Journal of The Palaeontological Society of India
Vol. 37, 1992, pp. 109 - 112

STRATIGRAPHY OF THE CRETACEOUS ROCKS AROUND KILAPALAVUR, TIRUCHCHIRAPPALLI DISTRICT, TAMIL NADU

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ABSTRACT

The Cretaceous rocks exposed to the west, north and east of Kilapalavur in the Tiruchchirappalli district, Tamil Nadu, have been variously classified and mapped by different authors. Recent geological mapping and collection of fossils from these richly fossiliferous areas reveal the occurrence of the Sillakkudi Formation of the Ariyalur Group corresponding to the Campanian age in the north and east of the village, whereas to west, the rocks of the Trichinopoly Group (Turonian-Coniacian) occur. The field work also suggests the outcrop of the Ariyalur Group does not extend further south of Sattambadi as has been suggested in the geological maps prepared by previous workers. A biostratigraphic map of the area based on invertebrate fossil collections from these localities has been prepared. The lower age limit of the Ariyalur Group is assigned to Campanian based on the revised map and fauna.

INTRODUCTION

The Cretaceous rocks exposed in the classic Ariyalur area in southern India was first mapped by Blanford (1862). He divided the rocks into three groups, namely, the Uttattur, Trichinopoly and Ariyalur Groups in the ascending order and prepared a geological map. The map showed various lithological variations and a gist of fossil occurrences in different areas. The areas to the west, east and south of Kilapalavur were included in the Ariyalur Group, with a few outliers of Cuddalore Sandstone in the north. The southward extension of the Ariyalur Group was shown extending to the neighbourhood of Kallakkudi (10° 58′ 30": 78° 57′). Varadarajan and Jagtap (1968) prepared a geological map of the Ariyalur area based on aerial photographs. They maintained the southward extension of the Ariyalur Group towards Kallakkudi and interestingly, showed a small inlier of Trichinopoly 'formation', somewhat near Kannanur (11° 04′ 30": 78° 58′ 15"). Sastry *et al.* (1972) maintained Blanford's view. Nair (1974) followed Varadarajan and Jagtap (1968), but included the rocks exposed to the east of Kilapalavur also in the Trichinopoly 'formation' as a separate outcrop patch.

A programme of the Geological Survey of India was taken up to map the area for prospecting limestone deposits (Fig. 1). During the course of the survey, mega-fossils were collected from many localities. This work also offered a scope to re-study the fossils which inturn had a bearing on the distribution of various chronologically important units and lithological boundaries. The observations on the contact of various lithounits, their fossil content and their age are presented. The lithology of various rock types belonging to different lithounits are given in the following table.

Table1: Cretaceous Stratigraphy of the Kilapalavur Area

Group	Formation	Lithology	Age
—	Cuddalore	Red sandstone	Mio-Pliocene
---------- Unconformity ----------			
Ariyalur	Sillakkudi	Buff coloured grits	Campanian
---------- Unconformity ----------			
Trichinopoly	Unstratified rocks	Shingle beds / Conglomeratic sandstone / white sands	Coniacian
---------- Unconformity ----------			
Eastern ghat complex	unclassified	Gneiss	Archaean

CONTACT OF THE TRICHINOPOLY AND ARIYALUR GROUPS

Blanford (1862) clearly demonstrated that the contact of the Trichinopoly and Ariyalur Groups could be traced at Kannanur in the southern part of the Ariyalur Cretaceous outcrop area. In the small stream section besides the road from Kulattur (11° 06′ 30": 78° 59′) to Kannanur, the rocks of the Ariyalur Group is exposed, from where numerous, large specimens of *Inoceramus goldfussianus* d'Orbigny have been collected (loc. 301, Fig. 2). In a small stream section just south of the village, *Peroniceras dravidicum* (Kossmat), a characteristic ammonoid of the Upper

part of the Trichinopoly Group was collected suggesting the inclusion of the enclosed sandstone in the Trichinopoly Group. The contact between the Trichinopoly and Ariyalur Groups can be traced in a stream section available at about one kilometer southeast of the village, where the unstratified white sand/sandstone of the Trichinopoly Group underlies the buff-coloured grits of the Ariyalur Group (loc. 610.) Many invertebrate fossils belonging to the Ariyalur Group were collected from this locality. The collection included *Texanites roemeri* (Yabe and Shimizu), a characteristic Campanian ammonoid from the Ariyalur Group. The contact of the two groups is further traced to the east towards Sattambadi (11° 03': 78° 59' 30") (loc. 611). In the main stream section to the southeast of the village, the rocks belonging to the two groups are exposed, with an apparent unconformable contact. Further eastward, the rocks of the Cuddalore Sandstone, with its characteristic deep red colour overlaps the Cretaceous rocks, thereby obscuring the line of contact for quite a distance eastward.

EXTENSION OF THE ARIYALUR GROUP

As mentioned above, the contact of Trichinopoly and Ariyalur Groups is seen to the southeast of Sattambadi. The next outcrop of the Ariyalur beds is seen in the main stream south of Sillakkudi (11° 04' 30": 79° 00' 30") (loc. 625), from where an interesting collection of characteristic Ariyalur fossils was made. The small stream section to the east of Karapadi (11° 04' 30": 79° 01' 15") (loc. 848) which is a principal fossil collecting locality, yielded the majority of fossils in the present collection. Along the railway cutting to the east of the locality 848, which is the type section of the Sillakkudi Formation of Sastry *et al.* (1972) about 2.5 m of sandstone is exposed. This is also the famous fossil locality of Kilpadi and Kulkarni (1956) from where a

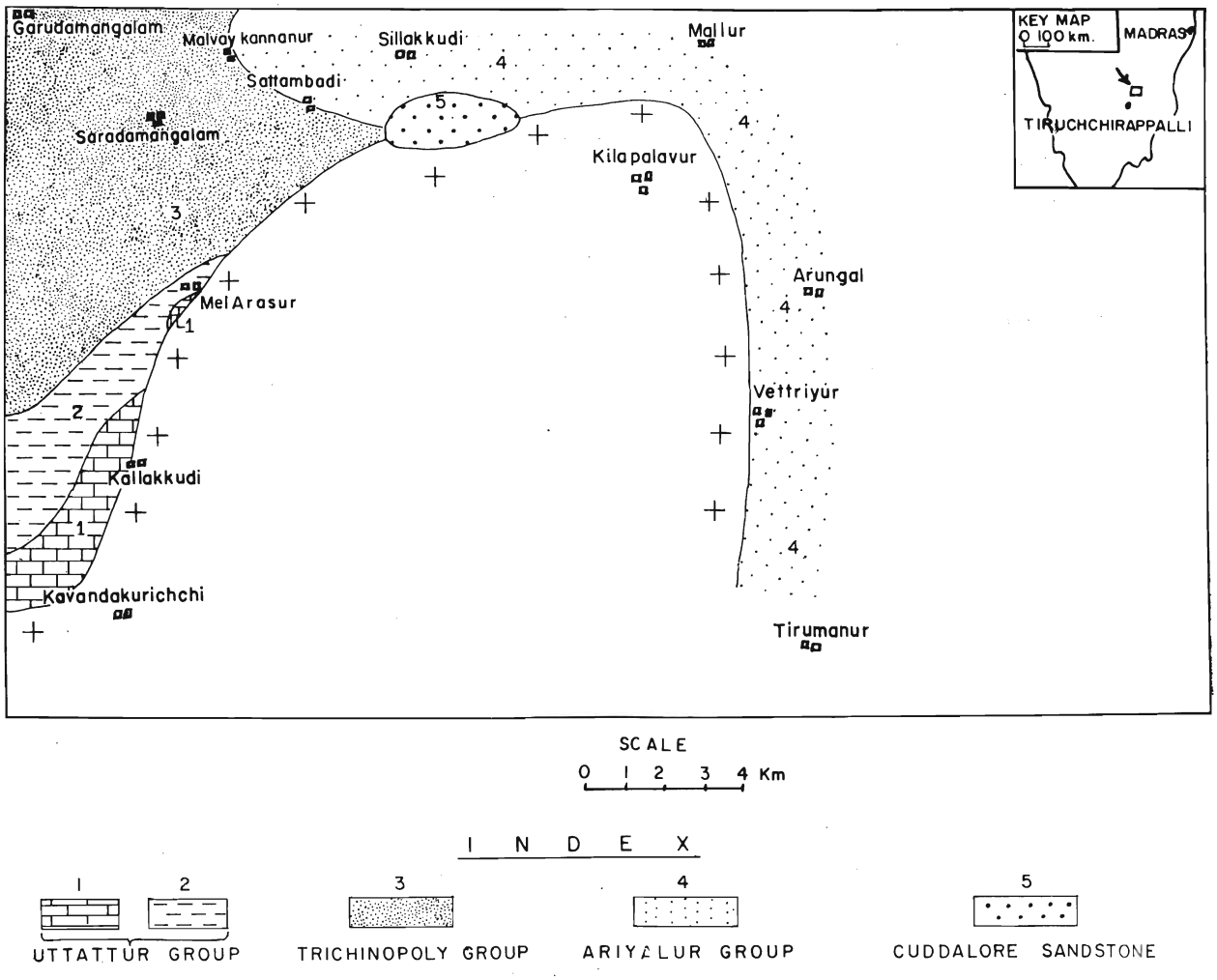

Fig. 1 Geology around Kilapalavur

giant *Inoceramus crippsi* (= *Inoceramus goldfussianus*) was collected. In the present collection, a large nautiloid belonging to the species *Eutrephoceras bouchardianus* d' Orbigny came from this place. The sandstone exposed to the east of the railway cutting (loc. 856), in the small stream sections to the north of Kilapalavur (11° 02' 30": 79° 04') (loc. 641) and to the east of the village (loc. 646), belongs to the Ariyalur Group as evidenced by the association of fossils. Its extension further southward towards Sattamangalam (10 59' 30": 79 05' 30") and Vettriyur (10° 59': 79° 05' 30") (loc. 650 and 651) is confirmed by the occurrence of characteristic Ariyalur fossils in sandstone. The Archaean and Cretaceous boundary in the area near Sattamangalam can be observed in the *nala* besides Thanjavur road, west of the villages.

A list of mega-fossils collected from different areas in the Ariyalur Group is given in Table 2.

LOWER AGE LIMIT OF THE ARIYALUR GROUP

The lower age limit of the Ariyalur Group in Ariyalur area was suggested as Senonian by Stoliczka (1872-73) and Kossmat (1897-98). Das Gupta (1916) was of the opinion that these beds exposed in the neighbourhood of Sillakkudi are of Campanian age.

Table 2: Check list of mega-fossils and the locality of occurrence

	Name of species	Localities
1.	*Baculites* n. sp.	625,650,651
2.	*Cardiaster orientalis* Stol.	651
3.	*Crania ignabergensis* Stol.	903
4.	*Eutrephoceras bouchardianus* d' Orb.	625,650,651,848
5.	*Gaudryceras subtilineatum* Kossm.	848
6.	*Glyptoxoceras* aff. *G. tenuisulcatum* Forb.	848
7.	*Hauericeras angustum* (Yabe)	625,650,651,848
8.	*Hemiaster tuberosus* Stol.	641,650,651,848
9.	*Hercoglossa trichinopolitensis* (Blanf.)	650
10.	*Inoceramus heberti* Woods	848
11.	*Inocramus simplex* Stol.	848
12.	*Inoceramus goldfussianus* d' Orb.	301,610,625,848,856
13.	*Karapadites karapadensis* (Kossm.)	650,651,848
14.	*Kossmaticeras (Natalites) madrasinus* (Stol.)	848
15.	*Pachydiscus arrialoorensis* (Stol.)	650,651,856
16.	*Plicatula striatocostata* Stol.	903
17.	*Pseudoschloenbachia blanfordiana* (Stol.)	848,903
18.	*Rostellaria palliata* Stol.	611,641,646
19.	*Texanites roemeri* (Yabe and Shimizu)	610
20.	*Turritella gemina* Stol.	848
21.	*Veniella* sp.	848

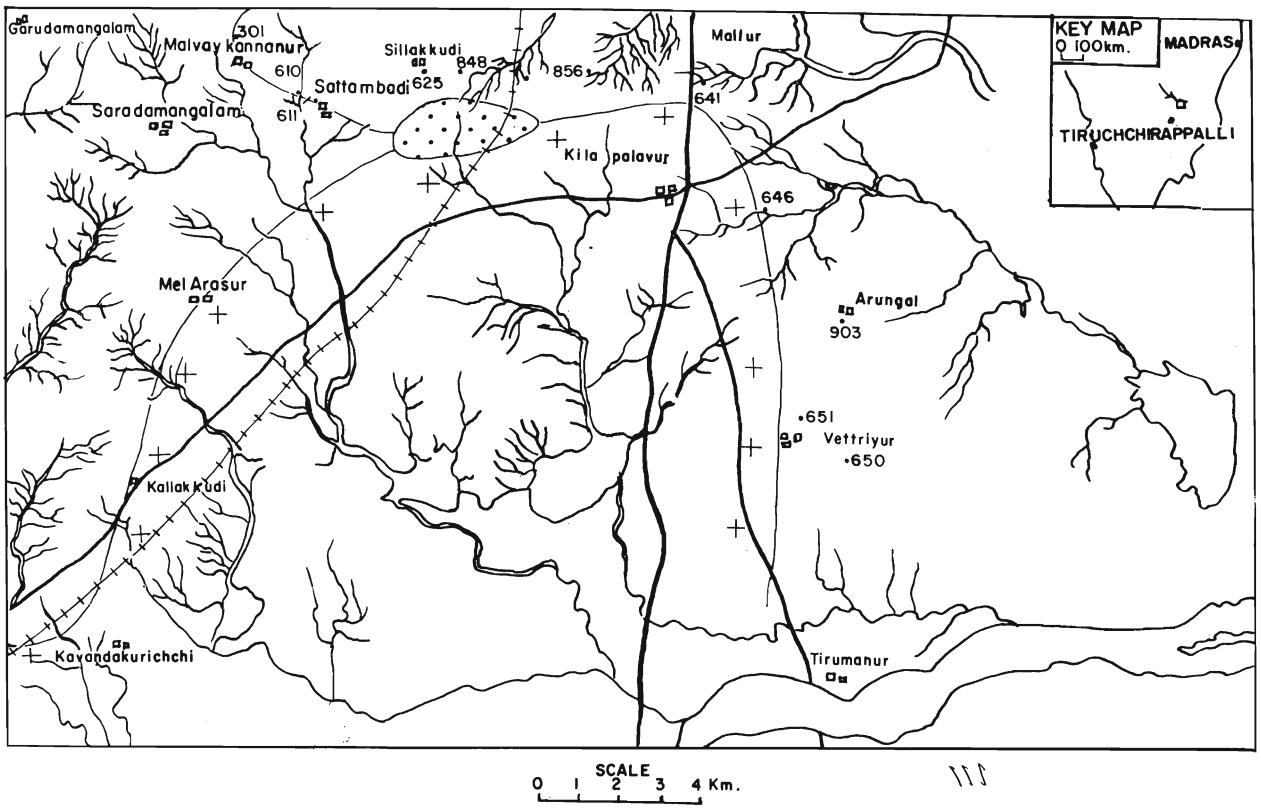

Fig. 2 Fossil localities mentioned in the text.

Sastry *et al.* (1965) have opined that the lower beds might be assigned to Campanian as evidenced by the presence of foraminifera such as *Globotruncana lapparenti lapparenti* Brotzen, *G. bulloides* Volger, *G. tricarinata* (Quereau) and *G. ventricosa* White. Tewari and Srivastava (1965) recorded Campanian foraminifera from a well cutting presumably to the east of Sillakkudi.

Banerji (1972) argued that the lower age limit of the Ariyalur Group is Santonian, based on the presence/absence of *Globotruncana fornicata* Plummer in *Globotruncana concavata* Zone is questionable, as he himself admitted in the paper that *G. fornicata* is a long ranging form (Santonian to Maastrichtian). He further agreed that *G. concavata* (Brontzen) is difficult to distinguish from *G. ventricosa* White of his collections. Thus, his arguments for an age older than Campanian cannot be supported.

The above listed species of mega-fossils, including many species of ammonoids, largely favour Campanian age for the lower limit of the Ariyalur Group. *Karapadites karapadensis* (Kossmat) and *Kossmaticeras (Natalites) madrasinus* (Stoliczka) occur in the Campanian of Madagascar and the former is a zonal index fossil of Early Campanian (Collignon, 1964). The species *Pseudoscholenbachia blanfordiana* (Stoliczka) is closely related to *P. umbulazi* (Baily), the latter being a Campanian species. *Hauericeras angustum* (Yabe) is a characteristic Campanian ammonoid in Japan. *Texanites roemeri* (Yabe and Shimizu) is a Campanian species occurring in Texas, U.S.A. (Young, 1963). The other molluscs belonging to the genus *Inoceramus*, including *Inoceramus goldfussianus* d' Orb., *I. heberti* Woods and *I. simplex* Stoliczka, all belong to Campanian horizon. Hence, the present invertebrate fossil collection from the lower beds of the Ariyalur Group around Kilapalavur favour Campanian age for the enclosed rocks.

ACKNOWLEDGEMENTS

We thank Sri K.R. Parthasarathy, Director and Dr. S.K. Acharyya, Dy. Director General, GSI for encouragement.

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