Archaeological Series No. 51

A STUDY OF THE NEOLITHIC CULTURE OF SOUTHWESTERN ANDHRA PRADESH

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ANDHRA PRADESH
HYDERABAD

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A STUDY OF THE NEOLITHIC CULTURE OF SOUTHWESTERN ANDHRA PRADESH

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Published by

THE GOVERNMENT OF ANDHRA PRADESH

HYDERABAD

1978

PRINTED AT
THE ANDHRA PRADESH GOVT. TEXT-BOOK PRESS,
MINT COMPOUND, HYDERABAD.

TO

OUR PRECURSORS,

WHO MADE US MEN.

FOREWORD

During the last three decades the *how* and *why* of the transition from hunting and gathering to food producing has been empirically studied in many parts of the world by means of analyses of archaeological materials. In the Indo-Pak sub-continent as many as seven regional manifestations of the neolithic culture have so far been identified. Let it be admitted that in none of these areas have the details been worked out of this transition from the stage of food gathering to that of food producing although some areas or regions have been shown to be potential for the development of this process. All the regional manifestations present an apparent diversity in their ecological setting and cultural equipment. The climate during the period in question seems to have been essentially the same as to-day except for minor fluctuations. The environment, however, might have been different as we know that landscape has suffered through intensive exploitation of the natural resources through farming, grazing and clearance of jungle. One of these regional manifestations is in peninsular India to which the present book relates.

Peninsular India has the advantage of having been investigated comparatively more intensively than other regions and as such presents quite a satisfactory picture : over a dozen sites of neolithic affiliation have been excavated in this area which show different phases of the neolithic economy. Around 3000 B.C. most of the people in this region were still hunter-gatherers showing subsistence pattern of intensive localised broad spectrum collecting. By about 2500 B.C. people had settled in permanent villages in a few places and had begun to produce food by planting crops and herding cattle. By about 2000 B.C. the knowledge of domestication of plants and animals had diffused to more areas in the region, with the optimum adaptation to the envirorment. By about the middle of second millennium B.C. metal was introduced in this area.

Dr. V. Rami Reddy's studies on the neolithic culture of a part of this region results from the explorations conducted by him in western Kurnool and the whole of Anantapur Districts of Andhra Pradesh, which earlier had been explored by Col. Meadows Taylor and Robert Bruce Foote. The present studies make an attempt to bring out the settlement pattern of the neolithic people in this area, clearly bringing out the close association of the neolithic settlements with the environment of granitoid hills, of which they could exploit the trap dykes for manufacturing their stone tools. The study also throws fresh light on the ashmound by focusing the attention of the scholars on the occurrence of iron-smelting sites in the close vicinity of these mounds. The present studies are a welcome addition to the existing knowledge on the subject and as such would be read with interest by researchers.

20 *Dec.* 1978
New Delhi - 11.

B. K. THAPAR,
Director General,
Archaeological Survey of India.

AUTHOR'S ACKNOWLEDGEMENTS

The present study of the Neolithic culture of south-western Andhra Pradesh is entirely based on my explorations conducted in the western Kurnool and Anantapur districts of Andhra Pradesh during 1965-66 in connection with my doctoral programme. I was first initiated into the field in particular and into palaeoanthropological research in general by the doyen of Indian Archaeology, Professor Dr. (now Padmabhushan) H. D. Sankalia, presently Professor Emeritus in Archaeology at the Deccan College Postgraduate and Research Institute, Poona. His learned guidance, encouragement and deep interest in my work enabled me in discovering a large number of sites of the ancient farmers in this part of the peninsula. For all this, I am ever grateful to him.

Among those who helped me in bringing out this work, I must mention Dr. V. N. Misra, Reader in Archaeology, Deccan College, Poona, who has thoroughly gone through my work and offered a number of valuable views from which I have greatly benefited. Two other scholars who offered several of their valuable views are Sri B. K. Thapar, Additional Director General, Archaeological Survey of India, New Delhi and Prof. Dr. F. R. Allchin of the Cambridge University. I offer my sincere gratitude and thanks to both of them.

Sriyuts Y. S. Rasar and R. B. Warke of Deccan College, Poona, helped me by making the line drawings of the illustrations for the book. Sri G. Munikrishna Reddy, S.V. University College, Tirupati has typed the manuscript neatly in a considerably short time. My colleagues and research scholars in the Department have also assisted me in some manner or other without which it would not have been possible for me to complete the work so soon. I am extremely thankful to all these persons.

I tender my grateful acknowledgements to the Government of Andhra Pradesh for giving me a merit scholarship to facilitate me in undertaking this study.

Lastly, I must express my deep sense of gratitude to Dr. N. Ramesan, M.A., Ph.D., I.A.S., Director of Archaeology and Museums, Government of A.P., Hyderabad, for obliging me by publishing the work in the Andhra Pradesh Government Archaeological Series within a short time.

Tirupati,
Dt: 31-12-1976.

V. RAMI REDDY

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CHAPTER I

INTRODUCTION

This study is primarily based on my explorations conducted in south-western Andhra Pradesh (Rami Reddy 1968), which is defined here as the area comprising the western part of Kurnool and the whole of Anantapur districts. The archaeological remains of this region attracted the attention of some geologists and amateur archaeologists since the middle of the last century. Robert Bruce Foote, a geologist, justly regarded as the Father of Indian prehistory, was the pioneer explorer in this area and his efforts brought to light a vast collection of antiquities belonging to Mesolithic, Neolithic and Megalithic cultures, etc.

The first discovery of the existence of Man in Andhra Pradesh was made as early as 1844 when Captain Newbold reported some animal bones and a human tooth of upper Palaeolithic period from the famous Billasurgam caves located about 5 kms., southeast of Betamcherla in Kurnool district. But the earliest explorations in our region were carried out by C.J. Pelly (Meadows Taylor 1852: 380-429), the Collector of the then Bellary district. These resulted in discovering a large number of megalithic monuments in Rayadrug and Dharmavaram taluks of Anantapur district. These were followed by Captain Meadows Taylor (1862 : 55) who found some more megalithic tombs at Kosgi in Adoni taluk of Kurnool district. The megalithic structures of Rayadrug area were also recorded in the Bellary district Gazetteer (Francis 1904 : 296) and further in 1912 a note was prepared on these structures by A.H. Longhurst. In Kalyandrug taluk at Mudigal around one thousand stone alignments were described in 'Anantapur Gazetteer'(1905: 175-6); and these were later visited by some members of the Archaeological Survey, Southern Circle, Madras ('Annual Progress Report' 1912-13: 52-63).

The discovery of Kudatini and Kupgal ashmounds by captain Newbold in 1836 and the subsequent finding of a neolithic settlement by William Fraser on the "north hill" of Bellary town and Kupgal or "peacock hill" near Sanganakallu, about six kilometres north-east of Bellary, aroused the curiosity of Bruce Foote (1914: 93), who, beginning in 1885, discovered several sites of mesolithic and neolithic ages, besides a few ashmounds, in this region. Foote's (1914: 85-97, 104-111; 1916: 97-106) survey was confined to the northern part of the region. His deep interest and enthusiasm for archaeological research inspired others also to participate in the activity.

Cornelius Cadrew (Foote 1901: Nos. 1220 to 1268; 1916:12 and 103), the then incharge of the Railway Locomotive Workshops of Guntakal Junction, excavated the 'barrows' and 'graves' here in 1887 and recovered an excellent collection of iron implements and pottery belonging to megalithic culture.

Reginald Ellis (Foote 1914: 132; 1916: 105) collected some chert flakes and a core of crystal, and a coin of Andhra dynasty on the left bank of Pennar river about a kilometre west of the railway bridge. Major Wuchope (Majumdar 1930-34: 258) made a collection of three celts from Nandavaram in Adoni taluk and two from Rayadrug. Later, Subbarao (1949: 92-98) and Rajarao (*IAR* 1958-59: 11) collected neoliths and microliths from Adoni and Alur taluks.

Among all the explorers the contribution of Bruce Foote was the most notable. He discovered more than two hundred neolithic sites in his south Indian exploration. Around eighty of these lay in Bellary district alone while the remaining were found in the districts of Hyderabad, Mahbubnagar, Kurnool, Cuddapah, Anantapur and Guntur of the present Andhra Pradesh State; Raichur and Chitaldrug of Karnataka; North Arcot, Salem, Tinnevelly and Trichinopolly of Tamil Nadu; and Palghat district of the present Kerala State. Among these, the site of Pathapadu about six kilometres west of Banaganipalle town in Kurnool district should be specially mentioned. Here Foote (1916:115, pl., 26) found a handmade lipped bowl with paintings in black, sherds of another lipped bowl and a thick 'lens shaped' lid along with pecked and ground stone tools and microliths. Allchin (1962: 221-4) who studied these finds besides his own collections compares them with those found on other neolithic and chalcolithic sites in the southern and northern Deccan.

In this century fresh light on the palaeolithic and mesolithic cultures of Kurnool has been thrown by the work of M.C. Burkitt and L. A. Commiade (1930:327-339) and more recently by that of N. Isaac (1960). However, very little new evidence on the neolithic cultures of the district has come to light. Specially in Anantapur district no work has been done after Bruce Foote's discoveries though extensive remains of neolithic culture have been discovered in the adjoining Bellary and Raichur districts of Karnataka and Mahboobnagar district of Andhra Pradesh by B. Subbarao and F. R. Allchin.

The Nizam's State Department of Archaeology (1936-37:14-16) excavated at Mask in Raichur district but the evidence had been given a summary treatment without analysing it to establish the culture sequence until Gordons (1943: 83-97) studied the excavated finds to know their chronological significance. The same Department (1938-39: 31-2) dug at Kallur as well but without accounting for the importance of the finds.

Krishna (1942) was the first to conduct a systematic excavation at Brahmagiri, which has been identified with the ancient city of Isila. No report of it was published. Wheeler (1948: 180-310) reexcavated the site. The excavations have been divided into three cultural periods: (i) Stone axe culture provisionally dated from 1st millennium B. C. to the beginning of 2nd century B.C., (ii) Megalithic culture after about 200 B.C. to the middle of the 1st century A.D.; and (iii) Andhra culture, circa 1st century A.D. to the 3rd century A.D.

Following the clues left by the work of Foote and others Subbarao (1948-49) undertook an intensive exploration of the Bellary district followed by a small scale excavation on the top of Sanarasamma hill at Sanganakallu near the town of Bellary. He proposed a three-phase sequence for Sanganakallu evidence – Phase I: Pre-Neolithic, Phase II: Neolithic and Phase III: Megalithic (1949:106-9). Since then this sequence has been more or less corroborated by other excavations at Maski (Thapar 1957: 4-142), Nagarjunakonda (Soundara Rajan 1958: 49-113), T. Narsipur (Seshadri 1971), Piklihal (Allchin 1960), Utnur (Allchin 1961), Tekkalakota (Nagaraja Rao and Malhotra 1965), Kupgal (Mujumdar and Rajaguru 1966) and Hallur (Nagaraja Rao 1971), Terdal (Sundara 1971), Kodekal (Paddayya 1973) and Hemmige (Hanumantha Rao and Nagaraju 1974) and Bainapalli (*IAR* 1964-65). During the last three decades considerable evidence has been brought to light for the neolithic culture of Karnataka giving it a firm stratigraphical position in the stone age cultures. It is from these sites that we have today a fairly good picture about the pattern of life and culture of the ancient farmers.

But the region to the east of the Karnataka remained unexplored. So it was intended to conduct an intensive and systematic exploration of the region to reconstruct its pre-historic cultures against the back-ground of available evidence from Karnataka. The present work was therefore undertaken at the suggestion of Professor (now Padmabhushan) H. D. Sankalia. Accordingly the field - work was carried out in three seasons over a period of six months and it brought to light 14 mesolithic sites, 35 neolithic sites, 17 ashmounds, one iron-smelting site and large number of various types of megalithic monuments at 17 places. Some of the known sites were also reexplored. All the sites are geographically distributed in the northern most, northern and central divisions. In the Southern division only in Kadiri taluk was found a mesolithic site. Other taluks consisting of Hindupur, Penukonda and Madakasira have not shown any indications of archaeological remains. It therefore cannot be said with certainty that these areas are bereft of archaeological remains unless it is proved by further intensive researches by choosing 'nuclear' areas.

Of all the taluks in this region, Kalyandrug has been found to be the richest in proto - historic remains. This taluk, clustered with a number of small and big granite hills, has brought to light the maximum number of neolithic sites, ashmounds and megalithic monuments. All the granite hills visited yielded evidence of neolithic culture. However, it was not possible to cover all such hills as their number is very large. Further work will definitely bring to light a large number of sites in this area.

Majority of the sites recorded by me are of open air type. They are either at the tops, slopes or feet of the castellated granite hills, or in fields in isolation, or sometimes on the river banks. The river bank sites are mostly on Tungabhadra. Thus the region is characterised by three distinct cultures: Mesolithic, Neolithic and Iron Age. This sequence has been confirmed stratigraphically by my excavations in 1967 at the site of Palavoy in Anantapur district (Rami Reddy 1968 and 1976).

Of the mesolithic sites, eight are located in the western part of Kurnool district and the other six in Anantapur district. Six of the former sites are located on the bank of Tungabhadra in Adoni taluk while the remaining eight are away from the river or at the most on the banks of the seasonal streams. The most common raw material used for preparing artifacts of the mesolithic culture is chert of various hues though other rocks like chalcedony, jasper, agate, carnelian, quartz, rock crystal, etc. were also employed to some extent. The typology comprises fluted cores, flakes, unretouched blades, backed blades, obliquely blunted blades, truncated blades, lunates, points, borers, scrapers and notched flakes. The mesolithic culture of this region is thus characterised by a non-geometric microlithic industry on the basis of the presently available evidence closely comparable to those of other areas in the Indian sub-continent (Rami Reddy 1975a: 13-39).

Of the neolithic sites four are located in Adoni and Alur taluks of Kurnool district and the rest in Anantapur district. Two of the former sites are on the bank of Tungabhadra river. Artifacts belonging to pecked and ground stone industry and blade industry were collected from these sites along with several potsherds. The raw materials used for the manufacture of pecked and ground stone tools comprise igneous rocks–both basic and acidic ranging from very fine-grained basalts to medium and coarse-grained dolerites, epidiorites, amphibolites, granites, grano-diorites, epidote granites and pegmatites, and intermediate rocks such as diorites. Besides these, a few metamorphic rocks consisting of micaceous schists, coarsely banded granite gneisses, and a few siliceous rocks such as

quartz and sedimentary rocks such as sand stone were also used in a small measure. The tool types consist of axes, chisels, adzes, chopper-chopping tools picks, core scrapers, flaketools, by-product flakes, rubbing stones, hammer stones, mace heads and a few miscellaneous tools. In addition, several saddles querns were noticed (Rami Reddy 1976). The artifacts of blade industry—chiefly made on chert of various colours and small proportions of chalcedony, quartz, jasper, etc., consist of fluted cores crested guide flakes, unretouched blades, backed blades, obliquely blunted blades, truncated blades, lunates, a trapeze, points, borers and scrapers etc. Thus the raw materials, techniques of manufacture and typology of this industry are mostly similar to those of the microlithic industry described earlier. However it can be seen that the crested guide flakes and a solitary specimen of trapeze of this industry are absent in that of mesolithic culture of this region. Further the percentage of finished tools comprising microliths and other tools like points, borers, scarpers and notched flakes of the microlithic industry is twice that of the neolithic blade industry.

The neolithic ceramic industry broadly divisible into blotchy grey and dull red wares includes a number of subwares on the basis of surface treatment. The pottery is entirely handmade. The common shapes are globular vessels of various sizes with constricted and concave necks and flared rims. Other shapes include spouted pots, rimless bowls, lipped pots, lugged pots, etc. The common decorations are red ochre, painted, incised, impressed, perforated and black painted-on-red ware. The last mentioned decoration is the least common in the region due to its occurrence only at four sites: Katamadevudu hill, Palavoy, Mudigal and Kunduripi. The first of these is located in the administrative jurisdiction of Dharmavaram taluk while the remaining three sites are in Kalyandrug taluk of Anantapur district. It is hence thought that such pots were imported from the northern Deccan. But at Palavoy the quantity of painted pottery found in excavations is considerably high (about 11 per cent of the total potsherds) and therefore it is surmised that this pottery was a locally made one. However, all the above mentioned characteristics of this culture are largely similar to those of other neolithic sites known in the South and Deccan.

Majority of the megalithic sites of this region are geographically located in Kalyandrug and Rayadrug taluks and some in Dharmavaram and Adoni taluks. The most common types of monuments are port-hole cists, stone circles, dolmens and menhirs. None of the sites represent all the four types of monuments. The megalithic pottery comprises black ware, black-and-red ware, red and black ware, red ware, chocolate-slipped ware and coarse grey ware. The common shapes are shallow dishes, rimless bowls, basins, globular pots with concave or constricted necks and beaded-out clubbed, or bevelled rims. Sometimes carinated pots and ring stands also occur.

Among the explored ashmounds four are located in Adoni and Alur taluks of Kurnool district and the remaining 11 are in Anantapur district. The date and origin of ashmounds have posed a problem for well over one-and-a-half centuries. Though a number of hypotheses have been advanced in regard to their origin no convincing explanation has yet emerged. However the problem has been discussed considerably elsewhere (Rami Reddy 1975-1976) on the basis of the results of my excavations conducted at Palavoy. The present work endeavours to study exclusively such traits of the neolithic culture of south-western Andhra Pradesh as pecked and ground stone and blade industries, pottery and others based on the material remains from several sites which broadly contribute to the well known south Indian neolithic culture.

CHAPTER II

GEOGRAPHICAL AND HISTORICAL BACKGROUND

A : PHYSICAL AND OROGRAPHICAL FEATURES

The area covered in the present study (situated between 13°40′ and 15°58′ N. latitude and 76°50′ and 78°30′ E. longitude) is bounded on the north by Raichur district of Karnataka, on the west by Bellary, Chitaldrug and Tumkur districts, all of Karnataka, on the south by Kolar district of Karnataka and Chittoor district of Andhra Pradesh and on the east by Cuddapah district and a larger part of Kurnool district, both of Andhra Pradesh.

The area forms part of the northern extremity of Mysore plateau and its physio-and orographic features are largely similar to those of the neighbouring Bellary and Raichur districts. It is an open country from the plains of which rise a number of granite hills, mostly castellated; these provided strong defence for the early settlers. The open stretches between these hills, devoid of trees, are to a large extent covered with black cotton soil. The elevation of the region gradually falls into the Penneru valley in Gooty and Tadipatri taluks, after which it gradually rises. The southern division consisting of Hindupur and Madakasira taluks has an average elevation of 600 ms., and so it forms the coolest part in the region, while in the northern and central divisions near Anantapur and Gooty it is about 330 ms. and at Tadipatri 270 ms. above sea level.

All the eleven taluks of Anantapur district—Anantapur, Kalyandrug, Rayadrug, Uravakonda, Gooty, Tadipatri, Dharmavaram, Kadiri, Penukonda, Hindupur and Madakasira, and two of Kurnool district—Adoni and Alur - are included in the area of investigation (Fig. 1). The whole area is divisible into four geographic divisions–the northern most, northern, central and southern.

The northernmost division consisting of Adoni and Alur taluks is a treeless tract. The surface of the division is almost flat excepting a few characteristic outcrops of granite hills overlooking the surrounding fields. The Adoni group of hills running south-easterly cover the country from Kosgi to Adoni and Yemmiganur. In these hills are found neolithic settlements at Adoni, Kotekallu and Kosgi. The Adoni fortified hill is the highest in the division. The Alur group starts from the confluence of the Tungabhadra and Hagari rivers and runs southeasterly upto Chippigiri and Guntakal. In this group also occur neolithic sites at Halekota, Kanchagarabelagallu, Holalgondi, Hosapetadevaragudda, Hattibelagallu, Ramadurgam, Arikere, Chippigiri and Guntakal.

The northern division comprising Uravakonda, Gooty and Tadipatri taluks is extensively covered with black cotton soil. In this division, excepting the Muchukota range of hills covering the western part and the flat-topped Erramalais binding the northern and eastern portions of Tadipatri taluk, there are only a few isolated hills. Prominent among these are the strongly fortified massive precipitous rock at Gooty, the hills at Uravakonda and Udiripikonda of about 120 metres in height and other noteworthy hills at Palasamudram, Konakondla and Gulapalyam. The plain of the Tadipatri taluk is lower in elevation than any part of this division.

The central division consisting of Anantapur, Dharmavaram, Kalyanadrug and Rayadrug taluks is almost an arid, treeless zone covered largely by a poor, stony red soil with isolated patches of black soil. The general appearance of the division is a level plain, though it is broken upto some extent by hills. In Anantapur taluk, the flatness is broken by the southern extension of the Nagasamudram range and the bold isolated masses near Singanamala and Malyavantam on the eastern flank. The Muchukota range of hills with its several spurs occupies much of this taluk. The northern extension of Mallappakonda and Penukonda line of hills disturb the flatness of Dharmavaram taluk, while many isolated granite hills are seen in the Kalyandrug and Rayadrug taluks.

The southern division includes Hindupur, Madakasira, Penukonda and Kadiri taluks, which cover a better variety of red soil. This is the most hilly division with a higher proportion of reserved forests. Penukonda taluk and the centre of Hindupur taluk are traversed by the Penukonda line of hills. The eastern flank of Hindupur taluk is bounded by the Mallappakonda range. Hindupur along with Madakasira taluk forms a part of the Mysore plateau thus sharing its higher elevation and cooler climate. The area supports thicker vegetation due to high rainfall. Kadiri taluk of this division contains as many as eight reserved forests according to the 1961 census figures.

Thus, the chief characteristics of the physiography of the region are aridity, treelessness and general poverty of the soil.

The hills found in the region (excluding those of Adoni and Alur taluks described earlier) are low with an average height of 900 metres. The highest points include Mallappakonda (927.6 ms.), about six kms. north of Bukkapatnam, and Penukonda (927.3 ms.)—both located in Penukonda taluk, Kunduripidrug (898.8 ms.) in Kalyandrug taluk and Madakasira hill in Madakasira taluk. These hills are situated on an area elevated 450 to 600 metres area above sea level. Besides these outcrops of rocks and low barren hills appear abundantly. The taluks of Tadipatri, Gooty, Anantapur, Dharmavaram, Penukonda, Hindupur and Madakasira are traversed by some five low ranges of hills. A few isolated hills are present in Kadiri taluk also. These hills are generally named after local gods that are believed to reside in them.

Isolated peaks and rocky clusters are the characteristic features of the region. Particularly, the Gooty rock, the compact Kunduripidrug, the clusters round about Kalyandrug and Rayadrug towns, the hills just north of Malyavantam in Dharmavarm taluk and the hills just north of Singanamala tank with the prominent Gampanamalla hill (753 ms.) are the known orographical formations in the region (Chandra Sekhar 1964 : iii).

B. GEOLOGY

South-western Andhra Pradesh was geologically mapped by Robert Bruce Foote (1895) in the last quarter of the last century. No information of subsequent work, if any, is available. Recently K. V. Krishna Murthy of the Geological Survey of India has published an article on the geology and mineral resources of Anantapur district (Chandra Sekhar 1964 : iv).

The chief geological formations of the region are: (1) the Archaeans, (2) the Dharwars, (3) the Cuddapahs, and (4) the Kurnools (Fig.1). The Archaean and Dharwar systems occur all over the region while Cuddapah and Kurnool systems are found only in Tadipatri taluk and the eastern portions of Gooty and Anantapur taluks.

Geographically, the Archaean group of rocks are confined to Adoni and Alur taluks–the two crystalline rock areas of Bellary district in Mysore–of the northernmost division, Gooty and Uravakonda taluks of the northern division, west and northwest part of Anantapur taluk, western part of Dharmavaram taluk, east and southwest part of Kalyandrug taluk and Rayadrug taluk – all of central division. The representative rock types of this group belonging to Dharwarian age include dolerite schists, chloritic granulites, banded ferruginous quartzite with intercalations of quartzite, metamorphic basic rocks comprising horn blende schists, hornblende quartz granulite, amphibolite, metagabbro and metadolerite.

Outcrops of grey and pink coloured granite and granitic gneiss are extensively found in the region. The granites, containing hornblende epidotemica, are traversed by several pegmatite veins. Granites porphyritic in character are exposed southwest of Togarakunta and around Nasanakota. The epidote bearing pegmatite intruding into hornblende and epidotic granite gneisses are supposed to contain diamonds.

The hornblende schists occurring as long narrow bands and as inclusions in the gneissic granites are seen in Katrimala reserved forests and to the west of Ramagiri. The Ramagiri hornblende schist is worked for its gold content. The steel grey cholite schists of schistose texture are impregnated with auriferous blue quartz veins.

About one-and-a-half kilometres east of Papampalli on the top and western slope of a hill a short narrow band of quartz and mica schists occurs in 198 metres length and 90 metres width. Well exposed ridges of hornblende-augite-plagioclase rock are found southeast of Namatabad west of Lachasanipalli. Ferruginous quartzite occurs in the form of narrow bands on the hills east of Kuderu and west of Talupuru. Haematite and red oxide pockets occur in banded heamatite quartzite to the northeast of Velpumadugu. Irregular patches of metadiorite and metagabbro occur in the granite rocks in the hillocks of Bhanukota. At several places pinkish pegmatite veins cross the rock.

The granitoid hills in this region are traversed by numerous trap dykes of dolerite and diorite of great size and length, which often rise into bold crests and ridges forming a very conspicuous object in the landscape. Basalt which occurs in small veins in the dykes was exploited by the neolithic people for making their implements. Two long and wide dolerite and diorite dykes on either extremity of the Palavoy hill were observed when we were excavating there in January/February 1967. A small number of tools were also found on and around these dykes. Dolerite porphyritic in nature is exposed in the area around Jallipalli and west of Katanka.

The "Cuddapah and Kurnool Systems" included in the "Purana Group" (Mahadevan 1940:4), are the next series of rock formations that occur in the region.

Only rocks belonging to lower Cuddapah group occur in the Tadipatri taluk of northern division of this region. These rocks mainly comprise Pulivendla quartzites and Tadipatri shales. Besides in the western parts of Tadipatri taluk and eastern parts of Gooty and Anantapur taluks the Papaghni series is exposed. The Gulcheru quartzites including mainly quartzite and grits with pebble beds and intercalation of purple sandy shales rest unconformably over the Archaeans and form steep cliffs.

The Vempalle dolerite limestones often intercalated with colitic chert are intruded by sills of basic igneous dolerites. The Pulivendala quartzites of the Cheyair series rest disconformably over Vempalle. Pulivendala mainly consists of quartzite grits and basal conglomerates.

The Tadipatri shales overlying the Pulivendala quartzites have been intruded by trap sills and dykes. The shales which give rise to clay beds locally, range from brown grey to purple colours and are prominently jointed.

The Cuddaph system is overlain unconformably by the Kurnool which is about 360 metres thick. The rocks belonging to the basal stage of this system consisting of the Banganpalle quartzites and sandstones overlying the Cheyair and Papaghni series of Cuddapah system occur in the Tadipatri taluk. The Banganpallis are of grey or buff colours massive and jointed. Their current beds of conglomerate are pebbly in the basal portions of which occur diamonds sometimes. The Banganpallis are overlain by the Jammalamadugu series, which consist of Narji limestones and calcareous and Auk shales.

The Narji limestones of different types are exposed in Kavalapalle terrace and around Gudipadu and Guruvanipalle and these rocks are compact and fine-grained. The Auk shales are found in the Barugala Plateau and on the hillslopes to the north and northeast of Guruvanipalle. The Paniam group of rocks occur in isolateed patches around Barugala of Tadipatri taluk.

The minerals that occur in the region are gold, diamond, barytes, asbestos, steatite, limestones, abrasives, clay, iron ore and soap stone. The schist belt near Ramagiri in the southwestern part of Dharmavaram taluk and in some parts of Penukonda taluk is known to yield gold. The ancient gold workings belonging to the Tippu Sultan period have been found in the 12 km.-long schist belt near Ramagiri village. M/s. John Taylor and Sons also mined here for gold between 1905 and 1927. The staff of the Geological Survey of India and of the Indian Bureau of Mines have resumed further work. The pipe rocks near Vajrakarur are supposed to contain diamonds. The Geological Survey of India has taken up the work here under the Third Five-Year plan Field Programme. Baryte deposits abundantly occur in veins in limestones, shales and quartzites on either side of the Tadipatri-Anantapur road to the south west of Muchukota and east of Venkatampalle. Other reported places include the west and southwest of Kondamapalli, west of Varadayapalli, north of Nayanipalli, west of Sanjivapuram, east and northeast of Kanapudi and northeast and southeast of Madugupalli. A variety by name chrysotile asbestos occurs at Vengannapalle, Singanaguttapalle, Sivapuram, Chalaverala, and Mallagundla. A good variety of steatite is reported to occur at about three-and-a-half kilometres S. S. E. of Tabjula, four-and-a-half kilometers northwest of Muchukota. Other reported places are Kondampalle, Karampudi and Singanaguttapalle. The best quality of limestone occurs near Kona Rameswaraswami temple about nine kms. north of Yadiki and 15 kms. from Rayalacheruvu railway station in Tadipatri taluk. From these limestones can be manufactured chemical lime. M/s. V. Nimbakar, Bombay and Binny and Co. Madras are carrying out the work here. Mineral corundum which is used in abrasive industry has been reported from Atmakur, Danduvaripalle, Thimmapuram, and Pasalur (Dharmavaram taluk) and Manirevu and Nuthimadugu in Kalyandrug taluk. Balapuram and Uravakonda are the places where the occurrence of clay is reported. The copper mountain in Rayadrug taluk is estimated to have contained five lakh tons of iron with

60 per cent iron. The mine has been partly worked. A good quality of soap stone is reported from Janamreddipalle and Julekalava. Soap stone is being worked at Chandrapalli. A kind of soap stone free from grit occurs on the hill called "Balapenangigunta" at Nerijumpalle.

C. SOILS

Six distinct varieties of soils occur in this region. They are black clay, black loam, black sand, red clay, red loam and red sand. Of these black soil is the best in quality. On it groundnut and cotton crops are grown extensively. Black loam and red clay come next. Black sand occupies a place below these while red sand is the most inferior.

The black soil area is mostly confined to the northernmost and northern divisions covering Adoni and Alur taluks and Uravakonda, Gooty and Tadipatri taluks respectively. The black red and mixed soils of Adoni and Alur taluks are very fertile. This area is also benefited by the Tungabhadra irrigation project. It is stated "in Gooty most of this lies to the west of a line drawn from Guntakal through Vajrakarur and Lattavaram to Amidala and forms a continuation of a great cotton soil spread of the eastern portion of Bellary" (Chadrasekhar 1964 : iv). The central part of the Tadipatri taluk is completely covered with black cotton soil leaving a little part of the area for red soil particularly near the hills and along the margin of the rivers.

Nearly 66% of the assessed area in Hindupur and Madakasira taluks is covered by fertile red soils. Red soils of the most inferior quality occur in the rest of the taluks. The red soils of the Kalyandurg taluk are even poorer than those of the rest of the areas in the region.

D. DRAINAGE

The rivers Tungabhadra, Pennar, Chitravati and Hagari with its tributary, Chinna Hagari constitute the main drainage system of the region. The Jayamangali and Kusavati, tributaries of the Pennar and the Swarnamukhi in Madakasira taluk, which joins the Hagari, the Tadakaleru and Pandameru in Anantapur taluk and the Maddaleru and Papaghni in Kadiri taluk are mere streams and offer no irrigation facilities.

The Tungabhadra is the biggest river in the region. It binds the Adoni taluk north-westerly and enters the river Krishna, about five kilometres upstream from Moravakonda in Nandikotkur taluk of Kurnool district. A dam built across this river at Hospet in Bellary of Karnataka, irrigates the districts of Kurnool, Cuddapah and Anantapur of Andhra Pradesh.

The river Pennar, the next large river rises in Karnataka where it is known as Uttara (north) Pinakini and enters the region in the extreme south of Hindupur. It drains the northwestern part of the region covering the taluk of Hindupur, Penukonda, Kalyandrug, Uravakonda, Gooty and Tadipatri and finally flows into the Bay of Bengal after draining Cuddapah and Nellore districts. The river Jayamangali joins it near Utakuru. Pennar has a shallow bed and flows through alluvial plains with no rock barriers. It remains dry for three-fourths of the year but during rains its banks often overflow. The floods however last only for a few days.

The Chitravati like the other two rivers originates in Karnataka and enters the region near, Kodikonda in Hindupur taluk. It drains the northern taluks of Hindupur, Dharmavaram, Penukonda and Tadipatri and finally joins the Pennar near the Gandikota gorge in Cuddapah district. Maddaleru joins it in the north-eastern corner of Dharmavarm taluk. For irrigation purposes the river has been dammed into tanks at Bukkapatnam in Penukonda taluk and at Dharmavaram town.

The Hagari with its tributary Chinna Hagari is another significant river in the region. It is known by the name 'Vedavati' due to the union of Veda and Avati rivers originating in Karnataka. The river enters the region at the southern end of Rayadrug taluk and forms the boundary between Rayadurg and Kalyandrug taluks. It drains the western part of the region covering Kalyandurg, Rayadrug, Alur and Adoni taluks and re-enters the Karnataka state. The Chinna Hagari joins it in Rayadrug taluk. The famous Bhyravanithippa project constructed on this river in Kalyandrug taluk forms an important irrigation facility for both Rayadrug and Kalyandrug taluks.

E. CLIMATE AND RAINFALL

Geographically south-western Andhra Pradesh is situated in the centre of the peninsula and hence it is extremely dry due to the passing of the air through heated plains. March, April and May are the hottest months in year during which the temperature ranges from 98°F to 107°F. The south-west monsoon cools down the region in June. November to January constitute the winter season in which the temperature falls to 62°F. In winter the average daily minimum temperature varies beween 62°F and 68°F.

The peculiar rock-weathering noticed in Bellary district (Subbarao 1949 : 35) is seen in south-western Andhra Pradesh as well, particularly in the northern most and northern divisions. The rapid changes in temperature during summer from hot days to cold leads to the weathering of the granite rock.

On account of the geographical location, the region suffers for scarcity of rainfall. It is neither benefited by the south-east monsoon because of its distant location from the east coast nor by the south-west monsoon because of the impediment of the high western ghats. These conditions make agriculture very precarious and therefore, the region often passes through drought and famine conditions.

The rainy season lasts from August to October in the latter part of the south-west monsoon and the early part of the north-east monsoon. The average annual rainfall during the past eighty years has been 58.6 cm., while the average for the past decade is 55.83 cm. Adoni, Alur, Kadiri, Hindupur, Madakasira, Penukonda and Gooty taluks receive slightly more rain than the average while the other taluks receive less. The rainfall is not equally distributed in the region. According to the "1950-51 *Statistical Atlas of Kurnool and Anantapur districts*", an average rainfall of 61.48 cm. was received by the northernmost division while an average of 54.7 cm, 53.15 cm. and 57. 78 cm. was received by the northern, central and southern divisions respectively during the decade.

F. FLORA AND FAUNA

Forests of some significance are found only in the southern division in Kadiri and Penukonda taluks. The rest of the region with few exceptions is mostly devoid of vegetation of any kind.

The most important trees met within the groves and gardens, and along roads in this region comprise the mango (*Mangifera indica*), tamarind (*Tamarindus indica*), banyan, margosa and cocoanut. The common indigenous trees are the babul (*Acacia arabica*), the ber (*Zizyphus jujuba*) and the wild date (*Elate sylvestris*). Babul trees, which are locally called 'Tumma' abound in the fields and on the outskirts of villages. The bark of these trees is largely used in tanning and in medicine. Its wood is used in making agricultural implements and for gum. The babul is usually seen on black soils while the ber and the date are found on sandy soils near nullahs. The yellow-flowered 'tangedu' shrubs (*Cassia auriculata*) the 'kanuga' (*Pongamia glabra*), *Indigofera coerulea*· the kusum (*Carthamus tinctorius*), the maddi (*Terminalia alata*), the neredi (*Calyptranthes caryophyllifolia*), *Tortollis euphorbia*, milk-hedge, prickly-pear, aloes, etc. are the other species that are found all over the region. The granite hills are full of cactus plants in all parts of the region.

The four classes of animals that are met with in this region are mammals, birds, fishes and reptiles.

Mammals belonging to orders carnivora, ruminantia, rodentia, pachydermata, primate and cheiroptera are found in this region.

The carnivores include panthers and cheetahs which are common in the western parts and in the Bukkapatnam hills of Penukonda taluk. Wild cats and toddy cats abound in the region. Wolves are seen only in Hindupur taluk while jackals and foxes are found all over the region particularly in the rocky plains of Dharmavaram taluk. The black Indian bear is found in the Penukonda hills. Mangooses are common and form the pet animals of tribal people. Dog is another domesticated animal found everywhere. The ruminants consist of antelopes usually seen in the red soils of Gooty, Anantapur and Dharmavaram taluks. Ox, goat and sheep are commonly domesticated throughout. The rodents include rats, mice, bandicoots, squirrels and hares and these are commonly found throughout. Porcupines of this order are rare. The order pachydermata includes a few horses and crested hogs (*Sus indicus*). The latter species are found in the Rayadrug taluk. The order primate comprises the common grey monkeys found everywhere. Another member of this order is the black monkey (*Innuus silenus*) seen only in Adoni taluk.

The class - birds includes the Indian eagle, the vulture, varieties of the hawk and falcon tribe, parroquets, king-fishers, jays, wood-peckers and the common sparrow, swallow and crow, Pea and jungle fowl, partridge, rock-pigeon, quail, bustard, florikin, plover, snipe, stork and heron are also common. The common wild duck, goose and pelican are found everywhere.

The commonly found fishes particularly in the river Tungabhadra comprise eels. The cobra and the venomous whip snake abound. Several green snakes supposed to be poisonous are found on trees and shrubs. Frogs, toads, lizards, tortoises, etc., are common. Alligators are seen in the Tungabhadra river waters.

Innumerable insects abound in the region. Of these the lac-insect and honey bee are the most useful ones.

G. HISTORICAL PERSPECTIVE

The recorded history of the region goes back to third century B. C. The earliest evidence consists of Asokan rock inscriptions found at Yerragudi in Pattikonda taluk of Kurnool district, and Siddapur and Brahmagiri in Chitaldrug district of Karnataka on the western border of Rayadurg taluk, which reveal that south-western Andhra Pradesh was a part of the Mauryan empire. Later the territories comprising Anantapur, Kurnool and Bellary districts came under the jurisdiction of the Satavahana Empire (225 B.C. to 225 A.D.). It apparently formed the home province of the Satavahana family (Krishna Rao 1942 : 203). This is supported further by a Satavahana coin found by me at Palavoy in 1967 (Rami Reddy 1976). The obverse view of this coin bears an elephant symbol with the name of the king, Srisātakarni,depicted in Brahmi script above the figure, while the reverse side has the Ujjain symbol of cross dumb-bells with dots in them and tourin symbol. An inscription of the last Satavahana king, Pulamavi, was found earlier at Mekadona in Adoni taluk (Sircar 1942 : 205). After this for over four centuries the history of the region is a blank till it came under the Pallava kingdom. A part of it was ruled by the Nalas, who were defeated by the western Chalukyan king, Vikramaditya, in the seventh century A.D. (Francis 1905 : 28). The area was under the control of the Western Chalukyan empire till the last quarter of the twelfth century A.D. This is shown by the three rock inscriptions found near the top of the Gooty fort. The Western Chalukyan power was wrested away by the Hoyasala Ballalas, and the Yadavas who ruled the tract for sometime. At the beginning of the 14th century, Allauddin Khilji of Delhi defeated both the Hoyasalas and the Yadavas.

The rule of the Delhi Sultans came to an end when the strongholds of Andhra, Harihara and Bukka,formed the Vijayanagar Empire with its capital at Hampi. The Vijayanagar kings ruled the area for two centuries. The glory of this empire came to an end by 1614 with its last ruler, Venkata (Chandra Sekhar 1964 : xii). The country wide disturbances gave a chance to the Golconda Nawab to conquer this part and Bellary district in 1589. By about 1677, the famous Maratha chief Chhatrapati Shivaji ruled the area. Aurangazeb overthrew the Maratha rule in 1687 and appointed the Nizam of Hyderabad Governor of this part of the country. The Nizam later turned against the Mughal rule and declared himself independent in 1723 and ruled his state including south-western Andhra Pradesh. The Mysore Sultan Hyder Ali, took possession of the country in 1761. Hyder Ali was succeeded after his death in 1782 by his son, Tippu Sultan who had to cede the whole area to the British after his defeat in 1792 and 1799 by the British with the support of Marathas and the Nizam of Hyderabad. The whole area came under the rule of the Nizam who ceded it along with Bellary and Cuddapah districts in 1800 to the East India Company in accordance with the treaties of 1792 and 1799.

In the beginning the entire region was administered from Anantapur, which was the head-quarters of the Principal Collector, but in 1807 the area was divided into two districts, Bellary and Cuddapah, and the former under went further division in 1882 into Bellary and Anantapur districts. The British regime did not face any open resistance or revolt from any of the local rulers and chieftains.

H. THE PEOPLE

According to 1961 census the population of the south-western Andhra Pradesh comprised 2,164,531 persons. Of these, Hindus and Muslims are in majority. Next to these two major religious groups come the Christians and the Jains. Besides, there are several scheduled castes and aboriginal tribes with populations exceeding two-and-a half lakhs and 50,000 persons respectively.

The leading castes among Hindus are Brahmins, Vaisyas, Reddis, Kammas and Balijas. Others include panchalas the five classes of workers in (1) gold and silver (Kamsala), (2) copper and brass (Kanchara), (3) iron (Kammara), (4) wood (Vadla) and (5) stone (Silpi), Gollas (a pastoral community managing cattle, sheep and goats), Nese vandlu (weavers), Kummaras (potters), Satanis (temple servants) Upparas (salt makers), Vaddas (tank diggers), Mangalas (barbers), Chakalas (Washermen), Bestas (fishermen), Idigas (manufacturers of toddy, arrack and other intoxicating liquors), Dommaras (athlets and jugglers) and Boyas.

The scheduled castes who claim to be Hindus consist of Adi Andhra, Adi Dravida, Arundhatiya, Bariki, Chalavadi, Chamar, Mochi or Muchi, Dom or Dombara, Jaggali, Jambuvulu, Madasi Kuruva, Madiga, Madigadasu, Mala, Maladasu, Mundala, Matangi and Thoti. The scheduled tribes of the region mainly comprise the Chenchus, Koyas, Reddi dhoras, Sugalis (Lambadis), Yanadis and Yerukalas (Chandra Sekhar 1964 : xxiv).

Telugu, a language of the Dravidian family, is the principal language of the great majority of the Hindus. Muslims, largely found in Adoni, Guntakal, Gooty, Anantapur, Penukonda and Rayadrug towns, generally speak Hindustani; and Kannada is spoken in some parts of Alur, Adoni, Guntakal, Uravakonda, Rayadrug, Kalyandrug and Madakasira taluks, all bordering on Karnataka. These are bilingual areas since the people use both Telugu and Kannada in their day-to-day life. Marathi is also spoken by some persons in the region.

Of the aboriginals the Sugalis, the Yerukalas and the Yanadis are the three main nomadic communities. The population of other tribes - Reddi dhoras, Chenchus and Koyas - is numerically insignificant. Only stray individuals of these three tribes are to be found; but there are no settled communities in our area. However, in the adjoining Kurnool and Mahabubnagar districts there are large settlements of these tribes. The highest concentration of the tribes in our area is found in Kadiri (14,213) and Penukonda (6,495) taluks. Majority of them live in isolated rural areas besides jungles and forests. Roughly over 3,000 people live in urban centres. Besides their native dialect, they speak Telugu which is gradually replacing their original dialects.

The Hindus are well-built and sturdy, and have an average height of about 1.65 meters. Their skin colour is dark brown and they are long-headed with profuse black hair ranging from wavy to curly texture.

The tribal communities of the region have their own cultures which are independent of the Dravidian in their origin. Frequent contacts of these folk with Hindus have resulted in miscegenation which has consequently reduced primitive strains. Racially the tribes inhabiting south-western Andhra Pradesh belong to australoid type while according to Guha (1944:11) they are of proto-australoid type.

Sugalis, also known as Banjaras and Lambadis, have fine, muscular features with medium height. Sugali women who are robust are above the average height of country women (Thurston 1909:211 & 217-18). They are fair in skin colour unlike Chenchus. The wandering Yerukalas are a gypsy tribe with asymmetrical physical features, dark complexion and coarse dishevelled hair (Siraj Ul Hassan 1920:185). Their cephalic index is 78.6 (Thurston 1909:44). Thurston (1909:416) observes that "the Yanadis are a dark skinned, platyrhine tribe, short of stature, who inhabit the Telugu country", while Raghavaiah (1962:56) states that the Nellore Yanadis are of tall stature. He (1909: 27) elsewhere thinks that the Chenchus and Yanadis had a common ancestral stock.

Agriculture is the mainstay of the economy of Hindus—chiefly among the Reddis, Kammas and Balijas—and to some extent in other communities. Thurston (1909:222-3) describes Reddis as "the great caste of cultivators, farmers and squireens in the Telugu country." In the Gazetteer of Anantapur they are described as being the great land-holding body in the Telugu districts, who are held in much respect, steady going yeomen, and next to Brahmins are the leaders of Hindu Society". The usual crops they grow include jowar, bajra, ragi and korra, and to some extent paddy due to recently increased irrigation facilities. Besides these, cash crops such as ground-nuts, tobacco, castor, sugar-cane, betel vines, grapes, oranges etc., are also grown. The black cotton soil areas are utilised for growing cotton.

The usual food of the ryots consists of cholam, ragi and korra. In earlier days rice could be afforded by rich peasants only, but in recent years enough rice is available for even poor people to have one rice meal a day. The income from the cash crops has enabled a lot of the people to take to modern fashions in food and dress. Coffee and tea which used to be a luxury in this region till recently are becoming common drinks. These changes are noticeable even in the interior villages and hamlets.

There has been very little change in the economic life of the tribals. They are still keeping up their traditional way of life. The nomadic Yanadis, like their Chenchu brethren of the Kurnool and Mahabubnagar districts, generally obtain their food by digging out wild edible roots and tubers, and by collecting fruits and honey close to their settlements. They use iron-tipped digging sticks for this purpose. In spite of long contact with Hindus they have not taken to plough. Many members of this tribe are working as watchmen, farm-labourers, scavengers, stone masons or bricklayers, while some work as pounders of rice or domestic servants. While writing on the Yanadi economy Raghavaiah (1962:254 - 5) narrates that "he (Yanadi) is essentially a food-gatherer, but unlike the Chenchu long long ago ceased to be a hunter and has not yet reached the elevation to the status of a pastoralist. Among his essentials, land has no place or value and left to himself he would prefer doing away with it entirely so far as his requirements are concerned. It is with enormous difficulty and in no case out of free will that he could be induced in these enlightened times to take to the plough though he is right in the midst of prosperous ryot population." Their economy is supplemented by occasional rearing of poultry. At times Yanadis breed dogs which assist them in small hunting activities. Whatever may be the ways and means of the economy of Yanadis, they store no surplus food stuffs for morrow and thus lead a hand to mouth life. The Sugalis, who never mix with other tribes, chiefly live on cattle-keeping. Also several of them work as wood-cutters, carriers and day-labourers. Thurston (1909: 232) mentions that a few members of this tribe practise dacoity under the direction of their Naik or headman. Settled Sugalis took to agriculture. The Yerukalas subsist by basket-making while their

women go from house to house as fortune tellers. They rear pig and make money by selling them. Recently they have taken to begging also.

The dress of the Hindus is simple; it comprises a 'Dhoti' and a shirt or 'Kurta'. The women are dressed in a "Chira" (sari) wrapped from the feet to the waist and "Ravika" (bodice) covering the upper portion of the waist. The Kannada speaking ryots wear short trousers in place of dhoti and thus are easily distinguished from the Telugu speaking people in dress. The Muslims usually wear long trousers though dhoti is not completely unknown among them.

Even the dress pattern of the aboriginals has been greatly influenced by that of the Hindus due to the rapid development of communications. Raghavaiah (1962:61) describes the dress of Yanadis as under: "Men and women do not wear shirts or jackets as most of the north Indian Adivasis do and men generally go bare exposing the upper parts of their bodies. The women wear long pieces of plain or coloured cloth wrapped around the bodies in one or two folds, one end of the cloth being passed over the breasts and shoulders." Men's dress consists of a rag of cloth called 'gochipata' (in Telugu), of about 90 cms. length and 30 cms. width which is passed between the legs, covering the private organs in such a way that the ends of the rag hang infront and behind from out of the waist-thread. This pattern of dressing is analogous to that of the Hyderabad and Kurnool Chenchus (Haimondorf 1943:24), who, according to Taylor's report, in the fifties of the 18th century were dressing themselves in leaves which have been replaced by loin cloths in men and "chira" (Sari) and "Ravika" (bodice) in women after a lapse of about half-a-century (Thurston 1909:3). Same is the case with other tribes except for Sugalis whose women are comely in appearance and wear a colourful Rajasthani dress and ornaments by which they can be easily identified.

Marriages among the Hindus are usually endogamous. Though an upper caste man might be permitted to marry a girl from a lower caste, the opposite is never allowed. However, in recent years cases of the opposite type of marriages are taking place. As per the 1961 census the percentage of married women, including widows, is higher than that of married men.

Marriage customs among the tribals are mostly traditional though in recent years these are in certain respects domineered by those of their neighbouring Hindus. As a rule marriage is within the tribe but outside one's own clan. Marriage outside one's own tribe is prohibited and this prohibition is strictly enforced by the tribal elders. Thurston (1909:423) elucidates the Yanadi marriage as follows: "The parents rarely arrange marriages, the parties concerned marrying for themselves. Maturity generally precedes marriage. Seduction and elopement are common occurrences, and divorce is easily obtained. Adultery is no serious offence; widows may live in concubinage; and pregnancy before marriage is no crime."

Monogamy is the commonly accepted system of marriage by all tribes though polygamy is also permitted, but is rarely practised. However, polygamy is sometimes practised by Yanadis (Raghavaiah 1962:148) like the Hyderabad Chenchus (Haimondorf 1943:42). It freely takes place among Sugalis (Thurston 1909:224). Bride price in some form or other exists in all the tribes. Majority of tribal girls do have premarital sex relations with young men, who, when detected, as a rule, have to marry the girls. Unchaste women are frequently turned out of the tribal society. Unlike Hindus, widow marriage is permitted by all tribes but it is not strictly practised. Remarriage of widows is quite common among Yanadis, Sugalis, Reddi Dhoras and Koyas but in other tribes though this type

of marriage is permitted, but is not very common. Siraj Ul Hassan (1920:189) reports a strange form of marriage of Hyderabad Yerukala girls to temples, and sometimes to trees as well as to daggers as a fulfilment of their vows. Such girls, Hassan observes, would turn to prostitution. The Yerukalas in some parts of south-western Andhra Pradesh also practise this type of marriage.

The religious life of the tribals is largely ascribed to "animism", which, in the words of Majumdar (1965:423) is "the belief in the malevolent spirits and powers which influence the destiny of man." Any sickness or calamity in a tribal family is attributed to the malevolent action of spirits. The tribals thus have deep faith in supernatural powers.

Various tribes worship various deities. Yanadis' popular house-hold god is 'Chenchudevudu' who is believed to look after the welfare of the tribe. Their local deities include Poleramma or Ankalamma, Subbarayudu (snake god) and others. The Yanadis though they worship the Hindu mythological gods like Sri Rama and Sri Krishna and Lord Venkateswara of Tirupati hills are absolutely ignorant of the intricate views of the Hindu religion (Raghavaiah 1962: 363 - 4). The chief deity of Sugalis is 'Kalikadevi' to whom they offer sheep and goats once a year. Like Yanadis they also worship Balaji of Tirupati and Poleramma or Ankalamma of the local area. Yerukalas worship goddess 'Ellamma' who is offered pigs, fowl and goats on festive and other important occasions. They believe other Hindu gods but are strictly prohibited to enter the temples. The tribals, in majority name their children after various gods and goddesses. It therefore appears that in the near future at the climax of acculturation the popular Hindusim would completely but slowly replace the tribal religions.

The system of burying the dead in the south-north orientation, an existing custom among all the Hindus, excepting Brahmins and Vaisyas who cremate, is known to all tribes. Siraj-Ul Hassan (1920:26&193) reports that the Sugalis and Yerukalas of the Telangana region in Andhra Pradesh usually burn their dead though bury occasionally.

The houses of the Hindu folk are built of mud and stones with certain plan and regularity. The walls bear no windows but roof is provided with a small opening to let through air and light pass. The cattle are tethered in a part of the living house only. Wealthy agriculturists set up separate sheds for cattle.

Unlike the Hindus, the aboriginals live in small huts of usually circular but sometimes rectangular plan. The huts are mostly one roomed with a small entrance. The walls are made of wattle plastered with mud, and the roof is thatched.

Education among the Hindus is progressing at great speed while among tribals it is virtually unknown. Majority of them work as agricultural labourers while others earn their bread by working in household industry, mining, quarrying, etc. Unlike the Hyderabad and Kurnool Chenchus, who are still at the palaeolithic level of life, the tribes of this region mainly Yanadis, Sugalis and Yerukalas have settled in rural areas and are hardly recognisable as primitives though they still have their own way of life.

CHAPTER III

PRESENT EXPLORATIONS IN THE REGION

A : Explorations

In chapter I, an exhaustive survey of the past explorations and excavations in the region and its neighbourhood has been made. With the clues left by earlier scholars, especially Bruce Foote, an intensive and systematic exploration of the region was undertaken by the writer. While doing so, almost all the sites discovered by Foote have been revisited and collections of artifacts made from them to make the study as comprehensive as possible.

Generally, the sites, particularly neolithic, are confined to feet, slopes, or tops of high castellated granite hills, as characteristic physiographic feature of the Deccan, where rock-shelters to live in and raw materials in the form of trap dykes to manufacture tools were available.

The area on the Tungabhadra river bank as well as on other rivers, where mostly mesolithic sites have been found, is a vast plain country devoid of any hills or hillocks. As such, the sites are only open air sites on plain ground most of which is now under cultivation, thus causing unavoidable destruction and irreparable loss to archaeological wealth. The topography of the area is indistinct and inconspicuous, thereby differing in its nature from the rest of the region. The sites on the river bank have a mixture of river silt known as 'chavudu' in Telugu which means saline soil.

In the following pages is given a detailed list of the sites, their geographical location and the number of artifacts collected at each. On the basis of the study of their material evidence and field observations, all the sites have been conveniently placed under their respective cultures– Mesolithic, Neolithic and Megalithic. Explored ashmound and iron-smelting sites have also been described. All the sites, including those of Foote and others, have been plotted on the map of the region (Fig. 2).

B : Description of Mesolithic sites

(1) *Anantapur (ATP):*

The site lies a little west and south-west of the Police Training college on the right bank of a seasonal stream called 'Nadirni Vanka.' It yielded 42 artifacts comprising three flake cores, eight blade cores, three flakes, 17 chips, seven unretouched blades and four microliths.

Bruce Foote(1916:105) had reported site in this area but whether his collection came from the spot as the writer's, is not clear from his description.

(2) *Bogasamudram (BSM) :*

It is a village about 13 kms. north of Tadipatri town. The site is about half-a-kilometer east of the village in the inam land of Sri Anjaneyaswamy of Bogasamudram, on the right bank of

a perennial stream called 'Bugga Vanka,' a tributary of the Pennar river. The present collection comprising 221 pieces includes three chunks, eight flake cores, 53 blade cores, 22 flakes, 26 chips, 48 unretouched blades and 61 finished types.

This site was first found by Bruce Foote (1916:104) who did not give its exact location and treated the site as an unimportant one. The site is proved to be fairly extensive occupying an area of about eight to ten acres of land by the side of the stream.

(3) *Chinnakothaliki (CKL)*[1] :

This is a small village on the bank of the river Tungabhadra about 46 kms. north-east of Adoni. The site occupying an area of about five acres is about one km. to the east of the village on the river bank. It yielded a total of 117 artifacts of which 71 are waste products, eight unfinished types, six utilised types, and 32 finished types.

(4) *Dorigal (DGL)* :

It is a small village situated on the northern bank of Maddileru river, about 64 kms. south-east of Anantapur town and about ten kms. north-west of Anantapur-Madanapalle road.

The site lies seven-and-a-half km. south of the village on the western side of the Mudigubba-Dorigal road. It yielded 55 artifacts of which 28 are waste products, nine flakes, 12 unretouched blades, two microliths, two borers and two scrapers. Efforts made to locate Foote's (1916:106)site on the syenitic Kotikonda, from where he collected two neolithic flakes and a bead, did not succeed.

(5) *Gurzala (GZL)* :

This village is located right on the bank of the river Tungabhadra about 49 kms. north east of Adoni and about three kms. east of Nagaladinne neolithic site. The site is a few metres east of the village on the Tungabhadra river bank.

Foote (1914:88, Nos. 1451-1 and 2) collected two fluted cores of agate and chalcedony and a large quantity of red slipped potsherds. Later Subbarao (1949:94) visited this site and collected two cores of jasper and a large quantity of red slipped ware with grooved rims. He compares this pottery with that found at Sanganakallu and Brahmagiri in the megalithic and early historic periods.

The site yielded only 50 artifacts of which 30 are waste products, seven unfinished types, nine utilised types, one obliquely blunted blade and three scrapers.

(6) *Johrapuram (JPM)* :

This is a small village on the Tungabhadra river bank about 48 kms. north-east of Adoni. The site is about half-a-kilometre to the west of the village. Five specimens were found at this site out

1. This and a few other sites are in the revenue jurisdiction of Adoni taluk of Kurnool district. The rest of the sites unless otherwise mentioned are situated in the district of Anantapur.

of which two are flakes, while the other three, include a flake core, unretouched blade and a side scraper.

(7) *Kolimigundla (KGL) :*

This village is about 60 kms. south of Koilkuntla town in Kurnool district and about 29 kms. north-east of Tadipatri.

The site is an open rocky strip of waste land, with a sparse growth of stunted shrubs, lying about half-a-kilometre south of the village on the Koilkuntla-Tadipatri road. It occupies a large area and yielded 162 artifacts of which 81 are waste products, three unfinished types, 21 utilised types and 57 finished types.

(8) *Madhavaram (MVM) :*

The village is about 42 kms. north-east of Adoni town and half-a-kilometre south of the Tungabhadra river.

The site is located about one-and-a-half km. to the north-west of the village in an uncultivable patch of the saline soil in the midst of the wet lands of black soil. It yielded 53 artifacts. Of these 35 are waste products, 15 unfinished types, one utilised blade and two finished types. Part of the site is now under cultivation.

(9) *Mantralayam (MLM) :*

Also spelt as 'Mantasala' in the Adoni taluk map, this village is situated on the right bank of the river Tungabhadra, about 52 kms. north-east of Adoni town.

The collection comprising 37 artifacts of which 22 are waste products, seven flakes, and eight scrapers comes from the east and west of the village over a stretch of about two kms.

(10) *Muchukota (MKT) :*

It is a village situated about 16 kms. south of Tadipatri and about 37 kms. north-east of Anantapur on the Anantapur-Tadipatri road. The place is known for its rich barytes deposits.

The site, located a little north-west of the village at the foot of a hillock, was first discovered by Foote (1916:104-5) in 1890, who called it a 'flake factory.' The present collection comprising a total of 216 artifacts includes 117 waste products, 11 unfinished types, 36 utilised and 52 finished implements.

(11) *Peddakothaliki (PKL) :*

This village is about a kilometre west of Chinnakothaliki (S. No. 3 above). In between these two villages flows a seasonal stream called 'Peddakothaliki Vanka' into the river Tungabhadra. The village is located over an ancient ruined fort.

The site is situated on the Tungabhadra river about half-a-kilometre east of the village. Only 16 artifacts -11 waste products, threee unfinished types, and a scraper were collected from this site.

(12) *Rayachoti (RCH) :*

This small village is about four-and-a-half kilometres east of Gurzala (see page 18 S.No. 5 above). The site is located on the right bank of the river Tungabhadra about a kilometre west of the village. Subbarao (1949:95) reported a core of chert and a few flakes from this site.

The present collection comprises 51 artifacts of which 28 are waste products, nine unfinished types, four utilised types and ten finished types.

(13) *Tadipatri (TPT) :*

This is a taluk place with a population of about 20,000 people and lies about 53 kms. north-east of Anantapur on the southern bank of the Pennar river. The site lies about one-and-a-half kilometres east of the great temple of Sri Ramalingeswaraswamy on the Pennar river. Here 16 artifacts comprising nine waste products, four - two - each-utilised flakes and blades and three finished types were found.

Foote (1916:100-1, Pl. 48, No. 2055-88; Pl. No. 205ɔ-1 and Pl. No. 36, 2055-15) had found highly decorated and painted pottery belonging to post-neolithic period but his site could not be located in the present exploration.

(14) *Udripikonda (UPK) :*

The village, named after a big fortified granite hill, located a little to the north-west of the village, lies about 34 kms. north-west of Anantapur town on the road to Bellary. The site is about a kilometre south-east of the village in a locality called 'Musalamma Chenu' close to the southern bank of a perennial stream called 'Marri Vanka'. Here 71 artifacts were collected of which 30 are waste products, 19 utilised flakes and blades, and 22 finished types.

C : Description of Neolithic sites

(1) *Adoni-east (ADN-E) :*

Adoni, the largest town in Kurnool District, is situated about 94 kms. west of Kurnool town. Robert Bruce Foote (1916:32) visited Adoni hills and collected a few potsherds.

The present site is about a km. east of Adoni town on the right side of Adoni-Yemmiganur road just opposite the college site (now under construction) on the top of the Fateh Mahal hills. The site consists of a vast plain surface running 43 metres (S-N) in length and 21 metres (E-W) in breadth and exactly similar to the made ground on the top of Sanganakallu - Sanarasamma hill. The site is not very extensive and yielded 50 ground stone tools, 103 microliths and one unburnished greyware potsherd.

(2) *Akkammakonda (AKK) :*

It is a steep granite hill about two kms. north-east of Kalyandrug town (S. No. 16). The name 'Akkammakonda' is in vogue due to the hill goddess 'Akkamma' residing at the north-western foot of the hill.

The eastern, western and northern slopes of the hill yielded 60 ground stone tools and 4 microliths. Besides, five saddle querns were noticed. Many specimens are in a broken state. There are habitation deposits at the eastern foot of the hill opposite a deep gorge.

(3) *Andepalli (APL) :*

It is a hamlet of Kambadur village about 22 kms. south east of Kalyandrug on the road to Pavagada. About a km. east of the village and a little east of Ramappakonda, the area between the two halves of Durgammakonda and the western foot of its southern half retain neolithic habitation deposits and above them traces of iron age. The made grounds are mainly confined to the northern foot of the southern half and southern foot of the northern half. Forty-nine ground stone tools, three microliths and two neolithic and nine megalithic potsherds were collected from this site. Six saddle querns were also located here.

(4) *Budagavi Hill (BGH) :*

This hill is locally called 'Peddakonda'. The village is at the southern foot of the hill about 55 kms. north-west from Anantapur on the high road to Bellary. All the hill slopes except the eastern one and the top of the hill yielded 176 neolithic implements and 51 microliths along with two potsherds of blotchy grey ware and five of dull red ware. Thirty-one saddle querns of various sizes were also located. There are habitational deposits on the top of the hill.

(5) *Buthamahal Hill (BMH) :* (Foote's Budihal Hill)

This is a castellated granite hill, full of natural rock-shelters, lying half-a-kilometre south-west from Budagavi hill on the western side of the Anantapur-Bellary road. It was visited by Foote (1916:98) first.

The eastern and northern slopes and the top of the hill yielded 74 ground stone tools and eight microliths along with 12 potsherds of burnished and unburnished blotchy grey ware, and dull red ware. Nine saddle querns were also noticed during the exploration.

(6) *Chetnepalli (CHP) :*

This village, also known as Chetnepalli, is about 48 kms. north-east of Adoni town. The site is located at two localities on the right bank of the Tungabhadra—about one km. north-east and the other about one-and-a-half km. north-west of the village. The former locality of the site is richer in antiquities than the latter one. The two localities yielded together 320 artifacts of blade industry along with one rubber, one hammer stone and six flakes, one neolithic and 25 megalithic potsherds.

(7) *Chinnadandukonda (CDK) :*

This is a small granite hill situated a few metres to the north-west of Peddadandukonda (S. No. 26). The southern slope and the top of the hill yielded five ground stone tools and 30 artifacts of blade industry.

(8) *Donekal North-East (DKL-NE) :*

The village is about 20 kms. west from Guntakal junction on the road to Bellary. The site is about a km. north-east from the village. The antiquities collected from this site comprise nine ground stone tools and two microliths.

(9) *Gadekal South-West (GKL-SW) :*

Gadekal village is about 15 kms. north-west of Guntakal junction and about 53 kms. south-east of Bellary on the Bellary Guntakal road.

The site is on the top of a granite hillock a little to the south-west of the village. The site yielded 44 ground stone artifacts and a solitary flake of chert but no evidence of habitation deposits. Two saddle querns were located on the top of the hillock.

(10) *Gadekal North-West (GKL-NW) :*

It is a little to the north-west of the village, almost at the foot of a granite hill. The southern and eastern foot of the hill was fully occupied. There is a habitation deposit of about three metres thickness which is made up of both neolithic and historic periods. Eighteen ground stone implements were collected from this site.

(11) *Gulapalayam (GPM) :*

The village is located at the western foot of a big fortified granite hill about nine kms. south-west from Guntakal junction and about 22 km. north-east of Uravakonda, a little east of the road to Guntakal. The hill runs N-S for a km. and links Konakondla and Gulapalyam villages. The habitation deposits at the western foot of the hill run all along its length. Much of the deposit has been destroyed by the farmers to extend the area of the cultivable land.

The site yielded 80 ground stone tools, two blade cores along with 23 potsherds of blotchy grey, dull red, red-and-black and red slipped wares and two ground discs of dull red ware. Seven saddle querns were also noticed at this site.

(12) *Hattibelagallu (HBG) :*

It is a village about two-and-a-half km. south of Alur town. The site is about one km. to the west of the village on the top of the granitoid hills.

Foote (1914:76, Nos. 1357-59) had collected three neoliths from this site. Some members of the Archaeological Survey (*IAR* 1958-59:11) also collected neolithic celts and a few sherds of megalithic black-and-red ware but they wrongly reported the location.

The present collection includes 71 ground stone tools and 58 artifacts of blade industry besides two beads of steatite and 14 sherds of grey and dull red wares. Seven saddle querns were noticed on the granitoid boulders. There are habitation deposits at several spots on the hills.

(13) *Havaligi (HVG):*

The village is about 67 kms. north-west of Anantapur. The site is an isolated granite hill located close to the north-east of the village. This was first discovered by Foote(1916:101-2) in 1890.

The site yielded 108 ground stone tools and 13 microliths along with 30 neolithic and two megalithic sherds. The middle and eastern parts of the hill had a number of small, deep oval querns made on big flat granite boulders. Besides,16 loose and big saddle querns were noticed at this site.

(14) *Hulikal (HKI) :*

It is a village about ten kms. north-west of Kalyandrug and about two kms. west of the Kalyandrug-Rayadrug road.

The northern and southern foot of Mallappakonda, lying about a km. east of the village and close to the west of the road, have thick habitation deposits. The slopes and foot of the hill on all sides except on the east yeilded 159 ground stone tools and six artifacts of blade industry along with 36 potsherds of grey, and dull red wares. Besides, 15 saddle querns - some of them broken - were noticed at this site.

(15) *Idukal (IKL) :*

Idukal, a hamlet of Yatakal village (S. No. 35) is about six kms. north of it and about five kms. west of Kalyandrug. About one - and - a - half kms. south-east of the village there is a granite hill merged with another hill of Mangampalli village jurisdiction. The south-eastern foot and slopes of the hill facing the other hill through a gorge yielded 48 ground stone tools, 19 implements of blade industry and two grey ware and one black-and-red ware sherds. Four saddle querns were also located. Besides, many large rock-shelters suitable for habitation were noticed.

(16) *Kalyandrug fort (KDG-F) :*

The town of Kalyandrug is at a distance of about 53 kms. south-west from Anantapur on the Anantapur-Rayadrug road.

The Kalyandrug fortified hill locally known as Uravakonda (Meaning village hill) is about half-a-km. to the west of the town. The eastern and western slopes of the hill yielded 17 ground stone implements.

(17) *Karakumukkala (KML) :*

This village is about six kms. south–south-west of Vidupanakallu (S. No. 32) and about five kms. north-north-west of Havaligi (S. No. 13). The granite hill bearing evidence of neolithic remains, is a little to the west of the village. Habitation deposits were found at three spots on the hill top. The site

yielded 17 ground stone tools and 15 artifacts of blade industry along with a few potsherds of grey and dull red wares. Three saddle querns were also located here in the exploration. Foote (1916:103) who first visited this site treated it as a moderately important one.

(18) *Katamdevudu hill (KDH) : (Foote's Kalamedevur hill) :*

It lies about 21 kms. south-east of Anantapur town and about the same distance north-west of Dharmavaram on the Anantapur-Madanapalle high road close to, and north-east of Sanjeevapuram a hamlet of the nearby Musthuru village. Here the southern foot of the hill retains traces of a neolithic settlement. On the surface are lying large quantities of trap flakes, probably the debitage of the neolithic stone industry, and pieces of iron slag suggesting a later occupation.

The foot and slopes of the hill yielded 122 ground stone tools and 461 implements of blade industry along with three beads, 32 grey and red ware sherds, three sherds of black-painted red ware and 25 megalithic sherds. The pottery is much communited like the broken artifacts. The habitation deposits occupying a vast area have been disturbed by digging. Ten saddle querns were also noticed at this site.

The hill, named after the god 'Katamadevudu', was first discovered by Foote (1916:102) who considered it as a very important site, an impression that is confirmed by the present exploration.

(19) *Kunduripi (KDP) :*

It is a village about 30 kms. south-west from Kalyandrug. The village and the fortified hill are named after the hill-goddess residing on the north-east top of the hill The hill, lying close to the north of the village is about 893 metres above the sea-level and is one of the highest points in Anantapur district.

The western foot of the hill left traces of a neolithic settlement over which thick deposits of later debris are lying. The slopes and foot of the hill yielded a total of 43 artifacts of ground stone industry and nine implements of blade industry along with two potsherds, one each of burnished grey and red wares. Two megalithic sherds were also collected. Further five saddle querns were located.

(20) *Lattavaram hill (LVH) :*

The village of Lattavaram is about 51 kms. north-west of Anantapur. A little south-west of the village is a semi-castellated granite hill, the western slope and top of which yielded 90 ground stone tools, 27 artifacts of blade industry and 21 potsherds of grey and dull red wares. The implements are ill preserved. Nineteen saddle querns were seen on the western slope of the hill. The site was originally discovered by Foote (1916:97-8).

(21) *Malapuram (MPM) :*

This village is about 68 kms. north-west of Anantapur and about two kms. south of Vidupanakallu (S. No. 32) on the Anantapur-Bellary high road. About a km. south-west of the village is a vast

plain ground surrounded by granite hills on all sides except the east. Here is a small ashmound(see for details under the heading 'ashmounds')in the vicinity of which 42 ground stone tools were collected. The neolithic habitation deposits have been succeeded by later periods.

(22) *Mallappakonda (MLK) :*

This is a small granite hill about 50 kms. north-west of Anantapur, a little north-west of Budagavi hill (S. No. 4) and exactly a little north of Buthamahal hill(S. No. 5) on the western side of Anantapur-Bellary high road. Only six ground stone tools were collected from this site.

(23) *Mudigal (MGL) :*

It is a village about five kms. east of Kalyandrug at the northern end of a big pointed granite hill called Uravakonda(meaning village hill). The western, southern and south-eastern slopes and foot of the hill yielded 45 ground stone tools five artifacts of blade industry and a number of neolithic and megalithic potsherds.

The southern foot of the hill throughout its length has neolithic deposits overlain by thick megalithic deposits rich in pottery.

(24) *Nagaladinne (NDN) :*

The village is situated right on the bank of the river Tungabhadra about 46 kms. north-east of Adoni town. It is an ancient place and has remains of a ruined fort.

The site was first visited by Bruce Foote (1914 : 85) who collected microliths out of made ground one km. to the east of the village. Subbarao (1949 : 93-4) also collected a number of artifacts of blade industry.

In the present survey, the artifacts were collected at three localities—Nagaladinne-1, about three-fourths of a km. east of the village in an uncultivated patch of river alluvium belonging to one Yemmiganuru Sannappa of Nagaladinne village; Nagaladinne-2 about one km. east of the village in an uncultivated 'chavudu' or saline inam land of Ramalingeswaraswamy of Gurzala village and the site lying in between the two streams, Vaddavasiri vanka and Mangali Hanumappa vanka; and finally Nagaladinne-3, located at a few metres to the west of the village similar to Nagaladinne-1 and 2 soil type land—all on the river bank of Tungabhadra.

The present collection from all the three localities has been treated as one for the sake of convenience. It includes a total of 180 artifacts of blade industry out of which 74 (41.11%) are finished types and the rest unfinished. No neoliths were found, but seven potsherds of grey and dull red ware were collected. Also 13 megalithic sherds were found.

(25) *Palavoy (PLY) :*

It is a small village lying about eight kms. south-east from Kalyandrug on the Kalyandrug—Dharmavaram road. About two kms. south-east of the village is a big and long granite hill, the western foot of which retains habitation deposits merged with four ashmounds. Forty-nine ground stone

tools and ten artifacts of blade industry along with grey, and red potsherds were collected. Besides three bone scrapers, one terracotta bull, a crudely made carnelian bead, a coin belonging to the Sri Satakarni period and plenty of black-on-red ware and megalithic sherds were the other interesting finds from this site. Atleast thirteen saddle querns were collected here during exploration.

(26) *Peddadandukonda* (*PDK*) (Foote's Jambuldinne hill):

It is a castellated granite hill lying at a distance of about 20 kms. north-east by north of Anantapur town, about three kms. east of Anantapur - Gooty road, and on the southern side of the Garladinne-Singanamala mud road and about a km. east of Jumbuldinne village. Foote (1916 : 105) made a small collection from the top and western slope of the hill.

In the present survey besides the top and western slope of the hill explored by Foote, the eastern slope was also found to be exhibiting traces of neolithic settlements. The site has yielded 37 ground stone tools and 107 artifacts of blade industry. There are several flat terraces on the top of the hill which Foote called 'linchets'. A solitary piece of burnished blotchy grey ware was also collected. Besides ten saddle querns were spotted.

(27) *Pillalapalli* (*PPL*) :

It is about 12 kms. north-west of Kalyandrug. About one-and-a-half km. north-east of the village is a big granite hill, the eastern foot of which preserves man-made grounds. The site yielded 69 ground stone tools and three artifacts of the blade industry. The number of axes far outnumber the other types and most of them are technologically in stage 1 suggesting it to be a factory site. Two potsherds of burnished grey ware were also collected.

(28) *Rayadrug* (*RDG*) :

It is 90 kms. west from Anantapur town situated on the western extremity of the taluk bordering the Karnataka state. The town, surrounded on all sides by a number of granite hills, is said to have derived its name from the stronghold on the rocky hill at the foot of which it is built.

The fortified hill called 'Yellammakonda' is to the west of the town the eastern slope of which in a small area yielded 11 neolithic implements. Subbarao (1949 : 87) had collected a ground flake celt behind the taluk office while he was in search of a dolmen reported by Taylor. He states that Wuchope collected two ground axes from Rayadrug.

(29) *Uravakonda* (*UK*) :

This place is about 53 kms. north-west from Anantapur town. The sharp pointed granite hill 60 metres high above the surrounding plain is almost in the centre of the village. The northern and western slopes of the hill yielded 43 ground stone tools, one short blade core and eight potsherds of grey and dull red wares. Two megalithic sherds were added to these finds. Besides, 13 saddle querns were noticed on the hill slopes. The site was first discovered by Foote (1916 : 103).

(30) *Vajrakarur (VKR) :*

It lies 58 kms. north-west of Anantapur and about 16 kms. south of Guntakal junction. This place is known for the occurrence of diamonds from a long time and hence the name 'Vajrakarur'.

The site is about half-a-kilometre west of the village on the surface of a small mound-like heap of stones, which Foote (1916:102-3) called a 'knoll', surrounded by agricultural fields. Eighteen ground stone tools and a chert blade were picked up from this site.

(31) *Velpumaadugu (VMG) :*

This village is situated at the northern foot of a round topped fortified granite hill about 73 kms. north-west by east of Anantapur town and about three kms. east of Vidupanakallu (S. No. 32). Foote (1916: 99-100) had made a small collection of artifacts from the fortified area.

The present exploration which extended to the east of Foote's site yielded 134 ground stone tools and 26 artifacts of blade industry. One carnelian bead, 27 potsherds of grey and dull red ware were further added to the above collection. Besides, 14 saddle querns were located at this site. There are thick habitation deposits at several places which are being continuously depleted by the recent diggings.

(32) *Vidupanakallu Fort (VKL-F) :*

The village is situated at about 70 kms. north-west of Anantapur town on the road to Bellary. The rocky hill lying close to the west of the village crowned with a fortification of post-neolithic date yielded 69 ground stone tools, 16 artifacts of blade industry and one potsherd. Five saddle querns were located on the western hill slope. This and the following site were first visited by Foote (1916 : 98 - 9).

(33) *Vidupanakallu West (VKL-W) :*

It is a little to the west of the pointed fort hill (S.No. 32, above). Bruce Foote (1916 : 99, No.1853) pl. 18 reports a palaeolith from this site, being the only specimen from Anantapur district.

The present exploration brought to light 22 ground stone tools and ten specimens of blade industry from the eastern face of the hill besides noticing three saddle querns.

(34) *Vitlampalli (VPL) :*

It is a hamlet of Hulikal village (S. No. 14) lying at about two and-a-half kms. south-west from it and about ten kms. north-west from Kalyandrug.

About a km. south-west from the village there lies a granite hill called 'Thimmappakonda' named after the hill-god, the eastern foot of which preserves habitation deposits of the neolithic period. Fifty-eight ground stone and eight blade tools were collected in the exploration. Also, eight saddle querns were located. The site is almost in jungle area with thick forest.

(35) *Yatakal (YKL) :*

It is a small village about nine kms. south-west of Kalyandrug on the road to Chitaldrug in Karnataka. A little to the south east of the village is a granite hill, the western face, the northern hill top and the foot of which yielded a total of 57 ground stone implements and 33 specimens of blade industry.

At a point on the western foot of the hill is a small thickness of habitation deposits. The northern hill top which is a plain ground appears to be man-made. As the top is sealed by lateritic gravel nothing can be said unless it is dug.

D. Ashmounds

For well over one-and-a-half centuries ashmounds of the Deccan have attracted the attention of many professional and amateur archaeologists. Though a number of hypotheses have been advanced as to their origin, no convincing explanation has yet emerged. A full discussion of this problem is dealt with elsewhere (Rami Reddy 1976), here only a physical description of the ashmounds found to date in this part of the Peninsula is given.

To date, over 60 ashmounds have been reported in Dharwar, Belgaum, Bijapur, Raichur, Gulbarga, Bellary and Chitaldrug districts of Karnataka and in Mahabubnagar, Kurnool and Anantapur districts of Andhra Pradesh. The following is a detailed list of the ashmounds (Fig. 2) discovered by me, including those visited by earlier workers, in south-western Andhra Pradesh. While describing, the location of certain sites is not given since it has already been mentioned earlier. For location of such sites, reference has been made here.

(1) *Andepalli* (For location see page 21) *:*

There are two ashmounds at this site, one at the north-western foot and the other at the western foot of the southern half of Durgammakonda.

The first one is a huge, roughly circular and undisturbed mound measuring about 50 metres in length, 45 metres in width and about four metres in height from the western ground-level. The second one is small, is in much disturbed state and hence its precise dimensions could not be recorded.

The surroundings of these mounds have yielded plenty of iron ore and slag besides a large number of animal bones, pottery–both neolithic and megalithic – and artifacts of pecked and ground stone industry.

(2) *Hulikal* (For location see page 23)

At the northern foot of Mallappakonda is situated a big, partly disturbed ashmound that merges into the habitation deposits.

The mound is roughly circular in outline measuring about 60 metres in length (north-south) and 52 metres in breadth (east-west), with a height of about six metres from the northern

ground level. It is now under cultivation.[1] This mound too has yielded iron ore and slag lumps besides a few neolithic artifacts.

(3) *Gudikallu (GKL) :*

This is a small village about 26 kms. north-east of Adoni and about three kilometres south of Yemmiganur. The granite hill, a little to the south of the village, has an old fortification.

The top of the hill with a big ashmound is locally known by the name 'Narriavulagattu'. Subbarao (1949 : 213), who visited the hill mentions a traditional belief that a large number of cattle were burnt here. The surface of the mound is strewn over with iron ore and slag pieces.

(4) *Kanchagarabelagallu (KBG) :*

It is a village on the bank of the Hagari river about 35 kms. west of Alur town in Kurnool district. The ashmound here was first discovered by Foote (1914 : 92; 1916 : 94) who describes it as oval in shape, measuring 70 paces by 40. He collected a polished celt, many broken rubbing stones and saddle querns on the mound, and on that basis assigned it to neolithic period. The vicinity of the mound is full of iron ore and slag lumps besides ground stone artifacts and pottery.

(5) *Lingadahalli (LHL) :*

This is a village about six kilometres north-west of Alur town and about 19 kms. south-west of Adoni. Bruce Foote (1914 and 1916: 93) describes the ashmound here as roughly circular in shape measuring 254 paces in circumference. The mound lies close to the village from where Foote collected many polished axes, and cores and flakes of siliceous materials and a few grey ware potsherds in the enclosure. The mound is very much disturbed and its surface is covered with iron ore and slag pieces.

(6) *Malapuram* (For location see page 24)*:*

This ashmound is only partially preserved owing to destruction largely by cultivation in recent times. The mound is about eight metres in length (S-N), six metres in width (E-W) and about one metre in height from the surrounding ground-level. The surroundings of the mound are full of iron ore and slag pieces besides neolithic implements and pottery.

(7) *Mallipalli (MPL) :*

A hamlet of east Kodipalli village, Mallipalli lies at about 12 kms. south-east by north-east from Kalyandrug and about three kms. north-east from Kalyandrug-Dharmavaram road.

About half-a-kilometre south of the village in a patta land on the southern bank of a perennial stream called 'Mallipalli Vanka' is a small ashmound of about ten metres' length, eight metres' width and about half-a-metre height from the ground-level. The vicinity of the mound did not yield any neolithic implements nor pottery except for a few dolerite and chert flakes. Huge vitrified ashlumps are scattered around the mound. Iron slag and ore lumps occur in the vicinity of the mound, and the local inhabitants say that it is an ancient iron-smelting place.

1. The mound is partly in the patta land of Sri Potturi Venkateswarlu and partly in Sri Ediga Ramappa's land, both of Hulikal Village.

(8) *Mudigal* (For location see page 25) :

The ashmound, which is as small as the above two mounds (S. Nos. 6 and 7), is situated at the south-eastern foot of the Mudigal hill besides the neolithic and megalithic habitation deposits. The mound is about 12 metres in length and about the same dimension in width. Since it lies on the hill slope, is partly cut by a cart-track and has got merged with the surrounding ground-level. Due to erosion and other causes its correct thickness cannot be estimated. The surface around the mound is strewn with iron ore and slag lumps.

(9) *Palavoy* (For location see page 25) :

There are four ashmounds of varying dimensions at the western foot of a huge granite hill. For convenience sake, they are designated ashmound I, II, III and IV.

Ashmound I : This is the northern most and the biggest mound and is well preserved. It is approximately circular in plan, measuring 83.05 metres in south-north direction, 76.20 metres in east-west direction, and has a height of about six metres from the western ground-level.

Ashmound II : This mound is located about 120 metres south of mound I. It is almost circular in outline measuring 72.40 metres in south-north direction and 72.00 metres in east-west direction. Its height from the western ground-level is about five metres. It extends right upto the foot of the hill, and is much disturbed.

Ashmound III : This is situated outside the patta land a little to the south-east of mound II. The mound is only partially preserved. It is circular in outline, and is about eight metres in diameter. As its height is in level with the surrounding ground, it could not be estimated.

Ashmound IV : This is the southernmost mound about 200 metres south of mound III and is close to the hill slope. It is surrounded on all sides by huge granite boulders and cactus plants which protect it from disturbance. The mound is roughly circular in form measuring about 50 metres in length and 47 metres in width. Its approximate height is four metres from the western ground-level. The north eastern portion of the mound is much destroyed by recent digging.

All the four ashmounds merged with habitation deposits. The surroundings of the mounds yielded lot of iron slag and ore lumps, animal bones, neolithic implements and pottery.

(10) *Suguru* (*SGR*) :

It is a village on the Hagari river bank, about eight kilometres north of Kanchagarabelagallu (for location see page 29) in Alur Taluk. The mound is small and flat, and lies about one km. south of the village. Foote(1916 : 94), who discovered it did not find any antiquities except a black potsherd.

(11) *Vantareddipalli* (*VRP*) :

A hamlet of Kambadur, this place is about four km. east of Andepalli ashmounds. The writer was informed by the inhabitants of Vantareddipalli that in the patta land of one Venganna, there is a big ashmound by the side of a small rocky knoll.

While exploring the south-eastern and south-western corners of Kalyandrug taluk in 1966, the writer had the opportunity of recording two ashmounds in the adjoining territory of Karnataka state though strictly out of the geographical limits of the present survey. They are here mentioned for the sake of historical record.

(12) *Nagalapuram (NPM) :*

This village is situated in the revenue jurisdiction of Pavagada taluk of Tumkur district in Karnataka state, about 32 kms. south-east of Kalyandrug town.

The ashmound is fairly large, roughly circular in outline and is situated at the foot of a granite hill locally called 'Kamilikonda', named after the hill-god Siva, residing on the hill-top. The top of the hill retains a vast plain surface which might contain habitational deposits. The vicinity of the mound is strewn over with iron ore and slag lumps besides neolithic stone artifacts and pottery.

(13) *Kolimipalyam (KPM) :*

The village Kolimipalyam (meaning 'smelting place') lies about 38 kms. south of Kalyandrug town and about six kms. from Kunduripi (for location see page 24) neolithic site. The ashmound proper is at the foot of a granite hill.

The word Kolimipalyam means a "smelting place" (kolimi= smelting; palyam=furnace). This, in the context of the finding of iron ore and slag pieces, would suggest the existence of an iron smelting industry in the past.

E : Iron Smelting sites

It is a known fact that the ashmounds of the Deccan are situated in areas which are geologically rich in iron ore. The occurrence of iron slag and iron-containing haematite fragments in the vicinity of these ashmounds is not uncommon, just as we see the existence of megalithic monuments and settlements directly succeeding those of neolithic at a majority of the sites.

Foote (1916 : 80-81) while surveying the Bellary district found an iron-smelting site by the side of a neolithic settlement on the north, or "Face" hill of Bellary, not far from Kupgal ashmound, where he saw iron slag and fragments of haematite of both rich and poor quality. He observes, "this haematite must have been brought by human agency, for there are no signs of geological formation on the hill from which the ore could have been washed down, and the nearest natural source from which it could have been obtained lies in the great haematite quartzite beds of the copper mountain located 8 miles to the south-westward. The assumption of the existence of an iron-making industry in this neolithic settlement is supported by the occurrence on it of a small pottery tuyere suitable in shape for the protection against direct flame action of the nozzle of a small bellows". He suggests, "I fully expect that if the made ground in this and around many other sites were turned over carefully under competent expert supervision many discoveries would be made illustrating more fully the status of civilization attained by the polished stone people and their probable direct descendants, the early iron people".

Yazdani and his assistant Khwaja Muhammad Ahmed (1938 : 19-21 ; 28-31), who discovered many neolithic sites in Raichur district also found by the side of a majority of these a number of ashmounds and iron smelting sites. Mr. Muhammed Ahmed mentions that at Maski in the horse-shoe shaped valley two smelting furnaces were successfully excavated. He says that crucibles and stones used by the smiths for sharpening the tools and pounding stones were found by the side of the above furnaces.

Allchin (1960 : 10) in his exploration in Raichur district found iron-smelting factories at a number of places. He makes mention of the Piklihal site and thinks that such spots would belong to the Medieval period.

In my explorations, I discovered at one point on the south-eastern slope of the Mudigal hill lumps of iron slag covered over and above a number of cylindrical furnaces or tubes made of brownish red murum mixed with earth. These signs indicate the ancient smelting activities, the significance of which is discussed elsewhere (Rami Reddy 1976).

F. Megalithic Monuments

The term 'megalithic monument' means any structure built of large undressed or roughly dressed stones erected commonly in memory of the dead. Unlike other pre - and proto-historic remains which are usually buried in the soil, many of the megalithic structures occur on surface mostly at the foot of the hills and hillocks.

There are several types of megalithic monuments. Of these, those found in our area are :—

1. Port-hole cists,
2. Stone circles,
3. Dolmens, and
4. Menhirs.

None of the sites possess all the four types.

(1) Port-hole cist

It is an underground structure, rectangular in plan, made of two long vertical slabs and one or two short horizontal slabs driven into the ground with a floor-slab and with or without a roof-slab. Then one of the side-slabs is pierced with a circular, semi-circular or trapezoidal hole. "The opening is called a 'port-hole'; and a cist with such an opening is called a 'port-hole' cist" (Krishnaswami -1949 : 43). About a portion of 8 cms. to 10 cms. of the cist is usually found above the natural ground level. This is the most common type in this region, as indeed all over the Deccan. Majority of the monuments described by Pelly (Taylor 1852 : 86) are port-hole cists. In Brahmagiri excavations a typical port-hole cist has been exposed (Wheeler 1948 : pl. LXXXI B).

When one of the sides or ends of a cist wants a slab, then the structure is called a cist with an entrance chamber. Subbarao (1949 : figs. 2 and 3, pl XXXIX) illustrates an exposed cist with a port-hole at Gallapalli and another cist with an entrance chamber at a Mallapuram both the places located in Rayadrug Taluk.

A number of cists were found by the writer at Palavoy, Thimmaganipalli and Mudigal. None of these cists has a covering slab, and very few have port holes. Port-hole with a circular shape in the eastern side-slab is the characteristic feature of the cists in this area.

The absence of roof-slabs in the majority of cists in this region suggests that these have been removed by the local folk for construction purposes as these slabs with their flat and almost smooth surfaces are ideal for flooring and roofing purposes.

The functional significance of the port-hole is interpreted in various ways. Its frequent occurrence at several places has been attributed to a common origin of the culture. Childe (1948: 10) says "it seems to me a highly specialised trait suitable for defining a generalized 'megalithic' culture if any such exist". But, somewhere (Childe 1947:208) on the basis of the furniture, he thinks that such monuments do not belong to a single culture. Wheeler (1948: 554) points to the relationship between these and similar other structures. He further envisages that port-hole at Brahmagiri was probably meant for dropping food and other offerings to the dead in the beginning, throwing light on its symbolic character.

Cists are burial plans containing human bones, polished red slipped pottery, a number of iron implements such as swords, spears and axes, and ornaments of gold and precious stones. Subbarao (1949: fig.1, pl, XXXIX) illustrates a cist from Brahmagiri containing a bundle of bones in its centre with pottery and other things put around. The orientation of cists is always east-west so far as this region is concerned.

(2) Stone Circles :

These are usually circular in fashion, sometimes oval or irregular, with several flat small and big stone slabs arranged vertically all round with or without a huge pit inside the circle. They were located at all the places where cists were found. Stone circles sometimes enclose a number of cists, menhirs but in no case dolmens have been seen except for those reported by Pelly in Rayadrug area. Also, Krishnaswami (1949: 38) reports a number of dolmens bounded by a single stone circle in Kerala State.

Some scholars think that the stone circles were used by the builders for exposing the dead body after the desiccation of which a few selected bones were isolated and ritually put in the cist (Wheeler, 1948: 554). It is not known what explanation can be offered when cists are found in stone circles, as is the case at Palavoy in Kalyandurg taluk.

(3) Dolmens :

These are roughly square or quadrangular in plan, consisting of several upright orthostatic slabs erected on the natural ground level to support a solitary flat slab of stone, which covers a space or chamber below it. A port-hole may or may not be present in a dolmen. Thus, dolmens differ from cists, which are underground.

The orthostats may be three in number erected on three sides as walls with one side open and the roof with a capstone. Two such dolmens were located in the present exploration, one at Palavoy about one-and-a-half kilometres west of Palavoy hill on the left side of a perennial spring, and the other on the highest point of Muthalabanda hillock situated right on the naturally formed granite rock. The former has its opening to the east while the latter opens to the north.

The writer had opportunity of recording a different kind of dolmen from the above in the vicinity of the modern grave-yard, a little north-east of Mudigal village. This dolmen has four side slabs one of which has a port-hole and the top with a roof-slab. The monument is oriented north-east to south-west and there is a circular hole made at the bottom of the north-eastern orthostat. This slab is almost broken completely retaining a portion of the port hole.

Pelly had reported several dolmens at Addaguppa, Mallapuram, and particularly in the 'Gallapalli Reserve Forest' area of Rayadrug taluk.

Dolmens unlike cists were probably built in memory of the dead but they were not the houses of a short-statured tribals as Taylor (1852:55-57) thought, nor were they the burying places of the dead. They must have been erected with a great religious significance. The sporadic occurrence of these monuments in Kalyandrug taluk suggests us to conclude that they were built in memory of a few important persons of particular community of the megalithic culture.

(4) Menhirs :

A menhir consists of a single dressed or undressed standing stone with its base driven into the ground. These monuments vary in height from small to big and are frequently oriented north to south.

They have been recorded at almost all the sites in Rayadrug and Kalyandrug taluks. Their occurrence at or near a burial spot shows their sepulchral character. Besides, menhirs may be commemorative also.

A great deal of our knowledge on these various types of stone alignments in this region and in the neighbouring Bellary, Raichur and Hyderabad districts has been recorded by the pioneer efforts of Meadows Taylor, Pelly, Fawcet and Francis since the early fifties of the 19th century.

With the clues left by these scholars the writer could bring to light a number of new megalithic monuments. These exist generally in a badly preserved state due to extensive cultivation of land. In the following pages is given the geographical distribution and description of the sites of these monuments in this region.

Anantapur District :

Dharmavaram taluk : In this taluk the following four places are reported to have the existence of megalithic monuments[1].

1. *Dhavadhhoolacondah* (Probably Davadulakonda) : Pelly, while giving the location of this village to the south-east of Dharmavaram did not mention at what distance the place is situated. Efforts made by the writer to trace this place could not be fruitful.

1. The description of these sites is adopted from a statement of C. J. Pelly appended to Taylor's "Notices of cromlechs, cairns & other ancient Scytho-Druidal remains in the principality of Shahpur", *JABBARS, IV*, 1852.

Pelly reports 104 structures, which he calls 'dwellings' at this place. They are nothing but 'dolmens' consisting of a single capstone supported by three side slabs, one on each side, as walls leaving one side open. The roof stones of these dwellings are missing and are reported to have been taken away by the merchants of the village for their houses.

(2) *Kondapooram* (Kondapuram):

This village was in the jurisdiction of the former Kodikonda taluk. Pelly unfortunately did not give precise location, and enquiries made to trace the village revealed that no such village exists today. Three dolmens, which Pelly calls 'structures', were circumscribed by a single stone circle, which he names 'dwelling'. The first dolmen consists of an enclosure of three upright stone slabs topped by another slab and leaving one side open. The second and third structures have an enclosure of four up right slabs and another slab on the top; while the second one also has a central aperture in one of the side slabs. Pelly adds,"It is said to be a pagoda of Panadawahs. On being dug up some iron nails and plates were found therein".

Krishnaswamy (1949 : 38) mentions the existence of a number of such dolmens bounded by a single stone circle at a place near Varadarappalli in the Palappalli reserve forest in the former Cochin state of Kerala. He defines them as 'multiple dolmens'.

3. *Moodhegulur* (Probably Mudegulur) :

This is a village to the south-east of Dharmavaram. Efforts made by the writer to trace this village both through the revenue records and local enquiries did not bear fruit. Pelly reports 580 dwellings from this place. All the structures are dolmens similar to those found at the previously mentioned sites.

4. *Poolair* (Possibly Puleru) :

The village lies in the south-east corner of the former Kodikonda taluk. The site here, too, could not be located in the present survey. A single dolmen was found at this site.

An extract of the Tahsildars recorded by Pelly (Taylor 1852 : 86) on the subject is as under : "It is said that human beings, dwarfs, called Gujaris, resided in these dwellings, that they were built with no other material but flags of stone, from fear of showers of fire, and that the beings were under a yard in stature. One or two of these buildings were dug up, but nothing was found. The dwellings situated near Dhavadhhoolacondah are without the flags that were placed on the top as roofs, they were carried away by the merchants of the village."

Gooty Taluk :

5. Guntakal : Guntakal is about 32 kms. and 60 kms. north-west of Gooty and Anantapur respectively, on the border of Bellary and Anantapur districts. The site, a little south of Railway Junction was first found by Foote (1916 : 103) in 1887, who collected a good number of neolithic implements from here.

Later, Cornelius Cadrew (Foote 1916 : 12, 103), the then incharge of the Railway Locomotive Workshops at Guntakal, who took keen interest in the work, excavated the 'barrows' and 'graves' which

yielded an excellent collection of pottery and iron implements. This collection was catalogued by Foote in 1901. Subbarao (1949:175–7), who also visited the place, out of curiosity but not as a part of his research, could not locate Foote's site. He, however, describes the pottery and iron implements recovered by Cadrew in his excavations. The iron implements mainly comprise flat celts with concave sides, meeting in a splayed cutting edge, arrow-heads (barbed) with tang, spears, swords, a dagger, javelin heads with tang and a bit for horse. Pottery divided into seven types consists of black polished, black-and-red and red slipped wares.

Kalyandrug Taluk :

All the sites save for one, Mudigal, described under this taluk are writer's new discoveries.

6. *Akkammakonda* (For location see page 21).

To the east of the hill in the fields were located a number of stone circles and menhirs. These monuments are facing destruction through cultivation or diggings for treasure by the villagers.

7. *Andepalli* (For location see page 21).

There are two megaliths here. These are situated—one each on the western slopes of the northern and southern halves of Durgammakonda. The megaliths consist of a solitary, undressed, long granite also erected in the centre around which were laid in a circular fashion a number of big and small granite boulders. These structures may be called menhirs bounded by stone circles.

All over the surface of the man-made deposits were found scattered plenty of iron slags and pieces of wheel-made pottery indicating the existence of an early iron age settlement.

8. *Hulikal* (For location see page 23).

There are a few menhirs on the eastern slope of the hill. The surface has yielded a good number of potsherds belonging to iron age.

9. *Mudigal* (For location see page 25).

The megalithic monuments here, particularly, port-hole cists were first recorded in 'Anantapur Gazetteer' (1905 : 175–6) ; followed by G.O.Nos. 975 Public, 4th Aug. 1913 : Annual Progress Report, Archaeological Survey Department, Southern Circle, Madras, 1912–13, 52–63 ; and G.O. No. 1321, Public, 23rd October, 1913 (Mis.) (not printed).

In the present survey, around one thousand megalithic tombs were located in the cultivated and uncultivated lands and as well in the modern grave-yard. These localities lie a little to the north and north-east of the village and close to the east, south-east and north of a hillock locally called 'Ramappakonda', after the hill-god of that name. The monuments comprise dolmens, cists, stone circles, cists surrounded by stone circles and menhirs. A few menhirs were also found in the fields to the south of Mudigal hill.

Of all the dolmens here only one is well preserved measuring 3.50 metres in length (SW–NE), 3.20 metres in breadth (NW–SE) with a height of about one metre. The north-eastern wall slab with a porthole has been partly broken (Pl. C., No. 2). The cists and dolmens are oriented north-west to south-east. Most of the structures situated in the field to the east of 'Ramappakonda' are gradually vanishing on account of continued cultivation of the land.

Mudigallu Satyanarayana Rao (1963 : 18 and 32) wrote a booklet in Telugu on the glimpses of Ramappakonda, the vicinity of which is full of megalithic tombs. Rao mentions a locally current tradition that these structures were the dwellings of a small statured people called 'gujaris' or 'lilliputs'-also popularly known by the name 'Aryamauryas'. These houses and their owners suddenly met destruction according to some, while some others believe that they were the graves constructed in memory of the dead.

Luckily a day before the writer's visit to the place, clearing of a stone circle in the course of ploughing a field yielded a large number of sherds of black polished ware and iron implements. A few potsherds from this find could be procured but the disposal of the iron implements was not disclosed.

The south and south-eastern foot of the Mudigal hill, on the southern edge of the village, retain thick habitational deposits containing pottery of megalithic period over a comparatively thin neolithic deposit. These evidences suggest that this site, if excavated, will throw light on life and culture during iron age.

(10) *Muthalabanda :*

This is a small granite hill about two kilometres to the north-east of Kalyandrug and a little north of Akkammakonda. A dolmen measuring $3.42 \times 2.71 \times 1.93$ metres with its opening to the north stands on a big bare granite rock at the highest point of the hillock. The approach path leading to the plains to the south-west of the dolmen is lined on both sides with huge externally tilting stone slabs. This indicates that the dolmen on the top of the hill has had considerably religious importance in the life of the iron age people.

To the east and north of the foot hill there are numerous cists.

The eastern slope, close to the grinding groove on a granite rock, yielded a crude stone axe and a rubbing stone.

(11) *Palavoy:* (For location see page 25)

To the south and north of ashmounds at the western foot of the hill were located ten stone circles, 11 menhirs and three cists. About 210 metres south of ashmound II, there is in a field a huge menhir of undressed granite measuring 3.20 metres in height from ground level and 2.55 metres in circumference.

(12) *Thimmaganipalli:*

A hamlet of East Kodipalli village, Thimmaganipalli is about a km. north of Palavoy village. A little to the west of the place and close to the east of a dome-shaped hillock in the patta land (Survey

No.26 and in area 65 acres) of Mr. P. Subba Rao of Kalyandrug town, there are 36 stone circles (of which four have been dug for treasure) and a few menhirs, and some cists. The four stone circles dug by the owner, Mr. Subba Rao, yielded some pots containing ash, husk and a few iron implements. Mr Rao, however, could not recollect the disposal of the antiquities found in the dig.

The biggest stone circle measures 14.40 metres east-west, 14.20 metres north-south, while the smallest measures 6.10 metres by 5.90 metres. These dimensions indicate that the stone circles are roughly circular on plan. One cist, which measures 1.84 metres in length and 1.24 metres in breadth is representative of most of the cists recorded and at Mudigal.

About one km. to the north of Thimmaganipalli, there is a row of standing granite slabs suggesting the view of a passage burial.

Rayadrug Taluk :

The western part of this taluk goes under the name Rayadrug-Brahmagiri area when it was in Bellary district of Karnataka. It includes the eastern part of Kudligi taluk of Bellary district. The whole territory is called the valley of Chinna Hagari, which is about 16 kms. east of Rayadrug town. The area round about the town within a radius of eight kms. contains nearly 1,200 megalithic burials. A statement on these burials prepared by C.J. Pelly, the then Collector of Bellary district was appended to a paper on megaliths by Meadows Taylor (1852, 1873 : 329). These structures were later described by Francis in 1904. Longhurst (1912–13) also wrote on the Kistvaens (port-hole cists) of the Rayadrug already included in the Gazetteer.

Subbarao (1949:78–86) who visited this area has already given a detailed description of the megaliths and their locations. Here only a brief description of each site found in Rayadrug area is given.

(13) *Addaguppa:*

The village is about six kms. south-west of Rayadrug. Five hundred and twenty-five megalithic burials were recorded by Pelly in the Addaguppa reserve forest area. He divided these structures into four groups. The first dolmen is similar to that of Kondapuram. This group includes 17 such structures. The second and fourth groups, consisting of 51 and 214 structures, have an enclosure of four upright stone slabs while the third group, comprising 243 structures, has only three upright slabs leaving one side open; but structures of all the three groups are without a top slab. Besides, one of the side slabs of the dolmens in the fourth group has got a port-hole also.

(14) *Gallapalli :*

This village lies about nine kms. south-west of Rayadrug town. Pelly recorded the existence of 200 structures and he divided them into four groups similar to those found at Addaguppa. Their group-wise distribution is as under: group (1) six, (2) 85, (3) 81 and (4) 28.

Many of these monuments were reported to have been dug by various Tahsildars and their excavations yielded bone splinters and potsherds (Francis 1904 : 296). Pelly states that the villagers

said that the monuments were the houses of the pigmies, called Moravandlu (Moriyas). Longhurst (1912-13 : 42) who visited these structures calls them "cell-tombs".

(15) *Mallapuram :*

The village is about six kms. north of Rayadrug and about nine kms. from Brahmagiri. Pelly recorded 485 megalithic tombs at this place. Three of these consist of four upright stone slabs and another on the top, and one of the side slabs with an aperture. The rest 482 tombs fall into the following four groups similar to those found at Addaguppa and Gallapalli : group (1) 18,(2) 48,(3) 132 and (4) 284.

(16) *Rayadrug :* (For location see page 26) :

Longhurst (1912-13 : 42) reports a big dolmen about a km. east-north-east of the Rayadrug taluk office. Subbarao (1949 : 87) could not locate the dolmen found by Longhurst, but, instead he picked up a ground flake axe. The writer, who also visited the place in 1966 did not see any dolmen at the reported spot. The exploration, however, resulted in the collection of some neolithic implements.

KURNOOL DISTRICT

Adoni Taluk :

(17) *Kosgi :*

Kosgi town is situated about 29 kms. north of Adoni and 14 kms. south of Tungabhadra. About one-and-a-half km. south of the town at the junction of three hills, captain Meadows Taylor (1851-52 : 55-57) found six megaliths. His description of these shows that four structures are dolmens (Taylor's Nos. 1, 2, 3 and 5) while the rest two (his nos. 4 and 6) include a cist and a stone circle respectively. All the monuments are oriented east to west. Usually, the southern upright slab possesses a port-hole. In one of these structures (No. 1), Taylor mentions to have found fragments of red and black pottery, and a small piece of kindled wood. He observes that four of the erections were small houses of a nomadic tribe, while the remaining two were their burying places. Monuments of similar structure were located at this site in the present exploration also.

CHAPTER IV

NEOLITHIC CULTURE I: PECKED AND GROUND STONE INDUSTRY

This study is mainly based upon a surface collection of 1908 artifacts of which 1187 (62.21%) are complete while the remaining 721 (37.79%) are broken specimens. Besides, 208 saddle querns were recorded on the surface at several sites but not collected as they were too heavy to transport. These and other implements were found at 34 sites, three in Adoni and Alur taluks of Kurnool district and the rest in Anantapur district.

The proportion of artifacts varies from site to site. The site of Budagavi hill yielded the largest number (176 specimens; 9.23%) of tools. This together with four other sites, Velpumadugu Katamadevudu hill and Havaligi consisted of 37.03 per cent artifacts in the total collection. Ten sites where the artifactual number ranges between 50 and 90, yielded 678 (35.54%) specimens. Another 422 (22.13%) artifacts were found at ten more sites where the total number exceeds 20, but below 50 at each. The remaining nine sites, whose artifactual yield is below 20 at each, consist of only 109 (5.70%) specimens. Table 1 furnishes the frequencies and percentages of artifacts from individual sites.

The raw materials, tool types and their manufacturing techniques are, with minor variations, similar to those already known from the adjoining Bellary and Raichur districts.

Raw Materials :

Igneous, metamorphic and sedimentary rocks were all employed for the manufacture of pecked and ground stone tools. The first group which occurs in the form of dykes, sills, etc. includes basic rocks ranging from very fine grained basalts to medium to coarse grained dolerites and epidiorites as well as amphibolites (also known as green stones), acidic rocks such as granites, granodiorites, epidote granites and pegmatites; and intermediate rocks such as diorites. The metamorphic rocks comprise finely banded micaceous schists, coarsely banded granite gneisses and a few siliceous rocks such as quartz. The last or the sedimentary group comprises only sandstones of medium texture belonging to arenaceous rock variety of the elastic group.

An analysis of the material given in table 2 shows that igneous rocks were the most favoured material. These account for 1891 (99.11%) specimens while the other two comprise only 13 (0. 68%) and 4 (0.21%) specimens respectively. In this group again dolerite/basalt constitutes the highest proportion (1441 or 75.52% specimens). In the descending order of frequency come epidote granite (177 a or 9.28%), granite (172 or 9.02%), granodiorite (62 or 3.25%), diorite (17 or 0.89%), greenstone (144 or 0.74%), pegmatite (8 or 0.42%) schists (6 or 0.31%), quartz (5 or 0.26%), sandstone (4 or 0.21%) and granite gneiss (2 or 0.10%) respectively.

An analysis of the material in relation to typology presented in table 3 shows that basalt was frequently employed by neolithic man for edge tools, such as axes, axe-hammers, adzes, chopper-chopping tools, chisels, scrapers, etc., and in making pointed tools such as picks or borers. It occurs every-

where, is hard and fine-grained, and lends itself easily to flaking. Other rocks were only rarely used in the preparation of these tools. Rubbers and saddle querns were mostly made on granites (114 or 69.51% specimens) though for rubbers coarse-grained dolerite (24 or 14.63%) was also used. For hammer stones coarse-grained dolerite (219 or 46.30%) was predominantly used, next in importance being the epidote granite (Allchin's and Foote's pistacite or pistacite granite). Foote reported corn-crushers (spheroid or discoid hammer stones of the writer) made on this rock from a number of sites in Anantapur and Bellary districts. Later, at Piklihal, Allchin (1960:85) found nearly half of his spheroid rubbers (actually these are only hammer stones) made of epidote granite. This wide-spread use of the rock was perhaps due to its green colour which attracted the attention of the stone age people everywhere in the Deccan. One hundred and sixty (33.83%) hammer-stones in the present collection were made of this material, thus confirming Foote's and Allchin's observations. Other rocks used in hammerstones, include granite (6.99%), granodiorite (6.55%), greenstone (2.32%), pegmatite (1.69%), diorite (1.48) and quartz (0.84%). But, in the case of sling stones, granite (31.65%)exceeds other rocks, comprising dolerite (22.79%), epidote granite (21.52%) and granodiorite (17.72%) of varying percentages. Another significant feature is the utilisation of a fine-grained variety of micaceous schist in the preparation of mace-heads or ring-stones. One mace-head was made on medium grained gritty sandstone. The soft and fine grained texture of these rocks must have been the main reason for their being preferred for the preparation of mace-heads. Unlike in the Karnataka(Allchin 1957: 322) neither axes nor any other types, excepting mace-heads mentioned above, were made from schist in our area. However, a single ground celt of gneiss from Bastipadu[1] on the left bank of Hindri river in Kurnool taluk has been collected by the writer recently.

Foote (1916 : 17, 36, 84, 89 and 102) considered the existence of dykes as the main reason for the location of celt factories on Kupgal hill and Gadiganuru in Bellary district and Katamadevudu hill in Anantapur district. The absence of similar dykes at Utnur (Allchin 1960:45) might be the reason for the non-occurrence of many specialised types of tools there.

Techniques.

The techniques involed in the production of ground tools have often been described (Foote 1916: 85; Subbarao 1949:142-3; Allchin 1957:323; 1960: 85-86; Sankalia 1964: 80-2). There are three techniques for different purposes at three different stages in the manufacture of a tool. They are (1) flaking, (2) pecking, and (3) grinding. Flaking was employed to give a rough shape to the stone block by direct percussion method. It was carried out with spheroid or discoid hand hammers. Pecking was resorted to for removing the projections and ridges produced during flaking. As pointed tools are of rare occurrence discoid or cylindrical hammers, as suggested by Allchin, have served this purpose. The third process, namely, grinding might have been done by rubbing the tools in rock grooves till the edge attained a good sharpness. Some (Foote 1916: 85; Sankalia 1964: 81-2) take polishing to be a separate stage though no different technique is involved.

The present collection exhibits all the three techniques and these are discussed at proper place in the following pages under the individual types.

1. About 18 kms. south-west by south of Kurnool town.

Typology :

The proposed typological classification based upon the presumed functions of the tools is detailed in table 4. The tool types include both whole tools and identifiable fragments. The description of each type and its technological characteristics is dealt with as under:

A. Axes. (775 specimens; 40.62%) Fig. 3, Nos. 1-12 and 14.

Axes constitute the most significant and major group of the pecked and ground stone industry. All, but two sites, namely, Chetnepalli and Chinnadandukonda, have yielded axes and this shows that they were an essential part of the technology of the neolithic folk. At five sites which yielded above 100 artifacts each, the percentage of axes ranges from 34.42 at Katamadevudu hill to 52.98 at Velpumadugu; and at ten sites where the artifactual frequency is between 50 and 100, the percentage of axes ranges between 14 at Adoni east and 57.97 at Pillalapalli. Another ten sites, with the artifactual strength ranging between 20 and 50 have the percentge of axes between 7.15 at Malapuram and 61.36 at Gadekal south-west. Among the remaining nine sites, each containing below 20 artifacts, the proportion of axes is between nil percent as at Chetnepalli and Chinnadandukonda and 38.89 per cent at Vajrakarur.

Of the total axes, 260 (33.66%) are complete in various stages of manufacture while the remaining 515 (66.44%) are incomplete. Among the broken axes, 139 (17.94%) are fragments of edges with butt and body missing. Of these, in 127 the edge is ground and in 12 flaked. Two hundred and nineteen pieces (28.25%) consist of butts only with body and edge missing; and in the case of 157 (20.25%) tools, only body is present without butt or edge. This analysis shows that two-thirds of the total axes are broken and this must have resulted due to prolonged use. The analysis of different categories of the state of preservation is given in table 5.

In discerning the general shapes of the axes, only complete specimens have been considered as it would be hazardous to make any conjectures on the shapes of the broken specimens. Of the complete axes, 247 (95.0%) are triangular in shape while the remaining 13 (5.0%) specimens include eight (3.1%) of sub-triangular and five (1.9%) of rectangular shape. The shape of the celts like that of other implements has been greatly influenced by the naturally formed joint planes in basalt. In the words of Foote (1916 : 59) " the celt-makers did not, except possibly in very rare cases, make their implements out of large pieces of freshly broken rock, but sought about on the trap-dykes, whence they procured their work material, for fragments of rock of suitable size and shape formed by convenient disposition of the joint planes, or shrinkage cracks set up in all igneous rocks when cooling from a highly heated condition. Such suitably shaped fragments of the rocks were of very great assistance to the stone chippers as they enabled them to form their several implements with very much less labour than if they had to reduce large pieces of freshly broken rock to the comparatively small size of the axes, adzes....."

The size of the axes shows considerable variation. The largest and smallest specimens measure 24.5×8.4×3.8 cms. (Fig. 3, No. 12) and 5.0×2.8×0.7 cms. respectively; while the mean measurements are 10.5×5.9×3.0 cms. For convenience, three groups have been recognized on the basis of size – small, medium and large. Those upto or below 7 cms. in length are small; those between 7 and 18 cms. are medium and those over 18 cms. are large. The number of specimens in the groups is 29 (11.15%), 224 (86.15%) and seven (2.70%). It will be seen that large and small axes are quite rare.

Three groups in breadth–as in length – narrow, medium and broad–have been made. Those upto or below 4 cms. are narrow; those between 4.1 and 7 cms. are medium and those over 7 cms. are broad. The number of specimens in these groups is 10 (3.85%), 213 (81.92%) and 37 (14.23%) respectively. This analysis shows that narrow and broad axes are of rare occurrence. Similarly, in thickness also three groups – thin, medium and thick –have been discerned. Those upto a thickness of 2 cms. are thin; those between 2.1 and 4 cms. are medium and those over 4 cms. are thick. The number of specimens in these groups is 52 (20%), 171 (65.77%) and 37 (14.23%) respectively. This analysis shows that thin and thick axes are very rare. The distribution of frequencies and percentages of axes into various length breadth and thickness classes are given in table 6.

Two classes are recognised in terms of the ratio of the length to breadth. The highest frequency (200 specimens; 76.92%) occurs where the length is less than twice the breadth while in the remaining axes (60 or 23.03% specimens) the length is more than, or equal to, twice the breadth. Similarly in thickness/breadth ratios, in nearly half the axes (126 or 48.46%) breadth is less than twice the thickness while those with more than,or twice the thickness comprise a little more than half the number (134 or 51.54%) specimens of total axes. Distribution frequencies and percentages into breadth/length and thickness/breadth ratio classes are given in table 7.

Table 8 shows the frequency distribution of weight classes of axes. Twenty-nine (11.15%) specimens weigh 100 grams or less. All these are small celts. The highest frequency comprisirg 179 (65.85%) specimens occurs between 101 and 400 grams. The frequency of those measuring between 401 and 1000 grams is 44 (16.92%). The lowest frequency (8 or 3.08%) of specimens lies in heavy axes weighing above 1000 grams but below 2000 grams. Thus, we see that medium weight axes are the most common, though light and heavy axes also occur at random. The use of these rare axes must have been restricted to specific needs.

On the basis of the shape of the butt four types can be recognised in the axes–pointed butt, round blunt butt, broad thick butt and broad thin butt. The number of specimens in these groups is 104 (40%), 57 (21.92%), 64 (24.62%) and 35 (13.46%). Axes with pointed butt form the highest frequency (104 or 40% specimens).

In majority (160 or 61.54% specimens) of the axes cutting edge is curved with slight or prominent convexity. Those with a straight blade comprise 64 (24.62%) specimens while in 36 (13.84%) specimens the blade is oblique.

The results of the transverse section taken at the butt, in the middle, and at the blade are tabulated below :

		Butt		*Middle*		*Blade*	
S. No.	*Section*	*Frequency*	%	*Frequency*	%	*Frequency*	%
1.	Oval	104	40.00	112	43.08	..	..
2.	Circular	40	15.39	9	3.46	..	..
3.	Lenticular	37	14.23	55	21.15	176	67.69

S. No.	Section	Butt		Middle		Blade	
		Frequency	%	Frequency	%	Frequency	%
4.	Plano-convex	32	12.31	52	20.00	67	25.77
5.	Rectangular	19	7.31	21	8.08	..	..
6.	Triangular	16	6.16	4	1.54	..	..
7.	Rhomboidal	9	3.45	..	..	..	..
8.	Semi-circular	3	1.15	7	2.69	..	..
9.	Truncated biconvex	..	..	..	..	17	6.54
	Total :	260	100.00	260	100.00	260	100.00

It is seen in the above table that oval cross section is most frequent at the butt and in the middle, while at the cutting edge lenticular section has the highest proportion. On the basis of these sections only three varieties of blades could be distinguished, while at the butt and in the middle the range is wide.

The axes were also analysed according to vertical or longitudinal cross sections which reveal that flat, oval or lenticular sections have the highest frequency (188 or 72.30% specimens). Next come the plano-convex (60 or 23.08% specimens) and concavo-convex (12 or 4.62 specimens) sections.

The material used for the manufacture of axes varies from very fine-grained basalts to medium to coarse-grained dolerites. Stray pieces of diorite, granodiorite, and schist have also beer employed but only occasionally. High grade grinding producing a smoothness all over the body has been reserved to fine-grained basalts. The material could be procured by man easily from the locally occuring dykes and sills in the form of fragments.

Among complete axes, only 12 per cent specimens are patinated while in broken axes nearly 30% are deeply patinated. Majority of broken axes show that they have been reworked and used heavily till they became finally useless and irreducible. Among complete axes nearly 4% have been reworked.

Nearly 50% of the axes appear to have been used for cutting and splitting operations while the rest are unused. But, in none of the used axes could be seen the striation marks produced by use, such as found by Nagaraja Rao and Malhotra (1965: 65) in Tekkalakota axes. These marks could not be detected even under a high power microscope.

In at least 15 axes, all made on flakes, only unifacial flaking is seen. Very rarely, however, the cutting edge is unifacially ground.

Classification of axes :

The first systematic classification of neolithic axes was done by Foote (1916: 21). He recognised 12 types on the basis of the form of the butt, blade, sides and thickness of the body. His type 9 axes do not occur in this region or even outside in the peninsula. Later on, Subbarao (1948: 33-5) distinguished

ten types of axes at Sanganakal. He, thus, includes axe-hammer, adze and chisel under axes though functionally they are different. Then followed the classifications of Worman (1949: 181-201), Seshadri (1956: 54) and Allchin (1957: 328-332; 1962 b : 311-14).

In the technique of making axes Foote (1916: 85) discerns four stages, namely, flaking, pecking, grinding, and polishing. Subbarao (1949: 143-4) and Sankalia (1964a: 79-82) retain the four stages recognised by Foote thereby treating 'polishing' as a separate stage. But, to the writer, fourth technique is only an effect of the elaborate use of the third technique. It is, thus, not an independent technique. Seshadri (1956: 54) recognises seven processes of making axes while Allchin (1960: 86) identifies only five technological processes and further divides them into three or four varieties. All the three techniques, save for pecking, occur individually as well as in combination on tools. Pecking occurs only in combination either with flaking or grinding.

The present collection of axes has been treated into one single type and then classified into three technical groups and several sub-groups on the basis of the amount and nature of work done on them. Table 9 gives the distribution of axes according to their techniques of manufacture at various sites.

I. Only flaked or flaked and pecked but not ground : (102 specimens; 39.23%) Fig. 3, (Nos. 1-2).

The word 'unfinished' could not be applied to these axes, as finely flaked specimens of these with a thin sharp cutting edge could have been directly used in cutting and splitting operations like any edge ground axe. They are present at 22 sites, of which Pillalapalli (27) and Velpumadugu (17) yielded the highest number of axes. The two varieties of this stage are (1) only flaked tools (36 specimens; 13.85%) and (2) flaked and pecked tools (66 specimens; 25.38%). Tools of the first variety (Fig. 3, No. 1) occur at 15 sites. More than half of these have been finely flaked and then used without employing pecking or grinding processes. The second variety (Fig. 3, No. 2) is present at 20 sites. In these axes the high ridged angles of the flake scars have been removed by pecking with a hand hammer or fabricator. The occurrence of a large number of hammer stones (Figs. 3 and 6) at all the neolithic sites supports the above assumption. This variety forms the second largest group in the axes.

II. Edge ground tools or tools with grinding over the edge : (122 specimens; 46.91%) Fig. 3, Nos. 3-5, 7 and 9.

These occuring at 28 sites, constitute the single biggest group of axes. In this stage the process of grinding over the edge is not uniform in all axes. The degree and extent of grinding is rather immeasurable. In some it is coarse, in others medium, while in a few it is fine and smooth. This has mostly depended on the texture of the selected rock piece.

There are four varieties in this stage :

(1) *Flaked and edge ground tools :* (17 specimens; 6.54%) Fig. 3, No. 3. These occur only at ten sites. The illustrated specimen resembles a modern hoe, or *khurpa* or *khurpi*. This could have been used by fitting its butt into a socketed wooden handle of circular section and by holding the cutting edge at a distance from the user who sits on his feet.

(2) *Pecked and edge ground tools :* (20 specimens; 7.68%) Fig. 3, No. 4.

These were found at eleven sites. In these axes no trace of flaking is observable. It may, however, be presumed that the sides and edges of the axes of this variety must have beer trimmed to some extent even though no trace of it now remains on the tool.

(3) *Flaked, pecked and edge ground tools :* (74 specimens; 28.46%) Fig. 3, Nos. 7 and 9.

This is the only variety that contains the largest number of axes, which represent the three basic stone-working techniques. The category is present at 23 sites. Some (Fig. 3, No. 9) of the axes of this variety resemble Subbarao's (1949: 147; Pl. XXX, Nos. 10-13) shoe last celts.

(4) *Only edge ground tools :* (11 specimens; 4.23%) Fig. 3, No. 5.

This is a variety of miniature celts found at six sites only. Neither flaking nor pecking marks are visible on these specimens. These would have been apparently made on waste flakes which resulted during the manufacture of medium and big sized axes.

III. Completely ground tools : (36 specimens; 13.84%). Fig. 3, Nos. 4, 6, 8, 10-12, and 14.

These occur at 16 sites. This group is divided into two varieties :

(1) axes ground all over but with a partially uneven surface (29 specimens; 11.15%), and (2) axes ground all over to a smooth surface (7 specimens; 2.69%). Axes of the first type (Fig. 3, Nos. 8 and 11-12) come from 15 sites of which Budagavi hill and Velpumadugu alone yielded ten specimens. The second (Fig. 3, Nos. 6, 10 and 14) is the smallest of all the varieties and occurs at six sites. The smoothness on the surface of the axes of this variety was possibly obtained by intense rubbing on another rock by adding an abrasive and water. To obtain so much smoothness would have required much energy and time, and this is why such tools are so rare. The highly polished surface is however only of aesthetic value and did not in any way lead to the efficiency of the tool.

As regards the process of grinding, Sankalia (1964a : 106-07) describes at length from his personal observations at Tekkalakota where one of his assistants made an axe on dolerite with a pointed butt and a sharp medial cutting edge with well-ground surfaces within six hours. He further hafted it into a wooden shaft by tying with a string and then used it to cut the trunk of a babul (*acacia*) tree. Within half-an-hour the axe, without becoming blunt, could cut 13 mm. deep into the trunk.

Grinding grooves :

The evidence to show how the axes were ground, particularly their edges, was first noticed by Foote (1887; 1914: 92; 1916: 87 and 117, pl. 62) in the form of rock grooves on the 'north hill' of Bellary town east of Helalagundi (Holalagondi) in Alur taluk of Kurnool district and at Pullayyagudda in the former Hyderabad State. Similar grooves were found by De Terra (1942) on a quartzite boulder at Burzahom in Kashmir, and later by Subbarao (1949: 144, Fig. 3, pl. XVIIIa) at the southern foot of Sanarasamma hill on an exposed boulder in the open fields.

In the present survey a solitary grinding groove was found on the northern slope of the Uravakonda pointed hill on the surface of a big granite boulder around which more than half a dozen saddle

querns were lying. Four more such grooves were found on the eastern slope of the Havaligi hill and a few on the western slope of the Lattavaram hill, both in the administrative jurisdiction of Uravakonda independent sub-taluk of Anantapur district. Three similar grooves, measuring 25 to 40 cms. long and 2 to 4 cms. deep, were noted at the western foot of the Palavoy hill close to the north of ashmound I on the top and western slope of a big granite boulder.

At all these localities, a number of water ponds and springs around, in the vicinity of grinding grooves, were also observed. This indicates that the neolithic man had made use of this pond water and some sand-like abrasive while rubbing the axes. The same technique is in vogue in sharpening the iron-axe blades among the present day village folk in this region.

Hafting of the axes :

We have no direct evidence as to how the axes were used by their makers or owners. They could either be held in naked hand or were hafted into some kind of handle and then used. Probably large axes were used by free hand because of their size and heaviness. Axes of medium and small size must have been fitted in shafts and used. But Seshadri (1956: 56) thinks that big axes could have been hafted and used.

Since no perforated axes have been found in India so far nor any material evidence showing the method of hafting, it is not possible to reconstruct the same accurately. Coghlan (1943) postulates a number of hafting methods for the European axes of which this 'club' haft (fig. 16) and 'slot' haft (fig. 12) methods suit the pointed butt axes of this region. Foote (1916: 86) also suggests the 'club' haft method for the Indian axes. Subbarao (1949: 152-3, Pl. XXXII, fig. 3) wrongly attempted to apply the 'spear-headed' type of hafting suggested by Foote (1916:173) for palaeoliths. Axes with plano-convex section would have been hafted adze-wise where the blade lies at right angles to the haft. Subbarao (1949: fig. 7, pl. XXXII) classifies such axes as 'shoe-last' celts and thought that they were hafted in adze-wise fashion.

B. Adzes : (4 specimens ; 0.21%) Fig. 4, Nos. 18, 27 and 32.

An adze according to Coghlan (1943 : 29) is "a tool for chipping or slicing away the surface of the wood. The cutting edge stands transversely, that is, at right angles to the handle. Its level is ground on the inner face only, while the entire outer face is slightly rounded." Petrie (1917 : 5) was the first to define adze and it was later adopted by Childe (1930 : 60–61) and others. It differs from axe in having a bevelled, central edge.

As the occurrence of adze-blades is very rare in this region and as well in the Deccan, no remarkable difference can be seen in the axe and adze-blades. Many of the unequally ground axes (Fig. 3, No. 9) with a plano-convex cross section are quite suitable for being hafted and used adze-wise. Adzes are common on the neolithic sites in Assam, Yunnan and South East Asia. Dani (1960 : 47–8) distinguishes them as faceted tools. According to him these are multipurpose tools. In South East Asia these are called "quadrangular adzes" (Reine Geldern :1928).

In Peninsular India, adzes were first reported by Foote (1916 : 124 ; pl. 6, No. 2655). He found a solitary specimen from the Wuttugallu neolithic site in the present district of Raichur, and identified it as the "polynesian type", utilised in agricultural activities. Foote (1916 : 20–21) recognised

adzes into two types, a short and a long one. His find belonged to the latter type. Wheeler (1948: 249, fig. 33) found a specimen of adze in the late phase of the Brahmagiri stone axe culture. Later, Subbarao (1949 : 149, pl. XXXI, Nos. 7–8) illustrated two specimens from Sanganakal; one of them is broken towards the butt while the other does not show any bevel at all. Allchin (1960 : 89, pl. 44, No. 11) also records a single specimen from Piklihal which he describes as having been ground unequally on the upper and lower faces of the working edge. Nagaraja Rao and Malhotra (1965 : 50–1, pl. VII b Nos. 8–9, figs. 27 a and c) illustrate two doubtful specimens from Tekkalakota.

The present collection of adzes comprising four specimens comes from three sites, one each from Adoni-East and Velpumadugu, and two from Hulikal. All, made on natural flakes, are of triangular shape excepting the broken one which could be rectangular. Three specimens are made on fine and medium-grained dolerites while the fourth one from Adoni-East, a lightly patinated specimen, is of diorite/granodiorite.

The biggest specimen from Velpumadugu, weighing 244.2 grams, measures 9.7×6.0×2.9 cms; while the smallest from Hulikal (Fig. 4, No. 32) with a weight of 26 grams, measures 5.7×3.4×0.9 cms; and the average piece with 143.1 grams, measures 7.8×5.3×2.3 cms. All the four adzes are plano-convex in vertical as well as horizontal cross sections. Their cutting edges are either straight or slightly convex.

Technologically, the adzes represent all the three stages. One specimen has been flaked and pecked and hence it is put in third variety of stage I. A broken piece from Hulikal (Fig. 4, No. 27) has been placed in fourth variety of stage II since it is only edge ground on both faces. The remaining two pieces, one from Adoni East and the other from Hulikal are identified as ground all over on the upper face with only edge ground on the flat surface. They belong to variety one of stage III.

C. Chopper-chopping tools : (25 specimens ; 1.31%) Fig. 5, No. 40; Fig. 7, Nos. 74, 76 and 79—81.

Choppers as well as chopping tools are core implements usually made on pebble or angular chunks of rock. The difference between the two types is that the former are unifacially worked tools, while the latter are bifacially flaked, the flaking in both cases extending along one side or end. Further, in choppers the cutting edge is steep convex or straight prepared by "free" flaking, while in chopping tools it is jagged, wavy resulting due to alternate flaking. Both the types are heavy and massive, and were utilised in chopping purposes. When the choppers are small in size Movius (1948 : 350) recognises them as scrapers. Chopper-chopping tools are characteristic of lower and middle Palaeolithic cultures but they persist in small numbers in later cultures as well.

The present collection contains 16 (64%) choppers and nine (36%) chopping tools. They occur at ten sites. The site of Adoni-East yielded the highest number of specimens (7 or 28%) of these tools. All the specimens are made of dolerite. Nearly half (48%) of them are in slightly weathered and stained greyish and reddish colours.

The technique involved in making these tools consists of anvil or block-on-block technique as a result of which deep flake scars are produced on the surface of majority of the specimens. Sometime controlled or step flaking is also employed. Both these techniques are found in the present collection

of choppers. In making chopping tools the technique of direct percussion or alternate flaking is employed, as a consequence of which a ziz-zag, wavy cutting edge is produced. For convenience, both the types are studied here individually.

Choppers : (8 specimens ; 0.42%) Fig. 5, No. 40.

These occur at five sites. Three of these came from Adoni-East, two from Budagavi hill, and one each from Buthamahal hill, Katamadevudu hill and Pillalapalli. In outline they are circular, semi-circular, quadrangular and rectangular, their shape being dependent on the natural shapes of the material used. They vary in size from 6.4 to 10.3 cms. in length, 6.1 to 9.2 cms. in breadth and 3.2 to 7.5 cms. in thickness. The average measurements are 8.3×6.8×5.0 cms. Their weight ranges between 177 and 1041 grams with an average of 390.2 grams. In cross-section they are semi-circular, triangular or plano-corvex. The cutting edge is convex in majority of the specimens.

Chopper-cum-point : (1 specimen ; 0.05%) Fig. 7, No. 76.

This is distinguished from choppers in having a pointed working end besides the chopping edge. Hence it is treated separately and its function as the name signifies must have been double. The only specimen of this type comes from Adoni-East site. It is made on a thick flake of dolerite and is slightly weathered. The specimen measures 10.1×9.8×4.8 cms. and weighs 428 grams. This tool must have been employed both for cutting and piercing purposes.

Chopper-cum-hammerstones : (7 specimens; 0.37%) Fig. 7, Nos. 74 and 79.

These tools are essentially choppers with an unifacial step cutting edge. They however also bear at one or more spots battering marks which suggest their use as hammer stones. The battering marks are at thicker end, side or face of the tools. They come from five sites, two specimens each from Indukal and Yatakal ; and one each from Adoni-East, Hulikal and Vitlampalli. Four are made on flakes while three are core tools. In general outline these implements are circular, triangular and rectangular with rounded corners. In cross sections they are roughly triangular, and sometimes rectangular or rhomboidal. In size they vary between 6.3 and 9.1 cms. in length, 5.8 and 8.4 cms. in breadth, and 3.4 and 6.6 cms. in thickness; while the mean dimensions are 7.8×7.0×4.6 cms. Their weight ranges from 12.78 and 545 grams with an average of 304.1 grams.

Chopping tools : (9 specimens; 0.47%) Fig. 7, Nos. 78 and 80–1.

These are found at six sites. In form they are rectangular, circular, triangular, oval and irregular. In cross section they are triangular, plano-convex, oval, lenticular, trapezoid etc. In size they vary from 6.3 to 10.5 cms. in length, 5.3 to 9.2 cms. in breadth and 3.6 to 5.3 cms. in thickness. The average dimensions are 8.4×6.9×4.4 cms. Their weight ranges from 178.8 grams to 756 grams. The average weight is 327.2 grams. Cutting edge is zig-zag, wavy in all specimens. Tables 10, 11 and 12 give frequencies and percentages of lengths, breadths and thicknesses; B/L and T/B ratios and weights respectively of chopper-chopping tools. Table 13 gives the site-wise distribution of chopper-chopping tools.

D. Core scrapers : (6 specimens; 0.31%) Fig. 6, Nos. 49 and 54 and Fig. 7, No. 75.

This category comprises tools made on pebbles and chunks of rock and not on flakes. Movius (1957: 151-2) takes the size of the tools into consideration and classifies them into choppers when they

are big, crude and massive; and into scrapers or small choppers when they are small. But the technique of manufacture, that is, the unifacial and unidirectional flaking continues to be the same in both cases, according to him. This description when applied to the present collection of scrapers under study does not appear to be of any use since these tools exhibit varied types of working. Thus, the working does not confine to one face and one side only but extends to both faces, sides, ends and even to the whole circumference frequently. Besides this, some specimens (Fig. 7, No. 75) have been secondarily worked to achieve a sharp-scraping edge. Dharani Sen (1954a : 5) replaces Movius' chopper/scraper group by his scraper group. He (1954b : 128; 1957: 158) further visualises no distinction between flake and core scrapers. As the name indicates scrapers must have been employed by man in scraping skins, barks of trees, etc.

The collection of scrapers consists of only six (0.031%) specimens. These come from five sites one each from four sites - Chinnadandukonda, Havaligi, Katamadevudu hill and Lattavaram hill, and two from Palavoy. From the last mentioned site one of the scrapers (Fig. 5, No. 41) which was worked at an end is a reworked axe. In general outline the tools are either circular or oval and sometimes concavo-convex and even triangular. Their highest, lowest and mean dimensions are 9.1×7.4×3.4; 5.9×4.4×2.5 and 7.5×5.9×3.3 cms. respectively. Similarly their weights are 243,93 and 172.5 grams. In vertical and horizontal sections they are either lenticular or planoconvex and rarely oval. All specimens are made of dolerite save for a solitary piece (Fig. 7, No. 75) from Chinnadandukonda, which was made on sandstone of a reddish colour. Taking into account the extent of working and general outline scrapers can be divided into side scrapers (double) (Fig 6, No. 54), end scrapers (Fig. 5, No. 41), convex scrapers (Fig. 6, No. 49) and round (discoid) scrapers (Fig. 7, No. 75). The below given table furnishes the site-wise distribution of all these scrapers.

S. No.	*Site*	*Scraper Type*				*Total*
		Double side	*Convex*	*End*	*Round (discoid)*	
1.	Chinnadandukonda	..	..	..	1	1
2.	Havaligi	..	..	1	..	1
3.	Katamadevudu hill	..	1	..	..	1
4.	Lattavaram hill	..	..	..	1	1
5.	Palavoy	1	..	1	..	2
	Total :	1	1	2	2	6

E. Chisels : (30 specimens; 1.57%) Fig. 4, Nos. 19-20, and 23; Fig. 5, Nos. 42-3.

Chisels are narrow elongated axes with ground edge which may be straight or convex. They are the actual prototypes of the metal chisels employed in carpentry. Foote (1916: 21), who classified chisels into six types, did not make any distinction between these and picks. His type - 6 chisels are infact

what we have called picks. Chisels thus differ from picks in not possessing a pointed working edge and long body. Though of rare occurrence they have been found at a number of sites. Foote (1916: 200, pl. 6) was the first to pick up chisels from the south, particularly in the districts of Kurnool, Anantapur and Bellary. Later on, Subbarao (1949: 120: pl. XVII, Nos. 10-12; 14 - 5, pl. XXXV, Nos. 1, 4-6 and 10) found them in good numbers in his excavations and on the surface of Sanarasamma hill near Bellary. Allchin (1960: 89-90; pl. 44, Nos. 2 and 3) illustrates two specimens from Piklihal. Recently Nagaraja Rao and Malhotra's (1965: 60, pl. VII b, Nos. 6 - 7; fig. 27d and f) work at Tekkalakota added only two specimens of this type. Burkitt (1926: 106) traces the origin of chisel form from the narrow elongated celt-form. These tools with their truncated biconvex business edges are more akin to wedges than to celts. Chisels like wedges, besides splitting wood, might have also been used in cutting operations.

The present collection of chisels (30), has been found at 16 sites. This gives an average of less than two specimens per site. That shows the rare occurrence of these implements and their greater significance in the neolithic economy. The distribution of these is as follows: one site, namely, Pillalapalli yielded six (13.33%) specimens. Six other sites, namely, Andepalli, Idukal, Palavoy, Velpumadugu, Vidupanakal fort and Vitlampalli yielded two (6.67%) specimens each. The remaining eight sites, each yielded only one tool.

Of the total chisels, 13 (43.33%) are complete while the remaining 17 (56.67%) specimens are broken; of these 12 are retaining working ends, four butt ends and a solitary piece from Hulikal belongs to the middle or body portion.

Of the 13 complete specimens, six have rectangualr shape, three are triangular; two are elongated concavo-convex and the remaining two specimens are cylindrical and truncated biconvex respectively. There is very little flaking on the tools and for this reason the final shape of the tool is due more to the original shape of the material used than to artificial preparation.

Chisels vary in size between 7.7 and 16.1 cms. in length, 2.8 and 5.1 cms. in breadth, and 2.2 and 3.7 cms. in thickness. In length nine specimens measure between 11.4 and 16.1 cms. while four measure between 7.7 and 107 cms. In breadth eight specimens measure between 4.1 and 5.1 cms. while five measure between 2.8 and 3.7 cms. In thickness ten specimens measure between 2.2 and 3.0 cms. while three specimens range between 3.2 and 3.7 cms. In vertical section, six chisels are lenticular, three each concavo-convex and triangular, and one rectangular. In transverse section taken near the butt, four each are oval and triangular, two each rectangular and planoconvex and one square. In the middle of the tools, the section is triangular in six specimens; rectangular in four and square, lenticular and round, one each, in the remaining three. Near the working edge, the section is truncated biconvex in seven specimens, planoconvex in four and in the remaining two, one each, it is lenticular and triangular.

Butt ends are thick and blunt and eleven of these retain marks of battering. The working edges in majority are straight, medial and bifacially ground and most of them bear heavy use marks. In eight specimens the width of the butt is more than that of the blade while in the remaining five it is less than that of the blade.

Of the total 30 specimens, 28 (93.3%) have been made of medium grained - dolerites while the remaining two (6.70%) pieces have been prepared out of diorite and granodiorite. As dolerites are very tough and tenacious as compared with other rocks, the neolithians gave top priority to these rocks.

Save for one or two which are slightly stained due to their exposure to atmospheric conditions, all the specimens are well preserved. Five of the six specimens from Pillalapalli are very fresh looking as if they have been made yesterday. The method of classification of chisels, as in axes, is purely technological. Three stone working techniques — flaking, pecking and grinding — can be seen in the present collection of chisels. Functionally chisels are edge tools as the bifacially produced working edge could be used for cutting and splitting.

Chisels are recognised as technical groups and six varieties on the basis of the amount and nature of work done on them. The distribution of these at various sites can be seen in table 14. All the groups and their varieties with their characteristics and illustrations are described below.

I. Only flaked, or pecked, or flaked and pecked but not ground chisels : (7 specimens; 23.33%) Fig. 4, Nos. 19-20.

This group occurs only at five sites. The site of Pillalapalli alone yielded three specimens. There are two varieties in this group. They are (1) only flaked chisels (3 specimens; 10%) and (2) flaked and pecked chisels (4 specimens; 13.33%).

The first variety (Fig. 4, No. 23) comes from three sites, Hulikal, Pillalapalli and Vidupanaka West. The illustrated specimen from Pillalapalli is a bifacially chipped broken working edge which is curved round. The second variety (Fig. 4, No. 19) like the previous one occurs at three sites, namely, Pillalapalli, Vitlampalli and Yatakal. The illustration is a bifacially chipped broken working end which is oblique in nature.

II. Edge ground chisels : (23 specimens; 76.67%) Fig. 5, Nos. 42-3.

This group constituting slightly over three fourths of the total chisels occurs at 13 sites. Four varieties are recognised in this group: (1) flaked and edge ground chisels (9 specimens; 30%), (2) pecked and edge ground chisels (5 specimens; 16.67%), (3) flaked, pecked and edge ground chisels (7 specimens; 23.33%) and (4) only edge ground chisels (2 specimens; 6.67%). The first variety (Fig. 5, No. 43) occurring at six sites constitutes the largest single variety among chisels. The illustrated specimen is a bifacially ground, rectangular piece, the use of which as wedge (?) in splitting operations is quite probable. Evidence for the second variety (Fig. 5, No. 42) comes from five sites. The illustrated specimen from Vidupanakal fort site has a cylindrical body with somewhat pointed working edge which could be used as a pick also. The third variety like the first is present at six sites. The fourth variety is represented by the sites of Budagavi hill and Velpumadugu. The illustrated specimen (Fig. 4, No. 23) from Budagavi hill has a square sided body with minimum dimensions (7.7×2.8×2.6 cms.) and weight (105 grams). One of its ends has been bifacially ground to form a medial straight working edge, and is comparable to the one illustrated by Foote (1916: 102 and 200, Pl. 6, No. 2149) from the site of Katamadevudu hill in Anantapur district.

F. Flake Tools : (63 specimens; 3.30%) Figs. 4-7.

These, unlike the core tools, are made on flakes, which appear to have resulted from the stone blocks when the latter were being worked for axes and other edge tools. Of these 35 (55.56%) are end flakes while the remaining 28 (44.44%) consist of side and indeterminate flakes in equal proportions. Seven of the total flakes are of levallois type showing that they have been carefully prepared on their

surface by centrally directed flaking before they were struck off the core. These flakes are comparatively thick and the flake scars on their upper surface are shallow, round, triangular, oval and irregular. They must have been carefully removed by a small cylindrical hammer. All the seven specimens were, by further retouch, made into discoid scrapers. Of the remaining 55 pieces, 41 are plain flakes and 15 are flake blades. These two types of flakes were removed from the core by stone hammer technique, which involves no earlier preparation of the core. The flake blades are more or less parallel-sided but their length is less than two times of breadth in 13 specimens, while only in two it is more than twice the breadth, but the sides in these flakes are non-parallel. Majority (87.30%) of the flake tools are fresh while only a few (2.70%) are patinated from light to deep brown colour.

On the basis of extent of working, shape and function these tools are divisible into three types. They are (1) points, (2) borers, and (3) scrapers. All these types are distributed among 18 sites. Table 15 furnishes the distribution frequencies of the three types at individual sites.

(1) *Points :* (3 specimens; 0.16%) Fig. 4, No. 28

These occur at the sites, of Gadekal south-west, Peddadandukonda and Vidupanakal West. They measure between 4.3 and 7.7 cms. in length, 2.9 and 5.7 cms. in breadth, and 1.0 and 2.5 cms. in thickness. Two specimens are made on end-flakes and the third one on side flake. The illustration is a leaf-shaped, slightly patinated side flake, both lateral sides of which are worked to a point by inverse retouch.

(2) *Borers :* (2 specimens; 0.10%) Fig. 4, No. 33.

These occur at the sites of Akkammakonda and Hulikal. Both specimens are made on end-flakes. They vary from 5.6 to 7.1 cms. in length, 3.9 to 4.4 cms. in breadth, and 1.8 to 1.9 cms. in thickness. The example is from Hulikal and its retouched tip resembles a beak.

(3) *Scrapers :* (58 specimens; 3.04%) Figs. 4-6.

These, occurring at 17 sites, form the major group in the flake tools. They range in size between 4.9 and 13.2 cms. in length, 3.4 and 8.0 cms. in breadth, and 1.2 and 4.6 cms. in thickness.

The mean measurements are 7.5×6.2×2.5 cms. Five types are distinguished among scrapers. They are (*a*) side, (*b*) hollow, (*c*) side-and-end, (*d*) end, and (*e*) round (discoid) scrapers.

(*a*) Side scrapers (34 specimens; 1.78%) consisting of more than half of the total scrapers (3.04%) occur at 12 sites. A good number of these come from the site of Hulikal. Nineteen specimens of these are made on plain flakes while only 15 are made on flake blades. The scraping edge is confined to one side or extends along both. The sides are straight, slightly wavy, or convex in form. Retouch is extended from one face only. In sixteen specimens, comprising seven plain flakes (Fig. 4, No. 34) and nine flake blades (Fig. 4, No. 29), the scraping edge is straight or slightly wavy, while it is convex in ten plain flakes. The remaining eight specimens consisting of two plain flakes (Fig. 4, No. 35) and six flake blades (Fig. 4, No. 36) are double side scrapers. (*b*) Hollow scrapers (3 specimens; 16%) occur at Budagavi hill, Hulikal, and Kalyandrug fort. All are single hollow scrapers (Fig. 5, No. 45). (*c*) Side-and-end scrapers (8 specimens; 0.42%) are present at seven sites. Six of these are single side-cum-end scrapers (Fig. 4, No. 21) while the remaining two are two side-cum-one end scrapers (Fig. 7, No. 77). (*d*) End scrapers (4 specimens; 0.21%) are present only at two sites, namely, Hulikal and Yatakal. Three specimens are one-end scrapers (Fig. 6, No. 59) while the only specimen from Yatakal is a two-end scraper.

(*e*) Round scrapers: (9 specimens; 0.47%). These form the second largest group among scrapers. They occur at six sites – seven of these scrapers are made on levallois flakes (Fig. 4, No. 30).

All the flake tools were measured for their lengths, breadths and thicknesses. In length all the specimens range between 4.1 and 14 cms., nearly three-fourths (74.60%) of the total tools measuring between 2.1 and 8 cms., 61.90 per cent of them measuring between 4.1 and 6.0 cms. In thickness the range is slightly smaller, the specimens measuring between 0.8 and 5 cms., more than three-fourths (76.19%) of them measuring between 1.1 and 3 cms. Their mean measurements are 7.4 cms. in length, 6 cms. in breadth and 2.4 cms. in thickness. The ratio of breadth to length in these tools ranges between .33 and 1.00 in majority (88.89%) the length being less than twice the breadth. The high mean value, .72, suggests that most of the flake tools are roughly square in shape. The T/B ratios range between 0.21 and 0.9, 80.95 per cent specimens being limited between 0.31 and 0.6 (see tables 16 - 20).

G. Flakes : (211 specimens; 11.06%) Fig. 4 and 6. Flakes are found at 28 sites. They include large flakes, small chips, and irregular flakes which resulted during the manufacture of finished tools. Of these, 100 (47.39%) are end flakes, 43 (20.38%) are side flakes, and the remaining 68 (32.23%) are indeterminate flakes. On the basis of their shape, flakes can be divided into five groups: rectangular, discoidal, triangular, oval and irregular. The number of specimens in these groups is 110 (52.13%), 28 (13.27%), 12 (5.69%), 7 (3.32%), and 54 (25.59%). This analysis shows that rectangular and irregular flakes are most common.

Flakes are broadly divisible into two varieties: (1) simple flakes, and (2) flake blades. Simple flakes (145 specimens; 7.60%) occur at 28 sites. All these were removed by stone hammer technique. In majority of these the entire dorsal face has been worked though partly worked or completely unworked specimens are also present. This was, however, done either after the removal of the flake or before. In the latter case it was part of the general dressing of the core and not specifically intended for core proportion. Most of these flakes have a plain striking platform and in some no platform is visible. The last mentioned flakes are certainly by-products resulting from the working of finished tools. Nearly 75% flakes have unfaceted platforms and a few of these possess one or two flake scars. The remaining 25% specimens are shapeless irregular chips with no platform. In as many as 49 per cent flakes a pre-existing flake scar has been taken advantage for a striking platform while in the remaining pieces original cortex of the flake has been struck to create a striking platform. The angle of striking platform with the flake surface ranges between 90^0 and 120^0. The bulbs of these flakes are diffused in nature.

All the flakes were measured for their lengths, breadths and thicknesses. They vary between 3.1 and 15 cms. in length, 2.1 and 11 cms. in breadth and 0.8 to 4 cms. in thickness. In length 88.27% measure between 4.1 and 8 cms. in breadth 85.51 per cent measure between 3.1 and 6 cms., and in thickness 92.42 per cent measure between 1.1 and 3 cms. Their mean dimensions are $6.1 \times 4.8 \times 2.4$ cms. Thus medium sized flakes are most common. Their B/L ratios range between 0.33 and 1.00, majority (92.41%) of these being found between 0.21 and 1.00, the high incidence (86.20%) of them occurring between 0.21 and 0.5. Their B/L and T/B mean values are 0.78 and 0.39 respectively (Tables 16-20).

Of the total simple flakes (145), 124 (85.52%) are unutilised (Fig. 4, No. 31), while the remaining 21 (14.48%) specimens (Fig. 6, Nos. 60) show signs of their previous use. Many of the unutilised flakes bear battered marks which might be the result of the heavy trampling of cattle or other natural phenomena.

Flake blades (66 specimens; 3.46%), unlike the previous variety, possess roughly parallel sides. These occur at 20 sites. In all of them length, breadth and thickness were measured. They measure between 3.1 and 11 cms. in length, 1.1 and 6 cms. in breadth and 0.8 and 3 cms. in thickness. Forty eight (72.72%) specimens measure between 4.1 and 7 cms. in length, 55 (83.33%) measure between 3.1 and 5 cms. in breadth and 52 (78.78%) pieces alone measure between 1.1 and 2 cms. in thickness. Their mean measurements are 6.1x3.9x1.5 cms. Small and large blades are rare. They range between 0.33 and 1.00 in B/L ratio, but in majority (60 specimens; 90.91%) the length being less than two times the breadth though the sides are parallel. Hence they could be called 'flake blades'. The T/B ratio range between 0.21 and 0.7, 48 (72.72%) specimens being restricted between 0.31 and 0.5. The mean B/L and T/B ratios are 0.66 and 0.38 respectively (Tables 16-20). Two types are distinguishable in these flakes: They are levallois type, and plain.

The only specimen of levallois type flake blade (Fig. 6, No. 53) comes from the site of Hulikal. It measures 7.9x6.3x2.1 cms. It is a thick, broad utilised flake blade with a faceted platform. It has been carefully prepared on its upper surface by centrally directed flaking before it was struck off the core. The three flake scars on its dorsal surface make a Y-shape. They appear to have been removed by a small cylindrical hammer. The technique of removing the plain flake blades (65 specimens, 3.48%) from the cores is in every respect similar to that of the flake blades. Most of the rectangular flakes fall in this category. Of the total flake blades, 54 (83.08%) are end flakes, eight (12.31%) are side flakes and three (4.62%) are indeterminate. Forty eight (73.85%) of these are unutilised (Fig. 4, No. 25) while only 17 (26.15%) specimens bear marks of use (Fig. 4, No. 24; Fig. 6, No. 50). Many of the unutilised flake blades, like those of the flakes, bear marks of battering. Table 21 furnishes the distribution of flake blades at individual sites.

PATINATION ON FLAKES AND FLAKE BLADES

The flakes, under study, are similar to those found by Subbarao (1949: 116-8) at Sanganakal in the sense that all of them resulted from the production of axes and other tools from dolerite blocks. Of the total flakes 89 (42.18%) specimens are patinated to brownish colour, while the remaining 122 (57.82%) are unpatinated. The degree of patination is not uniform on all the specimens. Thus, 25 (11.85%) are deeply patinated while 64 (30.33%) are lightly patinated. However, the high or low degree of patination on artifacts is of lesser significance than patination itself in judging their antiquity.

For the word "patination" no clear-cut definition has yet emerged (Goodwin 1960: 300) though James Stewart (1960: 9) employs the term as a phenomenon for the altered appearance of the surface of stone caused by chemical action and staining. He thinks that the prolonged exposure of the stone results in deeper patination indicating that such specimen is older than the lightly patinated one. Robert F. Schmalz (1960: 49) who conducted laboratory experiments on artificial and natural patination agrees with E.C. Curwen (1940 : 435-7) stating that no inferences can be drawn regarding the antiquity of an artifact from its high or low degree of patination.

H. Picks : (4 specimens, 0.21%) Fig. 7, No. 64.

Picks are irregular, pointed tools usually prepared by flaking though some specimens have undergone pecking and grinding as well, the former probably to facilitate hafting of the butt into a wooden handle and the latter to make the point sharper. Picks could have been used in digging and loosening soil and for other agricultural purposes.

Foote's (1916: 21) type 6, chisel with sharp point may well go under this category. However, Foote (1914: 61; 1916: 200, Pl. 6, No. 987) did not differentiate picks from adzes as his illustrations from Gadiganuru, Bellary district shows. Allchin (1960: 89-90, Pl. 44, Nos. 2 and 3)illustrates two examples from Piklihal, both incomplete, which appear to resemble chisels more than the ideal type of picks. His (1957: 333) observation that the picks described by Subbarao (1948: 38-9, Pl. XXIII, Nos. 7-9, Nos. 11-12) are borers, may not be correct.

Only four picks have been found in the present exploration. Two of these come from Andepalli and one each from Hullikal and Velpumadugu. All specimens are fresh looking, made of the locally available dolerite. They are rectangular, cylindrical and triangular with narrow pointed ends and thick butts. These shapes mostly depended on the natural shapes of the blocks or slabs chosen for the purpose. In vertical cross section they are either lenticular or pointed oval. Their transverse sections at the butt are roughly circular, semicircular or even rectangular to oblong; in the middle they are roughly rectangualr or circular, and at the working end lenticular, quadrangular or even square. Their maximum, minimum and average dimensions are 22.1 x 9.1 x 6.8; 16.7x5.2x4.9 and 19.3x7.1x5.7 cms. and corresponding weights are 2038, 564 and 1176.8 grams respectively. In spite of their small number in our collection, picks demonstrate remarkably all the three techniques of manufacture ; thus one specimen is only flaked at the butt and working end; two specimens are flaked as well as pecked all over and the remaining one specimen depicts all the stages of working with grinding restricted to working end alone. Excepting the last mentioned specimen, the other three have been heavily used as seen from the battered marks at the butt as well as working end.

I. Rubbing stones : (164 specimens; 8.60%)

These are a class of domestic implements usually found in association with querns, serving the purpose of grinding and pounding grain. They are made from small, natural slabs. Robert Bruce Foote had called these stones as "mealing stones". In shape they are oblong, rectangular, oval or circular They do not exhibit any signs of flaking, but are pecked all over to give them a flat surface and produce dentitions for grinding. Grinding was not involved in their manufacture.

Half the number of specimens in the present collection are broken. All the rubbing stone were found at 30 sites. Table 22 shows the distribution of rubbing stones and their raw materials at various sites. As would be seen from the table, granite in various shades forms the most common rock which accounts for 114 (69.51%) specimens in the whole collection. In the descending order of frequency come dolerite, granodiorite, and diorite representing 24 (14.63%), 16 (9.76%) and five (3.05%) specimens respectively. The remaining 3 per cent consists of gneiss and sandstone, 1.22 per cent each and 0.51 per cent of greenstone. The two sandstone rubbers one complete and the other broken, come from Katamadevudu hill. These were probably imported from the adjoining Tadipatri taluk where quartzites and sandstones are exposed. It is not clear why this material was imported when other suitable rocks were available in the vicinity. A few specimens are patinated, but the majority are in a fresh condition. Only complete specimens are taken into account for the study of shape, size and weight since incomplete specimens do not give full data in these respects. Therefore unless otherwise mentioned, the total number of rubbing stones studied is 82 and the number of associated sites is 27.

As could be seen from table 23, the common shapes in rubbing stones are circular (25 specimens; 30.49%), oval (21 specimens; 25.61%), oblong (16 specimens; 19.51%) and rectangular (14 specimens; 17.07%). The remaining six (7.32%) specimens include square (4 specimens; 4.88%) and triangular (2 specimens; 2.44%) sections. In vertical and horizontal cross-sections, rubbing stones are planoconvex (30 or 36.59% and 26 or 31.71% specimens), oblong (29or 35.37% and 24 or 29.27% specimens), rectangular (17 or 20.73% specimens in both sections), trapezoidal (2 or 2.44% and 7 or 8.54% specimens), oval (2 or 2.44% and of the same proportion in the other sections) and triangular (1 specimen; 1.22% and 5 specimens or 6.10% respectively.) Besides, one specimen each is lenticular and truncated biconvex. Rubbing stones with planoconvex section are almost one-surface worked and used, though two faced-specimens are also there. Those with oblong and rectangular sections are always flat and they are worked and utilised on both faces. Specimens with other types of section fall into both groups.

All the rubbing stones were measured and their measurements and ratios show the following distributions.

Character	*Range*	*Mean*
Length	6.1 — 18 cm.	10.3 cm.
Breadth	4.1 — 13 cm.	8.1 cm.
Thickness	1.1 — 7 cm.	4.1 cm.
B/L ratio	.41 — 1.0	.79
T/B ratio	.21 — .9	.53
Weight	151 — 1700	607.5

In length nearly 88 per cent specimens measure between 7.1 and 14 cms. and this wide range indicates the preference of both long and short rubbers. Similarly in breadth as many as 76 per cent specimens measure between 6.1 and 10 cms., showing the use of both narrow and broad rubbers. In thickness the range is narrow, about 67% specimens measuring only between 3.1 and 5 cms. Another 24 per cent rubbers measure in thickness between 2.1 and 3 cms. and 5.1 and 6 cms. The B/L ratio ranging between .71 and 1.0 includes more than three-fourths (79.27%) of the rubbers showing the predominance of broad specimens. Only in one (1.22%) specimen the length is more than twice the breadth. The T/B ratios ranging between .21 and .5, and .51 and .9 each, include nearly equal proportion of rubbers. This can also be inferred from the medium mean value —.53— as well.

Tables 24-25 show the distribution of frequencies and percentages of lengths, breadths and thicknesses as well as the B/L and T/B ratios of rubbing stones. Table 26 shows the frequencies and percentages of weights of rubbing stones. The heaviest specimen weighs 1630.5 grams, while the smallest weighs only 186 grams. The mean weight of the rubbing stones is 607.5 grams. Seventy four (90.24%) rubbers weigh between 200 and 1000 grams, while four (4.88%) specimens each are less than 200 or more than 1000 grams. The highest number in one single class is 14 (17.07%); it occurs in two classes, 201-300 grams and 701-800 grams. It may therefore be inferred that larger and heavier specimens could be used by both hands while medium and small sized implements must have been utilised by one hand.

Classification of rubbing stones :

Foote (1916: 20) classified his collection of rubbing stones into two types–flat and rounded. Allchin (1957:327) who uses the term oval rubbers for Foote's mealing stones did not define the extent of working and use of these stones. Sankalia (1964: 87-8) treats these specimens as the two sub-types of the muller type of implements. His two sub-types are: (*a*) round, but having two surfaces flattened or naturally flat, and (*b*) plano-convex mullers, having one surface flat and the other convex or slightly rounded (Figs. 103-5). In the present study the term 'muller' is used for long, well dressed stones, which form the upper moving part for the saddle querns. Further, mullers have to be used by both hands while it is not necessarily so in the case of rubber.

On the basis of the extent of the working and use of the surface, sides and ends, rubbers have been broadly divided into two main types and several sub-types. The site-wise distribution of the types and sub-types of rubbers is given in table 29. The characteristics of both types and their sub-types are as under.

Type I (26 specimens; 31-71%) includes rubbers which have been worked and used on one surface only. The other surface retains cortex. Further either one or both ends, and one or both sides exhibit signs of utilisation in crushing operations (Figs. 4, 6 and 7). These occur at 14 sites. Six sub-types have beeen discerned in this type. Sub-type 1 (5 specimens; 6.10%) rubbers have been worked and used on one surface only. The other face, the two sides and ends remain unworked and unused (Fig. 7, No. 67). Sub-type 2 (6 specimens; 7.32%) rubbers have undergone work and use on one face and one end (Fig. 7, No. 65). In Sub-type 3 (4 specimens; 4.88%) besides one face, the two ends have also been used (Fig. 6, No. 55). In sub-type 4 (6 specimens; 7.32%) the two ends and one of the sides have been worked and used (Fig. 4, No. 22). In sub-type 5 (5 specimens; 6.10%) specimens, one face, both ends and sides have been worked and utilised (Fig. 6, No. 138). In the 6th sub-type, (1 specimen; 1.22%) one face, one end and both sides have been worked and used. The only specimen of this sub-type comes from Vitlampalli.

Type II (56 specimens; 68.29%) is differentiated from the previous type in having worked and used both faces besides ends and sides. Twenty-four sites yielded rubbers of this type (Fig. 7, Nos. 66 and 68–69). There are eight sub-types in this type. Sub-type 1 (4 specimens; 4 – 88%) rubbers have the two faces worked and used. The two sides and ends retain cortex (Fig. 7, No. 69). In sub-type 2 (6 specimens; 7.32%) the two faces and one end have been worked and used. In sub-type 3 (4 specimens; 4.88%) the two faces, and one end and one side have been used after working (Fig. 7, No. 66). Sub-type 4 (9 specimens; 10.98%) tools have both faces and ends utilised after working. In sub-type 5 (10 specimens; 12.20%) besides bifacial work and use, both ends and one side have been employed in crushing. In sub-type 6 (1 specimen; 1.22%) both faces and one side have been worked and used. The only specimen of this type was found at Kalyandrug fort. In sub-type 7 (4 specimens; 4.88%) excepting one end, all the other portions have been worked and used. The 8th sub-type (18 specimens; 21.95%) includes rubbers which have been worked and used all over, irrespective of sides, ends and faces. This is the largest of all the sub-type in the collection.

J. Saddle Querns : (Not illustrated.)

Querns derive their name from their resemblance to the riding saddles. They were used for grinding and pounding grain and other cereals. They are rectangular, square and less frequently

round in shape and are made out of huge granite boulders. Foote (1916: 20) who classified them as 'mealing troughs', divided them into two: deep and shallow types. Two hundred and eight saddle-querns were noticed during the present survey. They were found at every site but none of them was collected due to their large size and weight. However, 31 of them from five sites - Vidupanakal fort, Vidupanakal West, Uravakonda, Havaligi and Lattavaram hill were measured *in situ*. An analysis of these measurements shows that they vary in size from 25 to 120 cms. in length, 13 to 90 cms. in breadth and 2.5 to 21 cms. in depth. In length 23 (74.2%) measured between 31 and 50 cms. and in breadth 25 (80.7%) measured between 25 and 40 cms. In depth 12 (38.7%) measured 6 cms. and below, while 19 (61.3%) measured more than 6 cms. This shows that long, broad and shallow querns are of common occurrence.

Observations made on these querns indicate that neolithic folk chose roughly oblong rectangular granite blocks, the upper surface of which was hollowed out by pecking. This became deeper due to prolonged and continuous rubbing by round grinders or rubbers.

K. Axe-hammers : (64 specimens; 3.35%) Figs. 3 and 5.

The term 'axe-hammer' is applied to axes whose cutting edge due to prolonged utilisation, ceased to serve the purpose of an axe and which were therefore employed as hammers. They differ from the true hammers in having the shape and technology of the axes, though functionally they are identical with the former. It is because of their function that they are grouped as hammers, though some scholars (Subbarao 1949: 148) have treated them in the axe-category. Foote (1916: 20-1) however considered these implements as a separate type which is maintained in the present study as well.

Axe-hammers were found at 21 sites. Of these, 51 (79.7%) specimens are traingular, six (9.4%) semi-triangular, while seven (10.9%) are rectangular in shape. In almost all specimens the shape largely depended on that of the original rock pieces employed. Horizontal cross sections taken in the middle of all specimens show that 37 (57.8%) are ellipsoidal or oval, 11 (17.2%) plano-convex, eight (12.5%) flat oval or lenticular, seven (10.9%) rectangular and one (1.6%) circular. To find out the size and shape all axe-hammers were measured and weighed. The largest specimen measures 18.1x 10.3x5.6 cms. while the smallest measures 6.8x4.7x2.0 cms. The mean measurements being 10.0x6.4x 3.7 cms. The maximum, minimum and average weights are 1497.7, and 373.8 grams respectively. In length more than half (35 specimens; 54.69%) of the total specimens measure between 9.1 and 12 cms. while nearly one-third (21 specimens; 32.82%) and one-eighth (8 specimens; 12.41%) specimens measure between 6.1 and 9 cms. and 12.1 and 19 cms. But, in breadth, unlike length, the range is very narrow - nearly 80 per cent specimens measuring between 5.1 and 7 cms. The thickness range is still narrower, more than two-thirds (67.19%) of the specimens measuring in one single class between 3.1 and 4 cms. The B/L ratios show that in all but five specimens length is less than twice the breadth. This can also be seen from the high mean value. In T/B ratio, 50 per cent specimens are restricted between .51 and .7, while the remaining specimens are distributed between .21 and .5, and .71 and .94 in equal proportions. The distribution of frequencies and percentages of lengths, breadths, thicknesses, B/L and T/B ratios of axe-hammers can be seen in tables 27-28. As could be seen from table 30, 68.75 per cent specimens weigh between 201 and 400 grams, while the remaining stray specimens weigh more than 900 grams or below 200 grams.

The rocks employed for making axe-hammers are same as those used for axes. Excepting two specimens, which are made on diorite and granodiorite, all are made on coarse to fine grained dolerites.

Most of the axe-hammers (44 specimens; 68.8%) are nicely preserved. Sixteen (25%) specimens are lightly patinated while four (6.3%) are deeply patinated. As the assemblage is from surface almost all of them look discoloured though not patinated or stained.

Classification of axe-hammers :

Foote (1916: 20) classified axe-hammers into two types; (1) axe-hammer with a long narrow body, and (2) axe-hammer with a short thick broad body. He regarded shape and size as the criteria for his classification. Foote's first type includes many specimens made from used axes while his second type probably comprises such axe-hammers which have been deliberately made for the purpose. In the present study the whole collection of axe-hammers has been treated as one type and classified them into their respective technological groups and varieties. Table 33 furnishes the site and technique-wise distribution of axe hammers.

The techniques of manufacture are similar to those discerned in axes, adzes and chisels. All axe-hammers are divisible into seven varieties-three in stage I, two in II and of the same number in III.

I. Only flaked or pecked or flaked and pecked but not ground : (22 specimens; 34.38 %)

This group occurs at 11 sites. In this group there are six specimens with reworked edges while another specimen is worked all over leaving butt and one of the surfaces. The three varieties of this group are : (1) only flaked tools (3 specimens; 4.69%), (2) only pecked tools (5 specimens; 7.81%), and (3) flaked and pecked tools (14 specimens; 21.88%). Tools of the first variety come from the sites of Havaligi and Lattavaram hill. The specimens seem to have been made intentionally. The illustrated piece (Fig. 5, No. 37) has a thick short broad body resembling Foote's type-2 axe-hammers. The second variety occurs at five sites. The example appears to be an intentionally made one. Both ends bear battering marks resulted due to use (Fig. 5, No. 38). The last variety is represented by ten sites. Many reworked axes occur in this type (Fig. 3, No. 15).

II. Edge ground tools (11 specimens; 17.19%) :

These were found at eight sites. This group contains four edge reworked specimens. There are two varieties in this group : (1) pecked and edge ground tools (3 specimens; 4.69%) come from three different sites (Fig. 3, No. 3). (2) Flaked, pecked and edge ground tools (8 specimens; 12.50%) occurred at eight sites. All specimens were heavily used.

III. Completely ground tools (31 specimens; 48.44%) :

This is the largest of all groups. Twelve sites yielded specimens of this group. Almost all the specimens are nothing but utilised axes. Among these, nine show unifacial reflaking on the edge. At least in one case both butt end and working edge were reworked while in another specimen edge and one of the sides have undergone the process of rechipping. The two varieties of this group are (1) flaked, pecked and ground all over unevenly (24 specimens; 37.50%), and (2) ground to a smooth face all over (7 specimens; 10.94%). The first is the biggest of all the varieties. It includes all reworked and used axes (Fig. 3, No. 16). Evidence for the second variety comes from three sites. All specimens bear marks of heavy use.

L. Hammer Stones : (473 specimens; 24.80%) Figs. 3, and 5-6.

On the basis of technique of manufacture and probable function, Foote (1916: 20) had recognised several sub-types in hammer stones. Allchin (1957: 327) divided hammer stones into four groups according to their general function and shape. He includes axe-hammers as one of these groups. In the present study, however, axe-hammers have been treated as a separate type in view of their distinctive origin and function. Allchin also included one group of hammer stones (Foote's corn-crushers) as spheroid rubbers. These objects can in no way be considered as grinders or rubbers as they do not show any marks of use of rubbing or grinding.

There are 373 (78.86%) complete and 100 (21.14%) broken hammer stones in the present collection. Except Adoni East all other sites yielded these artifacts. Majority of the hammer stones are either made out of dolerites/basalts or green epidote granites (Foote's pistacite granite, 1916:23) though several other rocks were also employed. An analysis of the raw materials is given in the following table.

S. No.	*Name of rock*	*Frequency*	%
1.	Dolerite	219	46.30
2.	Epidote granite	160	33.83
3.	Granite	33	6.99
4.	Granodiorite	31	6.55
5.	Greenstone	11	2.32
6.	Pegmatite	8	1.69
7.	Diorite	7	1.48
8.	Quartz	4	0.84
	Total :	473	100.00

Pistacite granites (Foote 1916: 23) or pistacites (Allchin 1957: 327) which are nothing but epidote granites were largely used by the neolithic folk for making corn-crushers or spheroid rubbers which are infact hammers, on account of their attractive green colour but which were in no way better than the common country rock. Foote and Allchin thought that they were brought from great distances. In the present collection 160 (33.83%) hammer stones are of pistacite or epidote granite and 33 (6.99%) of granite. The comparatively high percentage of epidote granite is due apparently to the attractive colour of this stone as was mentioned earlier by Foote and Allchin.

However our limited observations show that pistacite granite outcrops occur at many places in the granite region of Bellary and Anantapur districts and at least in this area these rocks therefore do not seem to have been fetched from long distances. In size hammer stones range from 4.3 to 13.4 cms. in length or diameter while in thickness they vary from 3.1 and 8 cms. Of the complete 373 specimens

nearly 240 have breadths ranging between 4 and 8 cms. Their maximum, minimum and average lengths × thickness are 13.4 × 7.5 cms., 4.3×3.1 cms., and 7×5.1 cms. respectively. Majority of the hammer stones have their lengths measuring between 5.1 and 8 cms. (315 or 84.45% specimens). Of these, hammer stones ranging between 6.1 and 7 cms. predominate the rest (145 or 38.87% specimens). In thickness most of the specimens fall between 4.1 and 6 cms. (311 or 80.69% specimens). But the dominant thickness class is from 5.1 to 6 cms. (152 or 40.75% specimens). Tables 31-32 give the distribution of frequencies and percentages of lengths and thicknesses of hammer stones.

In weight, hammer stones vary from 101 to 800 grams. Their maximum, minimum and average weights are 776 grams, 105 grams and 345.7 grams respectively. The most common range is between 201 and 400 grams (245 or 65.68% specimens) with the highest frequency (140 or 37.53%) of specimens falling in 201-300 grams weight class (also see table 34). In shape hammer stones are generally roughly circular or discoidal, spheroidal, square, cylindrical and irregular. In section they are round, semi-circular and rarely planoconvex or oblong to rectangular. Of the total 473 pieces, only 51 (10.78%) specimens are in a weathered state; the rest are fresh and well preserved.

Classification of hammer stones :

On the basis of the extent of use marks on them hammer stones are classified into the following seven groups (also see table 35). The technique of preparation and shape have also been taken into account but these are of subsidiary importance at least in case of some groups.

Group I : (9 specimens; 2.41%) Fig. 5, No. 46.

In these hammer stones use marks are confined to one end or shorter side. They have been chipped round the body and then used for battering. None of the specimens is pecked or ground. These specimens are roughly spheroidal or discoidal or square in shape. They vary in size from 5 to 7.7 cms. in length and 4.1 to 5.8 cms. in thickness while the mean length × thickness are 6.3×4.9 cms. In weight they range from 182 to 446 grams, the mean weight being 289.7 grams.

Group II : (72 specimens; 19.30%) Fig. 3, No. 17.

These hammer stones exhibit use marks at two ends or shorter sides. Some of them were roughly flaked and then used while others have been either ground and used or used directly without any dressing. They are roughly cylindrical, oblong, rectangular, or asymmetrical specimens. Allchin's (1957: 334) cylindrical hand-hammers, and Foote's (1916: 20) and Subbarao's (1949: 156-7) fabricators go with this group. The bruised ends of these tools suggest that they might have been used as punches or as flaking tools while making axes and other ground tools. Subbarao gives the name 'stone finger' for a fabricator.

These tools vary in length from 5 to 13.4 cms. while their thickness ranges between 3.4 and 6.9 cms. Their average length × thickness are 8.1 × 4.8 cms. In weight they range from 151 to 776 grams, while an average specimen wieghs 373.2 grams. Illustration No. 56 in (Fig. 6) has a hollow in the middle probably to facilitate hafting. It is closely akin to Foote's (1916: 20) and Subbarao's (1949: 157- 8, pls. XXXIV and XXXV) grooved or belted hammer stones. Both ends of this specimen have been heavily used.

Group III : (91 specimens; 24.40%) Fig. 6, No. 58.

These hammer stones have a bruised surface all round the periphery with flat, convex or uneven upper or under surfaces retaining cortex. The bruised surface in some specimens is too regular to have been produced by use alone. This was intentionally produced by pecking to give them a spherical shape. Though because of their spherical shape they look like unfinished sling stones, we have considered them as hammer stones due to the presence of characteristic use marks on them. They are round, circular or rarely oblong, large, flat thick discoids. In length they measure between 5 and 9 cms. and in thickness between 3.2 and 6.9 cms. Their mean length and thickness are 6.7 and 4.9 cms. respectively. Their weight varies from 128 to 704.5 grams, the average weight being 329.8 grams. Foote's (1916:20) and Subbarao's (1949: 157) round hammers and pounders, and Allchin's (1957: 334) spheroid and discoid hand-hammers go with this group of hammer stones.

Group IV : (125 specimens; 33.51%) Not illustrated.

This group, like group III, comprises hammer stones having use marks all over the body but differs from the latter in that the use marks are not uniform but unevenly distributed. Almost all of them have spherical shape with a few concavities here and there. These like group III specimens are possibly incomplete sling stones. In length they vary from 4.4 to 9 cms. and in thickness from 3.6 to 7.5 cms. An average specimen measures 6.4 cms. in length and 5.4 cms. in thickness. Their maximum, minimum and average weights are 764.5 grams, 105 grams and 325.6 grams respectively. These tools would have served the same function like group III specimens.

Group V : (49 specimens; 13.14%) Not illustrated.

Hammer stones of this group possess a bruised surface all round the periphery like group IV tools, but in addition these specimens have one of their flat surfaces ground while the other is left unworked. Banerjee (Sankalia and others 1960: 160) treats such tools as hammer-cum-sling stones or weights. As regards the ground flat surface he explains that this facilitates the stone to sit. The specimens of this group are circular to spheroidal in shape. They are 5.1 to 8.9 cms. long and 3.6 to 6.4 cms. thick. Their average length and thickness are 6.9 cms. and 5 cms. They range from 195 to 655 grams in weight, while an average tool weighs 354.9 grams.

Group VI : (19 specimens; 5.10%) Fig. 6, Nos. 57 and 61.

These hammer stones are similar to those of Group V but differ from the latter in having both flat faces ground. These must have been employed for grinding as well as battering. They are roughly circular to oval measuring between 5.6 and 9 cms. in length, and 3.3 and 7 cms. in thickness, the average measurement being 7.4 cms. in length and 5.1 cms. in thickness. The weight range starts from 203 grams to a maximum of 754.5 grams where as the average weight is 413.7 grams.

Group VII : (8 specimens; 2.14%) Fig. 6, Nos. 47-48.

Foote and Allchin called these as cylindrical pestles. Allchin's axe-hammers are not included in this group. These are long, perfectly cylindrical specimens with a horizontally circular or round section. They have been pecked all round their body and then used in grinding and pounding purposes. Occasionally they might have been hafted and used as hammers also. Besides these eight complete specimens, there are three broken pieces also. Their maximum × minimum lengths and

thickness are 9.9×7.2 cms. and 6.4×4.2 cms. respectively, while an average specimen is 8.2 cms. long and 5.6 cms. thick. In weight pestles vary from 295 to 573 grams while an average tool weighs 453.1 grams.

Example No. 48 in Fig. 6 resembles a potter's dabber. Allchin (1960 : 91, pl. 56a, No. 2 and pl. 55, No. 2) illustrates similar specimen of brownish-red stone from surface of Piklihal. He suggests a special function to it. Our example has been finally pecked after flaking and heavily used as seen from the marks at both ends.

M. Sling stones : (79 specimens; 4.14%) Fig. 4, No. 26.

These stones are perfectly spherical in shape and the absence of battering marks on them suggests that they were the final products of the process involved in the making of hammer stones, discussed earlier, with a different function. Banerjee (Sankalia and others 1958 : 240-1; 1960: 476-7) and Ansari (Deo and Ansari 1965: 134 and 136) thought that similar objects were used as weights at Navdatoli, Maheshwar, Nevasa and Chandoli. However, even to day such spherical balls are used as missiles or throwing stones to drive away the birds from green crops. But, nowhere are they employed as weights. It is, therefore, more likely that these were used as sling stones, as Foote suggested, for hunting. Of course, their size must have been of some significance in the method of their use.

The present collection of these comes from 23 sites. Almost all are spherical in shape. They are made of granite (25 or 31.65% specimens), dolerite (18 or 22.79% specimens), epidote granite (17 or 21.52% specimens), diorite (3 or 3.79% specimens), granodiorite (14 or 17.12% specimens), greenstone (1 or 1.27% specimen) and quartz (1 or 1.27% specimen). As seen from the above analysis granite, dolerite and epidote granite, which together constitute more than three fourths of the collection, were the chief rocks used for making these spherical balls.

Their size ranges between 4.3 and 8 cms. in diameter and 3.1 and 7 cms. in thickness. An average specimen has a length of 5.7 cms. and a thickness of 5.1 cms. Majority of the objects measure from 5 1 to 7 cms. in diameter (66 or 83.54 specimens) or while the most common thickness class is between 4.1 and 6 cms. (71 or 89.88% specimens) (See table 36). In weight sling stones range from 93 to 598 grams and their average weight is 280.2 grams. The most frequent weight range is between 101 and 400 grams (70 or 88.61% specimens) (table 37).

N. Mace Heads or Ring Stones : (6 specimens ; 0.31%) Fig. 7, Nos. 71–72.

These are thick massive circular stones with a well drilled central hole. Their surfaces are sometimes pecked and ground. The central hole was pecked or drilled alternately from both surfaces and is of 2 to 3 cms. diameter. The width of the hole narrows down from the surface to the centre. Their use as weights for digging sticks suggests that they were primitive agricultural implements. Their association with agricultural operations has been further corroborated by Oakley (1956 : 33) who reports that the Bushmen of South Africa chiefly utilised the perforated stones as weights for digging sticks. Sankalia (1964 : 86) thinks that these might have also been used as mace heads.

Foote had not collected any mace heads from Anantapur or Kurnool districts. He (1914 : 100; 1916 : 81–2) however found two in Bellary district. He (1916 : 52, 136, pl. 19, No. 3395; 161,

pl. 52, No. 4055) had also found two specimens one each from Madurai district of Tamilnadu state and the former Baroda state, and three from the former Rewa state. Later, Subbarao (1949 : 160, Fig. 3, pl. XXXIV) illustrates two specimens discovered by Fawcet and Boys. Thus, he too did not come across such specimens. Allchin (1957 : 327) who studied the museum collections from the North Karnataka region classed mace heads in miscellaneous group.

The present collection comes from four sites — one each from Akkammakonda and Yatakal and two each from Hulikal and Kunduripi — all located in Kalyandrug taluk of Anantapur district. All the six are broken specimens. Five out of these are made on a fine grained variety of micaceous schist of glittering grey colour (Fig. 7, No. 71) while the remaining one piece from Akkammakonda (Fig. 7, No. 72) is prepared on gritty sandstone of medium grained texture, but soft and dull red in colour. All specimens are lightly weathered. These rocks have not been employed in the manufacture of any other type.

As all the specimens are broken they could not be measured for their lengths. In breadth they vary from 7 to 9.5 cms. and in thickness from 3.3 to 4.8 cms. Their mean breadth and thickness are 8.2 and 3.7 cms. respectively. The diameter of the central hole measures between 2 and 3.5 cms. the average measurement being 2.6 cms. At least in one specimen the bore seems to be equal in diameter both at the top and centre. In shape three specimens appear to be roughly circular, two short oblong and one long oblong. In one specimen grinding has been extended to the circumference.

O. Miscellaneous Tools : (4 specimens; 0.21%) Figs. 5–7.

This group includes implements which do not find place in any specific types due to their multiplicity of functions. All the four specimens are described below.

HBG. 27, dolerite, dimensions: 10.6×4.5×4.3 cms., weight 307 grams. This is a roughly triangular specimen with a convex under surface and a cortexed flat upper surface. The specimen is flaked and pecked all over the body. One of the ends is broader and thicker than the other, and the rounded sides are thick and taper to the pointed end. The narrow end is bifacially ground and reflaked at right angles to the broader end. This suggests that this end might have been used as a chisel (?). Similar implement but completely and intensively ground to much smoothness from Tekkalakota is at present on display in the Deccan College Museum.

The other end is ground to a bevel. This smooth bevel appears to have resulted due to continuous rubbing or sharpening of the axe-blades. To such tools Foote (1916 : 19–20) gave the name slick or slying stones. Some he called whet stones and hones. Foote (1916 : pl. 6, no. 1122a, pl. 20, No. 2251) had collected a whet stone from Gadiganuru of Bellary district and a hone from Bastipadu of Kurnool district. Subbarao (1949 : 159, pl. XXXV, No. 18) found a slick stone which he calls sharpner, at Sanganakallu. The present example also seems to have served the function of a rubber or sharpner. Another possible function of this interesting object is that, had it been a finished artifact it would have served the function of an axe (?) probably like the shoe-last celt of Subbarao (1949 : 147–8). Both the ends bear battered marks which show its use as a fabricator or hammer stone (?) (Fig. 6, No. 62).

MPM. 11 : Greenstone, dimensions : 20.7×10.4×8.2 cms. Weight : 2407 gms. It is an elongated pointed cylindrical tool having a circular section across the middle. One of the longer sides is convex, intentionally flaked and battered while the other is concave with cortex. One of the ends is thicker and broader than the other. Both ends are heavily battered indicating its function as a heavy fabricator (?) or a fabricator-cum-pestle (?). One of the faces was used in grinding till it became very smooth while the other is battered and lightly ground. This evidence makes us think that the tool might have been used as a muller (?) on a big flat quern. But no such querns were found at Malapuram from where that tool comes (Fig. 7, No. 63).

PPL. 47, dolerite, dimensions : 11.1×3.6×3.6 cms. Weight : 224.4 grams. It is a plano-convex specimen with a quadrangular cross section. The convex upper surface is flaked over which battering is attempted while the round under surface is cortexed. Both ends are bifacially flaked, one of them thicker than the other, probably to act as a butt. The less thicker end was probably meant for use. Since the tool is unfinished, it is difficult to say as to what type of implement man wanted to make it into. Most likely, it could have been made into a chisel (?) (Fig. 5, No. 44).

Anvil : (Dimensions : 9.1×8.8×4.5 cms.) (Fig. 7, No. 70).

In our collection there is only one specimen of anvil. It comes from Yatakal. It is asymmetrical in shape due to fractures at both ends, and is made of schist. It has a pecked and drilled convex upper surface, and a slightly rubbed roughly flat under surface. This depression was probably caused by placing cores while flaking. It possesses grooves on either side of the depression and so it is presumed that the specimen has been hafted and used in cutting and other operations. As the specimen appears to have been broken, its shape and use cannot be reconstructed.

More or less similar specimens were found by Foote (1916 : 128, No. 2873; pl. 48, No. 1466; pl. 52, No. 426) one each at Kerehal in Raichur district, south-west of Nagaladinne in Adoni taluk of Kurnool district and at Bellary fort hill. Later, a number of these were found at Navdatoli, Nevasa (Sankalia and others 1958 : 235, fig. 115, No. 14; 1960; 160–1, fig. 73, Nos. 1–2), Tekkalakota (Nagaraja Rao and Malhotra 1965 : 68, pl. XIc, Nos. 3 and 9) and Chandoli (Deo and Ansari 1965 : 134, fig. 68, No. 1).

SUMMARY

The evidence for the ground stone industry of south-western Andhra Pradesh presented in the preceding pages comes from 34 surface sites. The site of Budagavi hill yielded the highest number of artifacts (176 specimens; 9.23%) while the smallest number (5 specimens; 0.26%) is derived from Chinnadandukonda. The most favoured raw material for preparing the artifacts comprises dolerite/basalt (1441 specimens; 75.52%) of the igneous group. Other rocks like epidote granite, greenstone, pegmite, schist, quartz, sandstone and granite gneiss were also used in a small measure. The three basic stone-working techniques—flaking, pecking and grinding were all employed for the manufacture of the tools either individually or in combination with one another.

The typology consists of four categories—*edge tools*: axes, adzes, chopper–chopping tools, scrapers, chisels and flake tools; *pointed tools* like picks; *domestic implements*: rubbing stones, saddle

querns, hammer stones and axe-hammers; and *other tools* like sling stones, mace-heads, anvils and so on. Of all, axes constituting over 40 per cent form the main tool type of this industry. Majority of the axes bearing use marks, are of medium size and triangular shape with pointed butt, and have oval cross-section at the butt and in the middle, while at the cutting edge lenticular section is frequent. They were used for splitting and cutting in agricultural activities both by naked hand and by hafting into suitable handles. Other types of edge tools as well as pointed tools assisted man in clearing jungles and for other agricultural purposes, whereas domestic implements acted as kitchen equipment. Certain hammer stones and sling stones appear to have been used in hunting activities.

CHAPTER V

NEOLITHIC CULTURE II : BLADE AND CERAMIC INDUSTRIES AND OTHER ANTIQUITIES

A. BLADE INDUSTRY

The blade and microlithic industry forms an inseparable part of the neolithic culture. In the present exploration 32 sites yielded evidence of this industry on surface. The total collection from them consists of 1,548 artifacts. Five of these sites are located in the western part of Kurnool district while the remaining lie in Anantapur district.

The proportion of artifacts of the industry varies from site to site. The heavy bulk of artifactual evidence comes from only three sites : Katamadevudu hill (29.78%), Chetnepalli (20.67%) and Nagaladinne (11.62%), accounting for slightly more than half (52.07%) of the total collection. Four more sites : Peddadandukonda, Adoni, Hattibelagallu and Budagavi hill of considerable importance together contributed 20.60 per cent of the whole collection. Another six sites : Yatakal, Chinnadandukonda, Lattavaram hill, Velpumadugu, Idukal, and Vidupanakal fort yielded a total of 9.77 per cent. The rest with an average of less than one per cent artifacts yielded only 113 (7.56%) specimens. The site-wise distribution of artifacts is furnished in table 38.

Raw materials :-

Chert, chalcedony, jasper, agate and carnelian of the cryptocrystalline form, and quartz and rock crystal of the crystalline form, both of the silica group, constitute the chief raw materials used for the preparation of tools in this industry; of course, a few artifacts of igneous and metamorphic rocks, are also met with. Same is the case with other sites in the adjoining Bellary and Raichur districts.

The analysis of the materials from various sites in table 39 shows that chert (69.25%) of various shades—chocolate, brown, dark brown, brown-red, red and white—far outnumbers the rest. In the descending order of frequency come chalcedony (18.22%), quartz (4.42%), jasper (2.13%) haematite or jaspadious quartzite (1.74%), agate (1.16%), crystal (1.09%), carnelian (0.84%), quartzite (0.77%), basalt (0.19%), banded quartzite (0.13%) and schistose rock (0.06%) respectively.

Water-worn pebbles of chert, quartz and chalcedony of varying sizes (upto about 5 cms. in longer axis) abounding the shingle beds of the Tungabhadra river were freely used by the neolithic folk for producing blades and other tool types. This is true of Nagaladinne and Chetnepalli located on the Tungabhadra bank and of Bastipadu situated on the left bank of Hindri river. On sites located away from the Tungabhadra banks or limestone outcrops, the raw materials must have been imported by the people from the river beds or natural outcrops, possibly through exchange, an opinion also held by Bruce Foote (1916 : 96). Allchin (1960 : 96) thinks that the site of Hegragi (Meadows Taylor's

Hegaratgi) lying on a spur of Bhima limestone might have served the purpose of a core-producing factory for neolithic settlements. However, the sites in south-western Andhra Pradesh are not likely to have drawn their materials from this source because of their plentiful availability in the nearby Tungabhadra beds.

A low proportion of chert and chalcedony is found slightly patinated. This may be due to prolonged weathering and hence may not be helpful in estimating the antiquity of the industry.

Techniques :

The techniques involved in the manufacture of artifacts are similar to those known at other neolithic and chalcolithic sites in peninsula and central India. In his study of the blade industry of Maheshwar, Subbarao (1955 : 126–149) has recognised four stages in the manufacture of microliths : (1) dressing of the nodule, (2) preparation of crested guide ridge, (3) removal of blade flakes from prepared cores, and (4) retouching of blades to convert them into various types of tools. These are also observed in our material.

The initial stage in the techniques of manufacture entails the dressing of the selected nodules available in the form of water-worn pebbles and chunks. The aim was to attain a regular and perfect shape of the nodule by removing its outer cortex and other irregularities like roughness, unevenness etc. For this purpose the technique of pressure flaking by a light wooden or bone hammer was executed. The application of this technique by blade-makers has been confirmed by the occurrence of several rejected nodules retaining the remnants of cortex found on the sites as also the high incidence of chips (556 or 35.92%), and unutilised and utilised flakes (167 or 10.79%).

The next stage of core-preparation embraces the preparation of a crested ridge by alternate flaking from both faces of the cores along the longer axis at right angles to it resulting in a zig-zag ridge. In his study of the Navdatoli blade industry Sankalia(1967:264)points out that the preparation of the crested ridge,besides its occurrence on the longitudinal axis of the cores, has also been found across the corners and on the extreme proximal or distal, or both ends of the cores. This ridge is thought to help in the easy removal of the blade flakes of required lengths and also as a keel to hold the core tightly inserted into a groove or slot of an anvil at the time of blade production. These flakes (5 or 0.32%), also known as "detaching flakes" (*lames de degagement* in French),though of a small number in the collection, indicate the awareness of it to the artificiers of the industry about this technique. The technique was however not employed for producing a vast majority of blades though it seems to be in frequent use on raw material-rich chalcolithic sites.

Prior to the production of blades, their authors had to see whether the platforms of the cores were suitable for the punch to rest at the time of striking or were they needed to be prepared by carefully removing several tiny flakes. Majority (152 or 77.55%) of the fluted cores (196. or 12.66%) found in the explorations show faceted platforms. These cores possess one, two or sometimes even three platforms. The rest 44 (22.45%) unfaceted specimens have either a single flake surface or retain cortex on their platform.

The core thus prepared is ready for the removal of blades of varying sizes. Therefore, during the third stage the stone-workers had to devote to the production of these blades. The

technique of their production involves the maker to hold a core of his choice against the tip of a pointed chisel-like instrument which is in turn erected on a stationary block of stone known as "anvil". The maker then hits the core on its top with a hammer resulting in a narrow parallel-sided blade. The blades could also have been produced by pressure flaking (Sankalia 1964 : 35). The former method appears to have been in much more use than the latter on the sites of this region due to the association of this industry with the pecked and ground stone industry of which a large number of stone hammers and fabricators were found. Besides, many chisels which served as pointed instruments were yielded. A solitary stone anvil of schist (Rami Reddy 1968, Fig. 8, No. 7) supporting its use in the blade production was found at Yatakal in Kalyandrug taluk. Four-hundred-and-two (25.97%) unretouched as well as retouched blades were found mostly at all the sites essentially indicating the blade-producing nature of the industry. The occurrence of several core rejuvenation flakes justifies that at least one out of every four cores has been necessarily rejuvenated either to improve the existing platform or to provide a fresh one.

The final stage consisted of the blunting of one edge, generally the thicker one, of the blade by steep retouch. This was probably done to facilitate its hafting into a wooden or bone handle. These finished tool types, also known as "microliths" (86 or 5.56%) comprised backed blades, obliquely blunted flakes, truncated blades, lunates and trapezes. In truncated blades the retouch, usually confined to the shorter sides or ends, is of oblique or flat type. These tools are supposed to have been utilised as end scrapers. Other finished tool types (90 or 5.80%) were retouched by removing small, thin flakes for obtaining a sharp working edge. They include unifacial and bifacial points, most of which are made on midridged flakes and sometimes from blades with two or three ridges, borers, various types of scrapers, notched flakes and a solitary chopper. Both types of retouch, as seen from the small, shallow flake scraps on the tools, could have been executed by pressure technique with a pointed tool or bone.

Typology :

Three main groups namely flakes, blades and cores are recognisable in the whole collection. Flakes (52.77%), whose frequency is slightly over half of the total number of artifacts, predominate both blades and cores. These comprise regular tool types made by retouch, unutilised, core rejuvenation, crested guide and plunging flakes, and chips or byproduct flakes. Blades (27.52%), which come next to flakes, consist of microliths and a few points formed by retouch, and unutilised and utilised specimens. The rest (19.71%) are represented by those converted into core-scrapers by retouch, and various types of cores.

A detailed analysis of the collection, however, suggests a four-fold classification : (A) *waste products* (57.44%), the dominant category, include various types of cores, core rejuvenation, crested guide and plunging flakes, and chips; (B) *un-finished types* (13.11%) comprise unutilised flakes and blades; (C) *utilised types* (18.03%) consist of flakes and blades which bear signs of use; and (D) *finished types* (11.36%) represented by microliths (5.56%), include backed blades, lunates and trapezes. Other tools (5.80) comprise points, borers, various types of scrapers, notched flakes and a solitary piece of chopper.

Six of the total 32 sites whose artifactual number is over 20 at each, contain a percentage of finished tools ranging between 6.06 and 14.81 at five sites while the sixth site, Velpumadugu,

represents 34.62 per cent finished tools being the highest in the collection. Five sites, which yielded above 100 artifacts each, have a finished tool percentage varying from 5.82 to 18.33, the highest coming from Nagaladinne site.

The typological classification proposed for the industry is given in table 40 which shows the frequencies and percentages of artifact types at all the sites. All the types with their salient features and illustrations are described below :

I. Worked pieces (36 specimens; 2.33%) Fig. 8, No. 1 :

This type includes both chunks and water-worn pebbles of small size and irregular shape. Flakes have been exhuastively removed from these in such a way that the selected nodule or pebble got reduced to a miniature size with small traces of cortex left at one end, side or face. They do not exhibit any flake surface and the small scars on them indicate that no usable flakes were produced from them. They are smaller in size than the flake cores and, therefore, were probably resulted from the latter in the preparation of blade cores. Only nine sites yielded such specimens, the highest number (11) being found at Chetnepalli.

II. Flake cores (30 specimens; 1.95%) Fig. 8, No. 2 :

These are ordinary cores, not regularly prepared for the production of flakes of any particular size and shape. They have undergone a very liberal flaking, the flakes being removed from various sides and positions. In some cases a prepared platform is seen, but in the majority a previous flake scar was used as a platform. Several of these specimens are worked all over besides a small number of pieces with one or two flake scars.

The proportion of flake cores is very small in relation to the huge quantity of flakes and chips (52.77%). This is obviously due to the conversion of several of the flake cores into blade cores. The maximum, minimum and average dimensions[1] of these cores are 7.4×6.6×3.4 cms.; 1.5×0.7×0.5 cms. and 3.2×2.7×2.0 cms. respectively. They occur at 12 sites.

III. Blade cores (196 specimens; 12.66%) Fig. 8, Nos. 3–5) :

These are found at all but three sites. Katamadevudu hill yielded the highest number (50) of cores. They range in length between 1.3 and 6.5 cms., in breadth between 1.0 cm. and 4.4 cms. and in thickness betweeen 0.5 and 2.4 cms; the average measurements are 2.4×1.8×1.3cms. These are regular cores from the broad, mostly prepared platforms of which were removed thin, parallel-sided flakes or blades. In shape, cores are cylindrical, tabular or quadrilateral with pointed chisel, or flat-based ends. The occurrence of core rejuvenation flakes(3.04%) removed from fluted cores, as also the existence of more than one platform, shows that many nodules were subjected to more than one phase of blade-removal. Of the total 196 cores, 152 (77.55%) have faceted platforms (Fig. 2, Nos. 10, 12–13, 16–17, 20, 22) while the rest 44 (22.45%) are unfaceted having either plain cortexed surface (18 or 9.18%) or a single flake surface (26 or 13.27%). The occurrence of faceted platforms more frequently on cores made of fine-grained rocks than on those of coarse-grained rocks shows that the latter material is bad for

1. Dimensions are throughout given in the order of length, breadth and thickness.

flaking purposes. Judging from the number of platforms, 121 (61.74%) cores are found to possess only one platform (Fig. 2, No. 3), while the remaining 67 (34.18%) and eight (4.08%) specimens have two (Fig. 2, No. 4) and three (Fig. 2, No. 5) platforms respectively.

To understand the usual length of the blades, of which several (46.27%) are broken, the whole collection of cores have been measured for their lengths and their distribution into various length classes is given below.

Length class (centimetres)	*No.*	%
1.0 - 1.5	7	3.57
1.6 - 2.0	47	23.98
2.1 - 2.5	63	32.14
2.6 - 3.0	35	17.86
3.1 - 3.5	26	13.27
3.6 - 4.0	10	5.10
4.1 - 4.5	4	2.04
4.6 - 5.0	2	1.02
5.2 -	1	0.51
6.5 -	1	0.51
Total	196	100.00

The above analysis shows that the highest number of cores (32.14%) are included in the 2.1–2.5 cms. category. Majority of the cores (87.25%) generally measure between 1.6 and 3.5 cms., while slightly over 8 per cent specimens measure between 3.6 and 5.0 cms. The last two specimens (1.02%) from Chetnepalli measuring 5.2 and 6.5 cms. respectively form individual classes.

IV. Core rejuvenation flakes (47 specimens ; 3.04%) fig. 8, No. 6

These flakes were detached from the apex, base or toe of the fluted cores either to improve the existing platform or to provide a fresh one when the chance of obtaining blades from the original platform was weakened. Traces of the original blade scars as well as platform are clearly visible on the surface of these flakes. In size, they range from 1.2 to 3.3 cms. in length, 0.8 to 2.3 cms. in breadth and 0.3 to 1.5 cms. in thickness. Their average dimensions are $2.3 \times 1.6 \times 0.7$ cms. Only 11 sites yielded these flakes the highest number (21) being found at Katamadevudu hill site.

V. Crested guide flakes : (5 specimens; 0.31%) Fig. 8, No. 7–8.

These flakes prior to their removal were prepared on the cores by alternate flaking from two faces along the longer axis of flakes producing a crested ridge. The first blade removed from the core

was along this 'crested ridge' and this is believed to have helped in controlling the run of subsequent flakes. They have triangular cross section. Only two sites, Chetnepalli and Nagaladinne, yielded these flakes.

VI. Plunging flakes : (19 specimens; 1.23%) Fig. 8, Nos. 9–10.

These flakes resulted from hinge fracture. They are usually end-flakes thicker at one end with one of the surfaces convex ridged and the other deep concave. In cross-section they are roughly triangular. Their length ranges from 1.6 to 3.8 cms. All the specimens are complete excepting one which is a broken distal end. Three of these flakes show use marks. They are present at nine sites of which Katamadevudu hill yielded the highest number (9).

VII. Chips : (556 specimens; 35.92%) Not illustrated.

These are shapeless by-product or waste flakes resulting from the preparation of blade cores and various types of artifacts. They are smaller in size than the flakes. None of them bear either signs of retouch or of utilisation. They were found at 23 sites, the high incidence(206) occurring at Katamadevudu hill site.

VIII. Flakes : (148 specimens; 9.56) Fig. 8, Nos. 11–13.

This group includes both unutilised (type VIII, Fig. 8, No. 11) utilised (type X) flakes, and (Fig. 8, Nos. 12–13). The proportion of the latter type of flakes (5.56%) is more than that of the former (4 00%)in the total collection. They occur at 21 sites. At five important sites whose artifactual frequency exceeds 100 at each, the percentage of flakes ranges between 3.88 at Adoni East and 11.88 at Chetnepalli.

Of the total flakes, 93 (62.84%) are end-flakes, 14 (9.46%) are side flakes and the remaining 41 (27.70%) are indeterminate. These flakes are mostly elongated like blades but their breadth is more than that of the latter. Some of them are oval and leaf-like (Fig. 2, No. 12) in shape though irregular forms are also present. They vary considerably in size. The biggest flake measures 7.9 cms. in length, 3.5 cms. in breadth and 1.5 cms. in thickness (Fig. 2, No. 13) while the smallest one has the dimension of 1.3× 0.9×0.3 cms. The average size is 2.5×1.7×0.7 cms. Larger flakes appear to have resulted during the splitting of big pebbles or chunks either horizonatally or vertically for producing short blade cores; whereas the smaller flakes seem to have been directly struck from the unprepared as well as prepared platforms of the cores. Majority of the flakes are partially or fully worked while only a few bear cortex on their dorsal surfaces.

IX. Unretouched blades : (335 specimens; 21.64%) Fig. 2, Nos. 14–17.

In this category are included both unutilised (type IX) and utilised (type XI) blades. Like the utilised flakes, the frequency of utilised blades (12.53%)is more than that of the unutilised blades (9.11%) in the total collection. Of the total utilised blades (194), only 47 (24.23%) (Fig. 2, No. 14) specimens bear use marks on one lateral side while the rest 147 (75.77%) pieces (Fig. 2, Nos. 15-16) exhibit use marks on both lateral sides. The other 141 specimens are neither retouched nor used (Fig. 8, No. 17).

Of the total blades, 165 (49.25%) are complete, 66 (19.70%) are proximal ends, 94 (28.06%) are middle portions and ten (2.99%) are distal ends. An analysis of the blades according to their dorsal

surface facets shows that 168 (50.15%) are with a single midridge, 163 (48.66%) are with two parallel ridges and only four (1.19%) have three ridges.

These blades were found at 24 sites. At five rich sites the percentage of blades varies between 17.76 at Peddadandukonda and 31.88 at Chetnepalli. Blades range in size from 1.1 to 4.4 cms. in length, 0.5 to 2.0 cms. in breadth and 0.2 to 1.1 cms. in thickness. The mean measurements are 2.0× 0.9×0.4 cms. One hundred and thirty complete blades from five sites were measured for their lengths against those of blade cores already studied. Their distribution into various length classes is as below.

Length class (centimetres)	*No.*	%
1.0 - 1.5	21	16.15
1.6 - 2.0	48	36.92
2.1 - 2.5	42	32.31
2.6 - 3.0	12	9.23
3.1 - 3.5	5	3.85
3.6 - 4.0	2	1.54
Total :	130	100.00

The above analysis shows that majority of blades also, like the cores, vary between 1.6 and 3.0 cms. In this category, the percentage of cores is about 74 and in the blades it is about 78. There is no blade measuring beyond 4.0 cms. though there are eight (4.08%) cores measuring above 4 cms., upto a maximum of 6.5 cms. However, the proportion of cores and blades in regard to length is close to each other.

X. Microliths : (86 specimens; 5.56%) Fig. 8, Nos. 18–29.

Microliths, unlike the unretouched blades, are finished types. These, although occur at 15 sites, are in majority (58.14%) from Chetnepalli (25.58%) and Katamadevudu hill (32.56%). There are five types of microliths in the collection : backed blades, obliquely blunted blades, truncated blades, lunates and trapezes (types XII to XVI given in table 40). Excepting the truncated blades, whose shorter sides or ends are worked by oblique or flat retouch, in all the other types one of the longer sides, usually the thicker one, is steeply blunted by secondary trimming, probably for hafting, while the other is a thin, sharp, working edge bearing use marks.

XI. Backed blades : (17 specimens; 1.10%) Fig. 8, Nos. 18–19.

This type is present at seven sites. But, of the total 17 specimens, nearly half the number (8) came from Katamadevudu hill site only. Almost all these blades are left-sided, *i. e.*, blunted on the left lateral side.

XII. Obliquely blunted blades : (27 specimens; 1.74%) Fig. 8, Nos. 20–22.

This type like the previous one, also occurs only at seven sites with a high incidence of tools (12) found at Katamadevudu hill. Unlike in the backed blades the blunted side in these tools curves to meet the unretouched side. These blades range in size from 1.2 to 3.8 cms. in length, 0.4 to 1.8 cms. in breadth, and 0.2 to 0.9 cms. in thickness. The average dimensions are 2.1×0.7×0.4 cms.

Of the 23 blades, eight are blunted near the tip alone (Fig. 8, No. 22), while in the remaining 19, blunting is visible all along their backs (Fig. 2, No. 21). Twenty-two specimens are left sided (Fig. 8. Nos. 20–21) and the rest two right sided (Fig. 8, No. 22). Further, 14 specimens have a thin lateral side and a thick double-edged side, which makes a triangular section with the former (Fig. 8, No. 20). In these tools, the thin lateral side is curved concavo-convex, or concave all along and rarely straight. The remaining 13 specimens are nothing but parallel-sided blades, with one midridge or two ridges, one of the lateral sides of which is converted to a curved blunt edge to facilitate hafting (Fig. 8, No. 22).

Among these blades, there is one specimen (Fig. 8, No. 21) in which the blunted edge is retouched in such a way that two arms are produced, the upper being shorter and more oblique, and ending in a point. The trimmed lower portion is to improve hafting. Lal (1958 : 27, sub-type Gx, figs. 10, 27–28, pl. IX A 27–8) illustrated similar specimens from Birbhanpur microlithic site. He classified them as obliquely blunted points. Prof. Sankalia[1] compares this tool with the *"Gravette point"* of the European upper palaeolithic. He (1964 : 70), however, calls it 'straight with one end pointed blade' or asymmetrical point. The writer thinks that this unique piece might have been put to use both as a blade, as is evident from the use marks, and as an asymmetrical point.

Regarding the blunting of the edges either straightly or obliquely, various hypotheses have been put forth of which the most popular one holds that these blunted sides were so made to facilitate hafting. But according to Braidwood (1957 : 75) the blunted edge is to save the user's fingers from being cut. Mitchell (1949 : 60–63, fig. 24, p. 59, Nos. 1–16) classifies the obliquely blunted blades as asymmetrical points. He explains that there are flake tools with one end narrow, thin and pointed and the other thick, broad, blunt serving as a butt. As these blades have been blunted on one lateral margin, he called them asymmetrical points. But, the possibility of their being used as baldes cannot however be ruled out as is evident from the utilised marks.

XIII. Truncated blades : (23 specimens; 1.49%) Fig. 8, Nos. 23–24.

This is the only type that occurs at ten sites. Of the total blades, 19 are complete and the rest four, broken fragments comprise, two each, of proximal and distal ends. In 12 specimens, retouch is executed transversely (Fig. 8, Nos. 24) in eight at one end (Fig.8, Nos. 23–24) and in four at both ends. The rest 11 specimens are obliquely retouched only at one end (Fig. 8, No. 23).

Truncated blades range in size from 1.2 to 3.2 cms. in length, 0.5 to 1.2 cms. in breadth and 0.2 to 0.7 cms. in thickness. The average measurements are 2.0×0.8×0.3 cms. The purpose of truncation of parallel blades either transversely or obliquely is difficult to predict. It is likely that these blades with retouch at their ends served the purpose of end-scrapers.

1. Has kindly examined the writer's collections.

XIV. Lunates : (17 specimens; 1.10%) Fig. 8, Nos. 25–27.

These were found at six sites. Chetnepalli alone yielded ten specimens. Their dimensions vary between 1.1 and 1.9 cms. in length, 0.4 to 0.9 cms. in breadth and 0.2 to 0.5 cms. in thickness. The mean measurements are 1.5×0.6×0.3 cms.

The following distinctions are made amongst the present collection of lunates. (1) There are 12 lunates, whose dorsal surfaces are ridged indicating that they were made from minute parallel sided blades (Fig. 8, Nos. 25–27). Their under surfaces are either flat or in a few slightly concave. The remaining five specimens possess single flake surface on both dorsal and ventral surfaces. (2) In all the lunates, the maximum length is frequently two-and-a-half times and sometimes even more than three-and-a-half times the maximum breadth. In all specimens only arc is blunted while the chord or axis bears signs of use.

XV. Trapezes : (2 specimens; 0.13%) Fig. 8, Nos. 28–29).

In this type, the two unretouched horizontal sides (upper and lower) are parallel to each other while the shorter blunted sides are not. The two specimens of this type occurs, one each, at two sites, Chetnepalli and Velpumadugu. Both are made on parallel sided blades. The maximum length is more than twice the maximum breadth in both pieces. The specimen from Velpumadugu (Fig. 8, No. 29) which is of quadrilateral shape, has its two horizontal sides non-parallel to each other. Moreover one of these sides, along with both the shorter sides, is blunted. According to Clark's definition (1932 : xxiii), this specimen approaches a trapezoid (?).

XVI. Points : (15 specimens; 0.97%) Fig. 8, Nos. 30–31 : Fig. 9, No. 35.

These occur at 12 sites. Fourteen points are retouched unifacially and bimarginally while the remaining one specimen is retouched bifacially and bimarginally. The base of this specimen which is narrowed by retouch appears to have served the function of tang. All the points are complete except for one specimen which is a broken proximal end. In size, they range from 1.6 to 6.2 cms. in length, 0.5 to 2.7 cms. in breadth and 0.3 to 1.5 cms. in thickness. The average measurements are 2.6×1.3×0.6 cms. Majority of the points measure between 2 and 3 cms. in length.

Of the unifacial points, three specimens are retouched near their tips, eight all along their lengths (Fig. 8, Nos. 30–31) and the remaining three are worked all over (Fig. 3, No. 35). The earlier two varieties are more or less symmetrical in shape while the last variety contains asymmetrical specimens. At least three points are made on true parallel sided blades (Fig. 8, No. 30) and the rest on elongated end and indeterminate flakes.

XVII. Borers : (4 specimens; 0.25%) Fig. 9, No. 36.

These tools occur at Chetnepalli, Peddadandukonda and Velpumadugu. All are made on flakes. The shoulders of the tool from either side produced a well pronounced working point. The illustrated specimen from Chetnepalli is a typical borer but for its accidentally broken tip. It is a deeply patinated elongated ovoid tool with planoconvex cross-section.

XVIII. Scrapers : (66 specimens; 4.27%) Figs. 8 and 9.

This is the largest single group, which alone accounts for more than one-third (4.27%) of the finished tools (11.36%). The whole collection comes from 18 sites. Their high incidence can be seen at three

sites : Nagaladinne (24 specimens; 36.36%), Chetnepalli (15 specimens; 22.73%) and Katamadevudu hill (8 specimens ; 12.12%), which together constitute 71.21 percent of the total specimens; majority (49 specimens; 74.24%) of the scrapers are made on flakes; end (24 specimens; 36.36%), side (5 specimens, 7.58%) and indeterminate (20 specimens; 30.30%); 17 (25.76%) specimens are made on complete, or transversely or longitudinally broken pebbles (13 specimens; 19.70%) and cores (4 specimens; 6.06%).

Scrapers vary in size from 1.8 to 7.7 cms. in length 1.0 to 6.4 cms. in breadth and 0.4 to 3.9 cms. in thickness. The mean measurements are 3.6 x 2.6 x 1.3 cms. Nearly two-thirds (40 specimens; 60.60%) of the total scrapers range in length between 2.1 and 4.0 cms. while only 17 (25.76%), six (9.09%) and three (4.55%) vary fom 4.1 to 6.0 cms. 1.8 to 2.0 cms. and 6.1 to 7.7 cms. respectively. On the basis of extent of retouch and shape, scrapers are divisible into the following six sub-types with varieties wherever needed.

(a) **Side scrapers :** (47 specimens; 3.04%) Figs. 8 and 9.

This sub-type, represented by 11 sites, is the biggest of all and comprises nearly three-fourth (3.04%) of the total collection (4.27%). The scraping edge is confined to a single side or extends along two sides. The sides are straight, zig-zag or convex in form. Further retouch is executed from one or both faces. Thirty two (2.08%) specimens are unifacially worked straight or zig-zag single side scrapers (Fig. 8, No. 34), while four (0.25%) are bifacially (Fig. 9, No. 38) treated. In ten (0.65%) specimens, the scraping edge is convex. Only one unifacially worked specimen is a double-side scraper (Fig. 9, No. 37).

(b) **Hollow scraper :** (1 specimen ; 0.06%) Fig. 9, No. 39.

The only specimen included in this sub-type was found at Nagaladinne.

(c) **Side-and-end-scrapers :** (3 specimens; 0.20%) Not illustrated.

The three specimens of this sub-type occur at three different sites : Bastipadu, Hulikal and Velpumadugu. Here, the retouched one side and end act as scraping edges.

(d) **End scrapers :** (12 specimens; 0.78%) Fig. 8, No. 33.

This sub-type, present at ten sites, forms the second important group among scrapers, the first being side - scraper. Here one of the both ends or short side are secondarily worked for scraping purposes while the longer sides remain unworked. Among these, ten (0.65%) specimens possess retouch at one end (Fig. 8, No. 33) while the remaining two are two-end scrapers. Excepting one core tool, all others are made on end or indeterminate flakes and rarely on sideflakes.

(e) **End-and-hollow scraper :** (1 specimen; 0.06%) Fig. 9, No. 41.

Like sub-type (b), this too is represented by a single specimen found at Katamadevudu hill.

(f) **Round scrapers :** (2 specimens; 0.13%) Fig. 9, No. 42.

The two specimens of this sub-type were collected at Chetnepalli and Nagaladinne.

XIX. Notched flakes : (4 specimens; 0.25%) Fig. 9, No. 32.

The presence of secondarily prepared 'notch' in these flakes separates them from those classed under unfinished and finished types although both these types are similar to each other in form. Further, their retouched 'notch' or 'concavity' is confined to a particular spot of one of the sides unlike the fully retouched concave-side scrapers. However, functionally both the types, concave scrapers

and notched flakes may be similar to each other. These are present at four sites and are higher in proportion (0.25%) than the hollow scrapers (0.06%) in the collection.

XX. Chopper : (1 specimen; 0.06%) Fig. 9, No. 43.

This type, represented by a solitary specimen, was found at Nagaladinne. It is made on a pebble, one end of which is unifacially worked to form an oblique working edge, and cortexed end serving as butt.

SUMMARY

The evidence for the neolithic blade industry of south-western Andhra Pradesh comes from 32 sites. The site of Katamadevudu hill yielded the largest number of artifacts (461 specimens; 29.78%). The chief raw material for the preparation of artifacts of this industry is chert of various colours as in that of mesolithic period. Other siliceous rocks like chalcedony, quartz, jasper etc., were also used to some extent. Most of these were available in the surroundings of the sites as in pecked and ground stone industry.

The tool-manufacturing techniques involve four stages: dressing of the nodule, preparation of crested guide ridge, removal of blade-flakes from prepared cores and retouching of blades to convert them into various types of tools. The occurrence of a high proportion of blades (25.97%) and a relatively small proportion of finished products (11.36%) including microliths and other tools like points, borers, scrapers etc., suggests that the people were mainly interested in producing blades while retouch was a secondary criterion for them. A single specimen of crested guide flake and a trapeze of this industry are absent in that of mesolithic period of the region.

B. CERAMIC INDUSTRY

This study is based on a surface collection of 246 pot-sherds from 21 sites.[1] The largest number of sherds comes from Hulikal (36 or 14.64% sherds) and close to this comes the Katamadevudu hill site with 35 (14.23%) sherds, while the smallest number (1 or 0.40% each) of sherds comes from four sites. The incidence of pottery at various sites is not without some relation to the incidence of stone industry. For instance, Hulikal and Katamadevudu hill, which yielded the highest proportion of pot-sherds are also rich in artifacts of ground stone and blade industries.

On the basis of surface colour, the pottery has been classified into two main wares—blotchy grey ware and dull red ware. The grey ware comprises 149 (60.57%) sherds and occurs at all sites except one, namely Chetnepalli. Dull red ware includes the remaining 97 (39.43%) sherds and was found only at 16 sites. Table 4 gives the ware and site-wise distribution of all the pottery.

All the pottery is hand-made. It is classified into a number of sub-wares on the basis of surface treatment, nature of clay, technique of manufacture, shape and decoration. A detailed account of all the occuring wares, sub-wares and the types and designs in each is as follows :

1. Palavoy is excluded from this list since the result of the excavations have been published in the Andhra Pradesh Government Archaeological series No. 43 (1977).

I. Blotchy Grey Ware (Figs. 10–13)

This ware has a blotchy appearance due to uneven firing and is characterised by a black core mostly in all its sub-wares. The fabric is hand-made, coarse and gritty. In majority of the sherds (128) the external surface colour varies from dull grey to pale (having a greenish tinge over the surface) grey, while the inner is black. However, in a total of 21 sherds both internal and external surfaces are of black colour and this marked difference of colour is not to be ignored. But, it is too difficult to treat these as a separate ware due to their small numbers only at a few sites (9) where the incidence of grey ware sherds is very high. These sherds are presently treated in this ware as their significance as a separate ware is to be known in the light of future investigation in the region. The thickness of the fabric varies from 0.7 to 1.9 cms. as far as the present collection is concerned. The vessels of pale grey ware are of ten slipped.

Two varieties can be noticed in this ware: (1) Unburnished grey ware, and (2) burnished grey ware.

1. Unburnished Grey Ware: (Fig. 10).

This sub-ware includes 45 sherds accounting for 30.20 per cent of the grey ware. Only four sherds bear decoration. The pots are crudely made and bear no slip. The most common shapes are small and big globular vessels with constricted as well as concave necks and flaring rims, basins, lugs and handles, and spouted pots. This sub-ware is found at 14 sites.

Types [1] :

T. 1 Small vessel with constricted neck and short flaring rims. Sides become thinner down below neck (LVH. 1).

T. 2 Big vessel with short concave neck, convex flaring rims and flat edge (KML 1). Variant 20 is smaller with square edge (NDN 1).

T. 3 Fragment of, probably, a basin with a ridged shoulder (HKL 1).

T. 4 Fragment of a lug, long and broad with uneven upper and under surfaces (KDH 8).

T. 5 Part of a cylindrical handle gradually tapering to one end. Circular in transverse section (HKL 7).

T. 6 Almost a complete specimen of tubular spout, 4.3 cms. in length and 1.9 cms. in diameter at the mouth. (HKL 8).

Decoration :

Only four decorated sherds were found in this ware.

1. Impressed designs :

D. 1 Flat edge of the rim of a vessel impressed with a cylindrical or square-shaped instrument. The impressions are close to each other (Fig. 10, T. 2).

D. 2 The shoulder fragment of a basin is finger-tip impressed (Fig. 10, T. 3).

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1. Type numbers given here and after correspond to the actual number of sherds illustrated. This had led to a certain overlap of types in different wares and sub-wares. As drawings were made earlier and numbered T_1, T_2...., etc. The mistake could not be rectified later on.

2. Perforated Design :

D. 3 A sherd with a solitary perforated hole having a diameter of 0.4 cms (VMG 1).

3. Incised Design :

D. 4 The square rim of a pot incised with four obliquely cut marks (Fig. 10, T. 2a).

2. Burnished Grey Ware : (Figs. 11–13)

There are 104 (42.28%) sherds in this ware from 17 sites. These account for more than twice the quantity of unburnished grey ware. Of these 88 are undecorated while the remaining 16 are decorated with red ochre paint.

The external surfaces of the pots are slipped and highly burnished and majority of these exhibit a fine smooth appearance. They are blotchy due to uneven firing. The most common types in this ware are small and big, narrow as well as short concave necked globular vessels with straight, concave or convex flaring rims. Big vessels of this type with a diameter between 30 and 50 cms. must have been used for storing grains while the smaller variety must have been employed for cooking. Other types consist of rimless bowls, tipped vessels, spouted pots, pots with ladled handles, and carinated pots. Besides these, in red ochre painted grey ware, pots with high cylindrical neck occur.

Red ochre painted decoration occurs on almost all the types and it is often confined to the rims but sometimes extends to internal and external neck portions.

This ware, both in undecorated and ochre painted varieties, is most common at Gulapalyam, Hulikal, Katamadevudu hill and Velpumadugu.

Types :

T. 7 Small vessel with constricted neck and straight flaring rims (APL. 1).

T. 8 Big vessel with constricted neck and straight flaring rims (VMG. 5). Variant 8a has convex flaring rims (VMG. 1).

T. 9 Small vessel with concave neck and straight flaring rims (KDH. 1). Variant 9a has convex flaring rims (GPM. 1).

T. 10 Big vessel with short concave neck and straight flaring rims. Outgoing sides get thinner below neck (HKL. 4). Variant 10a has convex flaring rims (KDH. 2).

T. 11 Pot with cylindrical neck and convex curved out-turned rims (GPM. 2).

T. 12 Rim-fragment of a lipped pot (KDH. 5).

T. 13 Medium - sized bowl with bulging sides, slightly out-turned bevelled edge, externally grooved and sides getting thinner towards the bottom. Both inner and outer surfaces burnished (HKL. 15). Variant 13a is a big sized bowl with convex sides and rounded edge (HKL. 11). Variant 13b is smaller with bulging base (KDH. 9). Variant 13c is a shallow bowl grooved externally (GPM. 1).

T. 14 Rim fragment of a lipped pot with a made cavity near the rim to serve the purpose of a spout probably (KDH. 7).

T. 15 Almost a complete specimen of tubular spout measuring 6.4 cms. in length and 2.2 cms. in diameter at the mouth (GPM. 4). Variant 15a has a length of 5 cms. and diameter of 1.8 cms. at the mouth. (PDK. 1).

T. 16 Part of a ladled handle of a small bowl or pot tapering towards outside; cylindrical in shape and circular in cross section. Lightly burnished (VMG. 7).

T. 17 Fragment of a pot with carination on the belly (VMG. 6).

Decoration :

The only decoration seen in burnished grey ware is that of red ochre painting. Sixteen sherds bear this decoration. The ochre wash was given after firing. This decoration is commonly found on vessels, lipped pots and bowls of various sizes.

Designs :

D. 5 A band of red ochre paint applied around the constricted neck of a small vessel (Fig. 10, T.7)

D. 6 Six vertical bands of red ochre are seen suspended from the edge on the interior of the rim besides the band around the constricted neck of vessel (KDH. 10).

D. 7 The edges of pot types 8, 9, 11 and bowl type 13a are painted with a red ochre band.

D. 8 The edge and the external surface below the edge of a lipped pot are painted with red ochre. It seems to be an animal design but not decipherable (KDH. 6).

II. Dull red ware: (Figs. 13–15)

This ware is distinguished by its coarseness which is the result of poor clay and firing. The clay is sometimes micaceous and surfaces are uneven, particularly, in unburnished variety. The external surface colour varies from brick-red to burnt-sienna, while the internal is often black. The fabric consists of a black core mostly. Its thickness varies from 0.7 cm. to 2.2 cms. The ware is divisible into two varieties : (1) Unburnished and (2) burnished.

1. Unburnished dull red ware: (Figs. 13–14).

This ware includes a total of 62 (25.20%) sherds. Of these, seven are decorated. In the red ware the percentage of this ware (63.92%) exceeds that of the burnished variety.

This ware occurs at 12 sites. The largest number of sherds (16) comes from Havaligi. The most common shapes in this variety are small and big sized globular vessels with short concave as well as constricted neck, and straight and convex, flaring rims. Other types include the wide-mouthed pots spouted vessels, basin and handles of different kind.

Types :

T. 18 Small vessel with short concave neck and convex flaring rims. Edge round (HVG . 2). Variant 18a has straight flaring rim and broken edge. Outgoing sides get thinner as they go downward from the neck (BGH. 1). Variant 18b is bigger with convex flaring rims (HKL. 1).

T. 19 Vessel with constricted neck and straight flaring rims. Edge broken (BMH. 2).

T. 20 Pot with a wide mouth and convex flaring rims. Edge sloping (UKD. 3).

T. 21 A small sized spouted pot with constricted neck and convex flaring rims. Spout, probably cylindrical in shape, is missing. Surfaces slipped (MGL. 2).

T. 22 Fragment of flat base of a basin or wide vessel (HBG. 1).

T. 23 Fragment of a broad handle, 11.8 cms. wide, thickly slipped. One of the surfaces retain scratches of rubbing (HKL. 4).

T. 24 Fragment of a looped handle of circular shape, probably half portion, with a diameter of 6.2 cms. having a circular hole in the centre to serve as loop for holding (VMG. 1).

Decoration :

Five of the decorated sherds are fragmentary indicating no shape of the pot to which they belong, while two sherds, with finger-tip impressed rims, belong to a big vessel with short concave neck and convex flaring rims resembling type 18b pots.

Three types of decoration are seen in this ware: (1) impressed, (2) perforated and (3) painted.

1. Impressed designs:

D. 9. There are two sherds of this decoration. Both these come from Karakumukkala and bear identical design. The sherds are rim fragments of a big globular vessel with short concave neck and convex flaring rims. The edge of the rim comprises numerous short narrow depressions made by pressing wet clay with fingers. They give a corrugated appearance to the flat surface of the edge (KML. 2)

2. Perforated designs:

D. 10 to 10a. The two sherds of this decoration one each came from Uravakonda and Velpumadugu. The shape of pots to which they belong is not clear. They bear perforated decoration consisting of several circular holes with a diameter measuring between 0.6 and 1.1 cms. (VMG. 2 and UKD. 1).

3. Painted designs:

D. 11, 11a and b. The three black painted sherds are fragmentary occurring one each at Mudigal, Kunduripi and Katamadevudu hill. The painting on all the three is similarly represented by horizontal bands of 0.2 to 0.4 cms. width. The three sherds are illustrated (KDH. 1, and MGL. 2).

Burnished dull red ware: (Figs. 14–15).

There are 35 sherds of this ware. Of the total red ware sherds, this ware constitutes only 36.08 per cent. Of these 31 sherds are undecorated while the rest four are decorated – two finger-tip impressed, and the other two, each incised and painted respectively.

This ware is known from 14 sites but is more common at Mudigal, Gulapalyam and Buthamahal hill. The notable shapes in this ware are small and big-sized vessels with constricted as well as short concave neck and straight or convex flaring rims similar to those seen in blotchy grey ware. Other types comprise small bowls, spouted pots and a basin.

Types :

T. 25 Vessel with nearly concave neck and almost straight flaring mouth (APL. 1). Variant 25a has convex flaring rims.(BGH. 1)

T. 26 Big-sized vessel with constricted neck and straight converging flaring rims. The outgoing sides project out from the thicker neck at an acute angle (GPM. 1). Variant 26a has convex flaring rims (HKL. 3).

T. 27 Pot with cylindrical neck and convex curved rims (GPM. 3).

T. 28 Fragment of a big vessel or basin (KDH. 2).

T. 29 Big-sized bowl with bulging sides (LVH. 3). Variant 29a is deep with slightly bulging sides (LVH. 3). Variant 29b is flaring-sided with bevelled edge (KDH. 3). Variant 29c is smaller with slightly bulging out sides (KDH. 1). Variant 29d is tapering sided (BMH. 1).

T. 30 Fragment of a tubular spout with a diameter of 1.5 cms. at the mouth (HVG. 1).

Decoration :

There are four decorated sherds. These show three types of designs : (1) impressed, (2) incised and (3) painted.

1. Impressed designs :

D. 12 Edge of a bowl partly decorated with finger-tip impressions (Fig. 14, T. 29).

D. 13 Big vessel or basin with decoration of finger-tip impressions on the shoulder (Fig. 14, T. 28).

2. Incised designs :

D. 14 The flat edge of a bowl with incised decoration of five obliquely cut marks (Fig. 15, T 29a).

3. Painted designs :

D. 15 Bowl painted with black decoration of several short strokes on the bevelled edge and a broad horizontal band with several thick vertical zig-zag bands against it on the external surface below the edge (Fig. 15, T. 29b).

We may now summarise the results of this study.

The largest quantity of pottery occurs in blotchy grey ware (60.57%). The site of Hulikal yields the highest number of sherds (36 or 14.64%) and close to this frequency with a sherdless comes that of Katamadevudu hill (35 or 14.23%).

In both the main wares the frequency of burnished sherds (139 or 56.51%) is higher than that of the unburnished specimens (107 or 43.49%). This tendency indicates the preference and interest of man towards the process of burnishing of a much more percentage of pottery.

None of the sites or wares is represented by all the types and designs. An anlysis of the shapes of the specimens belonging to both unburnished and burnished varieties shows that the *globular* vessels of various sizes with constricted as well as short concave neck and straight or convex flaring rims are of common occurrence in all the wares. The next common shape includes tubular spouted

pot occurring in all the wares. Bowls are represented by burnished grey ware and red ware. Lugged and cylindrical handles are restricted to unburnished grey ware while ladled handles are found in burnished grey ware and broad handles and looped handles in burnished red ware. The rest are all uncommon types which include a lipped bowl and a belly carinated pot both occurring only in burnished grey ware, a wide mouthed vessel and a basin in unburnished red ware, and a solitary example of a pot with cylindrical neck represented by burnished red ware.

In burnished grey ware pots painted with red ochre include globular vessels with constricted as well as short concave necks and straight flaring rims, and bowls. Besides these, a pot with cylindrical neck and a lipped bowl also occur.

Incised decoration is represented by a small pot with short concave neck and a bowl belonging to unburnished grey ware and burnished red ware.

Finger tip impressed decoration is found on the edges of big pots with short concave neck and flaring rims of unburnished grey ware and red ware. It is also represented by a bowl and a basin of burnished red ware. Perforated designs are known on fragments of unburnished grey ware and red ware.

Black painted decoration, occurring only in red ware of unburnished and burnished varieties, is represented by a flaring sided bowl.

The occurrence of a few painted black-on-red ware sherds only at three sites : Katamadevudu hill, Kunduripi and Mudigal—indicates that these pots have been imported from the northern Deccan. Even non-painted decorative motifs are found on a small number of sherds (13) which shows the crudeness of the industry taking it to pure and early neolithic cultures.

Tables 42-43 show the types and designs at various sites.

C. BEADS

The exploration yielded a total of ten beads of which six specimens are complete while the remaining four are broken halves. All the ten beads were collected from only four sites in the following order : (1) Bastipadu—three, one complete and two broken halves ; (2) Hattibelagallu—three, two complete and one broken half ; (3) Katamadevudu hill—three, two complete and one broken half ; and (4) Velpumadugu—one complete specimen. Seven of the total beads are made of steatite while the rest of the three specimens, one each, are prepared from agate, carnelian and chert respectively.

With regard to their shapes and sections, it may be mentioned that six pieces are discoidal, ground to a round outline with a perforation in the centre, two are truncated short bicones, and the remaining two are long bicone and short bicone to barrel, both truncated, respectively. The short and long bicones and bicone to barrel shaped specimen give a circular section in the centre, while the discoidal shaped specimens give a rectangular section with rounded or curved sides.

The short bicones vary in diameter from 0.6 to 0.8 cms. and in thickness from 0.5 to 0.7 cms. The truncated long bicone is 1.3 cms. in length and 0.9 cms. in thickness while the bicone to barrel-shaped

specimen is 1.1 cms. long and 1.2 cms. thick. The discoids—all made of steatite range in diameter from 0.8 cm. to 1.6 and in thickness from 0.2 to 0.3 cms. while an average specimen is 1.2 cms. in diameter, 0.25 cms. in thickness.

The following seven beads are illustrated (Fig. 9, Nos. a–g):

Nos. a to c discs, steatite (BPU. 1 and HBG 2 to 3).

d. Short truncated bicone, circular, steatite (KDH 1).

e. Broken half of a bicone to barrel shape, circular, blackish chert (KDH 2).

f. Truncated short bicone, circular, carnelian, the whole surface orange to blood red in colour (VMG. 1).

g. Truncated long bicone, circular, agate, entire surface with full of ripple bands of orange colour with whitish tinges (KDH. 3).

Foote (1916 : 207) found beads at the sites of Havaligi and Katamadevudu hill in this region. The latter site had yielded three beads to the writer also. Beads, were also recovered in the excavation at Brahmagiri (Wheeler 1947–48 ; 264–7), Sanganakallu (Subbarao 1949 : 125), Maski (Thapar 1957 : 104–9), Piklihal (Allchin 1960 : 109–111) and Tekkalakota (Nagaraja Rao and Malhotra 1965 : 79–80) in the South.

Allchin (1960 : 111) thinks that these objects of ornament, particularly the steatite discs, have reached the Deccan neolithic sites from the Indus valley as exchange articles or brought first by the itinerant nomadic pedlars while they were passing through the Indus valley region. From our observation it may be pointed out that there was no need for man to import these objects of lapidary art from such a far off place like Indus valley when the required raw materials are abundantly available in the South. For instance, steatite occurs in limestones in Bellary (Francis 1904 : 20) and Anantapur (Chandrasekhar 1964 : vi) districts. Similarly agate and chert could be produced from the Tungabhadra shingle beds.

CHAPTER VI

RELATION OF THE NEOLITHIC CULTURE OF SOUTHWESTERN ANDHRA PRADESH WITH OTHER AREAS

The non-artifactual and artifactual evidence collected from the surface of several sites have shown us that there existed in the dim past in southwestern Andhra Pradesh three distinct cultures : Mesolithic, Neolithic and Iron Age. However, exploration in the region did not yield any relics of the palaeolithic period though Robert Bruce Foote (1914 : 120; 1916: 99 ;No. 1853, pl. 18) had picked up a solitary cleaver of quartzite on the Vidupanakal west hill. Future researches may yield tools of palaeolithic period in case smaller areas are surveyed intensively. The present chapter aims to examine the extent to which the neolithic culture of our area is comparable to its counterparts known from other regions in and outside India.

The neolithic culture is distinguished by the arts of domestication of animals, agriculture, pottery, pecked and ground stone and blade industries and above all sedentary settlements. The knowledge of metal became known to the people of this culture in the late stages of their career. On the whole the culture is advanced both technologically and economically over the preceding mesolithic way of life. A recurring feature of the Indian neolithic culture is the blade and microlithic industry based on the crested guiding ridge technique. The origin of this culture is not at present clear. A comparison of its traits from our region with those of other contemporary and earlier cultures of India and outside might throw some light on its origins. The traits compared are settlement pattern, economy, raw materials, tool typo-technology, pottery, and so on. The material evidence from our region is first summarised and is then compared with that of other areas.

The neolithic culture of southwestern Andhra Pradesh presented below is based on the evidence from the surface of many sites and is confirmed by the stratigraphical evidence from Palavoy (Palavoy II). The distribution pattern of the sites show that the people inhabited hill-tops and slopes as well as valleys, and river banks. That they lived in circular and/or rectangular houses with mud walls and thatched roof is known from the posthole plans noticed in Palavoy excavations. The wooden remains of acacia and zizyphus species would not only speak of their use as posts in house constructions but also reflect arid and dry climatic conditions under which the people lived.

Stock-raising was the mainstay of the economy. The most commonly represented animal species were cattle and some sheep and goats, canine, and dog. Wild animals such as antelope and deer supplemented their diet. The tool technology is distinguished by pecked and ground stone tools mostly produced out of basalts and dolerites occurring as dykes and sills. Pointed butt axe is the chief tool type besides others like chisels, adzes, choppers, scrapers, picks, flake tools, rubbing stones, hammer stones, sling stones and mace-heads. Several granite querns used for grinding grains or other substances have been noticed on the surface of several sites. The artifacts of the blade industry were mainly made on

fine-grained chalcedony, quartz, jasper etc. They comprise blades, backed blades, obliquely blunted blades, truncated blades, lunates, trapezes, points, borers and scrapers. Apart from these two lithic industries, there came to light from the Palavoy excavations a rich bone tool industry consisting of bone axe-heads, blades and points, which were made on bovine scapulae, ribs and long bone splinters. The knowledge of copper in the form of an arrow head(?) was known to these folk in the late stages of life.

Their pot types mainly consisting of globular vessels of various sizes with constricted and concave necks and flared rims, and a few of other types like spouted pots, rimless bowls, lipped pots, lugged pots were of blotchy grey and dull red wares. The people commonly decorated their pots with red ochre painting and occasionally with incised, impressed, and perforated designs. Black painted pots were also prepared by those folk but only to a limited extent. However at Palavoy the painted pottery is adequately represented and gives the impression that the people have locally developed the technique of producing these pots which are similar to those of the blotchy grey and dull red wares. The painted designs are represented by simple horizontal and vertical bands, zig-zags, lattices, and sometimes chevrons and loops.

The objects of ornament consist of only beads chiefly made on steatite and occasionally on agate, carnelian and chert. The system of burying the dead particularly children in verticaly placed pots out side the houses was known to these folk. No burial goods have come to light.

Let us now examine its relationship with the neolithic-chalcolithic cultures of other areas.

SOUTH INDIA

Following the discovery by Captain Meadows Taylor of a ground stone axe at Lingsugur in Raichur district of Karnataka, a huge quantity of surface material of this culture has been collected from a large number of sites in various parts of south India. But during the last 30 years several sites have been explored and many of them have been excavated. It is the excavated evidence that gives a comprehensive and convincing picture of this culture. The excavated sites are Brahmagiri (Krishna 1942, Wheeler 1948), Sanganakallu (Subbarao 1949, Ansari and Nagaraja Rao 1969), Maski (Thapar 1957), Piklihal (Allchin 1960), Tekkalakota (Sankalia 1964, Nagaraja Rao and Malhotra 1965), T. Narsipur (Seshadri 1971), Hallur (Nagaraja Rao 1971) Terdal (Sundara 1971), Kodekal (Paddayya 1973)—all located in Karnataka; Nagarjunakonda (Soundara Rajan 1958), Utnur (Allchin 1961) and Palavoy (Rami Reddi 1968)—all in Andhra Pradesh ; and Bainapalli (*IAR* 1964–65) in Tamil Nadu.

The evidence from these as also the surface sites reveal that the people chose the tops of granitoid hills, where they made use of natural rock-shelters for their abode as at Sanganakallu, Piklihal, Tekkalakota and Bainapalli. The flat terraces on these hills were at times made so by levelling the ground for habitation. The occupation has further been extended to the slopes and the plains at the feet of the hills as at Maski and Brahmagiri. People also lived on the river banks as at T. Narsipur and Hallur. All these types of settlement patterns have been observed in south-western Andhra Pradesh also. In view of the limited nature of excavations no clear picture of the house-plans has come to light. That the huts with thatched, conical roofs were raised on round wooden posts has been known at Brahmagiri, Maski, Piklihal, Tekkalakota and Hallur. The house-walls at Piklihal were those of bamboo matting plastered with mud and floors were made of clay and dung. Brahmagiri and Sanganakallu people used lime also

in making floors. The houses were circular, square or rectangular in plan. More or less similar house-plans have come to light at Palavoy as at other sites.

The South Indian neolithic economy is a mixed one; it included hunting, fishing, primitive agriculture and pastoralism. The discovery of charred grains of horsegram (*Doliches-lablab*) from Tekkalakota and ragi (*Eleusine coracana*) from Hallur provided direct evidence for the practice of agriculture. The prolific occurrence of a large number of querns and rubbing stones at all sites show their use in pounding and grinding grain. Farming was possibly carried out by making clearings in the surrounding jungles with the help of stone axes and fire. Microliths might have served as knives or sickles for harvesting crops. These folk domesticated cattle, sheep and goat, swine, dog and horse. Most bones of these species particularly cattle are charred, and show chopping and splitting marks on their surfaces. Cattle must have been domesticated both for their milk and meat. *Bos indicus* was the main representative in all the neolithic settlements, followed by sheep (*Ovis vignei*) and goats (*Capra hircus aegagrus*). *Bos bubalis* has been known at Maski and Nagarjunakonda only. Brahmagiri yielded no animal remains but the unbaked clay figurine of pig or sheep (?) substantiates it. Swine, dog and horse, were known to Hallur people alone. Other animals comprise small vertebrates like tortoise from Maski, Piklihal, Utnur and Tekkalakota; rats (*Rattus rattus*) and invertebrates like fresh water mussels (*Parreyssia sp.*) from Maski and Tekkalakota and snails from Maski and Piklihal. Punctured decorations of a snake and a peacock on a lid from Tekkalakota indicate that these animals were not only known to the people but also formed a subsidiary item of their food. The people hunted wild animals like wavy horned antelope and stag or deer for their meat. The finding of fish-hooks at Tekkalakota indicates that the people were aware of fishing. Twilled mat impressions noticed under the bases of burial pots at Tekkalakota speak of mat-weaving as a part of the economy. The neolithic man of our region practised almost similar type of economy. Several terrace-like spots on the hill-tops and slopes in southwestern Andhra Pradesh were used by the people for some kind of patch agriculture, remnants of which are still found among rural farmers of to-day. The occurrence of querns and rubbers in large numbers as well as the close proximity of the sites to these of Karnataka would hint at the practice of agriculture although no direct evidence of grains as at Tekkalakota and Hallur is available. Domestication, as at other south Indian sites, of *Bos indicus*, *Bos bubalis*, sheep and goats, canines and dogs formed a significant part of the neolithic economy in our region. Animals like antelope or deer were hunted by the people. The large numbers of bone points from Palavoy suggest their use in the stitching of leather bags or weaving some kind of textile (?) which activity was probably unknown to their counterparts in south India.

The neolithic tool technology of south India is characterised by two lithic industries : pecked and ground stone, and blade and microlithic. The first of these industries forming a significant trait is characterised by edge tools as well as non-edge tools. The tool types are axes, adzes, wedges, picks, borers, chopper-chopping tools, scrapers and chisels all edge tools ; the non-edge tools comprise hammers, sling stones, rubbers, querns, grooved hammer stones and mace-heads or ring stones. No single site yielded all the types. Of all the implements axes, form the most common and significant group of tools of the industry. Flaking, pecking and grinding was the technique employed for the manufacture of these tools either individually or in combination with each other.

The tools belong to rocks of igneous and metamorphic type like basalt, dolerite, diorite, granite epidote granite, greenstone, schist, gneiss, quartz and quartzite. Basalts and dolerites that occur as dykes and sills formed the most common rocks for the manufacture of tools. Typo-technologically and in raw materials, the ground stone tools of our region agree with those of other south Indian sites. The

blade industry based on the crested guiding ridge techinque consists mostly of blades without retouch. Retouched tools form a small proportion ; these include serrated or blunted back blades,lunates, triangles, trapezes, points, scrapers etc. These are made of siliceous rocks like chert, chalcedony, jasper, agate, opal and quartz. Excepting Bainapalli, where blade industry is absent in the excavations although surface yielded some specimens, all the other sites including those of our region are characterised by the industry. At certain sites like Maski, the blades are very large in size, obviously due to the raw material there.

Bone tools occur in small proportions at some of the neolithic sites. They comprise an awl from Sanganakallu; a point from Piklihal; a chisel-like blade from Utnur; two chisel ends, one scraper and seven points from Tekkalakota; and a few points from Hallur. At Tekkalakota, some perforated antlers of antelope and deer were used as handles by the hunters. Palavoy II as well as the surface of the site, rich in bone tools unlike other south Indian sites, yielded bone axe-heads, blades, points, a punch and a chisel.

The sporadic occurrence of copper objects is another feature of the south Indian neolithic sites. They are represented by a pin and a ring and channel-spouted bowls, handled pots, bell-shaped jars, legged stands and perforated pots. But no single site yields all the types. The earliest find of a lipped-bowl was reported by Foote (1916: 115, Pl. 26, No. 2605–22) at Patapadu in Kurnool district of Andhra Pradesh. Similar bowls but in grey and dull red wares were later found in Brahmagiri IB, Sanganakallu II, lower and upper neolithic levels at Piklihal, Tekkalakota I, T. Narsipur and Bainapalli I. Comparable lipped-bowls have been found on surface (fig. 12, T. 12 and 14) and in the excavations at Palavoy (Rami Reddy 1976) in burnished grey, dull red and painted red wares. So also spouted-bowls and vessels characteristic of Brahmagiri, Nagarjunakonda, T. Narsipur, Piklihal and Tekkalakota are found at some sites of our region (Fig. 13, T. 15, 15a and 21; Fig. 10, T. 6 ; Fig. 15, T. 30). A specimen of channel-spouted bowl occurring at a few sites like T. Narsipur and Piklihal has been recovered from Palavoy excavations too. Lugged bowls are present at Piklihal, Sanganakallu and Maski. A comparable specimen of this type in unburnished grey ware has been found at Katamadevudu Hill (Fig. 10, T. 4). Cylindrical handles (Fig. 10, T. 5) similar to the one from Piklihal have been collected from the surface of a few sites including Palavoy. Broad handles (Fig. 14, T. 23), ladled handles (Fig. 13, T. 16) and a number of looped handles (Fig. 14, T. 24) characteristic of the surface collection of our region have no parallels from other sites in south India. At least five types of decoration occur upon the vessels of various wares in south India : impressed, incised, applique, perforated and painted. The first type is a finger-tip impressed decoration usually confined to the rims of storage jars in single or double rows. The decoration, known from Sanganakallu, Piklihal and Tekkalakota also occurs on the storage jars of unburnished grey (Fig. 10, D. 1–2), and unburnished and burnished dull red wares (Fig. 13–14, D. 9, 12 and 13) from Southwestern Andhra Pradesh including Palavoy. Incised decoration in the form of elementary herring bone or criss-cross patterns and as irregular incisions on grey and buff-slipped sherds was found in Brahmagiri Ia culture and as vertical, horizontal and oblique or as finger-nail incisions on an applied band below the rim throughout Maski I. Piklihal and Utnur also presented similar patterns. Palavoy II and a few surface sites of our region also yielded sherds bearing incised decoration in the form of pricked traingles, diagonal lattice or cris-cross, straight parallel and diagonal lines and date-palm pattern-all on burnished grey ware sherds. The designs on dull red ware sherds comprise horizontal and vertical parallel lines or mere stroke. Incised decoration in the form of oblique cut marks (Fig.

10, D. 4 and Fig. 15, D. 14) on surface sherds of grey and dull red wares. The criss-cross design and vertical, horizontal and oblique lines are found on sherds from Palavoy II. Others like pricked triangles, and date-palm designs of our region are unknown at other sites while the herring bone pattern of other sites is absent in our region. Applique decoration is known in combination as well as individually only from Piklihal and Tekkalakota. Palavoy II also yielded similar evidence. Perforated decoration present on the base of grey and dull red ware pots is reported from all over south India including our region. Painted decoration occurs at all sites in South including our region in the form of horizontal or vertical bands of red ochre upon the rim edges, neck and shoulders of bowls, globular pots and lipped bowls etc. of burnished greyware mostly.

The painted black-on-red ware was known to the neolithic people in the closing stages of the culture. Its sporadic occurrence has been reported from almost all the excavated sites. Most of the sherds do not give the shapes of the pots to which they belong. The decorative patterns on them consist of simple horizontal and vertical bands, criss-cross or lattice, and highly conventionalised plant patterns. The pot types consist of lipped bowls as at Patapadu, open-mouthed vessel as at Utnur, globular vessel and high necked jars as at Tekkalakota and goblet bowls, wine cups and bowls with convex flaring rims, globular jars-constricted as well as highnecked vessels as at several sites around Patapadu in Kurnool and Cuddapah districts of Andhra Pradesh (Sarma 1967: 75–94). These are comparable to the ones from the sites of Jorwe and Malwa. The painted pottery from Palavoy is in larger proportion than at other sites in south India and handmade with the help of some kind of mould. The common shapes are globular pots, slightly carinated pots, basin, pan, lipped bowl and few ordinary bowls, all of which are common to blotchy grey and dull red wares too. The high cylindrical necked vessel is comparable to more or less similar pot from Piklihal (Allchin 1960: pl. 35, T. 13). Another comparable type is a vertical narrow-necked pot which is paralleled at Tekkalakota (Nagarajarao and Malhotra 1965: Fig. 20 h). All the other types are absent in the painted ware of other excavated sites in south India. The comparable painted designs are simple horizontal and vertical bands, criss-cross or lattice and diagonal lines. Other designs like zigzag, chevrons, loops, a vertically hatched body of an animal and so on are unkown at other sites of south India. These findings thus support the thesis that the painted pottery is of local origin at Palavoy and it is difficult to extend this inference to other sites in the area.

The neolithic art in the form of paintings and decoration on pottery, rock carvings or bruisings and paintings is noticeable at a number of sites. Incised, perforated, impressed, applique and painted decorations have been noticed on pottery from almost all the sites in the south including those of our region in some style or other showing the aptitude of the neolithic folk for art. Red ochreous rock paintings were noticed by me at Adoni situated about a kilometre east and west of the town on the hill-tops which yielded the remains of neolithic man. Rock-bruisings of two bulls facing each other is depicted on a big granite boulder facing west, a little to the east of the fortified hill at Velpumadugu neolithic site in Anantapur district (Rami Reddy 1971: 289–294), Figs 1–2; pl. A, Nos. 1–3). The evidence of a terracotta bull is another additional evidence. These examples show that particularly the oxen/cows have been domesticated by these people who must have had high esteem for them, and hence must have worshipped them. The method of disposing the dead children at Palavoy and males and females in various ways with grave goods and furniture indicates the belief of the people in future life.

Radiocarbon dates for the southern neolithic culture are now available for the sites given in the following table.

Sites	*Radiocarbon dates in B. C. for*	
	Early levels	*Late levels*
ANDHRA PRADESH :		
Palavoy (Anantapur Dist.)	..	1965±105*
Utnur (Mahabubnagar Dist.)	2170±150	..
KARNATAKA :		
Kodekal (Gulbarga Dist.)	2335±105	..
Terdal (Bijapur Dist.)	1805±95	1665±120
Tekkalakota (Bellary Dist.)	1675±100	1510±135
	1515±105	
	1545±105	
Sanganakallu (Bellary Dist.)	1490±100	1485±100
	1450±100	
Hallur (Dharwar Dist.)	1610±150	1330±105
		1105±95
	Neolithic	945±100
	Megalithic over-	1020±105
	lap phase	870±100
T. Narsipur (Mysore Dist.)	1445±105	1695±105
TAMILNADU :		
Paiyampalli (North Arcot Dist.)	1390±100	..

These place the culture between 2500 and 1000 B.C. covering a life span of 1500 years. It should however be noted that a single date from Kodekal takes the lower limit to 2500 B.C. and similarly a solitary date from Hallur puts the upper limit at 1000 B.C. The bulk of the dates thus put the neolithic culture between 1800 and 1500 B.C. The Palavoy late neolithic culture is about 2000 B.C. old while there is no date for the early level which may be older than 2000 B.C. This date may more or less hold good for the whole of south-western Andhra Pradesh.

*This date is based on the 5730 half-life value

To sum up the neolithic culture of Southwestern Andhra Pradesh that flourished around the early to mid-third millennium B.C., closely corresponds to its counterparts in S. India. However, two traits of Palavoy II stand up prominently. They are the bone axeheads which recall the ground stone axes which are absent at other excavated sites, and the painted pottery which is of local origin unlike at other sites in the South. The painted pottery may be correlated to that of eastern Andhra Pradesh but types like goblet-bowls, wine cups and bowls with convex-flaring sides and featureless rims typical of the region are absent in the painted red ware of Palavoy.

NORTHERN DECCAN

A number of village settlements were discovered in the northern Deccan in the valleys of Godavari, Pravara, Bhima and their tributaries. Several of these have been excavated. These are Nasik, Jorwes and Nevasa (Sankalia and Deo 1955 ; Sankalia, Deo, Ansari and Bhrhardt 1960) ; Bahal (*IAR* 1956–57; 117–8) Tekwada (*IAR* 1956–57); Prakash (Thaper 1967 : 4–167); Daimabad (*IAR* 1959 – 60 : 30 and 1960–61 : 19), Bahupura, Sawalda (*IAR* 1959–60 : 34–7);Chandoli (Deo and Ansari 1965) and Songaon (Deo 1969). Very recently one more site, Inamgaon, located on the bank of the river Ghod in Sirur taluk of Poona district, has been discovered and excavated extensively by Sankalia and his colleagues (Sankalia, Ansari and Dhavalikar 1975 : 1–11).

The earliest phases are known from the site of Diamabad on the river Pravara. Here the settlers used handmade grey ware pottery which is closely similar to that of the Southern neolithic culture. These people also used black-on-red ware pottery of the Malwa type. Besides, they used blades, blade tools and terracotta and stone beads. An extended burial is also known from this phase. At this site pointed butt axes were found on the surface, but they are likely to be associated with this phase. The second phase at Daimabad is characterised by the dominance of Malwa ware, which has also yielded channel-spouted bowls. This phase yielded terracottas of dog and bull, and evidence of burial in a specially dug pit. This phase is also known from the site of Prakash on the river Tapti in Khandesh. The third phase at Daimabad is distinguished by a pottery known as Jorwe ware. This is a thin-sectioned ware made of a well-levigated clay and very well fired. It has a red-slipped mat surface which is decorated in black paint largely by geometric designs but occasionally also by naturalistic motifs. The typical types in this ware are carinated bowls and pots with long tubular spouts. This Jorwe culture named after a site on the Pravara river where it was first discoverd is known from several other sites like Prakash and Bahal IB, Nevasa, Inamgaon, Chandoli and Songaon. The grey ware found in phase 1 at Daimabad continues in the Malwa and Jorwe phase as well.

Direct evidence of agriculture in this area comes from Songaon where charred grains of wheat have been found. But the evidence of querns and rubbers at all sites and the very sophisticated nature of the pottery leaves no doubt that these settlements were based on agricultural economy. The domestication of cattle, sheep and goat, and pig were known throughout, and hunting also played a part in the economy.

The technology was based largely on stone blades and microliths, but ground stone axes also formed a part of it. These along with adzes and chisels, and domestic implements have been found in the excavations at Nevasa and on the surface at Daimabad, Songaon and Chandoli. At Nevasa, the ground stone axes were found along with waste flakes and unfinished specimens showing clearly that such tools were made at the site and not imported.

Copper was used in this culture on a much larger scale than in the neolithic culture of the South. Flat copper axes are known from Nevasa, Jorwe and Chandoli excavations and these are similar to those of Brahmagiri and Tekkalakota. Besides, from Chandoli (Deo and Ansari 1965 Fig. 58, No. 1) comes an antennae-hilted dagger which shows close affinity with similar swords from the copper hoards of the Gangetic basin.

C-14 dates are available only for Jorwe culture from Nevasa (1250±125 B.C.and 1255±115 B.C.), Chandoli (1330±70, 1330±70, 1240±90, 1775±120 and 1040±105–all B.C.) and Songaon (1290±95 B.C.) and 1375±110 B.C.). These give a dating of 1500–1000 B.C. for this culture. The evidence from Inamgaon put this culture between 1400 and 700 B.C. However, the beginning of the settled villages in this area go back to an earlier period possibly a century or two as shown by the archaeological evidence at Daimabad, Prakash and Bahal.

It would thus appear the neolithic culture of the South though beginning slightly earlier than its chalcolithic counterpart of the Northern Deccan was largely contemporary to the latter.

There are certain definite affinities between these two cultures. Among these are the polished stone industry, the handmade grey ware and the practice of burial in earthen pots. It is not yet clearly established as to which of these two cultures contributed more to the other. In view of the relative priority of the southern neolithic culture, it would appear that the traits like grey ware, urn burial and polished stone tools might be derived in the northern Deccan from the south. On the other hand, painted pottery and use of copper are much more marked features of the Deccan chalcolithic. Their scarcity in the neolithic culture in the South might suggest that these items were imported from the northern Deccan into the southern Deccan and other parts of south India. Allchin (1960 : 126–7) has suggested that the grey ware of the south Indian neolithic culture was derived ultimately from the Anatolian and Caucasian regions of western Asia, and he has noted the presence of grey ware in several chalcolithic cultures in the intervening areas. The earliest stages at sites like Daimabad and Prakash may indeed be the prototypes of the southern neolithic culture. However, the problem of the exact relationship of cultural contact between these two areas will be clear only when larger excavations are carried out in the two areas and the absolute chronology of the various phases of the chalcolithic culture in the northern Deccan is firmly established on the basis of radiocarban dates. At the moment we can only guess the aerial antitquity of the first farming settlements at sites like Daimabad and Prakash.

CENTRAL INDIA

Numerous chalcolithic sites have been discovered in central India in the valleys of the rivers Chambal and Narmada and their tributaries and in the valley of the Betwa during the last 20 years. The important excavated sites are Nagda (*IAR* 1955–56 : 11–19), and Avra on the Chambal, Maheshwar and Navdatoli on the Narmada (Sankalia and others 1958: *IAR* 1957–58, 1958–59 ; and Sankalia 1963 : 197-202), Kayatha on the Kalisind (*IAR* 1963–64) and Eran on the Bina (*IAR* 1960–61 : 17–18 ; 1961–62 : 24–5 and 1962–63 : 11).

The earliest chalcolithic stettlement is known from Kayatha where excavation carried out so far has yielded pottery which has close Indus and pre-Indus affinities. Other finds are flat copper axes, copper

bangles, steatite and carnelian beads and stylised terracotta bulls in large numbers. This phase is dated by C-14 between 1965±110 and 1335±105 B.C. No similarities can be noted between the neolithic culture of south-western Andhra Pradesh and the Kayatha culture, if we may use that expression. The Kayatha phase is followed after a stratigraphical gap by painted black-and-red ware. This phase is also known from Nagda. At Nagda, this phase also yielded incised terracotta beads or spindle whorls. This culture too does not show any affinities with the neolithic culture of our region. Of course, the black and red ware occurs in the later phase of neolithic culture at Tekkalakota, Hallur and T. Narsipur. But the exact derivation of this ware in the neolithic culture is not yet clear. The black-and-red ware phase is followed by a culture which is best represented at Navdatoli. At this site four phases are recognised in this culture. The Navdatolions lived in square, rectangular or circular houses. The walls were made of bamboo screen plastered with clay similar to those of the neolithic houses at Piklihal, Tekkalakota and Hallur.

The pottery is characterised by four distinct wares: the Malwa ware, black-and-red ware, white slipped ware and Jorwe ware. The first of these wares consists of a pale-red-slipped fabric with paintings in black over it. The shapes are high, narrow-necked vessels, carinated bowls, dish-on-stand and goblets. The designs are mostly geometric and sometimes naturalistic. This ware occurs throughout the chalcolithic period. The black-and-red ware painted in white is known in a small proportion only in phase I. The white-slipped ware was confined to phases I and II while Jorwe ware was reported in phases III and IV. On the surface of the last two wares, as in Malwa ware black- painted designs occur. A distinctive type is a channel-spouted bowl which also occurs in grey, dull red and painted red wares of the southern neolithic culture including our region. Other types like high concave, narrow and constricted necked vessels with globular body and rimless bowls also occur in the painted red ware of our region. But one thing is clear that the channeled bowl which occurs in Malwa ware at a very late stage of this culture (Phase III) was already present in the wares of the neolithic culture mentioned above and in painted red ware as well. This shows the chronological anteriority of the southern neolithic culture including Palvoy II.

The rich blade industry based on the crested guide ridge technique is common to both regions. The finding of copper axes, fishhooks, etc., shows that the Navdatolians were better acquainted with copper than their counterparts in south-western Andhra Pradesh.

The finding of grains of wheat, rice etc., at Navdatoli shows that the people of this culture were agriculturists. The discovery of fishhooks indicates that they knew fishing. The culture is radiocarbon dated between 1829±62 B.C. and 1332±125 B.C.

The chalcolithic sites of Eran on the Bina though broadly similar to Navdatoli has quite individual traits. For instance, the black-and-red ware of this site is very thick and of coarse variety. The shapes in it are large dishes, shallow bowls and these are painted exclusively on the interior only.

The black-on -red ware is quite different from that of Navdatoli and Nagda. The Malwa ware at Eran is thinner and better made than at Navdatoli. Besides the geometric designs, it has several naturalistic designs like the dog, antelope and scorpion. The chalcolithic settlers at Eran had fortified their settlements by a mud rampart which was further enclosed by a wide moat. The community life at Eran therefore appears to have had a more complex organisation than is seen at any of the neolithic sites in south. The grey ware is the only common feature at Eran and in our region. The next common

feature in both the areas is the steatite beads. The earliest radio-carbon date for Eran is 2035±75 but other dates put the culture between 1340±70 B.C. and 64±60 B.C.

NORTHERN NEOLITHIC CULTURE

The remains of this culture have been found at Burzahom and a few other sites in the Jhelum valley of Kashmir (*IAR* 1960–1 : 11; 1961–62 : 17–21 and 1963–4). The excavations at Burzahom revealed a four-fold sequence. Periods I and II representing the Neolithic culture are our concern. The people of Period I lived in circular or oval pits dug into the Karewa deposits. These were provided by the evidence of landing steps and niches in the sides of the pit and ash deposits, etc. on the pit-floors. Traces of postholes on the periphery of the pits indicate the existence of timber superstructures. The material remains comprise axes, harvesters, polishers, pounders, chisels and mace heads. Bone tools include awls, needles, points, chisels, harpoons etc. The pottery is handmade and bears grey, dull red, brown, buff and drab colours. In period II instead of pit dwellings, structures of mud and mud-bricks made on plastered floors were found. Wheelmade black burnished ware made its appearance. Ground stone and bone tools occur in larger numbers. The upper-most level of this period yielded a solitary copper arrowhead. In the same period both human and animal burials were found in the habitational area itself. Human burials consist of extended skeletons as well as fragmentary burials. With these were found bones of domesticated dog and goat. Animal burials of dog, wolf and ibex occurred. These were either extended or fractional. Radiocarbon dates indicate that the neolithic culture of Burzahom flourished between 2400 and 1800 B.C.

The ground stone axes, pounders, chisels and maceheads characteristic of Burzahom can be compared to similar tools of our region. Bone tools such as points and chisels of Burzahom were found at Palavoy as well but the specimens of the former site are more finely finished than those of the latter. Bone awls, needles and harpoons of Burzahom do not find parallels at Palavoy. Similarly the ground bone tools called axe-heads which are morphologically similar to stone axes, bone blades and a punch have no analogues from Burzahom.

The hand made grey and dull red wares of Period I at Burzahom are similar to those of Palavoy II and other sites in southwestern Andhra Pradesh both in technique and typology. Unlike at Burzahom only child urn burials were recovered from Palavoy excavations. However, the extended burials of Burzahom can be compared to those of Tekkalakota, Piklihal etc. in the South. The Burzahom neolithic culture has earlier beginnings than that of our region.

EASTERN NEOLITHIC CULTURE

The Eastern neolithic culture area according to Krishnaswami (1959 : 124–49 and 1960 : 25–64) is represented by two culture-complexes: 1) the Assam culture-complex and 2) the Bengal-Bihar-Orissa culture-complex. The evidence for the neolithic culture in these comes from surface alone, excepting the recent excavations at Kuchai in Mayurbhanj district of Orissa and Daojali Hading and Daojali Parbat of the united district of Mikir hills in Assam (Sharma 1966).

A comprehensive study of the surface finds was made by Dani (1960) whose work has been supplemented by that of Allchin (1962 : 306–30). Dani divides the Assam region into six culture zones: (1) Sadiya Frontier, (2) Naga hills, (3) Khasi, (4) Garo, and (5) Cachar hills and (6) Brahma-

putra valley in Tezpur district. The tools of the ground stone industry are faceted tools, shouldered tools, round butt axe, with broad cutting edge, splayed axe, tanged axe, wedge blades and grooved hammer stones. Neither pottery nor microliths were associated with these tools. However, the excavation at Daojali Hading yielded pottery of greyish colour depicting basket-and-cord-impressions on the exterior in association with ground stone tools much as celts including one of shouldered variety, hoes, corn-crushers, mullers, pestles etc.

The only comparable type among the ground stone tools is the rounded butt axe with sub-types (a) and (b). Sub-type; (a) with plano-convex cross-section resembles the shoe-last celt from Sanganakallu (Subbarao 1948:34, pl. XX, 10–13). Similar axes have been found at the site of Velpumadugu in Anantapur district. Sub type b) with a biconvex or lenticular section is common on all the neolithic sites in the South including our region. Sankalia (1963 : 234) and Allchin (1962 : 323) are of the same opinion. The other comparable type is "axe with broad cutting edge" (Dani's type c) for which parallels occur in our as well in other parts in the South. All other tool types of Assam are unknown to our region. Further, the blade industry which is a regular component of the South Indian neolithic culture is totally absent in Assam. But the grey ware that occurred in the excavations at Daojali Hading is similar to its counterpart in our region.

The Bengal-Bihar-Orissa culture-complex covers the Chittagong region, sub-mountain zone of the Himalayas and the Chotanagpur plateau. The first two regions yielded faceted tools of the Assam variety while the second also brought to light rounded butt axes, wedge shaped axes of Assam and chisels and hammer stones. Chotanagpur is very rich in the remains of neolithic culture. Besides, perforated stones and shouldered celts were also found. The rounded butt axe, chisels and hammer stones are closely related to those of our region.

The excavations at Kuchai yielded sherds of a coarse grit tempered-red ware, sometimes slipped and decorated with incised or finger-tip designs and ground stone tools like rounded butt axes, faceted hoes, chisels, pounders, fragments of a mace head and a grinding stone. No evidence of metal was found at sites like Sonepur (*IAR* 1959–60 : 14; 1960–61 : 14) in Gaya district and Tamluk (*IAR* 1954–55: 19–20) also yielded pointed butt axes in a late context which dates them to the first millennium B.C.

Rajar Dhipi, in Burdwan district of West Bengal yielded black-and-red ware painted in white. Phase II of this site yielded a doubtful axe while in phase III there were many axes besides copper and iron. The radiocarbon date for the phase is 1012±125 B.C. corresponding to the latest phase of S. Indian neolithic culture. The sites of Kuchai and Daojali Hading in the absence of metal are thought to be purely neolithic in the opinion of Thapar and earlier than that of Rajar Dhipi. No evidence of black-and-red ware occurred in our region. Moreover, the neolithic culture of our region is chronologically quite earlier than these cultures which may correspond to the later stages of upper neolithic culture of South India.

BANAS CULTURE

Explorations in the Banas basin of south-eastern Rajasthan have brought to light a large number of chalcolithic sites. Among these, the sites of Ahar (*IAR* 1954–5 : 14–5 and 1955–6 : 11) and Gilund (*IAR* 1959–60 : 41–6) in Udaipur and Chitorgarh district respectively have been excavated.

At Ahar, two cultural periods are known : (1) the copper using village settlement, and (2) early historic iron age. Period I has yielded animal remains of cattle, buffalo, sheep and goat, pig and dog suggesting domestication as the mainstay of the economy. The lithic blade industry was virtually absent though a few of these were found at Gilund and other explored sites. Both Ahar and Gilund are rich in copper objects mainly axes.

The ceramics consist of painted black-on-red or cream ware, black-and-red ware painted with a white pigment, red ware and grey ware (Misra 1967). The red and grey wares though comparable to similar wares from our region. The painted black-on-red or cream ware which is characteristic of Ahar Ia and Ib does not correspond with that of Palavoy II both in technology and typology though Sarma (1967 : 91) reports a few sherds of this ware at a few sites in Kurnool and Cuddapah districts of eastern Andhra Pradesh. He equates this ware with the late levels of the lower neolithic of south India. However, it requires to be proved stratigraphically since these stray unstratified sherds give no idea of their antiquity and origin. This shows that these objects were meant for domestic purposes and hence the people were agriculturists. The ornaments of Aharians consist of copper bangles and rings beads of terracotta decorated with various motifs like chevrons, rows of arcs, zig-zag arches etc. looking like a stylised stage. Only Beads of semiprecious stones and steatite are common to both regions.

Aharians used to live in stone and mud houses, the latter usually supported by bamboo screens The plans seem to be rectangular. The floors were made with thick sticky black clay mixed with yellowish silt. All these features of Ahar houses differ from the simpler mud-walled round houses of Palavoy II The culture has been dated by radio-carbon between 1800 and 1200 B.C. showing a chronological posteriority to the Neolithic culture of our region.

The Indus Valley Civilization : The salient features of this culture, in brief, are an organised town-planning with streets and public drains, inscribed steatite seals mostly carved with animal figurines stone and bronze statues, copper and bronze implements, beads of steatite, faience and semi precious stones, wheel-thrown painted black-on-red pottery, brick-built spacious houses and extended burial practice of the dead.

Remains of this civilization have been extended from the Indus to the Ganga in the east and the whole of Saurashtra. Chronologically this culture is placed between 2300 and 1750 B.C. which is earlier by two or three centuries than the south Indian neolithic cultures. The Indus or Harappan civilization has similarities and at the same time close dissimilarities. For instance, the neolithic blade industry common on all neolithic - chalcolithic sites in the south including our region and northern Deccan and central India present striking similarities with that of the Indus sites and claims a common ancestry like that of the latter. The pecked and ground stone tools like saddle querns, also show vague affinities with those of the Indus. The occurrence of a large number of copper and bronze objects is the most common feature of the Indus civilization showing a high technological advancement while related forms occur on most of the neolithic-chalcolithic sites but in a very remote and crude form. One such specimen, the fragment of an arrowhead from Palavoy II, indicates such culture contacts with the Indus cultures. The pottery of our region present a striking difference from that of Indus both in technology and typology. No comparable pot types occur in both regions in any way. Even the perforated fragments of pots of our region do not appear to have any relation to the perforated braziers of the Indus culture. The terracotta bull of Palavoy is very crude while the Indus specimens are well made. The next striking affinity lies in steatite disc beads. They are common on all Indus sites as well as other neolithic and chalcolithic sites all over the sub-continent. This shows that some kind of trade was in vogue between

Indus valley and other sites. The next important point is the common economy, particularly, domestication of cattle (*Bos indicus*), sheep and goat etc. This also indicates culture contact between the two regions. Then the systematic extended burial system as at Piklihal, Tekkalakota, Nagarjunakonda is known to both cultures though at Palavoy only child burials were encountered. In view of still other traits like seals, script, house plans, drainage, streets etc, it is clear that the Indus valley civilization was the most advanced while the neolithic folk of our region were still in the hunting tofood producing stage.

Neolithic Cultures compared with those outside India

RUSSIA

The remains of the neolithic culture have been largely found in the north of the European part of the Soviet Union and to some extent in the South. In the south of the European part the U.S.S.R., the zone ofthe Dneipr and northern part of the area near the sea of Azov during the third millennium B.C. lived several hunter-fisher communities. The evidence comes from three excavated sites: Mariupol near Zhdanov on the left bank of Kalmius, Nalchik in the north Cacasus and a third locality located about one-and-a-half kms. northwest of the second site. The first two are burial sites while the third is a settlement. The tools comprise flint knives, scrapers, arrowheads, stone axes and maces. Pottery is also known. At Nalchik a few copper objects were also found. The pottery is undecorated. The dead—all adults—lay on their backs, and were provided with burial furniture in the form of bone or stone artifacts, animal teeth and shells. Animal figurines of pig and oxen made of bones (at Mariupol), rings on bones and pendants of teeth of wild boar, bear, deer, fox etc. (at Nalchik) were recovered. Both wild and domesticated animals were known at these sites.

In the South U.S.S.R. excavations at Akshtyrskaya cave on the shores of Black Sea, Tetramits in West Georgia, a site in Transcaucasia and Janbas-Kala IV in Central Asia brought to light several flat polished axes, picks, hoes, saddle querns, pounders and flint tools like knives, scrapers, spoke-shaves and arrowheads. Pottery vessels of a red ware have pointed base and incised decoration as at Janbas-Kala IV, which is dated to the late fourth or early third millennium B.C.

In Siberia, within a radius of 500 kms. around like Baikal several neolithic sites are known. On the basis of burials found here the neolithic period has been divided into four stages of development: I–the Khinsky named after the burial at that site dated to fifth millenium B.C. in which the bow and arrow appeared; II–the Isakovsky, 4000 B.C., polished tools and pottery appeared; III–the Serovsky, 3000 B.C., the techniques of working of bone and stone advanced, stone arrowheads, nets, harpoons, fish hooks, carved stones representing fish occurred ; and IV–the Kitoisky–third and early part of second millennium B.C. At this stage Nephrite was used for making axes.

From the forest zone of the European part of the U.S.S.R. the cultures named 'pit,comb ware' are known. The representative sites are Lyalovskaya on the river Klyzma, 40 kms. north of Moscow; Sunskaya on a creek on lake Onega; Kargopol on the bank of Kinem river; Charozero, about 500 kms. east of Leningrad; a peat site on the shores of lake Tamul in Baltic area and Gorbunovo peat bog in Central Ural area. The people flourished here between 2000 and 3000 and B.C. None of these sites yielded polished stone tools though flake tools, flint arrowheads and bone tools like harpoons, fish-hooks, antler mattocks or hoes etc. are common. The pots have pointed bases decorated with circular

incisions and comb-impressions. The houses are of mud and are of circular, rectangular or quadrilateral plan.

In Ukraine and Moldavia in Southern U.S.S.R., the well-known Tripole culture is represented at more than 300 settlements. A few excavated sites comprise Kolmischchina I on Dneipr near Kiev, Valdimirovka and Luka-Vrublevetskaya on the left bank of Dnestr. The people of Tripole culture lived in beaten clay or earth houses. Their implements consist of agricultural tools, querns, sickles of bone or flint with wooden handle. Copper objects include fish-hooks, small rings, flat splayed axes similar to ground stones axes. Burnt grains show that the people grew flax, wheat, barley and millets. Their pottery was of a high standard in the technique of manufacture, in modelling and in firing. The shapes and decorations varied. Pots are painted in white, black or red and are comparable to those from China to Balkans. The people bred pigs and sheep. These cultures are dated betwen 3000 B.C. and 1500 B.C.

In Central Asia, the Caucasus comprising Turkmenia, Transcaucasia, and North Caucasus have been investigated for the remains of neolithic culture that survived about 3000 B.C. back. In Transcaucasus the site of Shengavit on river Zaga, in the north-east Caucasus, Kakakent and in north Caucasus several ites in Kuban valley have been excavated. Here particularly at Shengavit, the people lived in houses of rectangular plan with conical roof. Material equipment consisted of querns, pestles, flint sickles, bone pins, arrowheads, beads and copper tools like shaft-hole axes and adzes similar to those from Mesopotamia. Pottery is black or red, burnished occasionally. Grooved and applied geometric decorations were common. They knew wheat and barley. Thus the neolithic culture of the U.S.S.R. is characterised by flaked and polished tools and pottery. The economy consisted of agriculture, stock breeding hunting and fishing. The people were acquainted with spinning and weaving. Trade and barter developed among them.

The foregoing account of the U.S.S.R. neolithic culture reveals that the pecked and ground stone industry did not have the same place as in south-western Andhra Pradesh. Many types like chisels, adzes, hammer stones, etc. are absent in U.S.S.R. Thus, U.S.S.R. man used flint, shale and nephrite while in our region dolerite was the most important rock. The culture is rich in bone and copper implements, while in the neolithic of our region these tools are very scarce. The ceramic industry of U.S.S.R. has fewer wares and shapes than in our region. Pointed base vessels are common in U.S.S.R. but unknown to our region. Rearing of cattle and sheep was known to the people of both the regions. Knowledge of spinning and weaving known to Russian Neolithic is not attested to in Andhra neolithic culture. In date the Neolithic culture in the U.S.S.R. is much earlier than that of our region.

WEST ASIA

The earliest neolithic cultures are known from west Asia. Even before the invention of pottery neolithic cultures were well developed in this area. The earliest phases are known from the sites of Jericho in Jordan, Hacilar and Chatal Huyuk in Anatolia and Jarmo in Iraq (Mellaart 1965). The pre-pottery neolithic culture dating from the early seventh to sixth millennia B.C. has been found at a number of sites like Beidha, Wadi Shu'Aib, Tepe Munhatta, Tepe Ramad in Syria, some in Cyprus and Alikosh, Tepe Guram near the Zagros mountains. The people domesticated goat, dog and cat and

supplemented their food by hunting gazelle, ibex, partridges etc. Their stone industry at Jericho known by the name 'Tahunian' comprises large and small arrowheads, mostly tanged and some barbed, sickle blades, borers etc. Flint formed the most common raw material for making tools. Besides these, long oval querns used for pounding grain, limestone bowls and plates made their appearance. Their houses bore stone foundations and bricks were used in erecting walls. Racially the people belonged to proto-Mediterranean type. Crouched burial was in practice.

At Jarmo people cultivated emmer and eincorn wheat, and two row barley. The stone industry consisted of microliths like diagonal ended bladelets, trapezoids triangles, crescents, side blow flakes scrapers mostly of obsidian. Ground stone industry comprised polished stone axes saddle querns and grinders, mortars and pounders, door pivots, stone balls, palettes, perforated discs, mace-heads etc. It is thus better developed than that of Jericho. Other significant finds include cups and bowls made of stone. Worked bone tools like awls, rings, beads, pendants etc. were also found.

An aceramic neolithic culture is also known from the site of Khirokitia in Cyprus and is dated to sixth millennium B.C. The flint industry is non-microlithic and is probably derived from the upper palaeolithic; and the people were a round-headed (brachycephalic) type. They lived in dome-shaped round houses. The dead were buried within the habitational areas in a contracted fashion. The burial furniture consisting of stone bowls, neck-laces with women, and pins and other offering with men and children used to be kept. The presence of spindle whorls indicates that the people knew spinning. Ornaments like beads and pendants of stone were found. The ground stone industry was an advanced one. Spouted stone bowls of greenish grey andesite and shallow dishes of various shapes were the common forms. Several stone figurines of humans as well as animals figured at the site. They raised sheep and goats, and pig.

The pottery of the neolithic culture of south-western Andhra Pradesh is different from that of west Asia and Cyprus and the culture is chronologically younger than the latter cultures. The ground stone industry is common to both the regions. However no stone bowls, dishes or plates occur in our region. The flint industry of the above sites is comparable to the blade industry of our region only in certain types like scrapers, points, borers, lunates and trapezes. The clay figurines of humans and animals are unknown in our region. However, a terracotta bull dressed in red colour is known from the surface of Palavoy but it is not comparable to any of the figurines from Jarmo, Jericho and other sites. In Andhra Pradesh, the dead were buried outside habitations while at Khirokitia they were buried in the house itself.

In Syria several ceramic neolithic sites have been reported. The most notable among them are the Byblos, Amuq, Ras Sharma etc. The culture here is dated to about sixth millennium B.C. The neolithic culture at these sites having all the usual features is characterised by rectangular houses, burials, stone industries similar to those found at aceramic neolithic sites. The pottery is dark burnished and mostly undecorated in character. Some decorations like nail or shell impressed patterns were seen. The usual forms are globular pots, bowls etc. The pottery ranges in colour from greyish to black, brown, chocolate, red and buff.

The Jeitum culture in Western Turkestan as early as or earlier than Siyalk I is characterised by neolithic flint industry and ground stone industry comparable to those of our region. Other traits like growing of barley and wheat, making of bone sickle blades, painted red-brown on cream ware, clay

figurines and amulets, remarkable architecture, etc. significant of Jeitum culture are unknown to our region. The sites of Tureng Tepe Tepe Hissar (Schmidt 1937) and Shah Tepe (Arne 1945) all lying in the Turkeman Steppe of northeastern Iran, show some clear affinities with the neolithic culture of south India. The unburnished and burnished grey ware characteristic of the neolithic culture of south India including our region is present at all the above mentioned sites and is believed to have developed in the Turkeman Steppe. The earliest evidence of this grey ware complex has been found in the chalcolithic levels at Alishar in the first half of third millennium B.C. and later it occurs in II A at about 2500 B.C. In his excavations at Chagar Bazar Prof. Mallowan in 1947 found that grey ware replaced painted pottery. The pottery is handmade, black to grey incolour and unpainted. The usual forms as at Shah Tepe comprise globular vessels, lugged and handled vessels, spouted pots, rimless bowls etc. which are also characteristic of our region. But at Hissar jars, cups, goblets typical of painted ware in Hissar IA and B also occur in Hissar IC in gery ware. This shows that these forms were copied by the grey ware people from the earlier painted pottery. This also established that grey ware reached Hissar from outside. This ware has also been noticed in Quetta-Kalat area of Baluchistan (De-Cardi 1959 : 15–24). Even there is similarity in the nature of the stone industries. They comprise retouched blades, cores, scrapers, arrowheads - all made on flint. The ground stone tools comprise celts of diorite, whet stones, pestles, polishers, weights, etc.

Chapter VII

SUMMARY AND CONCLUSION

The area covered in the present study includes the western part of Kurnool district and the entire Anantapur district. Its importance lies in the rich archaeological remains which attracted the attention of some geologists and amateur archaeologists since the middle of the last century. Captain Meadows Taylor and Robert Bruce Foote were mainly responsible for the early discoveries of the relics of pre-historic man in this part of the peninsula. The former had recorded a large number of megalithic monuments in the fifties and sixties of the last century in Rayadrug and Dharmavaram taluks ir Anantapur district, and Adoni taluk in Kurnool district, while the latter beginning from 1885 had collected a large number of antiquities belonging to Mesolithic, Neolithic and Megalithic Cultures. However, no systematic exploration and study of this area had been done.

After these initial discoveries no work was done in this area though in its neighbourhood particularly in Karnataka, considerable evidence of the neolithic culture was brought to light. The present work was undertaken with the aim of conducting an intensive and systematic exploration of the region to reconstruct its pre-historic cultures against the background of the available evidence from north Karnataka. Explorations were carried out by me during 1965–66. These brought to light 14 mesolithic sites, 35 neolithic sites, 14 ashmounds, an iron-smelting site and a large number of various types of megalithic monuments at 17 places. This list includes some of the known sites also since the aim was to make the account geographically comprehensive. Subsequently, an excavation was planned and carried out on two of the ashmounds at Palavoy in Kalyandrug taluk of Anantapur district in 1967. The present work is exclusively devoted to the study of the neolithic culture of the region. The neolithic sites are geographically distributed in the Adoni, Alur, Uravakonda, Gooty, Anantapur, Dharmavaram, Kalyandrug and Rayadrug taluks located in the northernmost, northern and central divisions respectively. Other taluks comprising Hindupur, Penukonda and Madakasira have not revealed any remains of pre-historic man. However future work in these taluks might yield the remains of early man. The sites are either at the feet, slopes and tops of castellated granite hills, or sometimes, on the river banks. The river bank sites are mostly on the Tungabhadra.

A study of the archaeological materials collected from the surface of several sites and from the excavations at Palavoy unfolded a sequence of three distinct cultures: Mesolithic, Neolithic and Iron Age. These cultures could be reconstructed with the help of stratigraphy, techniques, typology and state of preservation of the artifacts. In the following lines we shall examine the traits of the neolithic culture only as it is our primary concern here.

The evidence for the neolithic culture has been found at 35 sites, of which four are located in Adoni and Alur taluks of Kurnool district and the rest in Anantapur district. In Anantapur district, the sites are concentrated in Uravakonda and Kalyandrug taluks touching Karnataka State on the west and south, while in the south other taluks like Dharmavaram, Rayadrug and Anantapur only stray sites have been found.

Two of the former sites are on the bank of Tungabhadra river while the remaining are situated at the feet slopes and tops of castellated granite hills which possess natural rock shelters, open spaces covered by granite boulders, and natural water-cisterns quite suitable for habitations. The granitoid hills in this region as well as in the neighbouring Bellary and Raichur districts are traversed by several trap dykes, which rise mostly in the form of crests and ridges. The close association of new stone age sites and granitoid hills indicates that the neolithic man preferred to occupy the granite hills not only for his habitation but also to exploit the trap dykes, to manufacture the pecked and ground stone tools which formed the chief artifacts of his technology. Thus the physiographical and geological features have remarkably contributed to the establishment of neolithic settlements in our region. This phenomenon is also seen in Bellary and Raichur districts because the physiographical features of these areas are largely similar to those of Anantapur and Kurnool districts.

The evidence of this culture from the surface of several sites consists of pecked and ground stone and blade industries, ceramics and beads.

The chief raw material for the manufacture of pecked and ground stone tools consists of dolerite/basalt and other rocks like epidote granite, granite, granodiorite, diorite, greenstone, pegmatite, schist, quartz, sandstone and granite gneiss. The tools of this industry exhibit three techniques : flaking, pecking and grinding for different purposes at different stages in the manufacture of a tool. The most important tools of the industry are 'axes' and hence some scholars even named the whole culture as "Polished Stone Axe Culture". Other types are adzes ; chopper-chopping tools ; core scrapers ; chisels ; flake tools including points, borers and scrapers; picks ; rubbing stones ; saddle querns ; axe hammers ; hammer stones ; sling stones ; ring stones ; anvils and a few miscellaneous tools. These tools occur in large quantities at the sites of Katamadevudu hill, Velpumadugu, Budagavi hill Gulapalyam, Hulikal, and Havaligi, etc.

The blade and microlithic industry is similar to that of mesolithic period in all respects except one, namely the presence of crested guide ridge technique in this period. Also the proportion of finished tools (11.36%) in this industry is slightly less than half of that in the Mesolithic culture (23.53%), whereas the blade element is relatively more (25.97%) than that of the latter industry (18.53%) indicating the predominance of blade element in the technology. Besides crested guide ridge flakes, trapezes characteristic of this culture are absent in the mesolithic culture of the region.

The chief ceramics consist of hand made unburnished and burnished blotchy grey and dull red wares and a small quantity of black-on-red ware. The most common forms are globular pots of various sizes. Other shapes include spouted pots, basins, lugs, blades and handles of pots, bowls, lipped vessels, and carinated pots with high cylindrical neck. The decorations consist of horizontal bands in ochre paint, impressed, perforated and incised designs. Designs in black paint consist of simple horizontal and vertical bands, and short strokes on the rim, lattices, loops, chevrons, or sometimes a broad horizontal band from which are suspended several vertical zig-zag bands on the external surfaces of pots. Objects of ornament in the form of beads of steatite and a few of agate, carnelian and chert occurred.

All these traits have been found in the excavations at Palavoy. The neolithic culture designated here as Palavoy II, and represented in layers 11 to 9, is separated from Palavoy I by a gap of two sterile layers. The excavations showed that the people lived in small circular or rectangular huts with walls of mud and roof probably of thatch. Later people of this culture knew the use of copper. Painted

pottery, handmade with the help of mould, is in large quantity (10.69%) and occurs in all the strata of this period. The characteristic pot types of Jorwe and Nevasa are absent in this ware and so it appears to be of local origin.

Bone tools comprising axe-heads, blades and points occurred in this period. The first mentioned type of tools resembling ground stone axes in shape, size and technique of manufacture have been found for the first time in neolithic levels in India. Other finds from this period include several unbaked clay objects and a grey ware disc whose significance has already been discussed elsewhere (Rami Reddy 1976). The occurrence of four vertical child urn-burials indicates the belief of these people in future life. The dead were buried outside the houses. The people domesticated *Bos indicus* (Ox) and *Bos bubalis* (buffalo), sheep and goat, hog and dog. The large number of bones particularly of cattle showing splitting, cutting and chopping marks, and charring condition throw light on the food economy of the people. These animals appear to have been domesticated for their milk and meat. Some of the cattle bones particularly joints showing heavy marks of concussion indicate that these animals were used for heavy and prolonged draft-work in agricultural operations as at Sanganakallu. Plant remains like zizyphus, acacia or dalbergia species reveals that the people lived in an arid climate.

The stratigraphical break between the pre-neolithic and neolithic levels represented by two sterile layers indicate that the neolithic people occupied the site long after the disappearance of mesolithic culture from this site. The late level of this culture is radiocarbon dated to 1965 B.C. The early level must be much older than 2000 B.C. The sites in other areas of southwestern Andhra Pradesh could be roughly dated to a period between the early and mid-third millennium B.C.

CONCLUSION

The neolithic culture is fairly widespread in the region particularly in the west and south west parts touching the Karnataka state. This culture is represented in layers 11 to 9 in Palavoy excavations. There is no direct proof to infer that this culture has immediately succeeded the mesolithic because in the Palavoy excavations we found a stratigraphical break of sterile layers between this and the pre-neolithic period. On the basis of the C-14 date available for the late neolithic level at Palavoy (1965 B.C.) and a number of dates from other south Indian sites, it may be reasonable to conclude that the mesolithic people in south western Andhra Pradesh survived about the middle and the beginning of the third millennium B.C.

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TABLE 1. SITE-WISE DISTRIBUTION OF PECKED AND GROUND STONE TOOLS

S. No.	*Site*	*No. of artifacts*	*Percentage*
1.	ADN–E	50	2.62
2.	AKK	60	3.14
3.	APL	49	2.57
4.	BGH	176	9.23
5.	BMH	74	3.86
6.	CHP	8	0.42
7.	CDK	5	0.26
8.	DKL–NE	9	0.47
9.	GKL–SW	44	2.30
10.	GKL–NW	18	0.94
11.	GPM	80	4.23
12.	HBG	71	3.72
13.	HVG	108	5.66
14.	HKL	159	8.33
15.	IKL	48	2.52
16.	KDG–F	17	0.89
17.	KML	17	0.89
18.	KDH	122	6.39
19.	KDP	43	2.26
20.	LVH	90	4.72
21.	MPM	42	2.21
22.	MLK	6	0.31
23.	MGL	45	2.35
24.	PLY	49	2.57
25.	PDK	37	1.94
26.	PPL	69	3.62
27.	RDG	11	0.58
28.	UKD	43	2.26
29.	VKR	18	0.94
30.	VMG	134	7.02
31.	VKL–F	69	3.62
32.	VKL–W	22	1.15
33.	VPL	58	3.03
34.	YKL	57	2.98
	Total :	1,908	100.00

TABLE 2. SITE-WISE DISTRIBUTION OF RAW MATERIALS IN THE PECKED AND GROUND STONE INDUSTRY

Sl. No.	Sites / Material	Dolerite Basalt	Epidote Granite	Granite	Grano-Diorite	Diorite	Green-Stone	Pegmatite	Schist	Quartz	Sandstone	Granite Gneiss	Total
1.	ADN-E	27 54.00	2 4.00	18 36.00	2 4.00	1 2.00	—	—	—	—	—	—	50
2.	AKK	39 65.00	13 21.67	5 8.33	2 3.33	—	—	—	—	—	1 1.67	—	60
3.	APL	44 89.80	4 8.16	—	1 2.04	—	—	—	—	—	—	—	49
4.	BGH	26 71.59	11 6.25	24 13.64	10 5.68	2 1.14	—	2 1.14	—	1 0.56	—	—	176
5.	BMH	56 75.68	8 10.81	6 8.11	2 2.70	2 2.70	—	—	—	—	—	—	74
6.	CHP	6 75.00	—	2 25.00	—	—	—	—	—	—	—	—	8
7.	CDK	1 20.00	3 60.00	—	—	—	—	—	—	—	1 20.00	—	5
8.	DKL-NE	4 44.45	1 11.11	1 11.11	2 22.22	—	1 11.11	—	—	—	—	—	9
9.	GKL-SW	35 79.54	2 4.55	6 13.64	1 2.27	—	—	—	—	—	—	—	44
10.	GKL-NW	11 61.11	4 22.22	3 16.67	—	—	—	—	—	—	—	—	18
11.	GPM	52 65.00	17 21.25	5 6.25	2 2.50	2 2.50	2 2.50	—	—	—	—	—	80
12.	HBG	55 77.46	5 7.04	9 12.68	—	—	1 1.41	—	—	1 1.41	—	—	71
13.	HVG	89 82.41	6 5.55	12 11.11	—	1 0.93	—	—	—	—	—	—	108
14.	HKL	133 83.65	14 8.80	6 3.77	4 2.52	—	—	—	2 1.26	—	—	—	159
15.	IKL	46 95.83	—	1 2.08	—	1 2.08	—	—	—	—	—	—	48
16.	KDG-F	9 52.94	2 11.77	2 11.77	1 5.88	—	1 5.88	1 5.88	—	—	—	1 5.88	17
17.	KML	5 29.41	3 17.65	6 35.29	2 11.77	1 5.88	—	—	—	—	—	—	17
18.	KDH	90 73.77	16 13.11	3 2.46	6 4.92	3 2.46	—	1 0.82	—	1 0.82	2 1.64	—	122
19.	KDP	34 79.07	1 2.32	2 4.65	3 6.98	—	1 2.33	—	2 4.65	—	—	—	43

Sl. No.	Sites	Materials	Dolerite Basalt	Epidote Granites	Granite	Grano-Diorite	Diorite	Green-Stone	Pegmatite	Schist	Quartz	Sandstone	Granite Gneiss	Total
20.	LVH		70 **77.78**	3 **3.33**	9 **10.00**	4 **4.45**	1 **1.11**	1 **1.11**	2 **2.22**	—	—	—	—	90
21.	MPM		15 **35.71**	6 **14.29**	8 **19.05**	6 **14.29**	2 **4.76**	4 **9.52**	—	—	1 **2.38**	—	—	42
22.	MLK		3 **50.00**	2 **33.33**	—	—	—	—	—	—	1 **16.67**	—	—	6
23.	MGL		32 **71.11**	4 **8.89**	3 **6.67**	4 **8.89**	—	1 **2.22**	—	—	—	—	1 **2.22**	45
24.	PLY		45 **91 84**	2 **4.08**	1 **2.04**	—	—	1 **2.04**	—	—	—	—	—	49
25.	PDK		24 **64 87**	7 **18.92**	5 **13.51**	—	1 **2.70**	—	—	—	—		—	37
26.	PPL		68 **98.55**	—	1 **1.45**	—	—	—	—	—	—	—	—	69
27.	RDG		11 **100.00**	—	—	—	—	—	—	—	—	—	—	11
28.	UKD		23 **53 49**	6 **13 95**	11 **25.58**	2 **4.65**	—	—	1 **2.33**	—	—	—	—	43
29.	VKR		8 **44.44**	5 **27.78**	1 **5.56**	4 **22.22**	—	—	—	—	—	—	—	18
30.	VMG		111 **82.33**	12 **8.96**	1 **6.71**	—	—	1 **0.75**	9	—	—	—	—	134
31.	VKL-F		44 **63.77**	12 **17 39**	12 **17.39**	—	—	—	1 **1.45**	—	—	—	—	69
32.	VKL-W		16 **72.73**	4 **18.18**	—	2 **9.09**	—	—	—	—	—	—	—	22
33.	VPL		56 **96.54**	1 **1.73**	—	1 **1.73**	—	—	—	—	—	—	—	58
34.	YKL		53 **92.97**	1 **1.76**	1 **1.76**	—	—	—	—	2 **3.51**	—	—	—	57
	TOTAL		1,441 **15.52**	177 **9.28**	172 **9.02**	62 **3.25**	17 **0 89**	14 **0.74**	8 **0.42**	6 **0.31**	5 **0.25**	4 **0.27**	2 **0.10**	1,908 **100.00**

The bold figures represent percentages.

TABLE 3. TYPE-WISE DISTRIBUTION OF RAW MATERIALS IN THE PECKED AND GROUND STONE INDUSTRY

Artifact Type / *Materials*	*Dolerite Basalt*	*Epidote Granite*	*Granite*	*Grano-Diorite*	*Diorite*	*Green-Stone*	*Pegmatite*	*Schist*	*Quartz*	*Sand-Stone*	*Granite Gneiss*	*Total*
A Axes	775 **100.00**	—	—	—	—	—	—	—	—	—	—	775 **40.62**
B Adzes	3 **75.00**	—	—	—	1 **25.00**	—	—	—	—	—	—	4 **0.21**
C Chopper-Chopping Tools	25 **100.00**	—	—	—	—	—	—	—	—	—	—	25 **1.31**
D Core Scrapers	5 **83.33**	—	—	—	—	—	—	—	—	1 **16.67**	—	6 **0.31**
E Chisels	28 **93.33**	—	—	1 **3.33**	1 **3.33**	—	—	—	—	—		30 **1.57**
F Flake Tools	63 **100.00**	—	—	—	—	—	—	—	—	—	—	63 **3.30**
G Flakes	211 **100.00**	—	—	—	—	—	—	—	—	—	—	211 **11.06**
H Picks	4 **100.00**	—	—	—	—	—	—	—	—	—	—	4 **0.21**
I Rubbing Stones	24 **14.63**	—	114 **69.51**	16 **9.76**	5 **3.05**	1 **0.61**	—	—	—	2 **1.22**	2 **1.22**	164 **8.60**
J Saddle Querns	—	—	208*	—	—	—	—	—	—	—	—	208*
K Axe Hammers	64 **100.00**	—	—	—	—	—	—	—	—	—	—	64 **3.35**
L Hammer Stones	219 **46.30**	160 **33 83**	33 **6.99**	31 **6.55**	7 **1.48**	11 **2.32**	8 **1.69**		4 **0.84**	—	—	473 **24.80**
M Sling Stones	18 **22.79**	17 **21.52**	25 **31.65**	14 **17.72**	3 **3.79**	1 **1.27**	—	—	1 **1.27**	—	—	79 **4.14**
N Mace Heads	—	—	—	—	—	—	—	5 **83.33**	—	1 **16.67**	—	6 **0.31**
O Miscellaneous Tools	2 **50.00**	—	—	—	—	1 **25.00**	—	1 **25.00**		— —	—	4 **0.21**
Total	1,441 **75.52**	177 **9.28**	172 **9.02**	62 **3.25**	17 **0.89**	14 **0.74**	8 **0.42**	6 **0.31**	5 **0.26**	4 **0.21**	2 0.10	1,908 **100.00**

*Not included in the total artifacts as these have been only recorded, but not collected.

The bold figures represent percentages.

TABLE 4 – SITE AND TYPE–WISE DISTRIBUTION OF ARTIFACTS

Sl. No.	*Sites Tool types*	*Axes*	*Adzes*	*Chopper-chopping tools*	*Core scrapers*	*Chisels*	*Flake tools*	*Flakes*
		A	B	C	D	E	F	G
1.	ADN-E	7 **14.00**	1 **2.00**	7 **14.00**	—	—	2 **4.00**	10 **20.00**
2.	AKK	19 **31.67**	—	—	—	1 **1.66**	5 **8.34**	8 **13.33**
3.	APL	29 **59.18**	—	—	—	2 **4.08**	—	4 **8.16**
4.	BGH	73 **41.48**	—	2 **1.14**	—	4 **2.27**	4 **2.27**	12 **6.82**
5.	BMH	37 **50.00**	—	2 **2.70**	—	—	1 **1.35**	3 **4.05**
6.	CHP	—	—	—	—	—	—	6 **75.00**
7.	CDK	—	—	—	1 **20.00**	—	—	1 **20.00**
8.	DKL–NE	1 **11.11**	—	—	—	—	—	1 **11.11**
9.	GKL–SW	27 **61.36**	—	—	—	—	1 **2.28**	4 **9.09**
10.	GKL–NW	6 **33.33**	—	—	—	—	—	—
11.	GPM	37 **46.25**	—	—	—	—	—	—
12.	HBG	39 **54.93**	—	—	—	1 **1.41**	—	9 **12.68**
13.	HVG	38 **35.19**	—	—	1 **0.93**	—	2 **1.86**	25 **23.14**

Picks	*Rubbing stones*	*Saddle querns* [Noticed]*	*Axe hammers*	*Hammer stones*	*Sling stones*	*Mace heads*	*Misc. tools*	*Total*
H	*I*	*J*	*K*	*L*	*M*	*N*	*O*	
—	15 **30 00**	—	—	4 **8.00**	4 **8.00**	—	—	50
—	4 **6.67**	5	1 **1.67**	20 **33.33**	1 **1.67**	1 **1.67**	—	60
2 **4.08**	1 **2.05**	6	3 **6.12**	8 **16.33**	—	—	—	49
—	21 **11.93**	31	8 **4.55**	43 **24.43**	9 **5.11**	—	—	176
—	6 **8.11**	9	2 **2.70**	19 **25.68**	4 **5.41**	—	—	74
—	1 **12.50**	—	—	1 **12.50**	—	—	—	8
—	—	—	—	3 **60.00**	—	—	—	5
—	—	—	1 **11.11**	5 **55.56**	1 **11.11**	—	—	9
—	5 **11.36**	2	1 **2.28**	5 **11.36**	1 **2.28**	—	—	44
—	3 **16.67**	—	2 **11.11**	4 **22.22**	3 **16.67**	—	—	18
—	4 **5.00**	7	4 **5.00**	30 **37.50**	5 **6.25**	—	—	80
—	4 **5.63**	7	2 **2.82**	12 **16.90**	3 **4.22**	—	1 **1.41**	71
—	5 **4.63**	16	4 **3.70**	29 **26.85**	4 **3.70**	—	—	108

Sl. No.	Sites Tool types	Axes	Adzes	Chopper-chopping tools	Core scrapers	Chisels	Flake tools	Flakes
		A	B	C	D	E	F	G
14.	HKL	63 **39.62**	2 **1.26**	1 **0.63**	—	1 **0.63**	17 **10.19**	21 **13.70**
15.	IKL	22 **45.83**	—	2 **4.17**	—	2 **4.17**	—	10 **20.83**
16.	KDG–F	4 **23.53**	—	—	—	—	1 **5.88**	2 **11.77**
17.	KML	2 **11.77**	—	—	—	1 **5.88**	—	—
18.	KDH	42 **34.42**	—	3 **2.46**	1 **0.82**	1 **0.82**	11 **9.02**	13 **10.65**
19.	KDP	13 **30.24**	—	—	—	—	1 **2.32**	5 **11.63**
20.	LBH	45 **50.00**	—	—	1 **1.11**	—	1 **1.11**	10 **11.12**
21.	LPM	3 **7.15**	—	—	—	—	—	1 **2.38**
22.	MLK	1 **16.67**	—	—	—	—	—	1 **16.67**
23.	MGL	22 **48.89**	—	—	—	1 **2.22**	—	3 **6.67**
24.	PLY	30 **61.23**	—	—	2 **4.08**	2 **4.08**	—	—
25.	PDK	1 **29.73**	—	1 **2.70**	—	—	2 **5.40**	9 **24.33**
26.	PPL	40 **57.97**	—	1 **1.45**	—	6 **8.70**	4 **5.79**	6 **8.70**
27.	RDG	1 **9.09**	—	—	—	—	—	9 **81.82**

Picks	*Rubbing stones*	*Saddle querns* [Noticed]*	*Axe hammers*	*Hammer stones*	*Sling stones*	*Mace heads*	*Misc. tools*	*Total*
H	*I*	*J*	*K*	*L*	*M*	*N*	*O*	
1 **0.63**	6 **3.77**	15	5 **3.16**	34 **21.38**	6 **3.77**	2 **1.26**	—	159
—	1 **2.09**	4	1 **2.09**	9 **18.75**	1 **2.09**	—	—	48
—	3 **17.65**	—	—	7 **41.17**	—	—	—	17
—	4 **23.53**	3	—	8 **47.06**	2 **11.77**	—	—	17
—	11 **9.02**	10	1 **0.82**	28 **22.95**	11 **9.02**	—	—	122
—	4 **9.30**	5	6 **13.95**	9 **20.93**	3 **6.98**	2 **4.65**	—	43
—	10 **11.12**	19	3 **3.33**	18 **20.00**	2 **2.22**	—	—	90
—	6 **14.29**	—	2 **4.76**	25 **59.52**	4 **9.52**	—	1 **2.38**	42
—	—	—	—	4 **66.66**	—	—	—	6
—	4 **8.89**	2	—	12 **26.66**	3 **6.67**	—	—	45
—	2 **4.08**	13	4 **8.16**	9 **18.37**	—	—	—	49
—	6 **16.22**	10	—	6 **16.22**	2 **5.40**	—	—	37
—	1 **1.45**	—	1 **1.45**	9 **13.04**	—	—	1 **1.45**	69
—	—	—	—	1 **9.09**	—	—	—	11

Sl. No.	Sites	Tool types	Axes	Adzes	Chopper-chopping tools	Care scrapers	Chisels	Flake tools	Flakes
			A	B	C	D	E	F	G
28.	UKD		8 **18.60**	—	—	—	—	1 **2.33**	—
29.	VKR		7 **38.89**	—	—	—	—	—	—
30.	VMG		71 **52 98**	1 **0.75**	—	—	2 **1.50**	2 **1.50**	7 **5.21**
31.	VKL-F		17 **24.64**	—	—	—	2 **2 90**	—	6 **8.69**
32.	VKL-W		9 **40.91**	—	—	—	1 **4 54**	2 **9.09**	3 **13.64**
33.	VPL		31 **53.45**	—	3 **5.17**	—	2 **3 45**	2 **3.45**	7 **12 07**
34.	YKL		20 **35.09**	—	3 **5.26**	—	1 **1.76**	4 **7.02**	15 **26.31**
		Total :	775 **40.62**	4 **0.21**	25 **1.31**	6 **0.31**	30 **1.57**	63 **3 30**	211 **11.06**

* Not included in the total artifact and hence percentages are not calculated.

The bold figures represent percentages.

Picks	*Rubbing stones*	*Saddle querns* [Noticed]*	*Axe hammers*	*Hammer stones*	*Sling stones*	*Mace heads*	*Misc. tools*	*Total*
H	*I*	*J*	*K*	*L*	*M*	*N*	*O*	
—	8 **18.60**	13	—	26 **60.47**	—	—	—	43
—	4 **22.22**	—	—	6 **33.33**	1 **5.56**	—	—	18
1 **0.75**	11 **8.21**	14	8 **5.97**	28 **20.89**	3 **2.24**	—	—	134
—	9 **13.04**	5	2 **2.90**	30 **43.48**	3 **4.35**	—	—	69
—	1 **4.54**	3	—	3 **13.64**	3 **13.64**	—	—	22
—	2 **3 45**	8	3 **5.17**	8 **13.79**	—	—	—	58
—	2 **3.51**	1	—	10 **17.54**	—	1 **1.76**	1 **1.76**	57
4 **0.21**	164 **8.60**	208	64 **3.35**	473 **24.80**	79 **4.14**	6 **0.31**	4 **0.21**	1,908 **100.00**

TABLE 5. SITE-WISE DISTRIBUTION OF COMPLETE AND INCOMPLETE AXES

S. No.	Sites	Complete axes	Incomplete axes			Total
			Ground edge, body and butt missing	Butt only, body and edge missing	Body without butt or edge	
1.	ADN-E	5	1	1	—	7
2.	AKK	—	9	4	6	19
3.	APL	9	5	10	5	29
4.	BGH	14	15	27	17	73
5.	BMH	6	7	12	12	37
6.	DKL-NE	1	—	—	—	1
7.	GKL-SW	16	3	5	3	27
8.	GKL-NW	3	1	—	2	6
9.	GPM	18	6	10	3	37
10.	HBG	7	9	13	10	39
11.	HVG	6	4	17	11	38
12.	HKL	21	9	18	15	63
13.	IKL	10	5	6	1	22
14.	KDG-F	1	1	—	2	4
15.	KML	2	—	—	—	2
16.	KDH	14	7	13	8	42
17.	KDP	4	1	4	4	13
18.	LVH	6	9	7	23	45
19.	MPM	2	—	1	—	3
20.	MLK	1	—	—	—	1
21.	MGL	6	3	6	7	22
22.	PLY	5	8	13	4	30
23.	PDK	3	5	2	1	11
24.	PPL	30	5	3	2	40
25.	RDG	1	—	—	—	1
26.	UKD	3	1	4	—	8
27.	VKR	3	—	3	1	7
28.	VKL-F	5	4	3	5	17
29.	VKL-W	1	4	4	—	9
30.	VMG	46	8	15	2	71
31.	VPL	5	5	13	8	31
32.	YKL	6	4	5	5	20
	Total :	260 **33.55**	139 **17.93**	219 **28.26**	157 **20.26**	775 **10.000**

The bold figures represent percentages.

TABLE 6. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF LENGTHS, BREADTHS AND THICKNESSES OF AXES IN PECKED AND GROUND STONE INDUSTRY

Sites : 31 No. of observed specimens 260

Measurement class (Centimetres)	*Length*		*Breadth*		*Thickness*	
	f	%	f	%	f	%
0.7–1	—	—	—	—	2	0.77
1.1–2	—	—	—	—	50	19.23
2.1–3	—	—	2	0.77	92	35.38
3.1–4	—	—	8	3.08	79	30.38
4.1–5	1	0.38	55	21.15	23	8.85
5.1–6	12	4.62	92	35.38	10	3.85
6.1–7	16	6.15	66	25.38	4	1.54
7.1–8	19	7.31	18	6.92	—	—
8.1–9	38	14.62	11	4.23	—	—
9.1–10	41	15.77	5	1.92	—	—
10.1–11	44	16.92	3	1.15	—	—
11.1–12	24	9.23	—	—	—	—
12.1–13	22	8.46	—	—	—	—
13.1–14	14	5.39	—	—	—	—
14.1–15	9	3.46	—	—	—	—
15.1–16	4	1.54	—	—	—	—
16.1–17	5	1.92	—	—	—	—
17.1–18	4	1.54	—	—	—	—
18.1–21	4	1.54	—	—	—	—
24.1–24.5	3	1.15	—	—	—	—
Mean	10.5		5.9		3.0	

TABLE 7. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF B/L AND T/B RATIOS OF AXES IN PECKED AND GROUND STONE INDUSTRY

Ratio class	*Breadth/Length*		*Thickness/Breadth*	
	f	%	f	%
.21– .3	—	—	9	3.46
.31– .4	11	4.23	52	20.00
.41– .5	49	18.85	73	28.08
.51– .6	108	41.54	76	29.23
61– .7	56	21.54	34	13.08
71– .8	25	9.62	12	4.62
81– .9	10	3.85	3	1.16
.91–1.0	1	0.38	1	0.38
Mean	.58		.50	

TABLE 8. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF WEIGHTS OF AXES IN PECKED AND GROUND STONE INDUSTRY

Weight class (Grams)	f	%
16.5–100	29	11.15
101–200	94	36.15
201–300	50	19.23
301–400	35	13.46
401–500	21	8.08
501–600	11	4.23
601–700	2	0.77
701–800	2	0.77
801–900	7	2.70
901–1000	1	0.38
1201–1300	3	1.15
1301–1400	1	0.38
1401–1500	1	0.38
1601–1700	2	0.77
–1928.1	1	0.38
Mean	294.1	

TABLE 9. TECHNOLOGICAL CLASSIFICATION OF AXES

S.No.	SITES	STAGE I	STAGE II				STAGE III		
		Only flaked, or, flaked and pecked tools but not ground	Edge ground tools or tools only with grinding over edge				Completely ground tools		
		1	2	1	2	3	4	1	2	
		Only flaked tools	Flaked and pecked tools	Flaked and edged ground tools	Pecked and edge ground tools	Flaked, pecked and edge ground tools	Only edge ground tools	Ground all over but with a partially uneven surface	Ground all over to a smooth surface	Total
1.	ADN-E	—	1	1	2	—	—	1	—	5
2.	APL	1	1	—	2	3	1	1	—	9
3.	BGH	2	1	1	—	1	4	5	—	14
4.	BMH	2	—	—	1	3	—	—	—	6
5.	DKL-NE	—	—	—	—	1	—	—	—	1
6.	GKL-SW	2	2	2	2	6	1	1	—	16
7.	GKL-NW	—	—	—	2	—	—	1	—	3
8.	GPM	1	1	1	—	13	—	1	1	18
9.	HBG	1	1	—	1	1	—	2	1	7
10.	HVG	3	—	—	—	—	—	3	—	6
11.	HKL	1	9	1	4	4	—	1	1	21
12.	IKL	2	3	—	—	5	—	—	—	10
13.	KDG-F	—	—	—	—	—	—	1	—	1
14.	KML	—	—	1	—	1	—	—	—	2
15.	KDH	1	5	3	2	2	—	—	1	14
16.	KDP	1	2	1	—	—	—	—	—	4
17.	LVH	—	2	—	—	1	—	3	—	6
18.	MPM	—	—	—	—	2	—	—	—	2
19.	MLK		—	—	—	—	1	—	—	1
20.	MGL	1	1	—	2	1	1	—	—	6
21.	PLY	—	1	—	—	2	—	—	2	5
22.	PDK	—	1	—	—	—	—	2	—	3
23.	PPL	14	13	—	—	3	—	—	—	30
24.	RBG	—	—	—	—	1	—	—	—	1
25.	UKD	—	—	1		2	—	—	—	3
26.	VKR	—	1	—	1	1	—	—	—	3
27.	VKL-F	—	3	—	—	2	—	—	—	5
28.	VKL-W	—	—	—	1	—	—	—	—	1
29.	VMG	3	14	5	—	15	3	5	1	46
30.	VPL	—	3	—	—	1	—	1	—	5
31.	YKL	1	1	—	—	3	—	1	—	6
	TOTAL	36 **13.85**	66 **25.38**	17 **6.54**	20 **7.68**	74 **28.46**	11 **4.23**	29 **11.15**	7 **2.69**	260 **100.00**

The bold figures represent percentages.

TABLE 10. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF LENGTHS, BREADTHS AND THICKNESSES OF CHOPPER-CHOPPING TOOLS IN PECKED AND GROUND STONE INDUSTRY

Sites: 10 No. of observed specimens 25

Measurement class (*cms.*)	*Length*		*Breadth*		*Thickness*	
	f	%	f	%	f	%
3.1- 4	—	—	—	—	7	28
4.1- 5	—	—	—	—	12	48
5.1- 6	—	—	2	8	4	16
6.1- 7	4	16	14	56	1	4
7.1- 8	9	36	5	20	1	4
8.1- 9	7	28	1	4	—	—
9.1-10	2	8	3	12	—	—
10.1-10.5	3	12	—	—	—	—
Mean	8.1		7.0		4.7	

TABLE 11. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF B/L AND T/B RATIOS OF CHOPPER-CHOPPING TOOLS IN PECKED AND GROUND STONE INDUSTRY

Ratio class	*Breadth/Length*		*Thickness/Breadth*	
	f	%	f	%
0 - .48	—	—	1	4
.51 - .55	—	—	2	8
.56 - .60	—	—	4	16
.61 - .65	1	4	6	24
.66 - .70	1	4	1	4
.71 - .75	1	4	6	24
.76 - .80	2	8	3	12
.81 - .85	6	24	2	8
.86 - .90	4	16	—	—
.91 - .95	5	20	—	—
.96 - .98	5	20	—	—
Mean	.86		.67	

TABLE 12. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF WEIGHTS OF CHOPPER-CHOPPING TOOLS IN PECKED AND GROUND STONE INDUSTRY

Weight class (Grams)	f	%
101–200	4	16
201–300	10	40
301–400	6	24
401–500	2	8
501–1041	3	12
Mean	344.8	

TABLE 13. CLASSIFICATION OF CHOPPER - CHOPPING TOOLS

S. No.	*Name of site*	*Choppers*	*Chopper-cum point*	*Choppers-cum-hammer stones*	*Chopping tools*	*Total*
1.	ADN–E	3	1	1	2	7
2.	BGH	2	—	—	—	2
3.	BMH	1	—	—	1	2
4.	HKL	—	—	1	—	1
5.	IKL	—	—	2	—	2
6.	KDH	1	—	—	2	3
7.	PDK	—	—	—	1	1
8.	PPL	1	—	—	—	1
9.	VPL	—	—	1	2	3
10.	YKL	—	—	2	1	3
	Total :	8	1	7	9	25

TABLE 14. TECHNOLOGICAL CLASSIFICATION OF CHISELS

S. No.	Sites	STAGE I			STAGE II			Total
		Only flaked, or pecked, or flaked and pecked but not ground			Edge ground tools			
		only flaked tools	flaked and pecked tools	flaked & edge ground	pecked and edge ground	flaked, pecked and edge ground	only edge ground	
1.	AKK	—	—	1	—	—	—	1
2.	APL	—	—	—	—	2	—	2
3.	BGH	—	—	2	—	1	1	4
4.	HBG	—	—	1	—	—	—	1
5.	HKL	1	—	—	—	—	—	1
6.	IKL	—	—	—	1	1	—	2
7.	KML	—	—	1	—	—	—	1
8.	KDH	—	—	—	1	—	—	1
9.	MGL	—	—	—	1	—	—	1
10.	PLY	—	—	—	1	1	—	2
11.	PPL	1	2	3	—	—	—	6
12.	VMG	—	—	1	—	—	1	2
13.	VKL-F	—	—	—	1	1	—	2
14.	VKL-W	1	—	—	—	—	—	1
15.	VPL	—	1	—	—	1	—	2
16.	YKL	—	1	—	—	—	—	1
	Total :	3 **10.00**	4 **13.33**	9 **30.00**	5 **16.67**	7 **23.33**	2 **6.67**	30 **100.00**

The bold figures represent percentages.

TABLE 15. SITE AND TYPE-WISE DISTRIBUTION OF FLAKE TOOLS

S. No.	Sites	Tool types								
		Points	Borers	Scrapers					Total of scrapers	Total
				Side	Hollow	Side-and-end	End	Round		
1.	ADN-E	—	—	2	—	—	—	—	2	2
2.	AKK	—	1	2	—	2	—	—	4	5
3.	BGH	—	—	2	1	—	—	1	4	4
4.	BMH	—	—	—	—	1	—	—	1	1
5.	GKL-SW	1	—	—	—	—	—	—	—	1
6.	HVG	—	—	1	—	—	—	1	2	2
7.	HKL	—	1	10	1	1	2	2	16	17
8.	KDG-F	—	—	—	1	—	—	—	1	1
9.	KDH	—	—	8	—	1	—	2	11	11
10.	KDP	—	—	1	—	—	—	—	1	1
11.	LVH	—	—	1	—	—	—	—	1	1
12.	PDK	1	—	—	—	1	—	—	1	2
13.	PPL	—	—	3	—	—	—	1	4	4
14.	UKD	—	—	1	—	—	—	—	1	1
15.	VMG	—	—	—	—	1	1	—	2	2
16.	VKL-W	1	—	1	—	—	—	—	1	2
17.	VPL	—	—	2	—	—	—	—	2	2
18.	YKL	—	—	—	—	1	1	2	4	4
	Total :	3	2	34	3	8	4	9	58	63

TABLE 16. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF LENGTHS OF FLAKE TOOLS, FLAKES AND FLAKE BLADES IN PECKED AND GROUND STONE INDUSTRY

Flake tools No : 63 Sites : 18

Flakes No : 145 Sites : 28

Flake blades No : 66 Sites : 20

Length class (centimeters)	Flake tools		Flakes		Flake blades	
	f	%	*f*	%	*f*	%
3.1- 4.0	—	—	6	4.14	2	3.03
4.1- 5.0	3	4.76	33	22.76	15	22.73
5.1- 6.0	7	11.11	39	26.89	19	28.78
6.1- 7.0	14	22.22	29	20.00	14	21.21
7.1- 8.0	26	41.27	27	18.62	12	18.18
8.1- 9.0	6	9.52	7	4.83	3	4.55
9.1-10.0	5	7.59	2	1.38	—	—
10.1-11.0	1	1.59	1	0.69	1	1.52
13.1-14.0	1	1.59	—	—	—	—
14.1-15.0	—	—	1	0.69	—	—
Mean		7.4		6.1		6.1

TABLE 17. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF BREADTHS OF FLAKE TOOLS, FLAKES AND FLAKE BLADES IN PECKED AND GROUND STONE INDUSTRY

Breadth class (centimetres)	*Flake tools*		*Flakes*		*Flake blades*	
	f	%	*f*	%	*f*	%
1.1– 2.0	—	—	—	—	1	1.52
2.1– 3.0	1	1.59	5	3.45	6	9.09
3.1– 4.0	8	12.70	35	24.14	32	48.48
4.1– 5.0	17	26.98	57	39.30	23	34.85
5.1– 6.0	22	34.92	32	22.07	4	6.06
6.1– 7.0	12	19.05	11	7.59	—	—
7.1– 8.0	3	4.76	2	1.38	—	—
8.1– 9.0	—	—	2	1.38	—	—
10.1–11.0	—	—	1	0.69	—	—
Mean		6.0		4.8		3.9

TABLE 18. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF THICKNESS OF FLAKE TOOLS, FLAKES AND FLAKE-BLADES IN GROUND STONE INDUSTRY

Thickness class (centimetres)	*Flake Tools*		*Flakes*		*Flake blades*	
	f	%	*f*	%	*f*	%
0.8 – 1.0	1	1.59	8	5.52	7	10.61
1.1 – 2.0	20	31.75	98	67.59	52	78.78
2.1 – 3.0	28	44.44	36	24.83	7	10.61
3.1 – 4.0	12	19.05	3	2.06	—	—
4.1 – 5.0	2	3.17	—	—	—	—
Mean		2.4		1.8		1.5

TABLE 19. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF RATIOS OF FLAKE TOOLS, FLAKES AND FLAKE BLADES IN PECKED AND GROUND STONE INDUSTRY

B/L Ratio class	*Flake Tools*		*Flakes*		*Flake Blades*	
	f	%	*f*	%	*f*	%
.33– .4	2	3.17	1	0.69	2	3.03
.41– .5	2	3.17	3	2.07	4	6.06
.51– .6	8	12.70	7	4.83	13	19.70
.61– .7	10	15.87	25	17.24	25	37.88
.71– .8	30	47.62	42	28.96	15	22.73
.81– .9	8	12.70	35	24.14	4	6.06
.91–1.00	3	4.77	32	22.07	3	4.54
Mean	.72		.78		.66	

TABLE 20. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF T/B RATIOS OF FLAKE TOOLS, FLAKES AND FLAKE BLADES IN PECKED AND GROUND STONE INDUSTRY

T/B Ratio class	*Flake tools*		*Flakes*		*Flake blades*	
	f	%	*f*	%	*f*	%
.21–.3	5	7.94	26	17.93	9	13.64
.31–.4	15	23.81	69	14.58	32	48.48
.41–.5	21	33.33	30	20.69	16	24.24
.51–.6	15	23.81	15	10.35	7	10.61
.61–.7	4	6.35	2	1.38	2	3.03
.71–.8	2	3.17	1	0.69	..	..
.81–.9	1	1.59	1	0.69	..	..
.91–1.00	..	..	1	0.69	..	..
Mean	.46		.39		.38	

TABLE 21. SITE-WISE DISTRIBUTION OF FLAKES AND FLAKE BLADES IN PECKED AND GROUND STONE INDUSTRY

S. No.	Site	Artifact type	Flakes		Flake blades		Total of all	%
			Unutilized	Utilized	Unutilized	Utilized		
1.	ADN-E		6	..	2	2	10	4.74
2.	AKK		2	1	4	1	8	3.79
3.	APL		3	..	1	..	4	1.89
4.	BGH		8	2	2	..	12	5.69
5.	BMH		2	1	..	..	3	1.42
6.	CHP		2	1	2	1	6	2.86
7.	CDK		..	..	1	..	1	0.47
8.	DKL-NE		—	1	..	..	1	0.47
9.	GKL-SW		2	..	2	..	4	1.89
10.	HBG		6	..	3	..	9	4.26
11.	HVG		20	2	3	..	25	11.85
12.	HKL		9	1	7	4	21	9.95
13.	IKL		7	1	2	..	10	4.74
14.	KDG-F		1	..	1	..	2	0.94
15.	KDH		7	..	4	2	13	6.16
16.	KDP		3	1	..	1	5	2.37
17.	LVH		10	..	..	..	10	4.74
18.	MPM		1	..	..	..	1	0.47
19.	MLK		1	..	..	..	1	0.47
20.	MGL		1	1	1	..	3	1.42
21.	PBK		9	..	..	..	9	4.26
22.	PPL		3	..	1	2	6	2.86
23.	RDG		4	2	2	1	9	4.26
24.	VMG		2	2	2	1	7	3.32
25.	VKL-F		4	2	..	..	6	2.86
26.	VKL-W		3	..	..	..	3	1.42
27.	VPL		4	1	2	..	7	3.32
28.	YKL		4	2	7	2	15	7.11
	Total :		124 **58.77**	21 **9.95**	49 **23.22**	17 **8.06**	211	100.00

The bold figures represent percentages.

TABLE 22. SITE-WISE DISTRIBUTION OF RAW MATERIALS FOR THE PREPARATION OF RUBBING STONES

S.No.	Sites	Materials							Total
		Granite	Dolerite	Granodiorite	Diorite	Gneiss	Sandstone	Greenstone	
1.	ADN-E	14	—	1	—	—	—	—	15
2.	AKK	4	—	—	—	—	—	—	4
3.	APL	—	1	—	—	—	—	—	1
4.	BGH	14	5	2	—	—	—	—	21
5.	BMH	4	—	1	1	—	—	—	6
6.	CHP	1	—	—	—	—	—	—	1
7.	GKL-SW	4	—	1	—	—	—	—	5
8.	GKL-NW	3	—	—	—	—	—	—	3
9.	GPM	3	—	1	—	—	—	—	4
10.	HBG	4	—	—	—	—	—	—	4
11.	HVG	5	—	—	—	—	—	—	5
12.	HKL	5	—	1	—	—	—	—	6
13.	IKL	1	—	—	—	—	—	—	1
14.	KDG-F	2	—	—	—	1	—	—	3
15.	KML	4	—	—	—	—	—	—	4
16.	KDH	1	6	2	—	—	2	—	11
17.	KDP	2	2	—	—	—	—	—	4
18.	LVH	7	1	1	1	—	—	—	10
19.	MPM	2	1	—	2	—	—	1	6
20.	MGL	2	—	1	—	1	—	—	4
21.	PDK	4	1	—	1	—	—	—	6
22.	PLY	1	1	—	—	—	—	—	2
23.	PPL	1	—	—	—	—	—	—	1
24.	UKD	8	—	—	—	—	—	—	8
25.	VKR	1	1	2	—	—	—	—	4
26.	VMG	8	2	1	—	—	—	—	11
27.	VKL-F	8	1	—	—	—	—	—	9
28.	VKL-W	—	—	1	—	—	—	—	1
29.	VPL	—	1	1	—	—	—	—	2
30.	YKL	1	1	—	—	—	—	—	2
	Total :	114 **69.51**	24 **14.63**	16 **9.76**	5 **3.05**	2 **1.22**	2 **1.22**	1 **0.61**	164 **100.00**

The bold figures represent percentages.

TABLE 23. SITE AND—SHAPE-WISE DISTRIBUTION OF RUBBING STONES

S. No.	Sites	Shapes						Total
		Circular	Oval	Oblong	Rectangular	Square	Triangular	
1.	ADN-E	2	2	..	1	..	1	6
2.	AKK	..	..	1	..	..	..	1
3.	APL	..	..	..	1	..	..	1
4.	BGH	4	1	2	1	..	..	8
5.	BMH	..	2	2	..	..	..	4
6.	GKL-SW	..	..	1	..	..	..	1
7.	GKL-NW	..	..	2	..	..	..	2
8.	GPM	1	1	1	..	..	..	3
9.	HBG	..	1	..	..	..	..	1
10.	HVG	1	..	1	..	..	..	2
11.	HKL	3	..	1	..	..	..	4
12.	IKL	..	..	1	..	..	..	1
13.	KDG-F	1	..	..	..	..	..	1
14.	KML	..	..	..	2	..	..	2
15.	KDH	2	3	..	2	1	..	8
16.	KDP	1	1	..	..	2	..	4
17.	LVH	..	1	..	1	1	..	3
18.	MPM	2	2	..	1	..	..	5
19.	MGL	2	..	..	1	..	..	3
20.	PLY	1	..	..	..	..	..	1
21.	PDK	..	2	..	..	..	..	2
22.	VKR	2	..	..	..	..	..	2
23.	VMG	2	2	2	1	..	..	7
24.	VKL-F	1	2	2	1	..	..	6
25.	VKL-W	..	..	..	1	..	..	1
26.	VPL	..	1	..	..	..	1	2
27.	YKL	..	..	..	1	..	..	1
	Total :	25 **30.49**	21 **25.61**	16 **19.51**	14 **17.07**	4 **4.88**	2 **2.44**	82 **100.00**

The bold figures represent percentages.

TABLE 24. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF LENGTHS, BREADTHS AND THICKNESSES OF RUBBING STONES IN PECKED AND GROUND STONE INDUSTRY

Sites : 27 No. of observed specimens : 82

Measurement class (*Centimetres*)	*Length*		*Breadth*		*Thickness*	
	f	%	*f*	%	*f*	%
1.1- 2	..	1	..	..	1	1.22
2.1- 3	..	..	..	..	10	12.20
3.1- 4	..	..	..	..	28	34.15
4.1- 5	..	..	3	3.66	27	32.93
5.1- 6	..	..	7	8.54	10	12.20
6.1- 7	5	6.10	16	19.51	6	7.32
7.1- 8	14	17.07	14	17.07	..	..
8.1- 9	11	13.41	13	15.85	..	..
9.1-10	10	12.20	19	23.17	..	..
10.1-11	9	10.98	6	7.32	..	..
11.1-12	10	12.20	3	3.66	..	..
12.1-13	9	10.98	1	1.22	..	..
13.1-14	9	10.98	..	..	..	..
14.1-15	1	1.22	..	..	..	..
15.1-16	3	3.66	..	..	..	..
17.1-18	1	1.22	..	..	..	..
Mean	10.3		8.1		4.1	

TABLE 25. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF B/L AND T/B RATIOS OF RUBBING STONES IN PECKED AND GROUND STONE INDUSTRY

Ratio class	*Breadth/Length*		*Thickness/Breadth*	
	f	%	*f*	%
.21–.3	..	..	7	8.54
.31–.4	..	..	12	14.63
.41–.5	1	1.22	20	24.39
.51–.6	2	2.44	20	24.39
.61–.7	4	4.88	11	13.41
.71–.8	30	36.59	10	12.20
.81–.9	22	26.83	3	3.66
.91–.1.0	13	15.85	..	..
Mean	.79		.53	

TABLE 26. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF WEIGHTS OF RUBBING STONES IN PECKED AND GROUND STONE INDUSTRY

Weight class (grams)	*f*	%
151–200	4	4.88
201–300	14	17.07
301–400	2	2.44
401–500	11	13.41
501–600	9	10.98
601–700	9	10.98
701–800	14	17.07
801–900	4	4.88
901–1000	11	13.41
1001–1100	2	2.44
1301–1700	2	2.44
Mean	607.5	

TABLE 27—DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF LENGTHS, BREADTHS AND THICKNESSES OF AXE HAMMERS IN PECKED AND GROUND STONE INDUSTRY

Sites :21 No. of Observed specimens : 64

Measurement class	*Length*		*Breadth*		*Thickness*	
(centimetres)	*f*	%	*f*	%	*f*	%
2 - 3	..	..	..	..	7	10.94
3.1-4	..	..	..	..	43	67.19
4.1-5	..	..	6	9.38	11	17.19
5.1-6	..	..	26	40.63	3	4.69
6.1-7	8	12.50	25	39.06	..	..
7.1-8	7	10.94	4	6.25	..	..
8.1-9	6	9.38	1	1.56	..	..
9.1-10	15	23.44	1	1.56	..	..
10.1-11	11	17.19	1	1.56	..	..
11.1-12	9	14.06	..	..	..	..
12.1-13	3	4.69	..	..	..	..
13.1-15	2	3.13	..	..	..	..
15.1-19	3	4.69	..	..	..	..
Mean	10.0		6.4		3.7	

TABLE 28—DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF B/L AND T/B RATIOS OF AXE HAMMERS IN PECKED AND GROUND STONE INDUSTRY

Ratio class	*Breadth/Length*		*Thickness/Breadth*	
	f	%	*f*	%
.21-.3	..	..	1	1.56
.31-.4	2	3.13	3	4.69
.41-.5	3	4.69	7	10.94
.51-.6	22	34.38	24	37.50
.61-.7	16	25.00	18	28.12
.71-.8	13	20.21	7	10.94
.81-.94	8	12.50	4	6.25
Mean	.65		.60	

TABLE 29—SITE AND TYPE-WISE DISTRIBUTION OF RUBBING

S. No.	Sites	Types	I *Worked and used on 1 face+2 sides*					
			1	2	3	4	5	6
			1 Face	1 Face 1 End	1 Face 2 Ends	1 Face 2 Ends 1 Side	1 Face 2 Ends 2 Sides	1 Face 1 End 2 Sides
1.	ADM-E		..	1	..	..	..	..
2.	AKK		..	..	..	..	..	..
3.	APL		..	..	..	..	..	..
4.	BGH		1		1	2	2	..
5.	BNH		..	..	1	..	..	..
6.	GKL-SW		1	..	..	..	..	..
7.	GKL-NW		..	..	..	..	..	..
8.	GPM		..	..	..	..	..	..
9.	HBG		..	..	..	..	..	..
10.	HVG		..	1	..	..	..	..
11.	HKL		..	..	..	..	..	..
12.	IKL		..	..	..	..	..	..
13.	KDG-F		..	..	..	..	..	..
14.	KML		1	1	..	..	..	..
15.	KDH		1	..	..	..	1	..
16.	KDP		1	..	..	1	..	..
17.	LVH		..	1	1	..	..	..
18.	MPM		..	..	..	..	..	..
19.	MGL		..	1	..	..	..	..
20.	PLY		..	..	..	1	..	..
21.	PDK		..	..	..	..	..	..
22.	VKR		..	..	..	..	..	..
23.	VMG		..	..	..	2	..	..
24.	VKL-F		..	1	1	..	1	..
25.	VKL-W		..	..	..	..	..	..
26.	VPL		..	..	..	..	..	1
27.	YKL		..	..	..	..	..	..
		Total :	5 **6.10**	6 **7.32**	4 **4.88**	6 **7.32**	4 **4.88**	1 **1.22**

The bold figures represent percentages.

Contd. on next page.

II

Worked and used on 2 faces + 2 sides, 2 ends

1	2	3	4	5	6	7	8	
2 Faces	*2 Faces 1 End*	*2 Faces 1 End 1 Side*	*2 Faces 2 Ends*	*2 Faces 2 Ends 1 Side*	*2 Faces 1 Side*	*2 Faces 2 Sides 1 End*	*All Over*	*Total*
..	..	..	2	3	..	..	..	6
..	..	..	..	..	..	1	..	1
..	..	..	1	..	..	..	..	1
..	1	..	..	..	..	1	..	8
..	1	..	..	..	..	..	2	4
..	..	..	..	..	..	..	..	1
..	..	..	..	2	..	..	..	2
..	..	..	..	..	..	..	3	3
..	..	1	..	..	..	..	..	1
..	..	..	1	..	..	..	..	2
..	..	..	..	1	..	..	3	4
..	..	1	..	..	..	..	..	1
..	..	..	..	..	1	..	..	1
..	..	..	..	..	..	..	..	2
1	2	..	1	..	..	..	2	8
..	1	..	1	..	..	..	..	4
..	..	..	..	1	..	..	..	3
1	..	1	..	..	..	1	2	5
..	..	..	1	..	..	..	1	3
..	..	..	..	..	..	..	..	1
2	..	..	..	..	..	..	..	2
..	..	..	1	1	..	..	..	2
..	..	1	..	..	..	1	3	7
..	1	..	..	1	..	..	1	6
..	..	..	..	1	..	..	..	1
..	..	..	1	..	..	..	..	2
..	..	..	..	..	..	..	1	1
4	6	4	9	10	1	4	18	82
4.88	**7.32**	**4.88**	**10.98**	**12.20**	**1.22**	**4.88**	**21.95**	**100.00**

TABLE 30. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF WEIGHTS OF AXE HAMMERS IN PECKED AND GROUND STONE INDUSTRY

Weight class (grams)	F	%
101- 200	5	7.81
201- 300	24	37.50
301- 400	20	31.25
401- 500	5	7.81
501- 600	4	6.25
601- 700	2	3.13
701- 900	1	1.56
901-1500	3	4.69
Mean	373.8	

TABLE 31. DISTRIBUTION OF FREQUENCIES AND PERCENTACES OF LENGTH OF HAMMER STONES IN PECKED AND GROUND STONE INDUSTRY

SITES: 33 NO. OF OBSERVED SPECIMENS: 373

Length class (centimetres)	*Group-wise frequencies of hammer stones*							*Total frequencies of all groups*	%
	Group I	*Group II*	*Group III*	*Group IV*	*Group V*	*Group VI*	*Group VII*		
4.3- 5	1	1	1	4	—	—	—	7	1.88
5.1- 6	3	5	20	38	6	2	—	74	19.84
6.1- 7	3	11	45	55	25	5	1	145	38.87
7.1- 8	2	29	17	25	15	6	2	96	25.74
8.1- 9	—	11	8	3	3	6	3	34	9.12
9.1-10	—	6	—	—	—	—	2	8	2.14
10.1-11	—	2	—	—	—	—	—	2	0.54
11.1-12	—	3	—	—	—	—	—	3	0.80
12.1-13	—	2	—	—	—	—	—	2	0.54
13.1-14	—	2	—	—	—	—	—	2	0.54
Mean	6.3	8.1	6.7	6.4	6.9	7.4	8.2	7.0	

TABLE 32. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF THICKNESSES OF HAMMER STONES IN PECKED AND GROUND STONE INDUSTRY

Thickness class (Centimeters)	*Group-wise classification of hammer stones*							*Total Frequencies of all Groups*	%
	Group I	*Group II*	*Group III*	*Group IV*	*Group V*	*Group VI*	*Group VII*		
3.1-4	—	16	10	2	3	3	—	34	9.12
4.1-5	5	28	45	41	22	7	1	149	39.95
5.1-6	4	25	32	58	20	8	5	152	40.75
6.1-7	—	3	4	22	4	1	1	35	9.38
7.1-8	—	—	—	2	—	—	1	3	0.80
Mean	4.9	4.8	4.9	5.4	5.0	5.1	5.6	5.1	

TABLE 33. SITE AND TECHNIQUE - WISE DISTRIBUTION OF AXE–HAMMERS

Sl.No.	SITES	STAGE I			STAGE II		STAGE III		TOTAL
		Only flaked or pecked, or flaked and pecked but not ground			Edge ground tools or tools only with grinding over edge		Completely ground tools		
		Only flaked tools	Only pecked tools	Flaked and pecked tools	Pecked and edge ground	Flaked, pecked and edge ground	Flaked, pecked and ground all over unevenly	Ground to a smooth surface all over	
1.	AKK	—	—	—	—	—	1	—	1
2.	APL	—	—	2	—	1	—	—	3
3.	BGH	—	1	—	1	1	1	4	8
4.	BMH	—	1	1	—	—	—	—	2
5.	DKL-NE	—	—	—	—	—	1	—	1
6.	GKL-SW	—	—	—	—	1	—	—	1
7.	GKL-NW	—	—	—	—	—	1	1	2
8.	GPM	—	—	—	—	—	4	—	4
9.	HBG	—	—	—	—	1	1	—	2
10.	HVG	2	—	2	—	—	—	—	4
11.	HKL	—	—	—	—	—	5	—	5
12.	IKL	—	—	—	—	—	1	—	1
13.	KDH	—	—	1	—	—	—	—	1
14.	KDP	—	—	1	1	1	1	2	6
15.	LVH	1	1	1	—	—	—	—	3
16.	MPM	—	—	—	1	1	—	—	2
17.	PLY	—	1	1	—	1	1	—	4
18.	PPL	—	—	—	—	1	—	—	1
19.	VMG	—	—	3	—	—	5	—	8
20.	VKL-F	—	1	1	—	—	—	—	2
21.	VPL	—	—	1	—	—	2	—	3
	Total	3 **4.69**	5 **7.81**	14 **21.88**	3 **4.69**	8 **12.50**	24 **37.50**	7 **10.94**	64 **100.00**

The bold figures represent precentages.

TABLE 34. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF WEIGHTS OF HAMMER STONES IN PECKED AND GROUND STONE INDUSTRY

Weight Class (Grams)	*Group - wise frequencies of hammer stones*							*Total frequencies of all Groups*	%
	Group I	*Group II*	*Group III*	*Group IV*	*Group V*	*Group VI*	*Group VII*		
101-200	2	5	7	12	2	—	—	28	7.51
201-300	4	20	42	53	16	4	1	140	37.53
301-400	1	24	21	33	18	7	1	105	28.15
401-500	2	10	10	15	7	3	4	51	13.67
501-600	—	7	8	8	3	3	2	31	8.31
601-700	—	3	2	3	3	1	—	12	3.22
701-800	—	3	1	1	—	1	—	6	1.61
Mean	289.7	373.2	329.8	325.6	354.9	413.7	453.1	345.7	

TABLE 35. SITE AND GROUP - WISE DISTRIBUTION OF HAMMER STONES

S.No.	Sites	Groups I	II	III	IV	V	VI	VII	Total
1.	AKK	1	3	3	5	—	—	1	13
2.	APL	—	4	3	—	—	—	—	7
3.	BGH	—	9	10	7	8	1	1	36
4.	BMH	—	2	5	4	4	1	—	16
5.	CDK	—	1	1	—	—	—	—	2
6.	CHP	—	—	—	1	—	—	—	1
7.	DKL-NEX	—	—	2	—	—	—	1	3
8.	GKL-SW	—	—	4	1	—	—	—	5
9.	GKL-NW	—	1	3	—	—	—	—	4
10.	GPM	1	2	7	13	4	—	—	27
11.	HBG	—	2	2	—	1	1	1	7
12.	HVG	—	5	5	—	2	2	—	14
13.	HKL	—	9	6	12	3	1	2	33
14.	IKL	—	3	—	4	2	—	—	9
15.	KDG-F	—	2	1	1	1	—	—	5
16.	KML	—	3	3	1	1	—	—	8
17.	KDH	—	2	5	14	5	2	—	28
18.	KDP	—	5	1	2	1	—	—	9
19.	LVH	—	2	4	2	1	2	—	11
20.	MPM	1	2	3	9	3	4	1	23
21.	MLK	—	—	2	—	—	—	—	2
22.	MGL	—	1	3	4	3	1	—	12
23.	PLY	—	2	1	4	2	—	—	9
24.	PDK	—	—	3	2	1	—	—	6
25.	PPL	—	4	1	2	—	2	—	9
26.	RDG	—	—	—	1	—	—	—	1
27.	UKD	1	1	2	5	—	—	—	9
28.	VKR	—	2	2	2	—	—	—	6
29.	VMG	1	2	6	15	3	—	—	27
30.	VKL-F	1	—	1	7	2	2	1	14
31.	VKL-W	—	—	—	1	—	—	—	1
32.	VPL	1	3	2	2	—	—	—	8
33.	YKL	2	—	—	4	2	—	—	8
	Total	9	72	91	125	49	19	8	373
		2.41	**19.30**	**24.40**	**33.51**	**13.14**	**5.10**	**2.14**	**100.00**

The bold figures represent percentages.

TABLE 36. DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF LENGTHS AND THICKNESSES OF SLING STONES IN PECKED AND GROUND STONE INDUSTRY

SITES: 23 NO. OF OBSERVED SPECIMENS: 79

Measurement Class (centimetres)	*Length or Diameter*		*Thickness*	
	f	%	*f*	%
3.1-4	—	—	4	5.06
4.1-5	7	8.06	31	39.25
5.1-6	43	54.43	40	50.13
6.1-7	23	29.11	4	5.06
7.1-8	6	7.60	—	—
Mean	5.9			5.1

TABLE 37—DISTRIBUTION OF FREQUENCIES AND PERCENTAGES OF WEIGHTS OF SLING STONES IN PECKED AND GROUND STONE INDUSTRY

Weight Class (grams)	*f*	%
—-100	1	1.27
101-200	17	21.52
201-300	37	46.84
301-400	16	20.25
401-500	4	5.06
501-600	4	5.06
Mean		280.2

TABLE 38. SITE-WISE DISTRIBUTION OF ARTIFACTS OF NEOLITHIC BLADE INDUSTRY

S. No.	*Site*	*No. of artifacts*	%
1.	Adoni East	103	6.65
2.	Akkammakonda	4	0.25
3.	Andepalli	3	0.19
4.	Bastipadu	11	0.72
5.	Budagavi Hill	51	3.30
6.	Buthamahal Hill	8	0.52
7.	Chetnepalli	320	20.67
8.	Chinnadandukonda	30	1.95
9.	Donekal North east	2	0.13
10.	Gadekal Southwest	1	0.06
11.	Gulapalyam	2	0.13
12.	Hattibelagallu	58	3.75
13.	Havaligi	13	0.84
14.	Hulikal	6	0.39
15.	Idukal	19	1.23
16.	Karakumukkala	15	0.98
17.	Katamadevudu Hill	461	29.78
18.	Kunduripi	9	0.58
19.	Lattavaram Hill	27	1.74
20.	Mallipalli	5	0.32
21.	Mudigal	5	0.32
22.	Nagaladinne	180	11.62
23.	Palavoy	10	0.65
24.	Peddadandukonda	107	6.90
25.	Pillalapalli	3	0.19
26.	Uravankonda	1	0.06
27.	Vajrakarur	1	0.06
28.	Velpumadugu	26	1.68
29.	Vadupanakal Fort	16	1.04
30.	Vidupanakal West	10	0.65
31.	Vitlampalli	8	0.52
32.	Yatakal	33	2.13
	Total:	1,548	100.00

TABLE 39. SITE - WISE DISTRIBUTION OF RAW MATERIALS IN THE NEOLITHIC BLADE INDUSTRY

Sl. No.	SITE	Material												TOTAL
		Chert	Chalcedony	Quartz	Crystal	Haematite or Jasp. Quartzite	Jasper	Agate	Carnelian	Banded Quartzite	Quartzite	Schistose rock	Basalt	
1.	ADN-E	60 **58.26**	28 **27.19**	6 **5.82**	1 **0.97**	4 **3.88**	4 **3.88**	—	—	—	—	—	—	103
2.	AKK	2 **50.00**	—	—	1 **25.00**	—	—	1 **25.00**	—	—	—	—	—	4
3.	APL	3 **100.00**	—	—	—	—	—	—	—	—	—	—	—	3
4.	BPU	1 **9.09**	1 **45.46**	1 **9.09**				3 **27.27**	1 **9.09**	—	—	—	—	11
5.	BGH	44 **86.27**	7 **13.73**	—	—	—	—	—	—	—	—	—	—	51
6.	BMH	5 **62.50**	2 **25.00**	1 **12.50**	—	—	—	—	—	—	—	—	—	8
7.	CHP	186 **58.12**	67 **20.94**	27 **8.44**	10 **3.12**	7 **2.19**	12 **3.75**	1 **0.31**	4 **1.25**	2 **0.63**	3 **0.94**	—	1 **0.31**	320
8.	CDK	22 **73.33**	4 **13.33**	3 **10.00**				1 **0.34**	—	—	—	—	—	30
9.	DKL-NE	2 **100.00**	—	—	—	—	—	—	—	—	—	—	—	2
10.	GKL-SW	1 **100.00**	—	—	—	—	—	—	—	—	—	—	—	1
11.	GPM	2 **100.00**	—	—	—	—	—	—	—	—	—	—	—	2
12.	HBG	38 **65.52**	15 **25.86**				4 **6.90**	—	1 **1.72**	—	—	—	—	58
13.	HVG	9 **69.23**	1 **7.69**	1 **7.69**	—	—	—	2 **15.39**	—	—	—	—	—	13
14.	HKL	5 **83.33**	1 **16.67**	—	—	—	—	—	—	—	—	—	—	6
15.	IKL	11 **57.90**	2 **10.53**	3 **15.79**	1 **5.26**	—	1 **5.26**	1 **5.26**	—	—	—	—	—	19
16.	KML	11 **73.33**	3 **20.00**	—	—	—	—	1 **6.67**	—	—	—	—	—	15
17.	KDH	410 **88.94**	40 **8.68**	6 **1.30**	1 **0.22**	— —	2 **0.43**	2 **0.43**	—	—	—	—	—	461
18.	KDP	6 **66.67**	1 **11.11**	2 **22.22**	—	—	—	—	—	—	—	—	—	9
19.	LVH	20 **74.07**	4 **14.82**	—	—	—	1 **3.70**	2 **7.41**	—	—	—	—	—	27

The bold figures represent percentages.

Sl. No.	Site	Material												TOTAL
		Chert	*Chalcedony*	*Quartz*	*Crystal*	*Haematite or Jasp. Quartzite*	*Jasper*	*Agate*	*Carnelian*	*Banded Quartzite*	*Quartzite*	*Schistose rock*	*Basalt*	
20.	MPL	4 **80.00**	1 **20.00**	—	—	—	—	—	—	—	—	—	—	5
21.	MGL	4 **80.00**	1 **20.00**	—	—	—	—	—	—	—	—	—	—	5
22.	NDN	69 **38.33**	61 **33.89**	6 **3.33**	3 **1.67**	15 **8.33**	7 **3.90**	2 **1.11**	6 **3.33**		8 **4.44**	1 **0.56**	2 **1.11**	180
23.	PLY	8 **80.00**	—	2 **20.00**	—	—	—	—	—	—	—	—	—	10
24.	PDK	77 **71.96**	24 **22.42**	3 **2.80**	—	—	1 **0.94**	1 **0.94**	1 **0.94**	—	—	—	—	107
25.	PPL	3 **100.00**	—	—	—	—	—	—	—	—	—	—	—	3
26.	UKD	1 **100.00**	—	—	—	—	—	—	—	—	—	—	—	1
27.	VKR	1 **100.00**	—	—	—	—	—	—	—	—	—	—	—	1
28.	VMG	20 **76.92**	4 **15.38**	1 **3.85**	—	—	1 **3.85**	—	—	—	—	—	—	26
29.	VKL-F	7 **43.75**	7 **43.75**	—	—	—	—	1 **6.25**	—	—	1 **6.25**	—	—	16
30.	VKL-W	6 **60.00**	3 **30.00**	—	—	1 **10.00**	—	—	—	—	—	—	—	10
31.	VPL	8 **100.00**	—	—	—	—	—	—	—	—	—	—	—	8
32.	YKL	26 **78.79**	1 **3.03**	6 **18.18**	—	—	—	—	—	—	—	—	—	33
	Total :	1,072 **69.25**	282 **18.22**	68 **4.42**	17 **1.09**	27 **1.74**	33 **2.13**	18 **1.16**	13 **0.84**	2 **0.13**	12 **0.77**	1 **0.06**	3 **0.19**	1,548 **100.00**

The bold figures represent percentage.

TABLE 40. SITE AND TYPE - WISE DISTRIBUTION OF

ARTIFACT TYPE / *SITE*	*ADN -E*	*AKK*	*APL*	*BPU*	*BGH*	*BMH*
A. WASTE PRODUCTS:						
I. Worked pieces	1	—	—	—	—	—
II. Flake cores	2	—	—	—	—	2
III. Blade cores						
With 1 platform	3	1	2	—	6	1
With 2 platforms	2	1	—	6	4	—
With 3 platforms	1	—	—	—	—	—
Total of blade cores	6	2	2	6	10	1
IV. Core rejuvenation flakes	1	—	—	1	2	—
V. Crested guide flakes	—	—	—	—	—	—
VI. Plunging flakes	—	—	—	1	—	—
VII. Chips	59	—	—	—	19	—
Total of waste products	69	2	2	8	31	3
B. UNFINISHED TYPES :						
VIII. Unutilized flakes	3	—	—	—	3	—
IX. Unutilized blades	2	—	—	—	1	—
Total of unfinished types	5	—	—	—	4	—
C. UTILIZED TYPES :						
X. Flakes	1	1	—	—	2	3
XI. Blades	22	—	—	—	7	2
Total of utilized types	23	1	—	—	9	5

ARTIFACTS OF NEOLITHIC BLADE INDUSTRY

CHP	*CDK*	*DKL-NE*	*GKL-SW*	*GPM*	*HBG*	*HVG*	*HKL*	*IKL*	*KML*	*KDH*
11	—	—	—	—	—	—	—	—	1	1
5	1	—	—	1	—	1	—	—	—	7
17	1	—	—	—	2	2	1	1	1	29
6	—	—	—	1	2	1	1	3	—	20
2	—	—	—	—	1	—	—	—	1	1
25	1	—	—	1	5	3	2	4	2	50
10	—	—	—	—	—	—	—	1	1	21
3	—	—	—	—	—	—	—	—	—	—
1	—	—	—	—	—	—	—	1	1	9
85	18	1	—	—	21	5	2	5	5	206
140	20	1	—	2	26	9	4	11	10	294
26	—	—	—	—	1	—	—	—	—	10
72	—	—	—	—	—	—	—	1	—	47
98	—	—	—	—	1	—	—	1	—	57
12	5	—	1	—	4	4	1	4	—	25
30	3	—	—	—	22	—	—	3	4	44
42	8	—	1	—	26	4	1	7	4	69

ARTIFACT TYPE	*SITE*	*KDP*	*LVH*	*MPL*	*MGL*	*NDN*	*PLY*	*PDK*
A. WASTE PRODUCTS:								
I. Worked pieces		—	—	—	—	9	—	9
II. Flake cores		2	—	—	2	6	—	1
III. Blade cores								
With 1 platform		3	5	2	—	8	5	15
With 2 platforms		—	—	—	1	8	—	5
With 3 platforms		—	—	—	—	2	—	—
Total of blade cores		3	5	2	1	18	5	20
IV. Core rejuvenation flakes		—	—	—	—	2	—	5
V. Crested guide flakes		—	—	—	—	2	—	—
VI. Plunging flakes		—	—	1	—	2	—	1
VII. Chips		1	13	1	1	51	—	37
Total of waste products		6	18	4	4	90	5	73
B. UNFINISHED								
VIII. Unutilized flakes		—	1	—	—	9	—	3
IX. Unutilized blades		—	—	—	—	11	—	4
Total of unfinished types		—	1	—	—	20	—	7
C. UTILIZED TYPES :								
X. Flakes		1	2	—	—	7	3	4
XI. Blades		—	2	—	—	30	—	15
Total of utilized types		1	4	—	—	37	3	19

PPL	UKD	VKR	VMG	VKL -F	VKL -W	VPL	YKL	TOTAL	PERCENT-AGE
—	—	—	2	1	—	—	1	36	2.33
—	—	—	—	—	—	—	—	30	1.95
2	1	—	—	1	3	1	8	121	7.82
—	—	—	1	3	—	—	2	67	4.33
—	—	—	—	—	—	—	—	8	0.51
2	1	—	1	4	3	1	10	196	12.66
—	—	—	—	—	1	—	2	47	3.04
—	—	—	—	—	—	—	—	5	0.31
—	—	—	—	—	—	1	1	19	1.23
1	—	—	8	6	2	—	9	556	35.92
3	1	—	11	11	6	2	23	889	57.44
—	—	—	1	—	—	2	3	62	4.00
—	—	—	1	1	1	—	—	141	9.11
—	—	—	2	1	1	2	3	203	13.11
—	—	—	—	1	—	2	3	86	5.56
—	—	—	4	1	2	1	2	194	12.53
—	—	—	4	2	2	3	5	280	18.09

(1) (2) (3)	*ADN-E*	*AKK*	*APL*	*BPU*	*BGH*	*BMH*
D. FINISHED TYPES: MICROLITHS						
XII. Backed blades	2	—	—	—	—	—
XIII. Obliquely blunted	—	—	—	—	—	—
XIV. Truncated blades	—	—	—	1	4	—
XV. Lunates	2	—	—	—	—	—
XVI. Trapezes	—	—	—	—	—	—
Total of microliths	4	—	—	1	4	—
OTHER TOOLS						
XVII. Points						
Unifacial	1	—	—	1	1	—
Bifacial	—	—	—	—	—	—
Total points	1	—	—	1	1	—
XVIII. Borers	—	—	—	—	—	—
XIX. Scrapers:						
Side	1	—	—	—	—	—
Hollow	—	—	—	—	—	2
Side-and-end	—	—	—	1	—	—
End	—	1	1	—	1	—
End-and-hollow	—	—	—	—	—	—
Round	—	—	—	—	—	—
Total of scrapers	1	1	1	1	1	—
XX. Notched flakes	—	—	—	—	1	—
XXI. Chopper	—	—	—	—	—	—
Total of other tools	2	1	1	2	3	—
Total of finished types	6	1	1	3	7	—
Total of all artifacts	103	4	3	11	51	8

CHP	*CDK*	*DKLNE*	*GKL-SW*	*GPM*	*HBG*	*HVG*	*HKL*	*IKL*	*KML*	*KDH*
1	—	—	—	—	—	—	—	—	—	8
7	—	—	—	—	—	—	—	—	—	12
3	—	—	—	—	2	—	—	—	—	6
10	—	—	—	—	1	—	—	—	—	2
1	—	—	—	—	—	—	—	—	—	—
22	—	—	—	—	3	—	—	—	—	28
2	—	—	—	—	—	—	—	—	—	3
—	—	—	—	—	—	—	—	—	—	—
2	—	—	—	—	—	—	—	—	—	3
1	—	—	—	—	—	—	—	—	—	—
13	—	1	—	—	1	—	—	—	1	6
—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	1	—	—	—
1	1	—	—	—	1	—	—	—	—	1
—	—	—	—	—	—	—	—	—	—	1
1	—	—	—	—	—	—	—	—	—	—
15	1	1	—	—	2	—	1	—	1	8
—	1	—	—	—	—	—	—	—	—	2
—	—	—		—	—	—	—	—	—	—
18	2	1	—	—	2	—	1	—	1	13
40	2	1	—	—	5	—	1	—	1	41
320	30	2	1	2	58	13	6	19	15	461

	KDP	*LVH*	*MPL*	*MGL*	*NDN*	*PLY*	*PDK*
D. FINISHED TYPES: MICROLITHS							
XII. Backed blades	—	—	—	—	1	—	3
XIII. Obliquely blunted	—	—	—	—	4	—	1
XIV. Truncated bades	1	—	—	—	1	—	1
XV. Lunates	—	2	—	—	1	—	—
XVI. Trapezes	—	—	—	—	—	—	—
Total of microliths	1	2	—	—	7	—	5
OTHER TOOLS							
XVII. Points							
Unifacial	—	1	1	—	1	—	1
Bifacial	—	—	—	—	—	—	—
Total points	1	—	1	—	1	—	1
XVIII. Borers	—	—	—	—		—	2
XIX. Scrapers :							
Side	1	—	—	1	19	2	—
Hollow	—	—	—	—	1	—	—
Side-and-end	—	—	—	—	—	—	—
End	—	1	—	—	3	—	—
End-and-hollow	—	—	—	—	—	—	—
Round	—	—	—	—	1	—	—
Total of scrapers	1	1	1	—	24	2	—
XX. Notched flakes	—	—	—	—	—	—	—
XXI. Chopper	—	—	—	1	—	—	—
Total of other tools	1	2	1	26	2	3	
Total of finished types	2	4	4	33	2	8	
TOTAL OF ALL ARTIFACTS	9	27	5	5	10	107	3

PPL	UDK	VKR	VMG	VKL-J	VKL-W	VPL	YKL	Total	PERCENT-AGE
—	—	—	1	—	—	—	1	17	1.10
—	—	—	1	1	—	—	—	27	1.74
—	—	1	2	—	—	—	—	23	1.49
—	—	—	—	—	1	—	—	17	1.10
—	—	—	1	—	—	—	—	2	0.13
—	—	1	5	1	1	—	1	86	5.56
—	—	—	—	1	—	—	1	14	0.91
—	—	—	—	—	—	1	—	1	0.06
—	—	—	—	1	—	1	1	15	0.97
—	1	—	—	—	—	—	—	4	0.25
—	—	1	—	—	—	—	—	47	3.04
—	—	—	—	—	—	—	—	1	0.06
—	—	1	—	—	—	—	—	3	0.20
—	—	1	—	—	—	—	—	12	0.78
—	—	—	—	—	—	—	—	1	0.06
—	—	—	—	—	—	—	—	2	0.13
—	—	3	—	—	—	—	—	66	4.27
—	—	—	—	—	—	—	—	4	0.25
—	—	—	—	—	—	—	—	1	0.06
—	—	1	4	—	—	1	1	90	5.80
—	2	9	1	—	1	2	2	176	11.36
26	1	21	13	16	10	38	33	1,548	100.00

TABLE 41. WARE AND SITE — WISE DISTRIBUTION OF NEOLITHIC POTTERY

WARES	*SITES*									
	ADN	*APL*	*BGH*	*BMH*	*CHP*	*GPM*	*HBG*	*HVG*	*HKL*	*IKL*
I. BLOTCHY GREY WARE:										
1. Unburnished:										
Undecorated	1	—	1	3	—	2	5	7	5	—
Impressed	—	—	—	—	—	—	—	—	1	—
Perforated	—	—	—	—	—	—	—	—	—	—
Incised	—	—	—	—	—	—	—	—	—	—
Total of unburnished sherds	1	—	1	3	—	2	5	7	6	—
2. Burnished:										
Undecorated	—	—	1	4	—	6	—	5	19	29
Red ochre painted	—	1	—	—	—	2	—	—	2	—
Total of Burnished sherds	—	1	1	4	—	8	—	5	2	2
Total of all grey ware sherds	1	1	2	7	—	10	5	12	27	2
II. DULL RED WARE:										
1. Unburnished:										
Undecorated	—	—	1	4	—	1	6	16	6	—
Impressed	—	—	—	—	—	—	—	—	—	—
Perforated	—	—	—	—	—	—	—	—	—	—
Painted	—	—	—	—	—	—	—	—	—	—
Total of unburnished sherds	—	—	1	4	—	1	6	16	6	—
2. Burnished:										
Undecorated	—	1	4	1	1	4	3	2	3	—
Impresed	—	—	—	—	—	—	—	—	—	—
Incised	—	—	—	—	—	—	—	—	—	—
Painted	—	—	—	—	—	—	—	—	—	—
Total of burnished sherds	—	1	4	1	1	4	3	2	3	—
Total of all red ware sherds	—	1	5	5	1	5	9	18	9	—

KML	KDH	KDP	LVH	MGL	NDN	PDK	PPL	UKD	VMG	VKL	Total sherds of all sites	%
—	5	—	5	—	2	—	—	1	3	1	41	16.68
1	—	—	—	—	—	—	—	—	—	—	2	0.81
—	—	—	—	—	1	—	—	—	—	—	1	0.40
—	—	—	—	—	—	—	—	—	1	—	1	0.40
1	5	—	5	—	3	—	—	1	4	1	45	18.29
2	4	—	19	6	3	1	2	2	12	—	88	35.78
—	—	—	15	1	—	5	—	—	4	—	16	6.50
2	7	4	21	4	3	1	2	2	16	—	104	42.28
3	29	6	7	9	1	1	2	3	20	1	149	60.57
2	2	—	8	2	—	—	—	3	4	—	55	22.36
2	—	—	—	—	—	—	—	—	—	—	2	0.81
—	—	—	—	—	—	—	—	1	1	—	2	0.81
—	1	1	—	1	—	—	—	—	—	—	3	1.22
4	3	1	8	3	—	—	—	4	5	—	62	25.20
—	2	—	1	5	1	—	—	1	2	—	31	12.62
—	1	—	1	1	—	—	—	—	—	—	2	0.81
—	—	1	—	—	—	—	—	—	—	1	1	0.40
—	1	—	—	—	—	—	—	—	—	—	1	0.40
—	3	—	4	5	1	—	—	1	2	—	35	14.23
4	6	1	12	8	1	—	—	5	7	—	97	39.43

TABLE 42. SITE AND WARE - WISE DISTRIBUTION OF TYPES IN NEOLITHIC POTTERY

Sites	*Wares*			
	I. Blotchy Grey ware		*II. Dull Red Ware*	
	Unburnished grey ware	*Burnished grey ware*	*Unburnished red ware*	*Burnished red ware*
APL		7		25
BGH	2	7	18a	25a, 30
BMH		8, 13	18b, 19	29d
CHP				25a
GPM	2	8, 9a, 11, 13, 13c, 15	18b	25a, 26, 27, 30
HBG			22	
HVG	2	7	18, 18b	30
HKL	2, 3, 5, 6	7, 8, 10, 13, 13a, 15	18b, 23	25a, 26a
IKL		8		
KML	2	10	18a, 18b	
KDH	2, 4	7, 8, 8a, 9, 9a, 10a, 12, 13a, 13b, 14		28, 29b, 29c
KDP				29
LVH	1,2	8, 13c, 15	18b	26a, 29, 29a
MGL		10, 10a, 13c	18, 18a, 18b, 21	25, 26
NDN	2a			25
PDK		15a		
UKD			18b, 20	
VMG	2, 6	8,8a,13,13b,13c,16,17	24	26

TABLE 43. WARE AND SITE – WISE DISTRIBUTION OF DECORATIVE PATTERNS IN NEOLITHIC POTTERY

Wares	*Sites*										
	APL	*GPM*	*HKL*	*KML*	*KDH*	*KDP*	*LVH*	*MGL*	*NDN*	*UKD*	*UMG*
I. BLOTCHY GREY WARE :											
1. Unburnished grey ware :											
Impressed	—	—	2	1	—	—	—	—	—	—	—
Perforated	—	—	—	—	—	—	—	—	—	—	3
Incised	—	—	—	—	—	—	—	—	4	—	—
2. Burnished grey ware :											
Red ochre painted	5	7	7	—	6,7, 8	7 7	—	7	—	—	7
II. DULL RED WARE:											
1. Unburnished red ware :											
Impressed	—	—	—	9	—	—	—	—	—	—	—
Perforated	—	—	—	—	—	—	—	—	—	10	10a
Painted	—	—	—	—	11	11a	—	11b	—	—	—
2. Burnished red ware:											
Impressed	—	—	—	—	13	—	12	—	—	—	—
Incised	—	—	—	—	—	—	14	—	—	—	—
Painted	—	—	—	—	15	—	—	—	—	—	—

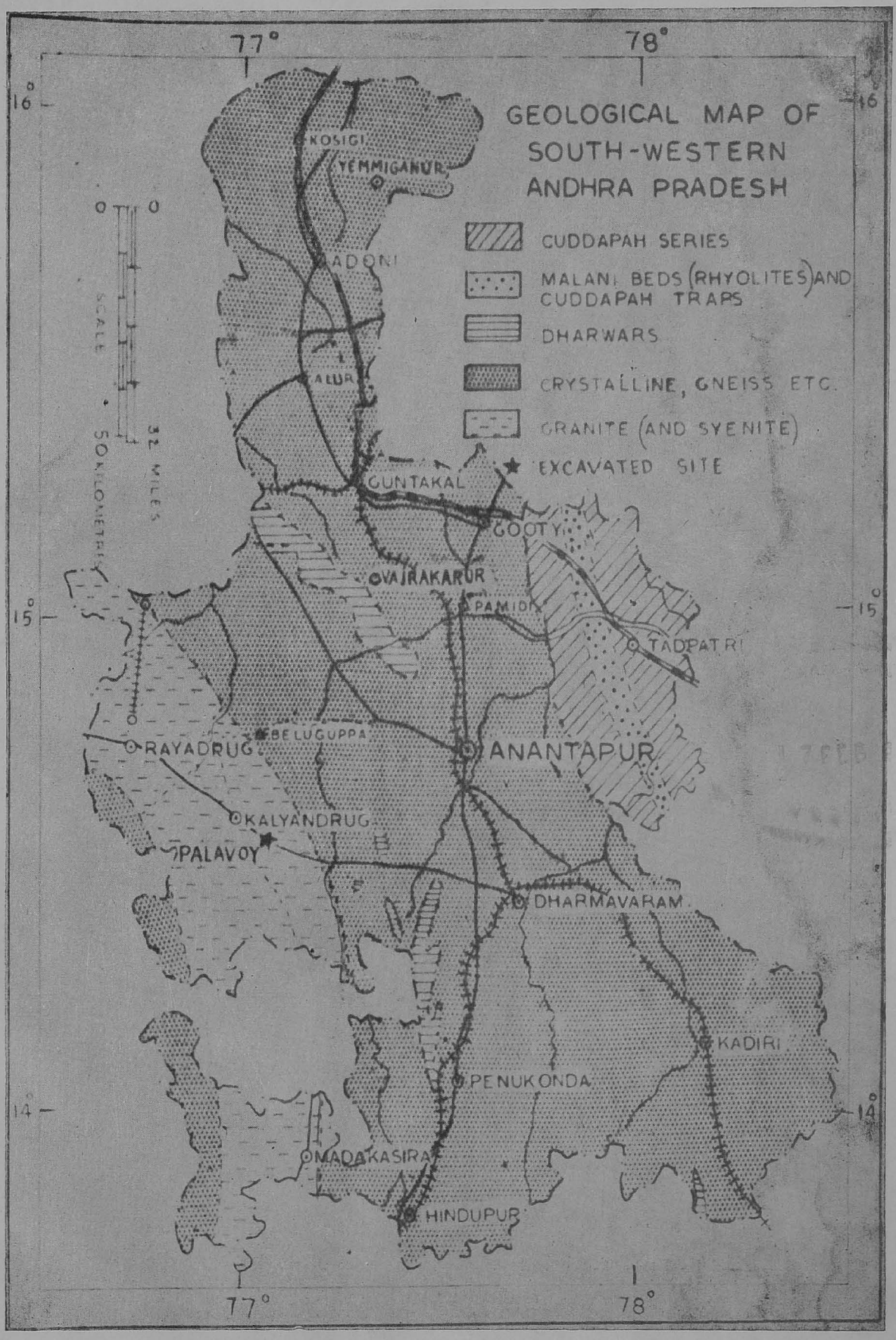
GEOLOGICAL MAP OF
SOUTH-WESTERN
ANDHRA PRADESH
CUDDAPAH SERIES
MALANI BEDS (RHYOLITES) AND
CUDDAPAH TRAPS
DHARWARS
CRYSTALLINE, GNEISS ETC.
GRANITE (AND SYENITE)
EXCAVATED SITE
SCALE
32 MILES
77°
78°
16°
15°
14°
KOSIGI
YEMMIGANUR
ADONI
ALUR
GUNTAKAL
GOOTY
VAJRAKARUR
PAMIDI
TADPATRI
RAYADRUG
BELUGUPPA
ANANTAPUR
KALYANDRUG
PALAVOY
DHARMAVARAM
KADIRI
PENUKONDA
MADAKASIRA
HINDUPUR

Fig. 1

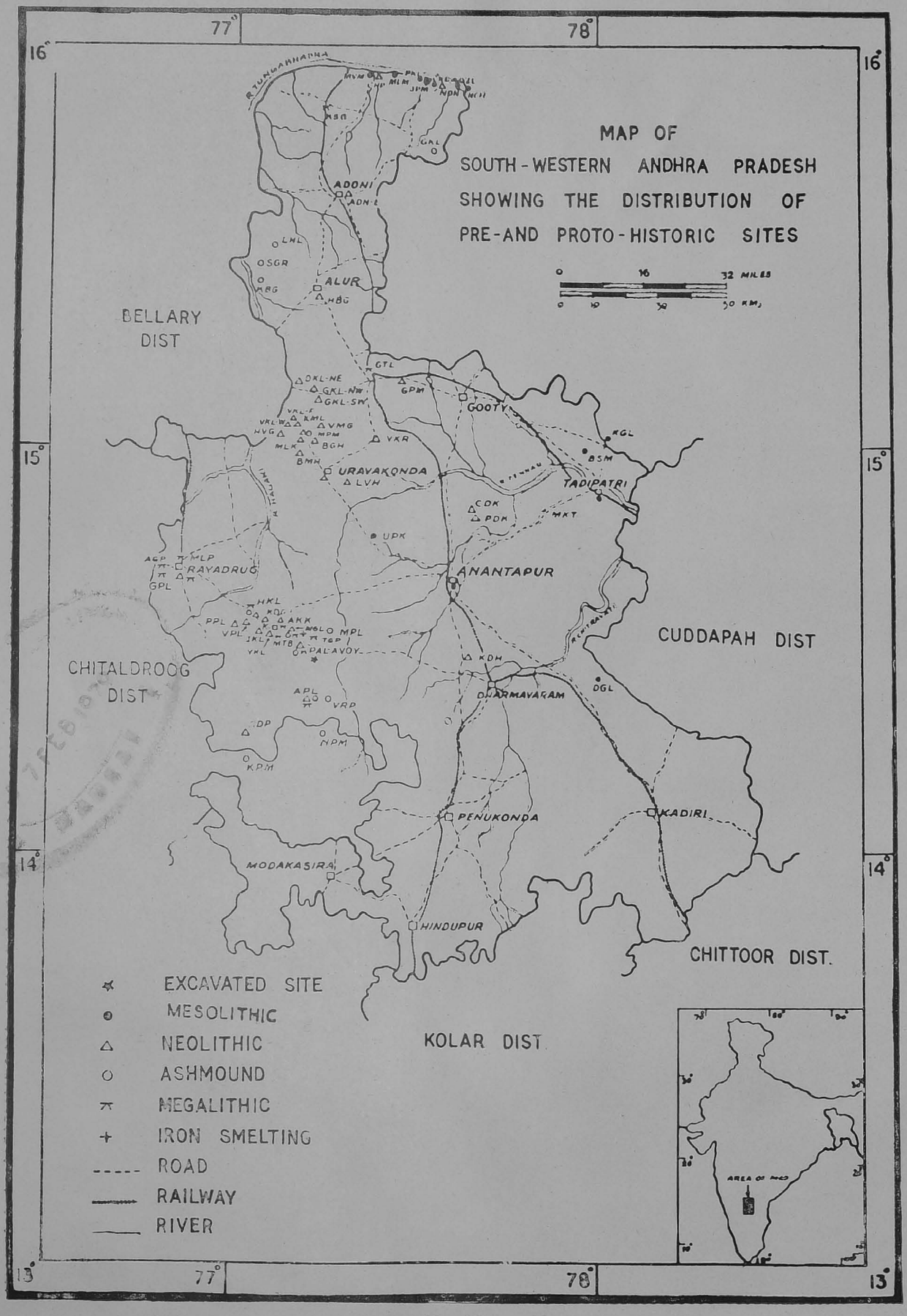
MAP OF
SOUTH-WESTERN ANDHRA PRADESH
SHOWING THE DISTRIBUTION OF
PRE-AND PROTO-HISTORIC SITES
0 16 32 MILES
0 10 30 50 KMS
77°
78°
16°
15°
14°
13°
BELLARY DIST
CHITALDROOG DIST
CUDDAPAH DIST
CHITTOOR DIST.
KOLAR DIST
ADONI
ALUR
GOOTY
URAVAKONDA
TADIPATRI
ANANTAPUR
RAYADRUG
DHARMAVARAM
PENUKONDA
KADIRI
MODAKASIRA
HINDUPUR
EXCAVATED SITE
MESOLITHIC
NEOLITHIC
ASHMOUND
MEGALITHIC
IRON SMELTING
ROAD
RAILWAY
RIVER

Fig. 2

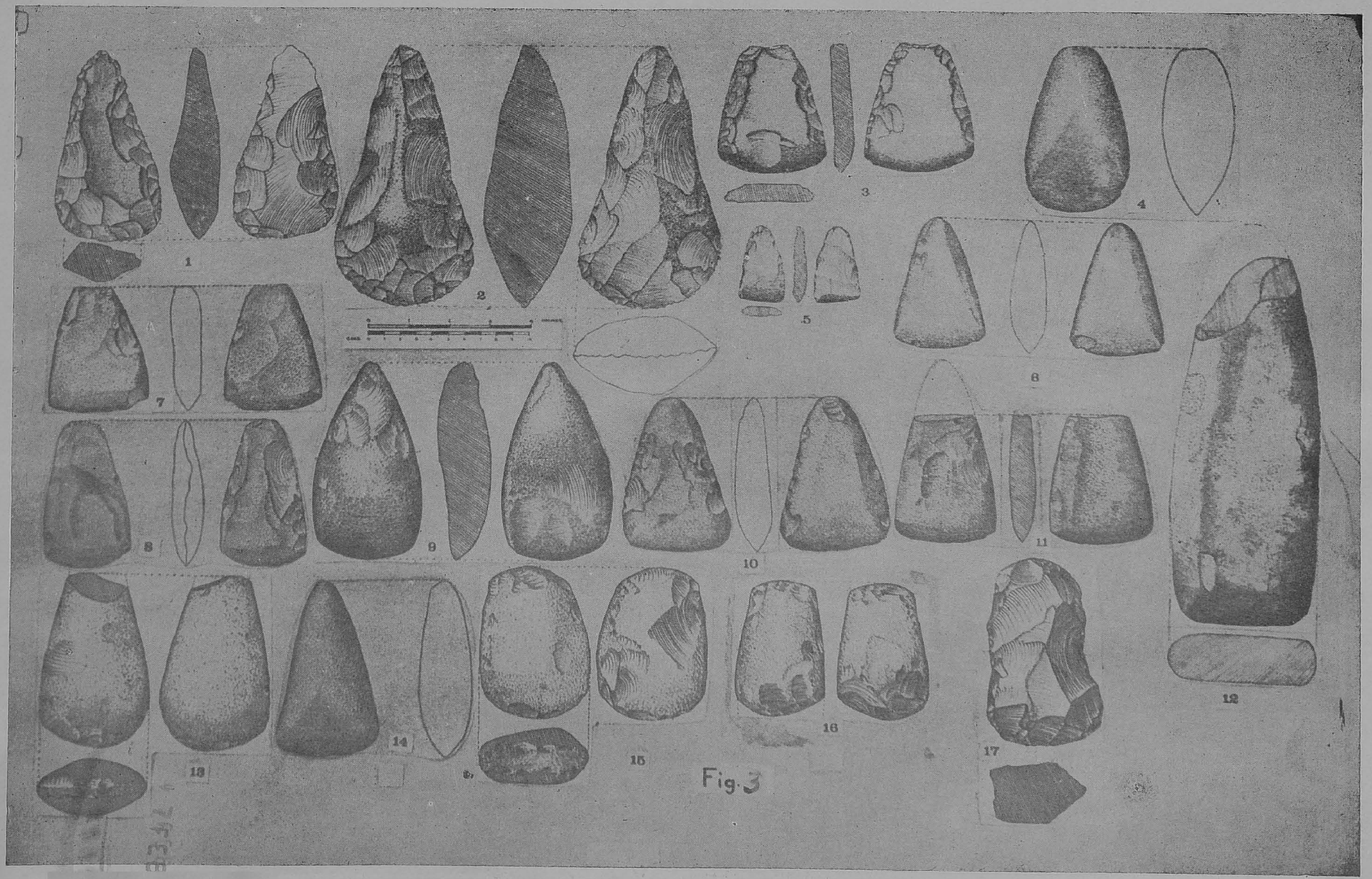

Fig. 3. *Artifacts of pecked and ground stone industry.*
1-12 & 14: axes; 13, 15 & 16: axe hammers; 17: hammer stone.

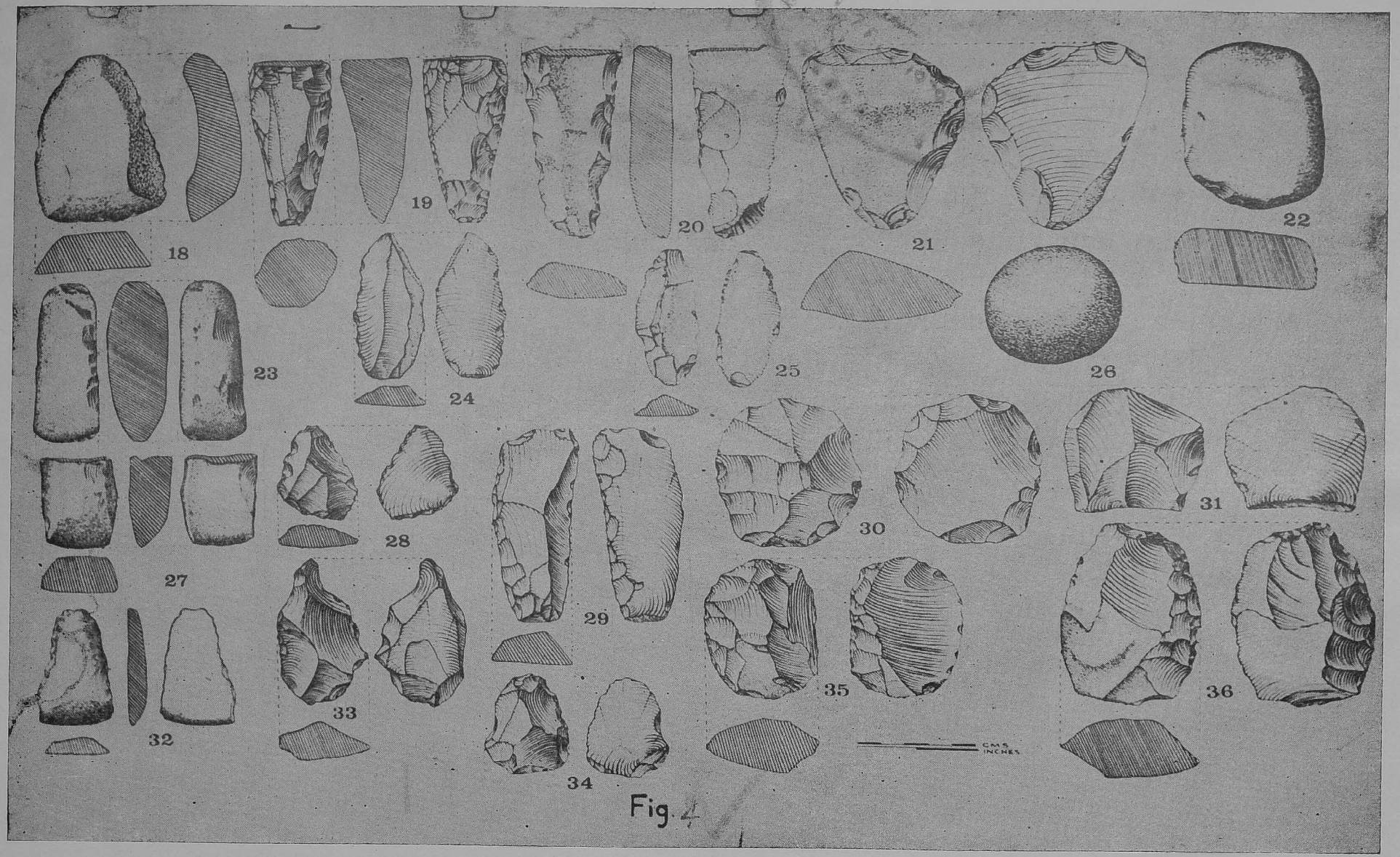

Fig. 4. *Artifacts of pecked and ground stone industry.*
18, 27 & 32: adzes ; 19-20 & 23: chisels; 21: side and end scraper on flake; 22: rubbing stone; 24-25: plain flake blades; 26: sling stone; 28: point; 29 & 34 - 36: side scrapers on flakes; 30: round scraper on flake; 31: simple flake; 33: borer.

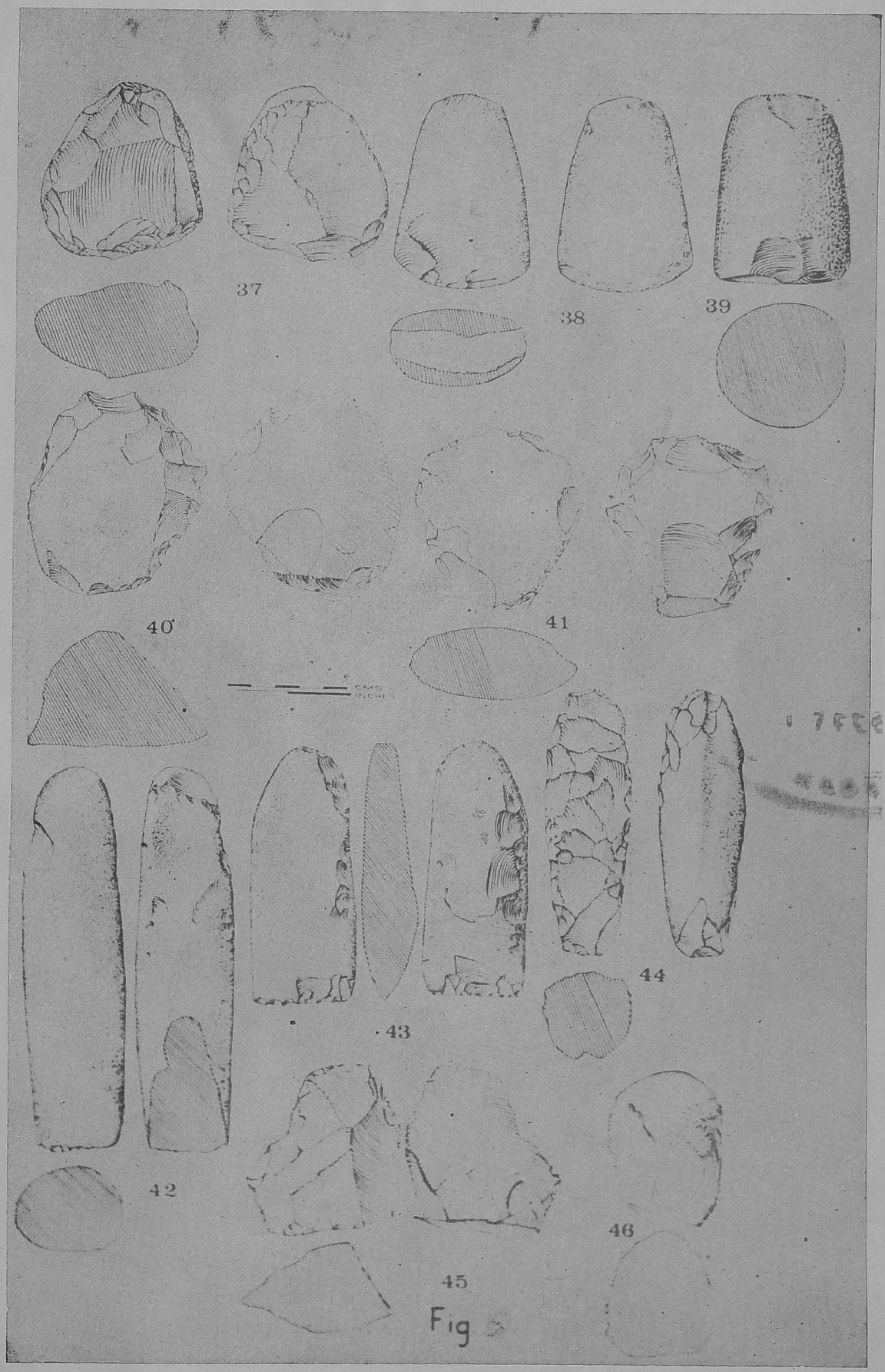

Fig. 5. *Artifacts of pecked and ground stone industry.*
37-39: axe-hammers; 40: chopper; 41: core scraper (end); 42-43: chisels; 44: miscellaneous tool chisel (?); 45: hollow scraper on flake; 46: hammer stone.

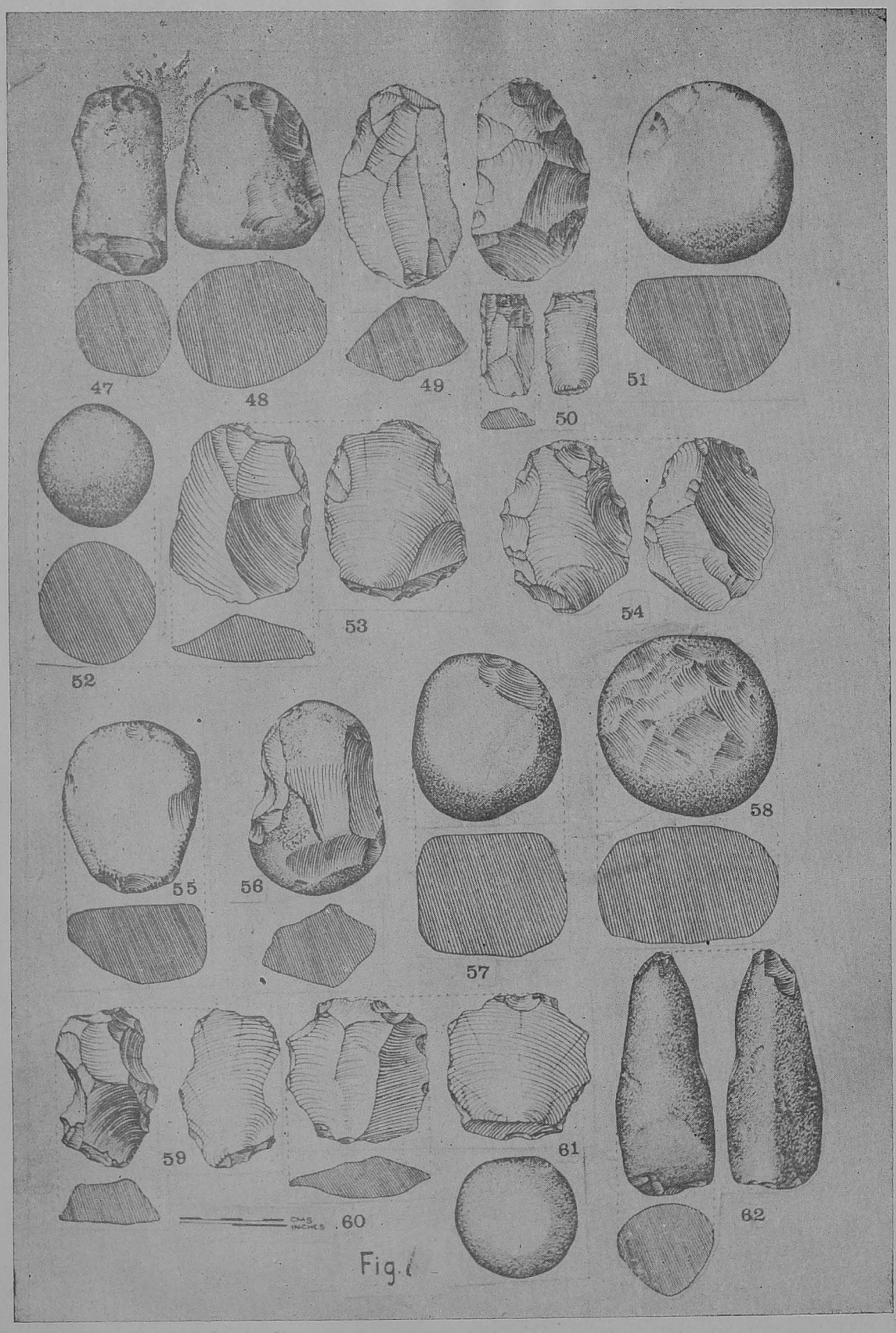

Fig. 6 : *Artifacts of the ground stone industry*
47–48, 56–58 and 61–62 : Hammer stones ; 49 and 54 : Core scrapers ; 50 : Plain flake-blade ; 51 and 55: Rubbing stones ; 52 : Sling stone; 53: Levallois flake-blade ; 59: End scraper; 60: Simple flake.

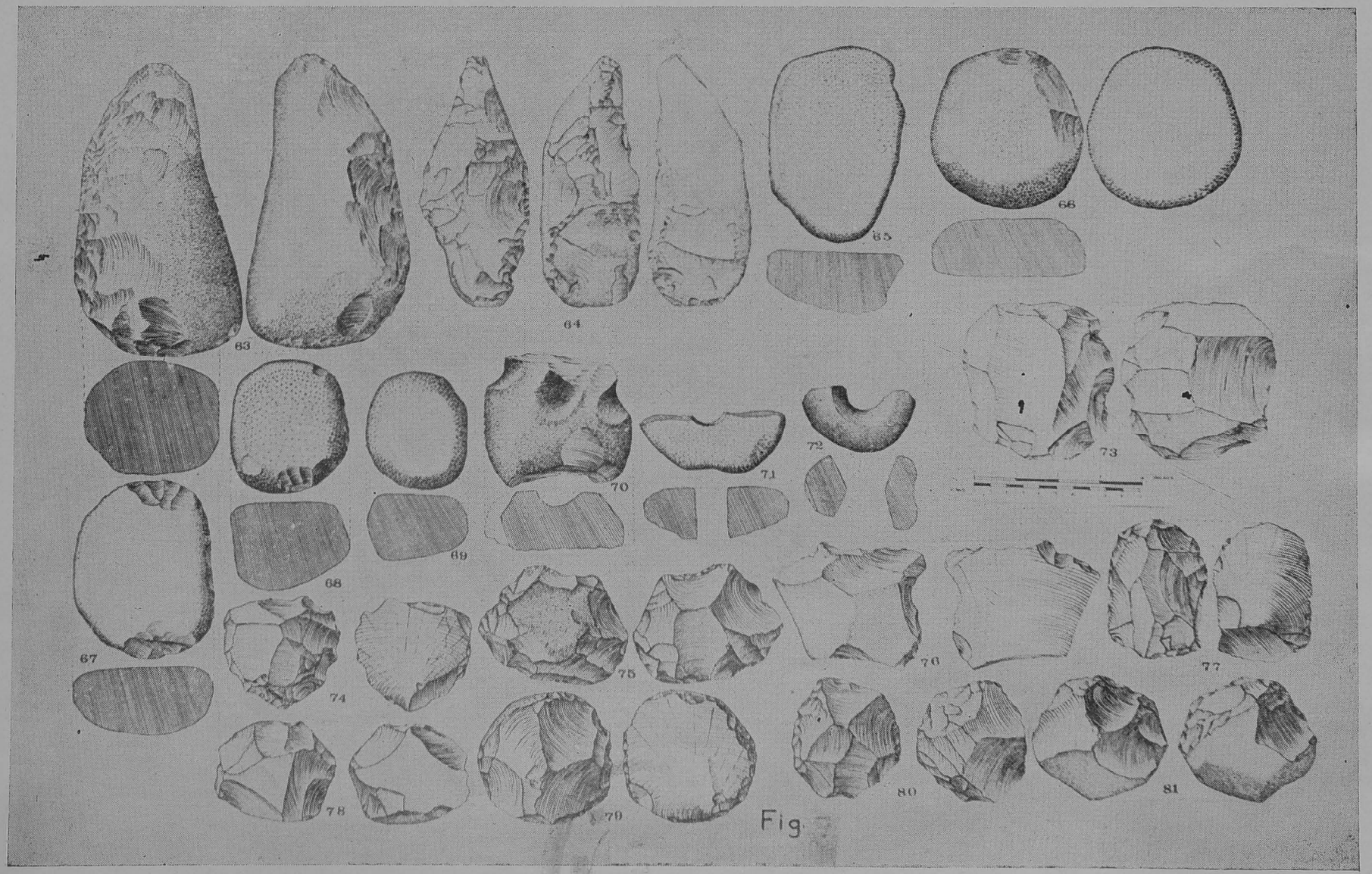

Fig. 7. *Artifacts of pecked and ground stone industry.*
63 : miscellaneous tool muller (?); 64: pick; 65-69: rubbing stones; 70: miscellaneous tool anvil: 71-72: mace heads; 73: round scraper on flake; 74 & 79: chopper cum hammer stones; 75: core scraper (round); 76: chopper cum point; 77: side & end scraper on flake; 78 & 80-81 chopping tools.

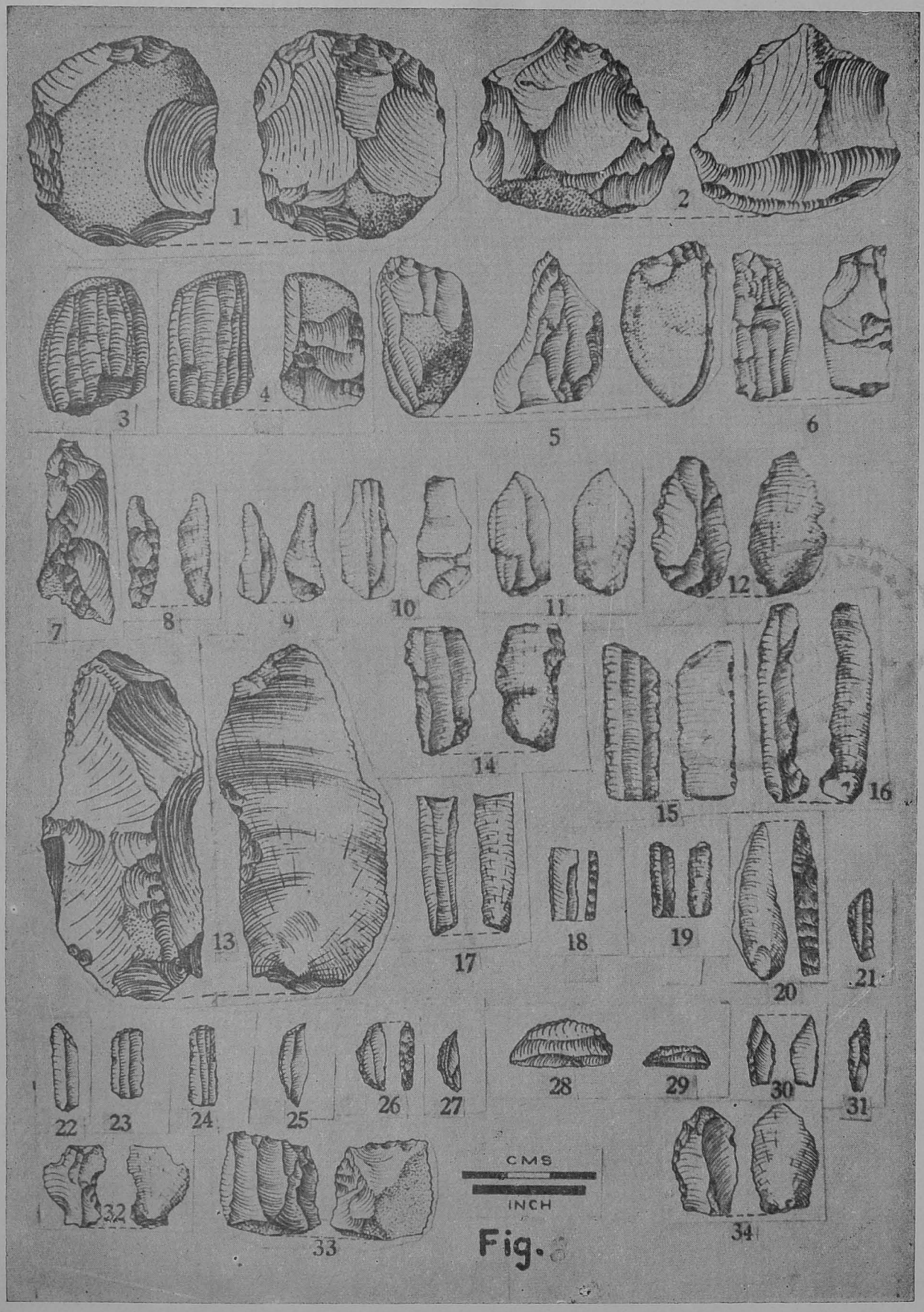

Fig. 8. *Artifacts of neolithic blade industry.*

1: worked piece; 2: flake core;3-5: blade cores; 6: core rejuvenation flake; 7-8: crested guide flakes; 9-10: plunging flakes; 11: unutilised flake; 12-13: utilised flakes; 14-17: unretouched blades;18-19: backed blades; 20-21: obliquely blunted blades; 22-24: truncated blades; 25-27: lunates;28-29: trapezes; 30-31: points; 32: notched flake; 33: end scraper; 34: single side scraper.

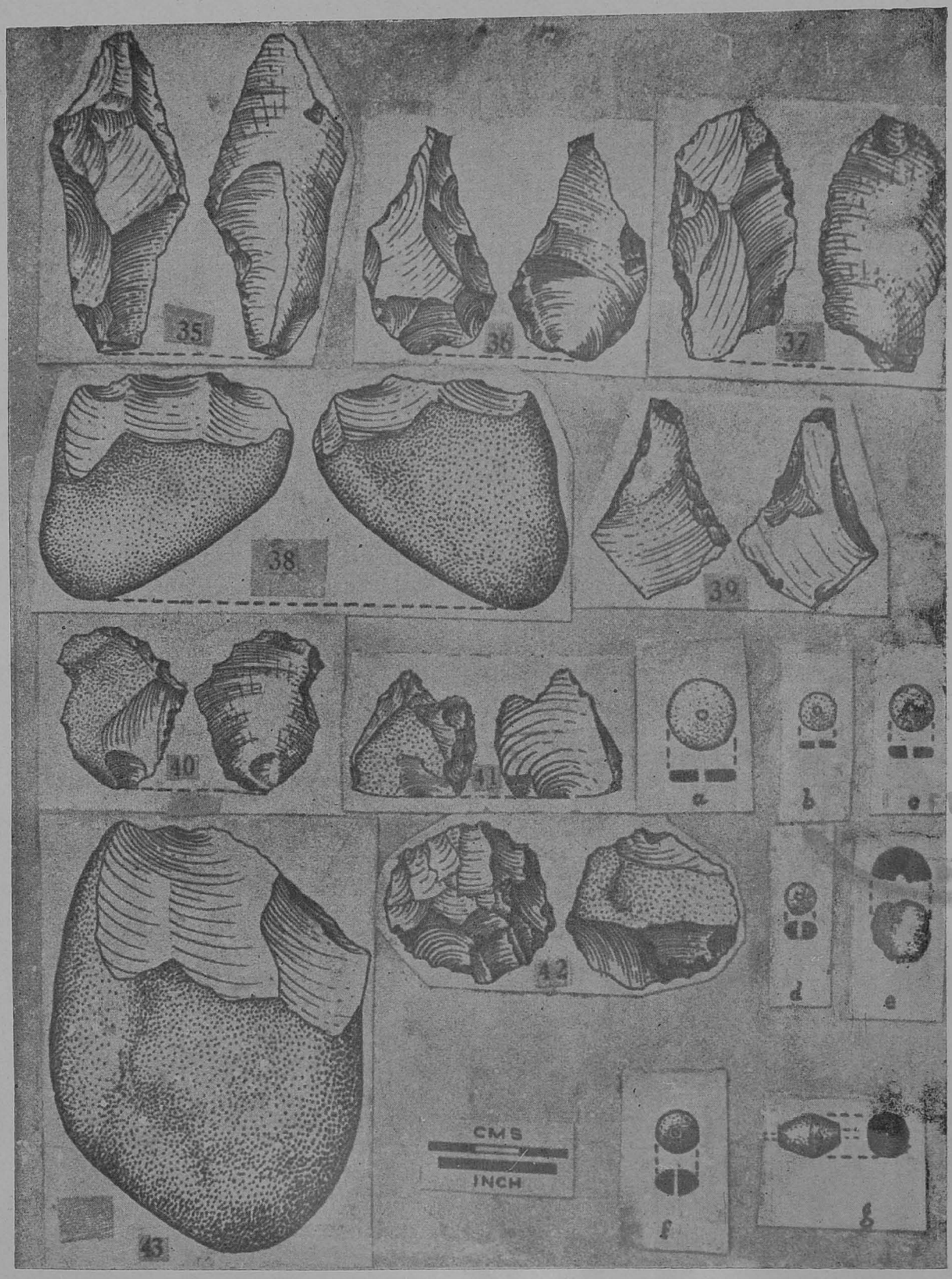

Fig. 9 : *Artifacts of the neolithic blade industry.*
35: Point; 36: Borer; 37-38: Side scrapers; 39 & 40: Hollow scrapers;
41: End-and-hollow scraper; 42: Round scraper; 43: Chopper; a–g: beads.

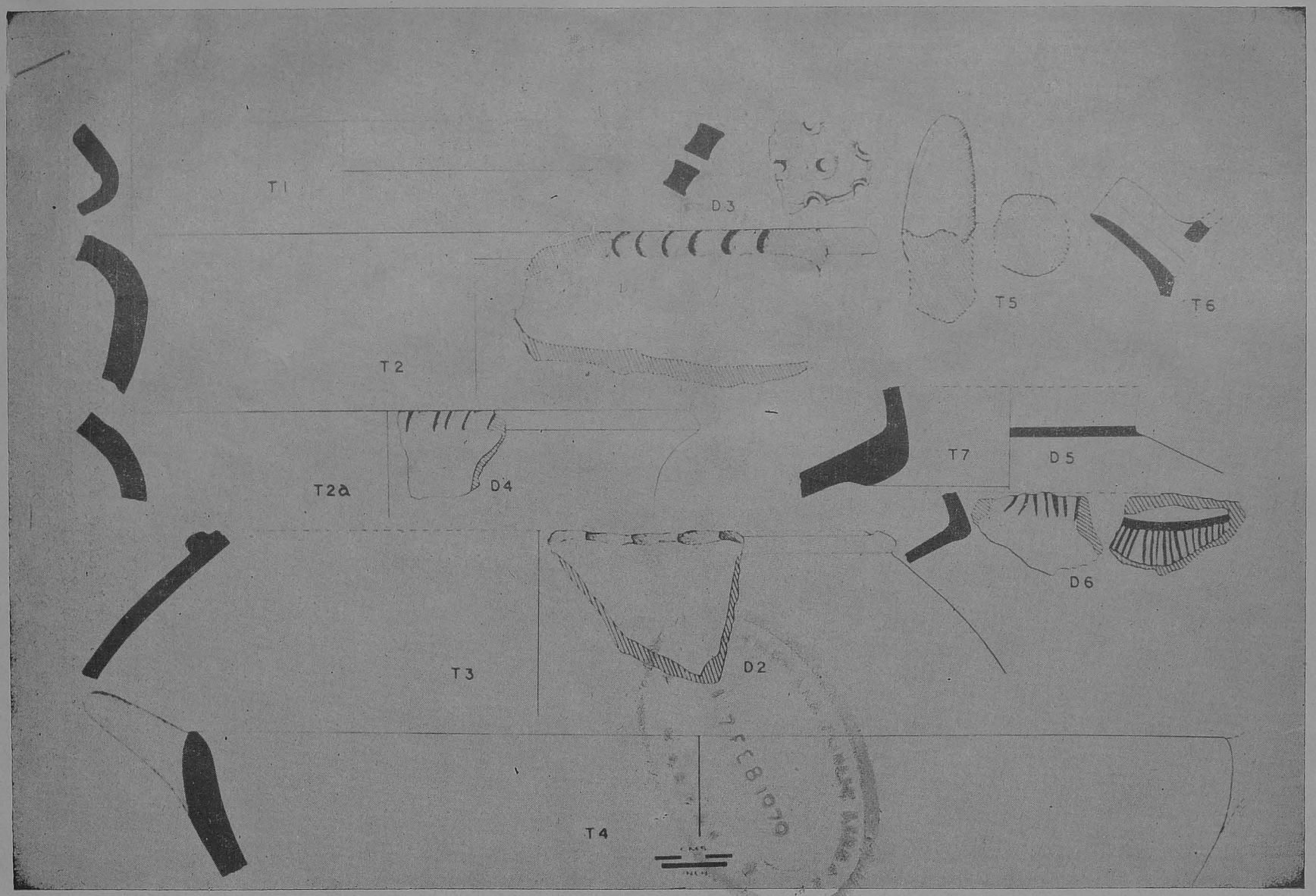

Fig. 10 : *Neolithic pottery:* Unburnished grey ware types and designs.

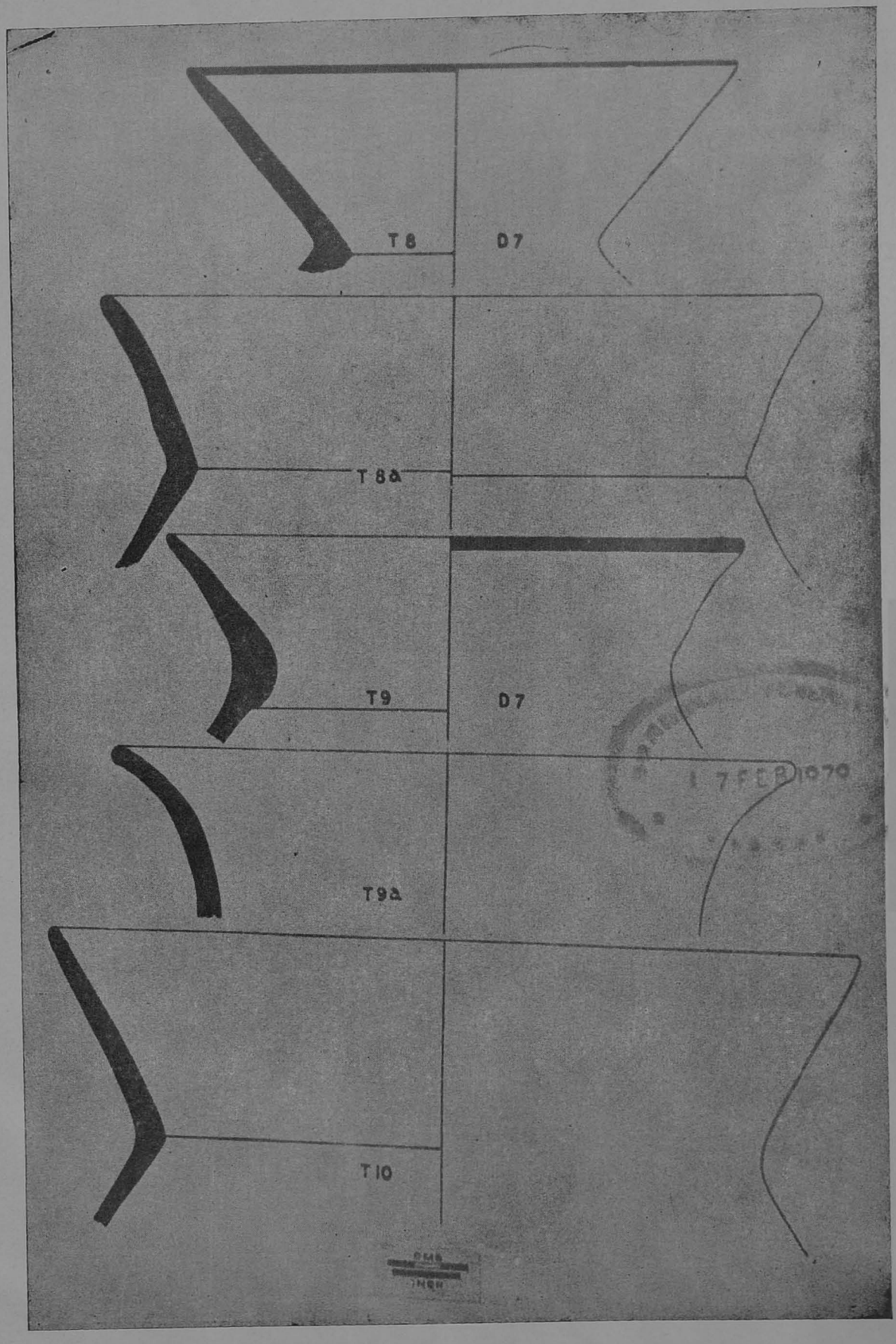

Fig. 11
Neolithic ceramic industry: Types and designs.

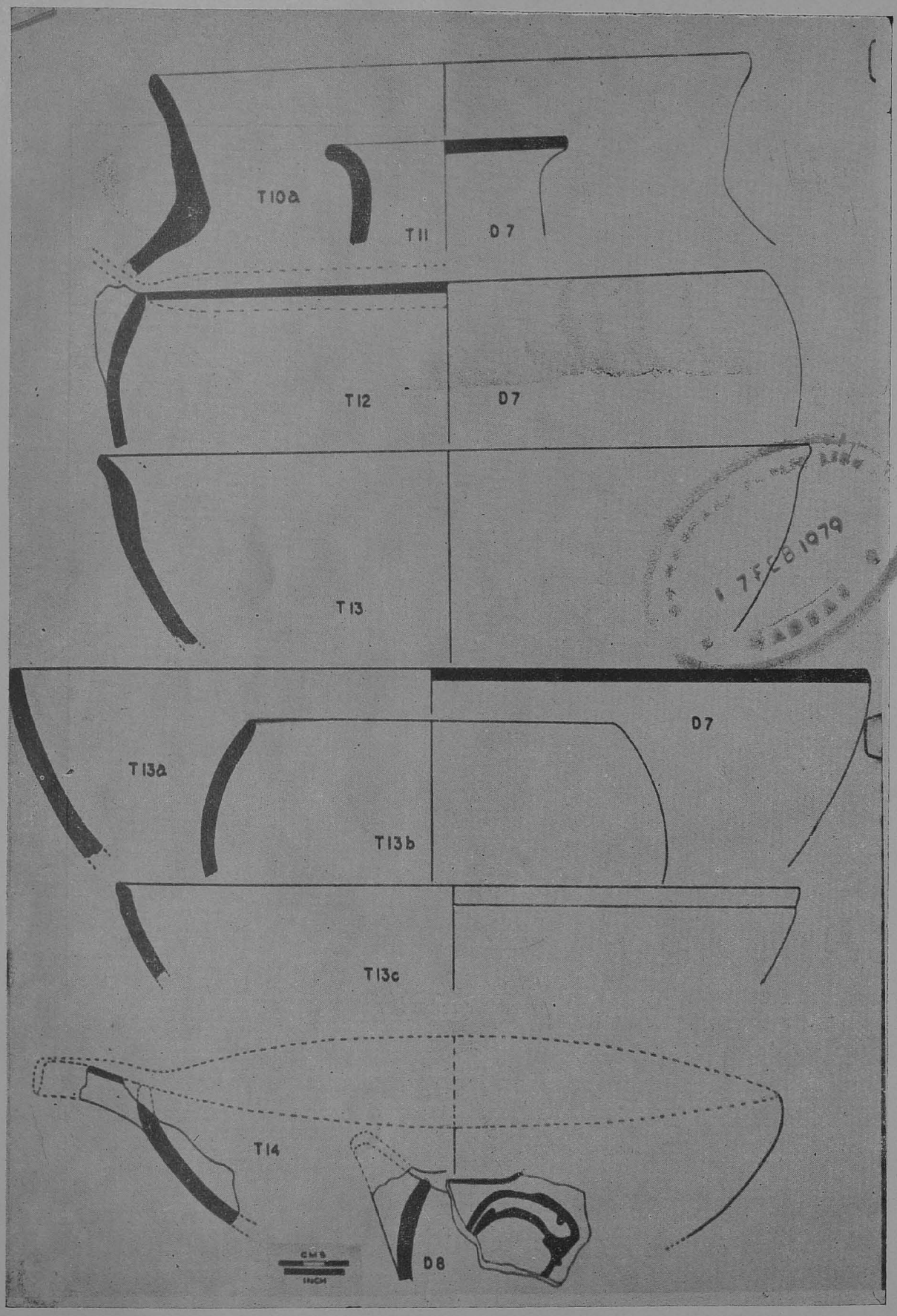

Fig. 12
Neolithic ceramic industry: Types and designs.

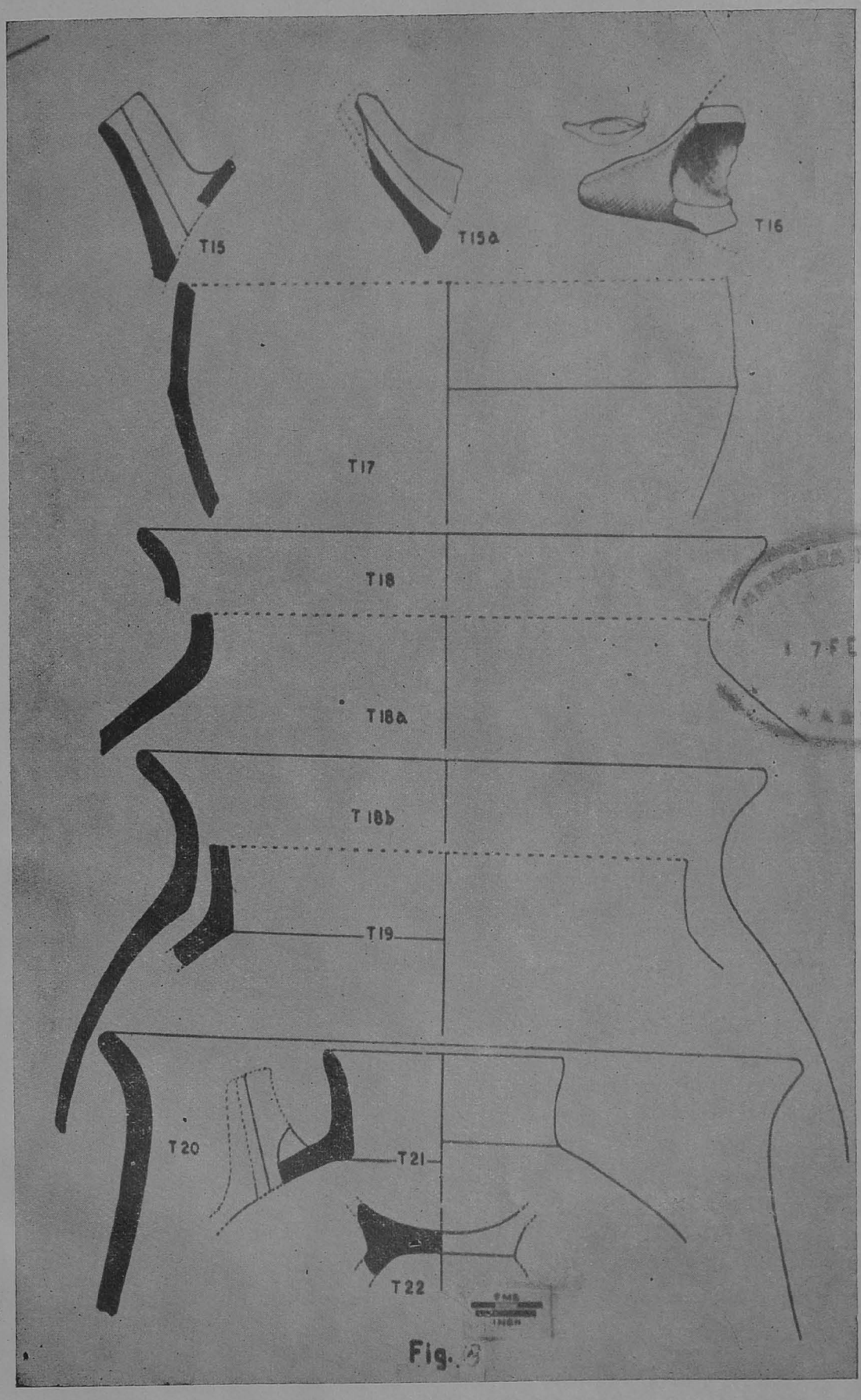

Fig. 13:
Neolithic pottery—T. 15 - T. 17: Burnished grey ware types; T. 18 - T. 22: Unburnished dull red ware types.

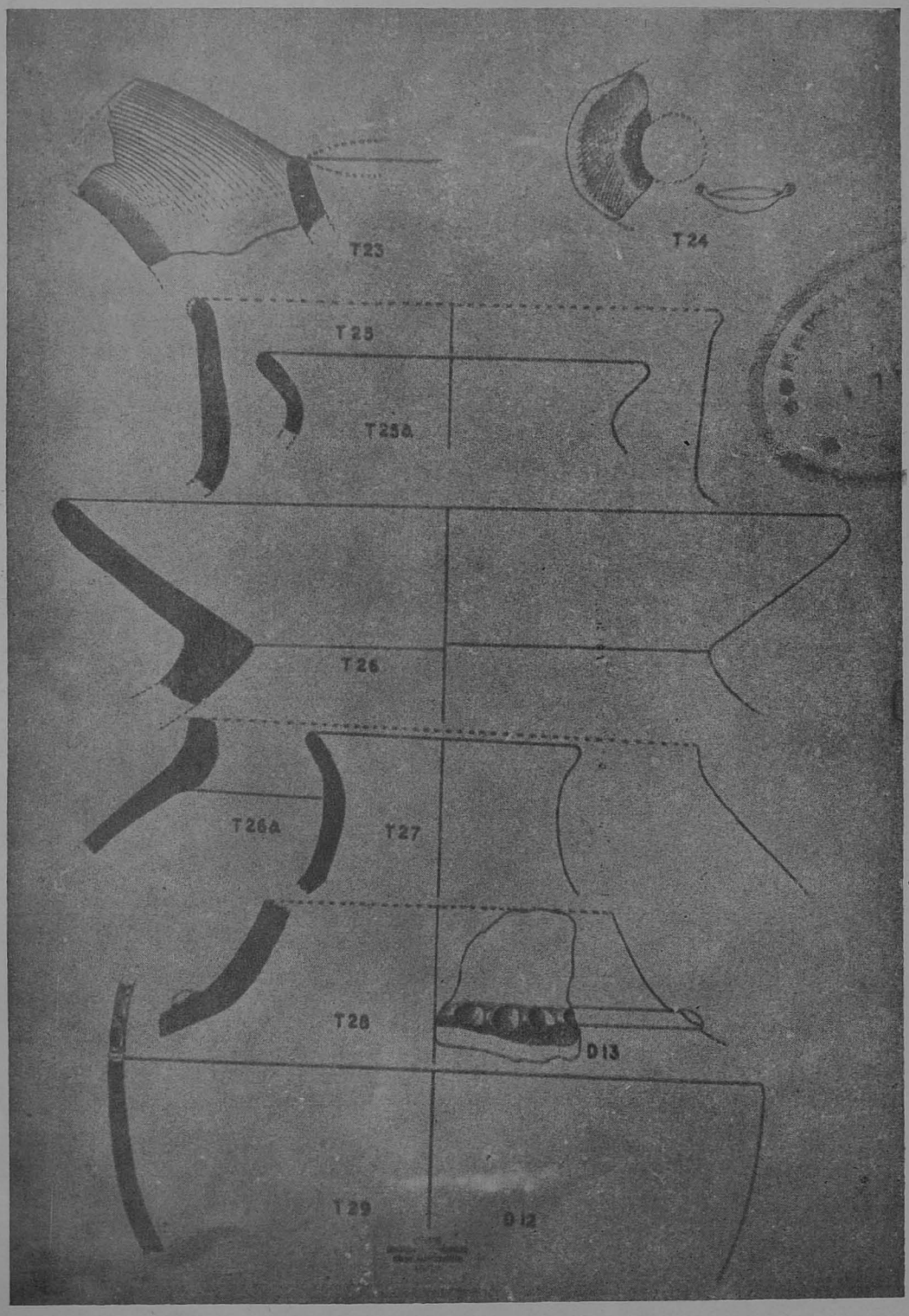

Fig. 14

Neolithic ceramic industry: Types and designs.

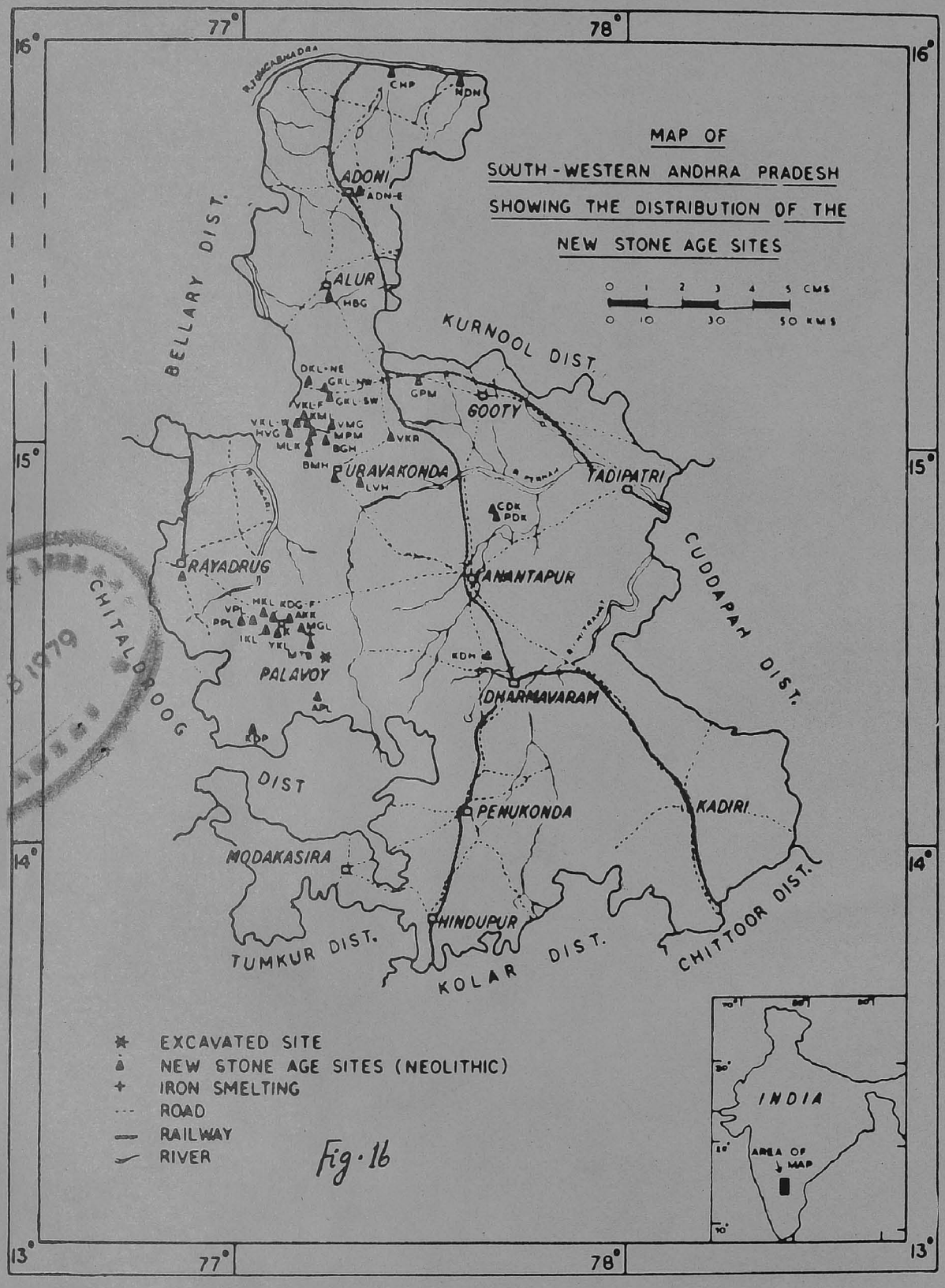

Fig. 16

Key to Fig. 16.

ADN-E : Adoni East. AKK : Akkammakonda. APL : Andepalli. BGH : Budagavi Hill. BMH : Butamahal Hill. CHP : Chetnepalli. CDK : Chinnadandu Konda. DKL-NE : Donekal North-East. GKL-SW : Gadekal South-West. GPM : Gulapalyam. HBG : Hatibelagallu. HKL : Hulikal. HVG : Havaligi. IKL : Idukal. KDG-F : Kalyandrug Fort. KDH : Katamadevudu Hill. KDP: Kanduripi. KML: Karakumukkala. LVH: Lattavaram Hill. MGL: Mudigal. MLK : Mallappakonda. MPM : Malapuram. PDK : Peddadandukonda. PLY : Palavoy. PPL : Pillalapalli. RDG : Rayadrug. UDK : Uravakonda. VKL-F : Vidupanakal Fort. VKL-W : Vidupanakal West. VKR : Vajrakarur. VMG : Velpumadugu. VPL : Vitlampalli. YKL : Yatakal.

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