Candida
and Candidiasis
SECOND EDITION
Cover: Candida albicans (red) and Staphylococcus aureus (green) biofilm stained with species-specific peptide nucleic acid (PNA)-FISH probes, demonstrating extensive adherence of S. aureus to the C. albicans hyphae. Courtesy Mary Ann Jabra-Rizk, University of Maryland, Baltimore.
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Preface

Over the past three decades, as one of the editors himself has witnessed, the experimental approaches and desired outcomes in the study of Candida spp. and the infections they cause naturally have changed. The overwhelming focus now is in molecular biology at a number of levels of research, such as genome comparisons and assessing virulence factors and host responses, as well as the promise of translational research into new antifungal drug discovery, diagnostics, and vaccines. The Candida community has been fortunate to witness the sharing of mutant libraries, strains, techniques, vectors, and probes; collaboration among laboratories seems to be increasing, a development that will be needed to solve the increasing complexity of research that requires interdisciplinary and “systems biology” approaches. Through genomics, we can now identify similarities and differences among Candida species, other human pathogenic and nonpathogenic fungi, and nonfungal species. “Oomics” studies and databases are especially useful in designing new targets for drug discovery, but their application extends beyond this goal, to showing why pathogens are pathogens. That knowledge is in many cases at our fingertips.

This is the fourth in a series of volumes on Candida and candidiasis (candidosis) and the first that is coedited to reflect a more thorough treatise of human disease, treatment, and expectations in health care delivery. Each of the preceding books emphasized different things. Candida and Candidosis (University Park Press, Baltimore, MD, 1979) and Candida and Candidosis: a Review and Bibliography, 2nd Ed. (Baillière Tindall, Oxford, U.K., 1988), both written by Frank C. Odds, focused on the species that cause candidiasis, including their morphogenesis, virulence, and structure; the first of these books included special emphasis on the types of candidiasis. Dr. Odds gave us meaning and direction, a unification to address new problems that existed. The third book, Candida and Candidiasis, edited by Richard A. Calderone, was published in 2002 by ASM Press.

The present book, Candida and Candidiasis, 2nd Edition, is a natural extension of the previous three. In this volume are emphasized genomes and variability, host-pathogen interactions, antifungal resistance and new drug discovery, and evolving diagnostics. Variability among Candida species is described with regard to genomes, molecular adaptation to the external milieu whether in a host or in vitro, and sexuality of Candida albicans; we have learned how variability contributes to resistance to triazole drugs. Traditional areas of interest remain. For example, research in morphogenesis and the cell cycle (and, ultimately, growth) has provided new heights of understanding. Major advances in immune responses are also covered in this volume. Chapters discuss vaccine candidates in the community and how host responses may be useful in diagnosis of blood-borne candidiasis. Virulence attributes are now placed in the context of gene families. While the cell wall is critically included, it is represented more now as an entity that interacts with the innate host system. Broad representation of specific pieces of the cell is included, ultimately reflecting the current interests among like scientists. Biofilms, either mixed-species or monospecific, tell us much about the survival of the fungus in the host.

Discovery has continued, and translational research is moving toward attainable goals. But have we made a difference in increasing awareness of public health issues in candidiasis? An answer to that question is not easily discerned. Candidiasis is the third most frequent hospital-acquired infection. But who knows that fact, beyond the candidiasis community? In reality, new drug discovery features little more than remodeled old drugs. The search for that magic bullet that can kill all 100+ fungal pathogens still survives, at least partially, but this objective lacks sense and is not part of the paradigm in antibacterial drug discovery.

We must lose the notion that we cannot do better. The greatest risk for the next decade is that candidiasis research will become lost in the current economic times, at least in the United States. Emphasis on other important, nonfungal pathogens has overwhelmed the goal of controlling candidiasis, cryptococcosis, aspergillosis, the endemic mycoses, and dermatophytosis in public health. Solutions to this dilemma are not easy. To a much broader extent, we in this field must educate the public by choosing leaders among us, especially physician-scientists, who can testify to the importance of these diseases. These leaders should be called on to seize the interest of “think tanks” and other groups that influence policy makers. But also, each of us needs to remind our professional societies, the major advocates of microbiology, that this field demands equal attention with all the other pathogenic microorganisms, whether in newsletters, public education, or influence peddling.

Even within our discipline, we cannot keep up with everything. Both of us marveled at the outstanding research presented at the most recent “Candida and Candidiasis”
conference, held in Miami Beach, Florida, in March of 2010. That message should continue to be carried to the public, in a language that conveys the importance of these diseases. For this reason, just as the present volume offers the most current information in this critical field, new books on *Candida* and candidiasis should continue to present new discoveries and developments.

RICHARD A. CALDERONE
CORNELIUS J. CLANCY
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