SUMMARY AND CONCLUSIONS

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The thesis incorporates taxonomic (chemical and cladistic) studies on 32 genera and pharmacognostic studies on 20 lesser known medicinal plants of the Rubiaceae. In addition eight members of the Caprifoliaceae also have been subjected to chemical analysis.

The family Rubiaceae appears to be a chemically homogeneous taxon. Flavonols such as quercetin and kaempferol are the major characters binding the members together. The near absence of flavones, glycoflavones, 6-hydroxy flavonoids and the complete elimination of highly hydroxylated flavonol myricetin are the other characters of the family. The reduction of proanthocyanidins and absence of myricetin do not allow to consider the family a very primitive taxa and also the absence of advanced characters such as flavones does not bring the family at a higher level either. The proposed relation of Rubiaceae with Dipsacales, does not seem to get much support from chemical grounds, as flavones and monoterpenoid alkaloids which are common in Dipsacales are found to be absent in Rubiaceae. Rubiales appear to be closer to Apocynales.

The two subfamilies of Rubiaceae, the Cinchonoideae and the Coffeoideae, appear to be natural groups. The former contain more of primitive characters such as quercetin and proanthocyanidins while the latter subfamily is comparatively

richer in advanced characters like iridoids and kaempferol and hence the Coffeoideae is advanced over the other subfamily.

Within the Cinchonoideae, Ophiorrhiza is unique in having 6-hydroxyflavonol herbacetin confined to it. It does not possess iridoids and kaempferol which are common in Oldenlandieae with which it was grouped. This chemical distinctness gives validity to the treatment of this genus as a separate tribe Ophiorrhizeae. The absence of proanthocyanidins and the prevalence of iridoids keep the tribe Oldenlandieae at an advanced level. The tribe Rondeletieae appear to be a comparatively primitive natural taxon. The tribe Naucleae and Cinchoneae are closely similar chemically. Cinchona can be separated as a monotypic tribe as none of the other genera in these tribes elaborate quinoline type alkaloids such as quinine. The separate status of Hymenodictyon away from Cinchona also is chemically confirmed. The tribe Mussaendeae appear to be primitive and is closer to Cinchoneae and Naucleae. The tribe Gardenieae appear heterogeneous and occupies an intermediate position between Cinchoneae, Naucleae and Oldenlandieae.

In the subfamily Coffeoideae the tribes Psychotrieae, Paederiae, Anthospermeae, Morindeae and Spermacoceae occupy an advanced position due to the absence of proanthocyanidins and prevalence of kaempferol (than quercetin) in them. The separate generic status for Spermacoce and Borreria cannot be

ruled out. The tribe Galieae is the most advanced tribe of the subfamily and also of the Rubiaceae. The reduction in the flavonols, the absence of proanthocyanidins and the uniform distribution of iridoids keep this tribe at a very high evolutionary level.

The presence of polyhydroxy and polymethoxy flavonols in most of the taxa screened is significant. A number of new sources of these bioflavonoids are located. Ten plants, elaborated alkaloids, 35 plants contained saponins and only Ixora coccinia contained tannins in its leaves. Iridoids were present in 23 plants, coumarins were identified in five plants and quinones were seen in 10 taxa.

The family Caprifoliaceae is peculiar in containing both flavones and flavonols equally distributed among its members. This family is distinct from the Rubiaceae in not having alkaloids and having a predominance of saponins and flavones. The reduction in frequency of occurence in the flavonols and proanthocyanidins is another character distinguishing the Caprifoliaceae from the Rubiaceae. The chemical features do not reflect any similarity between the Rubiaceae and the Caprifoliaceae which were once considered closely related. The Caprifoliaceae find a better place in Dipsacales than in Rubiales in containing flavones and in the absence of proanthocyanidins.

The cladistic treatment of the 32 genera of Rubiaceae shows that Galium is the most advanced genus of the family closely followed by Rubia, Knoxia, and Spermacoce, all belonging to the subfamily Coffeoideae. On the other hand Cinchona, Adina and Rondeletia are the most primitive genera of the Rubiaceae belonging to the subfamily Cinchonoideae.

In Cinchonoideae, Oldenlandia is the most advanced genus. Of the two subfamilies, Coffeoideae is advanced over the other. The dendrogram prepared recognised 12 groups in the family with six groups in each subfamily. All the groups recognised may be accorded the status of a tribe. The present analysis reinforces the circumscription of a number of tribes such as Spermacoceae, Galieae, Ixoreae etc.,

The family includes a number of medicinally importat plants (a list is given in general introduction). Pharmacognostic studies on medicinally important parts of 20 lesser-known medicinal plants are carried out in this study. The distinguishing histological features of individual whole drugs and powdered drugs are given alongwith illustrated camera-lucida drawings. The common anatomical characters of the family drawn are as given below: The cells contain reddish or brownish resinous contents, presence of secretory cells, vessels are small, wood fibres are with bordered and simple pits, calcium oxalate crystals found in the form of crystalsand, microcrystals, cluster crystals and raphides. The fibrovascular bundles are

collateral, stomata are typically rubiaceous and are confined to lower surface. Non-glandular hairs are unicellular or uniseriate. The leaf is normally dorsiventral. In stem and root, the pericycle includes a variable amount of sclerenchyma.

The highlights of the present work are summarised below:

1. The homogeneity of the Rubiaceae is established.
2. The two subfamilies the Cinchonoideae and the Coffeoideae are found to be natural groups and the latter is advanced over the former.
3. The highly evolved status of the tribes Galieae and Spermacoceae are proved.
4. Ophiorhiza is found to be chemically distinct and therefore the separate tribal status given to this genus is supported.
5. The separate identity of Hymenodictyon away from Cinchona is confirmed.
6. The separate tribal status accorded to Cinchona is justified.
7. The Caprifoliaceae are found to be advanced over the Rubiaceae and the view that these two families are close is disproved. The Caprifoliaceae are better placed to the Dipsacales.
8. The grouping of the Rubiaceae in the order Rubiales in between the Gentianales sensu lato and Apocynales sensu lato is proposed.
9. New combinations of genera which correspond to the tribes are proposed based on cladistics.

10. New sources of bioflavonoids (38), alkaloids (10), saponins (35), tannins (1) and iridoids (23) are located.

11. Distinguishing anatomical features helpful for the proper identification of the genuine drugs for 20 medicinal plants have been identified.