Lithic assemblage from Southern Neolithic sites.

5.1. Brief account on the study of stone tools from Neolithic period.

The Southern Neolithic stone tool technology is made up of two lithic industries; pecked and ground tools, and blade industry. Edge tools and non-edge tools characterize the former industry. The edge-tool types are axes, adzes, chisels, fabricators, flake tools, chopping tools and the non-edge tools include hammer stones, rubber stones, grinders, mullers, palettes, querns, sling stones, ring stones, anvils and by-product flakes. Of all the implement types, axes form the most common and significant group of tools in the industry. The techniques employed in their manufacture are identical to the various processes of flaking, pecking and grinding described by Allchin (1957:321-35). The South Indian Neolithic sites have revealed the use of a variety of rocks such as basalt, dolerite, granite, epidiorite, greenstone, gneiss, schist, quartz and quartzite.

The blade industry is based on the crested guiding ridge technique. It is composed of finished and simple artefacts divided into three main groups-flakes, blades and cores. The raw materials used in the order of frequency are chert, chalcedony, agate and quartzite. Chert is the main medium employed Neolithic sites of South India. The main tool types include long and short blades, retouched and backed blades,
scrapers, lunets, etc. all these types are known from all excavated and explored sites of Neolithic in South India.

*Raw Materials*

The principal raw materials utilized for the preparation of the ground stone tools include a range of igneous, metamorphic and sedimentary rocks. The igneous rocks which occur in the form of dykes, sills etc., include basic rocks such as fine grained basalt, and medium grained dolerites as well as acidic rocks such as granites, charnockites etc. The metamorphic rocks mostly comprised of micaeous schists, granite gneisses and quartzite's while the sedimentary rocks includes sandstone etc. Lumps of vein quartz have also been exploited for using them as hammers. The edge ground tools were invariably prepared on igneous rocks and rarely on metamorphic rocks as they were chosen for their hardness, high densities, durability and local availability. The non-edge ground tools on the other head were prepared on metamorphic rocks and occasionally on sandstones too.

Dolerite, basalt and charnockites are derived from dykes, which cut across the granetoid and schistose gneissic formations while the quartzite and other rocks are exploited from the Cuddapah and Kurnool formations. In the adjacent areas of South Western Andhra Pradesh, Raichur and Bellari doab of Karnataka, the principal raw materials used
for the fabrication of edge tools were dolerite and basalt while the non-edge ground tools were usually prepared on coarser rocks such as quartz, quartzite, sandstone epidotic granite, granite etc. (Reddy, V.R. 1978:4).

For microlith raw material used as Chert, Chalcedony, jasper, agate and carnelian of the cry-ptocrystalline form, and quartz and rock crystal of the crystalline form, both of the silica group, constitute the chief raw materials used for the preparation tools in this industry; though a few artifacts of igneous and metamorphic rocks are also met with.

Technology

The techniques used for the fabrication of the ground stone tools were discussed time and again by different scholars. Allchin, F.R. (1960:85-86) and Reddy, V.R. (1978:43-45) recognized that there were 3 basic techniques such as flaking, pecking and grinding employed in the preparation of ground stone tools of the 3 techniques flaking was already known while pecking and grinding were introduced for the first time during Neolithic times (Mc. Carthy, F.D.: 1949).

Foote, R.B. (1916:85) observed 4 stages in the preparation of ground stone tools such as flaking, pecking, grinding and polishing. Subba Rao, B. (1949:143-44) and Sankalia, H.D. (1961:79-82) retained
the four-stage preparation of ground stone tools proposed by Foote. Allchin, F.R. (1957:323) on the other hand, proposed 5 stages such as rough (primary) flaking, fine (secondary) flaking, pecking, grinding and overall grinding. If we consider polishing of Foote and overall grinding of Allchin are one and the same, the latter’s second stage i.e., fine (secondary) flaking is an extra stage. Reddy, V.R. (1978:45) failed to realize the difference between the different techniques and stages in the preparation of edge ground tools and hence he clubbed both of them under one category. In this context, it may be observed that not all the specimens were prepared into tools following all the 3 techniques in combination. The techniques were employed for different specimens depending upon the specific requirement. A few tabular blocks already having the required shape could be converted into an edge tool by simple grinding at the edge. Similarly some other tools were pecked and ground and a few more were flaked and ground. Only in rare occasions all these 3 techniques were used in combination on a single specimen. After all, preparing a stone tool is a laborious process and requires a lot of time and energy and hence whenever there is a possibility of avoiding any technique, the Neolithic folk of South India did not hesitate to do so.

Flaking was employed to give a rough shape to the stone by direct percussion method. Spheroid, discoid or an elliptical hand hammers
were the probable tools employed for the purpose. Pecking was resorted to for removing angularities and projections produced during flaking. Allchin, F.R. (1957:323) suggested discoid or cylindrical hammers as the probable tools utilized for this purpose. Grinding was done in a specially made groove or on a flat stone using sand and water. The lustrous shining on the tools might have been obtained by applying grease or oily substance. (Sankalia, H.D. 1964:80).

5.2. Typological Classification of ground stone tools

The typological classification of ground stone tools of South Indian Neolithic was first attempted by Foote, R.R. (1916:20-21). He recognized two basic artifact types on the basis of the technique and shape such as ground and polished objects and unpolished artefacts. Among the polished stone objects he recognized 40 groups, and among the unpolished artefacts 25 groups. Besides these, he divided celts in 12 types. Chisels into 6 types and axe hammers into 2 types etc. Though the attempt made by Foote was first of its kind and deserves appreciation, the criteria he adopted dividing the sub-groups and types through the shape of butt, blade, thickness etc., have created confusion and ambiguity. Later on Subba Rao, B. (1948:33) recognized 10 types among the axes by taking into consideration the external form and such other features including sections across the butt. However, he failed to
realize the functional utility of the tools and hence included axe hammers, adzes and chisels in axe group (Reddy, V.R. 1978:45). The classification of Worman, E.C. (1949:180-201) and Seshadri M. (1956:54) also carries similar drawbacks. Allchin, F.R. (1957, 328-332; 1962; 311-14) gave more emphasis on the functional aspect of the ground stone tools and classified the Neolithic stone artefacts of Karnataka into 5 major groups such as edge tools, points, rubbers, hammers and miscellaneous, which were again divided into sub-groups. Based on the taxonomy proposed by Allchin, the present writer classified the whole lot of ground stone artefacts into two major divisions such as edge tools and non-edge tools. The edge tools are basically cutting implements, which include the axes, adzes, chisels, and picks and non-ground edge tools such as flakes, flake tools etc. The non-edge ground tools are those that are meant for domestic use such as hammers, rubbers and saddle querns and non-domestic equipment such as sling stones and mace-heads etc.

*Microliths from Neolithic period*

The blade and microlithic industry constitutes another important feature next to ground stone tools in the Neolithic culture. Limestone, chert, chalcedony, agate, and quartzite of the siliceous, sub-crystalline
and crypto-crystalline kinds are the raw-materials used for manufacturing of tools of this industry.

In addition to ground stone tools, blade and microlithic flake tools were an important part of the southern Neolithic technology. These tools derived from an older, long-lasting and widespread technological tradition that spanned most of the Indian peninsula, south of the Narmada River, during the Microlithic/Mesolithic and the succeeding Neolithic/Chalcolithic periods (Gordon 1950; Todd 1950; Wheeler 1948:249; Subbarao 1955; Seshdri 1956; Fairservis 1971: 98-99,329; B.Allchin1977; Allchin and Allchin 1974b; 1982: ch4; cf. Ansari 1988). In general there is rather poor for the Mesolithic period that precedes the southern neolithic. Seshadri (1956) plots number sites throughout the state of Karnataka, while some thirteen sites without pottery, both with microlithic blades, flakes, and cores, were reported from the Anatapur district (Rami Reddy 1978: 17-20), and in the northern Cuddapah district (Venkatasubbaiah 1992). But there has been no systematic survey that might recognise and map such sites. None of these sites has ever been excavated and there is thus little understanding of the nature of occupations, the full range of tool types.

A few southern neolithic sites have suggestive evidence that pre-ceramic, microlithic habitation preceded the neolithic settlements, as
defined on the basis of ceramics, and microlith-using groups co-existed with the ceramic neolithic. The recent excavations at Watgal have revealed a sparse presence of microliths in a aceramic horizon beneath the clearly neolithic levels of the site (Devaraj et al. 1995). This evidence is similar to that reported by Subbarao (1948) from the lowest levels of his excavation at Sanganakallu, where microliths accompany the ‘pre-neolithic flake’dolerite finds (cf. Sankalia 1969). At Brahmagiri, surface finds of microliths distinct from those seen within the neolithic excavations hint at an earlier phase at this site as well (Seshadri 1956). In addition, some sites on the south bank of the Tungabhadra suggest interchange, or general contemporaneity, between groups. The site of Gurzala where microlithic assemblages were collected by several archaeologists (Foote 1916; Rami Reddy 1978: 18).

A few remarks are called for regarding the differences and similarities between the Mesolithic industry and the Neolithic blade industry. First, typologically both industries are more or less similar except a few tool types, which are not represented in the blade industry of Neolithic culture i.e., knives, pen-knives, awls, round and concave or hollow scrapers. Secondly, crested guide ridge technique represented in the Neolithic blade industry is lacking in the Mesolithic industry. Thirdly, fluted cores of the Neolithic assemblage have commonly faceted platforms, while their Mesolithic counterparts are unaffected. Fourthly,
the artefactual assemblages of the Mesolithic industry are homogenous, whereas the Neolithic assemblages are heterogeneous in character. Fifthly, there is a gradual decrease in the percentage of microlithic types like backed blades, lunates and crescentic points in the Neolithic industry and this suggests replacement of hunting-gathering economy by one based on food-production. Finally, in the Mesolithic culture limestone, chert, chalcedony, agate, quartz, quartzite and jasper were used, whereas in the Neolithic, use is restricted to limestone, chert, chalcedony, agate and quartzite and there is also a difference in respect of colour of raw-material.

*Edge tools*

*Axe from Neolithic context* The most important groups of Neolithic tools are the axes. The axe with medial ground edge, with generally triangular form and curved blade, and an oval or lenticular medium section. Full grinding is usually reserved for small, flattish axes, and pecking for larger tools from suitable raw material. The shape of axes is variable (Foote, 1916; F.R. Allchin, 1957). In south India the most common form is subtriangular with narrow, rounded or straight butts and ovoid or lenticular cross-section. These may be ground all over or dressed all over and ground only at the edge. The commonest axe form is that often spoken of as pointed-butt axes.
Hafting of axe. 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 his ‘club’ haft and ‘slot’ halft 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) 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 halft. Subbarao (1949), who calls such axes ‘shoe-last’ celts thought that they were hafted in adze-wise fashion.

Adzes. 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”. Patrie (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 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” (Heine Geldern 1928).

In Peninsular India, adzes were first reported by Foote (1916:124) He found a solitary specimen from the Muttugallu Neolithic site in the present district of Raichur, and identified it as the “polynesian type”, utilized in agricultural activities. Foote (1916: 20-21) recognized adzes into two types, a short and a long one. His find belonged to the latter type. Wheeler (1947-48: 249) found a specimen of adze in the late phase of the Brahmagiri stone axe culture. Later, Subbarao (1949: 149) 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) 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 Mahlhotra (1965:50-1) illustrate two doubtful specimens from Tekkalakota. Rami Reddy. V (1968) adzes, comprising four specimens, come from three sites, one each from Adhoni East and Velpumadugu, and two from Hulikal. All the four, 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, which is lightly patinated, is of dolerite/granodiorite.

**Chisels**

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 in fact what we have called picks. Chisels thus differ from picks in not possessing a pointed working edge and long body.

Chisels though of rare occurrence 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) found them in good numbers in his
excavations and on the surface on Sanarasamma hill near Bellary. Allchin (1960: 89-90) illustrates two specimens from Piklihal. Recently Nagaraja Rao and Malhotra's (1965: 60) 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 bioconvex business edges are more akin to wedges than to celts. Chisels like wedges besides splitting wood might have also been used in cutting operations.

Picks

Picks are rough, irregular tools, made almost only by chipping, with narrow sharp working ends and blunt ends suitable for use with wooden mallet. Probably in some case these were used also as cold chisels. They might have been fitted into wood or bamboo as many of them are bruised in the middle along the long axis and some of them have their high surfaces ground due to pressure.

Fabricators

According to Subbarao (1948:39), a fabricator is a rough, irregular, cylindrical tool blunted at both the ends. It is almost a "stone finger" which might have been used for a variety of purposes and is very useful in the manufacture of axes, etc.
Flake Tools

Flake tools were detached from nodules in the process of manufacturing pecked and ground tools. These invariably consist of bulb and platforms. These were converted into tools secondary working. They show different shapes: oval, discoidal, triangular and squarish.

Chopper-Chopping tools

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 resulted due to alternate flaking. Both the types are heavy and massive; and were utilized in chopping purposes. When the choppers are small in size Movius (1948:350) calls them scrapers.

Chopper-chopping tools are characteristic of early and middle Stone Age cultures but they persist in small numbers in later cultures as well.

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. Sometimes
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 of alternate flaking is employed as a consequence of which a zigzag, wavy cutting edge is produced.

Non edge tools

Rubbing Stones

Foote, R.B. (1916:20) identified rubbing stones as mealing stones and classified the specimens collected by him into flat rubbers and rounded rubbers. Allchin, F.R. (1957:327) classified them as rubber and discoid rubbers. According to him the former is Foote’s “corn crushers” where as the latter “mealing stones”, Sankalia, H.D. (1964:87-88) considered rubbing stones as mullers and plano-convex mullers.

Rubbing stones are those, which are used for grinding and pounding purposes. Reddy, V.R. calls these tools domestic tools while Nancy,K.(1977)considered them as food processing equipments.

The shape is spheroid rubbers discoid rubber, oval rubbers and oblong rubbers are common in south Indian Neolithics.
Mace Heads or Ring Stone.

Mace heads are thick massive circular stones with a well-drilled central hole. Their surface are some time pecked and ground. The central hole was pecked or drilled alternately from both surfaces and is of 2 to 3 cm. 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.

Hammer Stone

Foote, R.B. (1916:20) on the basis of technique and probable function has recognised several sub types in hammer stones. Allchin, F.R. (1957:327) divided hammer stone into three groups such as 1) Spheroid and discoid hand hammers, 2) Cylindrical hand hammers and 3) Axe hammer (or pestles) and grooved hammer stones. However, Reddy, V.R. (1978:61) raised objection for keeping axe hammer in hammer group in view of their “distinctive origin and function”, and hence, he kept the axe hammers in a separate group. In this connection, it may be mentioned that in the choice of raw material, the technique of
preparation and morphological features, there occur differences among true hammers and axe hammers but functionally both are one and the same.

**Axe Hammer**

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 where, 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 hammers. 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. He classified two types of axe hammer 1) axe-hammer with a long narrow body, and 2) axe-hammers with short thick broad body. He regarded shape and size as the criteria for the classification.

**Sling stones.**

These are perfectly spherical in shape except a few whose surfaces are peeled off because of the nature of the raw material or use. The absence of battering marks indicates that they were the final products of the process involved in the making of hammer stones with a different function. Foote (1916) suggested that these stones were used
for hunting because of their small size. Even today, such spherical balls are used as missiles or throwing stones to drive away birds from crops. But Banerjee (Sankalia et.al. 1958:240-1: 1960:476-7) and Ansari (Deo and Ansari 1965:134,136) thought similar objects were used as weights at Navdatoli, Maheshwar, Nevasa and Chandoli.

*Marcoliths Saddle Querns.*

The saddle querns derive their name from their appearance to the riding saddles. Querns were used for grinding and pounding grain and other cereals. They are rectangular, squire and less frequently round in shape and are made out of huge granite boulders. Foote (1916:20) who gave the name 'mealing troughs' to these divided them into two types—deep and shallow querns. These artefacts have been common from the neolithic into recent times.

5.3. Functional Analysis of Axes

Very little information is available on the functional aspect of the ground stone tools (Lee Roux 1978:44). In Indian context in general and South Indian Neolithic in particular, the studies leading to the functional aspect of the ground stone tools are almost nil. All the efforts of the earlier scholars were basically aimed at the morphological and metrical descriptions of ground stone tools such as length, breadth, thickness, cross-section and weight etc. as studies relating to the application of
ethnographic data and understanding the lithic concentrations against their behaviour patterns were still at infancy, the Neolithic tool kit could not receive hitherto a proper behavioural assessment against their geo-eco settings underlying the economic pursuits.

Foote, R.B. (1916:173), Subba Rao, B. (1949:152-53) and Seshadri, M. (1956:56) have tried to provide probable hafting methods of South Indian neoliths on the basis of the studies conducted by Coghlan, J.H. (1943:27-55). Foote and Subba Rao suggested that elongated ground stone axe could have been fixed to wooden hafts, in "Club Headed haft" (fitting an axe into a piece of perforated wood or antler) (Subba Rao, B. 1948) or in 'slot haft' (inserting an axe in wooden slot and trying it with fibre or other binding material). 'Knee shaft haft' an other hafting method (Subba Rao, 1948) was suitable for hafting adzes and 'shoe-last' celts. The presence of the lustrous shine near the butt and mid portions of the specimen is taken as the evidence for hafting. In this context, Subba Rao suggested that the shining formed on the axe near the butt and mid portion is not due to grinding but because of the rupture of the wooden haft at the time of fixing and also during use.

Subba Rao, B. (1948: 31-35) suggested probable functional aspects of the ground stone tools. According to him axe is to fell the
trees or split or break the wood, adzes for dressing the wood, chisel for cutting slots in the wood, picks for digging, 'shoelast celts' for tilling or loosening the soil similar to a plough share.

5.4. The shape and position of the blade:

One of the criteria used by the earlier scholars to classify the ground stone tools into different varieties is the shape and position of the blade. According to Allchin, F.R. (1957:328) “A median blade is agreed to be an axe blade while an eccentrically set or bevelled blade is termed as adze blade”. In this context, the functions with which the axe blade and adze blade were connected are worth investigating. If an axe is at operation, the mechanical force exerted on it will centrally project along a linear direction on the object since it has a median edge. The extent and depth of penetration differs from specimen to specimen depending on the acuteness of the edge angle. The adze on the other hand, is prepared with levelled edge and Plano-convex cross-section, consequent to which the weight of the specimen disperses across the bulging portion of the specimen. The force of impact exerted on the object in such cases never projects centrally, but diffuses laterally.