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Bnezopyran A Heterocyclic System with Antimicrobial Property



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ABSTRACT

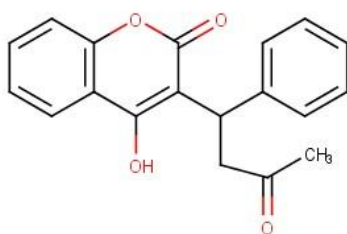
Benzopyran is a heterocyclic system also known as coumarin. Benzopyran is one of the most common heterocycles present in nature as several plants contain benzopyran or coumarin in it. The biological potential of benzopyran is also a keen area of interest as derivatives containing benzopyran are quite potent in action. Warfarin is quite a potent anticoagulant possessing a coumarin nucleus. Here we are summarizing some benzopyran derivatives with antimicrobial action.



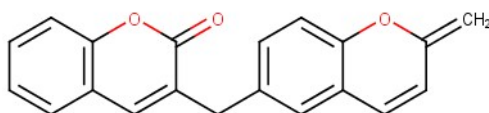
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INTRODUCTION

Benzopyran is a conjugated heterocyclic system containing a six-membered ring is linked with another six-number ring containing oxygen as heteroatom. Benzopyran nucleus is quite common in nature as several plants contain Benzopyran. Due to their presence in the nature and properties associated with them, benzopyran has been researched by various researchers and analyzed different biological properties associated with them. Antimicrobial are the compounds that are utilized against microbial infections. Development of the antimicrobial is a continuous process and the emergence of new stains and resistance towards the available agents. Benzopyran has been noted for several biological activities like anticancer, anti-inflammatory, antiulcer and antimicrobial. Benzopyran has been observed in several bioactive molecules like warfarin, dicoumarol as shown in the following figure:



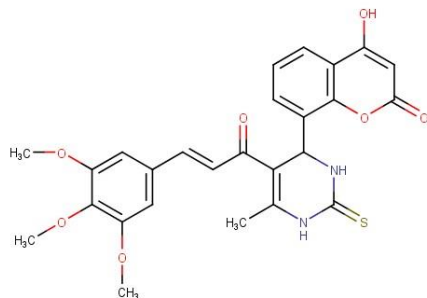
HUMAN
Warfarin



Dicoumarol

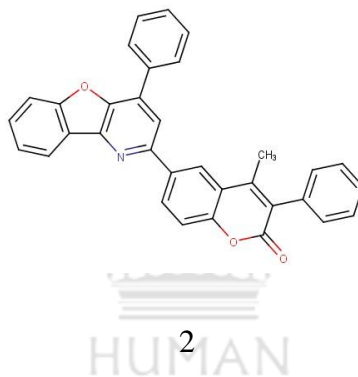
Several benzopyran derivatives with antimicrobial activities are reported here. We are summarizing the antimicrobial potential of some benzopyran with their development.

Shaik et. al. (2021) reported development of coumarin clubbed chalcone hybrids using molecular hybridization technique. 4-hydroxy-8-{6-methyl-2-sulfanylidene-5-[(2E)-3-(3,4,5-trimethoxyphenyl)prop-2-enoyl]-1,2,3,4-tetrahydropyrimidin-4-yl}-2H-chromen-2-one (1) was found to be most promising agent.



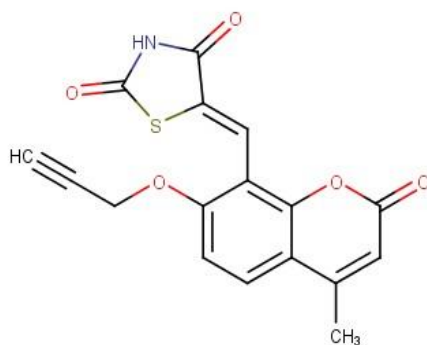
1

Giri et. al. (2015) reported the development of modified pyridine-substituted Coumarins (2) as antimicrobial and antitubercular agents.



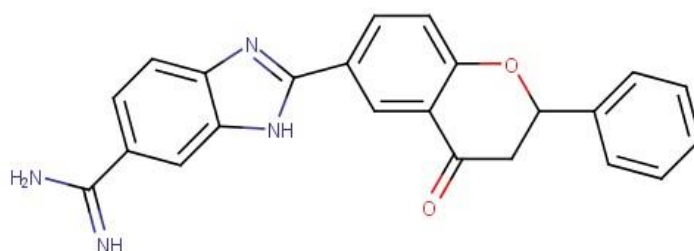
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Genget. al. (2018) reported development of ethylenic conjugated coumarin thiazolidinediones against methicillin-resistant *Staphylococcus aureus* (MSRA), (Z)-5-((4-methyl-2-oxo-7-(prop-2-yn-1-yloxy)-2H-chromen-8-yl)methylene)thiazolidine-2,4-dione (3) was found to be most active compound from the series.



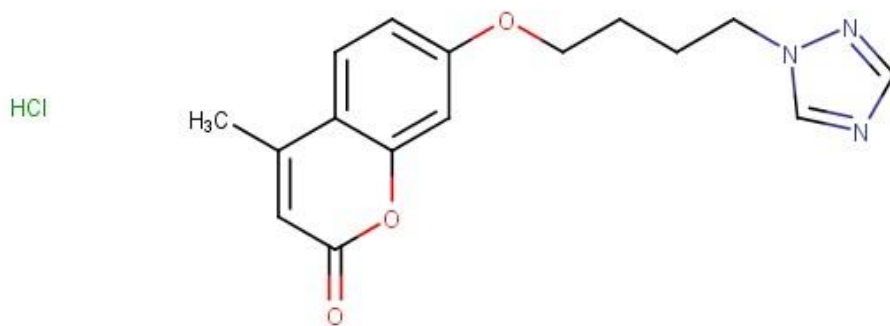
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Goerker, et al. (2021) reported the synthesis of 2-phenyl or methyl-4H-1-benzopyran-4-ones containing amidinobenzimidazoles (4) as antimicrobial compounds. 6-[2-(5(6)-Butylamidinobenzimidazolyl)]-2-phenyl-4H-1-benzopyran-4-one hydrochloride and 6-[2-(5(6)-Cyclohexylamidinobenzimidazolyl)]-2-phenyl-4H-1-benzopyran-4-one hydrochloride (was found to be most active derivatives).



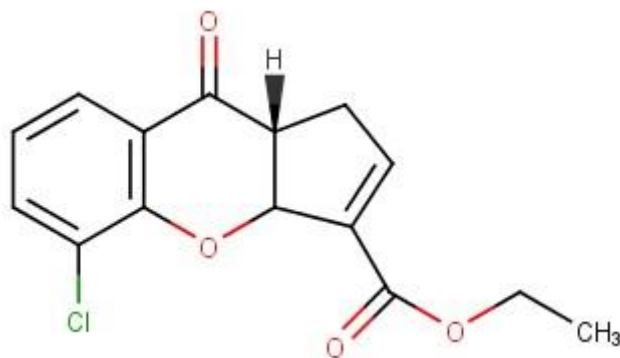
4

Zhou et al. (2011) reported the development of coumarin triazole derivatives as antimicrobial agents. 7-(4-(1H-1,2,4-triazol-1-yl)butoxy)-4-methyl-2H-chromen-2-one hydrochloride (5) is one of the active compounds from the synthesized derivatives.



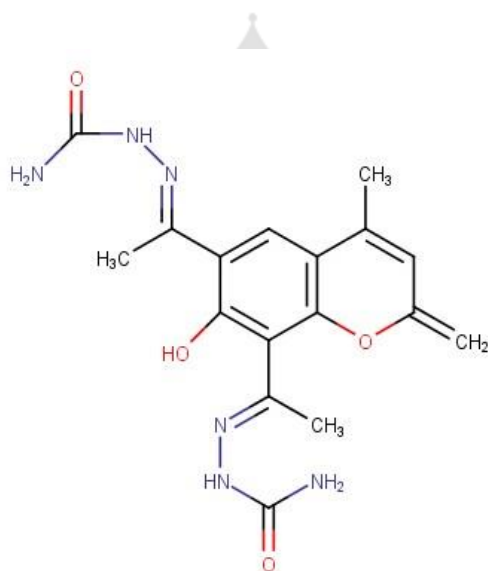
5

Ishar et al. (2012) reported development of 3a,9a-dihydro-1-ethoxycarbonyl-1-cyclopenteno[5,4-b]benzopyran-4-ones as antifungal agents. 8-Chloro-3a,9a-Dihydro-1-ethoxycarbonyl-1-cyclopenteno[5,4-b]benzopyran-4-one (6) is active compound from the series.



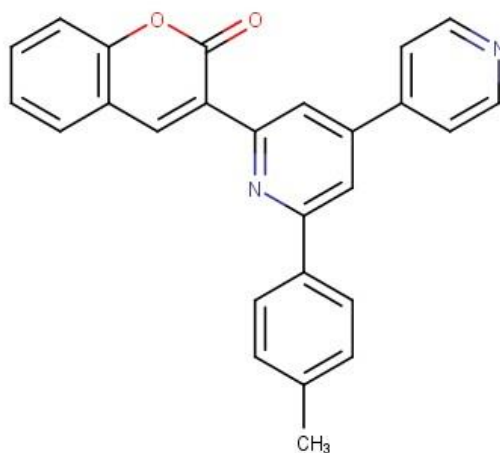
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Kariyappa et al. (2015) synthesized bis(formylpyrazole) derivatives as antimicrobial and antioxidant agent. [(E)-(1-{8-[(1E)-1-[(carbamoylamino)imino]ethyl]-7-hydroxy-4-methyl-2-methylidene-2H-chromen-6-yl}ethylidene)amino]urea (7) is one of active antimicrobial compound obtained.



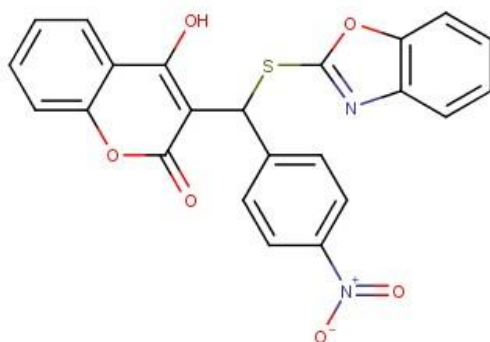
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Brahmbhatt et al. (2013) reported development of 3-bipyridinyl substituted coumarins derivatives as antimicrobial agents. 3-[6-(4-methylphenyl)-[4,4'-bipyridine]-2-yl]-2H-chromen-2-one (8) was found to be active compound.



8

Bodke et. al. (2019) reported 3-[[[(1, 3-benzoxazol-2-yl) sulfanyl] (phenyl) methyl]-4-hydroxy-2H-1-benzopyran-2-one derivatives as antimicrobial derivatives (9).



9

Bizzarri et. al. (2019) reported N-substituted-2-oxo-2H-1-benzopyran-3-carboxamides as anti-Helicobacter pylori.



10

SUMMARY:

Benzopyran is one of the most commonly observed heterocycles in nature. Physicochemical properties associated with benzopyran make them an excellent chemical scaffold for the design and development of therapeutic agents. The development of antimicrobial agents needs time and benzopyran can be an attractive option for the development of potent antimicrobial agents.

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