PREFACE

This book is a tribute to the pleasures of bacterial genetics as taught by one of the great gurus of this field, John Roth. Over the course of his career, John has influenced a large number of scientists, propagating a unique scientific philosophy that is emphasized in the many chapters of this book. He does not approach science as simply a job or a race to beat other groups. Rather, for John, science is clearly about the mental pleasure of solving a difficult puzzle, something that is not quite done until all of the pieces fit together. And solving complex puzzles isn't something you do on your own—thinking about the problem with colleagues is part of the fun. The chalkboards in the hallway outside John's lab have always been littered with diagrams of new ideas, often with several people talking excitedly about what it all means and what to try next. Each student has had his or her own unique project, so there have always been a variety of research projects going on at the same time, providing an exciting buffet of scientific discussions.

With John, thinking about a given topic begins with an idea, elaborated over a piece of paper or more often at the blackboard or at the bar. Ideas easily develop into models, which then evolve into experiments to test the model. It has been instructive to observe his thinking, which takes deductive leaps over details in which we have often been hopelessly mired. Ideas are molded and shaped by data—as the data come out, everyone is back at the blackboard or around a piece of paper to shape and redirect and design new tests for new models. Throughout, John has displayed indomitable optimism and irrepressible curiosity. He approaches science as a personal quest, an adventure to follow the story that nature has written. While working out the story, he is absorbed in the joy and the fun of it, to see where it takes us and whether we can second-guess nature or whether nature has misled us, demanding a trickier experimental approach. Elegant genetics takes precedence; brute force is looked down upon, to be used only as a last resort, after the awesome power of genetics has simply run out of steam. The adventure is the most important thing! John infects us with his own

enthusiasm, encourages us to think hard about every facet of the problem, to think about the implications of our model as if thinking several steps ahead in a chess move: if this happens, then that will happen, which in turn will result in something else. Yet the whole while, the adventure is shaped by rigorous thinking.

John also disdains artificial snobbery. If he calls someone "Dr." or "Professor," he is usually gently chiding them for being a bit snooty. He listens to students as attentively as he does to prominent scientists. He usually asks his students to explain their own work to visitors, so students have to be prepared to give a clear and cogent 5-min chalk talk about their research. Likewise, as a rule, he eschews flashy journals and flashy universities.

In addition, John is an enthusiastic, stimulating speaker who likes to throw a few surprises into his talks to make the audience think. He emphasizes that the speaker owes it to the audience to give a clear, thought-provoking talk. He works hard with his students to teach them how to give an interesting, compelling scientific talk. His advice is summarized in a handout that he gives in classes; an updated version of that advice is included as a chapter in this book.

John approaches writing manuscripts like the development of a fine wine–it shouldn't be uncorked before it has adequately matured, but it is never fully appreciated until it is opened and shared. He believes that a manuscript should be written with the reader in mind, with each concept expressed concisely and clearly so that the reader does not have to labor to understand the conclusions. Few of his students have been as adept at writing as John, so this has meant that many of us have written and rewritten drafts of manuscripts many times (15 or so on average, but 30 has not been unheard of) before they have been submitted. The thought put into writing a manuscript is no less than the actual experiments, with an emphasis on the use of simple language and clarity in every word, sentence, and paragraph.

Those of us who have worked with John have learned these lessons firsthand. We have tried to share these lessons with our own students, but these lessons are too good not to share with a wider audience. The first chapters give some background on John Roth and his impact on science. The subsequent chapters by John Roth's former students and colleagues give a flavor for how bacterial genetics is done–why people asked certain questions; how the first question led to the next; what the eddies, foibles, and eurekas (major and minor) were along the way. Each is different and each has unique scientific lessons, but together they demonstrate the irresistible lure of bacterial genetics.

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