SUMMARY AND CONCLUSIONS

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The family Acanthaceae is a large natural taxon belonging to the order Scrophulariales. It is predominantly a tropical and subtropical family consisting of about 250 genera and 2,500 species, out of which 49 genera and over 500 species occur in India. The Acanthaceae are characterized by opposite leaves containing cystoliths, zygomorphic flowers with conspicuous bracts, didynamous (when 4) or 2 stamens inserted alternately on corolla-tube, superior ovary with a disc at the base, axile placentation, elastically dehiscing fruit (capsule) and non-endospermic seeds with indurated funicle.

The family is known for various medicinal plants such as 'Kalmegh' (*Andrographis paniculata* Nees.) having bitter diterpene "andrographolide"- a preparative drug prescribed for infants to relieve gripping, irregular stools and loss of appetite and 'Vasaka' (*Adhatoda zeylanica* Medic.) having alkaloids "Vasicine" and "Vasicinone" used for treating cold, cough, whooping cough and chronic bronchitis. *Adhatoda beddomei* and *Phlogacanthus thyrsiflorus* are used locally and effectively for bronchial troubles. Other plants of medicinal repute are *Nelsonia canescence*, *Rhinacanthus nasutus*, *Lepidagathis incurva*, *Barleria prionitis* used for treating various ailments.

Since the inception of the family, it has remained controversial regarding the circumstances of different taxa at all the levels of hierarchy. Mohan Ram and Wadhi (1965) had elevated Thunbergioideae to a distinct family on morphological grounds. This proposition is ably supported by Chaubal (1966)

and Sahi and Dixit (1969). Bremekamp (1965) also had defined the family Thunbergiaceae separated from the Acanthaceae. Cronquist (1981) does not support this contention and keeps Thunbergioideae as a subfamily within the Acanthaceae. The subfamily Nelsonioideae is another taxon transferred by Bremekamp (l.c.) to the Scrophulariaceae based on palynological evidences. Raj (1961) and Chaubal (1966) supported Bremekamp's view, but based on anatomical characters, Ahmad (1974) suggested a close affinity of Nelsonioideae to Acanthaceae. Of the 99 taxa screened, 76 contained, flavones, flavonols, glycoflavones and proanthocyanidins, Alkaloids were detected in 19 plants and iridoids in 3. The family was found to be flavone-rich. Sixty-five species contained flavones as O-glycosides, 6-Deoxyflavones were common whereas 6-hydroxyflavones were rare in occurence. Apigenin, luteolin and/or their mono-, bi- or trimethoxy derivatives were the common flavones in most of the taxa investigated. The 6-hydroxyflavones were completely absent from the subfamilies Nelsonioideae and Thunbergioideae, and were confined to the Acanthoideae. Flavonols, Kaempferol, quercetin, myricetin and their monomethoxy derivatives were found in 6 species; one of the tribe Acantheae and five species in the tribes Odontonemeae and Justicieae. In no plant flavones and flavonols occurred together. Glycoflavones were isolated from 16 species. Vitexin and isovitexin were the most common glycoflavones. 4'-OMe Vitexin was confined to 4 plants and 6-OMe vitexin was restricted to *Rostellularia Japonica* whereas 7-OMe vitexin was located in *Ecbolium linneanum*. In at least 7 species flavone-O-glycosides and glycoflavones were found together. In *Adhatoda zeylanica* with flavonols. The subfamilies

Nelsonioideae and Thunbergioideae were found rich in glycoflavones. Proanthocyanidins were rare and restricted to *Elytraria crenata* of the subfamily Nelsonioideae. Of the 19 phenolic acids identified from the extracts, 14 were benzoic acids and the rest were cinnamic acids. Vanillic and syringic acids were present in more than 77% of the taxa studied. p-OH benzoic acid was recorded in about 56% of the taxa. This compound was located in only one member each from the Nelsonioideae and Thunbergioideae, whereas vanillic acid and cinnamic acid were rarely occurring in the later subfamilies. Gentisic and protocatechuic acids were found in al the members of Thunbergioideae studied. Aucubins were found in *Acanthus ilicifolius*, *Staurogyne glutinosa* and *Barleria prionitis*.

The prominent occurrence of flavones make the family Acanthaceae advanced in the Scrophulariales. The chemical distribution clearly delimite the *Thunbergioideae* as a natural group characterized by few flavones and uniform presence of glycoflavones along with the absence of 6-oxygenated flavones, proanthocyanidins, aucubins, vanillic, p-OH benzoic and cinnamic acids. These features supported by other characters such as climbing habit, prominent bracteoles, absence of cystolith, presence of axillary flowers, a small sized calyx and cushion-shaped funiculus forming a sort of obturator support a separated family status for this taxon **i.e.** the **Thunbergiaceae.** This family is more primitive than the Acanthaceae in the absence of 6-oxygenation, cinnamic acids and in the presence of flavones. The subfamily *Nelsonioideae* is similar to Thunbergiaceae in the absence of flavonols, 6-oxygenated

flavones and p-OH benzoic acid. Both Thunbergiaceae and Nelsonioideae possess pandauraeform glandular hairs and do not contain the characteristic cystoliths of the Acanthoideae. But Nelsonioideae differ from Thunbergiaceae in having aucubins, proanthocyanidins and cinnamic acids, all of which are characteristic to Acanthoideae. Absence of 6-oxygenated flavones clearly does not favour keeping this subfamily near the tribe Rhinantheae of the Scrophulariaceae. The subfamily *Acanthoideae* is relatively homogenous and together with Nelsonioideae constitute a well defined family Acanthaceae. Within the Acanthaceae the Nelsonioideae are primitive to Acanthoideae. The two series, **Contortae** and **Imbricatae** (on the basis of an aestivation in buds) proposed by Lindau (l.c.) is supported chemically; **Contortae** comprising the higher concentration of 6-oxyflavones (44%) with eliminating glycoflavones (2%) and absence of flavonols as against **Imbricatae** containing of higher incidence of glycoflavones (17%) and flavonols (13%) with very little 6-oxyflavones (8%). The elevation of these two groups to subfamilies is proposed. The tribes *Hygrophileae*, *Barlerieae*, *Ruellieae* and *Strobilantheae* form the core group of the Contortae and are entitled to the tribal status than the subtribal status (Bremekamp, l.c.). Similarly, the tribe Odontonemeae is also found distinct from the Justicieae of Bremekamp (l.c.) and to be accorded as a separate tribe. The tribe Lepidagatheae is found wanting the features needed to accord a separate tribal status and therefore should be merged with Barlerieae. The series **Imbricatae** is a homogenous group showing a number of distinct tribes where a progressive

advancement in chemical characters is evidenced. Pseuderanthemeae, Graptophylleae, Asystasieae and Aphelandreae form a distinct group and Acantheae, Odontonemeae and Justicieae form another with Andrographideae sandwiched in-between. The generic status of *Gantealbua*, *Dipteracanthus*, *Eranthemum*, *Bremekampia*, *Aunqia* and *Adhatoda* are supported whereas the subdivisions of *Strobilanthes* is recommended. The placement of *Eranthemum* in Ruellieae, *Leptosiphonium* in Hallerieae and *Crossandra* within the tribe Acantheae as a subtribe are also recommended.

The cladistic analysis of 99 taxa screened for its chemical characters resulted in a cladogram which does not agree with any of existing classifications. Therefore the utility of cladistics as a viable taxonomic method is critically discussed.