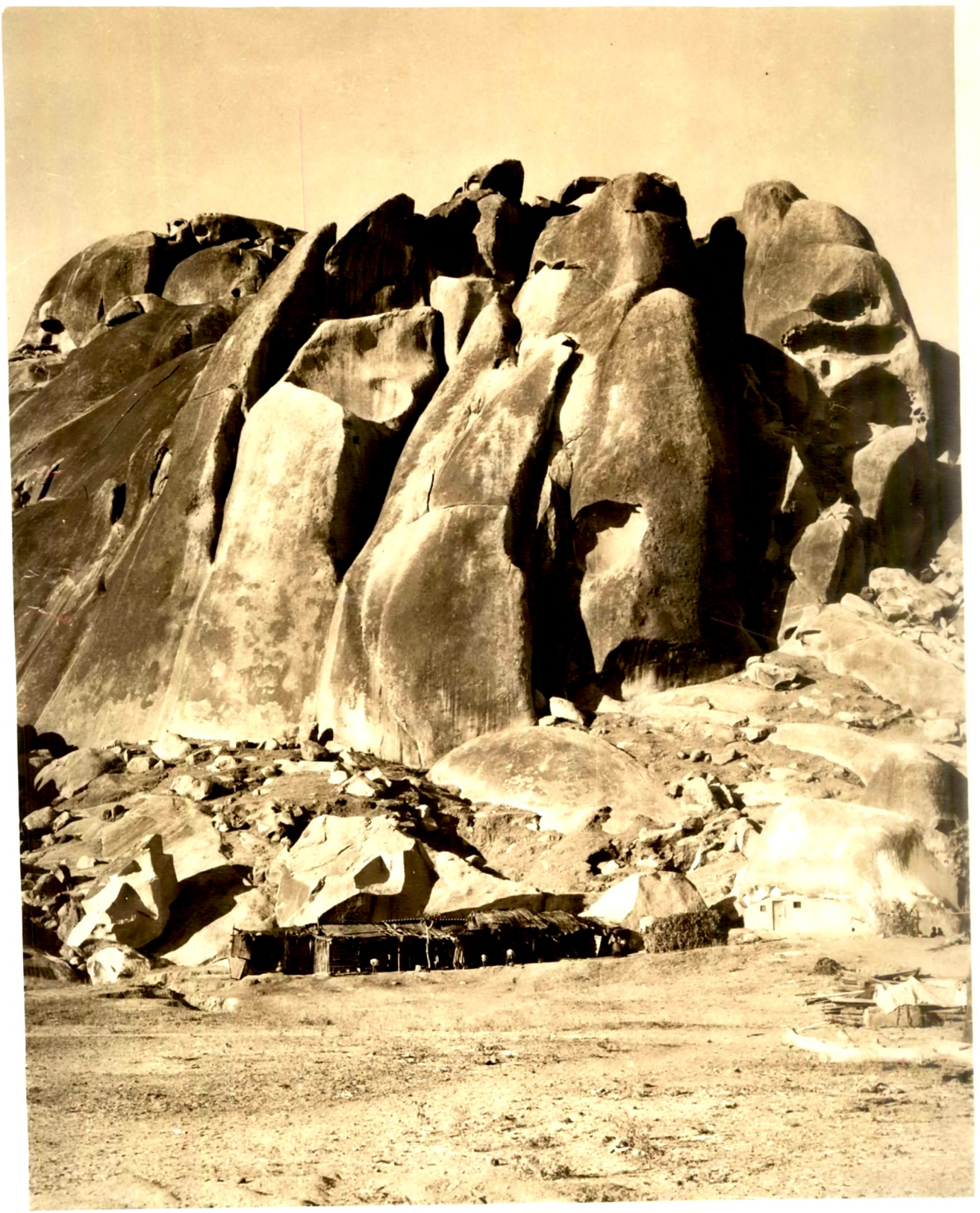
VIEW OF A GRANITE HILL (LOC: IDAR)



CHAPTER I

I N T R O D U C T I O N

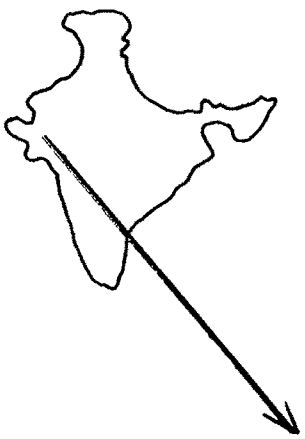
The pre-Cambrian geology of S. Rajasthan and N. Gujarat poses numerous problems which are yet to be fully answered. Though a number of workers have investigated different aspects of the geology of the terrain, and have furnished valuable data, yet the full and coherent details of its structure, metamorphism and igneous activity are not available. The various areas in this region still await detailed and systematic investigations. The Idar area in N. Gujarat, bordering Rajasthan is geologically very interesting, and since

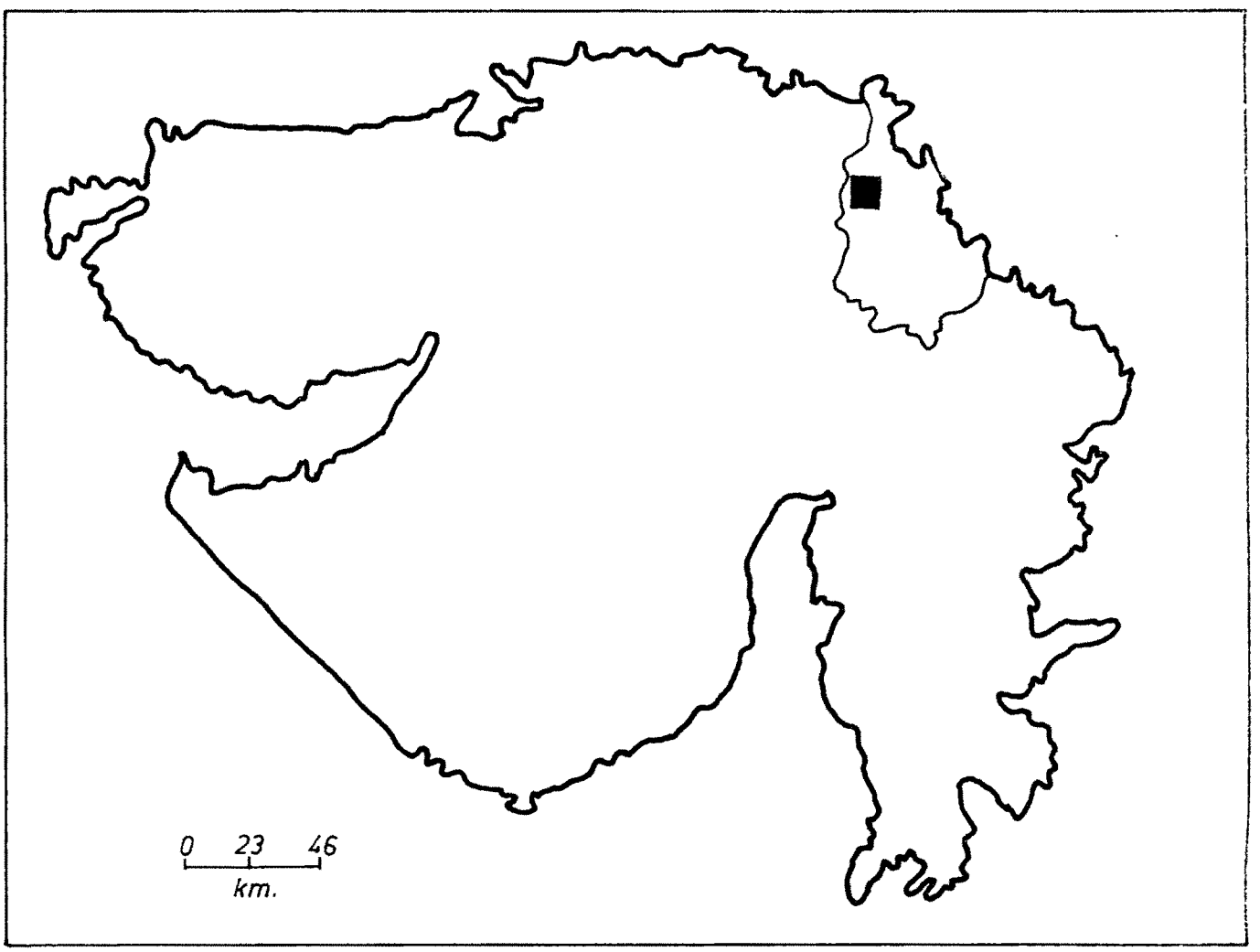
the times of Middlemiss (1921) about 50 years ago, its rocks have attracted attention of the geologists. The various metasedimentary formations comprising Aravallis and Delhis, together with intruded mafic and acidic igneous rocks, show quite a complicated structural, metamorphic and igneous history, on the unravelling of which depends the correct understanding of the geological evolution of the region as a whole. Though the original concepts put forth by Middlemiss have been considerably improved upon and modified by subsequent workers like Coulson (1933) and Heron and Ghosh (1938), yet there remain quite a few problems connected with the mafic and acid igneous activities which need further elaboration. With this in mind, the author took up the present study and he selected the Idar-Vadali area, which offers excellent opportunity of detailed studies of granites and mafic rocks in relation to the Delhis.

LOCATION

The Idar-Vadali area (formerly constituting a part of the erstwhile Idar State) comprises the central portion of Idar Taluka in Sabarkantha district of Gujarat State (Fig.I.1). To the N.E., the district of Sabarkantha is bounded by Rajasthan, on the W. by Banaskantha and Mehsana

Fig.—I.1 LOCATION MAP





districts and to its S. and S.E., lie the districts of Ahmedabad, Kaira and Panchmahal respectively.

PHYSIOGRAPHY

The northern and the northeastern parts of the district covering Khed-Brahma, Vijayanagar, Bhiloda, Meghraj, Malpur and parts of Idar Talukas are characterised by a hilly terrain, while the southern and the western parts are flat and mostly covered by sandy soils.

The study area falls within the hilly portion of the district and comprises the southern extremity of the Aravalli range. The terrain consists of mainly quartzite ranges and granite hills. Topographically, the study area is quite rugged, and in a broad way, its western, northern and eastern portions are hilly, while the southern portion forms flat low ground. The granitic hills of Idar and its immediate neighbourhood stand out majestically almost in the centre of the area.

DRAINAGE

There is no perennial river in the area, and it is drained by a few seasonal streams only which go dry during the summer. The river Ghuvai drains the eastern

portion, flowing south-southwesterly and meets the river Hathmati. In the western part, river Vekri which is a meandering stream flows almost westerly and finally meets the river Sabarmati. In addition, there are numerous streamlets flowing in various directions but they are too small to merit any mention.

The drainage of the area is evidently controlled by the lithology and the structure of the rocks. The general slope of the ground is southwesterly and is indicated by the flow of the various streams and streamlets practically all of which flow from northeast to southwest.

SOILS

The soil of the study area is of a sandy loam variety of pink colour, formed by the decomposition and disintigration of the granitic rocks.

CLIMATE

The area experiences extremes of climate and considerable variation in temperature. It is intensely hot in summer and severe cold in winter. This climate combined with low rainfall has given rise to a dry and healthy climate. The cold weather commences from October and lasts upto the end of February. The temperature

goes down as low as 6°C. Summer months are from March to the middle of June and during this period the temperature rises to a maximum of 46°C. Monsoon sets in by the end of June and rains continue upto the end of September, average rainfall being 105 cm. The monsoon breaks in the second half of June, followed by heavy showers in July with good rains in August and a few intermittent showers in September. The average rainfall varies from 75 cm. to 150 cm.

VEGETATION

Vegetation, on the whole is scanty and in patches. Hills are covered with fairly good vegetation. The trees observed commonly on the hill slopes are teak, bamboo, khair, khakhara, dhau, bor and prickly pear. In the low flat terrain, mohwa, mango, nim, banyan, peepal, rayan and tamarind grow. Regarding the agriculture an interesting pattern exists, locally known as 'Kampa-system'. In this a good productive strip of land is selected for agricultural development, is irrigated by wells and around which in due course, develops a small residential complex. Wheat, maize, bajri, juwar, methi, math and udad are the main crops. The common vegetables grown are potato, onion, tomato, ginger, cabbage and cauliflower.

ANIMAL LIFE

The fauna comprises both, the wild beasts as well as domestic quadrupeds with numerous species of birds. Wild animals like leopards, panthers, black bears, tigers, wolves, hyaenas, jackals, fox and monkeys are reported. Various types of birds, lizards and snakes are also common. Domestic animals such as dogs, cats, goats, ponies and cattles are confined to inhabitated areas.

POPULATION

The inhabitants are mostly Hindus with a few Muslims and Christians. Density of the population is 130 persons per square kilometre. The percentage of literacy is 24.03. It is found that 96.96 percent of the population speak Gujarati as their mother tongue. The common diseases prevalent are intermittent fever and parasitic diseases such as itch, ringworm, round and thread worms, to a less extent dysentry and eye diseases. Cholera and small-pox are epidemical.

COMMUNICATION

Idar is connected with Ahmedabad, the capital of Gujarat by a metre-gauge railway. The Gujarat State Highway from Ahmedabad to Abu Road station passes through Idar and Vadali. Important villages are

connected with Idar and Vadali by motorable roads. The Gujarat State Transport buses regularly ply on them and provide good means of transport and communication. A number of jeepable roads, cart-tracts, and foot-tracts connect the villages in the interior parts of the area.

SCOPE OF STUDY

The author first visited the Idar area in 1967 in connection with his investigations of the pre-Cambrian terrains of Gujarat under a CSIR research scheme on ultramafic rocks. His trips then made him interested in the various geological problems of the area in particular, and he subsequently decided to conduct a detailed and systematic investigation of the rocks of the area, the results of which are included in this thesis. His investigations have revealed hitherto unknown information on the structural and metamorphic characters of the Delhi rocks and have enabled the author to correlate the various igneous activities witnessed by the area. The present study has not only furnished details about the different aspects of the geology of the Idar area, but has also provided a number of clues which may help the future worker in the neighbouring areas as well.

Author's study mainly consisted of a detailed mapping and collection of structural and metamorphic data. An aggregate period of 20 weeks was spent during the years 1967 to 1969. Most of the field work was done in the winter months though short trips during summer months were also made. The geological mapping was carried out on a scale 1 cm. = 0.32 km. (2" = one mile) map photographically enlarged from Survey of India Toposheets No. 46, A/13 and E/1.

Individual outcrops were systematically investigated in the field and a well planned and methodical collection of representative samples was made. In all, about 500 samples were collected. Apart from the usual observations of the megascopic characters of the various rock types, about 200 samples were examined in thin section. Various structural elements were also recorded, analysed and classified. The structural data of Delhis was sorted out and interpreted stereographically. Forty selected samples of different rock types were chemically analysed, and various chemical diagrams were constructed with a view to understand metamorphism, metasomatism and the nature of granites and mafic rocks.

SUMMARY OF GEOLOGY

In the following lines the salient features of the geology of the area as worked out by the author have been briefly given and this has been purposely done to facilitate a proper understanding of the detailed account given in subsequent chapters.

The study area comprises rocks of Delhi system which have been intruded by mafic and acidic igneous intrusives in turn. The Delhi metasediments show wide range of lithological types viz. argillaceous, arenaceous and calcareous and show the following stratigraphy:

Calc-gneisses	)	
	)	Ajabgarh Series
Biotite-gneisses	)	
Quartzites	.....	Alwar Series

The Dlhi rocks have undergone N.N.E.-S.S.W folding which is seen as a number of moderately tight regional folds. On this folding a local superimposition of almost W.N.W.-E.S.E. folds has given rise to interesting refolded folds and 'eyed-folds' in calc-gneisses.

The Delhi rocks have been intruded by sills of olivine bearing dolerites. These in turn, are invaded by granites of Erinpura age. Granites form the most

conspicuous and abundant rock formation and occupy central and southern parts of the area. The bodies of mafic rock are found at some places only, as they are poorly exposed and occur as scattered outcrops. They are recorded in metamorphic as well as granitic terrains, and their pre-granite age is conclusively established on the basis of numerous evidences. The invading granite has transformed smaller mafic bodies into epidiorites, and has also assimilated them in parts, giving rise to hybrid varieties. The granites have also modified the Delhis. The original biotite schists have been migmatised to biotite-gneisses. The thermal effects of granites are seen in the development of calc-silicates and corundum bearing hornfelses.