

## **Transgenic Mouse Methods And Protocols Methods In Molecular Biology**

Providing experimental methods and protocols for performing pheromone research in a variety of organisms ranging from invertebrates to vertebrates, *Pheromone Signaling: Methods and Protocols* covers a wide spectrum of experimental approaches necessary for handling pheromone molecules, measuring receptor response and neural activation, and analyzing behavioral output. A great deal of progress has been made in understanding the molecular mechanisms underlying pheromone action, largely due to the discovery of receptor genes, the advancement of imaging techniques, and key multi-disciplinary approaches including aspects of organic chemistry, biochemistry, molecular biology, electrophysiology, and behavioral science. Written in the highly successful *Methods in Molecular Biology* series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips for troubleshooting and avoiding known pitfalls. Authoritative and practical, *Pheromone Signaling: Methods and Protocols* details the key methodologies utilized in laboratories all over the world, making them accessible to those who want to begin investigation in the area of pheromone research.

Provides background information and detailed protocols for developing a mouse colony and using the animals in transgenic and gene-targeting experiments. The protocols list the animals, equipment, and reagents required and step-by-step procedures. Topics include in vitro culture of preimplantation embryos, surgical procedures, the production of chimeras, and the analysis of genome alterations. The third edition adds protocols for cloning mice, modifying embryonic stem cells, intracytoplasmic sperm injection, and cryopreservation of embryos.

Genetic toxicology is recognized by geneticists and researchers concerned with the genetic impact of man-made chemicals. In *Genotoxicity Assessment: Methods and Protocols*, expert researchers in the field provide comprehensive genetic toxicology protocols. These include in vitro and in vivo protocols on mutation assays, cytogenetic techniques, and primary DNA damage, assays in alternate to animal models, and updated ICH guidelines. Written in the highly successful *Methods in Molecular Biology* series format, the chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step and readily reproducible laboratory protocols, as well as key tips on troubleshooting and avoiding known pitfalls. Authoritative and cutting-edge, *Genotoxicity Assessment: Methods and Protocols* seeks to aid research students and scientists working in regulatory toxicology as well as biomedical, biochemical and pharmaceutical sciences.

Joanna Wilson and Gerhard May have assembled a collection of the key molecular biology protocols used in the analysis of Epstein-Barr virus (EBV), along with a series of valuable immunology, cell biology, and transgenic mouse protocols. These readily reproducible techniques include methods for gene expression with mini-EBV plasmids, for expression analysis by FISH, for EBV detection and quantitation, and for cell proliferation and death assays. In addition, there are EBV-based vectors, an up-to-date map of EBV, a

comprehensive table of available latent protein antisera, and assays from in vitro to cell to organ to organism levels. Timely and highly practical, Epstein-Barr Virus Protocols provides powerful tools for elucidating the life cycle of EBV and its host interactions, work that promises the emergence of major new treatments and cures for EBV associated diseases, including several forms of human cancer.

Molecular Embryology

Volume 2: Molecular Embryo Analysis, Live Imaging, Transgenesis, and Cloning

Manipulating the Mouse Embryo

A Laboratory Manual

Epstein-Barr Virus Protocols

"Mouse Genetics: Methods and Protocols provides selected mouse genetic techniques and their application in modeling varieties of human diseases. The chapters are mainly focused on the generation of different transgenic mice to accomplish the manipulation of genes of interest, tracing cell lineages, and modeling human diseases...each chapter contains a brief introduction, a list of necessary materials, systematic, readily reproducible methods, and a notes section, which shares tips on troubleshooting in order to avoid known pitfalls."--Publisher's description.

This fully updated edition provides selected mouse genetic techniques and their application in modeling varieties of human diseases. The chapters are mainly focused on the generation of different transgenic mice to accomplish the manipulation of genes of interest, tracing cell lineages, and modeling human diseases. Written for the highly successful Methods in Molecular Biology series, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and up-to-date, Mouse Genetics: Methods and Protocols, Second Edition delivers fundamental techniques and protocols to geneticists, molecular biologists, cell and developmental biologists, students, and postdoctoral fellows working in the various disciplines of genetics, developmental biology, mouse genetics, and modeling human diseases.

Simian virus 40 gained notoriety in the 1960s because it was found to be a contaminant of polio and adenovirus vaccines that had been administered to millions of healthy individuals worldwide. The public health implications of this revelation provided the initial impetus for an in-depth study of SV40 biology. Later work showed that SV40 DNA sequences as well as infectious virus are in fact found in human tumors and may have contributed to oncogenesis. It also turned out that SV40 uses mostly cellular machinery to carry out many steps in viral infection, which makes it a powerful probe for examining many fundamental questions in eukaryotic molecular biology. SV40 Protocols consolidates a number of well-tested step-by-step techniques in one volume; experts with hands-on experience in particular methods give detailed accounts of their optimized experimental protocols, so that the beginner, as well as more experienced researchers, may readily overcome problems of ambiguity often present in the literature. As with other DNA tumor viruses, the response of cultured cells to SV40 infection depends upon the species being infected. Monkey cells support virus production, which leads to their death, whereas rodent cells produce only the early proteins and acquire a transformed phenotype. Thus, SV40 Protocols is organized in two sections. The first relates to assays of the lytic cycle of the virus, and the second deals with transformation.

Marten Hofker and Jan van Deursen have assembled a multidisciplinary collection of readily reproducible methods for working with mice, and particularly for generating mouse models that will enable us to better understand gene function. Described in step-by-step detail by highly experienced investigators, these proven techniques include new methods for conditional, induced knockout, and transgenic mice, as well as for working with mice in such important research areas as immunology, cancer, and atherosclerosis. Such alternative strategies as random mutagenesis and viral gene transduction for studying gene function in the mouse are also presented.

The Unfolded Protein Response

Gene Knockout Protocols

SV40 Protocols

Genotoxicity Assessment

A Laboratory Handbook

The study of germ cells has undergone enormous advances in recent years and has entered into an explosive phase of new discoveries with the introduction of transgenic technologies and nuclear cloning. Basic knowledge and techniques developed for lower vertebrate and invertebrate systems have facilitated the study of higher vertebrates, including humans. Many experiments that have first been performed on lower vertebrates provided the tools and strategies that could later be applied to other less readily available mammalian systems. The discovery of centrosomes in ascidians and sea urchin eggs now benefits studies of fertility and infertility in mammals including humans. External in vitro fertilization, now a common technique in assisted fertilization has only been possible as a result of numerous studies in lower systems in which external fertilization is natural. Egg activation, first explored in sea urchin and ascidian eggs, now benefits cloning efficiency in farm and domestic animals. Gene manipulations and molecular methods have added to the possibilities of producing live offspring with enormous biomedical, ecological, and economic implications. All sexually reproducing organisms produce primordial germ cells, a small population of cells that differentiate into gametes of either sex that carry to potency, an ability to develop into an entire new organism. The two volumes on germ cells combine techniques in a variety of different systems and have selected those systems that have provided landmarks in advancing our knowledge on germ cells.

The Guide to Investigation of Mouse Pregnancy is the first publication to cover the mouse placenta or the angiogenic tree the mother develops to support the placenta. This much-needed resource covers monitoring of the cardiovascular system, gestational programming of chronic adult disease, epigenetic regulation, gene imprinting, and stem cells. Offering detailed and

integrated information on how drugs, biologics, stress, and manipulations impact pregnancy in the mouse model, this reference highlights techniques used to analyze mouse pregnancy. Joining the ranks of much referenced mouse resources, *The Guide to Investigation of Mouse Pregnancy* is the only manual providing needed content on pregnancy in animal models for translational medicine and research. Provides instruction on how to collect pre-clinical data on pregnancy in mouse models for eventual use in human applications Describes the angiogenic tree the mother's uterus develops to support pregnancy and the monitoring of pregnancy-induced cardiovascular changes Educates readers on placental cell lineages, decidual development including immune cells, epigenetic regulation, gene imprinting, stem cells, birth and lactation Discusses how stress, environmental toxicants and other manipulations impact upon placental function and pregnancy success

This volume discusses a variety of animal models of diabetes, as well as describes techniques used to study end-points when using these models. The chapters in this book cover topics such as important considerations when working with mouse models of diabetes, highlighting factors that new investigators may not be aware of and some potential pitfalls in experimental outcomes; main characteristics of some commonly used animal models of diabetes research, ranging from mice to primates; animal models used to study specific aspects of beta-cell biology; and a focus on techniques used to assess blood glucose homeostasis, insulin action, and islet function in vivo and ex vivo. Written in the highly successful *Methods in Molecular Biology* series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Cutting-edge and comprehensive, *Animal Models of Diabetes: Methods and Protocols* is a valuable resource that will help diabetes researchers design and carry out in vivo studies that will best suit their experimental questions and needs.

This volume looks at the study of oligodendrocytes through in vitro and in vivo techniques, multiple model organisms, using approaches that bridge scales from molecular through system. Chapters in this book cover topics such as fundamental molecular analyses of oligodendrocytes and myelin; in vitro, ex vivo, and in vivo molecular-cellular-electrophysiology-based techniques; oligodendrocyte formation, homeostasis, and disruption in zebrafish and *Xenopus*; and parallel system-level imaging of animal and human models. Written in the highly successful *Methods in Molecular Biology* series format, chapters include introductions to their respective

topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and thorough, *Oligodendrocytes: Methods and Protocols* is a valuable reference guide that highlights the expansive and fast-paced nature of research into oligodendrocyte biology underlying health and function.

Neurobiology of Huntington's Disease

Macrophages

CRISPR-Cas

Transgenic Mouse Methods and Protocols

Schwann Cells

As the drug discovery process shifts more and more toward specifically targeting pathways and molecules, model systems continue to increase in importance, and the mouse, with its versatility, ease of use, and remarkable similarity to the human genome, has clearly risen to the forefront of animal model studies. In *Mouse Models for Drug Discovery: Methods and Protocols*, experts in the field present some background for those less familiar with mice as experimental model platforms as well as a collection of techniques involving general methods as well as specific disease topics such as type 1 and 2 diabetes, cardiovascular disease, arthritis, skin disorders, cancer, the use of behavioral models for depression and anxiety, neurodegenerative diseases, neuromuscular diseases, and infectious diseases. Written in the highly successful *Methods in Molecular Biology*<sup>TM</sup> series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and notes on troubleshooting and avoiding known pitfalls. Authoritative and easy-to-use, *Mouse Models for Drug Discovery: Methods and Protocols* will stimulate those not familiar with the power of the mouse and its potential for the drug discovery process, and it will encourage the development of new models and new ways to utilize existing models in order to further the use of this dynamic animal in this vital field.

Most people have some interest in embryos; this probably results, in part, from their interest in understanding the biological origins of themselves and their offspring and, increasingly, concerns about how environmental change such as pollution might affect human development. Obviously, ethical considerations preclude experimental studies of human embryos and, consequently, the developmental biologist has turned to other species to examine this process. Fortunately, the most significant conclusion to be drawn from the experimental embryology of the last two decades is the manner in which orthologous or closely related molecules are deployed to mediate similar developmental processes in both vertebrates and invertebrates. The molecular mechanisms regulating processes fundamental to most animals, such as axial patterning or axon guidance, are frequently conserved during evolution. (It is now widely

believed that the differences between phyla and classes are the result of new genes, arising mostly by duplication and divergence of extant sequences, regulating the appearance of derived characters. ) Other vertebrates are obviously most likely to use the same developmental mechanisms as humans and, within the vertebrate subphylum, the degree of conservation of developmental mechanism is considerable. It has long been recognized that particular vertebrate species offer either distinct advantages in investigating particular stages of development or are especially amenable to particular manipulations. No single animal can provide all the answers because not all types of experiments can be carried out on a single species.

CRISPR/Cas-based techniques are revolutionizing the way geneticists and molecular biologists modify DNA sequences and modulate gene expression in cells and organisms. This laboratory manual presents step-by-step protocols for applying this cutting-edge technology to any system of interest. Contributors describe approaches for de-

As the major task of sequencing the human genome is near completion and full complement of human genes are catalogued, attention will be focused on the ultimate goal: to understand the normal biological functions of these genes, and how alterations lead to disease states. In this task there is a severe limitation in working with human material, but the mouse has been adopted as the favored animal model because of the available genetic resources and the highly conserved gene conservation linkage organization. In just of ten years since the first gene-targeting experiments were performed in embryonic stem (ES) cells and mutations transmitted through the mouse germline, more than a thousand mouse strains have been created. These achievements have been made possible by pioneering work that showed that ES cells derived from preimplantation mouse embryos could be cultured for prolonged periods without differentiation in culture, and that homologous recombination between targeting constructs and endogenous DNA occurred at a frequency sufficient for recombinants to be isolated. In the next few years the mouse genome will be systematically altered, and the techniques for achieving manipulations are constantly being streamlined and improved.

Animal Models of Diabetes

Transgenesis Techniques

Guidelines for the Care and Use of Mammals in Neuroscience and Behavioral Research

Advanced Protocols for Animal Transgenesis

Gastrointestinal Physiology and Diseases

In 1993, the genetic mutation responsible for Huntington's disease (HD) was identified. Considered a milestone in human genomics, this discovery has led to nearly two decades of remarkable progress that has greatly increased our knowledge of HD, and documented an unexpectedly large and diverse range of biochemical and genetic perturbations that seem to result directly

from the expression of the mutant huntingtin gene. *Neurobiology of Huntington's Disease: Applications to Drug Discovery* presents a thorough review of the issues surrounding drug discovery and development for the treatment of this paradigmatic neurodegenerative disease. Drawing on the expertise of key researchers in the field, the book discusses the basic neurobiology of Huntington's disease and how its monogenic nature confers enormous practical advantages for translational research, including the creation of robust experimental tools, models, and assays to facilitate discovery and validation of molecular targets and drug candidates for HD. Written to support future basic research as well as drug development efforts, this volume: Covers the latest research approaches in genetics, genomics, and proteomics, including high-throughput and high-content screening Highlights advances in the discovery and development of new drug therapies for neurodegenerative disorders Examines the practical realities of preclinical testing, clinical testing strategies, and, ultimately, clinical usage While the development of effective drug treatments for Huntington's disease continues to be tremendously challenging, a highly interactive and cooperative community of researchers and clinical investigators now brings us to the threshold of potential breakthroughs in the quest for therapeutic agents. The impressive array of drug discovery resources outlined in the text holds much promise for treating this devastating disease, providing hope to long-suffering Huntington's disease patients and their families.

This laboratory manual, published in cooperation with the International Society for Transgenic Technology (ISTT), provides almost all current methods that can be applied to the creation and analysis of genetically modified animals. The chapters have been contributed by leading scientists who are actively using the technology in their laboratories. Based on their first-hand experience the authors also provide helpful notes and troubleshooting sections. Topics range from standard techniques, such as pronuclear microinjection of DNA, to more sophisticated and modern methods, such as the derivation and establishment of embryonic stem (ES) cell lines, with defined inhibitors in cell culture medium. In addition, related topics with relevance to the field are addressed, including global web-based resources, legal issues, colony management, shipment of mice and embryos, and the three R's: refinement, reduction and replacement.

This second edition volume provides new and updated chapters detailing simple and accessible experiment protocols to explore thymus biology. Chapters are divided into three parts presenting short reviews, analysis strategies, protocols for cell preparation, flow cytometry analyses, Innate Lymphoid Cells (ILC), mouse T-cell development, antigen receptor-less cousins of T cells, bone marrow chimeras, thymic stroma, and multiple aspects of thymocyte biology. Written in the successful *Methods in Molecular Biology* series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible protocols, and notes on troubleshooting and avoiding known pitfalls. Authoritative and cutting-edge, *T-Cell Development: Methods and Protocols, Second Edition* aims to be a useful practical guide to help readers overcome obstacles associated with experimental approaches of T-cell development.

Expanding on the National Research Council's *Guide for the Care and Use of Laboratory Animals*, this book deals specifically with mammals in neuroscience and behavioral research laboratories. It offers flexible guidelines for the care of these animals, and

guidance on adapting these guidelines to various situations without hindering the research process. Guidelines for the Care and Use of Mammals in Neuroscience and Behavioral Research offers a more in-depth treatment of concerns specific to these disciplines than any previous guide on animal care and use. It treats on such important subjects as: The important role that the researcher and veterinarian play in developing animal protocols. Methods for assessing and ensuring an animal's well-being. General animal-care elements as they apply to neuroscience and behavioral research, and common animal welfare challenges this research can pose. The use of professional judgment and careful interpretation of regulations and guidelines to develop performance standards ensuring animal well-being and high-quality research. Guidelines for the Care and Use of Mammals in Neuroscience and Behavioral Research treats the development and evaluation of animal-use protocols as a decision-making process, not just a decision. To this end, it presents the most current, in-depth information about the best practices for animal care and use, as they pertain to the intricacies of neuroscience and behavioral research.

Methods in Molecular Biology: Transgenic mouse: methods and protocols

An ISTT Manual

Mouse Cell Culture

Mouse Genetics

Mouse Models for Drug Discovery

This volume provides a comprehensive collection of classical and cutting edge protocols and techniques to examine the normal development and physiological functions of the gastrointestinal system and to model the most common digestive diseases. The chapters focus on diverse research topics including ex vivo systems to study gastrointestinal development and functions, in vivo imaging of the gastrointestinal tract, isolation and characterization of intestinal immune cells, and animal models of gastrointestinal inflammation and cancer. The Gastrointestinal Physiology and Diseases: Methods and Protocols book targets wide audience of physiologists, cell and developmental biologists, immunologists, and physician-scientists working in the field of gastroenterology and beyond. Written in the highly successful Methods in Molecular Biology series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Highly practical and clearly written, Gastrointestinal Physiology and Diseases: Methods and Protocols will serve both seasoned researchers as well as newcomers to the field and will provide a unique resource and expert guidance to modern laboratory techniques developed for examining normal functions and diseases of the gastrointestinal tract.

Transgenic animal technologies and the ability to introduce functional genes into animals have revolutionized our ability to address complex biomedical and biological questions. This well-illustrated handbook covers the technical aspects of gene transfer - from molecular methods to whole animal considerations - for important laboratory and domestic animal species. It describes methodologies as employed by leading laboratories and is a key resource for researchers, as well as a tool for training technicians

and students. This second edition incorporates updates on a variety of genetic engineering technologies ranging from microinjection and ES cell transfer to nuclear transfer in a broad range of animal modeling systems. Contains a comprehensive collection of transgenic animal and gene transfer methods Discusses background and introduction to techniques and animal systems Teaches practical step-by-step protocols Fully revised with updates to reflect state-of-the-art technology and associated changes to date

With genetic engineering, systems explored in this book now exist allowing for the simple, efficient, and near universally precise genetic manipulation directly in any organism, including the mouse. Herein, these models are applied to a wide field of disease areas, including diabetes, cardiovascular disease, skin disorders, cancer, neurodegenerative and neuromuscular diseases, retinal disorders, as well as various behavioral models. Written for the highly successful Methods in Molecular Biology series, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Practical and fully updated, Mouse Models for Drug Discovery: Methods and Protocols, Second Edition serves to equip the reader with an extensive overview of techniques to utilize the many possibilities of mice in the drug development process.

This volume provides readers with a historical foundation in standard techniques and a comprehensive update on the latest methods used in making gene-modified mice. The chapters in this book cover topics such as pronuclear microinjection in one-cell embryos; embryo transfer surgery; nuclear transfer and cloning; blastocyst microinjection; and cryobanking and recovery of genetically modified mice. Importantly, there are chapters devoted to the latest application of CRISPR technology, as well as the establishment of induced pluripotent stem cells. Written in the highly successful Methods in Molecular Biology series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Comprehensive and authoritative, Transgenic Mouse: Methods and Protocols is a valuable resource for both novice and expert researchers who are interested in learning more about this evolving field.

Methods of Behavior Analysis in Neuroscience

T-Cell Development

Molecular Biology of the Cell

Pheromone Signaling

Mouse Models for Drug Discovery: Methods and Protocols

This volume discusses basic and advanced techniques to study macrophages and their unique properties. The chapters in this book cover numerous topics such as in vitro culture models for murine and human macrophages; isolation of resident macrophages from several tissues; functional analyses of macrophages; and transgenic models of macrophage depletion and macrophage targeting. Written in the highly successful Methods in Molecular Biology series format,

chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Cutting-edge and comprehensive, *Macrophages: Methods and Protocols* is a valuable resource for researchers who are interested in studying macrophages on an experimental level. The chapters *A Simple Multi-Step Protocol for Differentiating Human Induced Pluripotent Stem Cells into Functional Macrophages* and *Isolation and Phenotyping of Adult Mouse Microglial Cells* are open access under a CC BY 4.0 license via [link.springer.com](http://link.springer.com).

Following the completion of the mouse and human genome sequences, a major challenge is the functional characterization of every mammalian gene and the deciphering of their molecular interaction network. The mouse offers many advantages for the use of genetics to study human biology and disease, unmatched among other mammals. Its development, body plan, physiology, behavior, and diseases have much in common, based on the fact that 99% of the human genes have a mouse ortholog. The investigation of gene function using mouse models is based on many years of technological development. In the two decades since gene targeting in murine embryonic stem (ES) cells was first described by Mario Capecchi and colleagues, more than 3000 predesigned mouse mutants have been developed. To date, a variety of mouse mutagenesis techniques, either gene- or phenotype-driven, are used as systematic approaches. The availability of the genome sequence supports gene-driven approaches such as gene-trap and targeted mutagenesis in ES cells, allowing efficient and precise gene disruption. In combination with the use of site-specific DNA recombinases, in particular the Cre/loxP system, gene disruption can be directed to specific cell types in conditional mouse mutants. Furthermore, chemical and transposon mutagenesis of the mouse genome enables us to perform phenotype-driven screens for the unbiased identification of phenotype–genotype correlations involved in models of human disease. Over the next several years, the mouse genome will be systematically altered, and the techniques for achieving predesigned manipulations will be constantly developed further and improved. The second edition of *Gene Knockout Protocols* brings together distinguished contributors with extensive experience in the gene targeting and mouse genetics fields.

"99% of mouse protein-coding genes have an equivalent homolog in the human genome, despite the striking differences in appearance between mouse and man. This remarkable genetic similarity, together with our ability to finely engineer the murine genome, has made the mouse the ideal animal in which to model and analyze human biology and disease. This B-lymphocyte development and function remains an exciting area of research for those interested in the physiology and pathology of the immune system in higher animals. While recent advances in genetics and cellular and molecular biology have provided a large spectrum of powerful new experimental tools in this field, it is both time consuming and often very

difficult for a student or just any bench-side worker to identify a reliable experimental protocol in the ocean of the literature. The aim of B Cell Protocols is to provide a collection of diverse protocols ranging from the latest inventions and applications to some classic, but still frequently used methods in B-cell biology. The authors of the various chapters are all highly qualified scientists who are either the inventors or expert users of these methods. Their extensive experience in mastering a particular method provides not only the step-by-step details of a reproducible protocol, but also useful troubleshooting tips that readers will appreciate in their daily work. We hope that this book will be helpful for both beginning and experienced researchers in the field in designing or modifying an experimental approach, and exploring a biological question from multiple angles.

Mouse Models of Cancer

B Cell Protocols

Germ Cell Protocols

Oligodendrocytes

Current Protocols in Molecular Biology

This volume is divided in six section covering the most experimental approaches involved in the study of the unfolded protein response (UPR) pathway. Chapters detail determination of unfolded protein levels, methods to study UPR signal transmission, analysing the outcomes of the UPR pathway activation, UPR studies in mammalian models, UPR in alternative models, and UPR and disease. Written in the format of the highly successful Methods in Molecular Biology series, each chapter includes an introduction to the topic, lists necessary materials and reagents, includes tips on troubleshooting and known pitfalls, and step-by-step, readily reproducible protocols. Authoritative and cutting-edge, The Unfolded Protein Response: Methods and Protocols aims to describe key methods and approaches used in the study of the UPR pathway and its complex cellular implications. Chapter 6 is available open access under a Creative Commons Attribution 4.0 International License via [link.springer.com](http://link.springer.com).

Cultured cells have combined accessibility and the ability to expand a homogeneous cell population from a relatively limited source, thus opening up a wealth of possibilities for researchers. In Mouse Cell Culture: Methods and Protocols, expert researchers provide a number of methods for the culture of a wide range of specific cells and tissues isolated from the key genetic model of the fetal or adult mouse. Including protocols for the explant of fetal tissues and stem cells that allow developmental processes to be followed *ex vivo* as well as protocols for the culture of isolated cell types that allow for the study of relatively homogeneous cell populations, this volume brings together a selection of the most current methods in order to make them available in one convenient source. Written in the highly successful Methods in Molecular

Biology™ series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and notes on troubleshooting and avoiding known pitfalls. Practical and authoritative, *Mouse Cell Culture: Methods and Protocols* serves as an immediately applicable springboard for the development of new tissue culture methods in order to advance the study and treatment of human disorders.

This volume presents an assortment of traditional and emerging experimental procedures relevant to Schwann cell research. The chapters are divided into four parts. Part I contains protocols for in vitro culture, purification, and characterization of primary Schwann cells from diverse species and stages of nerve development. It also contains protocols to create cancer cell lines and engineered Schwann cells from unconventional sources via chemical conversion, induced differentiation or genetic intervention. Parts II and III outline a wide range of methodologies used to study Schwann cells within in vitro and in vivo systems relevant to the analysis of peripheral nerve development, cancer, axon degeneration/regeneration, and myelination. Last but not least, part IV outlines protocols for Schwann cell production, collection, labeling and transplantation in the injured peripheral nerve and spinal cord of experimental animals and human subjects. Authoritative and practical, *Schwann Cells: Methods and Protocols* aims to aid both experienced and new investigators to make progress in their research endeavors involving Schwann cells.

Using the most well-studied behavioral analyses of animal subjects to promote a better understanding of the effects of disease and the effects of new therapeutic treatments on human cognition, *Methods of Behavior Analysis in Neuroscience* provides a reference manual for molecular and cellular research scientists in both academia and the pharmaceutical

Applications to Drug Discovery

Principles and Protocols

Microinjection

Transgenic Animal Technology

The Guide to Investigation of Mouse Pregnancy

The generation of genetically modified mice is absolutely crucial to gene function studies today, primarily because mice are genetically similar to man and because gene function studies in mice are in the context of a whole organism, making them particularly useful. In *Transgenic Mouse Methods and Protocols, Second Edition*, expert researchers explore current advances in the field through detailed laboratory protocols. Chapters provide a general introduction outlining how to deal with mice and how to generate transgenic mouse models, explore the generation of conditional and induced knockout and transgenic mice, and offer alternative routes to studying gene function in mice.

Composed in the highly successful *Methods in Molecular Biology™* series format, each chapter contains a brief introduction, step-by-step

methods, a list of necessary materials, and a Notes section which shares tips on troubleshooting and avoiding known pitfalls. Comprehensive and state of the art, *Transgenic Mouse Methods and Protocols*, second Edition is the ideal guide for all researchers interested in the latest information about the production and analysis of transgenic and knockout mice.

The past decade has witnessed a spectacular explosion in both the development and the use of transgenic technologies. In *Transgenesis Techniques: Principles and Protocols*, Second Edition, authoritative researchers-including members of the Dolly team-take stock of these exciting developments to present a collection of readily reproducible techniques for the generation and analysis of transgenic animals, focusing on the manipulation of the mammalian genome. This second edition devotes much space to the creation of genetically modified murine strains, providing access to the germline both by conventional pronuclear injection and by retroviral and adenoviral infection. Extensive coverage is also given to the generation, maintenance, and manipulation of embryonic stem cell lineages, with protocols for both constitutive and conditional (Cre-lox or the Flp-frt systems) gene targeting. Additional chapters provide cutting-edge techniques for the cryopreservation of both male and female germlines, for the generation of transgenic sheep by nuclear transfer, and for the basic analysis of transgenic organisms. Comprehensive and highly practical, this second edition of *Transgenesis Techniques: Principles and Protocols* updates and expands the acclaimed first edition with a wealth of easy-to-follow cutting-edge protocols and practical tips for producing transgenic animals and analyzing their integrated transgenes.

Transgenic Mouse  
Methods and Protocols