place depends on the presence of cultures of opposite mating type and the action of a chemical substance which induces copulating processes. This substance acts at a distance, and the result of this action could be observed even in a solid nutrient medium between separated colonies of yeast cells of opposite mating type.

No less fascinating than the chapter on cytology is that on "Yeast genetics," written by the same authors. The rapid vegetative growth of yeast in cultures and the possibility of isolating single cells or spores with the help of micromanipulators and of carrying out artificial hybridization experiments offer the geneticist many advantages he cannot find in other organisms. Thus it is understandable that, from a genetic point of view, yeast is one of the most thoroughly investigated of microorganisms. We know a large number of individual genes of which those inducing chemical specificity of action are of great theoretical and practical importance; on the basis of linkage of these genes, chromosome maps have been constructed; and the existence of inbreeding degeneration, hybrid vigor, and mutations have been demonstrated. But the most interesting and presently most active field of research is that of cytoplasmic inheritance, whose far-reaching implications in biological theory and even in medicine, especially in cancer research, have not yet been fully realized.

The "Aspects of chemical composition of yeasts" are expertly covered by A. A. Eddy, while "Yeast growth" is ably dealt with by E. O. Morris from both the chemical and physiological point of view. Until recently it has been a common assumption that yeasts are unable to assimilate atmospheric nitrogen, but now we have conclusive evidence that certain strains of *Rhodotorula* and at least one strain of *Saccharomyces,* when grown in a nitrogen-free medium but in an atmosphere containing isotopic nitrogen, are able to convert the latter into organic compounds of their cell substance. However, if these facts are considered only as of "mainly academic interest," as the author indicates, a vigorous objection seems to be in order. In a world so short of protein and with yeast promising to play an ever-increasing part in protein supply for human beings and animals, the fact that certain yeast strains should be able to "fix" nitrogen from the air appears to be not only of great theoretical but of even greater practical significance. There is no reason why scientists should not be able to discover, or by way of induced mutations be able to "breed," organisms that will have a much greater nitrogen-fixing ability than those presently under consideration.

Very readable and illuminating are the contributions on "Fermentation and respiration," by F. F. Nord and S. Weiss; on "Synthesis and degradation of carbohydrates," by W. E. Trevelyan; on "Nitrogen metabolism," by G. Harris; on "Yeast technology," by Magnus Pyke; on "Pathogenic yeasts," by C. G. Ainsworth; on "Food spoilage," by M. Ingram; and on "Flocculation," by H. E. Jansen.

In summarizing I must say that this work, to which scientists from England, Holland, Denmark, and the United States have made such eminent contributions, is a model of international scientific cooperation and, thanks to the painstaking efforts of its editor, also of conciseness and unity of presentation. In both text and appearance it does honor to the publisher; it should be recommended as a first-class scientific standard work to all who take a practical and theoretical interest in the agent of man's oldest industry—fermentation.

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The Effects of Atomic Radiation on Oceanography and Fisheries. Report of the Committee on Effects of Atomic Radiation on Oceanography and Fisheries of the National Academy of Sciences, Study of the Biological Effects of Atomic Radiation. Publication No. 551. National Academy of Sciences–National Research Council, Washington, D.C., 1957. vii + 137 pp. $2.

The material presented in this volume is much wider in scope and interest than the title suggests. This comment should not be taken as meaning that the members of the Academy committee have evaded the issue presented to them. The issue of the biological effects of radiation is one that confronts all persons and governments, and the seeming absence of authoritative information makes for the prevalence of contradictory opinions. While the gaps in knowledge are freely indicated in this report, the careful collation of relevant information enables the reader to learn that considerable and careful attention has been given to the problems which the use of atomic phenomena raises.

In addition to an introduction on the importance of the ocean as a receptacle for radioactive materials, there are 13 chapters, dealing with properties of atomic wastes, natural radiations received by organisms, disposal and dispersal of radioactive elements, effects of ecological relationships on transport and dispersal, effects of radiation on aquatic organisms, and isotopic techniques in chemical and physical oceanography. Although each chapter is self-contained, there is extremely little repetition, and the freshness in approach provides much stimulus to scientific thought. Despite the bias of the title towards the effects of atomic radiation, many fundamental fisheries and oceanographical problems are brought forward and receive illuminating attention.

The most serious type of hazard likely to arise from the addition of radioactive wastes to the sea is that following the concentration of wastes by organisms used as human food. The increasing use of the sea as a source of food for the rapidly expanding world population enhances the value of knowledge on this matter. As both the qualitative and quantitative natures of food chains differ in the various parts of the world, local studies are necessary. The information arising from such studies is indispensable to programs of proper fisheries management, and this interrelationship once more emphasizes the importance to fisheries science of a close synthesis with oceanographical knowledge. Similarly, the problems of radioactive disposal demand from oceanography a knowledge of currents, wind effects, sedimentation processes, and so forth—all matters of theoretical and applied importance in their own right but matters which ask for more urgent attention in the stress of the present age.

These questions and many others are critically considered throughout the report, and ingenious methods are suggested for their study. The collection of these stimulating and authoritative articles together in one volume is especially to be commended, as such reports are often buried in special publications issued in temporary form. It is hoped that the statement in the foreword that the study is a continuing one means that further volumes will appear.

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Colorimetric Determination of Nonmetals. David F. Boltz, Ed. Interscience, New York, 1958. xii + 372 pp. Illus. $8.50.

This book is volume VIII of a series of monographs on chemical analysis. As such, it complements volume III, Sandell's *Colorimetric Determination of Traces of Metals.*

Under the editorship of David F. Boltz, 14 authors, including Boltz, have cooperated in writing the 11 chapters. The first of these chapters covers briefly the principles and practices of colorimetric and related photometric methods. The other ten cover methods believed to