

---

## Contents

<i>Preface</i> .....	<i>v</i>
<i>Contributors</i> .....	<i>ix</i>
1 Construction and Evaluation of Zinc Finger Nucleases .....	1
<i>Hiroshi Ochiai and Takashi Yamamoto</i>	
2 Updated Overview of TALEN Construction Systems .....	27
<i>Tetsushi Sakuma and Takashi Yamamoto</i>	
3 CRISPR/Cas9 .....	41
<i>Izubo Hatada, Sumiyo Morita, and Takuro Horii</i>	
4 SNP-D-CRISPR: Single Nucleotide Polymorphism-Distinguishable Repression or Enhancement of a Target Gene Expression by CRISPR System .....	49
<i>Shohei Maruyama, Takashi Kusakabe, Xinyi Zou, Yoshiaki Kobayashi, Yoshimasa Asano, Qingbo S. Wang, and Kumiko Ui-Tei</i>	
5 Utilizing Large Functional and Population Genomics Resources for CRISPR/Cas Perturbation Experiment Design .....	63
<i>Qingbo S. Wang and Kumiko Ui-Tei</i>	
6 Generation of Genome-Edited Mice by Cytoplasmic Injection of CRISPR-Cas9 RNA .....	75
<i>Takuro Horii and Izubo Hatada</i>	
7 Gene Targeting in Mouse Embryonic Stem Cells via CRISPR/Cas9 Ribonucleoprotein (RNP)-Mediated Genome Editing .....	87
<i>Manabu Ozawa, Chihiro Emori, and Masahito Ikawa</i>	
8 Generation of Knock-In Mouse by Genome Editing .....	99
<i>Wataru Fujii</i>	
9 Introduction of Genetic Mutations Into Mice by Base Editor and Target-AID .....	111
<i>Hiroki Sasaguri</i>	
10 Genome Editing in Mouse and Rat by Electroporation .....	125
<i>Takehito Kaneko</i>	
11 Generation of Floxed Mice by Sequential Electroporation .....	135
<i>Takuro Horii, Ryosuke Kobayashi, and Izubo Hatada</i>	
12 Efficient Detection of Flox Mice Using In Vitro Cre Recombination .....	149
<i>Ryosuke Kobayashi, Takuro Horii, and Izubo Hatada</i>	
13 VCre/VloxP and SCre/SloxP as Reliable Site-Specific Recombination Systems for Genome Engineering .....	161
<i>Manabu Nakayama</i>	
14 Efficient CRISPR/Cas9-Assisted Knockin of Large DNA Donors by Pronuclear Microinjection During S-Phase in Mouse Zygotes .....	181
<i>Takaya Abe, Ken-ichi Inoue, and Hiroshi Kiyonari</i>	

15	Genome Editing of Murine Liver Hepatocytes by AAV Vector-Mediated Expression of Cas9 In Vivo.....	195
	<i>Yuji Kashiwakura and Tsukasa Ohmori</i>	
16	Nonviral Ex Vivo Genome Editing in Mouse Bona Fide Hematopoietic Stem Cells with CRISPR/Cas9.....	213
	<i>Hiromasa Hara, Natsagdorj Munkh-Erdene, Suvd Byambaa, and Yutaka Hanazono</i>	
17	Genome Editing of Rat.....	223
	<i>Takehito Kaneko</i>	
18	A Simple and Efficient Method for Generating KO Rats Using In Vitro Fertilized Oocytes.....	233
	<i>Kohtaro Morita, Arata Honda, and Masahide Asano</i>	
19	Editing the Genome of the Golden Hamster ( <i>Mesocricetus auratus</i> ).....	247
	<i>Michiko Hirose, Toshiko Tomishima, and Atsuo Ogura</i>	
20	Gene Targeting in Rabbits: Single-Step Generation of Knockout Rabbits by Microinjection of CRISPR/Cas9 Plasmids.....	255
	<i>Arata Honda</i>	
21	Genome Editing of Pig.....	269
	<i>Masahito Watanabe and Hiroshi Nagashima</i>	
22	GEEP Method: An Optimized Electroporation-Mediated Gene Editing Approach for Establishment of Knockout Pig Lines.....	293
	<i>Fuminori Tanihara, Maki Hirata, and Takeshige Otoi</i>	
23	Genome Editing Mediated by Primordial Germ Cell in Chicken.....	301
	<i>Jae Yong Han and Hong Jo Lee</i>	
24	CRISPR-Cas9-Mediated Genome Modifications in Zebrafish.....	313
	<i>Yusuke Kamachi and Atsuo Kawahara</i>	
25	Genome Editing of Medaka.....	325
	<i>Rie Hara, Satoshi Ansai, and Masato Kinoshita</i>	
26	CRISPR-Cas9-Based Functional Analysis in Amphibians: <i>Xenopus laevis</i> , <i>Xenopus tropicalis</i> , and <i>Pleurodeles waltl</i> .....	341
	<i>Miyuki Suzuki, Midori Iida, Toshinori Hayashi, and Ken-ichi T. Suzuki</i>	
27	Genome Editing of Silkworms.....	359
	<i>Takuya Tsubota, Hiroki Sakai, and Hideki Sezutsu</i>	
28	Improved Genome Editing in the Ascidian <i>Ciona</i> with CRISPR/Cas9 and TALEN.....	375
	<i>Yasunori Sasakura and Takeo Horie</i>	
29	Genome Editing of <i>C. elegans</i> .....	389
	<i>Takuma Sugi</i>	
	<i>Index</i> .....	397