CHAPTER III

GEOLOGY OF KADAYAMPATTI AREA
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3.1. INTRODUCTION

A detailed field investigation of the study area reveals an interesting igneous association amidst the country rocks of Precambrian age. The Precambrian country rocks include charnockite, syenite etc.

3.2 GEOLOGY OF SOUTH INDIAN SHIELD

The southern Indian granulites terrain was considered till recently as a single block forming part of the charnockite region, (Fermer, 1936). It was also considered as a mobile belt around South Indian craton of granite greenstone ensemble. However, recent synthesis of all available field and laboratory data pertaining to Tamil Nadu has brought to light that this granulites- gneiss terrain is made up of at least four distinct petro-tectonic blocks characterized by distinct litho assemblages, marked by igneous intrusive and by different structural and deformational styles. These blocks are available in certain sectors to indicate that these distinct petro-tectonic blocks are probably separate individual micro-continental plates while the straight belts form the corresponding ancient suture zones, alone which they collided and are welded (Fig 11).
PRISTINE SUTURES IN GRANULITE - GNEISS TERRAIN OF TAMIL NADU, INDIA.
Supportive evidences for the suture zone are in the form of occurrence of remnants oceanic crust with tectonic slices of probable ophiolite sequences, thrust slices and incorporation of marginal sequences of micro-continents, shear zones with mylonitisation, compressive mechanism manifested by high temperature, high pressure assemblages etc., These sutures are avenues for later righting with emplacements of alkaline and alkali carbonatite complexes (Gopalakrishnan et.al, 1990.)

This recognition is supported by the facts Moyar-Bhavani lineament hosts the Sittampundi layered anorthosite complex dating to 3000 ma (Snow and Basu, 1986). Bhavani layered gabbro anorthosite complex lineament. Forms the zone of younger igneous activity (emplacement of carbonatite-syenites dating to 720 to 925 ma ago). The study area occupies the central portion of the suture zone.

3.3. LITHO-STRATIGRAPHY OF THE STUDY AREA

The Geology around Kadayampatti gains importance as it lies in the transition zone between high and low grade terranes in South India and along a deep seated shear zone. The transition zone between the high and low grade (charnockite and peninsular gneiss.) is an irregular zone that stretches 600 kms. From Mangalore on the west coast to north of Chennai (Madres) of the east coast of South India.
The relationship between the high-grade charnockite and low-grade peninsular gneiss has been the subject of discussion and debate for more than 100 years. Exposures in many quarries in South India exhibit field evidence for incipient charnockitization of tonalitic and granitic gneiss which is referred commonly as prograde relation. Retrogression of charnockite produce tonalitic gneiss and these are commonly present along shear zones.

The reconstruction of lithostratigraphic succession in this terrain, as in any other Achaean terrains, is beset with problems. The reconstruction of lithostratigraphy to be tectonically significant.

In the study area, the primary sedimentary and igneous structure area not expected to be retained without getting thoroughly modified and largely obliterated. Thus the order of superposition cannot be determined on the basis of primary features.

In the absence of primary sedimentary and igneous structures, geochronology remains the only totally reliable parameter in reconstruction of lithostratigraphy. There is no geochronological data available from the present area of investigations. A few data are available for the rocks from the adjacent areas.

The litho-stratigraphic sequence established by the author in the Kadayampatti area is as follows.
FIG. 18. GEOLOGICAL MAP OF THE STUDY AREA.

LEGEND:
- Charnockite
- Migmatized charnockite
- Boulders
- Shear Rock
- Joints

Scale: 1: 50,000
3.4 DESCRIPTION OF INDIVIDUAL LITHOUNITS

During the field study the author has collected samples of charnockite, syenite and gneissic rocks. The petrology and mineralogy of the above rocks are given below.

3.4.1 CHARNOCKITE ± GARNET

Charnockite is the principal rock type of high grade or granulite facies terrains. It occupies the high rising hills and some parts of plains (Plate IV, Fig 1). Generally it contains older supra crustal enclaves. In the study area it is a medium to coarse grained rocks. A fresh sample of charnockite is bluish grey in colour. Some charnockite are garnet bearing.

Mineralogically charnockite is essentially composed of quartz, plagioclase feldspar, hypersthene, biotite, hornblende, chlorite, microcline and garnet (Almandine), common accessories are magnetite, apatite, sphene and rare rutile.
3.4.2 MIGMATIZED CHARNOCKITE: (GNEISSIC)

According to Mehnert (1968), 'A migmatite is a megascopically composite rock consisting two or more petrographically different parts. one of which is the country rock which is generally in a more or less metamorphic stage the other is of pegmatitic aplitic, granitic or generally plutonic appearance. The major part of plains of the study area is mainly comprised of migmatised charnockite. (Plate IV, Fig.2)

3.4.3. SHEET ROCK

Mostly the northwestern part of the study area surrounded by umbalikampatti village the sheet type of the charnockite is observed, and near Chinna Vadagampatti village some of the sheet type of the charnockite rocks is present. This charnockites are younger to the fundamental gneisses referred above and are coarse grained and bluish dark to gray in colour. They are the second largest in coverage in the area and are exposed in some quarries. The charnockites are, in general massive and less weathered in comparison to the gneisses and show due to three distinct sets of joints. (Plate V, Fig.1. Plate V, Fig.2)

3.4.4 GNEISSES

These are probably the oldest rocks (Fundamental gneisses) in the study area, mostly occupying the plains which cover a major part of sundagapatti and some other parts of study area. (Plat VI, Fig.1)
PLATE IV

Fig:1  Charnockite rock formation near Maragoundan Pudur.

Fig:2  Shows migmatite Charnockite rock formation near Chinna Yercaud.
PLATE V

Fig:1  Shows the sheet rock of Charnockite Formation.

Fig:2  Shows the sheet rock formation near Umbalikkampatti.
3.4.5. QUARTZO FELSPATHIC GNEISS

At some places quartzo felspathic gneiss is present in the study area near sundagapatti village. This quartzo feldspathic gneiss is located in garnet bearing rocks and mafic layers are segregated giving rise to banded structure. (Plate VI, Fig. 2)

3.4.6. GARNETIFEROUS SILLIMANITE GNEISS

The garnetiferous and sillimanite gneiss are also present in the Sudagapatti village in the study area. Biotite and hornblende gneisses are common. The gneiss are highly weathered up to 30m. At places they are intruded by number of ultramafic and basic rocks parallel to the foliating direction of the gneisses (Plate VII Fig. 1).
PLATE VI

Fig:1  Fundamental gneissic rock near Sundakapatti.

Fig:2  Shows the Quartzo feldspathic gneissic rock near Sundakapatti.
Fig:1  Shows the Garnetiferous Silliminite gneiss near Sundakapatti.