

An Account of Field and Petrographic Characteristics of Granitic Rocks of Cherlapally Area, Nalgonda District, Telangana

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Granites crystallize either from magmas evolving from igneous differentiation or due to low degrees of partial melting in fractional crystallization [4]. There is a pronounced decrease in iron, magnesium, titanium calcium and sodium and enrich the melt in potassium and silicon alkali-feldspar and quartz (SiO₂) that make up the formation of granite [5]. This process operates interactively resulting in the origin of the parental magma to the granite, regardless of its chemistry. However the composition and origin of the magma which differentiates into granite, leaves definitive mineral evidences through textural and compositions. In this context, granites are vital in providing a picture of crustal evolution. The aim of this investigation is to highlight the detailed field and petrographic study of granites of Cherlapally area.

II. Study Area

The study area is about 72 km NE of Hyderabad city and lies in the Survey of India (Sol) toposheet number 56 O/8 between the longitudes 79°15' and 79°17' E, and latitudes 17°5' and 17°7' N. A total area of around 14 sq km has been covered for the purpose of describing field and petrographic variations among the rocks present in this area.



Fig.1. Location of the granite bodies in the present study. Red line indicates granie ourcrop boundary.

ABSTRACT

Field geological and petrographic characteristics of granitic rocks of Cherlapally area, Nalgonda district, Telangana, within the eastern Dharwar craton are described in this paper. Field traverses revealed four types of granitic rocks in the study are viz., quartz-diorite, granodiorite, monzogranite and syenogranite. The variations in the texture and mineralogical composition of these plutons are so distinct that the term 'migmatite' has to be applied, wherein mutual field relations always remain enigmatic. The complex nature of the batholiths is also evident from the structural fabrics observed in the present investigation.

KEYWORDS: granodiorite, monzogranite, migmatite, syenogranite, field geology, petrography

I. INTRODUCTION

Granitic rocks dominate the continental areas in general and the Precambrian shields in particular and quite a few younger orogenic belts. Though these rocks do occur in other regions of the continents and oceanic areas as well, it is imperative that the study of granitic rocks assumes greater significance in understanding the continental growth through the geological past [1, 2]. Granites and related rocks have provided the motivation in petrological research, to a large number of reasons since the beginning of this century, and the systematic studies carried out on varied aspects of these rocks and their findings are related through the vast number of publications [3].

III. Field Characteristics

The Archaean Granitic Complex of Cherlapally, Nalgonda district continues beyond the adjoining districts of Suryapet, Bhuvanagiri, where these vast stretches of areas consist of several plutons of granodiorite, granite, adamellite and alkali feldspar granite in the forms of composite batholiths. The study area is made up of massive varieties of granite that are not metamorphosed in nature and the out crops are seen in the form of tors, boulders which are rolled down along slope of the hills they are grey in colour devoid of any foliation and lineation. The rock has a well developed coarse grain crystalline in nature consisting of k-feldspar, plagioclase, quartz with meagre sprinkling of mafic minerals, however there are certain clots where mafic minerals are seen in higher proportion.

At several places there are mafic enclaves of different shapes and dimensions which are traversed by a late stage felsic injection consisting of quartz only which run in different directions belonging to different generations.

At several places in north direction part of Cherlapally, a dolerite dyke in the form of discontinuous body is seen cutting across granites which indicates younger magmatic event. At some places where intrusion contact with the dyke granites is suffered some amount of deformation that is noticed in the form crude foliation and lineation.



Fig.2. Field photograph of Cherlapally area [A]. Banded appearance of granite with mafic rocks, [B]. View of the typical weathering of the dolerite dyke [C]. The stretching of mafic enclaves intersected by pegmatite veins, [D]. Mafic enclave within the granite

The field relations at Cherlapally and its adjoining areas are established after careful observations during extensive traverses carried out in the study area. The geological boundary of the granitoid rocks are demarcated in the geological map (Fig.1).

IV. Petrographic Characteristics

With the aid of microscopic studies, modal mineral abundances were determined and plotted in QAP ternary diagram (Fig.2A) [6]. The approximate crystallization trend of various essential and accessory mineral phases has been derived (Fig.2B) [7].

Table1. Modal analyses of Granitic rocks of the Cherlapally area

Sample No.	C2	C3	C4	C5	C6	C7	C8
K-Feldspar	48	34	62	48	19	47	54
Quartz	23	22	20	26	28	18	22
Plagioclase	16	38	12	14	46	14	12
Biotite	6	2	1	6	3	6	5
Hornblende	3	2	1	4	2	8	3
Sphene	1	0.5	2	-	1	1	1
Zircon	-	0.5	-	-	-	-	-
Opagues	2	1	1	2	-	5	2
Apatite	1	-	1	-	1	1	1
Total	100	100	100	100	100	100	100

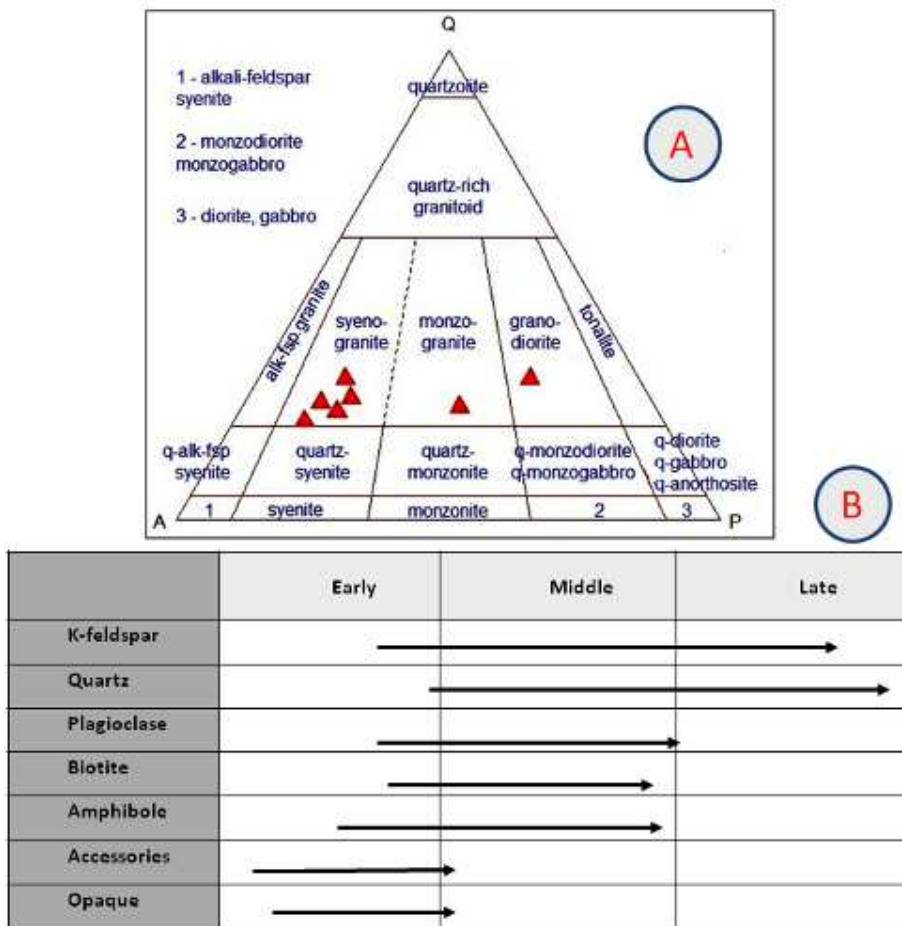


Fig.2.[A]. QAP Modal classification for the granitic rocks (after Streckeinsen 1974,). [B]. Sequence of approximate crystallisation of minerals in granite at Cherlapally.

The petrographic characteristics of the four granitoid rock types in the study area are described here under (Fig.3.A to D). The diversity in the mineralogical composition and the complex character of the granitic rocks of the study area are mainly attributed to either to a single petrogenetic process or by a combination of several polyphase episodes.

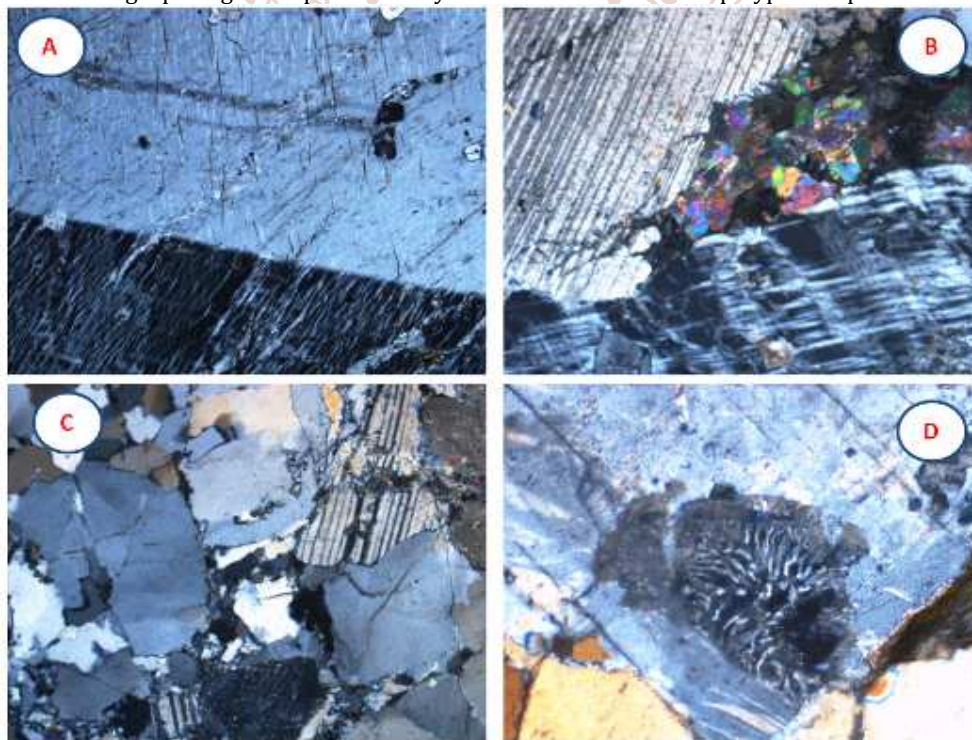


Fig.3: [A]. Granite displaying the twinning of feldspar. [B]. the lamellar twinning of Plagioclase feldspar and Microcline. [C]. Displaying the twinning of plagioclase feldspar in association with quartz and untwinned plagioclase. [D]. Displaying the K-feldspar in association with myrmekitic intergrowths of feldspar and quartz.

A. Quartz diorite: The quartz diorite is marked by plagioclase dominant than K-feldspar with less than 20% of modal quartz. The felsic minerals are very coarse and the plagioclase is sericitised plagioclase and a reddish brown coloured mineral which secondary mineral derived from the alteration of pre-existing mafic minerals.

B. Granodiorite: The granodiorites are chiefly made up of plagioclase feldspar, K feldspar, quartz, hornblende and biotite in different percentages. The accessory phases include sphene, opaques, apatite and zircon in the decreasing order of abundance. The mafic content is hornblende dominant and is in conformity with the increasing in K- feldspar content. The rock is coarse-grained and exhibit hypidiomorphic-granular, granoblastic and porphyroblastic textures. In non-porphyroblastic units, plagioclases and K-feldspars are subhedral and sub-equigranular.

C. Monzogranite: The monzogranites of the study area are medium to coarse grained and exhibit hypidiomorphic and equigranular texture and have colour index around (30) %. The mafic minerals included the amphibole and biotite, with former more prominent with sieve textures and relict pyroxenes. The amphiboles which are noticed in the form of large prismatic subhedral outline, they exhibit light green to light brown pleochroism and marked by low extinction angles and +possess serrated edges. The presence of biotite is bare minimum and nominal and occasionally the amphibole itself is seen transforming to biotite.

D. Syeno granite: The syenogranites of Cherlapally are K-feldspar dominant rocks that constitute around 47- 53% by volume and have nearly quartz and K-feldspar in more or less equal proportions and correspond to granitic composition. Potash feldspar, plagioclase feldspar and quartz constitute the essential minerals in this entire group.

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