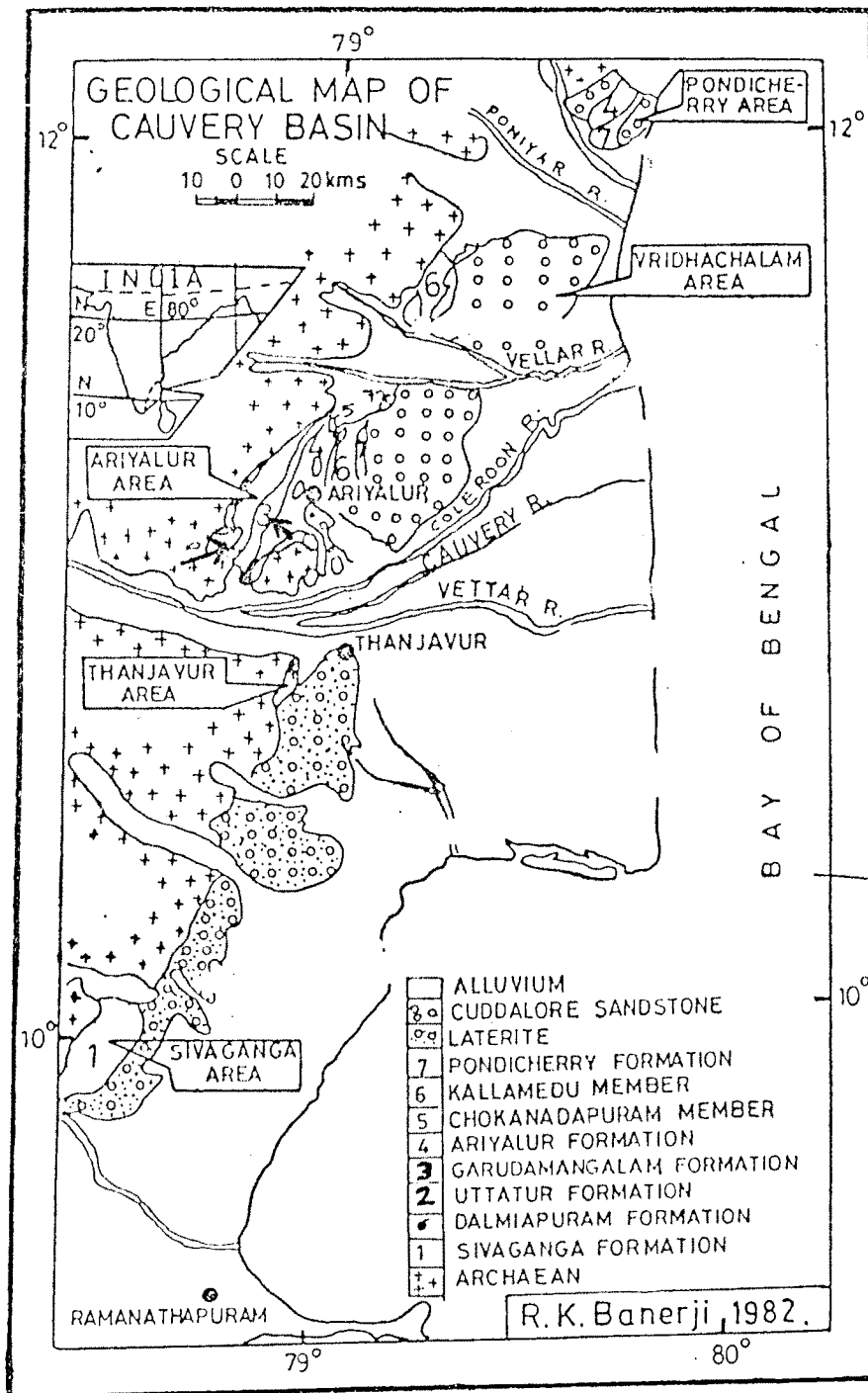

CHAPTER—III



Fossiliferous localities

2 UTTATUR →

3 GARUDMANGALAM →

AREAS		ARIYALUR		THANJAVUR		SIVAGANGA	
GEOLOGIC AGE							
RECENT TO PLEISTOCENE		AND GRAVEL BEDS					
PLIOCENE TO MIDDLE EOCENE		ONE		LATERITE			
EARLY EOCENE TO PALAEOCENE		PONDICHERRY Fm.		PONDICHERRY Fm. (EXPOSURES DOUBTFULL)		NOT KNOWN	
CRETACEOUS	LATE	MAESTRICHTIAN	LATE	KALLANKURCHI Fm.	KALLAMEDU SANDSTONE M.	KALLANKURCHI Fm.	KALLAMEDU SANDSTONE M.
			MID.		CHOKANATHAPURAM LIMESTONE M.		CHOKANATHAPURAM LIMESTONE M.
			EARLY	ARIYALUR Fm.	SADIYANKANPATTI M.	ARIYALUR Fm. (NO FURTHER SUBDIVISIONS RECOGNIZED)	
		CAMPANIAN	SILLAKUDDI M.				
		SANTONIAN TO CONIACIAN	MELMATUR M.				
	(NOT KNOWN)						
	TURONIAN	GARUDAMANGALAM Fm.	X				
	CENOMANIAN	UTTATUR Fm.			SANDSTONE		
					CLAY M.		
	EARLY ALBIAN	DALMIAPURAM Fm.			LIMESTONE		
SHALE							
EARLY CRETACEOUS TO LATE JURASSIC	SIVAGANGA Fm.	UPPER M.	?		SIVAGANGA Fm.	UPPER M.	
		?			SIVAGANGA Fm.	MIDDLE M.	
		LOWER M.			SIVAGANGA Fm.	LOWER M.	
		? GONDWANAS				? GONDWANAS	
PRECAMBRIAN		CRYSTALLINES					

MATERIAL. AND METHODS

Along the east-coast occurs a series of detached out crops belonging to Upper Gondwana period. These are small exposures deposited in the Jurassic to Cretaceous Periods.

In Orissa they are developed in Cuttack district and named as Athgarh Sand Stones. In Andhra Pradesh they are found in Guntur, Nellore and Prakasam district. They are included as exposure found in Krishna Godavari basin. Venkatachala and Sinha (1981) divided the Krishna Godavari basin into two distinct parts viz. (1) Krishna depression and (2) Godavari depression. IN Krishna depression Vemavaram shales represents the richest fossiliferous exposures and found in Guntur, Nellore and Prakasam districts. In Godavari depression they are found in Godavari district popularly called as Raghavapuram mud stones and Gollapalli sand stones.

In Tamil Nadu they are found in Chingleput district, the exposures are called as Sriperambudur beds.

In Tiruchinapally district they are called as Trichinopoly beds and Uttatur beds.

In Ramnathpuram district they are referred as Sivaganga beds.

All these plant beds represented Upper Gondwana flora

which is developed in Jurassic - Cretaceous period.

The Upper Gondwana flora is popularly called as Ptilophyllum flora. The name is given due to abundance of the Cycadophytic leaf genus found in the Upper Gondwana plant assemblage.

The fossil flora of the East-Coast represents a rich Mesozoic plant assemblage which can be compared with Rajmahal flora, Jabalpur flora and Cutch flora.

The major Upper-Gondwana floras one found in the Northern part of the India. These floras have been studied extensively by several authors and large data is accumulated from these studies. However, the flora of East-Coast was not studied in a major scale. The studies represent last 100 years work done by few workers.

The important contributions made by workers on the East-Coast include the following names. Feistmantel (1879), Seward and Sahni (1920), Sahni (1928), Suryanarayana (1954), Bose and Jain (1967), Bose (1974), Bose and Zeba Bano (1978), Bose and Banerji (1981). Recently Vagyani and his associates (1984-1994) have added more information to the fossil flora of East-Coast.

Among the different East-Coast fossiliferous beds the Vemavaram Shales, the Raghavapuram mud stones of Andhra Pradesh and Sriperambudur beds of Tamil Nadu are the major areas of attraction to the Palaeobotanist and most of the work is related to these areas.

Recently Sivaganga flora of Tamil Nadu is studied by Sukdev and Rajanikanth (1988). Fossil flora of Trichinapoly district is neglected by the workers and scanty information is available on its florastic studies. Considering these facts the present work is undertaken to study the fossil flora of some localities present in the Trichinapalli district. The Trichinapalli district represents the coastal part of Tamil Nadu and it is associated with the Ramnathpuram district where the Sivaganga beds are exposed.

The Trichinapalli district represents distinct divisions so far its stratigraphy and lithology is concerned.

According to Pascoe (1959) it is divided into following four stages, (1) Niniyur, (2) Ariyalur, (3) Trichinapalli and (4) Uttatur.

In the present work the morphological and anatomical studies of plant fossils found in Trichinapalli district is undertaken. The plant fossils are preserved as petrified woods and as impressions.

The petrified woods are collected from two different places they belongs to coniferales. The wood were collected from Garudamangalam which is situated on Pullambadi-Garudmangalam road. The location lies in the Southern direction of Garudmangalam village (11°5' : 78°55') Verma (1953) made first report about this place in 1954. The woods were handed over to Verma by S.R.Sarma

a Geology lecturer in Osmania University, Hyderabad. The exact spot is located at the distance of 14 Km from the South of Garudmangalam village. Taking the clues from this information the collections were made in 1994 in the month of February and April. The woods are exposed on the banks of small strips within a area of 1 Km from the already mentioned spot due to erosion they are exposed on the surface of the 'nalas' and some time due to strong water current they were drifted to the near by fields, hence most of them are drifted pieces of coniferous woods and not found in situ. The woods are light weight and yellowish white in colour. Due to continuous exposure they are found in weathered condition. This results partial loss of characters in them and therefore, many pieces do not show promising feature. Hence one has to cut number of pieces to get the desirable anatomical features. In general the preservation is ranging from poor to moderate and one has to take more efforts to find the important characters.

The second locality is the Uttatur village (11°4' : 78°55') this locality represents the well-known Uttatur plant beds which represents small isolated patches covering the area of 20 Km from Uttatur to the northern direction, riching the Terani beds. Earlier Foot (1878) made the first report of plant fossils from Uttatur beds. Later on Feistmantel (1879) described several plant impressions from these beds. Sahni (1931) in his monograph of coniferales mentioned these plant beds and described two petrified woods.

Sahni (1931) described Dadoxylon species from Uttatur in Trichinapalli district he also described a 'Coniferous wood indeterminate' from Trichinapalli itself. Hence so far studies on woods is considered; Verma (1953) and Sahni (1931) are the only earlier studies on petrified woods from Trichinapalli district are available. Therefore, present work adds further information to the knowledge of coniferous woods found in Trichinapalli district.

The plant impressions were collected from Terani beds in Trichinapalli district. The locality shows yellowish-brown sand stones associated with clay deposits around the village Teraini the plant impression were collected from clay pits. The impressions are on gray-buff sandy shale. They are mostly devoid of carbonified crust hence they could be studied only morphologically. The collections were made in February and May, 1995. The shale are separated from the pits by using hammers later on the impression are exposed by separating the shale along the bedding plane.

The petrified woods were collected from the field and properly packed in wooden-box and brought to the laboratory. In the laboratory they are examined with hand lens for the morphological features. Those showing promising features are selected for further studies. The woods are studied for their anatomical characters by using thin ground section method. The technique includes following steps;

1. The woods are washed under tap water and thoroughly cleaned. Then they are serially numbered by using white enamel paint and India ink.
2. The measurements were noted. Sections were cut by using the cutting machine. The machine is equipped with a circular diamond saw which is driven by an electric motor. First the wood was properly fixed in the vice of the machine and adjusted according to the required plane of the section. The machine works automatically when in operation. The blade is running through the water mixed with cutting oil and soap solution. After the section is cut the machine is stopped and section is taken out. Using this technique sections were cut along the different planes such as T.S., T.L.S. and R.L.S.
3. The section is polished on a glass plate using 400 grade emery powder. It is done to remove the vibration marks on the cut surface. This smoothed surface is then mounted on the glass slide using natural Canada balsam. For this purpose sufficient amount of Canada balsam is taken on the glass slide and heated on a spirit lamp. The heating is continued till the Canada balsam layer becomes thick. After the heating the smoothed surface of the section is firmly placed on the slide taking care that no air bubbles are left.
4. The fixed slide is further ground on a grinding machine. The grinding machine is provided with circular flat grinding disc driven by electric motor of 1/4 HP. The grinding machine

is provided with water trickling equipment which keeps the emery powder moist. The grinding is carried out using 60, 90 and 120 grades of emery powder. The process is continued till the section becomes translucent.

5. Next the slide is ground on a glass plate using 'O' grade of emery powder. After sufficient grinding on the glass plate the section is washed under tap water to remove the traces of emery powder. The polished section is taken out from the slide by gently heating on the spirit lamp. Then the section was dipped in Xylene to remove the traces of Canada balsam. The cleaned section is finally mounted on a new glass slide using laboratory grade Canada balsam. It was covered with cover glass and allowed to dry.
6. The mounted section is then observed under microscope for the anatomical characters. The important characters were sketched on Ivory paper using Camera lucida technique. For this purpose the attachment of Erma make was used. The sketches were inked with India ink and the text figure plates were prepared from these sketches. The explanation of text figures was introduced along with the magnifications.
7. For the description of anatomical characters the μ m reading were taken by using circular micrometer. For the photographs of the anatomical characters the sections were photographed using Jenaval microphotographic equipment. The important

characters were photographed by using black and white film of 125 ASA speed. The film of Nova make was used to obtain the better results. The film was developed in fine grain developer and prints were prepared on the Agfa black and white photographic paper of normal, special and hard grade. The photographs were fixed on Ivory sheets. The plate figures in the dissertation were prepared using these photographs. Explanation of plate figures were introduced and magnification of these figures was also added to it.

The method used for study of impressions - the plant impressions were carefully packed in the field and brought to the laboratory. In the laboratory they were cleaned with soft brush and habit sketches were drawn on the Ivory paper. For this purpose; type of the branching attachment of leaf to the rachis, pattern of venation and other important features were included. These habit sketches are used as text figure. Explanation of text figure was introduced along with the magnification calculated. The impressions were photographed under a diffuse light using a colour film of Kodak make. For colour photography, SLR Camera of the Pentax make was used. The use of close-up lense was made whenever necessary. Photographs were taken to show the important features of plant impressions. The film was processed in the computerized laboratory and prints obtained were used as plate figures. These photographs were fixed on the black card sheet. They were serially numbered. The explanation of the plate figure was introduced along with the magnifications calculated.