

RESEARCH ARTICLE

Screening novel antiviral compounds to treat *Clostridioides difficile* infectionsBrice J. Stoltz^{1,2}, Ahmed A. Abouelkhair^{1,2}, Mohamed N. Seleem^{1,2*}

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Abstract

Clostridioides difficile is a major cause of nosocomial infections, often associated with individuals who have gut dysbiosis from previous antibiotic therapies. *C. difficile* infections (CDI) have a high recurrence rate and impose significant financial and mortality burdens on the healthcare system. Therefore, novel anti-*C. difficile* drugs are urgently needed to treat and reduce the severity and recurrence of infection. In this study, we screened a library of 618 antiviral drugs to identify a potential candidate for repurposing as novel anti-*C. difficile* therapeutics. Following our preliminary screening, we identified 9 novel compounds that inhibited *C. difficile* at a concentration of 16 μ M or lower. Among these, 4 antiviral compounds demonstrated the most potent anti-*C. difficile* activity against a panel of 15 *C. difficile* isolates, with minimum inhibitory concentrations (MICs) comparable to the drug of choice, vancomycin. These include rottlerin (MIC₅₀ = 0.25 μ g/mL), α -mangostin (MIC₅₀ = 1 μ g/mL), dryocrassin ABBA (MIC₅₀ = 1 μ g/mL), and obelazimod (MIC₅₀ = 4 μ g/mL). All exhibited minimal to no activity against representative members of the human gut microbiota. Interestingly, α -mangostin, a natural xanthone derived from the mangosteen fruit, exhibited strong bactericidal action, clearing a high inoculum of *C. difficile* in less than an hour. All other drugs exhibited bacteriostatic activity. Given their characteristics, these compounds show great promise as novel treatments for CDI.

OPEN ACCESS

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Introduction

Healthcare-associated infections are one of the greatest burdens on healthcare systems. Most bacteria responsible for a part of this burden are associated with antimicrobial resistance, with one notable exception: *C. difficile*. Despite lacking a significant antimicrobial resistance profile, *C. difficile* is still considered an urgent threat and one of the deadliest bacterial infections responsible for approximately 30,000 deaths annually, primarily affecting older populations [1–5]. The incidence of *C. difficile* infections (CDI) in the United States has increased over the last two decades and has remained relatively stable from 2021 to 2022, with the COVID-19 pandemic seeing a drop in cases due to improved strategies preventing the spread of

Screening The Novel

Keith Selby, Robert Giddings



Screening The Novel:

Screening the Novel Robert Giddings, Keith Selby, Chris Wensley, 1990 **Screening The Novel** Keith Selby, Robert Giddings, 2016-07-27 The book takes as its theme the relationship between literature and the contemporary means of production and distribution collectively termed the media in particular film and television The intention of the book is to explore and evaluate the mutual opportunities and restrictions in this relationship In the grammar of our culture there seems to be an accepted opinion that print is superior in terms of cultural production to film radio or television that to read a book is somehow a higher cultural activity than seeing a play on television or seeing a film By the same token a novel is a superior work of art to film or television The longer perspective reveals that traditionally there always is a greater respect paid to the previous mode of literary production poetry was superior to drama poetic drama was superior to the novel and film attained cult and classic status initially over television **Screening Novel Women** Liora Brosh, 2015-12-04 From Hollywood classics like Jane Eyre or Wuthering Heights to the 1990s wave of Jane Austen films adaptations of the British Nineteenth century novel have been sensationally popular This book examines how British and American filmmakers used the domestic novels of the past to construct stable gender ideals for the present Private Screening Richard North Patterson, 1985 The nation is stunned silent when presidential hopeful James Kilcannon is shot dead point blank while sharing the stage at a benefit concert with his rock star girlfriend Stacy Tarrant Fiercely independent attorney Tony Lord defends the assassin in a sensational trial that erupts into the media event of the decade But the most shocking gambit ever witnessed in the history of television has yet to unfold As America watches a mysterious and ruthless figure known only as Phoenix takes to the airwaves in the ultimate act of high tech terror Holding the wife of a wealthy newspaper mogul and Stacy s manager hostage Phoenix mounts a televised trial of his own in which Stacy Tarrant and Tony Lord are helpless defendants millions of viewers are jurors and unless his chilling demands are met Phoenix is the unstoppable executioner Copyright Libri GmbH All rights reserved Photosynthesis Research for Food, Fuel and Future Tingyun Kuang, Congming Lu, Lixin Zhang, 2013-08-31 Photosynthesis is the process by which plants algae and certain species of bacteria transform solar energy into chemical energy in the form of organic molecules In fact all life on the planet ultimately depends on photosynthetic energy conversion The book provides a compressive and state of the art of very recent progress on photosynthesis research The topics span from atom to intact plants from femtosecond reactions to season long production from physics to agronomy The book is to offer advanced undergraduate students graduate students and research specialists the most recent advances in the all aspects of photosynthesis research The book is intended to offer researchers detailed information on the most recent advances in all aspects of photosynthesis research Tingyun Kuang is a professor at Institute of Botany the Chinese Academy of Sciences CAS and the Academician of CAS Congming Lu is a professor at Institute of Botany CAS Lixin Zhang is a professor at Institute of Botany CAS and the Chief Scientist in the National Basic Research Program of China on

photosynthesis G Protein-Coupled Receptors Xinfeng Zhao,Qian Li,Jing Wang,Qi Liang,Jia Quan,2023-02-20 This book summarizes the progress made to functional immobilize G protein coupled receptors GPCRs through site specific or orientated recognition in both non covalent and covalent manners The last decade is the dawn of the post structural biology era for G protein coupled receptor research As an emerging approach for state of the art immobilization this book discusses efforts to explore the elegance of naturally occurring biochemical reactions by using their high specificity and robust reactivity in the complex system such as site specific conjugation by covalent recognition between enzymes and their substrates With the perspective of protein drug interactions this book also reviews the applications of protein immobilization with an emphasis on G protein coupled receptors in drug discovery and protein ligand interaction analysis In addition the merits opportunities and disadvantages are analyzed for different immobilization methods and a perspective for future directions is presented Given its scope this book appeals to a broad readership particularly researchers engaged in the field of analytical chemistry bioconjugate chemistry and chemical biology and other related field as well as teachers of relevant majors in colleges and universities **Advances in Escherichia Research and Application: 2012 Edition** ,2012-12-26

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Golden Age were based on novels that never received the acclaim they deserved No one who saw Rod Steiger in The Pawnbroker could forget the actor s wrenching performance but does anyone remember the author of the book on which the film was based The same can be said of Jane Fonda in They Shoot Horses Don t They Greta Garbo in Susan Lenox and Humphrey Bogart in The Treasure of the Sierra Madre This book retrieves these novels and re evaluates the careers of the eight neglected novelists whose works inspired eight different directors among them Stanley Kubrick Sidney Lumet John Huston and Sidney Pollack Each chapter offers detailed analysis on both the original text and the resulting movie Taken together the double examination of novel and film raises some important questions about the nature and problems of cinematic adaptation **Protocols and Applications in Enzymology** Seema Anil Belorkar,Sudisha Jogaiah,2021-11-19

Protocols and Applications in Enzymology provides instruction on the experimental procedures of enzyme isolation

techniques innovative screening techniques and instrument enabled enzyme assays and their underlying principles among other protocols The book serves as a one stop solution for those working with different enzyme protocols in the fields of biochemistry microbiology biotechnology and allied subjects Each chapter offers a full overview of protocol key resources materials required quantifiable and statistical analysis optimization and troubleshooting safety considerations and standards Applications are discussed across distribution and diversity of microbial enzymes enzyme screening enzymes in solid state fermentations enzyme assays enzyme kinetics and biotechnological uses Provides step by step instruction on enzyme protocols and applications with actionable discussions of needed resources materials quantification and statistical analysis optimization and troubleshooting safety considerations and standards Presents easy to read reproducible protocols for researchers and students across academia and industry Includes color diagrams that illustrate key concepts Alcohol and Alcohol-related Diseases Sebastian Mueller,Markus Heilig,2023-10-24 Alcohol is one of the major risk factors for negative health outcomes worldwide It accounts for more than 60 alcohol related diseases ranging from addiction through liver cirrhosis to cancer Collectively these conditions account for mortality and morbidity that make alcohol use one of the leading preventable causes of disability adjusted life years DALYs lost globally In this book an international faculty covers all aspects of alcohol related disorders ranging from addiction alcohol use disorders AUD to alcohol related diseases of other organs such as liver heart or cancer A special focus is to reach out to primary care physicians who are in the front line of this major health problem The book also provides an update for addiction specialists as well as specialists in internal medicine gastroenterology and hepatology The book is divided into sections that include epidemiology alcohol use disorders and addiction alcohol related liver disease alcoholic hepatitis primary care and interdisciplinary approaches and other alcohol related diseases Besides current diagnostic measures and treatment strategies the book deals with the many underlying molecular and genetic mechanisms of alcohol toxicity Novel insights include prospective data on all cause mortality and the emerging major role of alcohol mediated hemolysis and enhanced red blood cell turnover The book also aims at guiding policy makers to handle the topic of alcohol in our society more responsibly *Biostimulants in Agriculture* Youssef Roupahel,Giuseppe Colla,2020-03-24 **Screen Adaptations: Jane Austen's Pride and Prejudice** Deborah Cartmell,2010-08-10 The study of literature on screen is a growing area of study in schools and universities Many students have to produce critical essays comparing the novel and film versions of a particular text The Screen Adaptations series offers a wealth of study material from the literary context of the original work through to thought provoking comparisons of the screen versions critical commentary and the afterlife of the films Pride and Prejudice is a classic piece of literature and any new adaptation is a major event With several well known TV and film versions available featuring stars such as Keira Knightley as well as a Bollywood version discussions around how these films interpret the story themes and characters is a popular classroom choice for students and teachers alike This new title in the Screen Adaptations series provides a rich

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Delivery Systems for Tuberculosis Prevention and Treatment Anthony J. Hickey,2016-11-14 Provides a review of novel pharmaceutical approaches for Tuberculosis drugs Presents a novel perspective on tuberculosis prevention and treatment Considers the nature of disease immunological responses vaccine and drug delivery disposition and response Multidisciplinary appeal with contributions from microbiology immunology molecular biology pharmaceutics

pharmacokinetics chemical and mechanical engineering **Recent Advances in Environmental Management** Ram Naresh Bharagava,2018-10-25 This book focuses on the toxicity of various organic and inorganic pollutants their ecotoxicological effects and eco friendly approaches for remediation of environmental pollutants Extensive focus has been relied on the recent advances in ecofriendly approaches such as bioremediation and phytoremediation technologies including the use of various group of microbes for remediation of environmental pollutants etc Researchers working in the field of bioremediation phytoremediation waste management and related fields will find this compilation most useful for further study to learn about the subject matter

Modern Developments In Catalysis, Volume 2 Graham J Hutchings,Matthew G Davidson,Richard C A Catlow,Nicholas J Turner,Christopher Hardacre,Charlotte Williams,Adrian Mulholland,Josie Goodall,Chris Mitchell,2023-02-06 The UK Catalysis Hub is a consortium of universities working together on fundamental and applied research to find out how catalysts work and to improve their effectiveness The contribution of catalysis to manufacturing contributes to almost 40% of global GDP making development and innovation within the field integral to industry Modern Developments in Catalysis Volume 2 provides a review and update of current research and practice on catalysis Topics range from the treatment of water using novel techniques for carbon neutrality cutting edge techniques using intense radiation including Operando Synchrotron Infrared Microspectroscopy to innovation in homogeneous catalysis heterogeneous catalysis and biocatalysis Edited by leaders of the UK Hub this book provides insight into one of the most important areas of modern chemistry it represents a unique learning opportunity for students and professionals studying and working towards speeding up improving and increasing the rate of catalytic reactions in science and industry

Microbial Energy Conversion Zhenhong Yuan,2018-05-22 The book provides an overview on various microorganisms and their industrialization in energy conversion such as ethanol fermentation butanol fermentation biogas fermentation and fossil energy conversion It also covers microbial oil production hydrogen production and electricity generation The content is up to date and suits well for both researchers and industrial audiences

Bt Resistance Mario Soberon,Yulin Gao,Alejandra Bravo,2015-04-24 Bacillus thuringiensis Bt bacteria use Cry proteins to kill their insect larval hosts The expression of certain

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




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