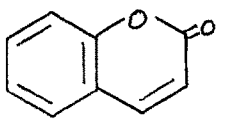
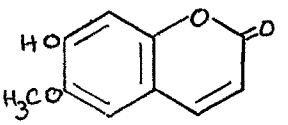
INTRODUCTION

Introduction

Benzo-α-pyrones, generally known as coumarins, occur naturally, both in the free state and as glycosides. Coumarin (I), Scopoletin (II), Ayapin (III) and Daphnetin (IV) are a few of the simple coumarins occurring in nature.



(I)



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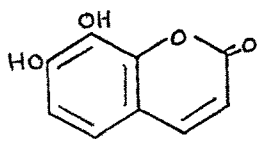

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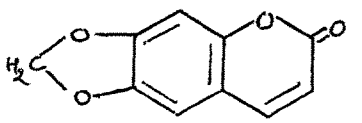
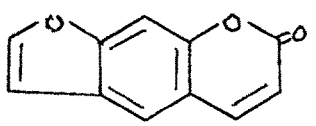


(III)

Another group of the interesting naturally occurring coumarin derivatives are the furocoumarins. Psoralene (V), Angelicin (VI), Pimpinellin (VII) and Oreoselone (VIII) are a few members of this group.



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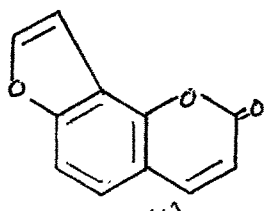
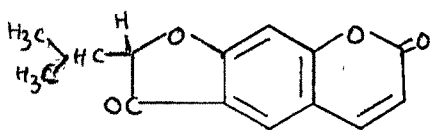
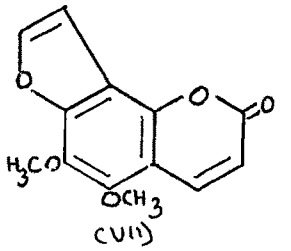


(VI)



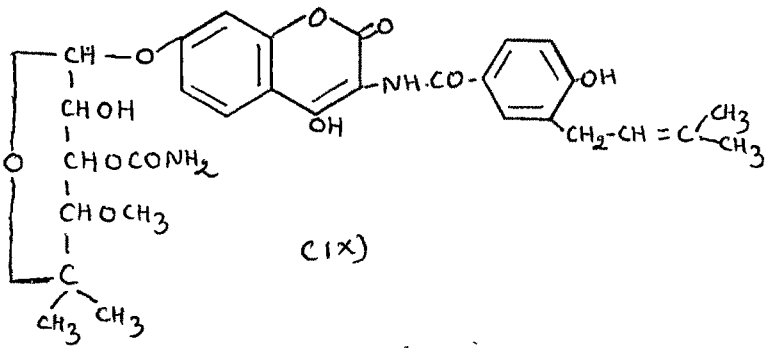
(VIII)



(VII)

Many natural coumarins affect the living cell of plants and animals in various ways. Bose (1) has reviewed the biochemical properties of natural coumarins. Coumarin itself inhibits the germination and growth of plants (2,3,4). It has been also shown that coumarin derivatives are found to possess the " blastocholine " effect on seeds (5) as well as on animals (6).

Novobiocin, a new antibiotic isolated from Streptomyces Sp., has been found to be a coumarin derivative having the structure (IX) (7,8). The antibacterial spectrum of this antibiotic corresponds generally with that of penicillin and erythromycin, but, in vitro it is less potent than penicillin and erythromycin.



(IX)

The therapeutic properties of 3,3'-methylene bis (4-hydroxycoumarin) derivatives and those of furocoumarins are described in chapters II and III respectively.

There are a number of methods available for the synthesis of coumarin derivatives. These have been reviewed by Sethna and Shah (9) and Wawzonek (10).

A good deal of work has been done on the substitution in the coumarin ring system. The earlier work has been reviewed by Sethna and Shah (9) and by Wawzonck (10). During the past ten years several studies on the substitution in coumarins such as bromination (11,12,13,14), iodination (15,16), chloromethylation (17) ~~of coumarin derivatives~~ have been made in this laboratory and elsewhere.

The present work deals with some ~~other~~ aspects of the chemistry of coumarins.

In chapter I, the syntheses of some substituted 3-hydroxycoumarins by the condensation of substituted salicylaldehydes with acetylglycine are described. Further, it incorporates the results of some substitution reactions on 3-hydroxycoumarin.

In chapter II, the syntheses of 3-methyl- and 3-benzyl-4-hydroxycoumarin derivatives by the thermal condensation of different phenols with diethyl malonate and ethyl benzylmalonate are described.

In chapter III, the syntheses of some coumarino-α-pyrones and furocoumarins are described.

In chapter IV, the use of ion exchange resins as catalysts in the synthesis of coumarins by the condensation of β -ketonic esters with phenols (Pechmann reaction) and o-hydroxybenzaldehydes with malonic ester, acetoacetic ester and cyanacetic ester (Knoevenagel reaction), and the Michael condensation of cyanoacetamide and cyanacetic ester with coumarin derivatives

has been studied.

In chapter V, some approaches to the synthesis of 7-hydroxy-6-acylcoumarins which are difficult to obtain are described. These have however been unsuccessful.

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