

Foreword xi
Peter Singer

Preface xiv
Kathrin Herrmann and Kimberley Jayne

Acknowledgements xvi
Notes on Contributors xvii

Introduction xxxiv
Kathrin Herrmann and Kimberley Jayne

Part 1 *Why and How to Shift the Paradigm*

1 Refinement on the Way Towards Replacement: Are We Doing What We Can? 3
Kathrin Herrmann

2 How to Evaluate the Science of Non-human Animal Use in Biomedical Research and Testing: A Proposed Format for Debate 65
Ray Greek and Lisa A. Kramer

3 How Can the Final Goal of Completely Replacing Animal Procedures Successfully Be Achieved? 88
Christiane Baumgartl-Simons and Christiane Hohensee

4 Disease Prevention with a Plant-based Lifestyle 124
Sabina V. Vyas

Part 2 *Politics and Legislation of Animal Experimentation*

5 Political Campaigning: Where Scientific and Ethical Arguments Meet Public Policy 151
Emily McIvor

6 Rethinking the 3Rs: From Whitewashing to Rights 168
Charlotte E. Blattner

7 Contesting Animal Experiments through Ethics and Epistemology: In Defense of a Political Critique of Animal Experimentation 194
Arianna Ferrari

Part 3 *Openness in Animal Experimentation*

8 The Moral Status of Animal Research Subjects in Industry: A Stakeholder Analysis 209
Sarah Kenehan

9 Increasing the Transparency of Animal Experimentation: An Australian Perspective 224

Monika Merkes and Rob Buttrose

10 Wasted Money in United States Biomedical and Agricultural Animal Research 244

Jim Keen

Part 4

The Ethics and Philosophy of Animal Experimentation

11 Ethics, Efficacy, and Decision-making in Animal Research 275

Lawrence A. Hansen and Kori Ann Kosberg

12 Beyond Plausibility Checks: A Case for Moral Doubt in Review Processes of Animal Experimentation 289

Mara-Daria Cojocaru and Philipp von Gall

13 Human Wrongs in Animal Research: A Focus on Moral Injury and Reification 305

Jane Johnson and Anna Smajdor

Part 5

Effectiveness of the Animal Model

14 Critically Evaluating Animal Research 321

Andrew Knight

15 Extrapolation of Animal Research Data to Humans: An Analysis of the Evidence 341

Rebecca Ram

16 Is Animal-based Biomedical Research Being Used in Its Original Context? 376

Constança Carvalho, Daniel Alves, Andrew Knight and Luis Vicente

17 The Scientific Problems with Using Non-human Animals to Predict Human Response to Drugs and Disease 391

Ray Greek and Lisa A. Kramer

18 Replacing Animal Tests to Improve Safety for Humans 417

Kathy Archibald, Robert Coleman and Tamara Drake

19 Genetic Modification of Animals: Scientific and Ethical Issues 443

Jarrold Bailey

20 Animal Research for Alzheimer Disease: Failures of Science and Ethics 480

John J. Pippin, Sarah E. Cavanaugh and Francesca Pistollato

21 Behavioral Research on Captive Animals: Scientific and Ethical Concerns 517

Kimberley Jayne and Adam See

Part 6

Animal-free Education and Training

22 Modernizing Biomedical Training: Replacing Live Animal Laboratories with Human Simulation 551

John Pawlowski, David Feinstein, Marie L. Crandall and Shalin Gala

23 Humane Education: The Tool for Scientific Revolution in Brazil 567

Vanessa Carli Bones, Rita de Cassia Maria Garcia, Gutemberg Gomes Alves, Rita Leal Paixão, Alexandro Aluísio Rocha, Karynn Capilé and Róber Bachinski

Part 7

The Paradigm Shift: Advanced Animal-free Approaches

24 Recent Developments in Alternatives to Animal Testing 585

Katy Taylor

25 The Changing Paradigm in Preclinical Toxicology: *in vitro* and *in silico* Methods in Liver Toxicity Evaluations 610

Fozia Noor

26 The Potential of Organ on Chip Technology for Replacing Animal Testing 639

Malcolm Wilkinson

27 When Is an Alternative Not an Alternative? Supporting Progress for Absolute Replacement of Animals in Science 654

Craig Redmond

28 Research and Testing Without Animals: Where Are We Now and Where Are We Heading? 673

Thomas Hartung

Afterword: Evidence over Interests 689

John P. Gluck

Index 692