PART - I

GEOLOGICAL ASPECTS OF THE YERRAPALLI FORMATION
PART I
Chapter 2
GEOLOGY

Introduction
The Gondwana succession of the P-G valley, Deccan, India is one of the best sites for studying the vertebrate-bearing continental Triassic history not only in India but also in the rest of the world as well. The Gondwanas in India are recorded in the Peninsular part as well as along the Himalayan foothills. The Gondwana succession ranging from Permian to Cretaceous as a whole is underlain and overlain by the Archean/Proterozoic rocks and the Deccan Traps respectively. In the P-G valley the Gondwanas occur as northwest-southeast trending linear belt, with a dip of 8-15 degrees towards northeast. Here the Triassic rocks rest conformably over the Permian Gondwanas but, are overlain unconformably by the Jurassic. The thick (approximately 3000m) pile of mudstone-sandstone sequence which forms the bulk of the Triassic has been considered mainly as fluviatile in origin (Pascoe, 1959; Sengupta, 1970).

Initially the Gondwana rocks were designated as the Gondwana System which was further subdivided into series and stages following the time-stratigraphic ranking. This was based essentially on the floral and faunal content of the units, occasionally the lithology was also taken into consideration. But, according to American Commission on Stratigraphic Nomenclature (1961), the time-stratigraphic boundaries should be "independant of lithology, fossil content or any other material bases of stratigraphic division". In
recent years, to get rid of such confusion, "formation" (rock-stratigraphic unit) status was assigned to the Gondwana units, which have been mapped purely on the basis of lithological characters (Banerjee, 1960; Sengupta, 1966, 1970). This idea was corroborated by Ghosh, Saha & Sengupta (1981).

Previous work

In the earlier part of the 19th century the Gondwana basin of the P-G valley attracted the attention of geologists chiefly for coal deposits. For convenience in the search for coal, the stratigraphy of the basin was established mainly on the basis of fauna and flora.

Kota (80°02'45"E, 18°55'N) and Maleri (79°40'E, 19°11'N) are among the few places in the P-G valley, important for vertebrate fossils. Hughes (1876) preferred to combine the rocks around Kota and Maleri into a single stratigraphic unit, the 'Kota-Maleri beds'. According to him, the limestone horizons, so characteristic of Kota, are present also within the Maleri red clay (mudstone); hence this association is to be considered as part of an inseparable stratigraphic unit. Blanford (1878) pointed out the chronological difference between the Triassic Maleri fauna (Ceratodus, Parasuchus & Paradapedon) and the Liassic Kota fauna (Lepidotes, Tetragonolepis & Dapedium), which had already been noticed by a number of earlier workers (Egerton, 1851; Oldham, 1859 etc.). King (1881) while mapping the Gondwanas of the P-G valley observed enough lithological as well as stratigraphical grounds to distinguish the Maleri and the Kota as two distinct stratigraphic units. Fox (1931) supported this and also
suggested that 'the difficulty of tracing the horizons across the 
country is one of the causes of the earlier confusion'. Moreover, the
definite Late Triassic age for the Maleri Formation (Oldham, 1859; 
Miall, 1878; Lydekker, 1885; Huene, 1940 etc.) and Early Jurassic age 
for the Kota Formation (Egerton, 1851; Jain, 1973, 1983; Jain, Kutty, 
Roy Chowdhury & Chatterjee, 1975,1979; Yadagiri & Prasad, 1977 in 
Kutty et al., 1987; Datta, 1981; Yadagiri, 1984 in Kutty et al., 1987 
etc.) are well established. King (1881) also included a horizon of 
highly ferruginous, conglomeratic or pebbly sandstone as the topmost 
member of the Gondwana succession and named it as the Chikiala group. 
However, six informal rock 'groups' - Talchir, Barakar, Kamthi, 
Maleri, Kota and Chikiala in the following sequence furnish King's 
(1881) stratigraphy of P-G valley Gondwana deposits.

<table>
<thead>
<tr>
<th>Deccan Traps</th>
<th>Unconformity</th>
<th>Chikiala</th>
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<tbody>
<tr>
<td>Upper Gondwana</td>
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<td>Gondwana</td>
<td>Unconformity</td>
<td>Maleri</td>
</tr>
<tr>
<td>Kamthi</td>
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<td></td>
</tr>
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<td>Lower Gondwana</td>
<td>Unconformity</td>
<td>Barakar</td>
</tr>
<tr>
<td>Talchir</td>
<td>Unconformity</td>
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</tr>
<tr>
<td>Precambrian</td>
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Jain, Robinson and Roy Chowdhury (1964) first noted an entirely new vertebrate fauna from the lower argillaceous part of the King's 'Maleri'in an outlier near Yerrapalli, Adilabad district, Andhra Pradesh. This new fauna turned out to be of Middle Triassic age (Anderson & Cruickshank, 1978; Colbert, 1984) and is completely different from the Maleri fauna from the upper argillaceous horizon of King's 'Maleri'. Moreover the latter is separated from the former by an arenaceous horizon. Sengupta (1966) proposed the name Yerrapalli Formation for the new vertebrate-bearing argillaceous horizon. The name 'Bhimaram Formation' was assigned to the arenaceous horizon by the same authors.

Chatterjee (1967), Sengupta (1970) and Kutty & Sengupta (1989) established the mappability of the Yerrapalli & Bhimaram Formations in the P-G valley. They also rejected the unconformities of some earlier workers (King, 1881; Roy Chowdhury, 1965) as well.

A sandstone-dominated horizon, the Dharmaram Formation (Late Norian to Rhaetian on faunal ground) was recognised between the Maleri and Kota Formations (Kutty, 1969). He has also considered the Gangapur Sandstone, a basal member of the Kota Formation (King, 1881) as a distinct lithostratigraphic unit, the Gangapur Formation, overlying the Kota Formation unconformably. The Late Jurassic to Early Cretaceous age for the Gangapur Formation has been indicated by several workers (Kutty, 1969; Bose, Kutty & Maheswari, 1982; Ramakrishna & Ramanujam, 1987 in Kutty et al., 1987) on the basis of flora. However, the relationship between the Gangapur and the unfossiliferous Chikiala Formations remained uncertain.
Recent works have indeed changed the geological map (Kutty, Jain & RoyChowdhury, 1987; Ramanamurthy, 1987) as well as the stratigraphy (Table 1) of the Indian Gondwanas considerably. A continuous Permo-Triassic succession has been well established (Sengupta, 1966,1970; Chatterjee, 1967; Kutty, 1969). The Triassic part of the Gondwana succession is now represented by the Yerrapalli, Bhimaram, Maleri and Dharmaram Formations. The possibility of an Early Triassic age for the upper part of the Kamthi Formation has also been suggested (Kutty et al., 1987; Ramanamurthy & Madhusudan Rao, 1987). Sufficient information regarding the Kamthi Formation (Sengupta,1970; Ramanamurthy, 1987; Kutty et al., 1987) on one hand and the Maleri and the Dharmaram (Kutty, 1969; Sarkar, 1988; Kutty & Sengupta, 1989) on the other is available. But adequate information about the Yerrapalli and Bhimaram Formations are not equally readily available.

An attempt is made in the present work to gather some more information on the less studied Yerrapalli as well as Bhimaram Formations. To define these new lithostratigraphic units more precisely, a type section for the formations has been presented following the code proposed by Hedberg et al. (1976), North American Commission on Stratigraphic Nomenclature (1983) and Whittaker et al. (1991). To achieve this, detailed geological field work in the area around Yerrapalli (Figure 1) was carried out. The results of the work are briefly described below.

The Yerrapalli Formation

The Yerrapalli Formation is a mudstone-dominated (approximately 80-85% mud) horizon with locally abundant vertebrate
FIGURE 1: GEOLOGICAL MAP OF THE AREA AROUND YERRAPALLI. INSET-A, GEOLOGICAL MAP OF THE PRANHITA-GODAVARI VALLEY SHOWING THE LOCATION OF THE AREA MAPPED; B, LOCATION OF THE STUDY AREA, IN INDIA.
fossils (Table 3). It crops out as a northwest-southeast trending belt with a general dip of about 8-12 degrees towards northeast (Figure 1). The formation attains a thickness of approximately 450-600m in and around Yerrapalli (Figure 2). [It conformably overlies the Kamthi Formation and is underlain conformably by the Bhimaram Formation.]

It is conformably underlain and overlain by the Kamthi Formation and the Bhimaram Formation respectively.

**Lithostratigraphy**

**Naming:**

The name Yerrapalli Formation has been derived from the village Yerrapalli (79°49'50"E, 18°49'45"N), Adilabad district, Andhra Pradesh (Figure 1), where the formation is found to be best developed. A single section denoting a stratotype of the formation, however, could not be erected; therefore a composite stratotype (Figure 3) has been attempted from several reference sections measured along different traverses (Figures 1 & 2).

**Mappability:**

Besides the study area the formation has also been mapped in other parts of the P-G valley. Chatterjee (1967) mapped the formation in the northern part of the P-G valley where he found the formation is exposed over a stretch of about 53.6 km. The northern outcrop has also been mapped in detail by other workers (Kutty et al., 1987; Kutty & Sengupta, 1989). The formation is also exposed in the southern part of the P-G valley (Rao, 1982; Raiverman, 1986; Ramanamurthy, 1987).
FIGURE 2: LITHOSTRATIGRAPHIC LOGS OF THE PERMO-TRIASSIC SUCCESSION AROUND YERRAPALLI MEASURED ALONG DIFFERENT TRAVERSES AS SHOWN IN FIGURE 1.
FIGURE 3: COMPOSITE STRATIGRAPHIC LOG (ALONG TRAVERSES SHOWN IN FIGURE 1) OF TRIASSIC SUCCESSION AROUND YERRAPALLI, PRANHITA-GODAVARI VALLEY.
Lithology:

The Yerrapalli Formation is dominated by moderate reddish brown (10R 4/6) to dark reddish brown (10R 3/4) and brownish grey (5YR 4/1) coloured (Rock-Color Chart Committee, 1980) mudstones (earlier referred as clay) with scattered sandbodies. The term mudstone is preferable as it contains 32% sand, 45% silt and 23% clay (Folk, 1974). Bulk chemical analysis and X-ray studies of several mudstone samples reveal that, the composition of the iron enriched mudstone is more or less uniform (Table 2, Figure 4). The mudstone is iron enriched. The presence of iron oxides (as Fe₂O₃) in profusion is also reflected by the colour of the mudstone. Identifiable minerals are quartz, kaolinite and montmorillonite. Local enrichment of calcite has also been noted. The mudstone is locally rich in vertebrate bones (Table 3).

The Yerrapalli sandbodies are of various sizes and shapes. These are mainly of two types - lensoid and sheet-like. The lensoid sandbodies are mostly small (approximately 2-3m. long and 1-2m. thick) but a few larger lenses are also present. The smaller lenses are structureless, while the larger ones show planar or trough cross-beddings. The sandstone is coarse to medium grained, dominantly calcareous quartz arenite with subordinate amount of subspherical calcareous peloids. At a few places the occurrence of the peloidal calcarenite/calcirudite has also been noted. The sandstone is composed mainly of quartz grains, often with calcite cement and hematite crystals. The presence of barites, though negligible in amount, has been noticed in the Yerrapalli sandstone. The sheet-like sandstone is moderately extensive, flaggy, greyish white, fine grained and poorly
<table>
<thead>
<tr>
<th></th>
<th>A-3</th>
<th>A-4</th>
<th>A-5</th>
<th>C-9</th>
<th>D-1</th>
<th>D-2</th>
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<tbody>
<tr>
<td></td>
<td>%</td>
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<td>%</td>
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<td>18.82</td>
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<tr>
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<td>8.75</td>
<td>6.60</td>
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<td>BaO</td>
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<td>Trace</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>K₂O</td>
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<td>0.75</td>
<td>0.75</td>
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<td>Na₂O</td>
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<td>ZnO</td>
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<td>-</td>
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<td>1.53</td>
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<td>L.O.I.¹</td>
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<td>8.44</td>
<td>6.80</td>
<td>9.35</td>
<td>9.21</td>
<td>7.81</td>
</tr>
</tbody>
</table>

**Total** | 100.25 | 99.86 | 99.64 | 99.86 | 99.96 | 99.61

**TABLE 2: BULK CHEMICAL ANALYSIS OF YERRAPALLI MUDSTONE SAMPLES**
FIGURE 4: XRD-SPECTRA SHOWING MINERALOGICAL COMPOSITION OF YERRAPALLI MUDSTONE SAMPLES

- Q: Quartz
- K: Kaolinite
- M: Montmorillonite
- C: Calcite
sorted; often showing parallel lamination, parting lineation and trace fossils.

**Thickness:**

The maximum thickness of the Yerrapalli Formation in the area around Yerrapalli is approximately 600m (in the northwestern part of the mapped area) but it gradually thins out to about 450m (approximately) in the southeastern part near Asanad (Figures 1 & 2). However, in the northern part of the P-G valley the formation is much thinner (about 100m) according to Kutty *et al.* (1987) and Kutty & Sengupta (1989).

**Boundaries:**

Previous workers (King, 1881; Roy Chowdhury, 1965) had the idea of an unconformable relation between the Lower Gondwana Kamthi and the Upper Gondwana 'Maleri' Groups. Sengupta (1966, 1970), Chatterjee (1967) and Kutty *et al.* (1987) have now established a continuous Permo-Triassic succession in the P-G valley. This relationship has been corroborated by the present work as well. The exposures of the Yerrapalli Formation near Yerrapalli exhibits a conformable relation with the underlying Kamthi and the overlying Bhimaram Formations. The contact with the Kamthi is mostly gradational, also sharp at places; with the Bhimaram it is always gradational wherever exposed (Figure 2).

**Palaeontological Account:**

The palaeontological account of the Yerrapalli Formation has been given by several workers (Jain *et al*., 1964; Chatterjee, 1967;
<table>
<thead>
<tr>
<th>Faunal List</th>
<th>Stratigraphic affinities</th>
<th>Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fishes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dipnoan</td>
<td>Ceratodus sp.</td>
<td>Mesozoic</td>
</tr>
<tr>
<td>Actinopterygian</td>
<td>Saurichthys sp.</td>
<td>Mesozoic</td>
</tr>
<tr>
<td><strong>Amphibians</strong></td>
<td>Parotosuchus rajareddyi</td>
<td>Middle Triassic</td>
</tr>
<tr>
<td>Capitosaurid</td>
<td>Wadiasaurus indicus</td>
<td>Middle Triassic</td>
</tr>
<tr>
<td><strong>Reptiles</strong></td>
<td>Rechnisaurus cristarbynchus</td>
<td>Middle Triassic</td>
</tr>
<tr>
<td>Dicynodont</td>
<td>Trirachidontid teeth, genus and species indeterminate</td>
<td>Lower or Middle Triassic</td>
</tr>
<tr>
<td>Cynodont</td>
<td>Mesodapedon kuttyi</td>
<td>Middle Triassic</td>
</tr>
<tr>
<td>Rhynchosaur</td>
<td>Plereria dolichotrichela</td>
<td>Middle Triassic</td>
</tr>
<tr>
<td>Prolacertiformes</td>
<td>Genus and species indet.</td>
<td>Triassic</td>
</tr>
<tr>
<td>Rauisuchian</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 3: LIST OF FOSSIL VERTEBRATES DISCOVERED FROM YERRAPALLI FORMATION.**
The Yerrapalli vertebrates are represented by forms ranging from aquatic to terrestrial and carnivorous to herbivorous types (Table 3). Two fishes, a dipnoan and an actinopterygian are present. The capitosaurid *Parotosuchus rajareddy* is the only known labyrinthodont which has been considered to be closer to the capitosaurids known from the Middle Triassic of Tanzania, Zambia and Russia (Roy Chowdhury, 1970a). The commonest reptile is the kannemeyeriid, *Wadiasaurus indicus* (Roy Chowdhury, 1970b) and the other dicynodont is a probable stahleckeriid *Rechnisaurus cristarhynchus* (Roy Chowdhury, 1970b). Among the different archosauromorph reptiles of this formation fragmentary remains of a rhynchosaurs (*Mesodapedon kuttyi*) have been reported by Chatterjee (1980a). Two others are the subject matter of the present study; one is a prolacertiform and the other is a rauisuchian.

Geological Age:

Jain *et al.* (1964) first proposed a late Lower Triassic or possibly early Middle Triassic age for Yerrapalli formation. Colbert (1984) assigned a Middle Triassic age on the basis of the presence of the capitosaur and the rhynchosaur and this was also corroborated by the study of two dicynodonts (Bandyopadhyay, 1988b). Anderson &
Cruickshank (1978) while commenting on the world's Middle Triassic vertebrate faunas suggested Anisian age for the Yerrapalli fauna which has also been supported by Kutty et al. (1987).

Discussion

The Yerrapalli is a distinct lithostratigraphic unit deserving the rank of a formation. The faunal content is strikingly different from that of the closely look-alike Maleri Formation (Jain et al., 1964; Chatterjee, 1967; Colbert, 1984; Chatterjee, Jain, Kutty & Roy Chowdhury, 1987; Kutty et al., 1987; Bandyopadhyay, 1988a). However, the Yerrapalli and Maleri Formations can be differentiated on the basis of the following criteria:

1) Colour of the Maleri clay (mudstone) differs from that of the Yerrapalli mudstone. The Maleri clay (mudstone) is mostly dark reddish brown (10R 3/4) and at many places it is pale olive (10Y 6/2) coloured (Rock-Color Chart Committee, 1980).

2) a. The sand-mud ratio is much higher in the Maleri Formation as compared to the Yerrapalli formation.

   b. In Maleri Formation there are many extensive and fairly thick (3-4m.) sheet-like and ribbon-type sandbodies, which are virtually absent in the Yerrapalli Formation.

   c. The Yerrapalli Formation consists of very thin sheets of sandstone and relatively smaller lenticular bodies (as compared to the Maleri Formation).

3) The carbonate grainstones (peloids) are more frequent and volumetrically more in Maleri Formation (Sarkar, 1988) as compared to Yerrapalli Formation.
4) The Maleri sandbodies are dominated by medium to fine grained, well sorted quartzose sandstone whereas, the Yerrapalli sandbodies are mostly made up of medium to very coarse grained, poorly sorted quartzose sandstone.

5) Ghosh et al. (1981) used the grain size analysis as well as the mineralogical composition to distinguish the Yerrapalli sandstone from the others by employing quantitative stratigraphic techniques.

Moreover, the Yerrapalli and Maleri Formations are separated by a thick (700–900m approximately) sand-dominant unit, the Bhimaram Formation.

Further subdivision of the Yerrapalli Formation on the basis of distribution of sandbodies (Sengupta, 1970) is not possible as, these are found to be scattered throughout the red and grey mudstone of the formation.

**Depositional environment**

The fresh water (fluviatile) origin of sediments of the Yerrapalli Formation has been suggested by several workers (Robinson, 1970; Sengupta, 1970; Maulik & Chaudhuri, 1983; Raiverman, 1986) on the basis of lithology, sedimentary structures, palaeocurrent data as well as fossil content. The red/grey mudstone is an interchannel floodplain deposit (Sengupta, 1970), while the sand lenses represent fillings of small ephemeral channels within an extensive floodplain and the sheet-like sandstone was probably deposited from wanning currents of sheet flows associated with episodic overbank flooding of
ephemeral streams (Maulik and Chaudhuri, 1983). Robinson (1971, 1972) suggested that the Yerrapalli and Maleri red beds were deposited in an oxidising milieu and the climate was hot monsoon type characterised by dry seasons alternating with periods of heavy rainfall.

The euhedral microcrystalline/cryptocrystalline hematite in Yerrapalli mudstone and sandstone suggests oxidising condition (cf. McPherson, 1980). The presence of iron as Fe$_2$O$_3$ also supports this idea. The occurrence of peloids (though present in subordinate amount) is most likely the result of the reworking of the caliche profile as, it has been suggested for the Maleri (Sarkar, 1988). The mud–sand ratio is quite high as compared to Late Triassic Maleri Formation and the lensoid sandbodies are also less frequent. Sarkar (1988) while, commenting on the depositional environment of the Maleri Formation suggested "warm to hot climate with low seasonal rainfall and annual deficit in the water budget". Similar attributes may as well indicate almost identical depositional environment for Yerrapalli sediments.

The Yerrapalli mudstone and sandstone are devoid of any plant fossils which does not necessarily indicate that the area was totally devoid of vegetation (as the herbivorous dicynodonts were quite abundant). Probably the prevailing oxidising condition and low water table were not suitable for the preservation of plant life (Rust, 1981). The abundance of (associated/fragmentary) vertebrates (Table 3) and fresh water trace fossils strongly suggests a fresh water (fluviatile) origin for the Yerrapalli deposits.
The Bhimaram Formation

The Bhimaram Formation is a sandstone-dominated horizon. The formation is about 600m thick in the northwestern part and about 900m in the southeastern part of the study area. The beds show a general dip of about 8-10 degrees towards northeast. The formation lies between the Yerrapalli and Maleri Formations (Figure 1).

The sandstone of this formation shows lithological variation vertically as well as laterally (Figure 2). There is a chocolate/purple coloured, ferruginous, feldspathic, medium to coarse grained sandstone containing hematite crystals in the lower part of the formation which is overlain by a pale white, coarse grained, highly calcareous and cross-bedded (mostly trough type) sandstone in the upper part. In certain areas towards the southeast, grey, hard and calcareous siltstone with numerous greenish grey clasts or galls are found. In the upper part the sandstone is intercalated with red clay/mudstone (c.f. Sengupta, 1970). At places in the upper part, greyish white, fine grained, poorly sorted sandstone with parallel lamination, parting lineation and fresh water trace fossils have also been recorded. A similar lithological horizon have also been observed elsewhere (Kutty et al., 1987; Kutty & Sengupta, 1989) in the P-G valley.

Like the Yerrapalli Formation, the mappability, lithological characters as well as the massive thickness (approximately 600-900m) help to recognise the 'Bhimaram sandstone' as a formation distinct from the others (Sengupta, 1966,1970; Kutty & Roy Chowdhury, 1970; Ghosh et al., 1981; Kutty et al., 1987). The name of the formation has
been derived from the village Bhimaram (79°41'E, 18°51'20"N), approximately 5km north of Yerrapalli. A composite stratotype has been worked out (Figure 3) from the reference sections (Figure 2) measured along the different traverses (Figure 1). The Bhimaram Formation is conformably underlain and conformably overlain by Yerrapalli and Maleri Formations respectively. Both the contacts are mostly gradational wherever exposed.

The formation is very poorly fossiliferous, only fragments of temnospondyls and dicynodonts have so far been discovered. Fresh water trace fossils are also noticed in flaggy sandstone present at a few places, the upper part of the Bhimaram Formation, which are also recorded in other parts of the P-G valley (Sarkar & Chaudhuri, 1992).

Discussion

The distinctive characters of the Bhimaram Formation briefly outlined above, fulfills the criteria (North American Commission on Stratigraphic Nomenclature, 1983; Whittaker et al., 1991) for formational status.

The poor fossil content poses problem for assigning an age for this horizon. The formation is underlain and overlain by definite early Middle Triassic and early Late Triassic horizons respectively. It can be tentatively given a late Middle Triassic age.

Depositional environment

The fresh water (fluviatile) deposition of the Bhimaram Formation is well established. According to Sengupta (1970) the coarse
clastics of the formation are channel-bar and point-bar deposits of the major Gondwana streams.

Some remarks on the Stratigraphic Status

A few workers (Rao, 1982; Ramanamurthy, 1987) preferred to consider the Yerrapalli and Bhimaram Formations along with the recently erected Dharmaram Formation as members or biozones of the 'Maleri' Formation.

The member status for these rock units has been suggested, probably, due to the apparent lensoid nature of the Bhimaram and the Dharmaram Formations. The Bhimaram Formation appears to thin out in the northwestern part of the P-G valley, near Tandur (79°26'E, 19°09'N). Chatterjee (1967) mapped the area near Tandur and was able to trace the Bhimaram Formation without showing any significant petering. However, subsequent mapping (Kutty & Sengupta, 1989) shows several juxtaposition of lower argillaceous beds (the Yerrapalli Formation) with the Maleri Formation due to faulting. In Ramagundum-Manthani (south of Yerrapalli outlier) area (Ramanamurthy, 1987), the Upper Gondwana outcrops have been shown as a pinching out arcuate feature. This is again due to the effect of faulting (northwest-southeast to east-west trending fault along the Godavari river (Ramanamurthy, 1987) and faults running across the Maner river (King, 1881). Further, the Bhimaram Formation reappears beyond the Maner river further southeast and a succession of Yerrapalli-Bhimaram-Maleri-Dharmaram can be recognised (personal communication, T.Roy Chowdhury).
The status of the Yerrapalli and the Bhimaram Formations as biozones of the 'Maleri Formation' have also been suggested (Ramanamurthy, 1987). These units were characterised as lithostratigraphic units by Sengupta (1966, 1970) using lithology and mappability as the attributable criteria and these have later been accepted by other workers (Kutty, 1969; Ghosh et al., 1981; Kutty et al., 1987; Kutty & Sengupta, 1989). There are, however, two biozones within both the Maleri and the Dharmaram Formations, and the faunal boundaries do not always coincide with the lithostratigraphic boundaries (Kutty & Sengupta, 1989).

The formational status of the Yerrapalli and Bhimaram appear to be justified and has further been strengthened by the present work. There is enough ground to reject the idea of considering the Yerrapalli as one of the members or biozones within the Maleri Formation. Though initially the 'Maleri' was defined on the basis of its lithology and fauna (King, 1881), it is now very clear from the present study and also from the recent works (Sengupta, 1966, 1970; Kutty, 1969; Ghosh et al., 1981; Kutty et al., 1987; Sarkar, 1988 and Kutty & Sengupta, 1989) that, several lithostratigraphic units (formations) can be separated out of this part of the Gondwana succession purely on lithological ground and field criteria.

Therefore, the mappability, distinctive lithology and characteristic Middle Triassic vertebrate fauna sufficiently establish the Yerrapalli along with Bhimaram as two distinct lithostratigraphic units of the status of formation.