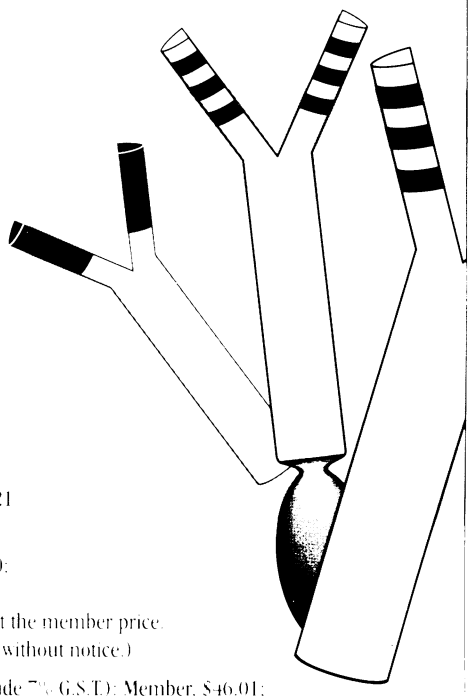
Immunochemical Assays and Biosensor Technology for the 1990s



Edited by **Robert M. Nakamura**, *Scripps Clinic and Research Foundation and University of California, San Diego, School of Medicine, La Jolla*; **Yasushi Kasahara**, *Fujirebio, Inc., Tokyo, Japan*; and **Garry A. Rechnitz**, *University of Hawaii, Honolulu*

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Immunochemical assays, fundamental measurement methods in biomedical research and analysis, have recently undergone revolutionary change and development deriving from innovations in the use of nonisotopic labels and in the marriage of biochemistry with electronics. By combining biochemical molecular recognition schemes with suitable transducers to achieve signal tests, researchers have developed more rapid, accurate, and efficient tests for the presence or concentration of desired analytes in biological specimens. Moreover, other assays in the developmental phase hold even greater promise for improved testing efficiency and for decentralization of these complex and sensitive laboratory procedures.

This volume summarizes the principles and applications of fundamental immunochemical assays, various assay formats, and the current state of the art in ultrasensitive and nonisotopic assays. It is intended primarily for anyone working with immunochemical assays who wants a comprehensive view of options now available as well as a glimpse at likely improvements which will occur in this decade. Students and practitioners of modern analytical techniques in immunology, clinical chemistry, diagnostic microbiology, serology, and medical technology will especially benefit.

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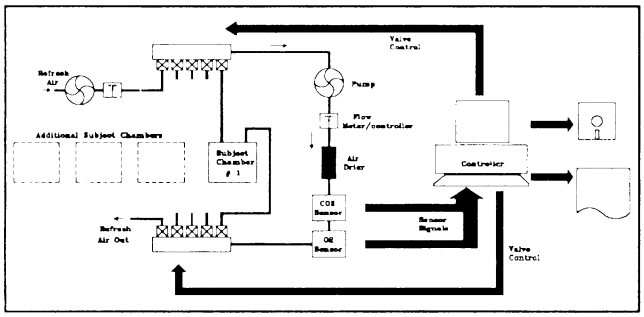
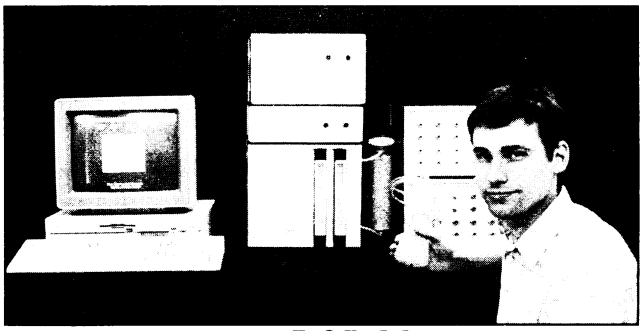
3. User can use own chambers (reactors) 50 mL to 30 L.
4. O_2 and CO_2 sensors external to the chambers (reactors).
5. Temperature of chambers can be user-adjustable.

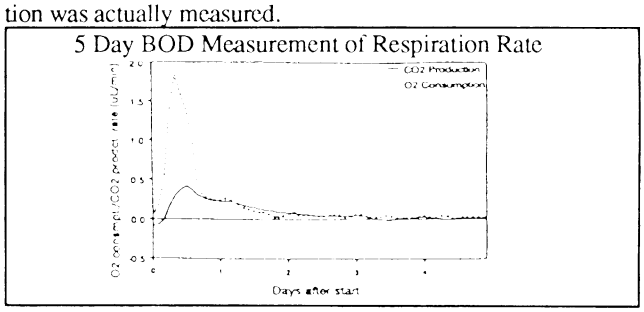




APPLICATION: BOD Measurement (Biochemical Oxygen Demand)

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.

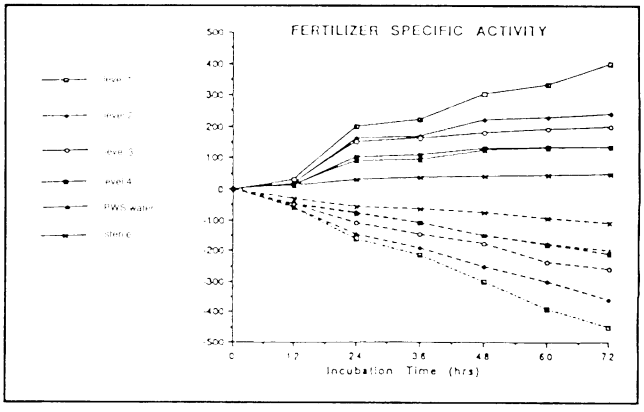


Biodegradation of Crude Oil

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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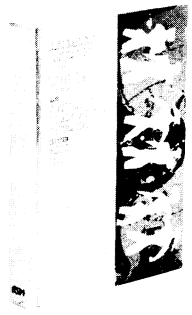
Research Issues in Human Behavior and Sexually Transmitted Diseases in the AIDS Era

Melding biomedical and behavioral sciences in a revolutionary model for research into the prevention and control of sexually transmitted diseases



Edited by **Judith N. Wasserheit**, *National Institute for Allergy and Infectious Diseases, Bethesda, Maryland;* **Sevgi O. Aral**, *Centers for Disease Control, Atlanta, Georgia;* and **King K. Holmes**, *University of Washington Center for AIDS and STDs, Seattle;* Associate editor, **Penelope J. Hitchcock**, *National Institute for Allergy and Infectious Diseases, Bethesda, Maryland*

This fascinating monograph is a collaborative effort by an interdisciplinary group of experts in behavioral sciences, sexually transmitted diseases (STDs), epidemiology, biostatistics, clinical trials, and health education from throughout the world, brought together under the auspices of the National Institute of Allergy and Infectious Diseases. Their common goal was to define a revolutionary new agenda for intervention-oriented behavioral research into the prevention and control of STDs, including HIV infection. Their strong belief is that exciting new advances can be made in the field of STD research when the entire constellation of factors determining the incidence and natural history of these diseases is addressed, including the biological characteristics of the host, the biochemical and physical properties of the causative agent or pathogen, and the broad range of human behaviors that come into play.

The contributors have successfully bridged the languages and paradigms of disparate research fields to achieve the interdisciplinary communication necessary to promote collaboration among workers in the clinical and social sciences. Some chapters focus on providing behavioral scientists with background information on biological aspects of these diseases; in others, biomedical investigators are introduced to the theoretical frameworks that are relevant in designing behavioral interventions. A glossary further facilitates reading by scientists from a diverse range of disciplines.

This monograph was written to assist other biomedical and behavioral scientists in both industrialized and developing countries in addressing STD research through interdisciplinary approaches. It is intended not only for established investigators but for students of a wide range of clinical and social sciences.

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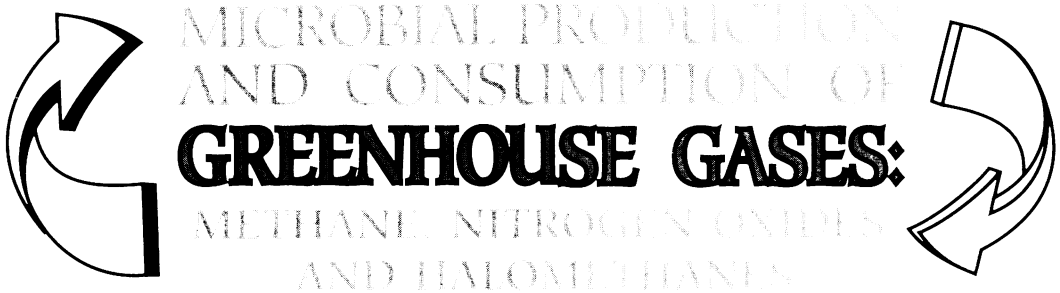
A very timely examination of microbial processes that affect global climate



Edited by
John E. Rogers, *Environmental Protection Agency, Athens, Georgia,*
and
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Considered together, the impact of trace gases such as methane, nitrogen oxides, and halomethanes on global climate could equal that of carbon dioxide. Many of these less-publicized "greenhouse gases" are produced or metabolized by microorganisms.

This volume reviews current data on the relationship between microbial processes and the synthesis and degradation of methane, nitrogen oxides, and halomethanes in the environment. Major global sources of these gases, their atmospheric concentrations and isotopic compositions, and their production and consumption in terms of basic microbial processes in a variety of ecosystems are covered. Problems associated with scaling and model building as ways to identify significant global sources for microbially produced trace gases are also discussed.

This timely publication will greatly interest environmental and general microbiologists, earth and atmospheric scientists in general, and graduate students focusing in these areas.

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July 1991. Hardcover [ISBN 1-55581-035-7], 308 pages, illustrated, index. Member, $49.00; Nonmember, $64.00 [Canadian customers add 7% G.S.T.]. **Shipping charges:** U.S., $1.50/book [1-3 copies] or $0.75/book [4 + copies]; non-U.S., $2.50/book [1-3 copies] or $1.25/book [4 + copies]. *When ordering, specify the offer number below.* Charge card orders for ASM books can also be placed by telephone [202-737-3600] or by FAX [202-737-0368].

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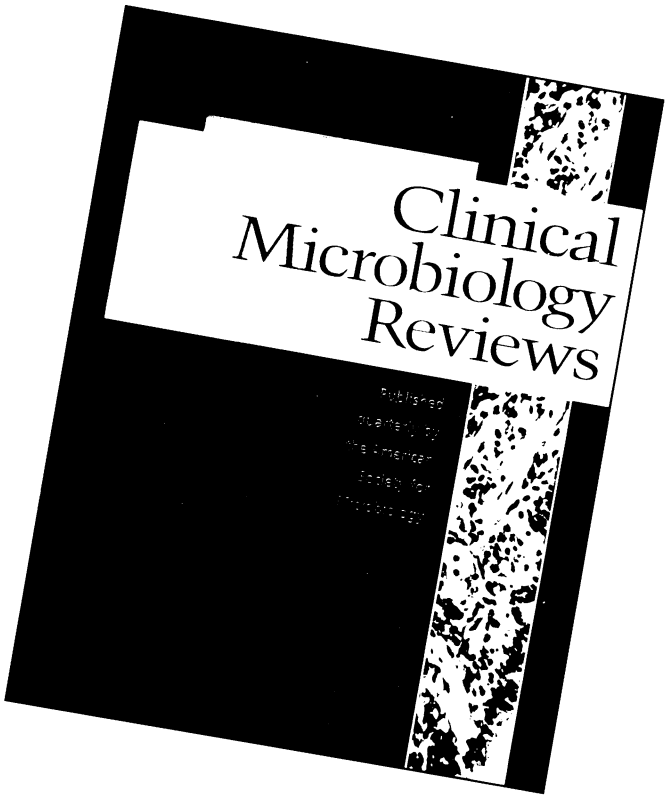

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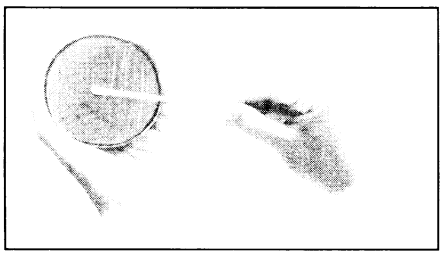

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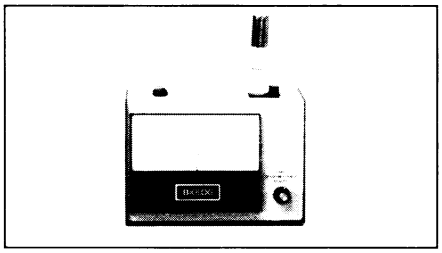

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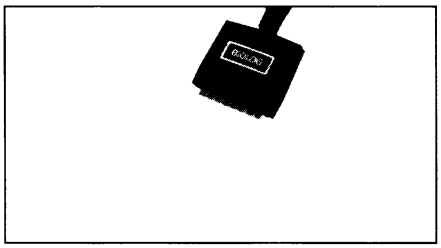

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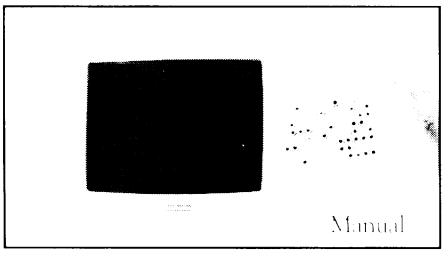

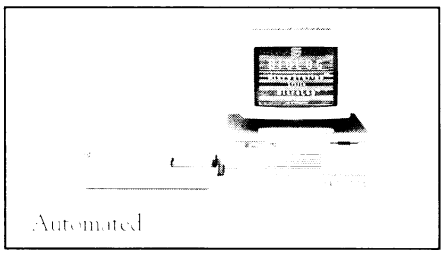

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