

---

## **CHAPTER— VI**

---

### GENERAL CONSIDERATION

The Upper Gondwana exposures in the East-Coast of India occur in isolated or detached outcrops. The sequence from Athgarh Sandstone, Cuttack District, Orissa & terminate into Ramanathapuram District, Tamil Nadu. In Andhra Pradesh they are found in Krishna-Godavari basin. The important exposures in Andhra Pradesh are Vemavaram Sandstone in Prakasam, Nellore & Guntur district. Gollapalli Sandstone & Raghavapuram mudstone, in Godavari District. In Tamil Nadu, besides Sivaganga Sediments the well known Upper Gondwana localities are found in Chigalpet district, Named as Sriperambudur beds. All these East-Coast deposits are marine intercalations of the Mesozoic era. These deposits consist of paralic, lagoonal Mesozoic Sediments distributed as detached outcrops along the Shoreline. Venkatachala & Rajanikanth (1987) pointed out the similar characters between the East Coast Sedimentary basin and West Coast of Australia. The East Coast Gondwana deposits are characterised by a distinct flora called as the 'Philophyllum Flora' mostly developed in Jurassic - Cretaceous period. Previous work on the different East Coast localities include the important contributions of Seward & Sahni (1920), Sahni (1928), Feistmantel (1879), Bose & Jain (1967), Bose & Zebq-Bano (1978), Bose (1974), Maheshari (1986). It is suggested that East-Coast Gondwana flora develops in distinct river basins such as Krishna-Godavari basin, Mahanadi basin, Polar basin, & Cauvery basin.

Present work represents an area from Cauvery basin which is mainly situated in Trichanapalli District. Cauvery basin represents the famous Sivaganga Formation, Earlier work on megafossil of this area includes the contribution of Feistmantel (1879), Gopal, Jacob & Jacob (1957), Chowdhury (1958), Mangain, Sastry & Subbaraman (1973), Ayyaswami & Gururaja (1977), Jeyasingh & Sudherson (1995) & Maheshwari (1986). In the Sivaganga formation important location are Therani beds which are covered by Uttatur sequence & underlain by the gneissic rocks. The important outcrops in Trichanapalli area are Uttatur village, Therani Village, Gurudmangalam Village in these areas represent the plant fossils in the form of impression as well as petrification. The impressions are mostly found in clay deposits which are associated with gypsum clay along the eastern side. Therani clay deposits is somewhat longer in size and consists of beds of brown coloured fire clay, ferruginous clay & ferruginous sandstones. The plant fossil from the Uttatur plant beds of the Trichanapalli District were first reported by Foote (1878). These beds, later named as "Therani Beds" by Shah & Singh (1972) after village Therani they show distinct white & ash-grey clay. Acharyya, Singh & Ghosh (1977) include the Uttatur, Plant Beds & Therani Beds in the Sivaganga Formation whose outcrop thickness is not known but in subsurface is estimated to be more than 1090 meters. Recently Verma (1954) described some coniferous woods from a village Gurudmangalam, Trichanapalli District. The work includes two species of the genus. Mesembrioxylon namely Dadoxylon Sp. & coniferous wood indeterminate. Earlier Sahni (1931) described a

10

brief account of coniferous woods from Uttatur. Considering the above data it appears that, the petrified woods collected from Garudmangalam & Uttatur it also includes the plant impressions collected from the localities like Therani & Uttatur, Trichanapalli District.

### PETRIFICATION

#### Coniferous Woods

In the Mesozoic beds of East Coast coniferous woods are known for long time Sahní (1931) has given a brief description of coniferous woods found in India. Accordingly the East-Coast woods are known from Sriperambudur beds, Tamil Nadu, Raghavapuram beds in Andhra Pradesh & little information from the Trichanapalli beds only 2 woods are described as Dadoxylan Sp & Indeterminable coniferous wood. Later on Verma (1954) described 2 species of the genus Mesembrioxylon Seward (1919) from the cretaceous rocks of Trichanapalli District. This indicates the occurrence of woods at several localities. However the considerable data is not available. The present work includes 3 genera of coniferous woods belonging to 2 families Genus- Podocarpoxyton Gothan (1905).

Fossil woods of Podocarpaceae are described under several under several generic names such as Podocar-poxyton Gothan (1905), Phyllocladoxyton Gothan (1905), Mesembrioxylan Seward (1919) & Circoporoxylon Krausel (1949). Recently Bose & Maheshwari (1974) have revised the nomenclature & suggested that the genus phyllocladoxyton was merged with Podocarpoxyton by Stopes (1915).

10

However on the basis of principal of Priority & International Code of Botanical Nomenclature all the Indian species of Mesembrioxylon were transferred to Podocarpoxylen. The practice is followed by present workers like Rajanikanth & Sukh-Dev (1989). In the present work 2 species of the genus are included namely Podocarpoxylen rajmahalense it is first described from Jurassic of Rajmahal hills in Bihar, in our work it is reported from Uttatur. The locality from which 2 species of genera are already known. This suggest 2 facts the first is family Podocarpaceae was quite common in the cretaceous of Trichanapalli district. Further it adds the wider distribution of P. rajmahalense ranging from Bihar to Tamil Nadu. The Second wood is described as P. Uttaturenses SP nov based on the comparative observation of anatomical features. If appears as distinct species this further supports the abundance of Podocarpoxylen.

Genus-Araucarioxylen Krause 1870. Genus Araucarioxylen represents the Primitive family of coniferous namely Araucareaceae. It is characterised by the presence of secondary xylem only showing araucarial radial pitting like multiseriate hexagonal pits. The another genus Dadoxylon Endlicher also belongs to the same family but it is characterised by presence of Primary features like pith & primary xylem associated with radial araucarial pitting. This scheme is recently putforth by Lepekhina (1972). Accordingly coniferous woods described from India are revised Bose & Maheshwari (1974) have given a brief account of mesozoic members of Araucarioxylen from India. Recently Jeyasingh & Kumarswamy (1994) have described a new species A. mosurensis

from Cretaceous of Tamil Nadu. They have also described 2 new species of the genus from sriperambudur formation as A. Rajivii & A. Giftii. This indicates like podocarpoxyton & Araucarioxyton is abundently found on East Coast. In the present works A. Garudmangalenes is described as a new species. This adds more information to the knowledge of coniferous woods found at Garudmangalam.

Genus- Agathoxyton Harig 1848.

This genus shows affinites of the family Araucareaceae. Represent the genus Agathis is from India we have very few reports of the fossil woods of Agathis. Krausel & Jain (1964) described A. agathiodes from Rajmahal hills. Present report is a new addition to the knowledge of Agathoxyton in India. A. trichinopoliense is described here as a new species showing distinct anatomical characters like hexagonal pits of araucariod type & cross fields pits are circular to oval in shape.

The above reports of 4 species of coniferous woods indicates that in Cretaceous of Trichanapalli, there were small pockets of upland vegetation. It is well-known fact that coniferous grow at the high attitude & indicates the temperate climate. Hence the petrified woods shows some light on the palaeo climate & past environmental of Trichanapalli District.

## IMPRESSIONS

The plant impression were collected from 2 places Therani & Uttature. According to sukh-Dev & Rajanikanth (1988) Therani is included in the Sivaganga formation. Maheshwari (1986) discussed the Uttatur area in Trichanapalli district. He suggested the inclusion of Uttatur plant beds in Sivaganga formations needs some more observations. However Acharyya, Singh & Ghosh (1977) included the Uttatur & Therani both in Sivaganga formation. In the present work 12 plant impressions are included belonging to different groups. The impressions described indicates the presence of cycadophytes, Coniferales & Unclassified ferns.

### Cycadophyta

The group includes mostly leaf genera & represented by 8 species. It forms the major content of the collection & suggest the dominance in the floristic composition.

#### Genus-Ptilophyllum Morris 1840.

It is a leaf genus where pinna are attached on the upper surface of the rachis & partially covered it. The pinna shows parallel venation. Recently Bose & Kasat (1972) have given an extensive account of Ptilophyllum in India & noted that it is represented by 15 species after this work 2 more species have been added by Mahabale & Satyanarayana (1979) from Andhra Pradesh. Therefore Ptilophyllum is represented by 17 species in

India. In the present work following 3 species are described. 1. P.SP.Cf.P.Sahnii, 2. P.acutifolium Morris (1840), 3) P. SP.Cf. P.distans. The occurrence of Ptilophyllum at various places on East Coast further it supports the presence of Upper Gandwana flora in the cretaceous of Trichanapalli District.

#### Genus-Dictyozamites oldham.

It is a cycadophytic pinnat leaf having pinnae with auriculate & reticulate venation. According to Bose & Zeba-Bano (1978) described 5 species are known from India. Recently Sukh-Dev & Rajanikanth (1988) have described a new species D.gondwanaensis from Gangapur formation in Andhra Pradesh. Hence it appears that 6 species of Dictyozamites are found in India. In the present work following 2 species are included.

1) D. indicus

2) D. feistmantalii.

Mahabale & Satyanarayan (1979), Vagyani & Jaman (1987) & Sukh-Dev & Rajnikanth (1988) have described different species of Dictyozamites from coastal part of Andhra Pradesh & Tamil Nadu. Occurrence of the above 2 species in the present work supports the presence of Dictyozamites on the East Coast.

#### Genus-Otozamites Braun 1842.

It is also pinnate leaf having auriculate base and radiating venation. Bose (1974) have made important contribution on this plant. In the present work it is some what rare and represented



by a single species namely O. SP. This indicates the rarity of otozamites on the coastal part of Tamil Nadu. On the other hand the coastal part of Andhra Pradesh shows a moderate presence of the genus. Recently Vagyan (1986) described O.Vemavarmensis Bose & Jain from Uppagundur in Prakasam District, Andhra Pradesh.

**Genus-Anomozamites Schimper 1870.**

It is also a pinnate leaf having segmented lamina showing parallel Venation. According to Bose & Banerji (1981) it is represent by 3 species. In the present work A. amarjolense is described. Anomozamites is common on the East Coast & recently Sukh-Dev & Rajanikanth (1988) described following 2 species from Sivaganga formation in Tamil Nadu.

- 1) A. haburensis bose & Banerji.
- 2) A.SP.

**Coniferophyta**

**Genus-Elatocladus Hale 1913.**

It present a vegetative leafy branch of podocarpaceae & shows a fairly wide distribution on East Coast. Seward & Sahni (1920). Sahni (1928). Vagyan (1985), Sukh-Dev & Rajanikanth (1988). Mahabale & Satyanarayan (1979) described occurrence of different species on the East Coast. Among all these species E.Plana appears to be a most common member in the upper Gondwana flora of East Coast. In the present work following 2 species are included E. Plana & E. tenerrima.

**Genus-Brachyphyllum Brongriart 1829.**

It is a sterile branch of Araucareaceae, genus Brachyphyllum is a common element in the Upper Gondwana flora of India. Several species have been described by different authors recently Sukh-Dev & Rajanikanth (1988) described a new species from Therani as a B.theraniense. It may prove as a characteristic member of the Sivaganga formation. However in the present work only one species is described as B. SP.

**Unclassified Ferns**

**Genus-Desmiophyllum Lesquereux 1878.**

Sahni (1928), described D.indicum from share river in Madhya Pradesh. According to Sahni the genus has, wider affinities covering broad ray of groups like coniferals, cordilates Ginkgoales. Vagyani (1984) reported occurrence of D.indicum from Vemavaram. This is first report from the East coast. In the present work D.indicum is included from Uttatur. Trichanapalli District. It support the earlier observation & conform the presence of Desmiophyllum in cretaceous of Tamil Nadu.

Venkatachala & Sinha (1986) recently discussed the palaeoclimate & environment of the East Coast. Recently Venkatachalam & Rajanikanth (1987) have discussed stratigraphic implication of East Coast upper Gondwana floras they have pointed out the Upper Gondwana Sediments are distributed in different river basin like Cauvery, Polar, Krishna-Godavari & Mahanandi

basin. These sediments supports a palaeoecology representing a non marine & marginal marine conditions. The Cauvery basin is represented by a distinct Mesozoic deposits made by sivaganga formation. It is consider as Southern end of East Coast deposits near Uttatur, Therani, Naicolam, Karai, Rayani & others. The Megaflora studied by Feistmantel (1879), Gopal Jacob & Jacob (1957), Chowdhury (1958), Ayyaswami & Gururaja (1977). Jeyasingh & Sudhersan (1985) and Maheshwari (1986), showed that cycadophytic elements are most dominant in the flora, they are followed by Conferous & Ferns. Blanford (1862) suggested that the uttatur plant beds are stratigraphical & lithological shows a widely separated Cretaceous rocks,

Sitholey (1944) showed the resemblance between the flora of Tabbowa & Sivaganga beds. Sukh-Dev & Rajanikanth (1988) found that abundance of cycadophytes infloral assemblage of Sivaganga formation indicates the presence of marginal marine Palaeo-environment of Cauvery basin. The presence of coniferous woods & cycadophytic dominance suggest the upland vegetation associated with the basal marine environment suggesting a shoreline in Trichanapalli florafits into the findings of Lower Cretaceous age and marginal marine palaeoenvironment.

\*\*\*\*\*