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Methods in Molecular Biology 515

# Viral Applications of Green Fluorescent Protein

Methods and Protocols

Edited by

Barry W. Hicks

 Humana Press



# Green Fluorescent Protein Methods In Molecular Biology

**Kevin F. Sullivan**



## **Green Fluorescent Protein Methods In Molecular Biology:**

*Viral Applications of Green Fluorescent Protein* Barry W. Hicks, 2009-04-01 Over the last ten years Green Fluorescent Proteins along with the other spectral variants have emerged from near obscurity to become a powerful and versatile tool in scientific research In *Viral Applications of Green Fluorescent Protein Methods and Protocols* leading investigators from around the world contribute detailed examples of both the construction and application of fluorescent proteins delivered by viruses in a format crafted to produce rapid readily reproducible results Written in the style of the popular and successful *Methods in Molecular Biology*<sup>TM</sup> series the chapters include brief introductions to the topics lists of the necessary materials and reagents step by step laboratory protocols and Notes sections which highlight tips on troubleshooting and avoiding known pitfalls Cutting edge and easy to use *Viral Applications of Green Fluorescent Protein Methods and Protocols* supplies researchers with an ideal guide to the many uses of GFP and a vital starting point for future studies utilizing this highly adaptable protein

*Green Fluorescent Protein* P. Michael Conn, 1999-04-02 One of the most important recent discoveries in science is the green fluorescent protein isolated from a bioluminescent jellyfish The gene that codes for this protein is active in any type of cell from microbes to humans producing a day glo dye visible as a bright green light in the microscope The power of the gene is that by using recombinant DNA technology GFP can be spliced to any protein essentially painting that protein green When such a spliced protein is inside a cell Further time lapse microscopy can be used to examine how that protein and the cellular components that it is part of move within the cell during the cell s life cycle This *Methods in Enzymology* volume deals with the utility of green fluorescent protein GFP The OVID database including MEDLINE Current Contents and other sources lists nine references to GFP for the ten year period 1985 1994 In contrast in less than four years thereafter over 500 references are listed a testament to the rapid growth of interest in this probe This volume documents many diverse uses for this interesting molecule in disciplines that broadly span biology The methods presented include shortcuts and conveniences not included in previously published sources The techniques are described in a context that allows comparisons to other related methodologies such comparisons are valuable to readers who must adapt existing procedures to new systems Also so far as possible methodologies have been presented in a manner that stresses their general applicability and potential limitations The volume provides a substantial and current overview of the extant methodology in the field and a view of its rapid development The critically acclaimed laboratory standard for more than forty years *Methods in Enzymology* is one of the most highly respected publications in the field of biochemistry Since 1955 each volume has been eagerly awaited frequently consulted and praised by researchers and reviewers alike Now with more than 300 volumes all of them still in print the series contains much material still relevant today truly an essential publication for researchers in all fields of life sciences Key Features Monitoring of Physiological Processes Localization of Molecules Special Uses Mutants Variants of GFP

*Green Fluorescent Proteins*, 1998-10-07 This volume is an authoritative and

comprehensive treatment of the approaches and techniques used for Green Fluorescent Proteins GFP The primary focus of this work is on research using biological systems The volume covers all aspects of GFP from its expression in different organisms to specific microscopic and data analysis methods Key Features Only volume on Green Fluorescent Protein research Covers all aspects of GFP Provides specific microscopic and data analysis methods Discusses the design and construction of GFP fusion proteins Covers GFP expression in animals insects plants and microbes Details procedures for time lapse imaging of living cells Explains how to implement single molecule fluorescence detection with GFP Discusses dual label GFP strategies for multicolor fluorescence Presents fluorescence resonance energy transfer methods with GFPs Details quantitative fluorescence imaging techniques Extensively illustrated with color photographs

**Green Fluorescent Protein** Martin Chalfie, Steven R. Kain, 2005-12-13 Since the discovery of the gene for green fluorescent protein GFP derived from jellyfish this protein that emits a green glow has initiated a revolution in molecular biosciences With this tool it is now possible to visualize nearly any protein of interest in any cell or tissue of any species Since the publication of the first edition there have been tremendously significant technological advances including development of new mutant variants Proteins are now available in yellow and blue and Novel Fluorescent Proteins NFPs have expanded their utility in developing biosensors biological markers and other biological applications This updated expanded new edition places emphasis on the rise of NFPs including new chapters on NFP properties with detailed protocols applications of GFPs and NFPs in industry research and biosensors This book provides a solid theoretical framework along with detailed practical guidance on use of GFPs and NFPs with discussion of potential pitfalls The expert contributors provide real examples in showing how to tailor GFP NFP to specific systems maximize expression and enhance detection

**Methods in Molecular Biology: Green fluorescent protein: applications and protocols** John M. Walker, 1984

**Viral Applications of Green Fluorescent Protein** Barry W. Hicks, 2009-04-01 Over the last ten years Green Fluorescent Proteins along with the other spectral variants have emerged from near obscurity to become a powerful and versatile tool in scientific research In Viral Applications of Green Fluorescent Protein Methods and Protocols leading investigators from around the world contribute detailed examples of both the construction and application of fluorescent proteins delivered by viruses in a format crafted to produce rapid readily reproducible results Written in the style of the popular and successful Methods in Molecular Biology™ series the chapters include brief introductions to the topics lists of the necessary materials and reagents step by step laboratory protocols and Notes sections which highlight tips on troubleshooting and avoiding known pitfalls Cutting edge and easy to use Viral Applications of Green Fluorescent Protein Methods and Protocols supplies researchers with an ideal guide to the many uses of GFP and a vital starting point for future studies utilizing this highly adaptable protein

**Fluorescent Proteins** Kevin F. Sullivan, 2007-12-14 This new edition of Fluorescent Proteins presents current applications of autofluorescent proteins in cell and molecular biology authored by researchers from many of the key laboratories in the field Starting from a current review

of the broad palette of fluorescent proteins available several chapters focus on key autofluorescent protein variants including spectral variants photodynamic variants as well as chimeric FP approaches Molecular applications are addressed in chapters that detail work with single molecules approaches to generating protein fusions and biosensors as well as analysis of protein protein interactions in vivo by FRET fluorescence polarization and fluorescence cross correlation techniques A number of approaches to in vivo dynamics are presented including FRAP photoactivation and 4 dimensional microscopy Behavior of spindle components membrane proteins mRNA trafficking as well as analysis of cell types in tissues and in development are detailed and provide models for a wide variety of experimental approaches In addition several chapters deal directly with the computational issues involved in processing multidimensional image data and using fluorescent imaging to probe cellular behavior with quantitative modeling This volume brings together the latest perspective and techniques on fluorescent proteins and will be an invaluable reference in a wide range of laboratories Fluorescent Proteins Mayank

Sharma,2022-09-15 This volume brings together cutting edge laboratory protocols to characterize the novel fluorescent proteins FPs and approaches based on fluorescent proteins that aim to answer some of the key cell biological questions The book covers topics ranging from the database of fluorescent proteins to their characterization and adaptation to a wide range of biological systems 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 and readily reproducible laboratory protocols and tips on troubleshooting and avoiding known pitfalls Authoritative and practical Fluorescent Proteins Methods and Protocols serves as an ideal guide for students and academicians enthusiastic about the recent progress in the practical application of fluorescent protein technology Green Fluorescent Proteins American Society for Cell Biology,1999 This volume is an authoritative and comprehensive treatment of the approaches and techniques used for Green Fluorescent Proteins GFP The primary focus of this work is on research using biological systems The volume covers all aspects of GFP from its expression in different organisms to specific microscopic and data analysis methods Key Features Only volume on Green Fluorescent Protein research Covers all aspects of GFP Provides specific microscopic and data analysis methods Discusses the design and construction of GFP fusion proteins Covers GFP expression in animals insects plants and microbes Details procedures for time lapse imaging of living cells Explains how to implement single molecule fluorescence detection with GFP Discusses dual label GFP strategies for multicolor fluorescence Presents fluorescence resonance energy transfer methods with GFPs Details quantitative fluorescence imaging techniques Extensively illustrated with color photographs

C. elegans Kevin Strange,2008-02-05 Molecular biology has driven a powerful reductionist or molecule c tric approach to biological research in the last half of the 20th century Reductionism is the attempt to explain complex phenomena by defining the functional properties of the individual components of the system Bloom 1 has referred to the post genome sequencing era as the end of naive reductionism Reductionist methods will continue to be an essential element of all biological research efforts

but naive reductionism the belief that reductionism alone can lead to a complete understanding of living organisms is not tenable. Organisms are clearly much more than the sum of their parts and the behavior of complex physiological processes cannot be understood simply by knowing how the parts work in isolation. Systems biology has emerged in the wake of genome sequencing as the successor to reductionism. The systems of systems biology are defined over a wide span of complexity ranging from two macromolecules that interact to carry out a specific task to whole organisms. Systems biology is integrative and seeks to understand and predict the behavior or emergent properties of complex multicomponent biological processes. A systems level characterization of a biological process addresses the following three main questions: 1. What are the parts of the system? i.e.

**Flow Cytometry Protocols** Teresa S. Hawley, Robert Hawley, 2008-02-03. Flow cytometry has evolved since the 1940s into a multidisciplinary field incorporating aspects of laser technology, fluid dynamics, electronics, optics, computer science, physics, chemistry, biology, and mathematics. Innovations in instrumentation, development of small lasers, discovery of new fluorochromes, fluorescent proteins, and implementation of novel methodologies have all contributed to the recent rapid expansion of flow cytometry applications. In this thoroughly revised and updated second edition of *Flow Cytometry Protocols*, time-proven as well as cutting-edge methods are clearly and comprehensively presented by leading experimentalists. In addition to being a valuable reference manual for experienced flow cytometrists, the editors expect this authoritative up-to-date collection to prove useful to investigators in all areas of the biological and biomedical sciences who are new to the subject. The introductory chapter provides an eloquent synopsis of the principles and diverse uses of flow cytometry, beginning with a historical perspective and ending with a view to the future. Chapters 2-22 contain step-by-step protocols of highly practical and state-of-the-art techniques. Detailed instructions and helpful tips on experimental design, as well as selection of reagents and data analysis tools, will allow researchers to readily carry out flow cytometric investigations ranging from traditional phenotypic characterizations to emerging genomics and proteomics applications. Complementing these instructive protocols is a chapter that provides a preview of the next generation of solid-state lasers and one that describes a rapid means to validate containment of infectious aerosols generated during high-speed sorting. Chapters 23-24

**Chromic Phenomena 3rd Edition** Peter Bamfield, Michael Hutchings, 2018-08-24. Chromic or colour-related phenomena are produced in response to a chemical or physical stimulus. This new edition will update the information on all those areas where chemicals or materials interact with light to produce colour, a colour change, or luminescence, especially in the imaging, analysis, lighting, and display areas. The book has been restructured to show greater emphasis on applications where coloured compounds are used to transfer energy or manipulate light in some way, therefore reducing the details on classical dyes and pigments. In the past eight years since the previous edition, there has been a remarkable increase in the number of papers and reviews being produced, reflecting the growth of interest in this area. This ongoing research interest is matched by a large number of new technological applications gaining commercial value, covering e.g. biomedical areas, energy, data storage,

physical colour bio inspired materials and photonics This book appeals to industrial chemists professionals postgraduates and as high level recommended reading for colour technology courses **Green Fluorescent Protein** Martin Chalfie, Steven R. Kain, 2005-10-28 Since the discovery of the gene for green fluorescent protein GFP derived from jellyfish this protein that emits a green glow has initiated a revolution in molecular biosciences With this tool it is now possible to visualize nearly any protein of interest in any cell or tissue of any species Since the publication of the first edition there have been tremendously significant technological advances including development of new mutant variants Proteins are now available in yellow and blue and Novel Fluorescent Proteins NFPs have expanded their utility in developing biosensors biological markers and other biological applications This updated expanded new edition places emphasis on the rise of NFPs including new chapters on NFP properties with detailed protocols applications of GFPs and NFPs in industry research and biosensors This book provides a solid theoretical framework along with detailed practical guidance on use of GFPs and NFPs with discussion of potential pitfalls The expert contributors provide real examples in showing how to tailor GFP NFP to specific systems maximize expression and enhance detection *Luminescent Proteins—Advances in Research and Application: 2012 Edition*, 2012-12-26 Luminescent Proteins Advances in Research and Application 2012 Edition is a ScholarlyEditions eBook that delivers timely authoritative and comprehensive information about Luminescent Proteins The editors have built Luminescent Proteins Advances in Research and Application 2012 Edition on the vast information databases of ScholarlyNews You can expect the information about Luminescent Proteins in this eBook to be deeper than what you can access anywhere else as well as consistently reliable authoritative informed and relevant The content of Luminescent Proteins Advances in Research and Application 2012 Edition has been produced by the world s leading scientists engineers analysts research institutions and companies All of the content is from peer reviewed sources and all of it is written assembled and edited by the editors at ScholarlyEditions and available exclusively from us You now have a source you can cite with authority confidence and credibility More information is available at <http://www.ScholarlyEditions.com> **Introduction to Experimental Biophysics** Jay L. Nadeau, 2016-04-19 Increasing numbers of physicists chemists and mathematicians are moving into biology reading literature across disciplines and mastering novel biochemical concepts To succeed in this transition researchers must understand on a practical level what is experimentally feasible The number of experimental techniques in biology is vast and often s **FLIM Microscopy in Biology and Medicine** Ammasi Periasamy, Robert M. Clegg, 2009-07-06 Detecting Signals at the Single Molecule Level Pioneering Achievements in Microscopy Recent advances have led to such remarkable improvements in fluorescence lifetime imaging microscopy s FLIM capacity for contrast and sensitivity that researchers can now employ it to detect signals at the single molecule level FLIM also offers the additional be **High-Throughput Screening Methods in Toxicity Testing** Pablo Steinberg, 2013-02-26 Explores the benefits and limitations of the latest high throughput screening methods With its expert coverage of high throughput in vitro screening methods for toxicity testing

this book makes it possible for researchers to accelerate and streamline the evaluation and risk assessment of chemicals and drugs for toxicity Moreover it enables them to comply with the latest standards set forth by the U S National Research Council s Toxicity Testing in the 21st Century A Vision and Strategy and the E U s REACH legislation Readers will discover a variety of state of the science high throughput screening methods presented by a group of leading authorities in toxicology and toxicity testing High Throughput Screening Methods in Toxicity Testing is divided into five parts General aspects including predicting the toxicity potential of chemicals and drugs via high throughput bioactivity profiling Assessing different cytotoxicity endpoints Assessing DNA damage and carcinogenesis Assessing reproductive toxicity cardiotoxicity and haematotoxicity Assessing drug metabolism and receptor related toxicity Each chapter describes method principles and includes detailed information about data generation data analysis and applications in risk assessment The authors not only enumerate the advantages of each high throughput method over comparable conventional methods but also point out the high throughput method s limitations and potential pitfalls In addition the authors describe current research efforts to make high throughput toxicity screening even more cost effective and streamlined Throughout the book readers will find plenty of figures and illustrations to help them understand and perform the latest high throughput toxicity screening methods This book is ideal for toxicologists and other researchers who need to implement high throughput screening methods for toxicity testing in their laboratories as well as for researchers who need to evaluate the data generated by these methods

*Proteoglycan Protocols* Renato V. Iozzo, 2008-02-02 Proteoglycans are some of the most elaborate macromolecules of mammalian and lower organisms The covalent attachment of at least five types of glycosami glycan side chains to more than forty individual protein cores makes these molecules quite complex and endows them with a multitude of biological functions Proteoglycan Protocols offers a comprehensive and up to date collection of prepa tive and analytical methods for the in depth analysis of proteoglycans Featuring st by step detailed protocols this book will enable both novice and experienced researchers to isolate intact proteoglycans from tissues and cultured cells to establish the composition of their carbohydrate moieties to generate strategies for prokaryotic and eukaryotic expression to utilize methods for the suppression of specific proteoglycan gene expression and for the detection of mutant cells and degradation products and to study specific interactions between proteoglycans and extracellular matrix proteins as well as growth factors and their receptors The readers will find concise yet comprehensive techniques carefully drafted by leading experts in the field Each chapter commences with a general Introduction followed by a detailed Materials section and an easy to follow Methods section An asset of each chapter is the extensive notation that includes troubleshooting tips and practical considerations that are often lacking in formal methodology papers The reader will find this section most valuable because it is clearly provided by experienced scientists who have first hand knowledge of the techniques they outline In addition most of the chapters are well illustrated with examples of typical data generated with each method

*Biophotonics, Part A*, 2003-02-19 The critically

acclaimed laboratory standard for more than forty years *Methods in Enzymology* is one of the most highly respected publications in the field of biochemistry Since 1955 each volume has been eagerly awaited frequently consulted and praised by researchers and reviewers alike Now with more than 300 volumes all of them still in print the series contains much material still relevant today truly an essential publication for researchers in all fields of life sciences Discusses optical instrumentation for imaging screening and diagnosis in molecules tissues and cells Covers the development and application of optical probes and techniques for imaging and drug screening Investigates the structure and dynamics of biomolecular systems screening and drug discovery and the diagnosis and treatment of disease

**Ion Channels** James D. Stockand, Mark S. Shapiro, 2008-02-04 Internationally recognized biomedical scientists describe recent technological breakthroughs and demonstrate their use in successful experimental designs The diverse applications range from the study of allosteric regulation of ion channel activity using a classic mutagenesis approach to the study of channel subunit stoichiometry using a novel biophysical approach based on fluorescence resonance energy transfer Highlights include methods for heterologous expression of ion channels in cells for determining channel structure function for studying channel regulation and physiological function and for genetic screening and investigating channelopathies

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the range of a quadratic function written in standard form with a negative  $a$  value is  $f(x) \leq k$

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web more importantly these equations show the two special forms of these types of functions form equation uses standard form  $y = ax^2 + bx + c$  simplified form vertex form  $y = a(x-h)^2 + k$  transformations of parent function sketch graphs determine equation from a graph transformation effects when a quadratic function is given in the

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web 1 explain the advantage of writing a quadratic function in standard form 2 how can the vertex of a parabola be used in solving real world problems 3 explain why the condition of  $a \neq 0$  is imposed in the definition of the quadratic function

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web when a quadratic function is represented in vertex form following points are to be noted if  $h > 0$  graph shifts right by  $h$  units if  $h < 0$  graph shifts left by  $h$  units if  $k > 0$  graph shifts upwards by  $k$  units if  $k < 0$  graph shifts downwards by  $k$  units  $h$

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