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**RESEARCH ARTICLE****TAXONOMIC AND PHYLOGENETIC CENSUS OF THE GENUS BARLERIA
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March, 2016**Keywords:***Barleria*, Taxonomy, Phylogeny.**ABSTRACT**

In past, circumscription at familial and intra-familial levels of Acanthaceae has long been debated. The evidence obtained from any single discipline appears generally to have contradicted evidence from other disciplines. Use of single character is sometimes taxonomically not safer. Placement of the genus *Barleria* Linn. is one such case. Present authors made an all-pervasive examination of evidence available, which are not used for any taxonomic and phylogenetic assessment earlier, for the genus besides their own anatomical evidence in the acanthaceous plexus. The sum total of evidence warrants that the genus *Barleria* Linn. is better at home under the subtribe Barlerieae in the tribe Justicieae of the Acanthaceae proper.

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INTRODUCTION

Earlier systems of plant classification obviously evolved relying on exomorphic features of various plant organs. This era came to an end when the newer evidence become available to plant taxonomist. This is particularly evident in the systems of modern period such as Cronquist (1968, 1988), Takhtajan (1997) and Dahlgren (1980).

The information adduced from different disciplines is adequately utilised by them whenever they found it beneficial. Use of proper exomorphic features vary to taxonomist to taxonomist which sometimes rendered certain taxa disputable taxonomically *vis-à-vis* phylogenetically. This is particular so at familial, subfamilial, at and above generic levels. One such taxon we came across *viz*; the genus *Barleria* Linn. while studying the family Acanthaceae comparatively. The synthetic assessment of the same is dilated in the following.

Taxonomic Position of the Genus Barleria Based On Exomorphic Features

The Acanthaceae is highly specialised family. It is a culminating point within the range of diversity presented by the multiovulate Tubiflorae (*cf.* Wernham 1912). There have been

attempts to resolve this complexity into more homogeneous groups. Nees (1847), Lindau (1895), Van Tiegham (1908), Wettstein (1935) and Bremekamp (1938) categorised them into four groups *viz.*, (1) Nelsonioideae, (2) Mendoncioideae, (3) Thunbergioideae and (4) Acanthoideae. The last one is thought to be a typical Acanthaceae. The former three groups received varied positions and ranks in various systems of classification. These variations range from tribe to subfamily to even independent families outside the Acanthaceae proper.

Table – I Taxonomic Position of *Barleria* Linn. Based on Exomorphic Features

| Sr. No. | System of Classification | Taxonomic Placement |
|---------|-----------------------------|--|
| 1. | Bentham (1876) | Placed under subtribe Barlerieae distinct from the subtribe Eujusticieae of tribe Justicieae. |
| 2. | Clarke (1884-1885) | Placed under subtribe Barlerieae in the tribe Justicieae |
| 3. | Lindau (1895) | Referred under the tribe Barlerieae. |
| 4. | Engler & Prantl (1887-1915) | Kept under tribe Barlerieae distinct from the tribe Justicieae. |
| 5. | Engler & Diels (1936) | Placed under subtribe Barlerieae outside the tribe Justicieae. |
| 6. | Bremekamp (1938) | Treated under the tribe Ruellieae. |
| 7. | Bremekamp (1965) | Opined that the subtribe Barlerieae distinct from other members of the tribe Ruellieae in having : (i) free stamens, (ii) quincuncial aestivation of corolla. |

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Table – II Taxonomic Position of *Barleria* Linn. Based on Various Evidence

| Sr. No. | Discipline | Features Revealed | Assessment |
|---------|--|---|---|
| 1. | Vegetative Anatomy: Patil & Patil, 2009, 2011, 2012; Shendage & Yadav, 2009; Metcalfe & Chalk, 1950; Shashi Kumar & Paliwal, 1978; Ahmad, 1975, 1979, a, b. | i) Stomata diacytic ii) Trichomes mostly unicellular and uniseriate iii) Cystoliths present iv) Petiolar vasculature | Similar to tribe Justicieae. |
| 2. | Wood Anatomy: Metcalfe & Chalk, 1950; Datta & Maiti, 1971. | i) Absence of multiseriate rays ii) Scarcity of pore chains iii) Wood deffuse porous iv) Wood non-stratified i) Oblique direction of calyx traces ii) Presence of both commissural- marginal and direct marginal traces for sepals | Distinctive from the tribe Justicieae. |
| 3. | Floral Anatomy: Datta & Maiti, 1969; Shashi Kumar & Paliwal, 1978. | iii) Annular disc supplied by numerous vascular traces iv) Five traces each to the stamens and petals v) Development of 04 opposite sepal lobes and 05 imbricate petal lobes vi) Stamens 04, of which 02 fertile and 04 – celled in early stage vii) Division of petal – midrib traces in to 03 | Distinctive from tribe Justicieae. |
| 4. | Cytology: Govindrajan & Subramanian, 1983; Saggio & Bir, 1982; Datta & Maiti, 1970; Fedorov, 1974; Raganath & Krishnappa, 1990. | Basic chromosome No. x = 15,16, 19, 20. | Primitive within the tribe Justicieae. |
| 5. | Palynology: Chaubal, 1966; Erdtman, 1952. | i) Pollen grains 3 – Zonicolporate ii) Pollen grains with exine reticulate | Resemble to some members of the tribe Justicieae and tribe Ruellieae. |
| 6. | Embryology: Mohan Ram & Wadhi, 1964; Mohan Ram, 1961. | i) Endosperm cellular ii) Embryosac 8 – nucleate | Similar to the tribe Justicieae. |

The exomorphic features like winding habit, type of fruits (capsular or not capsular), arrangement of flower in leaf-axile (2 or 3 superposed), development of bracteoles and occurrence of cystoliths, venation (penninerved or palmately-veined), shape of leaves and occurrence of retinacula, etc. Bremekamp (1938), however, remarked that a near relationship between these groups can not exist.

Lindau (1895) also divided the group Acanthoideae into two viz., Contortae and Imbricatae based on aestivation of corolla. Bremekamp (*loc.cit.*) pointed out these divisions as of limited practical utility.

The delimitation at tribal and subtribal level is also not certain. This is indicated clearly by various systems of classification mentioned above. The criteria employed at this level are also not uniform. This trend has thus vitiated the taxonomic position of certain acanthaceous genera. One such example is the genus *Barleria* Linn. Taxonomic treatments tendered to the genus are provided in Table-1.

Placement of the Genus *Barleria* Based On Synthetic Assessment

The genus and other taxa of Acanthaceae are assessed synthetically as in Table-2. A resume of taxonomic treatments (Table-1) indicates that the genus *Barleria* is placed either under subtribe Barlerieae within the tribe Justicieae or within the tribe Barlerieae distinct from the tribe Justicieae. Rerely, it is also referred under the tribe Ruellieae. These treatments are based on external morphological feature of the genus *Barleria* and its associates. The genus has been investigated in different domains (Table-2). A sum total of evidence suggests distinctiveness of the of the genus *Barleria* and also

resemblance with other members of the tribe Justicieae. It therefore, appears better to keep it under a subtribe the Barlerieae within the tribe Justicieae of the family Acanthaceae proper.

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References

- Ahmad, K. J. (1975). Cuticular studies in some species of *Lepidagathis* and *Barleria*. *Bot. Gaz.* 136 (1): 129-135.
- Ahmad, K. J. (1979a). Taxonomic significance of epidermal characters in Acanthaceae. In: Progress in Plant Research. Today and Tomorrow's Printers and Publishers. New Delhi. Vol.1.pp. 135-160.
- Ahmad, K. J. (1979b). Stomatal features of Acanthaceae. In : Structure, Function and Ecology of Stomata. Bishen Singh Mahendra Pal Singh, Dehra Dun. pp. 43-60.
- Bentham, G. and Hooker, J. D. (1862 – 1883). *Genera Plantarum*. Vol. I – II Reeve And Co., Williams and Norgate, London, England.
- Bentham, G. (1876). Acanthaceae. In: *Genera Plantarum* (Eds. Bentham G. and Hooker J. D.) Vol. III, Part II. Lovell Reeve and Co. London, U. K.
- Bremekamp, C. E. B. (1938). Notes on the Acanthaceae of Surinam. *Rec. Trav. Bot. Neerl* 35 : 130 – 174.
- Bremekamp, C.E.B. (1965). The delimitation and sub-division of the Acanthaceae. *Bull. Bot. Surv. India.* 7 : 21-30.

- Chaubal, P. D. (1966). Palynological Studies On The Family Acanthaceae. Ph. D. Thesis, Univ. of Poona, Pune (M.S.), India.
- Clarke, C. B. (1885). Acanthaceae. In: The Flora of British India (Eds. Hooker J. D.). Lovell Reeve and Co. London, U. K.
- Cronquist, A. (1968). The Evolution And Classification Of Flowering Plants. Thomas Nelson and Sons, London, England.
- Cronquist, A. (1988). The Evolution And Classification Of Plants. Ed. II. N. Y. B. G., New York, U. S. A.
- Dalhlgren, R. (1980). A Revised System Of Classification Of The Angiosperms. *Bot. J. Linn. Soc.* (80): 91 – 124.
- Datta, P.C. and R. K. Maiti (1969). Study of floral anatomy of the tribe Justiceae (Acanthaceae) with an aim to taxonomical interpretations. *Acta. Biol. Acad. Sci. Hung.* 20(3):311-317.
- Datta, P. C. and R. K. Maiti. (1970). Relationships of Justiceae (Acanthaceae) based on cytology. *Genetica* 41(3):437 – 450.
- Engler, A.H.G. and Gebruder Bortraeger, Berlin, Germany. Diels, L. (1936).
- Syllabus der Pflanzenfamilien, 11th Ed. Erdtman, G. (1952). Pollen Morphology And Plant Taxonomy : Angiosperms. Stockholm and Waltham, Mass. U. S. A.
- Fedorov. (1974). Chromosome numbers of flowering plants. Otto Koeltz Science Publishers . West Germany.
- Govindarajan, T. and D. Subramanian. (1983). Karyomorphological studies in South India. *Cytologia* 48 : 491 – 504.
- Hutchinson, J. (1973). The Families Of Flowering Plants. Clarendon Press, Oxford, London, (U. K.).
- Kumar, S. and G. S. Paliwal (1978). Foliar anatomy of the family Acanthaceae I. The tribe Justiceae. *Bull. Bot. Surv. Ind.* 20 (1-4): 54-63.
- Lindau, G. (1895). Acanthaceae. In: Die Naturelichen Pflanzenfamilien (Eds. Engler A. and Prantl K.) IV (3a and 3b): 313-315. W. Engelmann, Leipzig.
- Metcalf, C. R. and Chalk, L. (1950). Anatomy of Dicotyledons Vol. I – Clarendon Press, Oxford. 6: 1-20.
- Mohan Ram, H. Y. and Wadhi, M. (1964). Endosperm in Acanthaceae. *Phytomorphology* 14: 388 – 413.
- Mohan Ram, H. Y. (1962). The post fertilization development of the ovule in *Barleria cristata* Linn. *J. Indian Bot. Soc.* 41: 287 – 296.
- *Nees Von Esenbeck, C. G. (1847). Acanthaceae. In: A. P. De Candollo., *Prodromus Systematic Naturalis Regni Vegetabilis* II: 46 – 519 Paris.
- Patil, A.M. and D.A. Patil (2009). Foliar trichomes in some Acanthaceae. *Natl. J. Life Sci.* 6 (1): 37-52.
- Patil, A.M. and D.A. Patil (2011). Investigations on foliar epidermis in some Acanthaceae. *Current Botany* 2 (9): 1-8.
- Patil, A.M. and D.A. Patil (2012). Petiolar anatomy of some hitherto unstudied Acanthaceae. *Journ. Experimental Sciences.* 3 (3): 5-10.
- Ranganath, R. M. and D. G. Krishnappa. (1990). Karyotypic studies in a few species of *Barleria* L. (Acanthaceae) from South India. *Cytologia* 55 (2): 175 – 180.
- Saggoo, M I S and S. S. Bir. (1982). Cytological studies on certain Acanthaceae from Central India. *Proc. Indian Acad. Sci. (Plant Sci.)* 91 (6): 479 – 486.
- Shendage, S. M. and S. R. Yadav (2009). Cuticular studies in genus *Barleria* L (Acanthaceae). from India. *J. Indian Bot. Soc.* 88 (1/2): 176 - 183.
- Takhtajan, A. D. (1997). Diversity and Classification of Flowering Plants, Columbia Univ. Press, New York, U.S.A.
- * Van Tiegham, Ph. (1908). Structure du Pistil et de l' ovule du fruit et dela graine des Acanthacees Dedoublement de cette famille. *Arn.Sci.Nat.Ser.* 9, Bot. 7: 1-24.
- * Wettstein, R. (1935). *Handbuch der Systematischen Botanik.* (ed.4th). Franz Deuticke, Leipzig. and Vienna.

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