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NOTE

A New Anthraquinone from the Root Bark of *Cassia nodosa*

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The present communication deals with the isolation and structural elucidation of 1,8-dihydroxy-6,7-dimethoxy-2-methyl anthraquinone isolated from the root bark of *Cassia nodosa* Buch. Ham, a medicinal plant.

Genus Cassia, a tropical genus, belongs to Leguminosae family. It contains more than 600 species as herbs, shrubs and trees. Different parts of some *Cassia* species such as *C. alata*, *C. fistula*, *C. glauca* and *C. nodosa* etc. are indispensable ingredients in the Indian system of medicine and it contains mucilaginous and cathartic properties. Antibacterial, antibiotic, antifungal, antipyretic and analgesic activities have been reported from some of these plants.[1] The present paper deals with the isolation and structural elucidation of a new anthraquinone, 1,8-dihydroxy-6,7-dimethoxy-2-methyl anthraquinone.

The new yellow coloured compound has m.f. $C_{17}H_{14}O_6$ and m.p. 214°C. The aqueous solution of the compound was reduced with Zn/HCl[2] and Zn/NaOH. The compound dissolved in benzene; when treated with dilute solution of NaOH, the aqueous layer turned red and benzene layer lost its colour.[3] When the compound was treated with 5 N NaOH aqueous solution, red colour appeared which gradually deepened on heating.[4] These reactions and colour tests indicated that the compound had anthraquinone structure which was also supported by λ_{max}^{EtOH} 430 nm in the visible region of the UV absorption spectrum of the compound gave 2-methyl anthracene, m.p. 207°C indicating it to be a 2-methyl anthraquinone derivative.

The compound formed a diacetate with accetic anhydride and pyridine[6] indicating the presence of two hydroxyl groups. It was also supported by IR peak at 3460 cm^{-1}. No positive colour reaction was observed when the compound was treated with ceric ammonium nitrate but it gave positive test with neutral $FeCl_3$, solution, indicating the presence of phenolic hydroxyl groups. The presence of two methoxyl groups in the compound was confirmed by Zeisel's method[7] and it was also supported by a peak at 2925 cm^{-1} in IR spectrum.

The formation of a green complex with ethanolic $CuSO_4$ indicated the presence

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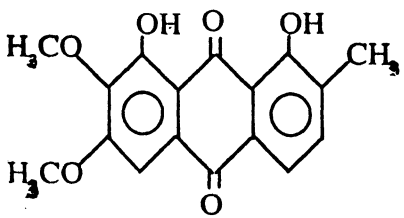
of one —OH group at α-position to the >C=O group in the molecule.[8] The compound did not dissolve in 5% Na_2CO_3 solution indicating the absence of β-hydroxyl groups.[9] A chromatogram of the compound was developed and sprayed with 5% methanolic solution of magnesium acetate and on heating at 90°C for a few minutes, it did not give pink colour, indicating the absence of 1,3-dihydroxy system in the molecule.[10] The solution of the compound in acetone was treated with alkaline zirconium nitrate; orange colour was obtained which was discharged on acidification indicating the absence of two *ortho-* hydroxyl groups. The compound did not give violet colour with conc. H_2SO_4 showing the absence of 1,5-dihydroxy system in the molecule.[11] A spot of the compound on the filter paper treated with glacial acetic acid failed to give the characteristic fluorescence in UV light indicating the absence of 1,4-dihydroxy system in the molecule.[12] When the compound was treated with 10% KOH solution and $HCONH_2$, a dark red colour was obtained which showed the presence of 1,8-dihydroxy system in the molecule.[13] The presence of —OH groups at 1 and 8 positions was also supported by IR peaks at 1668 and 1622 cm^{-1} corresponding to unchelated and doubly chelated >C=O group.

The compound when heated with 80% H_2SO_4 for a few minutes did not give deep red colour indicating the absence of α-methoxyl groups in the molecule. The presence of methoxyl group at position 3 is ruled out as the compound on dimethylation with HI/P did not respond to the characteristic test of 1,3-dihydroxy system. Thus, the two methoxyl groups can be fixed at positions 6 and 7 respectively. This is also supported as the demethylated compound showed positive test of vicinal hydroxyl groups.[14] When the methyl ether of the compound was oxidised with CrO_3/H_2SO_4, it gave 3,4,5-trimethoxyphthalic acid indicating the presence of methoxyl groups at positions 6 and 7 respectively. Thus the final structure of the compound is represented as follows:



1,8-dihydroxy-6,7-dimethoxy-2-methyl anthraquinone

Thus, the above mentioned compound appears to be a new anthraquinone from the root bark of *Cassia nodosa.*

Melting pooints were determined on a Richert microscope hot stage apparatus.

Isolation and Extraction. The air dried and crushed root bark of *Cassia nodosa* was exhaustively extracted in a soxhlet extractor using different solvents petroleum ether, benzene and ethylacetate successively. The ethylacetate extract was concentrated under reduced pressure to a small volume and chromatographed on silica gel column using different organic solvents as eluants. The eluate, benzene and ethyl acetate mixture (3 : 7 v/v) gave a yellow coloured compound

on concentration. The compund was crystallised with petroleum ether-ethyl acetate mixture and it showed m.p. 214°C.

Elemental Analysis

Observed	Calculated
C = 64.89%	C = 64.00%
H = 4.39%	H = 4.00%

Acetate m.p. 201°C, $C_{17}H_{12}O_6(OCOCH_3)_2$

Acetyl group:	Observed	Calculated
	21.80%	36.26%

—OCH_3 group in the compound:

Observed	Calculated
19.72%	19.25%

UV Spectum

λ_{max}^{EtOH} 430 nm

IR Spectrum

ν_{max}^{KBr} 3460, 3100, 3050, 2925, 2860, 2340, 1950 1850, 1668, 1622, 1470, 1375, 1260, 665 cm^{-1}

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