
Preface

The best way to become
acquainted with a subject is
to write a book about it.

Benjamin Disraeli

Cryobiology is a true multidisciplinary science involving concepts from biology, medicine, and physics. Its field comprises the study of any biological object or system (e.g., proteins, cells, tissues, organs, or organisms) under the temperatures below the normal (ranging from hypothermic conditions to cryogenic temperatures): cold-adaptation of organisms; cryoconservation of biological objects; conservation of organs under hypothermic conditions; lyophilization; cryosurgery. Origins of cryobiology could be traced down to ancient Egyptians; probably the first scientific account of this science is the monograph by Sir Robert Boyle “New Experiments and Observations Touching Cold” (London, 1683). Twentieth century witnessed a rapid development of cryobiology related to the progress of the cryogenic equipment (closed systems based on liquid nitrogen, Joule–Thomson cooling with mixed gases, etc.), developments of monitoring techniques, extension of the list of diseases that have been successfully treated by cryomedicine, and consolidation of research by foundation (simultaneously in 1964) of two major scientific societies in this field – The Society for Cryobiology and The Society for Low Temperature Biology.

There are a lot of good books on cryobiology that can be divided into two groups: (1) the ones that treat the whole field of cryobiology – these ones are somewhat out-of-date and (2) the books on specific applications of cryobiology such as cryosurgery or cryoconservation. The present book gives a modern view covering all aspects of cryobiology, with the most attention given to

the underlying physical phenomena and corresponding mathematical models, including numerical ones, since numerical simulation now is recognized as a third tool – along with experiment and theory – for knowledge generation.

The author is aware that “a single conversation across the table with a wise man is better than 10 years mere study of books” (*Henry Wadsworth Longfellow*), but still he hopes that this book will be useful to both physicists and biologists and to the undergraduate students in these disciplines as well as to those practioners who would like to understand what is going in the patient’s body during operation.

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