CHAPTER I
INTRODUCTION

Asteraceae (nem. alter. Compositae) is the largest family of Angiospermae (Bentham, 1873) consisting of 950 genera and around 21,000 species (Heywood et al 1977) and contains one tenth of the flowering plants. Members of Asteraceae are mostly distributed in the temperate regions and high altitudes. But a few of them are distributed pantropically. They are mostly annual herbs while shrubs and trees are of rare occurrence. The family is characterised by the presence of the head inflorescence, involucral bracts, calyx reduced to pappus, corolla differentiated into either disc or ray type, syngeneous anthers, bicarpellary syncarpous, unilocular and inferior ovary with basal ovule and fruit an achene.

Compared to its size, the family is of little importance economically. A large number of species are grown as ornamentals. The family contains oil yielding plants - the sunflower (Helianthus annuus), the safflower (Carthamus tinctorius) and nigger (Cucumis abyssinica) - which are used as cooking oils. Cichory obtained from the roots of Cichorium intybus is often mixed with coffee.
Embryologically the family attracted a large number of embryologists, because of its diversity in embryological features. A perusal of the available literature reveals that only 15% of the species have been investigated embryologically and many of these investigations are concerned with only one aspect, like embryo sac development or embryo development.

Most of the earlier systems of classification of Angiosperms were based on morphological features, especially those of flowers. Such systems of classification which are based on a single set of characters are now regarded as artificial. A natural system of classification is one that takes into consideration evidences from all possible disciplines of botany that can be useful. During the last few decades data from embryology, cytology, palynology, chemo-systematics and anatomy have been used in taxonomical considerations at various levels.

Björnstad (1970) states that an embryological study can be helpful to the taxonomist in three ways.
1. Systematic questions may be decided when two or more positions have been proposed on the basis of other characters.

2. New research may be prompted on a taxon when embryological data make the present systematic position doubtful or improbable and

3. Confirmation of the present systematic position of a taxon by embryological information.

Maheshwari (1950) listed a number of embryological features of taxonomic significance which are taken into consideration for evaluating phylogenetic relationships. Similarly Palser (1975) listed many embryological characteristics that may be useful, when employed judiciously and in connection with other characters, on arriving at taxonomic conclusions.

Diverse opinions have been expressed regarding the status and origin of the family Asteraceae. Engler (1926) and Engler and Diels (1936) included Asteraceae in the order Campanulatae along with Campanulaceae, Goodeniaceae, Brunoniaceae, Stylidiaceae, and Calyceraceae. Malchoir'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, Stylidiaceae and Asteraceae. 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 Asteraceae 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 Asteraceae to that of an ordinal rank Asterales comprising the only family Compositae. A similar treatment was accorded to the family by Benson (1957), Thorne (1968), Dahlgren (1975), Takhtajan (1969, 1980) and Cronquist (1981). Some systematists like Link (1829), Bessey (1915), Gunderson (1950) and Britton (see Lawrence, 1951) raised the tribes to the rank of independent families.

Similarly, divergent opinions have been put forth regarding the origin of the family Asteraceae.
According to Delpino (1871), Solereder (1885), Wettstein (1901-1908), Hallier (1905), Lotey (1911), Wernham (1912), Small (1919), Rendle (1925), Pulle (1937), Rosen (1946, 1949), Subramanyam (1951), Philipson (1953) and Hutchinson (1959, 1969, 1973), the family Asteraceae is derived from the Campanulaceae. Lindley (1846), Bentham (1873), Vaillemin (1884), Sinton (1914), Bessey (1915), Schurhoff (1926), Schnarf (1933) and Poddubnaja-Arnoldi (1933) favoured the Dipsacalean origin. Cronquist (1955, 1968, 1977) is of the opinion that the family Asteraceae originated from Rubiaceae. Hegnauer (1977) considering only chemical data favoured the origin of Asteraceae 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 three species spread over to three genera and three tribes.