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First Farmers in South India:
The role of internal processes and external influences in the emergence and transformation of south India's earliest settled societies

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Abstract

The Neolithic period in the south Deccan plateau of south India seems to have begun sometime in the 3rd millennium BC. It is therefore not one of the world's earliest Neolithic transitions, nor indeed the earliest Neolithic culture in South Asia. Nonetheless, the Southern Neolithic, as it is known in India, is of significant interest to Neolithic scholars worldwide because it appears in many significant ways to represent a largely indigenous transformation. This paper will explore the evidence for both internal processes and external influences in the genesis and subsequent transformation of Neolithic society in south India. It will in particular draw on recent studies at the site of Sanganakallu-Kupgal in the Bellary District of Karnataka, as well a larger-scale archaeobotanical project in the south Deccan plateau, in order to examine patterns of exchange, production and ritual in the Neolithic and Megalithic periods in south India.

Introduction

The Neolithic period in the south Deccan plateau of south India appears to have been ushered in sometime in the first half of the third millennium BC (Fuller et al. forthcoming; Korisettar et al. 2001a). Deposits from this time incorporate the first evidence for domesticated crops and animals, and indicate more intensive, and probably more sedentary, human occupation of the region (Allchin 1963; Korisettar et al. 2001; Paddayya 1998; Subbarao 1948). The Southern Neolithic, as it has become known, is thus comparable to other Neolithic cultures that developed across the Old World beginning in the early Holocene period (e.g. Shelach 2000; Marshall and Hildebrandt 2002; Byrd 2005; Bellwood 2005; Crawford 2006; Wengrow 2006). Its rather late date also suggests that it is rather unremarkable, and part of the general dispersal of farming populations, crops and technologies outwards from a small number of centres of origin (Diamond & Bellwood 2003; Bellwood 2005). Recent archaeobotanical findings, however, suggest that the story is not quite as simple as indicated by the farming expansion model (Renfrew 2000; Bellwood 2005). A number of the earliest Southern Neolithic crop domesticates appear to have been locally domesticated, and crops from SW Asia and the Indus Valley region do not reach south India until the Neolithic is well established. In addition, there are a

number of distinctive features of the Southern Neolithic – including the apparent symbolic importance of cattle, and the creation of ashmounds – that give it a notably indigenous air, and that appear to have local origins. The Southern Neolithic thus invites additional research attention, for it undoubtedly has much to teach us concerning the complex interplay between autochthonous and external elements that may be involved in generating Neolithic transformations and stimulating subsequent change.

The Sanganakallu-Kupgal Project

Recent years have seen increased interest in the Southern Neolithic amongst both Indian and foreign researchers. A number of archaeological projects aimed at investigating the emergence of Neolithic societies have been undertaken in the south Deccan plateau (Paddayya 1991-1992, 1993a, 1993b, 1998, 2000-2001; Deveraj et al. 1995; Dufresne et al. 1998), including a project led by the authors of this chapter. The latter is focused on studying the multitude of prehistoric sites that are concentrated on a group of hills north of the town of Bellary in Karnataka (see Figure 1). The project, which has come to be known as the Sanganakallu-Kupgal Project, derives its name from the two modern-day villages that bracket this extraordinary set of sites. While a number of the sites had been investigated by earlier researchers (Ansari & Nagaraja Rao 1969; Foote 1887, 1916; Gordon 1951; Mujumdar & Rajaguru 1966; Sankalia 1969; Subbarao 1947, 1948), the importance of the sites, and the threat to them as a result of industrial quarrying of the granite hills on which they sit, was deemed sufficient to demand renewed work in the area. The findings from this research, which has been underway since 1998, have been important in revising and adding to our understanding of Neolithic processes and the origins of complex societies in the southern Deccan plateau (see Boivin et al. 2002, 2004b, 2005; Brumm et al. 2006, forthcoming; Fuller in press). They have been accompanied as well by additional findings from a larger-scale, largely archaeobotanical-driven survey of sites in the wider region by two of the authors of the chapter (Fuller 1999, Fuller et al. 2001; 2004; Korisettar et al 2001b; Korisettar 2004). Findings from both of these projects will be addressed here in the context of a more general discussion of the economic, social and ritual transformations that took place in the southern Deccan plateau between the 3rd and 2nd millennia BC, and that involved both internal processes and ever-expanding external contacts.

Neolithic beginnings in south India

Although there is as yet no archaeological sequence for the transition from foraging to farming in the southern Deccan, several lines of evidence from botany and archaeology suggest indigenous plant domestications in the region. One important clue is the fact that the wild relatives of some Indian crops are today found in this region (Figure 2). In particular, wild mungbean (*Vigna radiata*) and urd (*Vigan mungo*) are distributed in the moist deciduous forests of the Western Ghats and western Himalayan foothills, while wild mungbean alone is also found sporadically in the Eastern Ghats. Additional wild populations of urd are known from the northernmost Western Ghats and southern Aravallis, Mount Abu in Rajasthan and the eastern Satpura ranges (Fuller and Harvey 2006; also, Tomooka et al. 2003). Wild horsegram is found throughout the savannah zone that stretches from Rajasthan through the central Deccan to south India. In addition, India as a whole is home to

numerous indigenous domesticated millets, which also occur wild in south India (Fuller 2002, 2006).

Archaeological evidence is also revealing. Archaeobotanical evidence from sites of the Southern Neolithic consistently indicates the predominance of mungbean (*Vigna radiata*), horsegram (*Macrotyloma uniflorum*), and two millets (*Brachiaria ramosa* and *Setaria verticillata*). These are not crops that co-occur in earlier periods in the northwestern part of the subcontinent, such as Gujarat or the Indus valley, nor are they found at Gangetic Neolithic sites (although these species do occur in the Ganges plain during the later Neolithic). This implies that these species had earlier been brought into cultivation somewhere in south India. The particular core region of the Southern Neolithic, however, is too dry, and would probably have been so even in the mid-Holocene, to support wild stands of mungbean (Fuller and Korisettar 2004). Thus the zone in which domestication occurred must have been towards the sides of the peninsula where the dry savannahs intergrade into deciduous forests. Because both wild urd and mungbean occur throughout the Western Ghats, but urd is absent from the Southern Neolithic until its very latest stages, we now believe the most likely zone of the domestication was located toward the Eastern Ghats (Figure 2). Since Neolithic sites in the Kurnool district are known only from after 1900 BC, we suggest that the origins were likely in some region north of the Kurnool district (i.e. north of the Krishna River in western Andhra Pradesh). While introduced crops, such as wheat and barley, are found on a few sites, at least by 1900 BC, they do not appear widespread nor as the dominant crops, and this suggests that they were adopted through processes of cultural diffusion (Fuller 2005) rather than the immigration of north-western winter cereal growers.

While a relatively strong case may be made for an indigenous development of plant cultivation, animal herding on the other hand may have been introduced. Sheep and goat occur at Neolithic sites throughout the southern Deccan, despite the fact that they have no wild ancestors in the area (Paddayya 1975; Korisettar et al. 2001b). These species had a much longer history in the north-western part of the subcontinent, and in particular the greater Indus region (Meadow and Patel 2003; Fuller 2006). They must have been introduced to the south by the mid-third millennium BC. The same situation could be the case for cattle, but there have also been suggestions for an indigenous domestication of cattle in south India (e.g. Allchin and Allchin 1974; Naik 1978). While humped zebu cattle were certainly domesticated in Baluchistan by ca. 6000 BC, what remains unclear is whether additional domestications of this species took place elsewhere in South Asia during the Holocene. Some of the distinctive regional differences between southern and north-western zebu breeds have been suggested to be very ancient, and perhaps already reflected in artistic evidence of the third millennium BC, since cattle depicted in Indus seals differ from South Indian rock art bulls along the same lines as modern genetic breeds (Allchin and Allchin 1974, 1994-1995). Further archaeozoological work is needed on this problem. What is clear is that by the mid-third millennium BC, Southern Neolithic sites had a mixed economy of pastoralism and indigenous crop cultivation, although which came first (the domesticated plants or animals) and where precisely this happened (e.g. Western Andhra or the Shorapur Doab, etc) remains to be resolved through further research.

Fire, ashmounds and the symbolic importance of cattle

Whatever the sequence of local domestications and species introductions, it is clear that one species in particular held pre-eminent symbolic status in the Southern Neolithic: the zebu. This can be discerned from several lines of evidence. Firstly, zebus overwhelmingly dominate the rock art images that concentrate on and around Southern Neolithic sites (Allchin & Allchin 1994-1995, Boivin 2004b). Bulls in particular are frequently depicted, and their humps and horns are commonly accentuated, whatever the style employed (Figures 3 and 4). Cattle also dominate the assemblages of terracotta figurines found at Southern Neolithic sites, most of which depict animals of one sort or another. Here too we find an emphasis on the hump and horns, and as with cattle figurines produced by modern-day pastoralists in southern Sudan (Evans-Pritchard 1940), these are sometimes virtually reduced to these key features.

Perhaps the most suggestive, and yet also mysterious, indication of the importance of cattle in Southern Neolithic society are the ashmounds that its members left scattered across the south Deccan plateau. While ashmounds of various sorts are found in various regions of the world at diverse time periods, those of the Southern Neolithic are not only remarkably large and ubiquitous, but also distinctive in terms of their composition. Unlike other reported mounds containing ash, Southern Neolithic ashmounds are composed almost solely of ash (and are therefore not generalised garbage heaps), and often include a substantial proportion of vitrified ash due to the high burning temperatures involved in mound creation. These mounds have been studied using chemical and microscopic methods, and analysis has shown that the ash they contain is the product of the burning of cow dung (Zeuner 1960; Majumdar & Rajaguru 1966; this is also demonstrated by our own unpublished micromorphological analysis). As originally pointed out by Allchin, the cow dung of which ashmounds are composed appears very much to have been deliberately set on fire (Allchin 1963). Allchin ruled out the possibility of accidental or spontaneous ignition of the mounds of dung based on the extremely limited occurrence of spontaneous combustion cases today despite the presence of dung mounds in many rural villages. He also observed that fires occurred repeatedly in the same localities, and noted the difficulties associated with accepting the notion that Neolithic peoples would not have figured out how to prevent such fires if they were accidental rather than deliberate occurrences.

The purpose of the dung burning events that led to the formation of the Southern Neolithic ashmounds nonetheless remains somewhat obscure. There is no evidence that the ash was used during Neolithic times (as it sometimes is today) as a fertiliser for crops. Nor is it easy to accept that Neolithic peoples possessed notions of hygiene of the type found in modern industrialised societies. Thus, the most promising explanation that has been offered is a predominantly ritual one, according to which dung was accumulated and set on fire for largely symbolic reasons. While Allchin acknowledged that the ashmound fires may have been understood as means of protecting cattle from disease (for example if pens were set on fire periodically, or cattle were driven through burning fires), he was also inclined towards the view that the fires were ritual events, and that the resulting ash had symbolic meaning (Allchin 1963). Allchin's conclusion is based on the systematic and detailed study of place name data for the southern Deccan region, as well as the analysis of contemporary ethnographic practices in India. In particular, Allchin observed the importance of cattle, dung and cow dung ash (known as *vibhuti*) in ritual and symbolic practices

across the subcontinent today. Studies of post-ashmound strata and sites would seem to confirm this link between the present and the distant past, since the intervening Iron Age contains numerous examples of white ash of definite or likely ashmound origin being reused in megalithic monuments (Allchin 1963; Korisettar et al. 2001; Munn 1934; Sundara 1975, 1987). And just as Neolithic ashmounds appear to have, in some cases at least, been located at specific meaningful places in the landscape (Boivin 2004a), megaliths and Iron Age burials were in some cases located relative to the ashmounds that came before them (Allchin 1963; Korisettar et al. 2001a: 208), indicating that they continued to hold some sort of meaning for people.

Whatever the case for the long-term continuity in certain Indian symbols (though probably not meanings), it is difficult to deny the distinctively Indian air of the Southern Neolithic (Boivin 2004a). Not only are cattle clearly of ritual importance during that period, but cow dung as well appears to be a potent symbol. Pastoralism as a whole seems to be culturally accentuated and symbolically elaborated, despite the clear evidence for the cultivation of domestic plants. A remarkable number of ashmounds were created during the Neolithic period in south India, and their ubiquity in a range of contexts and phases suggests that they had a central role to play in the Neolithic belief system (Boivin ibid.). What is observed then is a set of cultural themes and symbols that distinguish the Southern Neolithic from other Neolithic cultures in South Asia, and particularly the much more Near Eastern-inspired features of the Kili Ghul Mohammed Neolithic of Baluchistan. These cultural differences reinforce the notion that distinctive internal factors were key in the development of the Neolithic transition in south India.

Communal ritual and exchange networks in the Neolithic

Despite the importance of internal processes, however, Southern Neolithic societies were not isolated entities, functioning as solitary and self-sufficient communities somehow isolated from the rest of the world. On the contrary, our working (and still partly hypothetical) model of Southern Neolithic society recognises contact, exchange and interdependence as key factors in the emergence of the ashmound tradition, as well as the changes that subsequently led to the development of very different societies at the beginning of the Iron Age.

Our recent chronological analysis of the Southern Neolithic ashmounds (Fuller et al in press) demonstrates a number of patterns that suggest new ways of understanding the ashmounds and their relationship to the Southern Neolithic. Firstly, ashmounds are produced not just at the beginning of the Neolithic, as sometimes argued (Allchin and Allchin 1982), but rather throughout the whole of this period. The belief that ashmounds were strictly an early Neolithic phenomenon stemmed from the fact that ashmound layers frequently occur as one of the earliest phases of Neolithic sites. However, as we have demonstrated, ashmounds appear not to relate to a particular phase of the Neolithic, but rather a particular phase of the history of individual sites. That is, many settlement sites actually appear to begin with the creation of an ashmound. The practices that led to ashmound creation are then subsequently abandoned (after perhaps several hundred years or less), though settlement continues, and probably becomes more sedentary. Ashmounds from the early phase of activity at a site thus become buried, as witnessed at sites like Sannarachamma (Figure 5), Hiregudda, Watgal, Kurugodu and Velpumudugu. In cases where the site landscape

is more open, however, ashmounds remain exposed, with settlement deposits accumulating around them, as appears to be the case at Budihal, and perhaps Palavoy.

Not all sites, however, become settlement sites, and thus not all ashmounds are covered up with subsequent deposits. This is the case, for example, with one of the largest known ashmounds, located on a pass between two neighbouring valleys near the village of Kudatini (Allchin 1963: 52-57). Here, at the Kudatini ashmound as it is known, something quite different is going on. Despite the remarkable size of the ashmound (it may be as high as 8 m), it is associated with very little in the way of habitation debris. While artefacts are littered on the surface, recent digging at the site for the laying of pipeline has not revealed any significant cultural deposits below ground (see also Korisettar et al 2001a: 211-212). In addition, the querns and grinding stones found on the surface of a type used primarily for end-stage crop processing, i.e. flour-grinding (Fuller et al. 2001) The distinct impression is that the ashmound was used as a temporary camping site to which grain from more permanent settlement sites was brought for consumption. The large size of the ashmound may argue for larger scale gatherings of people and cattle, and a special, non-everyday context. Our hypothesis, much like that of Allchin (1963), is that such ashmounds were the sites of communal rituals involving the burning of dung. They were probably also, importantly, sites of exchange, where gathering communities traded cattle, goods and probably marriage partners as well.

The notion that certain ashmounds were sites of communal ritual, consumption and exchange is further strengthened by evidence from the site of Budihal (Paddayya 1993a, 1993b, 1998, 2000-2001). Re-analysis of the site stratigraphy and radiocarbon dates using Bayesian methods indicates that the ashmound at the site largely predates the Neolithic settlement found there (Fuller et al. in press). Before it was a settlement site then, Budihal was an ashmound site where occupation was much more sporadic. Some of the evidence that the site's excavator, Professor K. Paddayya, reports also indicates an emphasis on consumption and exchange rather than production. For example, Paddayya excavated a large butchering floor that may relate to feasting activity (Paddayya et al. 1995), and our analysis of its chronology suggests it formed not when the site was primarily a settlement site, but prior to this, when it was a temporary encampment site with a growing ashmound. The butchery of cattle that is attested may have been carried out in the context of the same ritual activities that led to the production of the ashmound. We would argue, based on preliminary archaeozoological findings (Boivin et al. 2005), as well as ethnographic parallels, that cattle were probably not kept to support everyday consumption, which was primarily focused on sheep, goat and crops. Instead, cattle were likely, as outlined above, a symbolic resource, and their consumption may have taken place predominantly within the context of larger ritual gatherings such as the type that we suggest took place at some of the bigger ashmounds. This remains to be confirmed through further research, however.

There appear to be reasonable grounds for arguing that certain ashmound sites were places of feasting and ritual then. It also seems likely, as already suggested, that occasions of communal ritual featuring the gathering of larger groups of people were also occasions of exchange. Items that might have been exchanged include beads, copper objects, axes and other implements, as well as cattle and marriage partners. Copper items are relatively rare on Southern Neolithic sites, which also so far lack

evidence for smelting. It is likely that copper items were produced on a very few number of sites, or, more likely, traded in from further afield (e.g., the Deccan Chalcolithic culture to the north). Beads were also probably valuable, sought after items, particularly those made of rarer materials like carnelian, and some may have been traded in from other regions. There is evidence too that axes were traded, often perhaps in unfinished form. The site of Hiregudda (known as Kupgal Hill in the literature) bears extensive evidence for dolerite quarrying and axe production (Boivin et al. 2005; Brumm et al. forthcoming; Foote 1916; see Figure 6) that is lacking on many other sites. While dolerite dykes are present on many sites in the region, there is one found at Hiregudda that is of particularly high quality and appears to have been extensively mined in the Neolithic period. It is likely that axes or axe blanks produced at Hiregudda were traded out to other sites in the region. Thus we find, at other sites like the ashmound site of Budihal to the north for example, evidence for extensive axe grinding with no accompanying signs of stone knapping or quarrying (Paddayya 2000-2001: 198).

We would argue that the exchange activities we propose for the Neolithic were likely supported by the kind of ritual mode of production that is characteristic of many small-scale societies (Spielmann 2002). Production of many items employed in ritual and exchange likely focused on settlement sites (many of which were probably relatively small) and the rainy season, when people were more settled. Goods were produced not for wealth accumulation, but specifically for exchange. Technological processes of manufacture of particularly valuable items were likely surrounded by ritual beliefs, and may in some cases have been carried out by semi-specialists. At Hiregudda, for example, there are interesting signs that symbolic beliefs had a role to play in axe production during the Neolithic (Brumm et al. 2006). It is also worth pointing out that goods exchanged need not have been finished goods, as observed by Spielmann (2002). She remarks that in pre-industrial societies, "[S]ocially valued goods are often not "finished" products, but, instead, evolve over time. Initially, they may be exchanged as valuables – but in unfinished form" (ibid.: 201). Thus we find that in Neolithic Europe and modern-day Melanesia, axes and arm shells were often roughed out by initial producers and polished by recipients (ibid.). It may be that the axe polishing grooves observed at Budihal were similarly created during the grinding of axe blanks exchanged at the site during large communal gatherings. Such gatherings, in which people undoubtedly sat together and talked, likely served as ideal contexts for carrying out time-consuming processes, and may have endowed the resultant objects with added value.

Even if many of the ideas discussed here remain to be tested further against the archaeological record, there are nonetheless some interesting indications that the Southern Neolithic featured communal ritual events at which groups gathered for feasting and exchange. The question remains, however, as to why such gatherings, rituals and exchange activities would have taken place. We would argue that aside from reproducing Neolithic belief systems, and providing people with a context in which to acquire both essential and socially-valued goods, such events also served to create ties of marriage and reciprocity that may have been important during times of resource stress. Analyses of environmental indicators for the Neolithic period in south India indicate increasing aridity (Fuller and Korisettar 2004; Asouti and Fuller 2007), and any instability in the climatic regime may have led to lean years that could be buffered through support from other groups in the region. Interestingly, pollen

evidence from Rajasthani lakebeds and the Arabian Sea also indicate that the period between 2300 and 1900 BC was a particularly unstable one from a climatic perspective (Figure 7), with droughts probably occurring more frequently and lasting longer periods. This coincides with a major period of settling down in the Southern Neolithic, and while increased sedentism may have played an essential role in generating more reliable food sources through agricultural production, it may also paradoxically have made groups more susceptible to famine in the event of abrupt climatic deterioration. It may be that regional exchange networks helped to protect Neolithic groups against the vagaries of climate change that are evidenced at the end of the third millennium BC. Communal rituals like those attested at certain ashmound encampment sites would have celebrated and reinforced those important linkages, and the resulting ashmounds may even have been recognised as monuments that commemorated and materialised them (Boivin 2004a; Boivin et al. 2002; Johansen 2004).

The transition to elite ritual and political economy

In south India, there is no Bronze Age; rather, Neolithic societies with rare copper goods are followed directly by Iron Age societies. These Iron Age groups possessed new types of material culture, including a new black and red ware pottery, as well as novel patterns of burial featuring the use of large stones. These megalithic burials, along with the new ceramic ware and use of iron have often been taken to indicate the arrival of a new population in the south. Leshnik (1974), for example, suggested that the megaliths were the creation of an immigrant pastoral population from the north that gradually eclipsed the existing Neolithic peoples, while Parpola argued for an iron-wielding Indo-Aryan elite ("adstratum") (Parpola 1994: 172). Nonetheless, it is becoming increasingly clear that the Iron Age was not an introduction by invading peoples, but a development from within the regional Neolithic (Kennedy 2000: 354; Korisettar et al. 2001a: 183; Mohanty & Selvakumar 2002). Allchin and Allchin (1982: 342) suggested internal social changes represented by the Megalithic culture occurred within the context of a widening network of intercultural contact and influences. Our own findings at Sanganakallu-Kupgal, where the late Neolithic/early Iron Age transition is well attested, support the model of regional continuity (which might be linked to Dravidian linguistic continuity: Fuller 2003a). We see, for example, the gradual development of ceramic fabrics, types and styles, leading to the emergence of a new ceramic repertoire in the Iron Age. There is no evidence for any abrupt replacement of one group by another.

By what mechanism then does early Iron Age (or Megalithic, as it is also known) society emerge? While the processes leading to increased complexity are inevitably complex and multifactorial, it seems likely that the emergence of Megalithic societies had much to do with the external contacts and complexity engendered by the ongoing expansion of Neolithic exchange networks. There are clear signs of such expansion, particularly, as our recent research indicates, in the archaeobotanical record (Fuller 2003b; Fuller et al 2004). Thus around 1900-1800 BC, we see the introduction of wheat and barley at Southern Neolithic sites, along with new vessel forms, indicating a culinary change that appears to be derived from outside influences (Fuller 2005). After 1800 BC we find the first metals in the archaeological record: copper, probably traded in from the Deccan Chalcolithic societies to the north, and gold, which was likely mined locally. Somewhat later, around 1600-1500 BC, the first African crops

were introduced into south India. Beginning around 1400 BC, we also find the first evidence for sandalwood (probably coming from Indonesia), mango and citrus (both from the northeast part of the subcontinent) (Asouti and Fuller 2007). Similarly dated deposits also yield Bengal madder (*Rubia cordifolia*), a plant used for dying that must have been brought in from the nearby Sandur Hills (at the closest), and that together with an increase in the number of spindle whorls, indicates new textile technologies. The presence of cotton on some Southern Neolithic sites (directly dated at Hallur at 900 BC) suggests further elaboration of such technology.

While all of these introduced items have much to tell us about changes within Southern Neolithic society – including changes in cuisine, personal adornment and ritual practice that likely relate to transformations in patterns of social identity and differentiation – they also, equally importantly, document an ever-expanding sphere of outside influence that gradually drew Southern Neolithic society into a world system. Indeed, we would argue that it is possible in late Southern Neolithic deposits to trace the origins of what would eventually become a pan-Indian Ocean trade network. It is particularly important to note the introduction of new maritime technologies during the second millennium BC. This must be seen in a broader Indian Ocean context. In which sailing canoes had developed amongst Proto-Malayo-Polynesians, perhaps in the Phillippines by 2000 BC (Bellwood 1997: 242) and subsequently developed into reversible single outrigger boats which propelled the Austronesian colonization of Indonesia, Melanesia, the Pacific and, much later, Madagascar. Such outrigger boats are known from South India and may derive from early Austronesian contacts (see Mahdi 1999). The significance of new seafaring technology for expanding scales of contact is indicated in the Pacific by finds of Talasea obsidian (from New Britain east of New Guinea) as far west as Borneo and as far east as Fiji in the late second millennium BC (Bellwood 1997: 224). While Pleistocene maritime technology had enabled the colonisation by modern humans of Australia by some 40,000 or more years previous, this new Holocene seafaring technology enabled much more regular contact and exchange between maritime localities. While Neolithic groups on the south Deccan plateau are very unlikely to have had direct contact with such localities, they clearly had increased interaction with groups that did. While most scholars agree that Indian Ocean trade was underway in the earlier part of the first millennium BC (e.g. Gupta 2002; Conningham 2002; Ray 2003), evidence from the late Southern Neolithic suggests that the precursors of regular trade must be sought in long-range Indian Ocean contact already established by the mid and earlier second millennium BC.

Other evidence for the expansion and intensification of exchange networks in the later Neolithic has also emerged during the course of our recent research. Most notable perhaps is the evidence for remarkable intensification and specialisation of dolerite axe production activities at the site of Hiregudda (Boivin et al. 2005; Brumm et al forthcoming). Late occupation deposits in Area A at Hiregudda (Figure 8), which date to c. 1400-1200 BC and hence the late Neolithic/Megalithic transition, indicate a marked transition from regular habitation with accompanying axe production activities to a situation in which axe production appears to have been the primary focus of activity at the site. Not only did axe production intensify, as indicated by the high densities of dolerite flakes in deposits dating to the final occupation of the site (Figure 9), but it also appears to have been accomplished by more technically demanding methods. The more technically difficult stone reduction strategies that are

common in later deposits would have demanded not only more competent and perhaps specialised knapping, but also more intensive quarrying to acquire larger dolerite blocks (Brumm et al. forthcoming). Quarrying and lithic reduction activities were also spatially segregated, with roughed out axe blanks being moved from quarries many hundreds of meters away to stone knapping areas where finer flakes were removed to create axes ready for grinding and polishing.

This evidence for more intensive and specialised axe production supports the notion that southern Deccan agricultural populations were engaging in more intensive trade activity at the end of the Neolithic period. While the hypothesis remains to be confirmed through geological sourcing studies of regional axes, it seems very likely that Hiregudda axes were created in large part for the purposes of exchange. Preliminary ceramic data also seem to support this hypothesis, with the first wheel finished forms, with somewhat more elaborate rims, occurring at this period. These are the precursors of the later polished black and red ware vessels of the Iron Age. In general, there appears to be a reduction in the diversity of ceramic fabrics, comparing the Neolithic (Phases II & III) with Phase IV and the Iron Age, suggesting a more restricted set of specialist potters.

Intensive exchange activities likely resulted not only in increased specialisation of craft production during the course of the Neolithic, but also the potential for increasing social differentiation and wealth accumulation. While the paucity of grave goods in Neolithic burials indicates an essentially egalitarian society, the fact that some individuals were buried on settlement sites and others were not does potentially indicate a degree of social differentiation. In addition, evidence for the use of beads and textiles may have been linked to the marking and increasing accentuation of social difference.

Eventually, it seems likely, a critical point was reached when Neolithic belief systems and social structure could no longer cope with the changes brought about by contact with the wider world and the internal processes of social and economic change that increasing complexity gradually brought about. This critical point seems to have been reached around the time that iron technology was introduced (or developed independently) in the south. At this time, many hilltop settlement sites are abandoned, indicating a dramatic alteration in the settlement pattern. It seems likely that agricultural production also intensified, drawing populations into dispersed homesteads on the plain below, where crops and groves could be more effectively managed. It may also be that groups finally felt secure enough to give up their naturally fortified positions on the rocky hilltops. The new megalithic grave burials, with their abundant grave goods and focus on single individuals, clearly indicate the emergence of a new elite component to society. The communal rituals of the ashmounds, where the presence of at least one child burial indicates their inclusive nature, are replaced by new megalithic rituals that are likely much more circumscribed, and presided over by ritual specialists. The new elites these represent probably indicate the emergence of small fiefdoms, and the beginnings of competitive display and more organised warfare, the latter attested by the predominance of iron weapons as grave goods. Populations likely traded a loss of independence for increased security in a world that was far less parochial but also increasingly hierarchical.

Conclusions

What we see in the south Deccan plateau then is a very complex situation in which it is impossible to attribute the emergence of Neolithic and subsequent Iron Age societies to either purely internal or purely external factors. Instead, for a very long period, the region has witnessed the interplay between the two. Evidence from archaeobotany indicates that some crops were likely locally domesticated on the south Deccan plateau prior to the arrival of winter crops from the north. Archaeozoological findings, on the other hand, indicate the introduction of southwest Asian domesticated animals from the north rather than their local domestication. The place of cattle in this scheme remains uncertain, as does the timing of the earliest processes of species domestication and introduction. More research, and particularly systematic excavations and environmental analyses, are needed.

The processes involved in the gradual transformation of Neolithic communities into early Iron Age societies are somewhat more accessible, especially after recent excavations at Sanganakallu-Kupgal. The period witnessed an intensification of exchange and production activities, as well as the gradual emergence of part-time craft specialists. As exchange networks expanded, the south Deccan plateau was gradually drawn into a world system, in which trade along the Indian Ocean rim became increasingly regular and important. Such changes encouraged a shift from the egalitarian societies of the Neolithic, with their communal rituals and ritual mode of production, to the much more hierarchical societies of the Iron Age, which featured an emphasis on elite ritual, specialised production and systematic warfare.

While this story appears to us the most convincing one based on present evidence, many of its specifics remain to be confirmed through further research. The prehistoric remains of south India constitute an essential resource for understanding the origins of the Iron Age societies that gradually emerge in the region, and which early textual evidence eventually place firmly in the light of history. Unfortunately, however, many of these important remains are currently threatened by development projects (see also Paddayya 1996), and in particular industrial-scale quarrying of the granite hills on which many Neolithic sites concentrate. While such development is obviously of substantial economic importance, the significance of the associated cultural heritage demands more integrated cooperation between archaeological institutions and developers in India so more of it is studied and recorded prior to destruction.

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Captions

Figure 1. Map of the cluster of hills under investigation as part of the Sanganakallu-Kupgal Project. Some of the major archaeological sites are highlighted. Ashmound sites are represented with circles (filled circle indicates extant ashmound; empty circle destroyed ashmound; and half filled circle a partially destroyed mound).

Figure 2. Map of selected wild crop progenitors in India in relation to the hypothetical south Indian centre of plant domestication and the Southern Neolithic. Indicated is the savannah-scrub vegetation zone where wild horsegram can be expected to have been more widely distributed in the past. The wild millets would have ranged from this zone into the moister woodlands with the wild *Vigna* pulses. Wild pulse distributions from Fuller and Harvey (2006), with additional reference to Tomooka et al. (2003).

Figure 3. An example of a rock-bruising on dolerite depicting a bull at Hiregudda (Kupgal Hill). The theme of the bull dominates rock art associated with Southern Neolithic sites. (Photograph by J. A. Soldevilla).

Figure 4. A tracing of a dolerite rock bruising from Hiregudda (Kupgal Hill). The interlocking bull motif may indicate a herd of cattle, or may make more symbolic reference, perhaps to the coming together of neighbouring clans during communal rituals such as those potentially carried out at the group of 3 large ashmounds on the plain immediately below the site. (Tracing by D. Robinson).

Figure 5. A drawing of the main stratigraphic sequence on Sanarachamma Hill, showing the lower ash deposits of a buried ashmound, sealed beneath later Neolithic settlement layers. Dates indicated from calibrated AMS-radiocarbon data (Fuller et al., in press).

Figure 6. Examples of dolerite stone axes produced at the site of Hiregudda during the Neolithic period. (Drawings by Adam Brumm).

Figure 7. A summary of Holocene palaeoclimatic patterns, indicating major dry periods correlated across datasets in grey and the prolonged dry-spell at the end of the third millennium indicated in diagonal hatching. Data sets have been correlated based on recalibration of radiocarbon data (after Madella and Fuller 2006). From top: the global pattern represented by methane levels in the Greenland ice core (Blunier et al 1995); patterns in monsoonal rainfall in the western Himalayas inferred from oxygen isotopes in foraminera from the sea bed in the north Arabian sea south of the Karachi Delta (from Staubwasser 2002 & 2003); lake level data from Lunkaransar Lake, Rajasthan (from Enzel et al. 1999); lake level data from Didwana (from Singh et al. 1990). These are compared to the Southern Neolithic chronological phases and the occupation span of Sannarachamma Hill and Hiregudda Area A

Figure 8. A plan of Hiregudda Area A, indicating stone features of Neolithic occupation, 1700-1500/1400 BC, and placement of an ashmound (destroyed since

1998 by quarrying). This area was a focus on intensive ‘industrial’ scale axe dolerite manufacture, ca. 1400-1200 BC. (Plan by Paul Masser).

Figure 9. Stratigraphic section through Feature 1 of Hiregudda Area A, illustrating the high concentration of dolerite flakes and debitage from axe manufacturing.