

*Appendix* .

## APPENDIX - I

Chemotaxonomical Observations on the Malpighiaceae,  
Linaceae and the Clusiaceae.

The Malpighiaceae, Linaceae and Clusiaceae (Guttiferae) are some other plant families which are considered related to the Sapindales, Geraniales, Celastrales or Rhamnales. During the course of present investigation some of the plants belonging to these families also have been collected and screened for their constituents. The results of such screenings are presented here as an appendix to the main research project. The data obtained are analysed in brief to find out the relationships of these plant groups.

The Malpighiaceae are distinguished by their modified unicellular hairs (sometimes clinging), the often lianous habit, glandular calyx, clawed petals, stamens with enlarged connectives and often winged or lobed fruits. This family was grouped in the Geraniales by Engler and Diels (under the suborder Malpighineae), Bentham and Hooker (1862), Lawrence (1951) and Thorne (1976). Hutchinson (1973) treated the Malpighiaceae in his order Malpighiales alongwith the Zygophyllaceae, while Hallier (1912), Cronquist (1981), Takhtajan (1980) and Dahlgren (1980) grouped it under the Polygalales. This family is always considered allied to the Geraniales.

The results of screening 9 members belonging to five genera of the Malpighiaceae are presented in Table 16.1. All plants contained various flavonoids in their leaves. The flavonoid pattern is dominated by flavonols mainly quercetin. Kaempferol and methoxyflavonols are rare and myricetin is absent. Glycoflavones are seen in all the genera except *Malpighia*. Flavones, as O-glycosides, are located in *Aspidop-*

Table : 16.1 The Distribution of Various Chemical Characters Among 9 Members of the Family Malpighiaceae.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
1. <i>Aspidopterys cordata</i> A. Juss.	+		+				+			+		+			+		+			+		+
2. <i>Hiptage madablota</i> Gaertn.			+	+			+		+				+	+							+	+
3. <i>Thryallis glauca</i> L.			+				+	+			+	+	+	+								+
4. <i>Malpighia coccigera</i> L.							+				+	+	+	+								+
5. <i>M. glabra</i> L.							+						+									
6. <i>M. puniceifolia</i> L.						+	+	+					+	+								
7. <i>M. urens</i> L.				+			+				+	+	+	+							+	+
8. <i>Stigmatophyllon ciliatum</i> A. Juss.							+						+	+								+
9. <i>S. periplocifolium</i> A. Juss.							+	+	+			+	+	+							+	+

1. Apigenin 2. 7-OMe Apigenin 3. Glycoflavones 4. Kaempferol 5. 4'-OMe Kaempferol 6. 5-Deoxy Kaempferol  
7. Quercetin 8. 3'-OMe Quercetin 9. 7,3',4',-TriOMe Quercetin 10. Proanthocyanidins 11. Gentisic acid  
12. p-Hydroxybenzoic acid 13. Vanillic acid 14. Syringic acid 15. Gallic acid 16. Mellilotic acid 17. p-Coumaric acid 18. Protocatechuic acid 19. Ferulic acid 20. Tannins 21. Alkaloids.

terys and one species of *Stigmatophyllon* i.e. *S. periplocifolium*. Proanthocyanidins and tannins are infrequent, seen in three and four plants respectively. Gallic acid is comparatively rare.

The Malpighiaceae seem to be similar to the Geraniales in containing the flavonols as the prominent phenolics and in introduction of glycoflavones and flavones. It is different from the Geraniales in containing proanthocyanidins in at least three genera. Evidently this character is associated with the woody nature of the family.

The Linaceae are distinguished by the generally 5-merous flowers, contorted corolla composed of distinct usually clawed fugacious petals, shortly connate filaments and septocidally dehiscent capsule. Bentham and Hooker (1862), Bessey (1931), Takhtajan (1980) and Thorne (1976) included it in the Geraniales, closely allied to the Geraniaceae. Hallier (1912) transferred this family to the Guttiferales. Cronquist (1981), however, considers the Linaceae with their simple, entire or merely toothed leaves and the habit ranging from distinctly woody (sometimes with scalariform vessels) in the more archaic forms to herbaceous in more advanced ones cannot be included in or derived from the Geraniales and groups them in a separate order the Linales. The Linales are kept closer to the Celastrales, Rhamnales and Polygalales.

The flavonoids and phenolic acids of four plants belonging to *Hugonia*, *Linum* and *Reinwardtia* are presented in Table 16.2. Both *Linum* and *Reinwardtia* contained flavonoids while *Hugonia* was devoid of them. *Linum mysorense* possessed quercetin and *L. usitatissimum*, quercetin and glycoflavones. *Reinwardtia* contained flavonols (4'-OMe kaempferol and quercetin), flavones, (apigenin) and glycoflavones. Proanthocyanidins were absent from all the four plants screened. Syringic

Table : 16.2 The Distribution of Plant Products in the Clusiaceae and Linaceae

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
<b>CLUSIACEAE</b>																			
1. <i>Calophyllum apetalum</i> Willd.	+	+							+										+
2. <i>C. inophyllum</i> L.	+			+	+		+		+			+	+						+
3. <i>Cratoxylon nerifolium</i> kurz.	+		+							+	+	+	+						
4. <i>Garcinia cambogia</i> Desr.					+		+		+	+	+	+	+						+
5. <i>G. cornea</i> L.				+	+				+		+	+	+						+
6. <i>G. gummigutta</i> Robson				+			+		+	+	+	+	+						+
7. <i>G. livingstonii</i>				+			+		+			+	+						+
8. <i>G. xanthochymus</i>							+		+	+	+	+	+						+
9. <i>Garcinia</i> sp.									+		+								
10. <i>Mesua nagassarium</i> kosterm.									+		+	+	+						+
11. <i>Ochrocarpus longifolius</i> Bth. & Hk.f.									+		+	+	+						+
<b>LINACEAE</b>																			
12. <i>Hugonia mystax</i> L.																			+
13. <i>Linum mysorensense</i> Heyne										+	+	+	+						+
14. <i>L. usitatissimum</i> L.										+	+	+	+						+
15. <i>Reinwardtia trigyna</i> planch										+	+	+	+						+

1. Apigenin 2. Acacetin 3. Luteolin 4. Glycoflavones 5. Kaempferol 6. 4'-OMe kaempferol 7. Quercetin  
8. 7-OMe Quercetin 9. Proanthocyanidins 10. Gentisic acid 11. p-Hydroxybenzoic acid 12. Vanillic acid  
13. Syringic acid 14. Melilotic acid 15. Gallic acid 16. p-Coumaric acid 17. Tannins 18. Saponins  
19. Alkaloids.

acid was common for all the plants while gentisic, p-hydroxy benzoic and p-coumaric acids were fairly common. The rarity of phenolics in *Hugonia* is noteworthy.

The advanced nature of the family is evident by the flavonoid chemistry. The family introduces flavones, both as C- and O-glycosides and eliminates proanthocyanidins. The similarities with the Geraniaceae include the predominance of flavonols and elimination of proanthocyanidins. In containing flavones, glycoflavones and in eliminating gallic acid and tannins the Linaceae are distinct from the Geraniaceae. The reports on the lignans and alkaloids from *Linum* add to the distinct identity of the Linaceae.

The Clusiaceae (Guttiferae), the major family of the Guttiferales of Bentham and Hooker (1862), are similar to the Anacardiaceae and Burseraceae in producing biflavones. The phytochemicals from 11 members of the Clusiaceae are tabulated in Table 16.2. Flavones, glycoflavones and flavonols are equally distributed among the plants screened. Proanthocyanidins are almost omnipresent. Tannins are more, saponins are less and alkaloids are almost absent. This family is similar to the other biflavone-containing family the Anacardiaceae in elaborating flavones but is dissimilar to the Burseraceae in the same character. The Clusiaceae combines both primitive and advanced chemical features.