INTEGRATION IN RESPIRATORY CONTROL
From Genes to Systems

Edited by Marc J. Poulin and Richard J. A. Wilson

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Like the geological treasures that surely must lie below the Athabasca glacier, some of the answers to key questions about the control of respiration remain buried. But bit by bit, year by year the ice is melting and perhaps in some areas the rocks are starting to be revealed. With a mission to advance our understanding of the emerging gems of respiration, the Xth Oxford Conference was held between 19–24th September (2006) next to the turquoise and tranquil waters of Lake Louise, in the middle of Banff National Park, Alberta, Canada.

Since its inauguration 30 years ago in Oxford, the Oxford Conference on modeling and control of breathing has been held every three years in locations spanning the globe (a list of past conferences and publications that have emerged is included in the pages that follow). The series has provided key opportunities for respiratory scientists to meet with colleagues, discuss recent advances and celebrate their field. The 2006 Lake Louise meeting was Canada’s second Oxford Conference; the previous Canadian meeting (the VIIth Oxford Conference) was held in 1997 at the Grandview Inn in Huntsville (Ontario) and was chaired by Richard Hughson, David Cunningham and Jim Duffin.

In total, 277 people from 16 different countries attended the Xth Oxford Conference. Of those, 170 were full delegates (82 invited speakers), 65 were trainees (students and postdoctoral fellows), 7 were exhibitors, and 35 were guests (accompanying people and children). The attendees came from Australia, Canada, Chile, Denmark, England, France, Germany, Ireland, Japan, Mexico, The Netherlands, New Zealand, Scotland, Sweden, Switzerland, and the United States of America.

A common theme of Oxford meetings is the integration of various aspects of respiratory physiology. Thirty years ago, electrophysiology and molecular biology were in their infancy. One of the few integrative approaches available was the melding of human respiratory physiology with mathematical modeling. The first Oxford Conference brought together scientists from various parts of the world with a wide variety of experimental and theoretical approaches to the problem of the regulation of breathing. Today, many scientists work on genetic models and animal preparations to better understand the regulation of breathing. These new approaches have allowed impressive advances, providing essential tools to study aspects of breathing
ranging from genes to system. However, as our field expands into these new realms, the need to relate disparate measurements in an integrative framework is as important today as it was in those early days in Oxford.

The Xth Oxford Conference offered a unique forum for respiratory physiologists, clinicians, neurobiologists, modelers, geneticists and biomedical engineers from around the world to exchange ideas and present their latest genomic perspectives. Indeed, the importance of integration was apparent in many of the sessions at the Xth Oxford Conference. We heard, for example, how there might be multiple oxygen sensing mechanisms. Three somewhat competing hypotheses were proposed regarding the identity of the central respiratory chemoreceptor(s). There was compelling evidence to suggest generation of the respiratory rhythm might extend beyond the PreBötzinger Complex and involve more than one cellular mechanism. Ultimately, only multiple disciplinary studies, similar to those that inspired the founders of the original Oxford Conference will resolve these issues.

At the beginning of the conference we heard about the complex genetics and physiology of Rett Syndrome, a disease causing severe respiratory dysfunction. We closed with a session on clinical perspectives of breathing disordered during sleep, a phenomenon that will become all too commonplace as the obesity epidemic mounts. Both sessions serve as a reminder as to the urgency of our work and how much is still to be done.

Oxford Conferences are an important ingredient to the future success of our field. Essential to such success, will be our ability to promote the careers of our trainees. At the Xth Oxford Conference, we held a competition to select trainees to present their work orally in a special symposium. An international panel of senior researchers served as judge and jury (the names of those on the selection committee are listed in the pages that follow). The six finalists included Trevor Day (University of Calgary, Calgary, Canada; 1st place), Harold Bell (University of Calgary, Calgary, Canada; 2nd place), Christopher Wyatt (St. Andrews University, St. Andrews, Scotland, 3rd place), Glen Foster (University of Calgary, Calgary, Canada; finalist), Lynn Hartzler (Wright State University, Dayton, USA; finalist) and Jun Ren (University of Alberta, Edmonton, Canada; finalist). We would like to congratulate and thank each of the 62 trainee participants: the standard was remarkable.

The success of the Xth meeting was the direct result of the hard work of our dedicated staff which included Linda Brigan (conference coordinator), Carly McMorris, Sherry Moore and Cherise Klotz. Special thanks to the members of the local and international organizing committees for their support and guidance and to Linda Brigan and Marnie Cudmore for editorial assistance in the production of this book.

We look forward to seeing you all at the XIth Oxford Conference that will take place in Nara City, near Kyoto, Japan in 2009!

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