

## CHAPTER 1

### INTRODUCTION

The family Compositae or Asteraceae is either the largest family of Angiosperms as Bentham (1873) claimed, or should Orchidaceae prove to be larger at least the largest family of Dicotyledons. The family comprises of about 950 genera and 21,000 species (Heywood et al, 1977) and consists of about one tenth of the flowering plants. They are distributed over the greater part of the earth. Morphologically, the family Compositae is characterised by the presence of head inflorescence with involucre of bracts, calyx which is not green and consists of pappus, corolla differentiated either into disc or ray types, anthers syngeneicous, ovary bicarpellary syncarpous and unilocular with a single basal ovule and fruit an achene.

Economically, a few are medicinally important while a few like Carthamus tinctorius, Helianthus annuus and Guizotia abyssinica are noted for their valuable edible oil. Chicory, which is frequently mixed with coffee is obtained from the roots of Cichorium intybus.

The Compositae have long been attracted attention as a well marked but highly variable group. The family is of great interest to embryologists mainly because of the variation in the embryo sac development and the phenomenon

of Apomixis. Although, the development of embryo sac in a majority of the species follows Polygonum type, as many as six different types - Allium, Endymion, Peperomia, Adoxa, Drusa and Fritillaria - occur within the family.

In spite of extensive embryological work in the family, many members remain uninvestigated embryologically. In this connection, it may be quoted from Davis (1964 b) who says, "Although more embryological investigations have been carried out in the Compositae than in any other family of Angiosperms only 15% of its genera have been examined and many of these records are concerned with a single species or frequently with one particular aspect of reproduction. A considerable amount of purely descriptive work still remains to be carried out therefore, before any generalisation can be made on the relative incidence of different types of embryo sac formation within genera as well <sup>as</sup> within the family." Since then several papers have appeared on the embryology of Compositae, but bulk of the species remain uninvestigated. From the above, it is quite clear that there is great scope to undertake further embryological investigations in the uninvestigated members of the Compositae.

Further, diverse opinions have been expressed regarding the systematic position of the family in various

systems of classification by different taxonomists. Engler (1926) and Engler and Diels (1936) included Compositae in the order Campanulatae along with Campanulaceae, Goodeniaceae, Brunoniaceae, Stylidaceae and Calyceraceae. Melchoir's (1964) order Campanulales is essentially similar to that of Engler excepting that he raised the Sphenocleaceae and Pentaphragmataceae to the family rank. Rendle's (1938) order of Campanulales comprises the families Campanulaceae, Goodeniaceae, Stylidaceae and Compositae. Core's (1955) classification is similar to that of Rendle, the only difference being that he included Cucurbitaceae in his order Campanulales. Bentham and Hooker (1862-1863) included the family Compositae in the order Asterales along with Valerianaceae, Dipsacaceae, and Calyceraceae while Hutchinson (1926) incorporated the family Adoxaceae also in the Asterales. Later, Hutchinson (1948, 1959, 1969, 1973) revised his system and raised the taxonomic hierarchy of Compositae to that of an ordinal rank Asterales comprising the only family Compositae. A similar treatment was accorded to the family by Benson (1957), Cronquist (1968), Thorne (1968), Takhtajan (1969) and Dahlgren (1975). Some systematists like Link (1829), Bessey (1915), Gundersen (1950) and Britton (see Lawrence, 1951) raised the tribes to the rank of independent families.

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Similarly, divergent opinions/put forth regarding the origin of the family Compositae. According to Delpino (1871), Solereder (1885), Wettstein (1901-1908), Hallier (1905), Lotsey (1911), Wernham (1912), Small (1919), Rendle (1925), Pulle (1937), Rosen (1946, 1949), Subramanyam (1951), Philipson (1953) and Hutchinson (1959, 1969, 1973) the family Compositae is derived from the Campanulaceae. Lindley (1846), Bentham (1873), Vuillemin (1884), Sinnot (1914), Bessey (1915), Schurhoff (1926), Schnarf (1933) and Poddubnaja-Arnoldi (1933) favoured the Dipsaclean origin. Cronquist (1955, 1968, 1977) is of the opinion that the family Compositae is originated from Rubiaceae. Hegnauer (1977) considering only chemical data favoured the origin of Compositae from Umbelliferae.

In the present study, an attempt has been made to discuss the bearing of embryological data in elucidating the status and origin of the family.

In the present thesis are presented the results obtained on the embryology of four species spread over to three genera and three tribes, representing both the sub-families Tubuliflorae and Liguliflorae.