Chapter 1

INTRODUCTION

The two families Amaranthaceae and Chenopodiaceae (sensu lato) included in the dicotyledones appear to be in an ambiguous position phylogenetically and attracted the attention of many research workers. Bentham & Hooker (1880) kept these families under Monochlamydeae and grouped in first series Curvembryeae corresponding to the Caryophyllinae of Hallier along with Nyctaginaceae, Illecebraceae, Phytolaccaceae, Batidaceae and Polygonaceae. Engler & Prantl (1887-1898) grouped these families in Archichlamydeae in 20th series Centrospermae and included Amaranthaceae and Chenopodiaceae (sensu stricto) in subseries Chenopodineae and separated Basellaceae as a distinct family from Chenopodiaceae (s.l.) and grouped with Portulacaceae in subseries Portulacineae. On the other hand, Hutchinson (1926, 1959) placed Amaranthaceae, Chenopodiaceae (s.s.) as well as Basellaceae in his herbaceous group the 'Herbaceae' under the Order Chenopodiales. While Takhtajan (1969) kept Amaranthaceae, Chenopodiaceae and Basellaceae under Class Magnoliatae, Subclass Caryophyllidae and Super order Caryophyllanae in Order Caryophyllales. (The Schematic representation of the Systems of Classification is shown in Table I and the line of evolution of these families are also shown in Table II and III). Even now Takhtajan's (1969) classification along with Cronquist (1968) and Ehrendorfer's (1971) classification are found to be controversial (Soó, 1975) regarding the systematic position of several orders and particularly the Subclass Caryophyllidae.
<table>
<thead>
<tr>
<th>Bentham &amp; Hooker</th>
<th>Engler &amp; Prantl</th>
<th>Hutchinson</th>
<th>Takhtajan</th>
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TABLE-II

Dendogram showing the probable phylogeny and relationships of the Orders of Angiosperms (An abstract)
( after John Hutchinson 1959 (2nd Ed.) )
Table III

Dendogram showing the probable relationships of the orders of flowering plants (An abstract)

after Takhtajan, 1969 (tr. Jeffrey)
Metcalfe & Chalk (1950) while reviewing the anatomical characters of these families and their taxonomic and phylogenetic positions stated that the Amaranthaceae and the Chenopodiaceae are alike in exhibiting similar anomalous secondary thickening. Also the Amaranthaceae have more common anatomical characters with the Nyctaginaceae with the exception of the presence of raphides and styloids in later. The types of Calcium oxalate crystals which occur in the Amaranthaceae bring the family more in line with Caryophyllaceae. At the same time, Fernald (1950) indicated that the Amaranthaceae have nearly all the characters of Chenopodiaceae and for a few exceptions the flowers are mostly imbricated with dry and scarios persistent bracts, those often coloured, commonly three in number.

Morphological and anatomical data along with geographical distribution were used by the Orthodox taxonomists during the Pre-Linnean, Linnean and to a certain extent Post Linnean periods and still considered an important source of present day taxonomy. In the families Amaranthaceae and Chenopodiaceae (s.s.) as well as Basellaceae, morphological characters, particularly the shape of the embryo were given much importance for assigning the systematic position as well as initial division of the families into Sub-families, Tribes etc. Recent studies on 'The Systematics of the Chenopodiaceae' by Williams & Ford-Lloyd (1974) also indicated the importance of morphological characters in delimiting the family into 3 Subfamilies viz:


Beteae (Engler)
Embryo cyclical. Operculum present in fruit.
Endosperm present. Ovary semi-inferior.

Although phylogenetic considerations entered into taxonomy during the late Nineteenth century, there is at present an increasing tendency to incorporate all available sources of knowledge from the different aspects for better understanding of the complex relationships between different plants and plant groups in identification. It is also recognised that no source of data is ever so obsolete as to be dispensed with the morphological characters just because there is sufficient cytological and chemical data. The need for this approach to taxonomic studies has been emphasised by different workers (Turrill 1942, Babcock 1947, Clausen 1951, Keck 1957, Stebbings 1959, Eames 1961, Bate-Smith 1962, Swain 1963, 1966, Heywood 1967, Hegnauer 1966, Hawkes 1968, Fairbrothers et al 1975, Hickey & Wolfe 1975, Dickison 1975, Palser 1975, Walker & Doyle 1975, Raven 1975 and others).

Recent researches on Chemotaxonomy (Bate-Smith 1973 and 1974; Takhtajan 1974, Cronquist 1974, Herout 1974, Mabry 1974,
Swain 1974, Harborne 1974, Flake & Turner 1974, Geissman & Irwin 1974, Boulter 1974, Grant 1974, Lavie 1974 and others) as well as pigment inheritance in plants (Davis et al. 1958) have clearly indicated that the chemical constitution of plants is a genetic character which exhibited clearer and more dependable data (Soó, 1975) on the phylogenetic status of the plants.

The main aim of the following investigations has been to correlate certain morphological, histological and chemical characteristics in the identification and classification of plants belonging to the families Amaranthaceae and Chenopodiaceae (s.l.) into more basic relationship. It is also intended to demarcate the various groups according to similarities in their structural as well as biochemical composition.
MAP 1

Map of Assam and its neighbouring areas showing areas of collection.

I. ASSAM:

A. Dibrugarh district: (1) Dibrugarh
   (2) Dhemaji

B. Lakhimpur district: (3) Lakhimpur

C. Sibsagar district: (4) Jorhat
   (5) Golaghat
   (6) Bokaghat

D. Mikir hills district
   (Karbi Anglong): (7) Bokajan
   (8) Diphu
   (9) Howraghat

E. Nowgong district: (10) Nowgong

F. Kamrup district: (11) Gauhati
   (12) Maligaon
   (13) Jalukbari
   (14) Kulsi
   (15) Mathanguri

G. Darrang district: (16) Tezpur
   (17) Bhairabkundo

H. Goalpara district: (18) Dhubri
   (19) Abhayapuri

I. North Cachar hills
district: (20) Mahur
   (21) Halflong

J. Cachar district: (22) Silchar
   (23) Loharbond
   (24) Hailakandi
   (25) Karimganj

II. MEGHALAYA:

A. Khasia hills
district: (26) Shillong
   (27) Nongpoh