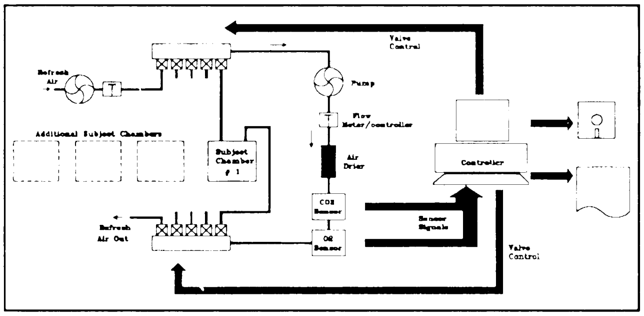
O_2/CO_2 RESPIROMETER

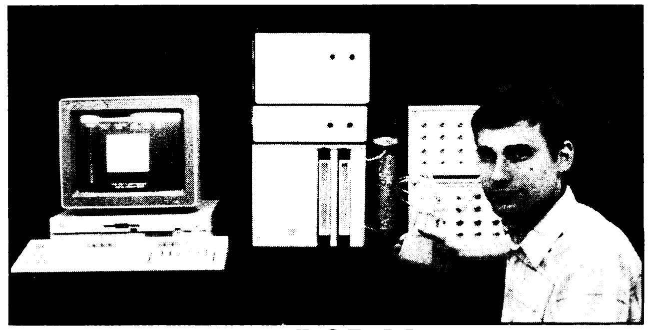
for Waste Bioremediation, Oxidation, Bioactivity and Food Technology

The Micro-Oxymax is a closed-circuit respirometer used to measure minute amounts of oxygen consumption and carbon dioxide production. External gas sensors measure the O_2 and CO_2 concentrations within the head space of the measurement vessel and this information is used to calculate O_2 consumption and CO_2 production. The Micro-Oxymax measures up to 20 samples at the same time, sequentially switching the gas sensors from one measuring vessel to the next. The head space gas in the measuring vessel is returned to the vessel after being analyzed by the sensors.

Specifications:

1. Measures O_2 and CO_2 plus RQ with 0.2 μL/h sensitivity.
2. 1 to 20 measuring chambers under IBM-PC control.
3. User can use own chambers (reactors) 50 mL to 30 L.
4. O_2 and CO_2 sensors external to the chambers (reactors).
5. Temperature of chambers can be user-adjustable.



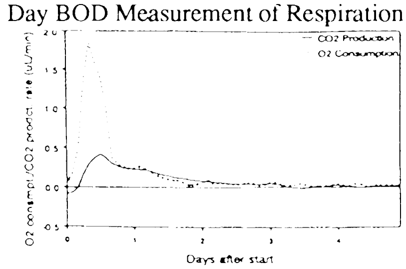


APPLICATION: BOD Measurement (Biochemical Oxygen Demand)

The Micro-Oxymax can be used to measure the total O_2 uptake and CO_2 production from the bacterial breakdown of waste. In the following experiment, a solution containing 5 mg sodium acetate is broken down over 5 days.

The graph below shows the O_2 consumption rate and the CO_2 production rate of the BOD sample minus the O_2 consumption rate and the CO_2 production rate of the control sample. After two days, most of the breakdown of the organics had already taken place. In theory, a total of 1645 μL of O_2 would have been expected to have been consumed, whereas 1424μL O_2 consumption was actually measured.

5 Day BOD Measurement of Respiration Rate

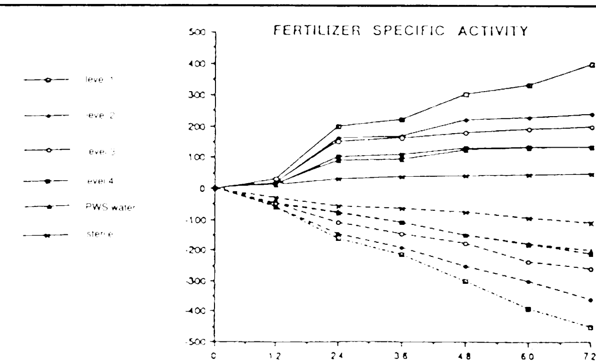


Biodegradation of Crude Oil

Oiled beach material was collected from Passage Cove (PC) and Disk Island (DI) in Prince William Sound, Alaska. Samples ,packed with dry ice, were transported to the Gulf Breeze Environmental Research Laboratory at Gulf Breeze, Florida or processed at the laboratory in Valdez, Alaska. Beach material was sieved (<12.5 mm diam, >2.75 mm diam) and mixed to generate an homogenized substrate of uniform size and degree of oiling (0.4% [weight] Prudhoe Bay crude oil).

Indigenous, oil-degrading microorganisms associated with the beach material were treated with one of the following inorganic nutrient soultions: **level** 1 35.7 mmol N as NH_4NO_3 (350 ppm N) and 8.07 mmol P as KH_2PO_4 (70 ppm P), **level 2** 35 ppm N and 7 ppm P, **level 3** 3.5 ppm N and 0.7 ppm P or **level 4** 0.35 ppm N and 0.07 ppm P. Effects of nitrogen (35.7 mmol) or phosphorus (8.07 mmol) alone were also evaluated. Sterile nutrient solutions were prepared with water from Prince William Sound (PWS), Alaska. Daily treatments were applied at each high-tide, or once at the initial high-tide. Results were compared with those observed with high-tide solutions of filtered PWS water, or 3% NaCl in distilled water (pH=8.1). A sterile, killed cell control was prepared using an acidified PWS water as the high-tide solution.

The graph below summarizes results typical of those generated throughout the past 2 years. Here, addition of the high-level nutrient solution (level 1) resulted in a 2- to 3-fold increase in the activity of the oil-degrading population as determined by the release of CO_2 and the consumption of O_2. As expected, the ratio of CO_2 production to O_2 consumption is nearly 1.0. The stimulatory effect of inorganic nutrients was shown to be directly proportional to the amount of nutrient added to the test systems. (Information provided by Dr. James G. Mueller, US EPA Gulf Breeze, Florida)



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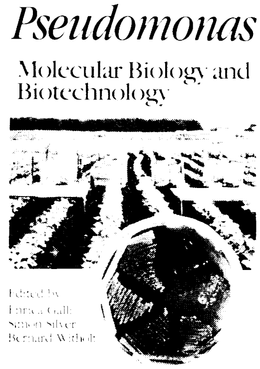
PSEUDOMONAS: Molecular Biology and Biotechnology

Edited by **Enrica Galli**, *University of Milan, Milan, Italy;* **Simon Silver**, *University of Illinois, Chicago;* and **Bernard Witholt**, *University of Groningen, Groningen, The Netherlands*

A summary of current research on an important bacterial genus and a signpost for trends in the development of modern microbiology



PUBLISHED by ASM in cooperation with the Federation of European Microbiological Societies (FEMS), this new book gathers and summarizes the latest developments in international research on *Pseudomonas* species. The contributors are representative of the science from many countries. Areas of emphasis include the molecular biology, biotechnological and industrial applications, and involvement in human and plant pathogenesis of pseudomonads. Chapters expand on the initial presentations of world experts at the Third International Symposium (Trieste, Italy, June 1991). These contents will be important for anyone interested in the various abilities and uses for pseudomonads. Students and workers concentrating on related groups of bacteria who need to understand how modern microbiology is developing, including such controversial topics as environmental release of genetically engineered microorganisms, will find this book a useful signpost.

CONDENSED CONTENTS

Pseudomonas in the Late Twentieth Century (*B. W. Holloway*); A Common System of Nomenclature for the Physical Map of the Chromosome of *Pseudomonas aeruginosa* PAO (*Tümmler et al.*)

Part 1. Bacterium-Plant Interactions (6 chapters by Lugtenberg et al., Hirano and Upper, Leong et al., Vivian, Durbin, and Bender et al.)

Part 2. Molecular Mechanisms of Animal Pathogenicity (4 chapters by Maharaj et al., Goldberg, Lazdunski et al., and Visca et al.)

Part 3. Taxonomy and Identification (3 chapters by Palleroni, Höfle, and Schleifer et al.)

Part 4. Cell Envelope and Transport (5 chapters by Feingold, Nikaido, Quinn, Coleman et al., and Bellido et al.)

Part 5. Metabolism and Regulation (9 chapters by Haas et al., Cuypers and Zumft, MacGregor et al., Drew and Wilson, Kok et al., Harayama et al., Golovleva et al., Palmer et al., and Ronald et al.)

Part 6. Biotechnology: Biodegradation and Industrial Products (6 chapters by Furukawa et al., Galli et al., Pieper et al., Imai et al., Witholt et al., and Steinbüchel et al.)

Part 7. Biotechnology: Manipulation, Cloning, and Vectors (4 chapters by Boronin, Williams et al., Nakazawa et al., and Dehò et al.)

Part 8. *Rhodobacter*: a Photosynthetic Pseudomonad (3 chapters by Kaplan and Lee, Drews et al., and Vignais et al.)

Part 9. Environmental Release (4 chapters by Lindow, Dowling et al., de Lorenzo and Timmis, and Duque et al.)

Estimated publication date: July 1992. Hardcover (ISBN 1-55581-051-9), approximately 456 pages, illustrated, color plates, index. **Prices:** Member (ASM, FEMS), $79.00; Nonmember, $89.00. **Canadian prices** (include 7% G.S.T.): Member (ASM, FEMS), $84.53; Nonmember, $95.23. **Shipping charges:** U.S., 1-3 copies = $2.50/book, 4+ copies = $1.75/book. Non-U.S., 1-3 copies = $4.50/book; 4+ copies = $2.25/book. **Offer Number:** 2L53-051-9. *Please specify this number when ordering.*

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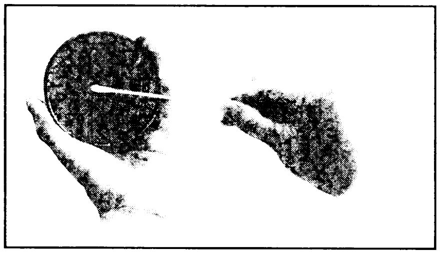
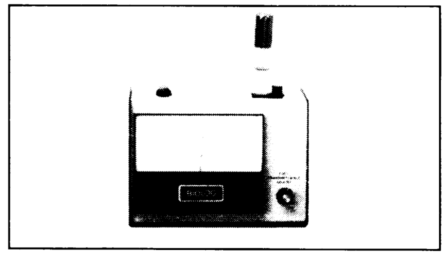
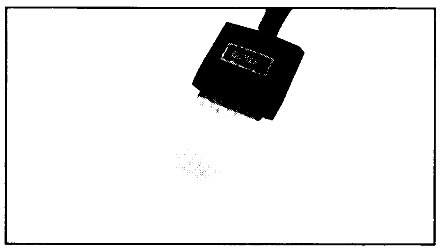


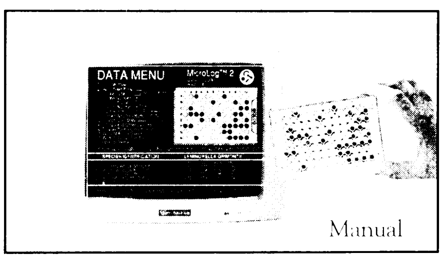
1. Swab colonies and transfer into saline

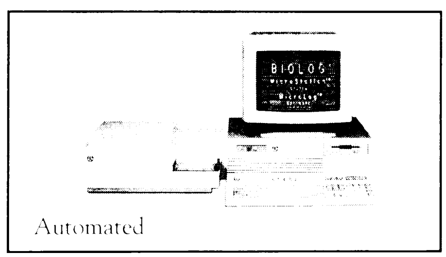


2. Adjust suspension density



3. Inoculate 96 test wells and incubate





4. Read results using either the Manual or Automated System

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