

CHAPTER-VI

GENERAL CONSIDERATIONS

Upper Gondwana rocks belonging to Mesozoic age occur all along the east-coast of India. In Andhra Pradesh they are found in Krishna, Godavari, Guntur and Prakasam districts. In Orissa they occur in Cuttack district. In Tamilnadu they are found in Chingalpet, Tiruchirapalli and Ramanathapuram districts. The Southern most exposures of these rocks are found near the Sivaganga town which is a district place of newly formed district Pasumpon, Mathuramalingam formerly part of the Ramanathapuram district, these rocks contain plant fossils and marine animals. Among these places Ongole area in Prakasam district is very rich and recently Vagyani (1985-86) discovered a new locality Uppugundururu situated near Ongole town. Vagyani and Zuting (1986), Vagyani and Jamane (1987) have made further contribution of fossil plants of this area, therefore, the Botany Department of Shivaji University is known as school of Mesozoic plant studies. Taking into consideration of further rich localities in Tamilnadu, it was decided to study fossil plants found at Sriperamatur and near by places for that purpose plant impressions were collected from several exposures found in the vicinity of Sriperamatur town. Similarly petrified woods were collected from a little known place Vellum situated 8 km. South of Sriperamatur.



PLANT IMPRESSIONS :

Feistmantel (1879) and Sahni (1928, 1931), Seward and Sahni (1920) have made earlier contribution on this area the present work confirms their earlier findings and also adds new genera and species to the fossil flora of this area.

I) BENNETTITALES :

This group is represented by following leaf genera.

- 1) Ptilophyllum,
- 2) Pterophyllum,
- 3) Dictyozamites.

It suggests humid and warm climate showing luxuriant growth of this group however, in our collection there are no reproductive organs but they were recorded by earlier workers hence the flora represents vegetative as well as reproductive parts of the plants.

Genus - Ptilophyllum Morris 1840

According to Bose and Kasat 15 species of this genus are found in different parts of India but along the East-Coast only four species are found viz. 1) P. acutifolium, 2) P. cutchense, 3) P. rarinervis, 4) P. tenerrimum.

The first 3 species are reported earlier but the 4th one is recently reported by Baksi from Raghavapuram.

Mahabale and Satyanarayana (1979) have added two more

new species from East-Godavari district viz. P.deodikarii and P.raghudeopurensis, hence the total number of species from East Coast becomes 6. In the present investigation following four species are reported viz.

- 1) P.acutifolium
- 2) P.cutchense
- 3) P.distans
- 4) P.horridum

According to Bose and Kasat, most of the species are known from East Coast are from Vemavaram and Raghavapuram and no record from Sriperamatur were made by the authors. Occurance of 4 species at Sriperamatur indicates that it has abundance of Ptilophyllum suggesting presence of Upper Gondwana flora.

Genus - Pterophyllum Brongniart 1928

This cycadophytic leaf which forms the important member of the Upper Gondwana flora. According to Bose and Banerji (1981) 10 species of Pterophyllum have been reported from various parts of India. From East-Coast following three species have been reported viz.

- 1) P.kingiamum from Gollapalle
- 2) P.footeanum from Vemavaram
- 3) P.incisum from Vemavaram

Hence, it appears that all these 3 species were found in

Andhra Pradesh only. In the present investigation two species of Pterophyllum are described viz. 1) P.footeanum 2) P.distans.

Recently, Vagyani (1986), Vagyani and Zuting (1986) and Vagyani and Mane (1989) reported P.footeanum, P.distans and P.incisum from Uppugunduru in Andhra Pradesh. Occurance of P.footeanum and P.distans at Sriperamatur suggests that they have wider distribution in the East Coast. Jeyasingh and Sudharsan (1989) reported P.morrisianum and P.medlicottianum from Sivaganga beds in Tamilnadu. This report strongly supports the occurrence of Pterophyllum in the East Coast of Tamilnadu. It is further suggested that genus Pterophyllum has more frequency than Ptilophyllum on the East Coast.

Genus - Dictyozamites Oldham 1863

Bose and Zeba-bano (1978) published a monographic account of Dictyozamites in India.

Accordingly 6 species of Dictyozamites are found in different parts of India from East Coast D.indicus and D.feistmanteli are reported. Mahabale and Satyanarayana (1979) described D.falcatus and D.sahni from Raghudevapuram in East Godavari district of Andhra Pradesh. Vagyani and Jamane (1987) reported D.falcatus and D.feistmanteli from Uppugunduru in Andhra Pradesh, hence, the above reported indicate that 4 species of Dictyozamites are found along the East Coast of India. According to Bose and Zeba-bano from Sriperamatur only one species that is D.feistmanteli is known,

but in the present investigation following two species are described viz;

- 1) D.falcatus, 2) D.indicus.

This suggests that Dictyozamites is represented by three species in Sriperamatur area. Other species may come out in future investigation.

II) Coniferales :

Genus - Elatocladus Halle 1913

This genus is widely distributed in the Upper Gondwana beds of India and represented by following six species -

1. E.plana,
2. E.conferta,
3. E.jabalpurensis,
4. E.tenerimma,
5. E.sahni,
6. E.kingiamum.

Vagyani and Jamane (1987) recorded E.plana from Uppugunduru in Ongole area of Andhra Pradesh, Mahabale and Satyanarayana (1979) also reported it from Raghudevapuram in Andhra Pradesh. Jeyasingh and Sudhersan (1989) and Goptal et al., (1957) reported it from various localities in Sivaganga area of Tamilnadu. According to Sahni (1928) from Sriperamatur only E.plana is reported and E.conferta and E.tenerrima are known from Madras presedency. In our work E.conferta and E.plana are described this indicates that these two species

are abundantly found in Sriperamatur area it is possible that other species are also present in this area and further investigation may confirm their occurrence in this part.

Vagyani and Jamane (1987) suggested that E.plana is one of the characteristic conifer of the East coast which represents Kota stage and indicates Upper Jurassic age of these localities.

Genus - Pagiophyllum Heer 1881

It is a Araucarian vegetative shoot showing spirally arranged leaves as found in the genus Brachyphyllum, however, it differs from Brachyphyllum in possessing free part of the leaves having more breadth than the leaf base cushion.

According to Sahni (1928), it is not reported from East Coast however, Baksi (1968) reported it from Raghavapuram in Andhra Pradesh and Jain (1967) described Pagiophyllum sp. from Vemavaram hence, it appears that it is rather rare on the East Coast.

In our work Pagiophyllum Cf. P.perigriamum is described and supports the rare occurrence of Pagiophyllum on the East-Coast on the other hand more species are found in Rajmahal Hills, Bihar, Madhya Pradesh and Cutch. They are described by Vishnu-mittre (1959), Bose and Suckdev (1972) and Bose and Banerji (1984) more investigation is necessary to clarify the situation.

Genus - Brachyphyllum Brongniart 1828

It also represents Araucarian vegetative shoot so far eight species of Brachyphyllum have been reported from various Upper Gondwana localities in India. Out of eight species, from East Coast following two species are known.

- 1) B.rhombicum
- 2) B.expansum

They are also reported from Sriperamatur area.

In our work following three species are recorded.

- 1) B.rhombicum,
- 2) B.expansum,
- 3) B.feistmanteli.

Mahabale and Satyanarayana (1979) described B.expansum from East Godavari district in Andhra Pradesh, hence it appears that out of eight species only three are known from East Coast among these. B.expansum shows wider distribution along the East-Coast, hence it is suggested that it can be another characteristic conifer of East Coast along with E.plana. Further, it is suggested that along the East Coast Araucariaceae and Podocarpaceae were present in large proportion than other coniferous families.

WOODS : (Petrifications)

The present work embodies investigations of five petrified woods chosen from collection of woods from Vellum near Sriperamatur area in Tamilnadu these woods belong to Kota

Stage of Tamilnadu and reveal interesting characters they belong to two families and three genera.

Family - Araucariaceae

Genus - Araucarioxylon Krauss 1846

This is an oldest genus of Araucariaceae instituted by Krauss (1846) previously there was confusion between genus Dadoxylon Endlicher and Araucarioxylon Krauss both genera belong to the family Araucariaceae hence earlier workers used to describe coniferous wood under these genera without any specific criteria. Recently Lepekhina (1972) separated these two genera on the basis of primary characters hence it is decided that when a wood showing Araucarian pitting and presence of pith and primary xylem it should be described under the genus Dadoxylon and when the wood having Araucarian pitting but lacks pith and primary xylem it must be described under the genus Araucarioxylon we have followed this criteria and one species of Araucarioxylon is included in the present work namely Araucarioxylon bosei, it shows distinct growth rings, uniseriate Xylem rays and biseriate and multiseriate circular pits, hexagonal multiseriate pits and 2 to 6 field pits. Presence of Araucarioxylon in this area supports the occurrence of Araucariaceae in this area. Already the vegetative parts of the family like Pagiophyllum and Brachyphyllum are included in this work.

Genus - Agathioxylon Hartig 1848

This genus instituted by Hartig (1848) showing affinities to the genus Agathis of Araucariaceae in the present work one species of Agathioxylon namely A. surangei is described it shows distinct growth rings uniseriate Xylem rays, presence of Xylem parenchyma and uniseriate and biseriate circular pits which are vestured and multiseriate hexagonal pits, 2 to 4 field pits. Genus Agathioxylon is reported from New Zealand, Australia, Hungary and India, it appears that it is widely distributed in Southern hemisphere than Northern hemisphere and ranges from Jurassic to Pliocene. In India it is reported from Rajmahal Hill, Bihar, having Jurassic age and its occurrence at Vellum supports that in India it is found in Jurassic rocks comparing to Araucarioxylon it is rare in occurrence and restricted in the Geological range hence it appears that in India, it was abundantly present in the Jurassic period.

Genus - Podocarpoxylon Gothan 1905

The genus Podocarpoxylon has a wide range from Jurassic to recent earlier the Indian woods of Podocarpaceae were described under the generic name Mesembrioxylon Seward recently Maheshwari (1974) has revised the woods of Podocarpaceae described from India and transferred them under Podocarpoxylon of Gothan in India the woods are found at Rajmahal Hills, Trichinapalli, Raghavapuram and Vellum near Sriperamatur all these localities belong to Jurassic Cretaceous period. They

are also found near Pondichery belonging to Miocene period this indicates that the genus evolved in the Triassic reached the climax in the Jurassic Cretaceous and got reduced in Miocene later on it became extinct. Our locality belong to Upper Jurassic (Kota Stage). This supports the abundance of Podocarpoxylo in the Jurassic of India. Three species of this genus are included in our work and supports the abundance of Podocarpoxylo in the Jurassic. The vegetative shoots of Podocarpaceae known as Elatocladus are also common in this area which supports a dominance of Podocarpaceae in the Jurassic of East Coast.

Flora and its age :

Along the East Coast of India Upper Gondwana plants are reported from various out crops. According to Krishnan (1960) Vemavaram shales in Andhra Pradesh and Sriperamatur beds near Madras are correlated and have rich assemblage of plant fossils Raghavapuram mudstones are also correlated with them. These formations belong to Kota Stage that is Upper Jurassic in age. According to Feistmantel (1879) Vemavaram shales have 30 species of plant fossils while Sriperamatur beds have 25 species. Feistmantel (1879) critically described plant fossils of these formations as Outliers on the Madras Coast.

King (1880) reported Feistmantel's work in his publication afterwards not much work has been done on the plant fossils

of this area recently Seward and Sahni (1920), and Sahni (1928) revised the fossil floras of the East Coast Suryanarayan (1953, 1954, 1955) has completed the list of work done on the Upper Gondwana formations. At Sriperamatur the fossil flora is dominated by Bennettitales and coniferales and have filicales and Ginkgoales in minor proportion but they are not described in our work. The presence of Podocarpoxylon shows equivalent situation of Coastal flora and central part of the Godavari valley flora belonging to Kota Stage. Similar situation is also found in the presence of Elatocladus, Brachyphyllum and Pagiophyllum. According to Feistmantel (1879) the Coastal Upper Gondwana flora is compared with Rajmahal and Jabalpur flora further it shows mixture of both these floras having 12 plants of Jabalpur group and 14 from Rajmahal group the dominance of Ptilophyllum, Elatocladus and Brachyphyllum confirms the Jurassic age of Sriperamatur beds to ascertain the exact age palynological data is highly desirable but except Ramamujam (1950) nobody has done work in this line he has described miospores from Vemavaram shales only. It appears that along the East Coast carbonaceous shales having the miospore assemblage is rather rare, therefore, for the time being one has to rely on the megafossil evidences. Hence, on the basis of present work Upper Jurassic age is suggested to this flora, more extensive work is required to clarify the situation regarding the age and composition of the flora.