SUMMARY AND HIGHLIGHTS

The thesis incorporates chemical findings of 66 plants, of which 31 belong to the family BIGNONIACEAE and 35 to VERBENACEAE. These members have been screened for various chemical markers such as leaf phenolics, leucoanthocyanins, tannins, saponins, alkaloids, iridoids and quinones. An attempt is being made to assess the role of chemical markers in understanding tribal and generic classification of these two families.

The characteristic distribution pattern of flavonoids has helped in delineating all the tribes of Bignoniaceae and understanding their evolutionary status. There are agreements and disagreements with the established schemes of classification. The tribe Tecomeae is accepted without any change. Separation of the tribe Bignonieae into Oroxyleae and Bignonieae is supported on chemical grounds. Subtribes Pyrostegineae and Bignonieae have been proposed within the limits of Bignonieae. The tribe Jacarandeae of Bentham and Hooker is retained with Jacaranda only. The transfer of Jacaranda to tribe Tecomeae though apparently sound on morphological grounds is not supported on chemical criteria. The realignment of Parmentiera in crescentieae on the basis of cauliflory and fruit character is justified on chemical

ground. The splitting of Crescentieae into Coleeae and Crescentieae is not supported.

In Verbenaceae, 35 members belonging to 3 tribes and 14 genera have been studied using chemical markers like flavonoids and phenolic acids. The chemical data point to the distinct nature of 3 tribes studied and their relative positions in the evolutionary scale. Creation of a separate family or even a subfamily within the Verbenaceae to accomodate Avicennia cannot be justified on the basis of available chemical data.

The highlights of the present work are :

1. 66 plants belonging to families BIGNONIACEAE and VERBENACEAE have been systematically screened for the first time for various chemical markers.

2. 47 taxa have been worked out for the FIRST TIME for their phenolic chemistry, of which 23 belong to the BIGNONIACEAE and 24 to the VERBENACEAE.

3. 39 additional hydroxylated or methylated derivatives of flavones, flavonols and c-glycosides have been detected. Of these, 19 belong to the BIGNONIACEAE and 20 to the VERBENACEAE.

4. The division of BIGNONIEAE into OROXYLEAE and BIGNONIEAE is firmly supported.

5. Subtribes PYROSTEGINEAE and BIGNONINEAE have been proposed within the limits of BIGNONIEAE.

6. Schumann's transfer of Jacaranda to Tecomeae is not justified. The realignment of Parmentiera in CRESCENTIEAE is supported. The tribe JACARANDEAE of Bentham and Hooker is left with Jacaranda only.

7. The chemical data support the placement of controversial genus Paulownia in the BIGNONIACEAE and not in the SCROPHULARIACEAE.

8. The identity of VERBENEAE and VITICEAE is distinctly brought out.

9. Avicennia shows primitive and advanced characters. Chemical study does not warrant a separate, monogeneric familial status for Avicennia.

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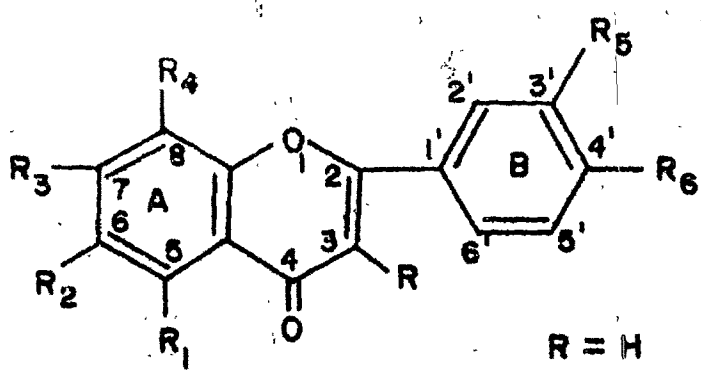
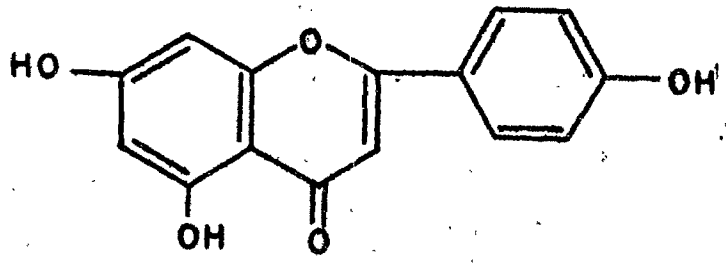
I. FLAVONES





APIGENIN

$R = R_2 = R_4 = R_5 = H$; $R_1 = R_3 = R_6 = OH$.

4'-Ome-Apigenin.

$R = R_2 = R_4 = R_5 = H$; $R_1 = R_3 = OH$; $R_6 = Ome$.

7-Ome Apigenin.

$R = R_2 = R_4 = R_5 = H$; $R_1 = R_6 = OH$; $R_3 = Ome$.

7,4'-di-Ome Apigenin.

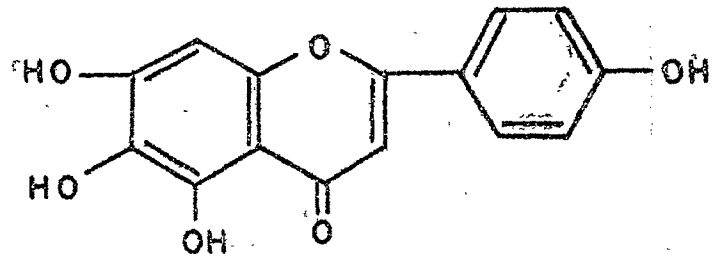
$R = R_2 = R_4 = R_5 = H$; $R_1 = OH$; $R_3 = R_6 = Ome$.

7,8-di-Ome Apigenin.

$R = R_2 = R_5 = H$; $R_1 = R_6 = OH$; $R_3 = R_4 = Ome$.

FIG. 3

CONTD.→



SCUTELLAREIN

$R = R_4 = R_5 = H$; $R_1 = R_2 = R_3 = R_6 = OH$.

4'-Ome Scutellarein.

$R = R_4 = R_5 = H$; $R_1 = R_2 = R_3 = OH$; $R_6 = Ome$.

5-Ome Scutellarein.

$R = R_4 = R_5 = H$; $R_2 = R_3 = R_6 = OH$; $R_1 = Ome$.

6-Ome Scutellarein.

$R = R_4 = R_5 = H$; $R_1 = R_3 = R_6 = OH$; $R_2 = Ome$.

8-Ome Scutellarein.

$R = R_5 = H$; $R_1 = R_2 = R_3 = R_6 = OH$; $R_4 = Ome$.

6,4'-di-Ome Scutellarein.

$R = R_4 = R_5 = H$; $R_1 = R_3 = OH$; $R_2 = R_6 = Ome$.

6,7-di-Ome Scutellarein.

$R = R_4 = R_5 = H$; $R_1 = R_6 = OH$; $R_2 = R_3 = Ome$.

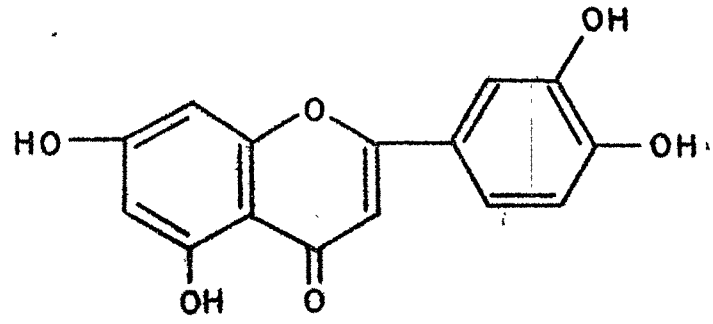
7,4'-di-Ome Scutellarein.

$R = R_4 = R_5 = H$; $R_1 = R_2 = OH$; $R_3 = R_6 = Ome$.

5,7,4'-tri-Ome Scutellarein.

$R = R_5 = H$; $R_2 = R_4 = OH$; $R_1 = R_3 = R_6 = Ome$.

[FIG.-3.CONTD..]



LUTEOLIN.

$R = R_2 = R_4 = H$; $R_1 = R_3 = R_5 = R_6 = OH$.

3'-Ome Luteolin.

$R = R_2 = R_4 = H$; $R_1 = R_3 = R_6 = OH$; $R_5 = Ome$.

4'-Ome Luteolin.

$R = R_2 = R_4 = H$; $R_1 = R_3 = R_5 = OH$; $R_6 = Ome$.

6-Ome. Luteolin.

$R = R_4 = H$; $R_1 = R_3 = R_5 = R_6 = OH$; $R_2 = Ome$.

3',4'-di-Ome Luteolin.

$R = R_2 = R_4 = H$; $R_1 = R_3 = OH$; $R_5 = R_6 = Ome$.

7,4'-di-Ome Luteolin.

$R = R_2 = R_4 = H$; $R_1 = R_5 = OH$; $R_3 = R_6 = Ome$.

6-OH-Luteolin.

$R = R_4 = H$; $R_1 = R_2 = R_3 = R_4 = R_6 = OH$.

8-OH-Luteolin.

$R = R_2 = H$; $R_1 = R_3 = R_4 = R_5 = R_6 = OH$.

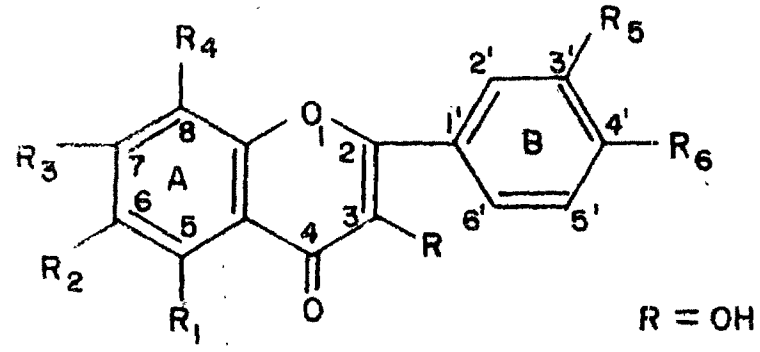
6-OH,3',4'-di-Ome Luteolin.

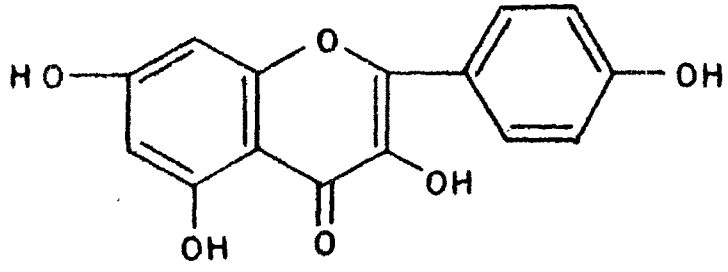
$R = R_4 = H$; $R_1 = R_2 = R_3 = OH$; $R_5 = R_6 = Ome$.

8-OH, 3',4'-di-Ome Luteolin.

$R = R_2 = H$; $R_1 = R_3 = R_4 = R_4 = OH$; $R_5 = R_6 = Ome$.

2. FLAVONOLS





KAEMPFEROL

$R_2 = R_4 = R_5 = H$; $R = R_1 = R_3 = R_6 = OH$.

4'-Ome-Kaempferol.

$R_2 = R_4 = R_5 = H$; $R = R_1 = R_3 = OH$; $R_6 = Ome$.

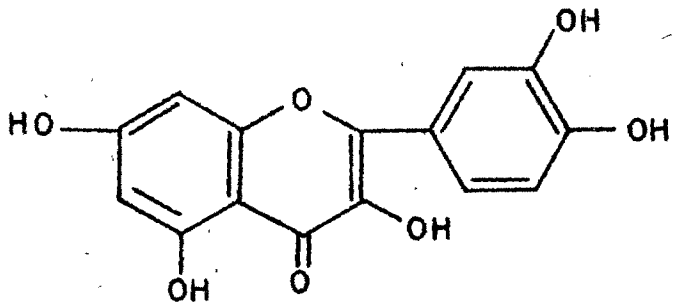
6-OH,4'-Ome Kaempferol.

$R_4 = R_5 = H$; $R = R_1 = R_2 = R_3 = OH$; $R_6 = Ome$.

6-OH,3',4'-di-Ome Kaempferol.

$R_4 = H$; $R = R_1 = R_2 = R_3 = OH$; $R_5 = R_6 = Ome$.

FIG.-4
CONTD.→



QUERCETIN.

$R_2 = R_4 = H$; $R = R_1 = R_3 = R_5 = R_6 = OH$.

3'-Ome Quercetin.

$R_2 = R_4 = H$; $R = R_1 = R_3 = R_6 = OH$; $R_5 = Ome$.

4'- Ome Quercetin.

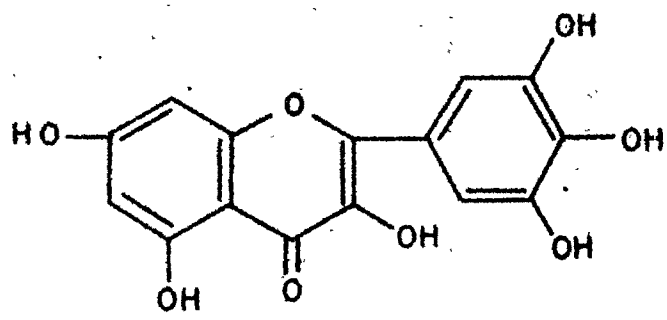
$R_2 = R_4 = H$; $R = R_1 = R_3 = R_5 = OH$; $R_6 = Ome$.

3',4'-di-Ome Quercetin.

$R_2 = R_4 = H$; $R = R_1 = R_3 = OH$; $R_5 = R_6 = Ome$.

6-OH Quercetin. (Quercetagetin)

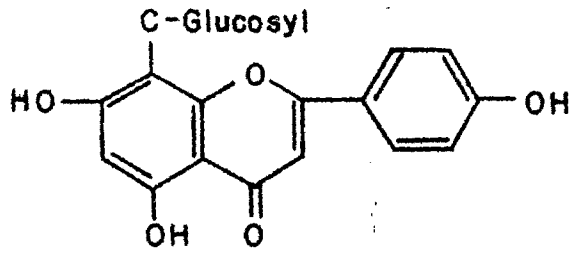
$R_4 = H$; $R = R_1 = R_2 = R_3 = R_5 = R_6 = OH$.



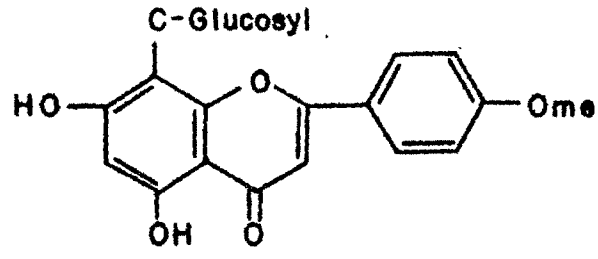
MYRICETIN.

$R_2 = R_4 = H$; $R = R_1 = R_3 = R_5 = R_6 = R_7 = OH$.

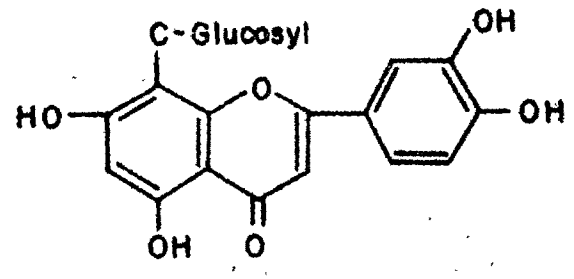
3. GLYCOFLAVONES



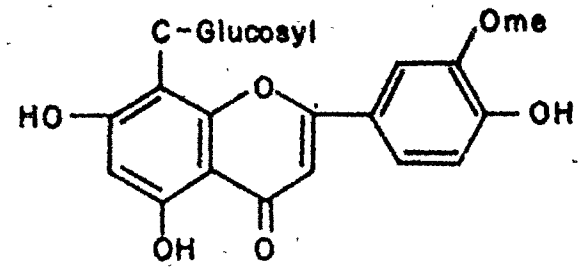
VITEXIN



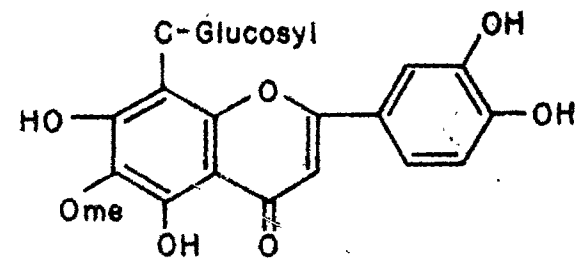
8-Glu-ACACETIN



ORIENTIN



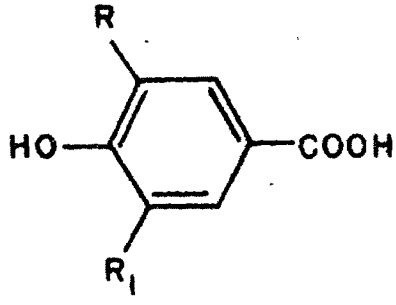
3'-Ome ORIENTIN



6-Ome ORIENTIN

FIG.-5

4. PHENOLIC ACIDS

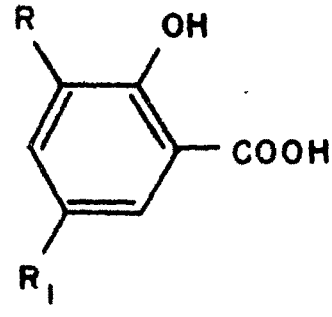


p-HYDROXY BENZOIC ACID. ($R=R_1=H.$)

PROTOCATECHUIC. ($R=OH$, $R_1=H.$)

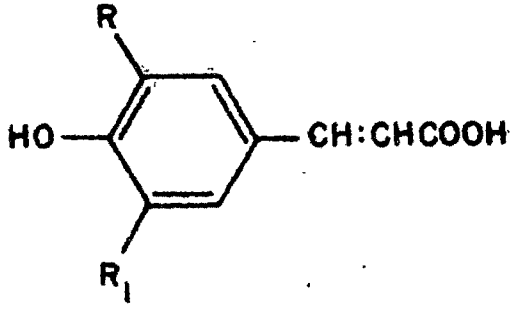
VANILLIC. ($R=Ome$, $R_1=H.$)

SYRINGIC. ($R=R_1=Ome.$)



SALICYLIC. ($R=R_1=H.$)

GENTISIC. ($R_1=OH, R=H$)



P-COUMARIC. ($R=R_1=H.$)

CAFFEIC. ($R=OH$, $R_1=H.$)

FERULIC. ($R=Ome$, $R_1=H.$)

SINAPIC. ($R=R_1=Ome.$)

O-COUMARIC.

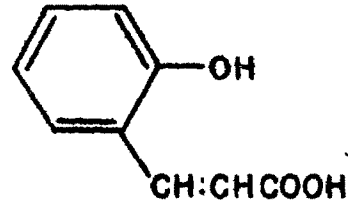
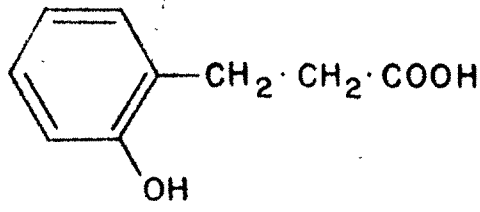
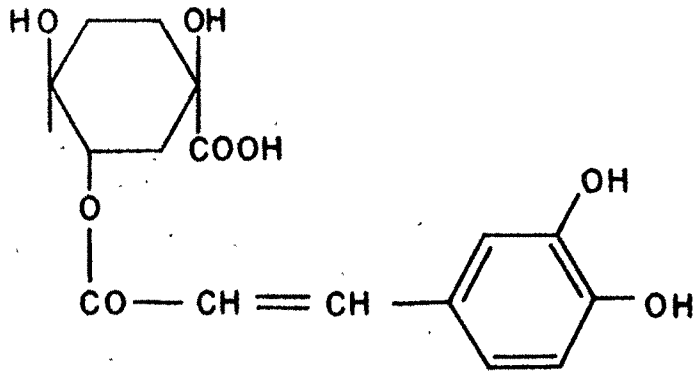


FIG.-6
CONTD.→

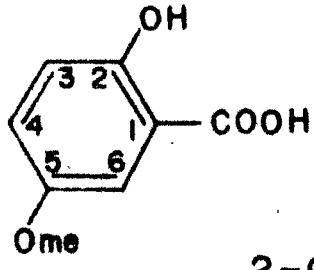
4. PHENOLIC ACIDS (CONTD.)



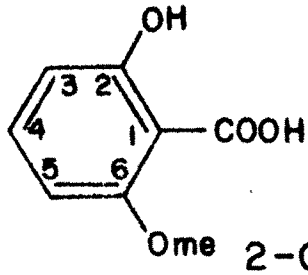
MELILOTIC



CHLOROGENIC

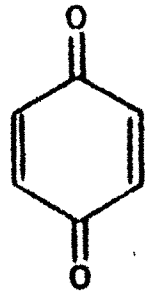


2-OH, 5-Ome BENZOIC ACID



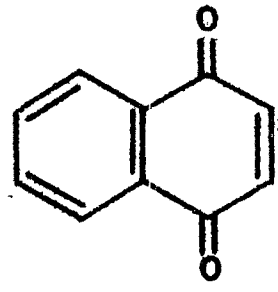
2-OH, 6-Ome BENZOIC ACID

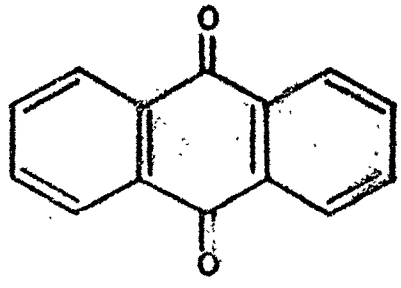
5. QUINONES



BENZOQUINONE

NAPHTHAQUINONE





ANTHRAQUINONE

FIG.-7