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INTRODUCTION



INTRODUCTION

Gondwana offers tremendous scope and attraction to the Indian Palaeobotanist. It represents a large museum of information regarding the past floristic history of the sub-continent and also serves as a store house of fossil fuels. Therefore, Palaeobotanists, Geologists have concentrated for last fifty years the study of Gondwana flora and its relevant aspects.

The word 'Gondwana' was first suggested by Medlicott in 1872. But it was not officially published. Later on Feistmantel in 1876 systematically used this term for a definite purpose and its utility. Fox (1931) used the term Gondwana system for characteristic rocks. Which includes sandstones, shales, coal deposits and other rock types. Gondwana covers all these shallow marine deposits in the southern hemisphere having typical, lithological, biological and tectonic aspects. The Gondwana deposits in India are mostly developed in river basins in the peninsular regions. They are of fluvial and lacustrine origin. Extra-peninsular deposits are also present and found in the northern and frontiers of India. The term Gondwana land includes a huge southern land mass covering countries like India, Australia, South Africa, South America, Antarctica and Madagascar Islands. The Gondwana period in India started from the Upper Carboniferous and terminated in the Lower Cretaceous. The period is estimated upto 120 million years. The name Gondwana is taken from the brave, medieval

tribe whose kingdom covered the area in the Madhya Pradesh and other regions. The kingdom was later on demolished by the mighty Moghul kings. However, the tough fight given by the tribe is still remembered by the historians. Even today the 'Gond tribe' is pushed back in the primitive area of Bastar in Madhya Pradesh and Chandrapur district of Maharashtra and adjoining regions in Andhra Pradesh.

It is already mentioned that in the peninsular India the Gondwana deposits are found in the river basins like Pranhita, Wardha-Godavari valley, Mahanadi valley and Damodar valley. Comparatively smaller deposits are found in Krishna-Godavari basin, Palar basin and Cauvery basin. Due to this peculiar mode of deposits Gondwana rock shows a rich preservation of fossil flora. The flora is vast both in vertical and horizontal direction.

Regarding the classification of Gondwana system and age of different formation of it, there are two different opinions. This has produced the main controversy among Palaeobotanist and Geologists and hence the floristic study and stratigraphical work of the Gondwana deposits offers extensive work for research workers. According to first school the Gondwana is classified into two divisions -

- 1) Lower Gondwana,
- 2) Upper Gondwana.

This school is strongly supported by Medlicott and

Blanford (1879), Oldham (1893), Cotter (1917) and Fox (1931). The suggestions of this school is followed officially by Geological Survey of India for the purpose of research, mapping and other geological activities. However, second school suggested that the system should be divided into three divisions viz. -

- 1) Lower Gondwana
- 2) Middle Gondwana
- 3) Upper Gondwana

This proposal has been advocated by Feistmantel (1882), Vrendenburg (1910), Wadia (1957).

Indian Palaeobotanical research which took the great impact due to Sahni and associates and produced a vast data. Some of the important contributions are by Lele (1964), Surange (1968), Saxena (1974), Vagyani and Mahabale (1972).

According to Surange (1968) in India we come across two distinct floras found in the Gondwana system, viz. the Glossopteris flora representing Lower Gondwana and Ptilophyllum flora representing Upper Gondwana. Broadly speaking these suggestions are accepted by most of the workers. However, some interesting beds in the South Rewa basin in the Madhya Pradesh showed a peculiar floristic composition. Particularly Parsora flora brought out many interesting facts. These activities were first started by Hughes (1881, 1884) and later on extensively studied by Feistmantel (1882). They observed

that the Parsora plants indicate a phase of change in time and space and therefore, they were named as transitional beds. Intensive work by Wadia (1957), Lele (1955, 1964), Mahabale (1966) have shown that they developed a distinct flora between Lower Gondwana and Upper Gondwana which shows the mixture of elements from both. Therefore the newly created division was named as Middle Gondwana and hence three fold divisions is established by the school. The Middle Gondwana flora is mostly developed in Triassic. Particularly Maleri beds in Andhra Pradesh, Tiki beds in Madhya Pradesh, Mangli beds in Maharashtra. The flora is popularly called as Dicroidium flora. Because this genus is considered as an index fossil of the Triassic. Recent work by Bose (1966 b), Maheshwari (1966 b), Mahabale and Vagyani (1980) have strongly supported this observations. To have a brief information of the development in the classification of the Gondwana system we have to consider the different suggestions and schemes put forth by various Geologist.

Following account gives different schemes of Gondwana classification suggested by different authors.

According to Fox (1931) Gondwana system is divided into two divisions. The details are as follows :

| | | | |
|----------|-----------------|-----------------------|---------------|
| Upper | Jabalpur Series | Umia Stage | |
| Gondwana | | Jabalpur Stage | Lower |
| | | Chaugaon Stage | Cretaceous |
| | Mahadeva Series | Maleri Stage | Jurassic |
| | | Pachmarhi Stage | Triassic |
| | Break | | |
| Lower | Panchet Series | Hirpur Stage | |
| Gondwana | | Maitur Stage | |
| | | (Mangli beds) | |
| | Raniganj Series | Kamthi Stage | |
| | | Raniganj Stage | |
| | Barren measures | Mahadeva Stage | |
| | | Iron stone shales | Damuda |
| | | Kulti Stage | |
| | Barakar Series | Barakar Stage | |
| | | Karharbari Stage | Permian |
| | | Umaria marine beds | |
| | Talchir Series | Rikba plant Stage | Upper |
| | | Talchir needle shales | Carboniferous |
| | | Glacial boulder beds | |

In comparing with Fox's classification the three fold system suggested by Feistmantel represents the second school. He suggested tripartite division of Gondwana system. On the basis of fossil flora of Parsora beds and other South Rewa localities. He concluded that these areas shows distinct lithological and floristic compositions. Therefore, a new division viz. Middle Gondwana was created. The classification is as follows :

Feistmantel's Classification

| | | |
|--------------------|---|---------------------|
| Upper Gondwana | Jabalpur Kota Rajmahal | Jurassic |
| Middle Gondwana | Parsora Panchet Damuda | Triassic |
| Lower Gondwana | Karharbari Talchir Talchir boulder beds | Permo-Carboniferous |

After Feistmantel, Vredenberg (1910) supported tripartite classification. But he used the evidence of animal fossils. Recently Lele (1952 a, 1955, 1962, 1964) further extended the three fold classification by his extensive palaeobotanical work on the South Rewa Gondwana basin. He found that the flora shows Glossopteris, it is an important member of the Lower Gondwana and Ptilophyllum representing the Upper Gondwana. Besides these elements the flora was dominated by Dicroidium, which serves as an index fossil of Triassic. The flora is named as Dicroidium flora represents the Middle Gondwana. The details of Lele's classification are as follows :

Lele's Classification

| | | |
|-------------------|--------------------------------------|-------------------------------|
| Upper Gondwana | Umia Jabalpur Kota Rajmahal | Jurassic to Lower Triassic |
|-------------------|--------------------------------------|-------------------------------|

| | | |
|--------------------|---|------------------------------------|
| Middle Gondwana | Mahadeva Parsora Maleri Panchet | Triassic ? Rhaetic |
| Lower Gondwana | Raniganj Barren measures Barakar Karharbari Talchir and Glacials | Permo-Carboniferous and Permian |

From the above data it appears that in the three fold system the Lower Gondwana starts from Upper Carboniferous and ends into Raniganj or Upper Permian and Triassic represents Middle Gondwana and Jurassic to Lower Cretaceous represents Upper Gondwana. On the other hand in the two fold system Lower Gondwana starts from Upper Carboniferous and extends upto Triassic. While the Upper Gondwana represents Jurassic to Lower Cretaceous. The major difference being absence of Middle Gondwana in the scheme.

The three fold system is further supported by Saxena (1952) and Wadia (1957). Particularly Wadia included Panchet series, Mahadeva series and the Maleri in the Middle Gondwana. Wadia further suggested Middle Gondwana shows distinct lithology, fauna and climate.

The Gondwana flora of India is studied extensively by several workers like Arber (1905); Feistmantel (1876 to 1889, Zeiller (1902), Seward and Sahni (1920), Sahni (1928), Bose and Kasat (1972), Bose (1974), Bose and Zeba-Bano (1978)

Bose and Banerji (1981, 1984), Vagyani and Mahabale (1972), Mahabale and Vagyani (1980), Vagyani (1985, 1986) Vagyani and Jamane (1987); Vagyani and Deshmukh (1994). The present work deals with the Upper Gondwana deposits found in the coastal part of Prakasam district in Andhra Pradesh. From the literature it was found that except Vemavaram there is no work on the fossil flora of Prakasam district. The Vemavaram shales are the richest fossiliferous beds found in the region. But past literature indicates work on the Vemavaram shale. Therefore, it was thought worthwhile to investigate the region extensively and try to locate the new localities and study the flora found there in. In this connection the palaeobotany division of Shivaji University, Kolhapur of Maharashtra under the supervision of Dr. B.A.Vagyani started exploration for last twelve years. The school has located a new rich locality Uppugundur in the Prakasam district and published the interesting elements found in them. In continuation with these efforts and taking a hint from Pascoe's suggestion, the place Kandkuru was selected for the present investigation. Kandkuru lies on the border of Prakasam and Nellore district and it is placed at the distance of 24 Km of Ongole. The plant fossils were collected from the newly dug wells as well as streams and sometimes from the cotton fields.

The flora on the whole is dominated by plant impressions. But few woods were collected from a site near Nallah. The work will add more information to the Upper Gondwana flora of the east coast and also brings out the locality Kandkuru in a focus for a feature Palaeobotanists.