

Preface

Most of our present knowledge concerning human physiology, microbiology, immunology, pharmacology, pathology, and related disciplines has been gained from studies involving animals—from studies of genetics in fruit flies to studies of cellular processes in genetically modified mice to investigations of life-threatening infections in nonhuman primates. Biomedical research involving animals remains absolutely essential for the advancement of the medical, veterinary, agricultural, and biological sciences.

All drugs prescribed for use in humans and animals have been developed and tested in laboratory animals as models. Noninvasive imaging techniques are optimized in animal models. New surgical techniques and materials are evaluated in animals before they are applied in cases that involve humans or domestic animals. The dramatic developments in genetics, including the sequencing of the human genome and the genomes of many of the most important laboratory animal species, translational research, and personalized medicines all rely on access to high-quality laboratory animals as models for humans.

In *The Principles of Humane Experimental Technique* (1959), W. M. S. Russell and R. L. Burch counseled scientists to aim to apply the three Rs whenever possible: *replacing* experiments on live animals with alternative methods, *reducing* the number of animals necessary to obtain valid results within experiments, and *refining* techniques to minimize the discomfort experienced by the animal participants. These three Rs form the cornerstones of laboratory animal science, and they have been integrated into the numerous laws and guidelines that regulate the use of animals in research across the globe. The three Rs have also been integrated into almost every chapter in this handbook; replacement, reduction, and refinement are relevant to virtually all areas of laboratory science. Good science can only be performed in environments that promote good animal welfare.

Efficient and humane experimental work with animals, in which subjects experience no avoidable pain and mental distress, requires skillful and conscientious staff, including specialist veterinarians. In many parts of the world, regulatory authorities require that all staff working with laboratory animals must document relevant competencies in the field, many of which are obtained through formal teaching and training programs. Universities around the world have established mandatory courses for scientists who wish to use animals in their research, and some have developed specialist education programs (often master's level courses) for staff to achieve laboratory animal specialist competence.

This handbook is a revised third edition of the handbook first edited by Per Svendsen and Jann Hau, published in 1994. Jann Hau and his old friend and colleague, Gerald Van Hoosier, in Seattle, joined forces to edit the second edition. Now, Jann Hau and Steve Schapiro, who have been friends and collaborators on numerous projects for almost 20 years, have teamed up to revise and produce the third edition of this handbook of laboratory animal science. The result is a truly international book, and we wish to thank all of the authors for their valuable contributions. Each individual chapter focuses on an important subdiscipline of laboratory animal science; the chapters can be read and used as stand-alone texts, with only limited necessity to consult other chapters for information. This approach has resulted in slight overlaps in contents in certain chapters, but we feel that this was a small price to pay in order to make the book as reader friendly as possible.

It is our hope that this handbook will be useful all over the world as a textbook in laboratory animal science courses for postgraduate and undergraduate students, as a handbook for scientists who work with animals in their research, and for university veterinarians, regulators, and other specialists in laboratory animal science.

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