CHAPTER SIX

GENERAL CONSIDERATION

VI. GENERAL CONSIDERATIONS

The present work deals with the Upper Gondwana flora of the east coast. The Upper Gondwana beds of the east coast are considered as marine intercalations. These beds are lagoonal Mesozoic sediments. They are found in a series of detached outcrops parallel to the shore line. The important areas of Upper Gondwana deposits represent -

(1) Cauvery basin in Tamil Nadu

(2) Palar basin in Tamil Nadu

(3) Krishna-Godavari basin in Andra Pradesh

(4) Mahanadi basin in Orissa

The present work deals with a small outcrop developed in the Krishna-Godavari basin. It comes under the famous Vemavaram shales having the richest fossiliferous beds among others. The Vemavaram shales have been earlier studied by Feistmantel (1879), Seward and Sahni (1920), Rao (1959), Sahni (1928), Suryanarayana (1954), Bose and Jain (1967), Jain (1968), Bose (1974) and Bose and Zeba-Bano (1978). Comparing to the Upper Gondwana floras of Rajmahal hills in Bihar and Jabalpur stage in Madhya Pradesh the work on Vemavaram shales is somewhat meagre. Further the Vemavaram shales are found in Guntur, Prakasam and Nellore districts of Andhra Pradesh. However all the earlier works deals with a single locality Vemavaram in Prakasam district.

According to Pascoe (1959) several small outcrops are

present around the Ongole town which is district place of Prakasam district. Considering this fact Vagyani (1984) began to discover these unknown fossiliferous localities. The most important place located is Uppugundduru in this region where a rich flora was found. A last 10 to 12 years Palaeobotanical research work by Shivaji University School is carried out and produced the interesting results. In the course of time other localities like Nagalauppalapadu, Rachapudi were discovered and studied by research workers of this department. There is a reference in Pasco's Manual of Geology about the place of Kandkuru which lies on the border of Prakasam and Nellore district. The locality Kandkuru is present in the Southern direction of Ongole having small outcrops of Upper Gondwana beds. Kandkuru is present 32 Kms. SSW of Ongole. Near the town Kandkuru the exposures are found in the well sections and sometimes on the stream banks. The interesting part of this town is there is no authentic published records of plant fossils. It is suggested that the beds are equivalent of Raghavpuram in Godavari district and Vemavaram in Prakasam district. The plants are found as impressions as well as petrifactions. Hence it was thought worthwhile to collect the fossil plants from this little known locality and study the floristic composition.

The investigations includes the morphological studies of impressions and anatomical studies of gymnospermous wood. In the present work several specimens were collected. 14 plant impressions and 4 petrified woods were choosen for studies and described in detail.

(I) Anatomical Studies

Studies of petrified woods from Kandkuru are made from the first time. The woods are moderately preserved and therefore out of several pieces those showing promising features were selected for the work. The woods belong to 4 genera namely -

1. Podocarpoxylon Gothan 1905
2. Taxaceoxylon Krausel and Jain 1964
3. Ginkgoxylon
4. Araucarioxylon Krauss 1870

Genus - Podocarpoxylon Gothan 1905

The woods of Podocarpaceae were described under the generic name - Podocarpoxylon Gothan 1905. Phyllocladoxylon Gothan 1905 and Paraphyllocladoxylon Gothan 1905. Stopes (1915), Seward (1919) instituted the genus Mesembrioxylon for such woods. The name was used by several authors in India and outside. However Bose & Maheshwari (1974) suggested that the name Mesembrioxylon should be a rejected and it should be replaced by Podocarpoxylon. They have made this suggestions on the basis of principle of priority using article 62 of the International code of Botanical nomenclature. Therefore Indian species of Mesembrioxylon are now transfered under Podocarpoxylon. From India more than 10 speices have been described from several localities ranging from Jurassic to Miocene. In the present work P. chandrapurensis described by

Rajanikanth and Sukh-Dev from Kota is incorporated. The wood shows all the important features of P. chandrapurensis and therefore it is identified as such. Interesting fact of the work is the species is found at a new place like Kandkuru. Which suggest a wider distribution in the rocks belonging to Kota stage. Family Podocarpaceae is a modern family and ranges from Jurassic to recent. Its fossil woods are found at several places in Peninsular India. Hence presence of Podocarpoxylon on the east coast is strongly justified.

Genus - Taxaceoxylon Krausel and Jain 1964

Fossil woods of Taxaceae are described under the name Taxoxylon Unger 1847. Recently Krausel and Jain (1964) replaced the name Taxoxylon and instituted a new genus Taxaceoxylon. From India very few woods of Taxaceae have been described. They come from Rajmahal hills in Bihar, Kota in Maharashtra and West Godavari district in Andhra Pradesh. In the present work a new speices T. kandkurense is described. This species showing distinct anatomical features like - Radial pits, uniseriate, Bars of sanio, and 2-5 cross field pits. Due to these distinct characters, it is described as a new species T.kandkurense. This adds new informations to the distribution of Taxinean woods.

Genus - Ginkgoxylon

The Ginkgo woods are quite rare in India and they were described as Ginkgo like wood by Rao (1969) from Andhra Pradesh, Woods of Ginkgo by Biradar and Mahabale (1978), Ginkgo woods described by Mahabale and Satyanarayana (1978), from Andhra Pradesh. While describing the Ginkgo woods the authors have used terms like Ginkgo or Ginkgo like wood. However we suggest that the term Ginkgoxylon will be more suitable for description of Ginkgolean fossil woods. The distinct features of Ginkgo are inflated parenchyma cells observed in T.L.S. and intercellular space present between trachieds of the secondary woods. Occurrence of Ginkgo at Kandkuru is quite a notable features. It should be noted that Vagyani (1985) described Ginkgo leaf as Ginkgoites crassipes from Prakasam district to which our locality belongs. Hence it is not surprising to note that presence of Ginkgo in this area. The wood is described as G.biradarii which is named after Dr. N.V. Biradar a well known Palaeobotanist of Poona University.

Genus - Araucarioxylon Krauss 1846

The araucarian woods are now easily classified on the basis of scheme given by Lepekhina (1972). Due to absence of pith in primary xylem the woods having only secondary xylem. are described under the genus Araucarioxylon. In Mesozoic beds of India several species of the genus have been described. In the present work a new speices A.jeyasinghii is described due to its distinct features. Jeyasingh (1994) described 3 species of Araucarioxylon belonging to Sriperamatur beds in Tamil Nadu

and showed that Araucarioxylon is equally common like Podocarpoxylon on the east coast. Our finding of A.jeyasinghii supports this observations.

(II) Morphological Studies

It includes the description of plant impressions found at Kandkuru. Total number of impressions described is 14. They belongs to following groups.

Genus - Ptilophyllum Morris

P. acutifolium

P. sp. cf. P. horridum and

P. sp. cf. P. sahni

Out of these 3 the number 2 and 3 are closely compared with relevant species. Further due to lack of cuticular features they are identified as such.

Genus - Pterophyllum Brongniart

It includes a single species namely P.footeanum Fesitmantel. Recently Vagyani (1986) described P.footeanum from Uppugunduru in Prakasam district. Hence its presence at Kandkuru supports its wider occurrence in this area.

Genus - Dictyozamites Oldham

It includes only one species D.feistmantelii Bose and Zeba-Bano. Which is quite common on the east coast.

Genus - Otozamites Braun

It is represented by a single species O. vemavaramensis in Prakasam district. Recently Vagyani (1986) reported its occurrence from Uppugunduru in Prakasam district. Hence presence of this species at Kandkuru indicates the wider occurrence of the species in this area.

B) Coniferophyta

This group is equally dominant like Cycadophyta. It is represented by following genera.

Genus - Elatocladus Halle

This is a foliage of Podocarpaceae and quite common in Mesozoic rocks of India. At Kandkuru following 3 species are found -

1. E. plana (Feist.) Seward
2. E. tenerrimus (Feist.) Sahni
3. E. confertus (Oldham & Morris) Halle

Genus - Brachyphyllum Brongniart

It is a foliage of Araucariaceae showing triangular or rhomboidal leaves arranged in a spiral fashion. Like Elatocladus it is abundandly found in the Mesozoic rocks in India. Recently Sukh-Dev & Rajanikanth (1988) described two species from Sivaganga in Tamil Nadu. Before that its occurrence is noted from Vemavaram, Raghavpuram, Sriperamatur and other places from the east coast. In the present work B.expansum (Brongniart) Seward is described.

Genus - Conites Sternberg

The genus represents reproductive organ of Conifers. In the present work only one specimen is described as Conites sp. It needs further collection and observations of additional specimens for specific identification. For the present it is kept as Conites sp. only.

Genus - Pagiophyllum Heer

It represents a vegetative shoot of Araucariaceae. The genus is an allied genus to Brachyphyllum. However it differs from Pagiophyllum in vertical length is more than the breadth of the leaf. Further the spiral arrangement is somewhat loose than Brachyphyllum. A new species P.kandkurensis is described on the basis of distinct features.

C) Pteridophytes

Genus - Equisetites Sternberg

Genus - Equisetites is found in the Jurassic and Cretaceous rocks of India. It is more common in Rajmahal hills. Recently Singh, Pandya, and Sukh-Dev (1990) added new species. E. sehorensis from Sehora in Madhya Pradesh. In the present work E. sehorensis is described. Which shows distinct features like longer internodes, Presence of Equisetites at Kandkuru is noteworthy feature of the flora.

Flora and its age

If we analyse floristic composition of the Kandkuru flora

we find that it is represented by not all the groups present in the flora of other places on the east-coast. It is dominated by two major groups viz. Cycadophytes and Conifers. The Pteridophytes are quite rare. Except the genus - Equisetites they are absent in this area. It is well known fact that east coast flora always shows lesser number of Pteridophytes than Rajmahal, Jabalpur and Cutch. Again at Kandkuru the other elements of Pteridophytes are also lacking. This is due to a fact that the place Kandkuru must have experienced some variations in the climate than the climate of other places of east-coast. Cycadophytes represent humid climate. Equisetites also support the presence of aquatic habitat. While conifers represents small pockets of temperate regions. However the picture may not be more clear due to complete investigation of this region. On the basis of megafossil studies it supports the Early Cretaceous age as suggested by Venkatchala and Rajanikanth in 1987. The absence of cuticle on plant impressions as well as microfossils studies from this area creates further problems in assigning the proper age to the flora. One should be careful in determining the age of the flora when studies are restricted to a small area and also include limited number of specimens. Hence the problem of age is quite open. It awaits the further intensive floristic studies of this region. Then one can reconstruct a proper picture of the climate; flora and probable age.