PART II
CHAPTER 4

PREVIOUS WORK

The marine Cretaceous beds of South India have attracted the attention of a large number of geologists during the last hundred years or so. The following are some of the more important contributions on different aspects of these beds.

**STRATIGRAPHY AND CLASSIFICATION:** The earliest and perhaps the most comprehensive work on the marine Cretaceous beds of South India is by Blanford (1862)* who subdivided them into the following groups:

<table>
<thead>
<tr>
<th>Age/Areas</th>
<th>Trichinopoly</th>
<th>Vridhachalam</th>
<th>Pondicherry</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRETACEOUS</td>
<td>The Ariyalur Group highly fossiliferous</td>
<td>Ariyalur Group</td>
<td>Ariyalur Group</td>
</tr>
<tr>
<td></td>
<td>The Trichinopoly Group highly fossiliferous</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>The Uttatur Group highly fossiliferous</td>
<td>-</td>
<td>Valudavur Group</td>
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<tr>
<td>?</td>
<td>The Uttatur plant beds; plant remains, other fossils doubtful?</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Not 1865, as mentioned by Rama Rao (1956), Rajagopalan (1965), Rasheed and Govindan (1966), and Banerji (1966).
He further subdivided the Ariyalur group into Lower fossiliferous beds, Middle unfossiliferous sands, and Upper fossiliferous beds.

The marine Cretaceous beds of the Pondicherry area were studied by Warth (1895) who established six lithological units A, B, C, D, E and F, in ascending order. The classification and correlation as proposed by him is given below:

<table>
<thead>
<tr>
<th>Warth (1895)</th>
<th>Blanford (1862)</th>
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</thead>
<tbody>
<tr>
<td>F</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Ariyalur Group</td>
</tr>
<tr>
<td>D</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Valudavur Group</td>
</tr>
<tr>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>

Kossmat (1897), on the basis of fossils found in the Pondicherry area, subdivided the Cretaceous rocks into three units and correlated them with the Ariyalur Group of the Trichinopoly area. The following is the classification and correlation of the Cretaceous beds of Pondicherry areas as proposed by Kossmat:
Rama Rao (1956), separated the Upper fossiliferous beds of the Ariyalur Group in Trichinopoly area into a distinct stratigraphical unit which he called as the Niniyur Group. He assigned this group to the Danian. He was of the view that the *Nerinea* beds found in the Pondicherry area are equivalent of the Niniyur Group of Trichinopoly. He also suggested that the second division of the Trichinopoly Cretaceous - the Trichinopoly Group - should be named as Garudamangalam Group as it is best developed in the neighbourhood of the village Garudamangalam. His suggestion has not been followed by subsequent workers though the emended classification as proposed by him and given below has been followed in all text-books on Indian Stratigraphy:

<table>
<thead>
<tr>
<th>Kossmat (1837)</th>
<th>Warth (1895)</th>
<th>Elanford (1862)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerinea Beds</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Trigonarca Beds</td>
<td>E</td>
<td>Ariyalur Group</td>
</tr>
<tr>
<td>Aribiyalur Group</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Anisoceras (Valudavur)</td>
<td>C</td>
<td>Valudavur Group</td>
</tr>
<tr>
<td>Beds</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A</td>
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</tbody>
</table>
Sastry and Rao (1964) separated the Miinyur Group (Danian) from the Cretaceous and transferred it to the Palaeocene. This view has been followed by most of the subsequent workers and in the present work.

The Cretaceous beds of Pondicherry District were subjected to detailed field and laboratory investigations by Rajagopalan (1965), who recognized two distinct lithological units namely, a basal Valudavur and an upper Mettuveli, and assigned them an Upper Campanian - Maestrichtian age. He also recognized two foraminiferal zones viz., *Globotruncana tricornata* zone and *G. gansseri* zone, which roughly correspond to the Valudavur and the Metuvelli Formation respectively.

Work on similar lines was undertaken by Banerji who in 1966 published a detailed biostratigraphic zonation of the Cretaceous beds of Vridhachalam District. He recognized the following five zones (in descending order) in the lower member of the Ariyalur Formation in Vridhachalam district and assigned them an Upper Turonian - Lower Maestrichtian age:

Miinyur Group
Ariyalur Group
Garudamangalam Group (= Trichinopoly Group)
Uttatur Group
Globotruncanina linneiana tricarinata zone
Globotruncanina globigerinoides zone
Globotruncanina concavata zone
Globotruncanina linneiana coronata zone
Unfossiliferous sandstone zone

Rasheed and Govindan (1966) in their work on the Cretaceous beds of the Vridhachalam District subdivided them into a lower Patti Formation and an upper Palakkollai Formation and assigned them a Santonian - Maestrichtian age. In the Patti Formation these authors recognized a lower Frondicularia pattiensis assemblage zone and an upper Globotruncanina farnicata, G. tricarinata assemblage zone. This broad subdivision of these beds into two units is in conformity with the two subdivisions of the Ariyalur Formation in the Trichinopoly District. In the present work, therefore, the classification as proposed by Rasheed and Govindan (1966) has been followed with the exception that instead of using the lithostratigraphic term 'Formation', the term 'Member' is substituted.

Banerji (1968a) on the basis of planktonic foraminifera recognized three biostratigraphic zones in the Cretaceous beds exposed near Pondicherry and assigned them a Santonian - Maestrichtian age. These zones (in descending order) are:
Globotruncana linneiana tricarinata zone
Globotruncana globigerinoides zone
Globotruncana concavata zone

On the basis of the revision of the ammonite fauna, Sastry et al. (1968) delineated the following biostratigraphic zones in the Cretaceous beds of Trichinopoly District (in descending order):

Pachydiscus ota'codensis zone
Havericeras rembada zone
Karapadites karapadense zone
Placenticeras temulinum zone
Kossmatieceras theobaldianum zone
Lewesiceras vaux zone
Hannites conciliatum zone
Calycoceras newboldi zone
Schloenbachia inflate zone

Rao et al. (1968) on the basis of various species of Globotruncana established two biostratigraphic zones, a lower *G. lapponensi, G. tricarinata, G. linneiana* assemblage zone, and an upper *G. contusa, G. gansseri, G. stuarti stuartiformis* assemblage zone, in the Ariyalur Formation of Trichinopoly District. These authors assigned a Campanian-Maastrichtian age to the Formation.
Murthy (1968), subdivided the Cretaceous beds of the Pondicherry area into Horizon I and II (in ascending order). He considers Horizon I to be equivalent of the Uttatur Group and Horizon II to be equivalent of the Ariyalur.

Subbaranam (1968), for the first time reported the presence in Trichinopoly area of a marine horizon older than the Uttatur Group. This horizon has recently been named as Dalmiapuram Formation by Bhatia and Jain (1969), who proposed the following revised classification of the Cretaceous beds of the Trichinopoly area:

- Ariyalur Formation
- Trichinopoly Formation
- Uttatur Formation
- Dalmiapuram Formation

Banerji (1971a) suggested that the 'Coral-reef limestones' and associated beds occurring in the basal part of the Uttatur Formation deserve an independent status and assigned them to a new formation, the Dalmiapuram Formation. He further subdivided this formation into a lower-shale and an upper limestone member and also delineated two foraminiferal zones, a lower Lenticulina macrodisca zone, and an upper Hedbergella planispire zone. The name Dalmiapuram Formation, however, is already pre-occupied (vide Bhatia and Jain, 1969). Whether or not, these 'Coral-reef
limestones' deserve a separate stratigraphic status, as
different from the Uttaturs, will depend on more extensive
field data.

In another brief note, Banerji (1971b) recognized the
following biostratigraphic zones in the lower member of the
Ariyalur Formation of Trichinopoly (in descending order):

- *Globotruncanina linneiana tricerinata* zone
- *Globotruncanina globigerinoides* zone
- *Globotruncanina concavata* zone

**PALAEOONTOLOGY:** The marine Cretaceous beds of South India
have yielded an exceedingly rich fossil fauna. To date more
than 800 taxa of megafossils have been recorded. In view of
the extensive literature on the fossil faunas of South
India, it is not possible to refer to all the published
works. Hence, only the more important ones are mentioned
in the sequel.

The earliest account of the fossil invertebrates from the
South Indian Cretaceous was given by Forbes (1845).

The most comprehensive work was done by Stoliczka (1863,
et seq.), who in four separate monographs described more than
six hundred taxa of invertebrate fossils from these beds.

More recently, Gowda (1954) reported certain Holothurian
remains from the 'coral-reef limestones' (Uttaturs); Sahni (1960) revised the Terebratulids from these beds; Sahni and Jain (1962) and Sastry et al. (1965) described a few taxa of nautiloid mandibles.

The fossils from the Pondicherry District were studied in detail by Kossmat (1897).

The fossil vertebrates from the South Indian Cretaceous were studied among others, by Matley (1929), Rama Rao (1932, 1956), Sahni (1957), and Gowda (1964a, 1967).

The fossil wood from the Trichinopoly formation was studied by Aiyenger and Jacob (1952). The algae from the Cretaceous beds of South India have been studied among others, by Narayan Rao (1946) and Rama Rao (1956).

The larger foraminifera from the South Indian Cretaceous have been studied by Vredenburg (1908a), Narayan Rao (1941), Rama Rao (1953, 1956), and Rasheed and Govindan (1963).

The more important contributions on the smaller foraminifera of the Cretaceous beds of South India are by Rasheed (1962a,b, 1963), Das and Chatterjee (1963), Gowda (1964b), Banerji (1965 et seq.), Rao et al. (1968), Rasheed and Govindan (1968), and Tewari and Srivastava (1968).

The ostracodes from the South Indian Cretaceous were first
reported by Jain (1963a), followed by Sastry and Rao (1963). Gowda (1966) for the first time figured a few ostracode taxa from the Uttatur and Ariyalur Formations. The occurrence of ostracode taxa in the Belmispuram Formation was first reported by Jain (1969a). The ostracode fauna of the Cretaceous beds of Vridhachalam has been described and illustrated by Govindan (1963) and Banerji (1970).

AGE AND AFFINITIES: The question of the age of the Cretaceous beds of South India and the affinities of the fauna have been discussed among others, by Blanford (1862), Stoliczka (1863 et seq.), Kossmat (1897), Spengler (1923), Rama Rao (1956), Banerji (1965 et seq.) and Sastry et al. (1968). These topics are discussed at length in chapter 7.