

essarily limited thereto, such as moving electrons and far-ultraviolet photons. Their aim is to arrive at an understanding of the microscopic properties of and processes on surfaces, and they are therefore happiest when working with single crystals. One might have thought that electron paramagnetic resonance, infrared, or visible spectroscopy would be as suitable for the elucidation of microscopic details as the current techniques of surface chemical physics, but spectroscopy, which does not involve ultrahigh vacua and is not readily applied to the surfaces of single crystals, by tradition belongs to the province of physical chemists. The results obtained in chemical physics at pressures less than 10^{-5} torr cannot immediately be applied to heterogeneous catalysis, in which the pressure usually exceeds 10^2 torr. There was considerable discussion at the meeting of this "pressure gap." There are a number of researches aimed, and with some success, at closing it. The papers of Ertl and Somorjai provide examples. Another sign of progress in the application of surface chemical physics to heterogeneous catalysis is the fact that most of the papers by chemical physicists deal with metals other than tungsten, the touchstone of surface chemical physics but of only slight interest in the study of heterogeneous catalysis.

The reports of the general discussions that followed groups of papers are among the most interesting items in the book. The interest in chemisorption shown by a rather large group of theoreticians is of very recent origin. Exact mathematical solutions are out of the question, and it is not yet clear what approximations will prove to be the most suitable for various purposes. The discussion of the theoretical papers involved most of the leaders in that area of research. The other discussions are also good, and they address many currently important problems in heterogeneous catalysis, such as the effect upon chemisorption and heterogeneous catalysis of steps and kinks on otherwise plane surfaces and the question whether the active catalytic sites in various reactions involving hydrocarbons on group VIII metals are directly on the metal surface or on overlying carbonaceous layers.

In a day of photoreproduced typescripts, it is a pleasure to see a book so handsomely printed.

ROBERT L. BURWELL, JR.
*Ipatieff Laboratory,
Department of Chemistry,
Northwestern University,
Evanston, Illinois*

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The Battle against Bacteria. A Fresh Look. A History of Man's Fight against Bacterial Disease with Special Reference to the Development of Antibacterial Drugs. Peter Baldry. Cambridge University Press, New York, ed. 2, 1976. xii, 180 pp., illus. \$9.95.

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Soil Biology with Special Reference to the An-
(Continued on page 1447)

RESEARCH NEWS

(Continued from page 1405)

ent types of leukemias and between leukemic cells and healthy ones. Identification of these differences could, of course, provide a great deal of information about the nature of cancer.

Yergey predicts that the technique will also be useful for investigating other materials. He and Risby have used it, for instance, to study the depolymerization of polyisobutylene. They find that the polymeric bonds break in a reproducible fashion during the heating and that the spectral and thermal data can be used to calculate the thermodynamics of depolymerization. The values they have obtained in this manner appear reasonable when compared with data from prior studies with related compounds, Yergey says, but there are no available data for polyisobutylene to compare them with.

The principal limitation of LPTD-MS in studying such problems is the low final temperature that is now achieved in the pyrolysis. Many of the organic and biopolymers he would like to examine, Yergey says, do not decompose appreciably at temperatures less than 400°C. Yergey and Risby are thus working to increase substantially the temperatures that can be achieved by their probe. They are also working on the data processing problem to ensure that all of the available data that is collected is used.

There are, of course, many other potential applications where all of the techniques may prove valuable. In particular, a great deal more work will certainly be done in the study of yeasts, molds, fungi, and viruses. It might even be possible to use them for the study of intact insects, as has already been attempted with cockroaches. But it will be many years before such applications are routine. The reliability of the techniques will have to be firmly established before they will be trusted by most microbiologists, who still prefer the older, better-known biochemical and serological tests. Some investigators also suggest that it will be necessary to overcome the reluctance of microbiologists toward spending large sums of money for instrumentation.

Nonetheless, many investigators have already conducted preliminary studies, and these show that the techniques have great potential; larger bodies of data are now being collected to confirm that potential. The techniques have already cleared some major hurdles of instrumentation, Quinn says, and, once their potential and reliability are confirmed, acceptance will not be far behind.—THOMAS H. MAUGH II

24 DECEMBER 1976

BOOKS RECEIVED

(Continued from page 1412)

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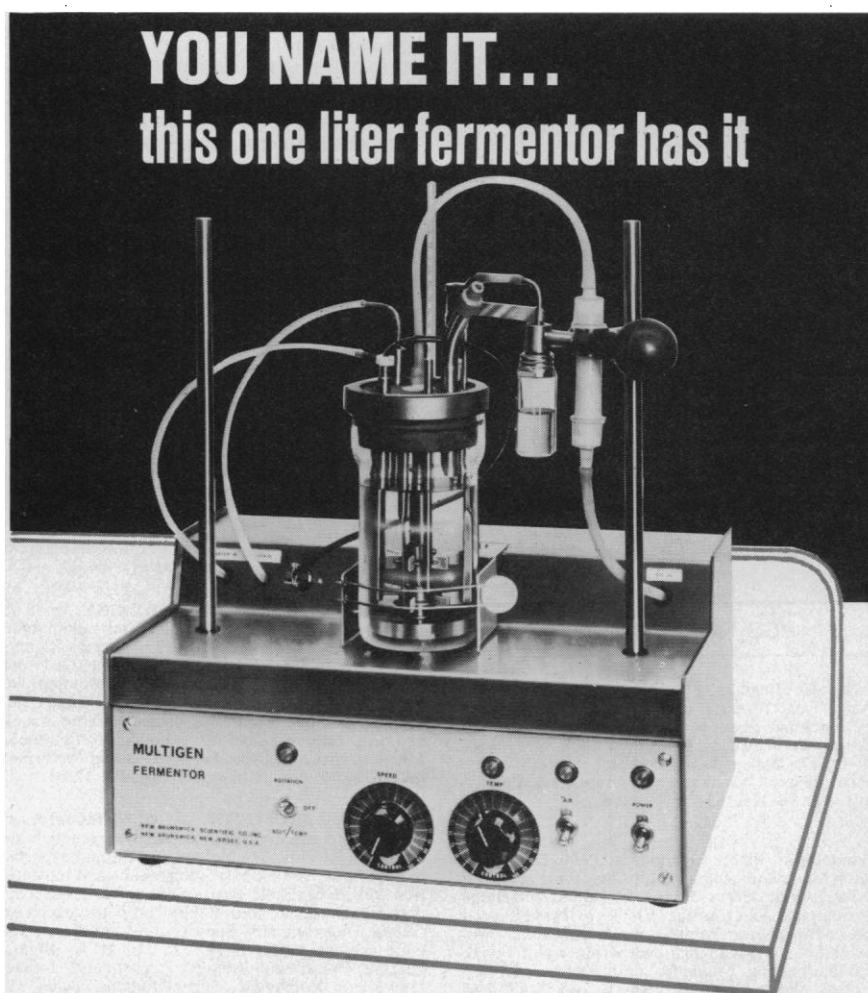
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Stylebook/Editorial Manual. Prepared by the Scientific Publications Division, American Medical Association. Publishing Sciences Group, Acton, Mass., 1976. vi, 162 pp. Paper, \$6.50.



The MultiGen is a low cost culture apparatus designed for the control of all basic environmental conditions: temperature, agitation, aeration, pH, and dissolved O₂. Whether the need is for viscous microbial cultures or animal cell suspensions, air sparging or gas overlay, the MultiGen can be adapted to specific research requirements, and can provide an ideal alternative to spinner flask procedures.

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