

MICROBIOLOGY AND MOLECULAR BIOLOGY

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Abstracts

Comparative Growth Kinetics of Microbial Bio-Oxidation. ROBERT H. L. HOWE, Eli Lilly and Company Tippecanoe Laboratories, Lafayette, Indiana 47902.—The comparative growth kinetics of microbial bio-oxidation was discussed. A number of mathematical explanations were devised and compared. For a substrate of high concentration, the kinetics of both batch and continuous systems were presented. Illustrations were given for signifying the difference of the first order kinetics and those of higher orders.

A Survey of Pollution Levels in the Bean Blossom Watershed (Lake Lemon) and in the Salt Creek Watershed (Lake Monroe)—Brown and Monroe Counties, Indiana. JAMES BUTLER, DAVID DOCAUER, MARK DOWNING, MICHAEL DULIN, KENT FISCHVOGT, WILLIAM GARDINER, JAMES HOLLOWAY, JOHN JACOBY, JERRY NEFF and LINDA SCHELL. Indiana University Undergraduate Honors Program and Department of Microbiology, Bloomington, Indiana 47401.—One hundred and twenty-two samples were taken from various areas within the Lake Monroe watershed by the H-300 Environmental Protection and Planning class during the spring of 1971 and analyzed for presumptive coliform numbers by the most probable number tube dilution method. Selected samples were also analyzed by the confirmed and completed tests. One hundred and thirty samples were similarly analyzed from the Lake Lemon and Bean Blossom Creek watershed. The detailed maps and results of the study are on file at the Indiana State Board of Health. Areas within the Lake Monroe area that showed unusually high coliform levels were: 1) downstream from the City of Nashville sewage treatment plant on the north fork of Salt Creek; 2) areas adjacent to boat launching ramps; 3) Moore's Creek and Ramp Creek; 4) bottom samples from the Fairfax marina; and 5) a number of isolated areas in the upper watershed. The swimming beaches and the center of the lake showed a negligible coliform level. In contrast to the low levels of coliform in the relatively undeveloped Lake Monroe watershed, the Lake Lemon and Bean Blossom watershed showed 100 presumptive coliform or greater per milliliter in more than 20 of the samples taken. These high coliform levels in a similar and adjacent unprotected watershed point out the necessity for continued environmental protection of Lake Monroe watershed by the Indiana State Board of Health.

The Use of Pollution Surveys as Aids in Environmental Protection and Planning. ROBERT F. RAMALEY, Department of Microbiology, Indiana University, Bloomington, Indiana 47401.—During the past 3 years

a large number of students both in courses and during independent study have conducted pollution surveys from this laboratory (e.g., the H-300 survey of Lake Monroe) upon the request of conservation and environmental groups and city and county planners. In these surveys we have tried a number of different procedures and survey methods, some of which may have utility especially to biology classes in Indiana's primary and secondary schools. It is to be anticipated that there will be an increasing number of public pollution surveys conducted by classes in Indiana schools and universities, and, in order for these surveys to have their desired effect, the following suggestions are offered: 1) *The use of Difco Endo LES agar rather than the presumptive coliform tube test.* It is a better teaching aid and is much more selective than other liquid or solid media. It is so highly selective for coliform that schools without sterilizing equipment for sterilizing media will be able to use it without any problem provided they make it up fresh before each use and protect it from light. We have found that 0.1 milliliter of water sample spread over the surface of the agar is usually sufficient for the determination of the number of coliform in most samples. However, a series of samples should be prepared if millipore filters are used to sample larger volumes since high bacterial growth may obscure the identification of coliform colonies, giving a false negative test. 2) *Coordination with local and state regulatory agencies* both in the planning and in the interpretation of the results. There is increasing evidence that the number of fecal coliforms is more closely related to the level of sewage pollution, and, although this test is not unusually difficult, it is best that some duplicate samples be done by experienced bacteriological laboratories such as the Indiana State Board of Health. 3) *Cooperation with local city and county planners* so that survey information will be as useful as possible in deciding the future extent and location of development as well as simply pointing out present problems.

NOTE

The Impact of Water Pollution on Recreational Areas in Delaware County. STANTON C. BURT, Department of Microbiology, Indiana University, Bloomington, Indiana 47401.—The contamination of lakes, rivers, and their tributaries with fecal material often results in the conversion of recreational areas into health hazards. This is an extensive problem which can be combated most easily by the application of state laws through local agencies.

Methods and Materials

The procedures followed for the determination of coliform group are those in *Standard Methods for the Examination of Water and Wastewater* published by the American Public Health Association. The "presumptive" and "confirmed" tests were performed before the application of the MPN chart.

Results

During the summer of 1971, Muncie Creek, which empties into White River within McCulloch Park, had an average coliform count of 130,000

organisms per 100 milliliters as it flowed through the park. The Muncie Mall and Marhoefer Packing Company outflows were investigated as possible contributors to this situation. Two-thirds of the Muncie Mall samples exceeded the million organisms per 100 ml. The Marhoefer samples varied from a low of 240,000 to a high of 1,100,000 organisms per 100 ml depending upon the time of day they were taken. The Regulation SPC 1R-2, Water Quality Standards For Waters of Indiana, states that "Coliform group (is) not to exceed 5,000 per 100 ml as a monthly-average value (either MPN or MF count)." This places the Muncie Mall and Marhoefer Packing Company as much as 220 times the violation figure at times.

The Prairie Creek Reservoir swimming facility was found to have an MPN of 15,000 per 100 ml. A creek, which drains a feedlot $1\frac{1}{2}$ miles upstream, empties approximately one block from the swimming site. This sloping feedlot is located near the corner of 700E and 500S and multiplies the coliform group level of the stream 30 times.

Data cannot relay the offensiveness of the Nebo Bridge outflow which dribbles toilet paper down the bank and into White River. Although residential outflows such as this one are small they are often the most potent as all samples having an MPN of greater than 1,100,000 per 100 ml would indicate.

The local Stream Pollution Control Board held hearings for the Muncie Mall and Marhoefer Packing Company reaching solutions agreed to by both parties. The Nebo Bridge outflow and the feedlot were outside the sanitary district's jurisdiction but will fall under county health laws. There are 123 outflows remaining to be investigated.