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In November 1991, one of the prestigious Banbury Conferences at Cold Spring Harbor was devoted to the molecular biology of free radical scavenging systems. That conference and a subsequent book published in 1992 brought together a great deal of information, bringing the existing knowledge from the two relatively new areas of free radical biology and molecular biology. The seeds for the present book were sown over the last few years as numerous individuals suggested a more current and more encompassing volume to bring together the ever-growing and significant developments in this field. With the advice and encouragement of John Inglis, Director of the Cold Spring Harbor Laboratory Press, I undertook the task to arrange and develop this book. The invited chapters clearly reflect the state of the field and indicate future research directions in this very important and exciting area of molecular biology.

Although the importance of reactive oxygen species in biological systems has been recognized for some time, its significance to biological, medical, and agricultural problems has become more apparent with the advent and application of the methods of molecular genetics. The molecular dissection of oxidative stress and antioxidant defense systems is an exciting area in biological research. Free radicals play a central role in biology. Oxidative metabolism supplies energy for most organisms, and oxidative reactions are employed as responders to stress and as defense mechanisms by all aerobic cells.

ROS generated during normal metabolic activity or as a consequence of environmental insults can cause significant damage by immediately reacting with various macromolecules, leading to a range of biochemical and physiological lesions, often resulting in cell death or impairment.