Pollution Caused by Refinery Effluent Water. In Water Pollution by Oil, Inst. of Pet., London, App. p. 380-381.
- Cowell, E. B. 1970. Refinery Effluents and Chronic Pollution. In Water Pollution by Oil, Inst. of Petroleum, London.
- Davis, J. B., and D. M. Updegraff. 1954. Microbiology in the Petroleum Industry. Bact. Reviews, 18(4):215.

Degler, S. E. (ed.). 1969. Oil Pollution: Problems and Policies  
Bureau of National Affairs, Washington, D.C. iii. 1969.  
(Environmental Management Series). 142 pp.

Dennis, J. V. 1959. Oil Pollution Survey of the United States  
Atlantic Coast, with Special Reference to Southeast Florida  
Coast Conditions. Amer. Petrol. Inst., Div. Transporation,  
Washington, D.C.

Dennis J. V. 1960. Oil Pollution Conditions of the Florida East  
Coast. American Petroleum Institute, Div. Transportation,  
9 pp. (March 15, 1960) Washington, D.C.

Detwyler, T. R. (ed.). 1971. Man's Impact on the Environment.  
(New York: McGraw-Hall).

Dotson, G., R. Dean, B. Kenner, and W. Cooke. 1970. Land Spreading:  
A Conserving and Non-Polluting Method of Disposing of Oily  
Wastes. Presented at Fifth Int. Water Poll. Res. Conf. and Exhib.,  
San Francisco. July 26 - August 1, 1970.

Ferguson, G. E., et. al. 1966. Oil Pollution of Water Supplies.  
Jour. AWWA, 58:813.

Freegarde, M., et. al. 1971. Oil Spill at Sea: Its Identification,  
Determination, and Ultimate Fate. Lab. Pract., 20(1):35-40.

Friendly, A. 1970. Special Danger Seen in Arctic Pollution.  
Washington Post, 64, June 6, 1970.

Galtsoff, P. S. 1936. Oil Pollution in Coastal Waters. North Ameri-  
can Wildlife Conference Prod., 1:550.

Gardiner, E. J. A. 1954. Oil Pollution. Fortnightly, 181(4):241-246.

Gibbons, M. M. 1940. Water Pollution by Petroleum Oils. Jour.  
AWWA, 32:465.

Glaeser, J. L., and G. P. Vance. 1971. A Study of the Behavior of  
Oil Spills in the Arctic. Coast Guard, Washington, D.C., Applied  
Technology Division, Final Report Feb. 1971. 60 pp. Project  
No. 714108/A/001,002.

Gloyne, F., and T. Malin. 1963. Petrochemical Waste Effects on Water.  
Water and Sewage Works, 110:R262.

Gusev, A., M. Mosevich, Z. Podoba, and L. Lesnikov. 1968. Sanitary  
Conditions of Neva River and Neva Gulf in 1956-1968. Tr. Zool.  
Inst., Akad. Nauk SSSR, 45:27-79.

- Hampson, G. R., and H. L. Sanders. 1969. Local Oil Spills. Oceanus, 15:8.
- Hartung, R. and G. Klinger. 1967. Sedimentation of Floating Oils. Paper of the Michigan Academy of Science, Arts and Letters, 5 pp. given at the 1967 meeting.
- Hautchiet, M. R. 1955. Vijf jaar stoohsalieslactoffers. Die Wielwaal, 11:289-294.
- Hawkes, A. 1961. A Review of the Nature and Extent of Damage Caused by Oil Pollution at Sea. Trans. N. Amer. Wildl. and Water Res. Conf., 26:643.
- Hermann, E. R. 1959. A Toxicity Index for Industrial Wastes. Ind. Eng. Chem., 51(4):84A.
- Hepple, P. (ed.). 1970. Water Pollution by Oil. Inst. Pet., London.
- Heyerdahl, T. 1971. Atlantic Ocean Pollution and Biota Observed by the "Ra" Expeditions. Biol. Conserv., 3(3):184.
- Holcomb, R. W. 1969. Oil in the Ecosystem. Science, 166:204-206.
- Holluta, J., W. Koelle, and H. Sontheimer. 1970. Examination of Pollutants of Mineral Oil. W. Husmann (ed.), In An Annual for Hydrochemistry and Water Purification Techniques, Vol. 36.
- Horn, M. H., J. Teal, and R. Brackus. 1970. Petroleum Lumps on the Surface of the Sea. Science, 168:245-246.
- Hoult, D. P. (ed.). 1969. Oil pollution of the Sea. Symposium Proceedings. (Held in Cambridge, Mass., May 16, 1969). Sponsored by Mass. Inst. Tech., Cambridge and Woods Hole Oceanographic Inst., Plenum Press, New York.
- Hubsehman, J. H. 1971. Lake Erie: Pollution Abatement, Then What?. Science, 171(3971):536-540.
- Jackson, R. I. 1968. International Fisheries and Marine Pollution. In Intern. Conference on Oil Pollution of the Sea. Rome, 1968. pp. 23-49.
- Jeffrey, L. M. Lipids in Sea Water. Jour. Amer. Oil Chem Soc., 43 (4):211-214.
- Jeffrey, L. M., et. al. 1963. Lipids in Ocean Water. In Advances in Organic Geochemistry, Proc. of the International Meeting in Milan, 1962. 24 pp. Pergamm Press, Oxford, London, N.Y., Paris.

- Jones, J. G. 1968. Methods of Studying the Effects and Metabolism of Hydrocarbons in Natural Environments. In The Biological Effects of Oil Pollution on Littoral Communities, Field Studies, 2 (Suppl.):145-150.
- Ketchum, B. H. 1970. Biological Effects of Pollution of Estuaries and Coastal Waters. Boston University Press.
- Kinne, O., and H. Aurich. (eds.). Biological and Hydrographical Problems of Water Pollution in the North Sea and Adjacent Waters. Helgolander Wiss. Meeresunters.
- Koelle, W., and H. Sontheimer. 1969. Ground Water Contamination by Mineral Oil Substances. (in German). Brennst-Chem., 50(4): 123-9.
- Lane, F. W., et. al. 1924. Effect of Oil Pollution of Coast and Other Waters on the Public Health. Publ. Hlth. Rep., 39: 1657-1663 (July 11, 1924).
- Levy, E. M. 1971. Presence of Petroleum Residues Off the East Coast of Nova Scotia, in the Gulf of St. Lawrence and the St. Lawrence River. Water Research, 5:723-733.
- L'Hardy, J. 1967. Sea Pollution by Hydrocarbons and Its Biological Consequences. Penn. Bed., 6(50):128.
- Livesey, R. 1969. Oil on the Sea. Engineering, 208(5380):130-131.
- Loftas, T. 1971. The Unseen Dangers of Oil. New Scientist and Science J., 49(737):228.
- Ludwig, H., et. al. 1964. Characteristics of Oil and Grease Found in the Marine Environment. In Pollutions Marines par les Micro-organismes de les Produits Petroliers, 71-78, Symposium de Monaco (April 1964).
- Ludwig, H., R. Carter and J. Scherfig. 1964. Characterization of Oils in the Sea. Symp. Comm. Int. Explor. Scient. Mer Medit., Monaco. 1964-1965.
- Ludzack, F. J., W. Ingram, and M. Ettinger. 1957. Characteristics of a Stream Composed of Oil Refinery and Activated Sludge Effluents. Sewage and Industrial Wastes, 29(10):1177.
- Malina, J. 1964. Toxicity of Petrochemicals in the Aquatic Environment. Water and Sewage Works, 111(10):456.

- Mallet, L. 1964. Pollution par les hydrocarbures en particulier du type benzo 3,4-pyrene des riuages meditterameens francais et plus specialement de la baie de Villefranche. In Pollutions marines par les microorganismes et les produits petrolier. Monaco Sypos. April 1964, p. 325-331.
- Mallet, L. and J. Sarclou. 1965. Recherche de las presence de l'hydrocarbure polybenzenique benzo 3,4-pyrene dans le milieu planctonique de la region de la baie. de Villefranche. In Pollutions marines par les microorganismes et les produits petrolier. Monaco Symp., April 1964. pp. 331-334.
- Mann, J. W. 1953. Problem of Sea Water Pollution. U.S. Dept. Of State Bulletin, 29:775-740. December 7, 1953.
- Marstrand, K. 1971. Evaluating Biological Quality in Pollution Control. Mar. Poll. Bull., 2(11):168-171.
- McCaull, J. 1969. The Black Tide. Environment, 11(9):10.
- McKee, J. 1956. Oily Substances and Their Effects on the Beneficial Uses of Water. Calif. Water Poll. Cont. Bd., Publ. 6.
- McKinney, R. E., et. al. 1956. Metabolism of Aromatic Compounds by Activated Sludge. Sew. Ind. Wastes, 28:547-557.
- Meyer, L. 1970. Oil Spills Heavily Damage Cycle of Sea Life, 2 Scientists Testify. Washington Post, A1, July 23, 1970.
- Mironov, O. G. 1968. Hydrocarbon Pollution of the Sea and Its Influence on Marine Organisms. Helgolander wiss. Meeresanters, 17: 335-339.
- Mitchell, C., E. Anderson, L. Jones, and W. North. 1969. Ecological Effects of Oil Spillages in the Sea. Abs. Tech. Paper 42, Water Control Fed..
- Morris, B. F. 1971. Petroleum: Tar Quantities Floating in the North-western Atlantic Taken with a New Quantitative Neuston Net. Science, 173 (3495):430.
- Murphy, T. A. 1970. Environmental Effects of Oil Pollution. Paper presented to the Session on Oil Pollution Control, Amer. Soc. Of Civ. Eng., Boston, Mass. (July 13, 1970) 27 pp.
- Nelson-Smith, A. The Problem of Oil Pollution of the Sea. Advances in Marine Biology, 8:215 (Academic Press, New York).

Noll, D., and T. Roberto. 1963. Fuel Oil Contamination. Jour. AWWA, 55:257-250.

Ogren, L., and J. Pearce. 1968. Oil Pollution - A Threat to Marine Resources and Recreation. Underwater Naturalist, 5(2):6.

Olson, T. A., and F. J. Burgess. 1966. Pollution and Marine Ecology. (Wiley, Interscience: New York) Proceedings of Conference, March 1966. Galveston, Texas. 364 pp.

Pearce, A. W., et. al. 1968. Scientific Aspects of Pollution of the Sea by Oil. J. Inst. Petrol., 54:299-366.

Perkins, E. J. 1970. Oil Pollution at Ravenglass. Mar. Poll. Bull., 1(2):18.

Pilpel, N. 1954. Oil Pollution of the Sea. In Research-Science and Its Application in Industry, V. 7 (Butterworth's Scientific Publications, London).

Pilpel, N. 1967. Oil Pollution of the Sea. Science Journal, June 1967, pp. 73-80.

Pilpel, N. 1968. The Natural Fate of Oil on the Sea. Endeavour, 27(10):11-13.

Porter, C. F. 1968. After the Torrey Canyon - Oil Pollution is Still a Problem. Duck and Harbour Authority, 4 pp. (January 1968).

Potter, J. L. 1969. Use Pollution to Benefit Mankind. Ocean Ind., 4(5):94-97.

President's Panel on Oil Spills. 1969. (First Report) The Oil Spill Problem. Executive Office of the President, Office of Science and Technology.

Preston, R. D. 1970. Occurrence and Quality of Groundwater in Throckmorton County, Texas. Tex. Water Develop. Bd., Rept. 1970, No. 113, 51 pp.

Price, D. K. 1967. The Scientific Estate. Belknap Press, Cambridge, Mass.

Reed, J. C. 1970. Effects of Oil Development in Arctic America. Biol. Conserv., 2(4):273-77.

Rosen, A., et. al. 1962. Odor Thresholds of Mixed Organic Chemicals. Jour. WPCF, 34(1):7.

- Rosen, A., et. al. 1963. Relationship of River Water Odor to Specific Organic Contaminants. Jour. WPCF, 35(6):777.
- Rouet, J., and F. Danon. 1968. Pollution of Seas by the Hydrocarbons. La Tribune du Célesteau, 21:279-283.
- Ruchhoeft, C. C., and M. B. Ettinger. 1947. Tastes and Odors in Water Resulting from Industrial Wastes. Proc. 3rd Indust. Waste Conf., Purdue Univ.
- Savage, P. D. V. 1970. Esso Foils the Bill. Mar. Poll. Bull., 1(2):19.
- Schoenagel, E. 1966. Die Ölpest. (The Oil Pollution). Ornith. Mitt., 13:120.
- Smith, H. M., H. N. Dunning, H. T. Rall, and J. S. Ball. 1959. Keys to the Mystery of Crude Oil. 24th Midyear Meeting of the Amer. Petrol. Inst., Div. of Refining, New York (1959).
- Spooner, M. 1969. Some Ecological Effects of Marine Oil Pollution. In Proceedings of Joint Conference on Prevention and Control of Oil Spills. (API/EPA/USCG), New York, N.Y.
- Stander, G. H., and J. A. V. Venter. 1968. Oil Pollution in South Africa. Intern. Conf. on Oil Poll. of Sea, October 1968, pp. 251-259 (Paper No. 16B).
- Straughan, D. 1970. Oil Pollution. Aust. Natur. Hist., 16(12):414.
- Sullivan, W. 1970. Oil Called Peril to Food Supply in Sea. New York Times, January 16, 1970.
- Taylor, G. R. 1970. The Threat to Life in the Sea. Saturday Rev., 53(31):40-42.
- Warner, R. 1969. Symposium on Coastal Oil Pollution - Its Effects and Implications. Presented to Amer. Soc. Zool. and Amer. Inst. Biol. Sci., Burlington, Vt., Aug. 20, 1969.
- White, P. T. 1971. Barehanded Battle to Cleanse the Bay. National Geographic Mag., 139(6):866-881.
- White, G. H. (ed.). 1969. Water, Health and Society, Selected Papers by Abel Wolman. Bloomington, Ind., Indiana Univ. Press. 400 pp.
- Wilbur, Ch. G. 1969. The Biological Aspects of Water Pollution. Ch. C. Thomas, Pub., Springfield, Ill.
- Zeldin, M. 1971. Audubon Black Paper #1: Oil Pollution. Audubon, pp. 99-119 (May 1971).

- Zimmermann, W., et. al. 1956. Beeinflussung von Trinkwasser durch Erdöl produckti. (Pollution of Drinking Water by Petroleum Products). Zeit. Schr. Hyg., 142:322-338.
- ZoBell, C. E. 1962. Oil Pollution in the Sea. Jour. WPCF, 34(3): 259.
- ZoBell, C. E. 1963. The Occurrence, Effects and Fate of Oil Polluting the Sea. J. Air Water Poll., 7:173-197.

REPORTS OF OIL SPILL INCIDENTS

- Abbott, B. C., et al. 1969. Santa Barbara Oil Pollution Project: 8-Month Progress Report. Mar. Poll. Bull., 18:1-8.
- Anon. 1969. "Keo" Disaster, November 1969. Mar. Poll. Bull., 1(8):22-23.
- Anon. 1969. Review of the Santa Barbara Channel Oil Pollution Incident. Battelle Memorial Institute. Richland, Washington. U.S. Federal Wat. Poll. Contr. Admin., Wat. Poll. Contr. Res. Ser. 15080 EAC 07/69, 164 pp.
- Blumer, M. 1970. Testimony of Max Blumer Before the Subcommittee on Air and Water Pollution. Senate Committee on Public Works (Unpublished manuscript) Machias, Maine. (June 30, 1970).
- Blumer, M., J. Sass, G. Souza, H. Sanders, F. Grasde, and G. Hampson. 1970. The West Falmouth Oil Spill - Persistence of the Pollution Eight Months After the Accident. Woods Hole Oceanographic Institute Technical Report Ref. No. 70-44, September 1970. 32p. FWQA Grant 15080 EBN.
- Blumer, M., et. al. 1971. A Small Oil Spill. Environment, 13(2):12.
- Caldwell, J. M. 1968. Oil Pollution of the Shore Face Caused by the 'Torrey Canyon' Disaster. Coastal Engineering Research Center. August 1, 1968.
- Cerame-Vivas, M. J. 1968. The Wreck of the Ocean Eagle. Dept. of Marine Sciences, Univ. of Puerto Rico.
- Chia, F. S. 1971. Diesel Oil Spill at Anacortes. Mar. Poll. Bull., 2 (7):105.
- Committee of Scientists. 1967. The Torrey Canyon. Report of the Committee of Scientists on the Scientific and Technological Aspects of the Torrey Canyon Disaster, (The Zuckerman report). Her Majesty's Stationery Office, 48 pp.
- Cowan, E. 1968. Oil and Water: The Torrey Canyon Disaster. Philadelphia: J. B. Lippincott, 241 pp.
- Dixon, T., and T. Dixon. 1971. The Panther Affair. Mar. Poll. Bull., 2(7):107.
- Forrester, W. D. 1971. Distribution of Suspended Oil Particles Following the Grounding of the Tanker Arrow. J. Marine Research, 29:151-170.

Hemphill, J. E. 1969. Santa Barbara Channel Oil Spill Manuscript for Presentation to the hearings of the U.S. Senate, Santa Barbara, California, Feb. 24-25, 1969. Bureau of Sport Fisheries and Wildlife, 5 pp.

Home Dept. Report. 1967. The Torrey Canyon. Report presented to Parliament by the Secretary of State for the Home Department by Command of Her Majesty; 10 pp. Her Majesty's Stationery Office, London (April 1967).

Lomasney, E. P. 1968. Partial Preliminary Report on Pollution Created by Crude Oil from the Wrecked Ocean Eagle Tanker at San Juan, Puerto Rico. FWPCA, SE Region (March 13-21, 1968).

Marshall, J. M. 1967. The Black Wake of the Torrey Canyon. U.S. Naval Institute Proceedings, December, 1967.

Mercer, I. D., et. al. 1967. Conservation and the Torrey Canyon. J. Devon Trust Nat. Conserv., Suppl., July, 1967.

Sanders, M. K. 1970. Another Oil Spill at Santa Barbara. Mar. Poll. Bull., 1(2):18.

Spooner, M. 1970. Oil Spill in Tarut Bay, Saudi Arabia. Mar. Poll. Bull., 1(11):166.

Stander, G. H. 1971. Stilbau Oil Spill Fumble. Mar. Poll. Bull., 2 (6):83.

Vaas, K. F. 1971. Oil Ravages the Biesbasch. Mar. Poll. Bull., 2 (4):51.

Walsh, J. 1968. Pollution: The Wake of the 'Torrey Canyon'. Science, 150:167-169.

## GENERAL BIOLOGICAL EFFECTS AND SPECIFIC OIL SPILL INCIDENTS

- Anon. 1963. Oil Spills Affecting the Minnesota and Mississippi Rivers, Winter of 1962-3. Report PHS of U.S. Dept. HEW. 40 pp.
- Anon. 1965. Biological Factors of Pollution as Affecting Receiving Waters. API Refining Division, Manual on Disposal of Refinery Wastes. 12 pp.
- Anon. 1968. Last Word on Torrey Canyon. Nature, 217(5126):303-4.
- Anon. 1968. Torrey Canyon: A Postscript. Lancet, 7561:205.
- Anon. 1969. Oil Spill Damage to Marine Life Scent. Oil and Gas J., March 17, 1969, pp. 65-68.
- Anon. 1969. Santa Barbara Slick Leaves Turbulent Wake. Offshore Mag., 29(3).
- Anon. 1969. The Santa Barbara Oil Spill, Oil and Gas J., February 17, 1969.
- Anon. 1970. Oil Pollution in the Fay. Mar. Poll. Bull., 2(1):4.
- Anon. 1970. Schuylkill Oil Deluge. Mar. Poll. Bull., 2(1):6.
- Anon. 1970. Seychelles Oil Scare. Mar. Poll. Bull., 1(7):98.
- Anon. 1971. Santa Barbara Reprieved. Mar. Poll. Bull., 2(2):18.
- Armstrong, N. E., et. al. 1968. Ecological Aspects of Stream Pollution. Water Resour. Symp., No. 1, 83-95.
- Arthur, D. R. 1968. The Biological Problems of Littoral Pollution by Oil and Emulsifiers - A Summing Up. In The Biological Effects of Oil Pollution on Littoral Communities, Field Studies, 2 (Suppl): 159-164.
- Aubert, M., et. al. 1968. Etude des Effects de Pollutions Chimiques sur le Plancton. Revue Int. Oceanogr. Med., 13-14:107-123.
- Aubert, M., et. al. 1969. Etude Generale des Pollutions Chimiques Rejetees en mer; Intertaire et Etudes des Toxicite - Methodologie. (in French). Revue International d'Oceanographie Medicale, Supplément 1; 74 pages.
- Aubert, M., et. al. 1969. Study of the Toxicity of Chemical Products with Respect to the Marine Food Chain. (in French). Revue Internationale d'Oceanographie Medicale, 13-14:45-72.

Baker, J. M. 1969. Oil Pollution in Milford Haven. Mar. Poll. Bull..  
14:8-16.

Baker, J. M. 1970. The Effects of a Single Oil Spillage. In Ecological Effects of Oil Pollution on Littoral Communities, Proc. of Symposium Nov. 31 and Dec. 1, 1970, Institute of Petroleum. E. B. Cowell, ed.

Baker, J. M. 1971. Comparative Toxicities of Oils, Oil Fractions and Emulsifiers. In Ecological Effects of Oil Pollution on Littoral Communities, Inst. of Petroleum, London, E. B. Cowell, ed.

Baker, J. M. 1971. Effects of Cleaning. In Ecological Effects of Oil Pollution on Littoral Communities, Inst. of Petroleum, London. E. B. Cowell, ed.

Baker, J. M. 1971. Refinery Effluent. In Ecological Effects of Oil Pollution on Littoral Communities, Institute of Petroleum, London. E. B. Cowell, ed.

Baker, J. M. 1971. Seasonal Effects. In Ecological Effects of Oil Pollution on Littoral Communities, Institute of Petroleum, London. E. B. Cowell, ed.

Baker, J. M. 1971. Successive Spillage. In Ecological Effects of Oil Pollution on Littoral Communities, Institute of Petroleum, London. E. B. Cowell, ed.

Baker, J. M., and G. B. Crapp. 1971. Predictions and Recommendations. In Ecological Effects of Oil Pollution on Littoral Communities. Institute of Petroleum, London. E. B. Cowell, ed.

Barry, T. W. 1970. Likely Effects of Oil in the Canadian Arctic. Mar. Poll. Bull., 1(5):73.

Bellamy, D. J., P. H. Clarke, D. M. John, D. Jones, A. Wittick, and T. Darke. 1967. Effects of Pollution from the "Torrey Canyon" on Littoral and Sublittoral Ecosystems. Nature, 216:1170-1173.

Blumer, M. 1970. Marine Hydrocarbons from Organisms and Pollution. Abstr., ACS Meeting, September 1970, Chicago, Ill.

Blumer, M. 1970. Oil Contamination and the Living Resources of the Sea -- A Review. Presented at the FAO Technical Conference on Marine Pollution and Its Effects on Living Resources and Fishing, Rome, Dec. 9-18, 1970.

Blumer, M., M. Mullin, and R. Guillard. 1970. A Polyunsaturated Hydrocarbon (3, 6, 9, 12, 15, 18 - heneicosahexane) in the Marine Food Web. Marine Biology, 6(3):226-235.

California Fish and Game Department. 1969. Progress Report on Wildlife Affected by the Santa Barbara Channel Oil Spill. January 28 - March 31, 1969, 8 pp.

Chipman, W. A., and P. S. Galtsoff. 1949. Effects of Oil Mixed with Carbonized Sand on Aquatic Animals. U.S. Dept. Int., Spec. Sci. Rep. Fish. No. 1, Fish and Wildlife Serv., Washington, D.C.

Clark, R. C., and M. Blumer. 1967. Distribution of n-paraffins in Marine Organisms and Sediment. Limnol. and Oceanogr., 12:79-87.

Cooper, L. 1969. Scientific Consequences of the Wreck of the Torrey Canyon. Helgolander Wiss. Meer., 17:340.

Copeland, B. and T. Dorris. 1964. Community Metabolism in Ecosystems Receiving Oil Refinery Effluents. Limnol. and Oceanog., 9(3): 431.

Corner, E. D. S., A. J. Southward, and E. C. Southward. 1968. Toxicity of Oil-Spill Removers (detergents) to Marine Life: An Assessment Using the Intertidal Barnacle, Elminius modestus. J. Mar. Biol. Assn. U.K., 48:29.

Coughlan, J., and J. F. Spencer. 1967. Milford Haven: Effects of Oil Spillages on Ecological Survey. Central Electricity Research Lab. Report. RD/L/23/67. 1967.

Cowell, E. B. 1971. Some Effects of oil Pollution in Milford Haven, United Kingdom. In Proc. Jt. Conference on Prevention and Control of Oil Spills; API, EPA and USCG, June 15-17, 1971. Washington, D.C. pp. 429-435.

Cowell, E. B. 1970. Oil Pollution in Perspective. In Ecological Effects of Oil Pollution on Littoral Communities, Inst. of Pet., London, 1970. E. B. Cowell, ed.

Cowell, E. B. 1970. Some Biological Effects of Oil Pollution. Your Environment 1(3):84, 93-94.

Cowell, E. B., (ed.). 1970. The Ecological Effects of Oil Pollution on Littoral Communities. Proc. of Symposium, Nov. 31 and Dec. 1, 1970. Inst. of Petroleum.

Crafts, A. S. 1949. Control of Aquatic and Ditchbank Weeds. Calif. Agric. Exp. Sta. Ext. Serv. Circ. No. 158.

Crapp, B. 1969. The Biological Effects of Marine Oil Pollution and Shore Cleansing. In Field Studies Council, Oil Pollution Research Unit, Orielton Field Centre. Annual Report. 1969. pp. 27-42.

- Crapp, G. 1970. The Biological Effects of Marine Oil Pollution and Shore Cleansing. Ph.D. Thesis, Univ. Wales.
- Crapp, G. B. 1971. Chronic Oil Pollution. In Ecological Effects of Oil Pollution on Littoral Communities, Inst. of Petroleum, London, E. B. Cowell, ed.
- Crapp, G. B. 1971. Field Experiments with Oil and Emulsifiers. In Ecological Effects of Oil Pollution on Littoral Communities, Inst. of Petroleum, London. E. B. Cowell, ed.
- Crapp, G. B. 1971. Monitoring the Rocky Shore. In Ecological Effects of Oil Pollution on Littoral Communities, Inst. of Petroleum, London. E. B. Cowell, ed.
- Crapp, G. B. 1971. The Ecological Effects of Stranded Oil. In Ecological Effects of Oil Pollution on Littoral Communities, Inst. of Petroleum, London. E. B. Cowell, ed.
- Crapp, G. B., et. al. 1971. Investigation on Sandy and Muddy Shores. In Ecological Effects of Oil Pollution on Littoral Communities, Inst. of Petroleum, London. E. B. Cowell, ed.
- Croker, R. A. 1969. Post Oil-Spill Intertidal Survey, Great Bays, N.H., June 3-7, 1969. Report to the Executive Committee of the Jackson Estuarine Laboratory. June 10, 1969.
- Crutchfield, J. A. 1968. Effects of Mineral and Petroleum Extraction on living Resources of Continental Shelf Water. Proc. 21st Annual Session, Gulf and Caribbean Fisheries Institute, Univ. of Miami, pp. 20-36.
- Daugherty, F. M., Jr. 1951. Effects of Some Chemicals Used in Oil Well Drilling on Marine Animals. Sewage Ind. Wastes, 23(10): 1282-1287.
- Dean, R. A. 1968. The Chemistry of Crude Oils in Relation to Their Spillage on the Sea. In the Biological Effects of Oil Pollution on Littoral Communities, Field Studies, 2 (Suppl.):1-6.
- Diaz-Pifarrer. 1962. The Effects of an Oil on the Shore of Quanico, Puerto Rico. 4th Meeting Assoc. Island Marine Labs. Curacao, 4:12.
- Dorris, T. C., et. al. 1963. Oil Refinery Effluent Treatment in Ponds. Journ. WPCF, 35(7):932.
- Dorris, T. C., W. Gould, C. R. Jenkins. 1959. Toxicity Bioassay of Oil Refinery Effluents in Oklahoma. In Trans. 2nd Sem. Biol. Prob. Water Poll., R. A. Taft San. Eng. Center, Cincinnati, Ohio, Tech. Rep. W60-3:276-285.

- Dudley, G. Oil Pollution in a Major Oil Port: The Incidence Behaviour, and Treatment of Oil Spills. In Ecological Effects of Oil Pollution on Littoral Communities, Inst. of Petroleum, London. E. B. Cowell, ed.
- Duffy, J. M., and R. A. Hardy. 1970. Inshore Survey of Santa Barbara Oil Spill. California Dept. of Fish and Game. Marine Resources Operations. State Fisheries Laboratory. 3 pages, March 10, 1970.
- Environmental Protection Agency. 1971. Biological Assessment of Diesel Spill. Final Report, Anacortes, Washington.
- Fauchald, K. 1971. The Benthic Fauna in the Santa Barbara Channel Following the January 1969 Oil Spill. In Biological and Oceanographical Survey of the Santa Barbara Oil Spill, 1969-1970, Vol. I, p. 61. Allan Hancock Found. Sea Grant Publ. #2. D. Straughan, ed.
- Foster, A., et. al. 1970. Santa Barbara Oil Pollution, 1969, A Study of the Biological Effects of the Oil Spill which Occurred at Santa Barbara, California in 1969. Water Pollution Control Research Series 15080 DZR 11/70, October 1970. 49 pp. FWPCA Program 15080 DZR.
- Gelphi, E., J. Oro, H. J. Schneider, and E. O. Bennett. 1968. Olefins of High Molecular Weight in Two Microscopic Algae. Science, 161: 700-701.
- George, J. D. 1970. Mortality at Southend. Mar. Poll. Bull., 1(9): 131.
- George, J. D. 1970. Sub-lethal Effects on Living Organisms. Mar. Poll. Bull., 1:107-109.
- George, M. 1971. Oil Pollution of Marine Organisms. Nature, 192 (4808):1209.
- Goldacre, R. J. 1968. The Effects of Detergents and Oils on the Cell Membrane. Suppl. to Vol. 2 of Field Studies, Field Studies Council. London. 1968. pg. 131-137.
- Gunkel, W. 1967. Experimental Ecological Investigations into the Factors Limiting Microbial Decomposition of Oil in the Marine Environment. Helgoland. wiss. Meeresunters, 15:210-225.
- Gunkel, W. 1968. Bacteriological Investigations of Oil-Polluted Sediments from the Cornish Coast Following the Torrey Canyon Disaster. Field Studies, 2 (Suppl.):151-158.

Hackett, H. E., and R. B. Wait. 1969. Effects of an Oil Spill and Chemical Cleaners on a Littoral Community in Casco Bay, Maine. State Biologists Assn. Newsletter, October 20, 1969.

Hartung, R. 1969. Sedimented Polluting Oils as Depots for Chlorinated Hydrocarbon Insecticides. Paper presented to Division of Water, Air and Waste Chemistry. American Chemical Society, New York. September 1969.

Hartung, R., and G. W. Klinger. 1970. Concentration of DDT by Sedimented Polluting Oils. Envir. Sci. Technol., 4(5):407.

Hayhurst, E. R. 1936. Poisoning by Petroleum Distillates. Indust. Med., 5:53-63.

Hoffmann, Hans D., et. al. 1970. Chemical Linkage of Polycyclic Hydrocarbons to Deoxyribonucleic Acids and Polynucleotides in Aqueous Solution and in a Buffer-Ethanol Solvent System. Biochem., 9(13):2594-2604.

Home, N. A. 1969. Effects of 'Torrey Canyon' Pollution on Marine Life. In Oil on the Sea. D. P. Hoult (ed.). Plenum Press.

Ignatiades, L., and T. Bacacos-Kontos. 1970. Ecology of Fouling Organisms in a Polluted Area. Nature, 225:293-294.

Jones, J. R. E. 1964. Fish and River Pollution. (London:Butterworths) 203 pp.

Kokin, K. A., and L. A. Konoplja. 1966. On the Influence of Pollution of Marine Aquatories on the Character of Water Biocoenoses. Byall. Mosk. Obshch. Ispyt. Prir., 71(4):149-150.

Konig, D. 1968. Biological Effects of the Waste Water of an Oil Refinery in a Silting Area of the North Sea. Helgolander wiss. Meeresunters, 16:321-327.

La Roche, G., et. al. 1970. Bioassay Procedures for Oil and Oil Dispersant Toxicity Evaluation. Jour. WPCF, 42(11):1982-1989.

Ludemann, D. 1968. Gewasserverschmutzung durch Aussenbord-motoren und deren Wirkung auf Fauna und Flora. Helgolander wiss. Meeresunters, 17:356-369.

Mackin, J. G. 1971. A Study of the Effect of Oilfield Brine Effluents on Biotic Communities in Texas Estuaries. Texas A&M. Res. Foundation, Project 735.

Marine Biological Assoc., U.K. 1970. 'Torrey Canyon'. In Pollution an Marine Life J. E. Smith, ed. Cambridge Univ. Press, London.

- Maryland Legislative Council. 1953. Study of the Effects of Oil Upon Marine Life. Report of the Committee, 25 pp.
- McKenna, E. J., and R. E. Kallio. 1965. The Biology of Hydrocarbons. Ann. Rev. Microbiol., 19:183-208.
- Mitchell, C. T., E. Anderson, L. Jones, and W. North. 1970. What Oil Does to Ecology. JWPCF, 42:812-18.
- Nelson, R. C. 1925. Effects of Oil Pollution on Marine and Wildlife. In App. V to the Report of the U.S. Commissioner of Fisheries, pp. 171-181.
- Nelson-Smith, A. 1966. Biological Consequences of Oil Pollution and Shore Cleaning. In Biological Effects of Oil Pollution on Littoral Communities, J. McCarthy and D. Arthur (eds.).
- Nelson-Smith, A. 1967. Oil, Emulsifiers, and Marine Life. J. Devon Trust for Nature Conserv., Suppl., 29-33.
- Nelson-Smith, A. 1968. Effects of Oil and Emulsifiers on Shores in Southwest Britain. Rep. Challenger Soc., 20:60.
- Neushal, M. 1970. Effects of Pollution on Populations of Intertidal and Subtidal Organisms. Paper presented at Santa Barbara Oil Symposium, Santa Barbara, December 17, 1970.
- Nicholson, N., and R. Cimberg. 1971. The Santa Barbara Oil Spills of 1969. A post-spill survey of the rocky intertidal. In Biological and Oceanographical Survey of the Santa Barbara Oil Spill, 1969-1970. Vol. 1, p. 325. Allan Hancock Foundation Sea Grant Publ. 2. D. Straughan, ed.
- North, W. 1961. Successive Biological Changes Observed in a Marine Cove Exposed to Large Oil Spillage. Ref. Ser. Inst., Mar. Res. Univ. Calif., p. 61-66.
- Orton, J. 1925. Effects on Marine Organisms of Oils Discharged at Sea. Nature, 115:910.
- Ottway, S. 1970. The Comparative Toxicities of Crude Oils. Field Studies, Oil Pollution Research Unit, Orielton.
- Parker, B., and G. Barson. 1970. Biological and Chemical Significance of Surface Microlayers in Aquatic Ecosystems. Bioscience, 20: 87-93.
- Ranwell, D. S. 1968. Extent of Damage to Coastal Habitats Due to the Torrey Canyon Incident. In The Biological Effects of Oil Pollution on Littoral Communities, Field Studies, 2 (Suppl.):39-47.

- Remmart, H. 1970. The Significance of Some Industrial Pollutants for Animals of the Marine Supralittoral Zone. Oceanologia, 5: 158.
- Roberts, C. 1926. Oil Pollution: The Effect of Oil Pollution Upon Certain Forms of Aquatic Life and Experiments Upon the Rate of Absorption, Through Films of Various Fuel Oils, of Atmospheric Oxygen by Seawater. J. Du Conseil Int. pour l'Explor. Sci. Mar. Medit., 14:535.
- Ruston, W., and E. Jee. 1928. Fuel Oil and Aquatic Life. Salmon and Trout Mag., 31:89.
- Rutzler, K., and W. Sterrer. 1970. Oil Pollution: Damage Observed in Tropical Communities Along the Atlantic Seaboard of Panama. Bioscience, 20:222-224.
- Sanders, H. 1970. Testimony of Howard Sanders before the Antitrust and Monopoly Subcommittee. U.S. Senate, Washington, D.C., August 11-13, 1970. 8 pp.
- Sanders, H. 1970. Testimony of Howard Sanders before the Conservation and Natural Resources Subcommittee. Committee on Government Operations, Washington, D.C., July 22, 1970.
- Shelton, R. G. J. 1971. Effects of Oil and Oil Dispersants on the Marine Environment. Proc. Royal Soc., Ser. B., 177(1048):411-22.
- Smith, E. J. (ed.). 1968. "Torrey Canyon" Pollution and Marine Life. Cambridge Univ. Press, Cambridge. 197 p.
- Smith, J. W. 1968. Identification and Evaluation of Toxic Effects of Organic Micropollutants. 237 pp. Avail. Univ. of Missouri, Microfilms, Ann Arbor, Mich.
- Spooner, M. 1969. Some Ecological Effects of Marine Pollution. In Proc. Joint Conf. on Prevention and Control of Oil Spills. API/FWPCA (Dec. 15-17, 1969) p. 313-316.
- Sprague, J. B., and W. G. Carson. 1970. Toxicity Tests with Oil Dispersants in Connection with Oil Spill at Chedabucto Bay, Nova Scotia. Fish. Res. Bd. Canada Tech. Rpt. No. 201, 30 pp.
- Straughan, D. 1970. Santa Barbara Oil Pollution Project. Mar. Poll. Bull., 1(4):61.
- Straughan, D. 1971. The Influence of Oil and Detergents on Recolonization in the Upper Intertidal Zone. In Proc. Joint Conf. on Prevention and Control of Oil Spills, 1971. API/EPA/USCG, p.437-440.

- Straughan, D. 1971. What Has Been the Effect of the Spill on the Ecology in the Santa Barbara Channel? In Biological and Oceanographical Survey of the Santa Barbara Oil Spill 1969-1970. D. Straughan (ed.). Vol. 1, Biology and Bacteriology, Allan Hancock Foundation, Univ. of S. Calif.
- Tarzwell, C. 1967. Crude Oil and Petroleum Products. In Interim Rep. on Water Quality Standards for Fishes, Other Aquatic Life and Wildlife. p. 108. Nat. Tech. Advis. Comm., Washington.
- Tarzwell, C. 1969. Standard Methods for the Determination of Relative Toxicity of Oil Dispersants and Mixtures of Dispersants and Various Oils to Aquatic Organisms. In Proc. Joint Conference on Prevention and Control of Oil Spills, API and FWPCA, December 15-17, 1969. New York. pp. 179-186.
- Tendron, G. 1968. Contamination of Marine Flora and Fauna by Oil and the Biological Consequences of the Torrey Canyon Disaster. In Proc. Int. Conf. Oil Poll. of the Sea, Rome, Oct. 7-9, 1968. p. 114. Berclay-Smith (ed.).
- Watson, J. A., J. P. Smith, L. C. Ersham, R. H. Parker, W. G. Blanton, D. E. Solomon, and C. J. Blanton. 1971. Biological Assessment of Diesel Spill, Anacortes, Washington, May 1971. Final Report, Prepared for the Environmental Protection Agency, 168 pp.
- Woods Hole Oceanographic Institution. 1971. Interaction Between Marine Organisms and Oil Pollution. For the Office of Research and Development, Environmental Protection Adm., Program #18050 EBN. July 1971, 15 pp.

## EFFECTS OF OIL ON BIRDS

- Aldrich, J. W. 1970. Review of the Problem of Birds Contaminated by Oil and Their Rehabilitation. Resource Publication 87.
- Anon. 1967. More Dead Birds. Nature, 215:119.
- Anon. 1969. Deaths of Seabirds on the British West Coast. Mar. Poll. Bull., 18:20-21.
- Anon. 1970. Alaska Oil Probe in Wildlife Kill. Wall Street J., 21 (April 16, 1970).
- Anon. 1970. Bird Deaths Mount in Alaska. Mar. Poll. Bull., 1 (5):66.
- Anon. 1970. Missing Seabirds. Mar. Poll. Bull., 1(8):114.
- Anon. 1970. More Oiled Birds. Mar. Poll. Bull., 1(3):36.
- Beer, J. V. 1968. The Attempted Rehabilitation of Oiled Sea Birds. Wildfowl, 19:120-124.
- Beer, J. V. 1970. Treating Oil Birds. Mar. Poll. Bull., 1(6):84-85.
- Boos, G. 1964. Oil on the Seas. Bird Notes, 31(5):185-188.
- Bourne, W. R. P. 1965. The Weather, Oil and Seabirds Cast Ashore. Seabird Bull., 1:42-43.
- Bourne, W. R. P. 1969. Chronological List of Ornithological Oil Pollution Incidents. Seabird Bull., 7:3-8.
- Bourne, W. R. P. 1969. Firth of Clyde Oiling of Birds. Smithsonian Institution Center for Shore Bird Phenomena. Mar. Poll. Bull. 17:38-39.
- Bourne, W. R. P. 1970. Oil Pollution and Bird Conservation. Biol. Conserv., 2(4):300-302.
- Clark, R. B. 1970. Oiled Seabird Research Unit. Mar. Poll. Bull., 1(2):22.
- Clark, R. B., and K. G. Gregory. 1971. Feather-Wetting in Cleaned Birds. Mar. Poll. Bull., 2(5):78.
- Cooper, J. 1971. The Jackass Penguin. Mar. Poll. Bull., 2(4):52.
- de Jager, S. and T. Belterman. 1970. Treatment of Oiled Eider Duck in Holland. Mar. Poll. Bull., 1(10):156-157.

- Dennis, J. V. 1959. Can Oil Pollution be Defeated?. Audubon Mag., 44(2):66.
- Drost, R., and C. Konig. 1965. Oil Pollution and Danger to Birds by Polluting the Water. (in German) Rep. Intern. C'tee Bird Preserv. (German Sect.), 5:7-9.
- Greenwood, J. J. D. 1970. Oiled Seabirds in East Scotland. Mar. Poll. Bull., 1(3):35-36.
- Greenwood, J. J. D., and J. P. F. Kiddie. 1968. Birds Killed by Oil in the Fay Estuary (Scotland), March and April 1968. Scot. Birds 5(4):189-196.
- Gregory, K. G. 1970. Oiled Birds in Holland. Mar. Poll. Bull., 2 (2):23.
- Griner, L. A., and R. Herdman. 1970. Effects of Oil Pollution on Waterfowl; A Study of Salvage Methods. Water Pollution Control Research Series 15080 EBZ, 12/70, December 1970. 35 p. EPA-WQO Program 15080 EBZ 12/70.
- Harrison, J., and W. F. A. Buck. 1967. Peril in Perspective. Kent Ornithological Society (Special Suppl. to Kent Bird Rep., 16).
- Heldt, R. 1960. Dead Birds on the Drift-Line of the North Sea Coast of Schleswig, Particularly Around Eiderstedt. Mitt. Fraun. Arb.-Gem. Schlews.-Holst., 13:37-43 (in German).
- Hiatt, R., J. Naughton, and D. Matthews. 1954. A Relation of Chemical Structure to Irritant Responses in Marine Fish. Nature (British), 172:904.
- Hoffitt, J., and R. T. Orr. 1938. Recent Disastrous Effects of Oil Pollution on Birds in the San Francisco Bay Region. California Fish, Game, 24:239.
- Konig, D. 1966. The Situation in Inland Water Pollution and Preventative Measures Taken by the German Federal Republic with Regard to Birds. Rep. Intern. Com. Brid Preserv. (German section), 6:25-35. (in German).
- Kuhl, H., and H. Mann. 1967. The Control of Pollution from a Fisheries Viewpoint. (in German) Schiff Hafen, 19:588-589.
- Kuhnhold, W. W. 1969. Effect of Water Soluble Substances of Crude Oil on Eggs and Larvae of Cod and Herring. International Conference for the Exploration of the Sea. Fisheries Improvement Committee, CM 1969/E 17:1-11.

- Mironov, O. G. 1969. The Development of Some Black Sea Fishes in Sea Water Polluted by Petroleum Products. (in Russian). Voprosy Ikhtiolozii, 9(6):919-922.
- Morzer, B. M. F. 1959. Oiled Birds Along the Dutch Coast. Levende Natur., 62:172-178.
- O'Connor, R. J. 1967. The Torrey Canyon: A Census of Breeding Auks in Cornwall, June 1967. Seabird Bull., 4:38-45.
- Odham, G. 1971. Cleaning and Rehabilitation of Oiled Seabirds. In Proc. Joint Conf. on Prevention and Control of Oil Spills, 1971. (API/EPA/USCG) pp. 453-457.
- Portier, P., and A. Raffy. 1934. Micanisme de la mort des oiseaux dont le plumage est impregne de carbures d'hydorgene. C. R. Acad. Sci., Paris, 198:851-853.
- Rook, D. 1967. To Clean or Kill. Torrey Canyon Birds, 1(1):201-212.
- Royal Society for the Protection of Birds. Oiled Birds - What To Do. The Lodge, Sandy, Belfordshire. December, 1969.
- Sage, B. L. 1968. Pollution - Coast to Wildlife. Petroleum Review, April, 1968:123-4.
- Scott, P. 1970. Oil and Wildlife in Alaska. Oryx, 10(4):220-235.
- Smith, P. C., and J. S. Bleakney. 1969. Observations on Oil Pollution and Wintering Purple Sandpipers, Erolia maritima (Brannich), in Nova Scotia. Field Natur., 1(9):134.
- Straughan, D. 1971. Oil Pollution and Sea birds. In Biological and Oceanographical Survey of the Santa Barbara Channel Oil Spill 1969-70, Vol. 1, p. 307. Allan Hancock Foundation. Sea Grant Publ. 2. D. Straughan (ed.).
- Taylor, J. C. 1969. Firth of Clyde Oiling of Birds. Mar. Poll. Bull., 1(8):27.
- Teifts, R. W. 1942. Informal Report on Investigations of Damage Being Done to Waterfowl in Coastal Nova Scotia as a Result of Floating Oil. Report to: Chief, Conad Wildlife Serv., Ottawa, Canada, March, 1942.
- Vogt, H. 1964. Die Olpest, der schwarze Tod füllt seevogel. (Oil Pollution, the Black Death for Seabirds). Vogel-Kusmos, 2:42-43.
- Wright, P. 1971. High Pollution Toll of Shetland Seabirds. London Times, 3, June 7, 1971.

## EFFECTS OF OIL ON SHELLFISH

- Albeaux - Dernet, M., and C. M. Laur. 1970. Influence de la Pollution par le Mazaut sur les Testicules de Crabes. C. R. Acad. Sci., Paris, 270:170-173.
- Anon. 1970. Lobsters Unharmed by Oil Pollution. Fisheries of Canada, 22(10):20.
- Blumer, M., G. Souza, and J. Sass. 1970. Hydrocarbon Pollution of Edible Shellfish by an Oil Spill. Marine Biology, 5(3):195.
- Chanmann, H. J., and M. Kuratsune. 1957. Determination of Polycyclic Aromatic Hydrocarbons in Oysters Collected in Polluted Water. Anal. Chem., 29:1312-1317.
- Chipman, W. A., and P. S. Galtsoff. 1949. Toxic Effects of Oil Mixed with Carbonized Sand on Aquatic Animals. Pap. Nat. Shellfish Assoc., pp. 9399.
- Galtsoff, H. F., H. F. Prytherich, R. O. Smith, and V. Koehring. 1935. Effects of Crude Oil Pollution on Oysters in Louisiana Waters. Bull. Bur. Fish., 48:209.
- Gowanloch, J. N. 1935. Pollution by Oil in Relation to Oysters., Trans. Amer. Fish. Soc., 65:293.
- Kanter, R., D. Straughan and W. Jessee. 1971. Effects of Exposure to Oil on Mytilus californianus from Different Localities. In Proc. Joint Conf. on Prevention and Control of Oil Spills, 1971. (API/EPA/USCG) pp. 485-488.
- Lund, E. J. 1957. Effect of Bleedwater, "Soluble Fraction", and Crude Oil on the Oyster. Publ. Inst. Mar. Sci., Univ. Texas, 4:328-341.
- Mackin, J., and S. Hopkins. 1962. Studies on Oysters in Relation to the Oil Industry. Publ. Inst. Mar. Sci., Univ. of Texas, 1:1-131.
- Mackin, J. and A. Sparks. 1961. A Study of the Effects on Oysters of Crude Oil Loss from a Wild Well. Publ. Inst. Mar. Sci., 7:230.
- Mironov, O. G. 1967. Deistvie nefti i nefteproduktov na nekotorykh mollyuskov pribrezhnoi zony Chernogo morya - (Effect of Oil and Oil Products Upon Some Molluscs on the Littoral Zone of the Black Sea USSR). (in Russian, Engl. sum.) Zool. Zh., 46(1):134-136.
- Prytherin, H. F. 1933. Report of Investigation of Oyster Mortality in Louisiana in Relation to Oil Well Operations, U.S. Bur. Fish., Washington, D.C.

## EFFECTS OF OIL ON FISH

- Anon. 1939. No. 6 of a Series of Reports on the Toxicity of Petroleum Refinery Wastes to Fish Indigenous to Eastern Pennsylvania. Waste Control Lab., Atl. Refinery Co., Philadelphia, Pennsylvania.
- Anon. 1964. Pollution Caused Fish Kills in 1964. U.S. Dept. HEW, Public Health Service, Publ. No. 847 (Revised), 28 pp.
- Anon. 1968. Pollution and Fish. Oceanography International, 3(1):16.
- Chadwick, H. K. 1960. Toxicity of Tircon Oil Spill Eradicator to Striped Bass, Morone saxatilis. Calif. Fish & Game, 46:373.
- Dykstra, J. 1967. The Effect of Marine Pollution on Commercial Fisheries. Paper given before New England Council, Seminar on Marine Pollution, South Portland, Maine, Oct. 18, 1967.
- Glen, D. 1970. Marine Pollution - a Growing Danger to Fisheries. Fish. News Int., 9(1):29-34.
- Gutstell, J. S. 1921. Danger to Fisheries from Oil and Tar Pollution of Water. Bur. Fish., Doc. 910, Rept. U.S. Comm. Fish.
- Irwin, W. H. 1965. Fifty-seven Species of Fish in Oil Refinery Waste Bioassay. Trans. 13th N. Amer. Wildl. and Natl. Resources Conf., 89-99.
- Klinke, H. R. 1962. Effects of Oil and Tar Products in Water on the Fish Organism. (in German) Munchner Beitrage zur Abwasser-Fischerei-und Flussbiologie, 9:75-81.
- Klinke, H. R. 1965. Phenol Content in Waters and Its Effect on Fish Organisms. (in German). Arch. Fisch. Wiss., 16:1-16.
- Krishnaswami, S. K. and E. E. Kupchanko. 1969. Relationship Between Odor of Petroleum Refinery Wastewater and Occurrence of 'Oily' Taste-flavor in Rainbow Trout, Salmo gairdnerii. Jour. WPCF, 41 (5, Pt. 2):R189-R196.
- Kuhmhold, W. 1969. The Influence of Water Soluble Compounds of Crude Oil and Their Fractions on the Ontogenetic Development of Herring Fry (Clupea harengus L.). Ber. Deut. Wiss Komm Meeresforsch. 20:165.

LeClec, E., and F. Devlamiuck. 1953. Research on the Influence of Films of Fuel Oil and Lubricating Oil on Fish. Bull. Centre Belge Etude Et Document Eaux, 20:126.

Mais, K. F. 1969. Pelagic Fish Survey of the Santa Barbara Oil Spill. Calif. Dept. of Fish and Game, Cruise Report 69A4. February 18, 1969. 4p.

Malacea, I., V. Cure, and L. Weiner. 1964. Contributions to the Knowledge of the Noxious Action of Oil, Napthenic Acid and Phenols on Certain Fish and the Crustacean, Daphnia magna. Straus. Stud. Prot. Epur. Apel., 5:339-397.

Mathis, M. H. 1970. Fish Feed on Tar Lumps. Christain Science Monitor, 5, August 18, 1970.

Mikryakov, V. 1969. Effect of Phenol on the Protein Level in the Serum of Carp (Cyprinus carpio) Under Chronic Experimental Conditions. Transl. Inst. Biol. Unutr. Vod. Akad. Nauk. SSSR, No. 19.

Pickering, Q. H., and C. Henderson. 1966. Acute Toxicity of Some Important Petro-Chemicals to Fish. J. Water Pollution Control Fed., 38(9):1419-1429.

Portmann, J. E., and P. M. Connor. 1968. The Toxicity of Several Oil-Spill Removers to Some Species of Fish and Shellfish. Mar. Biol., 1:322.

Rosenthal, H. and W. Gunkel. 1967. Effects of Crude Oil-Emulsifier Mixtures on Marine Fish Fry and Animals Forming Their Food. Helgoland. wiss. Meeresunters, 16:315-320.

Shipton, J., J. Last, K. Murray, and G. Vale. 1970. Kerosene Like Taste Taint in Mullet (Mugil cephalus). J. Sci. Food Agr., 21 (8):433.

Sidhu, G., G. Vale, J. Shipton, and K. Murray. 1970. Nature and Effects of a Kerosene-Like Taint in Mullet. FAO Tech. Conf. on Mar. Poll., Rome, December, 1970.

Spratt, J. D. 1970. Pelagic Fish Survey of Santa Barbara Oil Spill. California Dept. of Fish and Game, Marine Resources Operations. State Fisheries Laboratory, Terminal Island, Cruise Report, No. 70-A-2, 4 pages, March 5, 1970.

Stepanov, V., and B. Flerov. 1969. Effect of Subtoxic Concentrations by Phenol on the Quantity and Quality of the Progeny of Lebistes reticulatus. Trans. Inst. Biol. Vod. Akad. Nauk SSSR, 19:61.

- Tagatz, M. 1969. Reduced Oxygen Tolerance and Toxicity of Petroleum Products to Juvenile American Shad., Chesapeake Sci., 2:65.
- Thompson, J. M. 1963. Mortality Thresholds of Fish in Fly Ash Suspensions. Australian Jour. Sci., 25(4):4.
- Veselov, E. A. 1948. The Effect of Crude Oil Pollution on Fishes. Rybnoe Khoziastvvo, 12:21-22. (in Russian).
- Wiebe, A. H. 1935. The Effects of Crude Oil on Fresh Water Fish. Trans. Amer. Fish. Soc., 65:324-350.
- Zahner, R. 1962. Effects of Motor Fuels and Oils on Rainbow Trout. (in German) Ein Jahrbuch fur Wasserchemie und Wasserreinigungsstechnik, 29:142-177. Weinheim, Verlag Chemic. Translated from German: Fisheries Res. Bd. Canada. Translation Series No. 1025.
- Zitko, V., and S. Tibbo. 1971. Fish Kills Caused by an Intermediate Oil from Coke Ovens. Bull. Environ. Cont. and Toxicol., 6(1):24.

## EFFECTS OF OIL ON MARINE AND FRESHWATER INVERTEBRATES

- Blumer, M. and D. Thomas. 1965. "Zamene", Isomeric C<sub>19</sub> Mono-olefins from Zooplankton, Fishes and Mammals. Science, 148:370.
- Blumer, M. et. al. 1969. Phytol-Derived C<sub>19</sub> Di- and Triolefinic Hydrocarbons in Marine Zooplankton and Fishes. Biochemistry, 8:4067.
- Butler, P. 1962. Reaction of Some Estuarine Molluscs to Some Environmental Factors. Bull. Probl. in Water Poll., Trans., 3rd Seminar, U.S. Pub. Health Serv., Cincinnati.
- Chia, F. 1970. Reproduction of Artic Marine Invertebrates. Mar. Poll. Bull., 1(5):78-79.
- Conover, R. J. 1971. Some Relations Between Zooplankton and Bunker C Oil in Chedabucto Bay Following the Wreck of the Tanker ARROW. J. Fish. Res. Bd. Canada, 28:1327-1330.
- Evans, W. 1970. Thalassotrechus barbareae (Horn) and the Santa Barbara Oil Spill (Coleoptera: Carabidae). Pan-Pac Entomol., 46(4):233 - 237.
- Ewing. 1964. Structure of Littoral Insect Communities in a Limiting Environment, Oil Refinery Holding Ponds. Thesis, Oklahoma State University.
- Fernet, M. A., and M. Laur. 1970. Influence of Fuel Oil Pollution on the Crab Tests. (in French). C. R. Acad. Sci., Paris, 270:170-173.
- Grant, E. 1970. Notes on an Experiment Upon the Effects of Crude Oil on Live Corals. Fish. Notes (New Ser.), Dept. Primary Indust. Brisbane, 1:1.
- Hoelscher, C. E., and H. A. Dean. 1968. Control of Texas Mite Populations on Oranges with Selected Petroleum Oil Fractions. J. Econ. Entomol., 61(5):1329-1333.
- Knight, H., J. C. Chamberlin, and C. D. Samuels. 1929. On Some Limiting Factors in the use of Saturated Petroleum Oils as Insecticides. Plant Physiol., 4:299-321.
- Knight, H., and C. R. Cleveland. 1934. Recent Developments in Oil Sprays. J. Econ. Entomol., 27:269-89.
- Latiff, S. A. 1969. Experiments on the Toxicity of Oil Counteracting Agent (Esso Corexit 7664), with and without Iraq Crude Oil, for Selected Members of Marine Plankton. Arch. Fishereiwiss., 29(2-3): 182-5.

- Lewis, J. B. 1971. Effect of Crude Oil and an Oil Spill Dispersant on Reef Corals. Mar. Poll. Bull., 2(4):59.
- Mileikovsky, S. A. 1970. The Influence of Pollution on Pelagic Larvae of Bottom Invertebrates in Marine Nearshore and Estuarine Waters. Mar. Biol., 6(4):350-356.
- Mironov, O. G. 1969. Effect of Oil Pollution Upon Some Representatives of the Black Sea Zooplankton. Zool. Zh., 48:980-984.
- Mironov, O. G. 1969. Viability of Larvae of Some Crustacea in the Sea Water Polluted with Oil Products. (in Russian, Engl. Abstr.). Zoologicheskii Zhurnal., 68(11):1734-1737.
- Powell, N. A., C. Sarce, and D. Tufts. 1970. Hyperplasia in an Estuarine Bryozoan Attributable to Coal Tar Derivatives. J. Fish. Res. Board Canada, 27(11):2095-6.
- Reish, D. 1964. The Effect of Oil Refinery Wastes on Benthic Marine Animals in Los Angeles Harbor, Calif. Sympos. Comm. Int. Explor. Sci. Mer. Medit., Monaco. p. 355.
- Remmert, H. 1970. Influence of Industrial Effluents on Arthropods of the Marine Supralittoral Zone. (in German, Engl. Summary). Oecologia, 5:158-164.
- Rzhepishevsky, I. K. 1967. On the Influence of Organic Pollution of Marine Water on Spawning and Development of Larvae in Barnacles. In Problems of Bioceanography (in Russian), pp. 165-168. Kiev: Naukova Dumka.
- Slumkin, M., B. Koe, and L. Zechmeister. 1951. An Instance of the Occurrence of Carcinogenic Substances in Certain Barnacles. Science, 37:1132.
- Straughan, D. 1970. Redressing the Balance on the Reef. Mar. Poll. Bull., 1(6):86.
- Straughan, D. 1971. Breeding and Larval Settlement of Certain Intertidal Invertebrates in the Santa Barbara Channel Following Pollution by Oil. In Biological and Oceanographical Survey of the Santa Barbara Oil Spill 1969-70. Vol. 1, p. 223, Allan Hancock Found. Sea Grant Publ. 2. D. Straughan (ed.).
- Thorpe, W. H. 1931. The Biology of the Petroleum Fly. Science, 73: 101-103.
- Thorpe, W. H. 1931. The Biology of the Petroleum Fly, Psilopa petrolii, Coq. Trans. Int. Soc., Lond., 78:331-343.

- Tubb, R. A. 1963. Population Dynamics of Herbivorous Insects in a Series of Oil Refinery Effluent Holding Ponds. Ph.D. Thesis, Oklahoma State University (August 1963).
- Whittle, K. J., and M. Blumer. 1968. Chemotoxicity in Starfish. Symposium on Organic Chemistry of Natural Waters, Univ. of Alaska, Fairbanks.
- Wilhm, J. L., and T. C. Dorris. 1966. Species Diversity of Benthic Macro-invertebrates in a Stream Receiving Domestic and Oil Refinery Effluents. Amer. Midl. Nat., 76:427-449.
- Wilson, D. P. 1968. Temporary Absorption on a Substrate of an Oil Spill Remover (detergent): Tests with Larvae of Sabellaria spinulosa. J. Mar. Biol. Assn., U.K., 48:183.
- Zetko, V. 1970. Determination of Residual Fuel Oil Contamination of Aquatic Animals. Bull. Env. Contamin. Toxic., 5(6):559-564.

## EFFECTS OF OIL ON PLANTS

- Anon. 1970. Salt Marshes Trap Oil. Mar. Poll. Bull., 1(12):189.
- Aubert, M. et. al. 1968. Etude des Effects des Pollutions Chimiques sur le Placon. Revue Int. Oceanogr. Med., 13-14:107-123.
- Baker, J. M. 1971. Growth Stimulation Following Oil Pollution. In Ecological Effects of Oil Pollution on Littoral Communities, Institute of Petroleum, London. E. B. Cowell, (ed.).
- Baker, J. M. 1971. Oil and Salt Marsh Soil. In Ecological Effects of Oil Pollution on Littoral Communities, Institute of Petroleum, London. E. B. Cowell (ed.).
- Baker, J. M. 1971. The Effects of Oils on Plant Physiology. In Ecological Effects of Oil Pollution on Littoral Communities, Inst. of Petroleum, London. E. B. Cowell (ed.).
- Baker, J. M. 1970. Oil Pollution in Salt Marsh Communities. Mar. Poll. Bull., 1(2):27.
- Baker, J. M. 1970. Seasonal Effects of Oil Pollution on Salt Marsh Vegetation. Oikos, 22(1):106-110.
- Baker, J. M. 1970. The Effects of Oils on Plants. Environ. Poll. 1:27-44.
- Baker, J. M. 1969. The Effects of Oil Pollution and Cleaning on Salt Marsh Ecology. In Field Studies Council, Oil Pollution Research Unit, Orielton Field Centre: Annual Report, 1969, pp. 3-26.
- Baker, J. M. 1969. The Effects of Oil Pollution on Salt Marsh Communities. Mar. Poll. Bull., 1(7):1-3.
- Baker, J. M. 1968. The Effects of Oil Pollution on Salt Marsh Communities. Rept. Oil Poll. Res. Unit Field Studies Council, B1-B11.
- Bartholomew, E. T. 1936. The Effects of Oil Sprays on Plant Tissues. Proc. Third Western Shade Tree Conf., 3:53-61.
- Blumer, M., R. Guillard, and T. Chase. 1971. Hydrocarbons of Marine Phytoplankton. Marine Biology, 8:183-189.
- Boney, A. D. 1970. Toxicity Studies with an Oil-Spill Emulsifier and the Green Alga, Prasinocladus marinus. J. Mar. Biol. Assn. U.K. 50:461-473.
- Carr, R. H. 1919. Vegetation Growths in Soils Containing Crude Petroleum. Soil Sci., 8:67-8.

- Copeland, B. J. 1961. Primary Productivity of Oil Refinery Effluent Holding Ponds. M.S. Thesis, Okla. State Univ. 46 pp.
- Copeland, B. J., and T. C. Dorris 1962. Photosynthetic Productivity in Oil Effluent Holding Ponds. J. Water Poll. Cont. Fed., 34: 1104-1111.
- Copeland, B., and T. Dorris. 1964. Chlorophyll and Suspended Organic Matter in Oil Refinery Effluent Holding Ponds. Limnol. and Oceanog., 9(4):500.
- Corke, A. T. K., and V. W. L. Jordan. 1963. Experiments on the Effects of Oil Treatment on Banana Leaves. Univ. Bristol, Ann. Rep. Agr. Hort. Res. Sta., 1962:115-23.
- Cowell, E. B. 1969. Effects of Oil on Salt Marsh Communities in Pembrokeshire and Cornwall. J. Appl. Ecol., 6:133.
- Crafts, A. S., and H. G. Reiber. 1948. Herbicidal Properties of Oils. Hilgardia, 18:77-156.
- Dalby, D. H. 1968. Some Factors Controlling Plant Growth in the Intertidal Environment. In The Biological Effects of Oil Pollution on Littoral Communities, Field Studies, 2 (Suppl.).
- Dalby, D. H. 1969. Some Observations on Oil Pollution of Salt Marshes in Milford Haven. Biol. Cons., 1(4):295-6.
- Dallyn, S. 1953. Herbicidal Action of Oils. Cornell Univ., Agr. Exp. Sta. Mem., Ithaca, New York.
- Doerr, R. 1965. Alkaloids and Benzopyrene Uptake by Intact Plant Roots. Naturwissenschaften, 52:166.
- Dogadina, T. V. 1970. Utilization of Algae in Purification of Wastes Which Contain Oil products. (in Ukrainian). Ukr. Bot. Zh., 27(3): 310-13.
- Green, J. R. 1936. Effect of Petroleum Oils on the Respiration of Bean Plants, Apple Twigs and Leaves, and Barley Seedlings. Plant Physiol., 11:101-13.
- Green, J. R., and A. H. Johnson. 1931. Effect of Petroleum Oils on the Respiration of Bean Leaves. Plant Physiol., 6:149-59.
- Helson, V. A., and W. H. Minshall. 1956. Effects of Petroleum Oils on the Carbon Dioxide Output in Respiration of Parsnip and Mustard. Plant Physiol., 31:5-11.

- Hoffman, M. B. 1935. The Effects of Several Summer Spray Oils on the Carbon Dioxide Assimilation by Apple Leaves. Proc. Am. Soc. Hort. Sci., 31:104-106.
- Huang, J., and E. F. Gloyne. 1967. Effects of Toxic Organics on Photosynthetic Reoxygenation. Univ. of Texas Center for Research in Water Resources, FWPCA Contract WP-00688-03.
- Johnson, C. M., and W. M. Hoskins. 1952. The Relation of Acids and Peroxides in Spray Oils to the Respiration of Sprayed Bean Leaves and the Development of Injury. Plant Physiol., 27:507-25.
- Kelly, V. K. 1930. Effects of Certain Hydrocarbon Oils on Respiration of Foilage and Dormant Twigs of the Apple. Illi. Agr. Exp. Sta. Bull., 348:371-406.
- Kloke, A., and H. O. Leh. 1963. The Effects of Mineral Oils in Soil on Plant Development. Arch. F. Hydrobiol., 56:43-57.
- Kolattukudy, P. E. 1969. Oxidation of Paraffins by Plant Tissues. Plant Physiol., 44:315-17.
- Lacaze, J. C. 1959. Effects of a 'Torrey Canyon' Type of Pollution on the Unicellular Marine Alga Phaeodactylum tricornutum. Rev. Int. Oceanogr. Med., 1969. 13-14:157-179 (in French, English Summary).
- Lachman, W. H. 1944. The Use of Oil Sprays as Selective Herbicides for Carrots and Parsnips. Proc. Am. Soc. Hort. Sci., 45:445-48.
- McMillan, R. T., and J. M. Riedhart. 1964. The Influence of Hydrocarbons on the Photosynthesis of Citrus Leaves. Proc. Florida State Hort. Soc., 77:15-21.
- Minshall, W. H. 1961. The Effects of Environment on the Comparative Resistance of Petiole Parenchyma to Petroleum Oils. Weeds, 9: 356-63.
- Minter, K. W. 1964. Standing Crop and Community Structure of Plankton in Oil Refinery Effluent Holding Ponds. Ph.D. Dissertation, Okla. State Univ.
- Mironov, O. G. 1968. Survival Ability of Some Marine Planktonic and Benthoplanktonic Algae in Sea Water Polluted by Oil Products. (in Russian, Engl. Summary) Bot. Zh., 53(5):661-669.
- Mironov, O. G., and L. A. Lanskaya. 1968. The Capacity of Survival in Seawater Polluted with Oil Products Inherent in Some Marine Planktonic and Benthoplanktonic Algae. Bot. Zhurn., 53:661-669.
- Morozov, N. V., et. al. 1969. The Role of Higher Water Plants in the Self-Purification of Oil Polluted Rivers. Hydrobiological J., 5(4):37-42.

- Murphy, H. F. 1929. Some Effects of Crude Petroleum on Nitrate Production, Seed, Germination, and Growth. Soil Science, 27:17.
- Nagata, T., and K. Muramatsu. 1968. Effects of Heavy Oil on the Yields of Paddy Rice. J. Sci. Soil Manure, Tokyo, 39:251-2.
- Narayanaswamy, D., et al. 1970. Supplementary Value of Yeast Grown on Petroleum Hydrocarbons to Poor Diets Based on Rice and Ragi (Eleucine coracana). Nutr. Rep. Int., 1(5):305-12.
- Nozzolillo, C., and V. A. Nelson. 1959. Effects of Petroleum Oils on the Oxygen Uptake in Respiration of Parsnip and Mustard. Plant Physiol., 34:97-102.
- Oberle, G. D., et al. 1944. Some Physiological Responses of Deciduous Fruit Trees to Petroleum Oil Sprays. Proc. Am. Soc. Hort. Sci., 45:119-30.
- Oguri, M., and R. Kanter. 1971. Primary Productivity in the Santa Barbara Channel. In Biological and Oceanographical Survey of the Santa Barbara Channel Oil Spill. D. Straughan, (ed.).
- Petrov, G. N. 1969. Removal of Petroleum from Water Reservoirs by the Action of Higher Aquatic Vegetation and Microorganisms. (in Russian) Nefteprom. Delo., 9:27-30.
- Plince, M. J. 1948. Some Effects of Crude Petroleum on Soil Fertility. Soil Sci. Society Proceedings, 13.
- Riedhart, J. M. 1961. Influence of Petroleum Oil on Photosynthesis of Banana Leaves. Trop. Agr., London, 38:23-27.
- Riedhart, J. M. 1964. Influence of Hydrocarbons and Oil on Photosynthesis in the Orchid Tree. Proc. Am. Soc. Hort. Sci., 85: 265-69.
- Riedhart, J. M. 1964. Influence of Petroleum Oil Fractions in Sigatoka Disease Control in Bananas. Trop. Agr., London, 41:155-58.
- Riehl, L. A., and R. T. Wedding. 1959. Relation of Oil Type, Deposit, and Soaking to Effects of Oil Sprays on Photosynthesis in Citrus Leaves. J. Econ. Entomol., 52:88-94.
- Riehl, L. A., and R. T. Wedding. 1959. Effects of Naphthenic and Paraffinic Petroleum Fractions of Comparable Molecular Weight on Transpiration of Eureka Lemon and Bearss Lime Plants. J. Econ. Entomol., 52:334-34.
- Riehl, L. A., et al. 1958. Effect of a California Spray Oil on Transpiration of Citrus. J. Econ. Entomol., 51:317-20.

- Rohrbaugh, P. W. 1934. Penetration and Accumulation of Petroleum Oil Sprays in the Leaves, Twigs, and Fruit of Citrus Trees. Plant Physiol., 9:699-730.
- Strand, J. W., W. L. Templeton and I. A. Liehatowich. 1971. Development of Toxicity of Test Procedures for Marine Phytoplankton. In Proc. Joint Conf. on Prevention and Control of Oil Spills, API, EPA, and U.S. Coast Guard, June 15-17, 1971. Washington, D.C. pp. 279-286.
- Stebbins, R. 1970. Recovery of Salt Marsh in Brittany 16 Months After Heavy Pollution by Oil. Environ. Poll., 1(2):163.
- Van Overbeek, J., and R. Blondeau. 1954. Mode of Action of Phytotoxic Oils. Weeds, 3:55-65.
- Walker, C. R. 1959. Control of Certain Aquatic Weeds in Missouri Farm Ponds. Weeds, 7:310-316.
- Wedding, R. T., and L. A. Riehl. 1958. Influence of Petroleum Oil on the Translocation of Phosphorus in Small Lemon Plants. Am. J. Bot., 45:138-42.
- Wolfenbarger, D. A., et. al. 1970. Toxicity of Petroleum Oils to Larvae and Eggs of Some Cotton Insects and Persistence of These Oils on Cotton Foilage. J. Econ. Entomol., 63(6):1765-7.
- Youngblood, W. W., M. Blumer, R. Guillard, and F. Fiore. 1971. Saturated and Unsaturated Hydrocarbons in Marine Benthic Algae. Mar. Biol., 8:190-201.
- Zgurovskaya, L. N. 1969. Effect of Petroleum Growth Agent on the Photosynthesis Intensity and Rate of Cell Division of Chaetoceras curvisetus. (in Russian). Gidrobiol. Zh. Akad. Nauk. Ukr. SSSR, 5(1):55-9.

## EFFECTS OF OIL ON DISSOLVED OXYGEN

- Baumgardner, R. K. 1966. Oxygen Balance in a Stream Receiving Domestic and Oil Refinery Effluents. Thesis, Okla. State Univ., 78 pp.
- Brown, S. O., and B. L. Reid. 1951. Report on Experiments to Test the Diffusion and Oxygen Through a Surface Layer of Oil. Texas A&M Res. Found., Project 9, 5 pp.
- Copeland, B. J. 1963. Oxygen Relationships in Oil Refinery Effluent Holding Ponds. Ph.D. Thesis, Okla. State Univ. May 1963.
- Mann, H., and E. Stehr. 1958. The Effect of Oiling on the Oxygen Tension of Some Natural Waters. (in German). Fischwirt., 8:333-364.

### CARCINOGENIC EFFECTS OF OIL

- Badger, G. M. 1948. The Carcinogenic Hydrocarbons: Chemical Constitution and Carcinogenic Activity. Brit. J. Cancer, 2:309-350.
- Buu-Hoi, H. 1964. New Developments in Chemical Carcinogenesis by Polycyclic Hydrocyclic Hydrocarbons and Related Heterocycles: A Review, Cancer Res., 24(9):1511.
- Cook, J. W., W. Carruthers, and D. Woodhouse. 1958. Carcinogenicity of Mineral Oil Fractions. Brit. Med. Bull., 14:132.
- Fahmy, O. G., and M. J. Fahmy. 1970. Genetic Deletions at Specific Loci by Polycyclic Hydrocarbons in Relation to Carcinogenesis. Int. J. Cancer, 6(2):250-260.
- Greffard, J. and J. Meury. 1967. Carcinogenic Hydrocarbon Pollution in Toulon Harbor. Cah. Oceanog., 19:457.
- Heidelberger, C. 1970. Studies on the Cellular and Molecular Mechanisms of Hydrocarbon Carcinogenesis. Eur. J. Cancer, 6(3):161.
- King, P. J. 1969. Carcinogenic Action of Mineral Oils. Ind. Lubric. Tribology, 21(8):230-3.
- Koe, B. K., and L. Zechmeister. 1952. Isolation of Carcinogenic and Other Polycyclic Hydrocarbons from Barnacles. Arch. Biochem. Biophys., 41:396.
- Lacassagna, M. 1966. Introduction to the Interaction Between Carcinogenic Hydrocarbons and Cellular Proteins. In Wave Mechanics and Molecular Biology, Addison Wesley Publ. Co.
- Lalou, C. 1963. Contribution a l'etude de la pollution des sediments de la Mediterranee occidentale par les benzo-pyrenes. Rapp. P-V Reun. Commn. Int. Explor. Scient. Mer. Mediterr., 17:711-718.
- Medical Research Council. 1968. The Carcinogenic Action of Mineral Oils: A Chemical and Biological Study. Her Majesty's Stationery Office, 251 pp. London.
- Niaussat, P. 1970. Pollution par biosynthese "in situ" d'hydrocarbures cancerigènes, d'une biocoenose lagunaire reproduction "in vitro" de ce phénomène. Review Int. d'Oceanographic Medicale, 17:87.
- Niaussat, P., and C. Auger. 1970. Evidence and Distribution of Benz-3-4-Pyrene and Perylene in Different Organisms of the Clipperton Lagunar Biocoenosis. (in French). C. R. Acad. Sci., Paris, 270:2702-2705.

Scaccini, A., and M. Scaccini-Cicatelli. 1969. Donnees preliminaries sur la diffusion de 1-hydrocarbure cancerigène Benzo-3-4-Pyrene dans les matériaux du fond et dans certains organismes des mers italiennes. (in French), Rapp, P-V Reun. Commn Int. Explor. Scient. Mer Mediterr., 19:761-763.

Sisler, F. D., and C. E. Zobell. 1947. Microbial Utilization of Carcinogenic Hydrocarbons. Science, 106:521-522.

Suess, M. J. 1970. The Occurrence of Polycyclic Aromatic Carbohydrates in Coastal Waters and Its Possible Effects on Man's Health. (in German, Engl. Summary). Archiv. fuer Hygiene und Bakteriologie, 154(1):1-7.

Tarzwell, C. M. 1970. Fighting Oil Pollution - Carcinogens Claim by American Scientist. Survr. Local Govt. Technol., 135(4066-4069):38-43.

Vasserot, M. J. 1962. La Pollution des Animaux Marins Comestibles par des Hydrocarbures Cancerigènes. Penn. ar. Bed., 3(29):183-186.

Zechmeister, L., and B. K. Koe. 1952. The Isolation of Carcinogenic and Other Polycyclic Aromatic Hydrocarbons from Barnacles. Arch. Biochem. Biophys., 35:1-11.

ZoBell, C. E. 1971. Sources and Biodegradation of Carcinogenic Hydrocarbons. In Proc. Joint Conf. on Prevention and Control of Oil Spills, 1971. (API/EPA/USCG) pp. 441-452.

MISCELLANEOUS BIOLOGICAL REPORTS ON OIL

- Blumer, M. 1967. Hydrocarbons in Digestive Tract and Liver of a Basking Shark. Science, 156:390-391.
- Brownell, R. 1971. Whales, Dolphins and Oil Pollution. In Biological and Oceanographical Survey of the Santa Barbara Oil Spill, 1969 - 1970. Vol. 1, p. 255. Allan Hancock Found. Sea Grant Publ. 2. D. Straughan (ed.).
- Brownell, R., and B. LeBoauf. 1971. California Sea Lion Mortality: Natural or Artifact. In Biological and Oceanographical Survey of the Santa Barbara Oil Spill, 1969 - 1970. Vol. 1, p. 287. Allan Hancock Foundation Sea Grant Publ. 2. D. Straugahn (ed.).
- Hine, C., and H. Zuidema. 1971. The Toxicological Properties of Hydrocarbon Solvents. Ind. Med. Surg., 39(5):215.
- Kerimov, E. 1966. An Experimental Study of the Leukocyte Reaction of Blood Under the Chronic Action of Small Concentrations of Petroleum Hydrocarbons. UCH Zap. Azerb. Med. Inst., 18:137.
- LeBoeuf, B. 1971. Oil Contamination and Elephant Seal Mortality: A "Negative" Finding. In Biological and Oceanographical Survey of the Santa Barbara Channel Oil Spill, 1969 - 1970. Vol. 1, p. 277. Allan Hancock Foundation Sea Grant Publ. 2. D. Straughan (ed.).
- Rideal, E. K., and J. H. Schulman. 1939. Reactions with Monolayers and Their Biological Analogies. Nature, London, 144:100-102.

## MICROBIAL UTILIZATION OF OIL

- Abbott, B. J., and W. E. Gledhill. 1972. The Extracellular Accumulation of Metabolic Products by Hydrocarbon Degrading Micro-organisms. In Adv. in Appl. Microbiol., D. Perlman, (ed.).
- Amphlett, M. J. 1968. Petroleum Microbiology. Ann. Report Progr. Appl. Chem., 51:486.
- Anon. 1965. Marine Pollution by Micro-Organisms and Petroleum Products. (Pollutions marine par les micro-organismes et les produits pétroliers). Commission Internationale pour l'Exploration Scientifique de la Mer Méditerranée, Paris, 1965. 384 pp.
- Anon. 1969. Microbial Oxidation of Some Petroleum Products in Waters of the Danube River. (in Russian) Hydrobiol. J., 5(3):29.
- Anon. 1970. Controlling Oil Pollution of Harbors Through Biological Means. Naval Research Reviews, 23(5):24-26.
- Anon. 1970. Microorganisms Consume Oil in Test Spills. Chem. & Eng. News, 48:48-9.
- Anon. 1971. Bacteria to Get Oil Clean-Up Test in Texas. Oil and Gas Journal, 69(30):61.
- Anon. 1971. Microbes Are One Way to Clean Up Oil Spills.... Environ. Sci. and Technol., 5(5):389.
- Appert, J. 1952. Bacteriologie et Petrole. Rev. Inst. France. Petrale, 7:170-180.
- Aubert M., et. al. 1969. Study of the Biodegradability of Toxic Chemical Products with Respect to the Marine Food Chain. (in French) Revue Internationale d'Oceanographie Medicale, 13-14: 73-105.
- Aubert M., et. al. 1969. Study of the Effects of Chemical Pollutants on Plankton: Degradability of Fuel by Soil and Marine Micro-organisms. (in French) Revue Internationale d'Oceanographie Medicale, 13-14:107-123.
- Austin, R. J., et. al. 1954. Biological Oxidation of Oil-Containing Waste Waters in Pilot Scale Trickling Filters. Ind. Engng. Chem., 46:316-318.
- Azoulay, E. 1965. Conditions Generales de Developpement des Micro-organismes sur Hydrocarbures. Bull. Soc. France Physiol., 11: 299-310.

- Azoulay, E., and J. C. Senez. 1965. Assimilation of Straight-Chain Paraffinic Hydrocarbons by a Yeast Culture. (in French) Abhandl-dentsch Akad. Wiss. Berlin. 1965, (2):93-108.
- Bainhart, E. L., and G. L. Kehilberger. 1970. The Ability of Biological Systems to Assimilate Oils. Proc. Division of Refinery. Vol. 50, American Petroleum Institute.
- Baker, R. A., and R. O. Weston. 1956. Biological Treatment of Petroleum Wastes. Sew. Ind. Wastes, 28:58-69.
- Baldwin, I. L. 1922. Modifications of the Soil Flora Induced by Applications of Crude Petroleum. Soil Science, 14:465.
- Bartha, R. 1970. Biodegradation of Oil Slicks in the Marine Environment. Report No. TR-1, Rutgers Univ., New Brunswick, N.J.
- Bastin, E. S. 1926. The Presence of Sulfate Reducing Bacteria in Oil Field Waters. Science, 63:21-24.
- Beerstecher, E., Jr. 1954. Petroleum Microbiology. 1st Ed., Elsevier Press, New York.
- Bridie, A., and J. Bos. Biological Degradation of Mineral Oil in Sea Water. Journal of the Institute of Petroleum, 57:557.
- Brown, L. R., and W. E. O'Brien. 1968. The Catabolism of Isobutane and Other Alkanes by a Member of the Genus Mycobacterium. Developments in Indust. Microbiol., 9:389-393.
- Brown, L. R., and G. S. Pabst. 1968. The Role of Isopropyl Alcohol in the Microbial Metabolism of Propane. Develop. in Indust. Microbiol., 9:394-400.
- Brown, L. R., and G. S. Pabst. 1969. Microbial Degradation of Petroleum in Aquatic and Marine Environments. Bacteriological Proc., 1969.
- Brown, L. R., W. E. Phillips, G. S. Pabst, and C. M. Ladner. 1969. Physical, Chemical and Microbiological Changes Occurring During Degradation of Oil in Aquatic and Brackish Water Environments. Presented at ASME Winter Annual Meeting, Nov. 16-20, 1969.
- Brown, S. O. 1950. Microbial Oxidation of Crude Oils and Water, Soluble Fractions of Crude Oil as Shown by the BOD Method. Texas A&M Res. Found., Project 9.
- Brown, S. O., et. al. 1951. Decomposition of Organic Compounds by Marine Microorganisms. Texas A&M Res. Found., Project 9, 11 pp.

Brown, S. O., and V. Van Horn. 1950. Aerobic and Anaerobic Oxidation of Crude Oils by Microorganisms from Louisiana Bay-Bottom Muds. Texas A&M Res. Found., Project 9.

Bukholz, D. A., et. al. 1961. The Microbial Deterioration of Hydrocarbons and the Related Degradation of Equipment Used for Storage Distribution and Handling of Petroleum Products; A Selected Bibliography. Res. Eng. and Project 7-65-01-003, Ser. Rep. 5:1-19, Suppl. 1:1-16.

Champagnat, A., et. al. 1963. Biosynthesis of Protein-Vitamin Concentrates from Petroleum. Nature, 197:13-14.

Clans, D., and N. Walker. 1964. The Decomposition of Toluene by Soil Bacteria. J. Gen. Microbiol., 36:107-122.

Colla, C., and V. Treccani. 1969. Microbial Oxidative Metabolism of Saturated Cyclic Hydrocarbons. Identification of Adipic Acid and an Intermediate in the Oxidation of Decalin. Ann. Microbial Enzymol., 10:77.

Dagley, S., P. J. Chapman, D. T. Gibson, and J. M. Wood. 1964. The Degradation of the Benzene Nucleus by Bacteria. Nature, 202 (4937):775-778.

Dagley, S., et. al. 1960. New Pathways in the Oxidative Metabolism of Aromatic Compounds by Microorganisms. Nature (London), 188: 560-566.

Davies, J. A., and D. E. Hughes. 1968. The Biochemistry and Microbiology of Crude Oil Degradation. In The Biological Effects of Oil Pollution on Littoral Communities, Field Studies, 2 (Suppl.) 139-144.

Davis, J. B. 1956. Microbial Decomposition of Hydrocarbons. Ind. Eng. Chem., 48, 1444.

Davis, J. B. 1967. Petroleum Microbiology. Elsevier Publishing Co., Amsterdam.

Dostalek, M., et. al. 1956. The Action of Microorganisms on Petroleum Hydrocarbons. (in Polish) Ceskoslav. Mikrobiol., 2:43-47.

Edmonds, P., and J. Cooney. 1967. Identification of Microorganisms Isolated from Jet Fuel Systems. Appl. Microbiol., 15(2):411-416.

Ekzertsev, V. A. 1958. A Study of the Process of Oil Decomposition by Microorganisms Under Anaerobic Conditions. Mikrobiol., (in Russian) 27:626-633.

- Elkin, H. F. 1956. Biological Oxidation and Re-Use of Refinery Waste Water for Pollution Control and Water Conservation. Proc. Amer. Petrol. Inst., 36:340-356.
- Elkin, H. F. et. al. 1956. Biological Oxidation of Oil Refinery Wastes in Cooling Tower Systems. Sew. Ind. Wastes, 28:1475-1483.
- Ellis, R., Jr., and R. S. Adams, Jr. 1961. Soil Contamination by Petroleum Hydrocarbons. Advances in Agronomy. 13.
- El-Nashar, A. 1969. Protein Concentrates from Petroleum. (in Arabic) Batrol., 7(3-4):82-84.
- Fei, T. C., and R. Z. K. Zeh. 1969. Protein from Petro-Bacteria Fermentation. Bull. Iran Petrol. Inst., No. 37.
- Foster, J. 1962. Bacterial Oxidation of Hydrocarbons. In Oxygenases, p. 24-271, Acad. Press. O. Hayaishi (ed.).
- Foster, J. W. 1962. Hydrocarbons as Substrates for Microorganisms. Ant. v. Leeuwenhoek, 28:241-274.
- Foster, J. W. 1968. Bacterial Oxidation of Hydrocarbons. Proc. World Petroleum Congr., Mexico City. 1967, 7(8).
- Foster, J. W. 1968. Microorganisms Assimilating and Transforming Hydrocarbons and Other Petroleum Components. Proc. World Petrol. Congr., Mexico City, 1967, 7(8).
- Fredericks, K. M. 1966. Adaptation of Bacteria from One Type of Hydrocarbon to Another. Nature, 209(5027):1047-1058.
- Fusey, P., et. al. 1969. Elimination des Aechets Petroliers par un Produit san Action Nocive pour la Flore et al Fauna Aquatiques. C. R. Acad. Sci., 269:2435-2438.
- Gavrilova, N. A. 1969. Microbial Oxidation of Some Petroleum Products in Waters of the Danube River. Hydrobiol. J., 5(3):29-34.
- Gibson, D. T. 1968. Microbial Degradation of Aromatic Compounds. Science, 161:1093-1097.
- Gilliam, A. S., and F. C. Anderegg. 1960. Biological Disposal of Refinery Wastes, Proc. Industra. Waste Conf., Purdue Univ., 15:145-154.
- Gradova-Krylova, N. B., et. al. 1969. Microbiological -physiological Principles in the Biosynthesis of Protein and Fatty Substances from Petroleum Hydrocarbons. Int. Conf. Global Impacts Appl. Microbiol., 2nd, 1967 (Pub. 1969). E. J. Gaden, Jr., (ed.), Interscience Publ., New York.

- Gunkel, W., and H. H. Trebul. 1964. On the Method of Quantitative Determination of Oil Decomposing Bacteria in Oil Polluted Sediments and Soils, Oil-Water Mixtures, Oils and Tarry Substances. Helgolander wiss. Meeresunters, 16(4):336-348.
- Haas, H. F., M. Yantz, and L. Bushnell. Microbial Utilization of Hydrocarbons. Trans. Kansas Acad. Sci., 44:39-45.
- Harada, T. 1970. Fermentation of Petroleum and Its Products. (in Japanese). Sekiyu Gakkai Shi, 13(6):433-7.
- Hill, E.) ( 1968. Biological Degradation of Petroleum Products. Microbiol., Proc. Conf., 1967 (Publ. 1968), P. Hepple (ed.). London: Elseview.
- Humphrey, A. E. 1970. Microbial Protein from Petroleum. Process Biochem., 5(6):19-22.
- Hunter, J. V., et. al. 1970. Benthal Decomposition of Adsorbed Oil Pollutants. Wat. Resources Res. Inst., Rutgers - The State Univ. of N.J., May 1970, 31 pp.
- Huybreytse, R., and A. C. Van der Linden. 1964. The Oxidation of Alpha Olefins by a Pseudomonas. Antonie van Leeuwenhoek, Jour. Serol., 30:185.
- Ives, H., G. Schecket, D. Rhoads, and A. Ornstein. 1971. Student Projects on the Oxidation by Marine Bacteria of Aromatic Compounds Found in Oil. Mass. Inst. Tech. Sea Grant Project Office, Cambridge, Rpt. #71-10 56 pp. June 28, 1971.
- Janasch, H. W. 1971. Microbial Degradation of Organic Matter in the Deep Sea. Science, 171(3992):672-675.
- Johnson, M. J. 1964. Utilization of Hydrocarbons by Microorganisms. Chem. Indust., 1964, p. 1532-1537.
- Johnston, R. 1970. Decomposition of Crude Oil Residues in Sand Columns. J. Mar. Biol. Assn. U.K., 50(40):925-927.
- Jones, J. G. 1969. Determination of Microbial Hydrocarbon Metabolism in Natural Environments. Arch. Mikrobiol., 67:397-407.
- Jones, J. G., et. al. 1970. Effect of Gross Pollution by Kerosine Hydrocarbons on the Microflora of a Moorland Soil. Nature, London, 227:1166.
- Juge, S. 1971. A Study of the Bacterial Populations of Bottom Sediments in the Santa Barbara Channel After the Oil Spill. In Biological and Oceanographical Survey of the Santa Barbara Oil Spill 1969 - 1970. Vol. I, p. 179. Allan Hancock Found. Sea Grant Publ. #2. D. Straughan (ed.).

- Karban, V. I., et. al. 1969. Chemistry and Physicochemical Features of the Microbiological Oxidation of Petroleum Hydrocarbons. (in Russian) Usp. Khim. 38(3):539-59.
- Kator, H., C. Oppenheimer, and R. Miget. 1971. Microbial Degradation of a Louisiana Crude Oil in Closed Flasks and Under Simulated Field Conditions. In Proc. Joint Conf. on Prevention and Control of Oil Spills, 1971. (API/EPA/USCG) pp. 287-296.
- Khan, M. Y. A., A. N. Hall, and D. S. Robinson. 1963. Microbial Transformation of n-Octane into Dicarboxylic Acids. Nature, 198:289.
- Kinney, P. J., D. Burton, and D. Schell. 1969. Kinetics of Dissipation and Biodegradation of Crude Oil in Alaska's Cook Inlet. In Proc. Joint Conf. on Prevention and Control of Oil Spills, 1969 (API/FWPCA) (Dec. 15-17, 1969) pp. 333-340.
- Klug, M. J., and A. J. Markovetz. 1967. Degradation of Hydrocarbons by Members of the Genus Candida. I. Hydrocarbon Assimilation. Appl. Microbiol., 15, 690-693.
- Klug, M. J., and A. J. Markovetz. 1971. Utilization of Aliphatic Hydrocarbons by Microorganisms. Adv. in Microbial Phys. A. H. Rose and J. F. Wilkinson. (eds). Vol. 5, p. 1-43.
- Kluss, W. M. 1968. Microbiological Action on Oil in the Sea. Tanker and Bulk Carrier, 15(4):236-7.
- Kramer, N., and R. H. Doetsch. 1950. The Growths of Phenol-utilizing Bacteria on Aromatic Carbon Sources. Arch. Biochem., 26:401-405.
- Kuelieu, A. M., I. I. Namazou, M. A. Gadzhieva, and G. M. Ibragimova. 1970. Microbiological Oxidation of Various Fractions of Diesel Fuels. Int. Chem. Eng., 10(2):241-243.
- Kuriyama, M., and A. Saito. 1968. Biological Treatment of Petroleum Waste Waters; Microbiological Degradation of Petroleum Waste Crotonaldehyde. Hakko Kogaku Zosshi, 45:641.
- Kusnetsov, S. 1968. Role of Microorganisms in Oil Transformation and Destruction. Proc. World Petrol. Cong., Mexico City. 7(8).
- Kvasnykov, Y. I., and I. P. Kryvytskyi. 1968. Pro poshyrennya mikroorhanzmv, yaki vykorystovijut; aromatychni vuhlevodni, u hruntakk boryslavs; koho maftorodovyyshcha. (Distribution of Microorganisms Using Aromatic Hydrocarbons in the Soils of the Borislav Oil Deposits). (in Russian) Mikrobiol. Zh. (KYYIV), 30(4):291-295.

LaLou, C. 1965. Pollutions Marine par les Micro-organismes et les Products Petroliers. Commission Internationale pour l'Exploration Scientifique de la Mer Mediterranee, Monaco., Symp., Apr. 1964. pp. 363-366.

LaRock, P., and M. Severance. 1971. The Bacterial Treatment of Oil Spills: The Facts Considered. Presented at the Belle W. Baruch Symp. in Marine Science, Estuarine Microbial Ecology, June 9, 1971, Columbia, S.C.

LePetit, J., and M. H. Barthelemy. 1968. Les hydrocarbures en mer: Le probleme de l'epuration de zones littorales par les micro organisms. Annales de l'Institute Pasteur, 114(2):149-158.

LePetit, J., M. H. N'Guyen and L. Deveze, Etude de l'intervention de levures dans la bio-degradation en mer des hydrocarbures (Study of the Intervention of Yeasts in the Biodegradation of Hydrocarbons in the Sea). Ann. Inst. Pasteur, 118(5):709-720.

Liebmann, H. 1962. Effects of Oil and Detergents in Water on Natural Self-purification. Munch Beitt Abswass. Fisch u Fluss Biol., 9:11.

Lindsay, E. M., and M. B. Donald. 1961. Small-scale Studies of Microbiological Oxidation of Hydrocarbons to Long-chain Fatty Acids. J. Biochem. Microbiol. Technol. Eng., 3:219-233.

Lubvik, J., V. Munk, and M. Dostalek. 1968. Ultrastructural Changes in the Yeast Candida lipolytica Caused by Penetration of Hydrocarbons Into the Cell. Experientia, 24(10):1066.

Ludzack, F. J., and M. B. Ettinger. 1960. Chemical Structures Resistant to Aerobic Biochemical Stabilization. Jour. WPCE, 32(11):1173.

Ludzack, F., and D. Kinkead. 1955. The Persistence of the Motor Oil Class of Hydrocarbons in Polluted Water Under Aerobic Conditions. Presented to the 127th National Amer. Chem. Soc. Meeting, April 14, 1955.

Midget, R. J., C. H. Oppenheimer, H. I, Kator, and R. A. LaRock. 1969. Microbial Degradation of Normal Paraffin Hydrocarbons in Crude Oil. In Proc. Joint Conf. on Prevention and Control of Oil Spills (December 15-17, 1969, New York) API/FWPCA. 1969, pp. 327-331.

Miller, T. L., and M. J. Johnson. 1963. Growth of Yeasts on Paraffin Hydrocarbons. Am. Chem. Soc. Meeting, 145th, New York. Abstr. papers, 7, 3 pg.

Mironov, O. G. 1969. Black Sea Microorganisms Growing on Hydrocarbons. Microbiol., 38(4):508-610.

- Mironov, O. G. 1969. Self-purification of Sea Water from Petroleum Products. Gidrobiol. Zh., 5(4):89-93.
- Mironov, O. G. 1970. Microorganisms Growing in Oil and Oil Products in Western and Central Regions of the Mediterranean Sea. Revue International d'Oceanographic Medicale, 17, 79-85.
- Mironov, O. G. 1970. On the Role of Microorganisms Growing on Oil, in the Self-cleaning and Indication of Oil Pollution in the Sea. (in Russian, Engl. Summary). Okeanologia, Moscow, 10:820.
- Muller, A., and W. Schwartz. 1949. Investigations on Petroleum Bacteriology. Arch. Mikrobiol., 14:291-308.
- Murphy, J., and R. Stone. 1955. The Bacterial Dissimilation of Naphthalene. Can. J. Microbiol., 1:579.
- Nissen, T. V. 1970. Microorganisms and Hydrocarbons. Biological Decomposition of Hydrocarbons, Especially Oil Spills. (in Danish) Dan. Kemi., 51(8):118-23.
- North, W. J., M. Neushul, and K. A. Clendenning. 1964. Successive Biological Changes Observed in a Marine Cover Exposed to a Large Spillage of mineral Oil. In Proc. Symp. Poll. Mar. Microorg. Prod. Petrol., Monaco, p. 335-354.
- Novelli, G. D., and C. E. Zobell. 1944. Assimilation of Petroleum Hydrocarbons by Sulfate-Reducing Bacteria. J. Bacterial., 47: 447.
- Oshima, T. 1965. On the Anaerobic Metabolism of Aromatic Compounds in the Presence of nitrate by Soil Microorganisms. Z. Allg. Mikrobiol., 5:386-394.
- Osnitakaya, L. K. 1946. The Decomposition of Hydrocarbons by Bacteria. (in Russian). Mikrobiol., 15:249-263.
- Osntska, L. K. 1965. Growth of Certain Mycro Bacteria in Petroleum and Petroleum products. (in Russian). Priklad. Biokhim. Mikrobiol., 1:167-174.
- Pankakoski, M. 1970. Crude Oil in Water; Its Decomposition and Effects. (in Finnish). Kem. Teollisuus, 27(5):375-377.
- Parker, C., M. Fregarde, and C. Hatchard. 1970. The Effects of Some Chemical and Biological Factors on the Degradation of Crude Oil at Sea. Seminar on Water Poll. by Oil, Auremore, Scotland, May 4-8, 1970.
- Payzin, S. 1968. Hidrokarbonlar mikrobiyolojisi (The Microbiology of Hydrocarbons). (in Russian) Mikrobiol. Bull., 1(2):115-123.

- Poliakova, J. N. 1962. Distribution of Microorganisms Oxidizing Hydrocarbons in the Water of the Neva Inlet. (in Russian). Mikrobiol., 31:1016-1081.
- Prokop, J. F. 1950. Report on a Study of Microbial Decomposition of Crude Oil, Texas A&M Research Foundation, Project 9.
- Raitcheva, V., and O. Zlatarev. 1970. Chronic Effect of Petroleum Derivatives on Enzyme Constituents. Ind. Med. Surg., 39(8): 345-346.
- Raymond, R. L. 1961. Microbial Oxidation of N-paraffinic Hydrocarbons. Develop. Ind. Microbiol., 2:23-32.
- Raymond, R. L., and J. B. Davis. 1960. n-Alkane Utilization and Lipid Formation by a Nocardia. Appl. Microbiol., 8:329-334.
- Raymond R. K., V. W. Jamison, and J. O. Hudson. 1971. Hydrocarbon Cooxidation in Microbial Systems. Lipids, 6:453-457.
- Reese, E. T., H. Cravetz, and G. Mandels. 1955. Activity of Fungi on Oils. Farlowia, 4(4):409-421.
- Rogoff, M. H. 1961. Oxidation of Aromatic Compounds by Bacteria. Adv. Appl. Microbiol., 3:193-221.
- Rosenfield, W. 1947. Anaerobic Oxidation of Hydrocarbons by Sulfate-Reducing Bacteria. J. Bacteriol., 54:664.
- Ross, W. K., and A. A. Sheppard. 1955. Biological Oxidation of Petroleum Phenolic Wastewater. Proc. Industr. Waste Conf., Purdue Univ., 10:106-110.
- Sabina, L. R., and H. Pivnick. 1956. Oxidation of Soluble Oil Emulsions and Emulsifiers by Pseudomonas oleovorans and Pseudomonas formicans. Appl. Microbiol., 4:171.
- Schobert, P. 1967. Stoffwechsel physiologische unter suchunger in einem kohlenwasserstoff oxydieren Pseudomonas - Stamm aus der Elbe. (Metabolic physiological studies on a hydrocarbon-oxidizing strain of Pseudomonas from the Elbe). Arch. Mikrobiol. 56:354-370.
- Schwartz, W. 1963. Mikrobielle Korrosion von Kunststoffen und ihren Bestandteilen. (Microbial Degradation of Synthetic Materials and Their Constituents). Abhandl. Deutsch Aka. Wissenach., Berlin, 5:1-138.
- Schwartz, W., and A. Müller. 1948. Erdölbakteriologie. (Petroleum bacteriology). Erdöl Kohle, 1:232-240.

Schwartz, W., and A. Muller. 1956. Mikrobiologie des Erdols.  
(Microbiology of Petroleum Oils). Wissenschaft. zut Erast Moritz Berndt., Univ. Apreifswald, 5:281-288.

Schweisfurth, R. 1966. Mikrobiologische Untersuchungen an industriell verwendete Olemulsionen. (Microbiological Studies on Oil Emulsions Discharged by Industry). Zbl. Bakt., 198:324-327.

Schweisfurth, R., and F. Schwille. 1962. Untersuchungen über einem Fall von untergrund verunreinigung durch Dieselkraft stoff. 2. Mikrobiologische Untersuchungen. (Studies on a decline in pollution of sub-soil by diesel fuel 2. Microbiological studies). Wesser. Abwasser, 1962:170.

Schwille, F., and H. Krieger. 1962. Investigation on a Case of Underground Pollution by Diesel Fuel. I. Geological and Chemical Investigations; II. Microbiological Investigations. Wass. u. Abwass. I:164.

Sharpley, J. M. 1960. A Technique for the Direct Estimation of Bacteria in Oil Field Waters. Developments in Industrial Microbiology, 1:253-260.

Sharpley, J. 1961. Applied Petroleum Microbiology. Buckman Labs, Inc., Memphis.

Sharpley, J. M. 1966. Elementary Petroleum Microbiology. Gulf Pub., Co., Houston, Texas.

Sheets, W. D., M. K. Haimdy, H. H. Weisre. 1954. Microbiological Studies on the Treatment of Petroleum Refinery Phenolic Wastes. Sewage Indstr. Wastes, 26:862-868.

Shiurm, L. 1958. Studies on Hydrocarbon Assimilation by Microorganisms, Mikrobiol., 27:740.

Shturm, L. D. 1958. Studies on Hydrocarbon Assimilation by Micro- organisms. Mikrobiol., 27:723-733.

Slavina, G. P. 1965. Napthalene Oxidizing Bacteria in Ground Waters of Oil Beds. Microbiology, (Mikrobiologiya), 34:103-106.

Smith, P. V. 1952. Preliminary Note on Origin of Petroleum. AAPG Bulletin, 36:411-413.

Sohngen, N. L. 1913. Benzin, Petroleum, Paraffinol und Paraffinale Kohlenstoffund Energiequelle für Mikroben. (Gasoline, Petroleum, Kerosene, and Paraffin as Carbon and Energy Sources of Microbes). Zbl. Bakt., 37:595; 38:621.

Stewart, J. L., and R. E. Kallio. 1959. Bacterial Hydrcarbon Oxidation II. Esters Formation from Alkanes. J. Bacteriol., 78:726-730.

- Stewart, J. E., et. al. 1960. Esters from Bacterial Oxidation of Olefins. Science, 132:1254-5.
- Stewart J. E., et. al. 1940. Micro-organisms Attacking Petroleum and Petroleum Fractions. J. Bacteriol., 39.
- Stone, R. W., et. al. 1942. Bacteria Attacking Petroleum and Oil Fractions. J. Bacteriol., 44:169-178.
- Strawinski, R. J., and R. W. Stone. 1940. The Utilization of Hydrocarbons by Bacteria. J. Bacteriol., 40:461.
- Stundl, K. 1958. Beimflussig von Bodenorganismen durch versickernde Treibstoffe. (Effects on Soil Organisms of Fuel Oil Seepages). Osterreich. Wasserwirtsch., 10:113-116.
- Takab, H. H., C. W. Chambers, and P. W. Kabler. 1964. Microbial Metabolism of Aromatic Compounds. J. Bact., 87(4):910-919.
- Tauson, V. O., and I. Vesselov. 1934. On the Bacteriology of the Decomposition of Cyclical Compounds at the Reduction of Sulfates. (in Russian). Mikrobiol., 3:360-369.
- Tausson, W. O. 1928. Bacterial Oxidation of Crude Oils. (in Russian) Neft. Khoz., 14:220-230.
- Taylor, F. B., W. L. Campbell, and L. Chinoy. 1970. Anaerobic Degradation of the Benzene Nucleus by a Facultatively Anaerobic Micro-organism. J. Bacteriol., 102:430-437.
- Treccani, V. 1962. Microbial Degradation of Hydrocarbons. Prog. Ind. Microbiol., 4:3-33.
- Treccani, V. 1965. Microbial Degradation of Aliphatic and Aromatic Hydrocarbons. Zeit. Allg. Mikrobiol., 5:332-341.
- Updegraff, M. D., and G. B. Wren. 1954. The Release of Oil from Petroleum-Bearing Materials by Sulfate-Reducing Bacteria. Appl. Microbiol., 2:309-322.
- Van der Linden, A. C., and G. J. E. Thijssse. 1965. The Mechanisms of Microbial Oxidations of Petroleum Hydrocarbons. Adv. Enzymol. 27:469.
- Varobyeva, G. I. 1957. Study on the Role of Bacteria of Genus Pseudomonas in Petroleum Biology. (in Russian). Dokl. Akad. Nauk. SSSR, 112:763-765.
- Volkmann, C. M., and C. H. Oppenheimer. 1962. The Microbial Decomposition of Organic Carbon in Surface Sediments of Marine Bays of the Central Texas Gulf Coast. Pub. Inst. Mar. Sci., 8:80-96.

- Voroshilova, A., and E. Dianoug. 1950. Bacterial Oxidation of Oil and Its Migration in Natural Wastes. Mikrobiol., 19:203.
- Wallhausser, K. H. 1965. Mikrobiologische Untersuchungen über flut wasser bei der Erdölge winning. (Microbiological Investigations on Waste Water from Petroleum Production). Erdöl Kohle, 18: 357:360.
- Wallhausser, K. H. 1967. Olabbauende Mikroorganismen in Natur und Technik. (Oil Decomposing Micro-organisms in Nature and Industry). Helgoland. Wiss. Meersunters., 16:328-335.
- Wang, H., and W. Schwartz. 1961. Untersuchungen Zur Mikrobiologie des Erdols und der Erdöl produkte, 4, Mikrobiologische Untersuchung eines Ölfeldes. (Studies of the Microbiology of Mineral Oils and Petroleum Products. 4. Microbiological Study of Some Oil Fields). Zeit. ally. Mikrobiol., 1:223-244.
- Weeks, L. A. 1949. A Study of the Utilization of Petroleum Hydrocarbons by Sulfate-Reducers. Thesis, Dept. of Bacteriology, Univ. of Wisconsin.
- Zimmermann, W., et. al. 1964. Experiment al untersuchungen über die Verschmutzung von grundwasser durch mineral ol produkte. (Experiments on the Fouling of Groundwater by Petroleum Products). Gas Wasserfach, 103:1033-1038; 1089-1092.
- ZoBell, C. E. 1945. The Role of Bacteria in the Formation and Transformation of Petroleum Hydrocarbons. Science, 102:364-396.
- ZoBell, C. E. 1946. Action of Microorganisms on Hydrocarbons. Bacteriol. Rev., 10:1-49.
- ZoBell, C. E. 1950. Assimilation of Hydrocarbons by Microorganisms. Adv. Enzymol., 10:443-486.
- ZoBell, C. E. 1959. Microbiology of Oil. New Zeal. Oceanogr. Inst. Mem., No. 3, p. 39-47.
- ZoBell, C. E. 1969. Microbial Modification of Crude Oil in the Sea. In Proc. Joint Conf. on Prevention and Control of Oil Spills, API/ FWPCA (Dec. 15-17, 1969) p. 317-326.
- ZoBell, C. E., C. W. Grant, and H. F. Haas. 1943. Marine Microorganisms Which Oxidize Petroleum Hydrocarbons. Bull. Amer. Assoc. Petrol. Geol., 27:1175-1193.