A HISTORICAL OVERVIEW

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Yeasts are important living organisms because of their contributions to biotechnology, particularly through fermentation, brewing, and baking and also as model systems for biological and biomedical research. Given the importance of yeasts, this scholarly and approachable book on the history of yeast research is very timely. Well written and illustrated, it comprehensively reviews the original published material, showing how the use of yeasts has advanced microbiology, biochemistry, molecular genetics, taxonomy, and cell biology as well as describing the history of studies of pathogenic yeasts. The book will be useful to those who are involved in research on yeasts and who want to understand how currently accepted concepts and practical methods have been developed.

The text contains descriptions of the work and characters of scientists who have made major contributions from the end of the 18th century onward, which will be helpful to teachers and students of microbiology and which provide a valuable perspective for those now directly involved in yeast research. I recommend this book to microbiologists in general and to yeast researchers in particular.

Paul Nurse, P.R.S.
Today thousands of people are engaged in research on yeasts: on their physiology, metabolism, genetics, and molecular biology as well as their roles in industry and medicine. The use of yeasts in industry is increasing, as they are very versatile and some are peculiarly suitable for industrial purposes. Most grow actively at lower pH values than those optimal for bacteria; hence it is relatively easy to keep industrial cultures of yeasts free from fast-growing contaminating microbes. Furthermore, yeasts are easier and cheaper to harvest than bacteria and large-scale yeast production does not usually evoke concern for problems of public health.

Research on yeasts has, and always has had, considerable scientific and social importance. Initially, much yeast research was concerned with problems of wine making and brewing; at the same time, the work laid down some of the foundations of microbiology, enzymology, and carbohydrate chemistry. Yeast biochemistry and muscle biochemistry developed hand in hand, with experiments on each often done by the same investigator. More recently, research on mitochondrial genetics and the cell cycle has been generated by work on yeasts.

Herein the development of yeast research since the end of the 18th century is described, based on material from vast numbers of original publications. PubMed generated a list of nearly 190,000 references to “yeast” in February 2010, so it was necessary to be highly selective. Many extracts from published papers, particularly by leading experimentalists, are quoted exactly as they were written so as to give clear and valid impressions of exactly how they thought about their work.

This book derives from a series of articles I have been publishing since 1998 in the journal Yeast, which have met with approval and seem to have supplied a want. So the account here, written mostly by someone who has spent 50 years working on yeasts in the laboratory, differs from publications of professional science historians who concern themselves primarily with the social or political aspects of science rather than with experimental details. Another difference is
an attempt to provide maximum evidence for the statements given. This evidence includes quotations from primary sources, and, where these have been translated, the original words are given as endnotes. I have seen every reference which I have cited.

I have tried to attain the standards of three great works: William Bulloch’s *History of Bacteriology* (1938), the best such history ever published; J. R. Partington’s four-volume *History of Chemistry* (1961 to 1964); and J. S. Fruton’s *Proteins, Enzymes, Genes* (1999), all of which I esteem highly.

**Names of yeasts**
Since yeasts’ names are constantly being changed (see chapter 14), those used here accord with the most recently (at the time of writing) published major work on yeast systematics (90). Further extensive yeast name changes and new species will be described in reference 1166a.

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I offer my warmest thanks to Frieder Lichtenthaler, Karl-Dieter Entian, and Alan Eddy for their kindness, generosity, and help and for permitting my use of material written jointly, in chapters 3, 9 and 10, respectively. However, I am solely responsible for all errors, omissions, and solecisms.

Chapters 4 and 5 are based on articles on yeast cytology which I was privileged to write with the late Carl Robinow. He was a German-born British cytologist who left Nazi Germany in 1935, as he had Jewish forebears, and came to work at the Strangeways Laboratory in Cambridge, where, in 1942 (having been interned for four months on the Isle of Man as an “enemy alien”), he was the first person to demonstrate chromatin (“the nuclear apparatus”) in a bacterium, *Bacillus mycoides*. Robinow went on to the University of Western Ontario in 1949, becoming professor of microbiology and specializing in yeast cytology.

Each of the published articles on which this book is based acknowledged the help of very many friends and colleagues. Here I must also express particular gratitude to André Goffeau, David Hopwood, Morten Kielland-Brandt, Paul Nurse, and Steve Oliver for all their support and encouragement. In addition, for finding obscure references I have had great assistance from Diana Green, Rachel Lewis, and Chris Groom of the Library at the John Innes Institute, Simon Goose of Cambridge University Central Science Library, and Heike Boos-Schuth of the Institute for Molecular Biosciences at Frankfurt University. It is also a pleasure to acknowledge the help I have had from Robert Hauer and Pratima Sinha. Many thanks to all these kind people for their unstinting aid.

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