CHAPTER I

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The family Fabaceae (nom. alter. Leguminosae) has approximately 650 genera and 18,000 species (Polhill and Raven, 1981). This family is the third largest family of the flowering plants after Asteraceae and Orchidaceae and the second largest family of Dicotyledons. It is cosmopolitan in distribution. Bentham and Hooker divided the family into three sub-families - (Faboideae) Papilionoideae, Caesalpinioideae and Mimosoideae. Most of the modern taxonomists treat them as three distinct families namely Papilionaceae, Caesalpiniaceae and Mimosaceae respectively.

The sub-family Faboideae comprises of about 440 genera and 12,000 species (Polhill and Raven, 1981) which are cosmopolitan in distribution but abundant in the tropical and subtropical regions of the world. The members are xerophytes, mesophytes, hydrophytes and halophytes. Plants of this family are herbs, shrubs, climbers, twiners and trees. Morphologically the sub-family is characterized by the presence of zygomorphic flowers, fused calyx, papilionaceous corolla showing descendingly imbricate aestivation, 10 stamens in a single bundle or two bundles (9+1), sometimes 9, monocarpellary, unilocular ovary with numerous ovules on marginal placentation and fruit a legume or a pod.

Economically the members of the sub-family Faboideae are of great importance and find a wide range of usefulness. They provide important food stuffs, valuable fodder, fatty oil, useful fibre, timber, dyes, gums and several beautiful ornamental plants. It is next in importance to cereals as source of human food (Pulses). The seeds of several species being rich in starch and proteins make a part of our daily diet in the form of pulses.
The classification of plants is mainly based on morphological and anatomical characters. Anatomical characters of the vegetative organs of flowering plants have been employed with great success to the solution of taxonomic problems and to the elucidation of phylogenetic relationships. The comparative anatomy still continues to be a fertile field for uncovering new facts and creating new concepts on relationships and evolution of plants and plant organs.

The application of anatomical characters in plant classification dates back to Bureau (1864). For the first time, Bureau (1864) used anatomical characters for the de-limitation of the taxa, within the family Bignoniaceae. Later, Bailey (1951), Metcalfe (1967, 1968), Dickson (1975) and Cutler (1984) have dealt on the possible uses of anatomical evidence in the study of phylogeny and classification of plants.

Anatomical characters prove very helpful for individual identification of taxa at various levels in and outside the family and have several advantages over other taxonomic characters because the characters are easy to observe. They do not need elaborate laboratory facility. Paliwal and Anand (1978) have discussed the role of anatomical evidence in the classification of Angiosperms.

The important vegetative anatomical characters which are used in plant classification are underground organs, stems, leaves, petioles and stipules. The foliar anatomy was proved to be a very valuable tool in plant classification (Carlquist, 1961). Hickey (1973) proposed a detailed terminology to describe the various architectural features of leaves of Dicotyledons.
The importance of epidermal characters of leaves in Angiosperms has been reviewed by Stace (1984). Stem and Wood anatomy was a useful taxonomic tool for a long time. "Anatomy of Dicotyledons" by Metcalfe and Chalk (1950) in two volumes is an illustrated encyclopedia of Plant Anatomy which clearly describes how best the characters of anatomy can be used in classification at various levels.

Extensive anatomical work has been carried out in the family Leguminosae by several morphologists. Knowledge of stomata in Leguminosae has been earlier reviewed by Solereder (1908) and then by Metcalfe and Chalk (1950). Later extensive work concerned with the stomata and development of stomata has been done by Shah and Gopal (1969a, b, c); Shah (1968); Shah et al (1972); Kothari and Shah (1974, 1975); Shah and Kothari (1973, 1974, 1975, 1976, 1978); Shanmukha Rao and Subba Rao (1990); Leelavathi (1976); Leelavath and Ramayya (1983) Vijayakumar and Ramayya (1987) and Vijaya Kumar (1988).

Though many morphologists have made indepth study in the epidermal and stomatal structure and on ontogeny of stomata in different genera of Papilionaceae, the studies on Crotalaria species is very little (Metcalfe and Chalk, 1950; Shah and Gopal, 1969a; Krishnamurthy and Kannabiran, 1970; Kannabiran and Krishnamurthy, 1974). The genus Crotalaria is one of the larger genera of the subfamily Papilionaceae with more than 350 species (Willis, 1973). Of these 97 species occur in India (Sanjappa, 1991). Out of these, following seventeen species are selected for the present study.
Observations are based on a study of mature leaves and the development has not been traced. This work is carried out with a view to find out the range of variation in stomatal characters and their uses as taxonomic character in the genus Crotalaria. These characters will be utilized in assessing the relationship of these taxa.