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Review

Molecular Insights into Coumarin Analogues as Antimicrobial Agents: Recent Developments in Drug Discovery

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Simple Summary: Coumarins are a large family of benzopyrones, and more than 1300 coumarins have been reported to date. Natural, as well as synthetic, coumarins have demonstrated a diverse activity spectrum. On the other hand, the demands of the current health scenario witnessing morbidity and mortality due to microbial infections and multidrug-resistant bacterial strains, the well-reported phytochemical coumarin can be of interest. Some of the well-reported coumarin analogues as antimicrobial agents include β-lactum derivatives, coumarin-based 1,2,3-triazole compounds, the miconazole analogue, coumarin-substituted pyrazole hybrids, pyranocoumarin, coumarin—sulphonamide hybrids, pyranocoumarins, coumarin—sulphonamide derivatives, chromenylpyrazoles candidates, 3-amidocoumarins analogues, uracil—coumarin hybrids, indolinedione—coumarin hybrids, coumarin—imidazole hybrids, coumarin-fused pyrazolones and methyl thiazole derivatives, coumarin—theophylline hybrids, etc. In the present review, several methods for the synthesis of coumarin derivatives as antimicrobial agents are reported, along with structure—activity relationship (SAR) studies focusing on the developments reported since 2016.

Abstract: A major global health risk has been witnessed with the development of drug-resistant bacteria and multidrug-resistant pathogens linked to significant mortality. Coumarins are heterocyclic compounds belonging to the benzophenone class enriched in different plants. Coumarins and their derivatives have a wide range of biological activity, including antibacterial, anticoagulant,

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Recent Research Developments In Antimicrobial Agents And Chemov3pt1

Tilak Saha

Recent Research Developments In Antimicrobial Agents And Chemov3pt1:

Recent Research Developments in Antimicrobial Agents & Chemotherapy S. G. Pandalai,1999 **Recent Research Developments in Antimicrobial Agents & Chemotherapy** ,1999 **Recent Research Developments in Antimicrobial Agents & Chemotherapy** ,1999 Novel Antibacterial Agents Fiorella Meneghetti,Daniela Barlocco,2022-01-12 This book was devoted to the latest advances achieved in the antibacterial field with a focus on the recent efforts made to develop new antimicrobial agents with novel modes of action and a perspective on future directions of this line of research Antimicrobial resistance has become a major threat to global health and the twenty two published articles here reported put in evidence that the discovery and development of new antibiotics are extremely challenging The antimicrobial research covers a wide area spanning from the design of new compounds also supported by molecular modeling techniques their synthesis and characterization and biological tests In this context the current crisis caused by the COVID 19 pandemic but also older threats such as the human immunodeficiency virus or the hepatitis C virus require greater attention than ever The research works described in this book provide an extremely useful example of the results achieved in the field of antibacterial drug development The search for new chemical entities was approached starting from both natural and synthetic compounds and addressing different targets In addition recent findings were presented and discussed highlighting the strategies to fight bacterial resistance Detailed references to the state of the art can be found in this book We strongly encourage the wide group of readers to explore the book that we are presenting to get inspired to develop new approaches for the diagnosis and treatment of antibacterial diseases and to circumvent resistance issues **Recent Trends and The Future of Antimicrobial Agents - Part 2** Tilak Saha,2023-06-27 Recent Trends and the Future of Antimicrobial Agents provides a significantly expanded overview of the topic with updated research in a broader context on the development of alternative approaches against microbial infections This part primarily describes the use of probiotics chemically synthesized compounds and nanomaterials as antimicrobial agents The first chapter describes the potential of probiotics for the restoration of gut microbiomes Amongst various antimicrobial agents the use of antibodies has recently been investigated as a potential remedy A chapter on antibody based therapy as an alternative to antibiotics has been included Chemical synthesis has eased the development of target based prospective drug molecules against microorganisms Chemically synthesized cationic amphiphiles and amphiphilic nanocarriers as antimicrobial agents have been discussed with sufficient detail in two different chapters Research and progress in Schiff Base Metal Complexes and Metal Organic Frameworks for their antimicrobial applications have also been described in two separate chapters Independent chapters discussing the design synthesis and antimicrobial applications of biogenic metal or metalloid nanoparticles bactericidal QDs and MoS2 based antibacterial nanocomposites have fulfilled the aim of incorporating cutting edge research in the areas of alternative antimicrobials Also a new age approach to combat microbes antimicrobial photodynamic therapy aPDT is

discussed in the final chapter of the edited volume This part intends to provide the readers with an updated and broad view of research and development in alternative remedial approaches against microbial infections The contents cater to the information needs of professionals and learners in academia industry and health services who aim to learn the most significant experimental and practical approaches towards finding alternatives to existing antimicrobial therapies *Novel Antibacterial Agents* Fiorella Meneghetti,Daniela Barlocco,2022 This book was devoted to the latest advances achieved in the antibacterial field with a focus on the recent efforts made to develop new antimicrobial agents with novel modes of action and a perspective on future directions of this line of research Antimicrobial resistance has become a major threat to global health and the twenty two published articles here reported put in evidence that the discovery and development of new antibiotics are extremely challenging The antimicrobial research covers a wide area spanning from the design of new compounds also supported by molecular modeling techniques their synthesis and characterization and biological tests In this context the current crisis caused by the COVID 19 pandemic but also older threats such as the human immunodeficiency virus or the hepatitis C virus require greater attention than ever The research works described in this book provide an extremely useful example of the results achieved in the field of antibacterial drug development The search for new chemical entities was approached starting from both natural and synthetic compounds and addressing different targets In addition recent findings were presented and discussed highlighting the strategies to fight bacterial resistance Detailed references to the state of the art can be found in this book We strongly encourage the wide group of readers to explore the book that we are presenting to get inspired to develop new approaches for the diagnosis and treatment of antibacterial diseases and to circumvent resistance issues **Development of Novel Antimicrobial Agents** Karl Lohner,2001-01-01 This book presents current research on the development of new classes of antibiotics with novel mechanisms of action Leading international researchers from academia and industry present this unique collection of highly acclaimed reviews covering every aspect of this important topic The authors also discuss strategies for the containment of antimicrobial resistance and advocate a more sophisticated and prudent use of antibiotics New Antimicrobial Agents and the Development of Resistance John baptist Maluda,Institute for Medical Research (Malaysia),1994 **Antimicrobials** Flavia Marinelli,Olga Genilloud,2013-10-04 Reports on the emergence and prevalence of resistant bacterial infections in hospitals and communities raise concerns that we may soon no longer be able to rely on antibiotics as a way to control infectious diseases Effective medical care would require the constant introduction of novel antibiotics to keep up in the arms race with resistant pathogens This book closely examines the latest developments in the field of antibacterial research and development It starts with an overview of the growing prevalence of resistant Gram positive and Gram negative pathogens including their various resistance mechanisms prevalence risk factors and therapeutic options The focus then shifts to a comprehensive description of all major chemical classes with antibacterial properties their chemistry mode of action and the generation of analogs information that provides

the basis for the design of improved molecules to defeat microbial infections and combat the emerging resistances In closing recently developed compounds already in clinical use those in preclinical or first clinical studies and a number of promising targets to be exploited in the discovery stage are discussed Recent Trends and The Future of Antimicrobial Agents - Part 2 Tilak Saha,2023-06-27 Recent Trends and the Future of Antimicrobial Agents provides a significantly expanded overview of the topic with updated research in a broader context on the development of alternative approaches against microbial infections This part primarily describes the use of probiotics chemically synthesized compounds and nanomaterials as antimicrobial agents The first chapter describes the potential of probiotics for the restoration of gut microbiomes Amongst various antimicrobial agents the use of antibodies has recently been investigated as a potential remedy A chapter on antibody based therapy as an alternative to antibiotics has been included Chemical synthesis has eased the development of target based prospective drug molecules against microorganisms Chemically synthesized cationic amphiphiles and amphiphilic nanocarriers as antimicrobial agents have been discussed with sufficient detail in two different chapters Research and progress in Schiff Base Metal Complexes and Metal Organic Frameworks for their antimicrobial applications have also been described in two separate chapters Independent chapters discussing the design synthesis and antimicrobial applications of biogenic metal or metalloid nanoparticles bactericidal QDs and MoS2 based antibacterial nanocomposites have fulfilled the aim of incorporating cutting edge research in the areas of alternative antimicrobials Also a new age approach to combat microbes antimicrobial photodynamic therapy aPDT is discussed in the final chapter of the edited volume This part intends to provide the readers with an updated and broad view of research and development in alternative remedial approaches against microbial infections The contents cater to the information needs of professionals and learners in academia industry and health services who aim to learn the most significant experimental and practical approaches towards finding alternatives to existing antimicrobial therapies *Discovery of New Antimicrobial Agents* William I. Northern,2007 Combinatorial chemistry has become an important aspect of medicinal research due to its flexibility and the ability to produce large numbers of potential therapeutic agents Once compounds are made they must be screened to determine if there is any biological activity This research project focused on developing a screening method for chemical agents produced by a graduate student in the chemistry department at Wright State University After an acceptable screening method was found the goal of the project was to determine if compounds produced had either antibacterial activity antifungal activity or both Seven compounds exhibited biological activity Two of these compounds had activity against all organisms tested Five compounds had activity against only Staphylococcus aureus Also initial toxicity studies were performed on the two compounds that had activity against both bacteria and fungi The toxicity was detected by cytopathic effect CPE noted in human and monkey cell lines One compound demonstrated severe toxicity while the other compound demonstrated slight toxicity Additional research including animal safety studies will be required to determine if these compounds are viable

prospects for development into antimicrobial agents This research confirmed that it is possible to use combinatorial methods to produce agents However the ability to produce antimicrobial compounds is only a small part of producing a useful drug

Antimicrobials in Pharmaceutical and Medicinal Research Arti Gupta,RAM PRASAD,2023-04-03 The need for state of the art antimicrobial agents is greater than ever because of the development of multidrug resistance in communal pathogens the rapid rise of new infections and the potential for use of multidrug resistant agents in biological protection Although the need for novel antimicrobials is increasing the development of such agents faces significant obstacles Pharmaceutical research and development costs are estimated to be 400 800 million per approved agent The most important natural antimicrobial compounds derived from various plant sources containing a wide variety of secondary metabolites With collected contributions from international subject experts this volume focuses primarily on antimicrobials This book deliberates recent developments in microbial science in combating infectious diseases and explores advances in antimicrobial constituents and their applications in the fight against bacteria In addition it also provides a variety of photographs diagrams and tables to help illustrate the material The novel strategies to combat antimicrobial resistance are also described emphasizing collaborative measures of control We describe the concerted efforts undertaken by global communities to combat antimicrobial resistance in detail The most efficient strategy could be a behavioural change towards indiscriminate consumption usage and prescription of antibiotics Students research scientists academicians and policy makers can benefit from Antimicrobials in Pharmaceutical and Medicinal Research as a resource that addresses biotechnology applied microbiology healthcare pharmaceutical products medicinal plant products and all disciplines related to antimicrobial research Features of the book Covers development in plant based antimicrobials for sepsis management and progress Describes modern approaches for phyto nanoconjugates in combating multidrug resistance in biomedicine Details methods to improve antimicrobial properties to have a longer service life in combating infection Describe bacteriocins and plant metabolites as biotechnological tools in food pharmaceuticals and therapeutics applications Highlights natural antimicrobial therapeutic peptides Offers current and future applications of emerging antimicrobial technologies *Novel Antimicrobial Agents and Strategies* David A. Phoenix,Frederick Harris,Sarah R. Dennison,2014-08-25 By integrating knowledge from pharmacology microbiology molecular medicine and engineering researchers from Europe the U S and Asia cover a broad spectrum of current and potential antimicrobial medications and treatments The result is a comprehensive survey ranging from small molecule antibiotics to antimicrobial peptides and their engineered mimetics from enzymes to nucleic acid therapeutics from metallic nanoparticles to photo and sonosensitizers and to phage therapy In each case the therapeutic approaches are compared in terms of their mechanisms likelihood to induce resistance and their efficiency in a global healthcare context Unrivaled knowledge for professionals in fundamental research pharmaceutical development and clinical practice *Natural Products for Antibacterial Drug Development: Recent Advancement of Computational Approach* Tripti

Sharma,Chita Ranjan Sahoo,Debdutta Bhattacharya,Sanghamitra Pati,2024-12-12 The book focuses on the rampant use of higher dose antibiotics in human routine consumption and how it leads to bacterial resistance to multiple drugs Book chapters focus on the result of their overuses and concomitant misuses and how antibiotics have become synonymous with the unending hellish experience that is antimicrobial resistance by pathogenic microbes It also talks about the challenges associated with the treatment of bacterial infections and challenges to mankind due to the development of high rates of antibiotic resistance This book also provides information about developments of antibacterial drugs from natural sources In addition it also covers different computational approaches used for antibacterial drug development from natural sources in recent times Finally the book also elucidates a detailed outline of bacterial resistance status current treatment methods natural products as an opportunity for the development of potent druggable candidates and methods of antibacterial drug development This book serves as a great resource for students researchers and academicians in the field of pharmacology

Treating Infectious Diseases in a Microbial World National Research Council,Division on Earth and Life Studies,Board on Life Sciences,Committee on New Directions in the Study of Antimicrobial Therapeutics: Immunomodulation,Committee on New Directions in the Study of Antimicrobial Therapeutics: New Classes of Antimicrobials,2006-01-03 Humans coexist with millions of harmless microorganisms but emerging diseases resistance to antibiotics and the threat of bioterrorism are forcing scientists to look for new ways to confront the microbes that do pose a danger This report identifies innovative approaches to the development of antimicrobial drugs and vaccines based on a greater understanding of how the human immune system interacts with both good and bad microbes The report concludes that the development of a single superdrug to fight all infectious agents is unrealistic **The Current Status of the Development of Antimicrobial Agents** Gladys L. Hobby,1955 Current Trends in the Identification and Development of Antimicrobial Agents M. Amin-ul Mannan,Gaurav Kumar,2023-03-08 Despite an increase in life expectancy over the past 20 years the number of novel multidrug resistant microorganisms has also risen dramatically To reduce the risk of reemerging infections and limit the spread of multidrug resistant microorganisms it is urgently necessary to develop safe and effective therapeutic countermeasures New antimicrobial chemicals are mostly produced with the help of microorganisms and the bulk of medications now on the market are of this type The use of high therapeutic screening and recent developments in analytical instrumentation has allowed the researchers to identify novel antimicrobial compounds from bacteria fungi plants mushrooms algae and other sources more quickly The second volume of Frontiers in Antimicrobial Agents highlights the ongoing requirement for researching and creating novel antimicrobial medications Current Trends in the Identification and Development of Antimicrobial Agents aims to bring together the expertise of notable academics to examine all facets of antimicrobial research while keeping recent advancements in perspective Antibiotic discovery sources of novel antimicrobial chemicals developing and reemerging microbial infections various elements of drug resistance and the need for antimicrobial medications in the future are all

covered in this book It is a timely reference for anyone involved in the discovery and development of new drugs including microbiologists biotechnologists pharmacologists doctors and researchers Biochemistry and Molecular Biology of Antimicrobial Drug Action Trevor J. Franklin,George Alan Snow,2005-03-03 The subject is one of major interest in basic microbiology and infectious diseases and the book is a known classic Antimicrobial Compounds Tomás G. Villa,Patricia Veiga-Crespo,2013-10-19 Since penicillin and salvarsan were discovered a number of new drugs to combat infectious diseases have been developed but at the same time the number of multi resistant microorganism strains is increasing Thus the design of new and effective antibacterial antiviral and antifungal agents will be a major challenge in the next years This book reviews the current state of the art in antimicrobial research and discusses new strategies for the design and discovery of novel therapies Topics covered include the use of genetic engineering genome mining manipulation of gene clusters X ray and neutron scattering as well as the antimicrobial effects of essential oils antimicrobial agents of plant origin beta lactam antibiotics antimicrobial peptides and cell wall affecting antifungal antibiotics Recent Advances in the Application of Marine Natural Products as Antimicrobial Agents Arumugam Veera Ravi,2023-10-02

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