

# Contents

PREFACE	v	10 The Sponge as a Model of Cellular Recognition	75
CONTRIBUTORS	xI	<i>Xavier Fernández-Busquets</i>	
LIST OF COLOR PLATES	xv	11 Sea Urchin Embryo: A Model System for Analyzing Cellular Activities During Early Development	85
<b>I INTRODUCTION</b>		<i>Tetsuya Kominami and Hiromi Takata</i>	
1 Animal Models for Human Diseases: An Overview	3	12 <i>Caenorhabditis elegans</i> Models of Human Neurodegenerative Diseases: A Powerful Tool to Identify Molecular Mechanisms and Novel Therapeutic Targets	91
<i>Jann Hau</i>		<i>Richard Nass and Lihsia Chen</i>	
2 Selection of Biomedical Animal Models	9	13 Zebrafish as a Model for Development	103
<i>Michael S. Rand</i>		<i>Brian A. Link and Sean G. Megason</i>	
3 Improved Models for Animal Research	17	14 Zebrafish as a Model for Studying Adult Effects of Challenges to the Embryonic Nervous System	113
<i>Rolf Sprengel, Leonid Eshkind, Jan Hengstler, and Ernesto Bockamp</i>		<i>Nicole Marie Roy and Elwood A. Linney</i>	
<b>II GENERAL CONSIDERATIONS</b>		15 Modeling Cognitive and Neurodegenerative Disorders in <i>Drosophila melanogaster</i>	121
4 The Ethical Basis for Animal Use in Research	27	<i>Junjiro Horiuchi and Minoru Saitoe</i>	
<i>James Parker</i>		16 Biomedical Research with Honey Bees	129
5 Bibliographic Searching Tools on Disease Models to Locate Alternatives for Animals in Research: A Website Companion	35	<i>Michelle M. Elekonich</i>	
<i>Mary W. Wood and Lynette A. Hart</i>		17 Establishing and Maintaining a <i>Xenopus laevis</i> Colony for Research Laboratories	139
6 NIH Policies on Sharing of Model Organisms and Related Research Resources	43	<i>Punita Koustubhan, Debra Sorocco, and Michael S. Levin</i>	
<i>J.P. Kim, Charlene Cho, and Norka Ruiz Bravo</i>		18 The Chicken as a Model Organism	161
7 Databases for Biomedical Animal Resources	49	<i>Janice M. Bahr</i>	
<i>Richard L. Crawford and Tim Allen</i>		<b>B RODENTS</b>	
8 Psychological Enrichment for Animals in Captivity	55	19 Rat Knockout and Mutant Models	171
<i>Kristine Coleman</i>		<i>Bart M.G. Smits, Jill D. Haag, Michael N. Gould, and Edwin Cuppen</i>	
<b>III WELL-ESTABLISHED MODELS</b>			
<b>A YEAST, WORMS, FLIES, SEA ANIMALS, AND BIRDS</b>			
9 Integrated Network Modeling of Molecular and Genetic Interactions	67		
<i>Gregory W. Carter, Vesteinn Thorsson, and Timothy Galitski</i>			

20	Rodent Genetics, Models, and Genotyping Methods <i>Sheryl J. Wildt, Andrew I. Brooks, and Robert J. Russell</i>	179	34	Animal Models of Parkinson's Disease <i>Emma L. Lane, Thomas Carlsson, Deniz Kirik, and Stephen B. Dunnett</i>	313
21	The House Mouse in Biomedical Research <i>John G. Vandenberg</i>	187	35	Transgenic Animal Models of Neurodegenerative Diseases <i>Anthony W.S. Chan and Yuksel Agca</i>	323
22	Mouse Model for Alzheimer's Disease <i>M. Azhar Chishti and Shaheen M. Nakeeb</i>	191	36	Animal Models of Nociception and Pain <i>James D. Rose and C. Jeffrey Woodbury</i>	333
23	Guinea Pigs as Models for Human Cholesterol and Lipoprotein Metabolism <i>Maria Luz Fernandez and Richard J. Wood</i>	201	37	Nonmammalian Models for the Study of Pain <i>Craig W. Stevens</i>	341
24	Reliability of Rodent Models <i>Dileep Kumar Rohra and Yureeda Qazi</i>	213	V MODELS OF BEHAVIOR		
C CATS, DOGS, AND PIGS			A CARDIOVASCULAR		
25	The Domestic Cat, <i>Felis catus</i> , as a Model of Hereditary and Infectious Disease <i>Marilyn Menotti-Raymond and Stephen J. O'Brien</i>	221	38	Animal Models of Vascular Development and Endothelial Cell Biology <i>Victoria L. Bautch</i>	355
26	Swine in Biomedical Research <i>M. Michael Swindle and Alison C. Smith</i>	233	39	Models of Behavior: <i>Cardiovascular</i> <i>Lina Badimon, Laura Casaní, and Gemma Vilahur</i>	361
27	The Minipig as an Animal Model in Biomedical Stem Cell Research <i>Petr Vodicka, Jana Hlucilova, Jiri Klima, Radek Prochazka, Jitka Ourednik, Vaclav Ourednik, and Jan Motlik</i>	241	40	Animal Models for Atherosclerosis, Restenosis, and Endovascular Aneurysm Repair <i>András Kónya, Kenneth C. Wright, Matthew Gounis, and Krishna Kandarpa</i>	369
D NONHUMAN PRIMATES			41	Transgenic Mouse Models of HIV-1/AIDS and Cardiac Performance <i>James J. Kohler and William Lewis</i>	385
28	The Nonhuman Primate as a Model for Biomedical Research <i>David M. Anderson</i>	251	B REPRODUCTION		
29	Primates as Models of Behavior in Biomedical Research <i>Steven J. Schapiro</i>	259	42	Primate Models for the Assisted Reproductive Technologies and Embryonic Stem Cell Biology <i>Don P. Wolf, Shoukhrat Mitalipov, and James A. Byrne</i>	397
30	Primate Models for Understanding Brain Mechanisms of Cognitive Behavior <i>Ronald E. Kettner, M. Lysetskiy, and M. Suh</i>	267	43	Rat Models of Polycystic Ovary Syndrome <i>Krishna B. Singh</i>	405
IV MODELS FOR SPECIFIC PURPOSES			44	Murine Models for Reproduction <i>Damayanti Chakraborty and T. Rajendra Kumar</i>	411
A VISUAL AND AUDITORY DISEASE			45	Pig Model to Study Dynamics of Steroids During Ovarian Follicular Growth and Maturation <i>Damodar K. Mahajan</i>	425
31	Animal Models for Eye Diseases and Therapeutics <i>Takeshi Iwata and Stanislav Tomarev</i>	279	C DRUG DEVELOPMENT AND RESEARCH MODELS		
32	Animal Models of Noise-Induced Hearing Loss <i>Richard Salvi and Flint A. Boettcher</i>	289	46	Molecular Genetic Approach to Identify Inhibitors of Signal Transduction Pathways: <i>Fission Yeast as a Model System for Drug Discovery</i> <i>Shunji Ishiwata, Takayoshi Kuno, Hirofumi Takada, Atsushi Koike, and Reiko Sugiura</i>	439
B TRAUMA, PAIN, AND NEUROLOGY					
33	Human and Animal Models for the Study of Muscle Pain <i>Norman F. Capra and Jin Y. Ro</i>	305			

47	Yeast as a Model System to Study DNA Damage and DNA Repair <i>Antonio Conconi</i>	445	61	Animal Models of Posttraumatic Stress Disorder <i>Hagit Cohen, Michael A. Matar, and Joseph Zohar</i>	591
<b>D PHYSIOLOGY</b>					
48	Human Models of Space Physiology <i>Victor A. Convertino and Caroline A. Rickards</i>	457	62	Animal Models for Studying Fetal Alcohol Syndrome, Alcohol-Related Birth Defects, and Alcohol-Related Neurodevelopmental Disorder <i>Timothy A. Cudd</i>	603
49	Developmental Space Biology of Mammals: <i>Concepts and Methods of Study</i> <i>April E. Ronca</i>	465	63	Modeling Drug and Alcohol Abuse: <i>Experimental Examples of the Utility of Zebrafish</i> <i>Robert T. Gerlai</i>	615
50	A Practical Approach to Animal Models of Sepsis <i>Bryan Belikoff and Jon A. Buras</i>	473	64	Mouse Models for Experimental Cancer Therapy <i>Sara Rockwell and Karen R. Rockwell</i>	623
51	Animal Models in Functional Magnetic Resonance Imaging <i>Afonso C. Silva and Bojana Stefanovic</i>	483	65	Rat Models of Skin Wound Healing <i>Wanda A. Dorsett-Martin and Annette B. Wysocki</i>	631
52	Animal Models in Aging Research: <i>A Critical Examination</i> <i>Rochelle Buffenstein, Yael H. Edrey, and Pamela L. Larsen</i>	499	66	Animal Models of Prostate Cancer <i>Adebusola A. Alagbala and Barbara A. Foster</i>	639
<b>E GENETICS</b>					
53	Gene Targeting in Human Somatic Cells <i>Eric A. Hendrickson</i>	509	67	Animal Models of Diabetes <i>Willy J. Malaisse and Abdullah Sener</i>	651
54	Animal Models for Investigating the Causes and Mechanisms of Mammalian Germ Cell Aneuploidy <i>John B. Mailhes and Mary Ann Handel</i>	527	68	Animal Models of Kidney Diseases <i>Chunsun Dai, Lawrence P. Kiss, and Youhua Liu</i>	657
55	Genetic Models of Alzheimer's Disease <i>Yann S. Mineur</i>	539	69	Animal Models of Multiple Sclerosis <i>Colin R. Young and C. Jane Welsh</i>	665
<b>F IMMUNOLOGY AND VIROLOGY</b>					
56	Rat Models of Experimental Autoimmune Encephalomyelitis <i>Erik Wallström and Tomas Olsson</i>	547	70	Canine and Feline Models for Cancer <i>Gionata De Vico and Paola Maiolino</i>	677
57	Animal Models in Virology <i>Joseph L. Bryant</i>	557	71	Obese Mouse Models <i>Deborah J. Good</i>	683
58	Nonhuman Primate Models for AIDS <i>Nancy L. Haigwood, Raymond R. O'Neill, and Vanessa M. Hirsch</i>	565	72	Study of Polycystic Kidney Disease in the Nematode <i>Caenorhabditis elegans</i> <i>Matthew J. Buechner</i>	703
<b>VI MODELS OF OTHER HUMAN DISEASES</b>					
59	Use of Congenic Mouse Strains for Candidate Disease Gene Identification in Complex Traits <i>Ute Christine Rogner and Philip Avner</i>	575	73	Animal Models of Myelofibrosis <i>Alessandro M. Vannucchi, Jean-Luc Villeval, Orianne Wagner-Ballon, Paola Guglielmelli, and Anna Rita Migliaccio</i>	713
60	Animal Models of Sudden Infant Death Syndrome <i>Jane Blood-Siegfried</i>	583	74	Animal Models for Bone Tissue Engineering Purposes <i>Véronique Viateau, Delphine Logeart-Avramoglou, Geneviève Guillemain, and Hervé Petite</i>	725
			<b>VII OTHER TOOLS</b>		
			75	Markov Processes for Biomedical Data Analysis <i>Ricardo Ocaña-Riola</i>	739

76	Software Tools for Modeling Biomedical Systems <i>Karl Thomaseth</i>	<b>747</b>	78	Building Virtual Research Communities Using Web Technology <i>Krishna B. Singh</i>	<b>759</b>
77	Developing Websites for Biomedical Research and Training <i>Krishna B. Singh</i>	<b>753</b>		Index	<b>763</b>