Signs of Life: Engraved Stone Artefacts from Neolithic South India

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While exceedingly rare on any given archaeological site, engraved stone artefacts have nonetheless been reported from sites covering a range of periods and regions across the world. Attempts to interpret such engravings have often focused on potential representational or communicative functions, including their role in notational systems, symbolic depiction, and the development of early forms of writing. Contextual and microscopic investigation of a number of engraved artefacts discovered in a large assemblage of dolerite artefacts excavated from a Neolithic hilltop habitation and stone-tool production site in south India suggests that an alternative interpretation of engraved stone artefacts is possible, however. Drawing on ethnographic evidence concerning the perception of stone, and particularly natural markings on stone, the article argues that the stone pieces on which the marks were engraved were more than just passive surfaces for the creation of unrelated signs. Instead, engravings appear to draw on natural features within and upon the surface of the dolerite, and to suggest an appreciation for the patterns of nature, as well as a lack of distinction between anthropogenic and natural markings. It is argued that the engravings may have been a response to a perceived 'life-force' within the dolerite. The fact that they were produced and then broken apart by knapping suggests that they may have been made to accentuate or attenuate a power that was perceived as either somehow beneficial or in need of careful control.

> We are dealing here with worlds where everything is meaningful, where anything may constitute a sign, or is liable to say something, on the state of the relationships between humans, and again between them and surrounding 'others' within a sentient landscape. The form of a cloud, the song of a bird, the direction of the wind, the lines on a stone, a tickling sensation on one's body, or a dream are capable of saying something to whoever is willing to decipher it within a framework of cultural idioms … (Poirier 2003, 121)

In south India, during the technological analysis of an assemblage of Neolithic stone artefacts from the Sanganakallu-Kupgal complex of sites in mid-eastern Karnataka, a number of unusual specimens were encountered. These artefacts were all apparent by-products of stone knapping, and consisted of dolerite flake and non-flake debitage, a biface and a fractured cobble that were unremarkable in all regards except that each of them bore a series of engraved lines or grooves on their remnant cortical surfaces. The engraved lines appeared in parallel vertical and horizontal series that on some specimens produced a sort of grid-like or cross-hatching effect. Comparison to naturally occurring dolerite cortical surfaces and examination under high-powered magnification indicated that the lines were artificial, and likely produced by a sharp-edged stone flake. At first, as only one or two in an assemblage of thousands of artefacts, the pieces appeared as mere oddities. However, as more of them appeared, they began to demand attention. While never more than rare occurrences — only 24 engraved specimens were found in an assemblage

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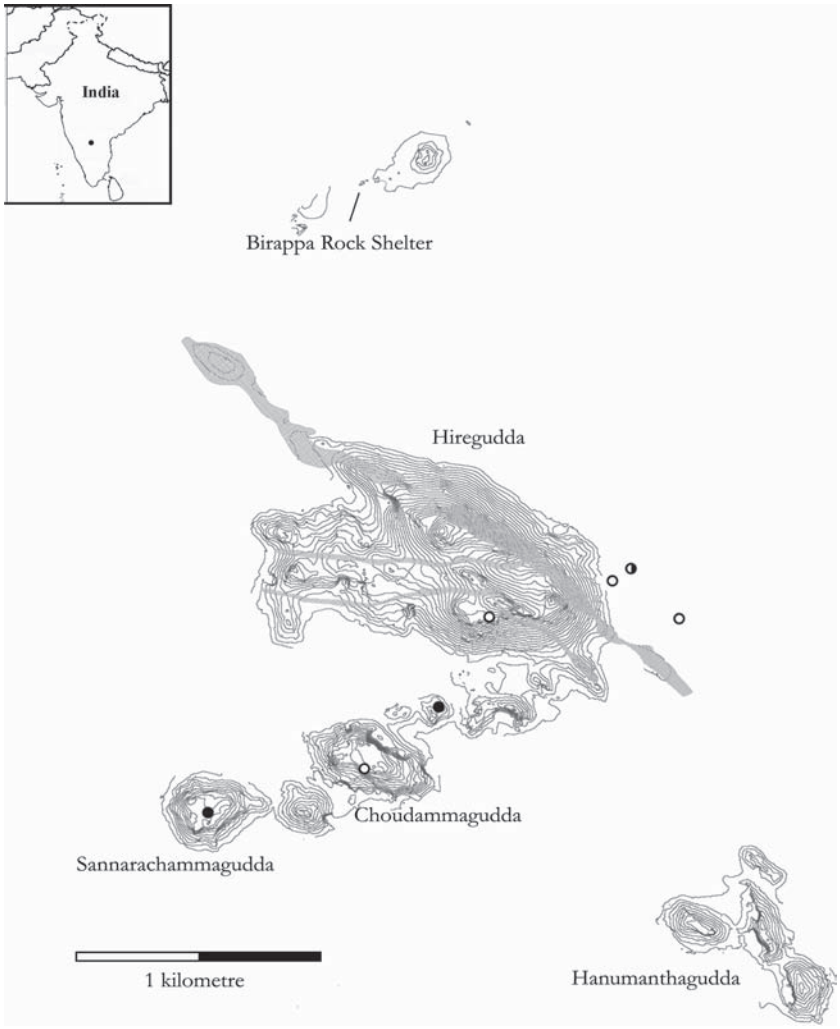

Figure 1. *Map of the Sanganakallu-Kupgal study area showing the location of Hiregudda, or Kupgal, Hill.*

that exceeded well over 100,000 analyzed artefacts, and some 500,000 additional sorted artefacts — they nonetheless formed a clear pattern that could not be ignored. The question was, though, how to interpret them? They had not been reported from any other south Indian Neolithic site, and served no obvious practical purpose.

Given the rarity and enigmatic nature of the engraved stone artefacts, a predictable response might have been to bury them as a brief note in the lithic-analysis section of the Sanganakallu-Kupgal Project's planned site monograph. However, other occasional archaeological examples of engraved and sometimes subsequently flaked stone artefacts in South and Southwest Asia and beyond indicated that we were dealing with more than an obscure and one-off archaeological phenomenon. In addition, ethnographic accounts of the perception and use of stone in non-industrial societies (addressed, for example, in Boivin 2004a; Brumm 2004; Taçon 1991), as well as other observations in the area from which the debitage derived, suggested to us that the engravings might well have significance in terms of our understanding of stone-axe production at Sanganakallu-Kupgal during the Neolithic period. We therefore decided to present some of our ideas about what they might mean, and more generally to highlight their existence so as to encourage documentation and publication of similar finds, both in south India and elsewhere.

The context of the engraved artefacts

Sanganakallu-Kupgal refers to a cluster of granite hills that are straddled by the villages of Sanganakallu and Kupgal in the Bellary District of Karnataka, south India (see Fig. 1). The hills and the immediately surrounding plains are home to a significant concentration of archaeological sites that have recently been the focus of detailed archaeological investigation as part of the Sanganakallu-Kupgal Project (see Korisettar *et al.* mss.). This work has led to renewed study of a hill first identified by Robert Bruce Foote as an axe production site in the late 1800s (Foote 1887), but largely overlooked by subsequent researchers. The hill is known locally as Hiregudda ('Big Hill'), but is commonly referred to in the archaeological literature as Kupgal or Peacock Hill (see also Boivin 2004b; Figs. 2–3). Investigations by the Sanganakallu-Kupgal Project led to the discovery of various lithic production-related localities, including an axe-manufacturing area on a medium-sized plateau in the southeast part of the large and topographically complex hill (Korisettar *et al.* mss.). This noteworthy locality has been labelled Area A according to the area designation system employed by the Sanganakallu-Kupgal Project. Area A features a particularly heavy surface scatter of dolerite bifacial axe manufacturing debris, including axe blanks and axes. It has been extensively modified by recent commercial granite

quarrying and sediment extraction activities, which have destroyed part of the area and exposed strata bearing thick deposits of similarly flaked dolerite material.

Four of the engraved artefacts described in this article come from several small trenches excavated with the aim of learning more about these exposed strata. The 20 remaining specimens, however, come from a circular stone structure (Feature 1; see Figs. 4–5) several metres away that was visible on the surface, and contained a dense surface scatter of flaked dolerite artefacts. The structure was excavated down to bedrock, revealing stratified deposits with a maximum depth of around 60 cm (Fig. 6), and covering a period from approximately 1750 to 1250 BC. Archaeological remains recovered from Feature 1, and extensive grinding features associated with it, suggest that during the final phases of occupation (around 1400–1250 BC) the structure functioned as a lithic-production 'workshop' for the manufacture of bifacial edge-ground stone axes (Brumm *et al.* mss.). All stages of bifacial axe manufacture seem to have occurred within Feature 1, from the initial reduction of unmodified stone blocks and the bifacial thinning and contouring of large bifacial 'rough-outs' transported from nearby dolerite quarries, to the final trimming, pecking and grinding of finished axe blanks. Massive piles of dolerite waste accumulated in a lithic dumping area located a short distance to the south of Feature 1, where a small trench (Trench 1) was also excavated (Fig. 7).

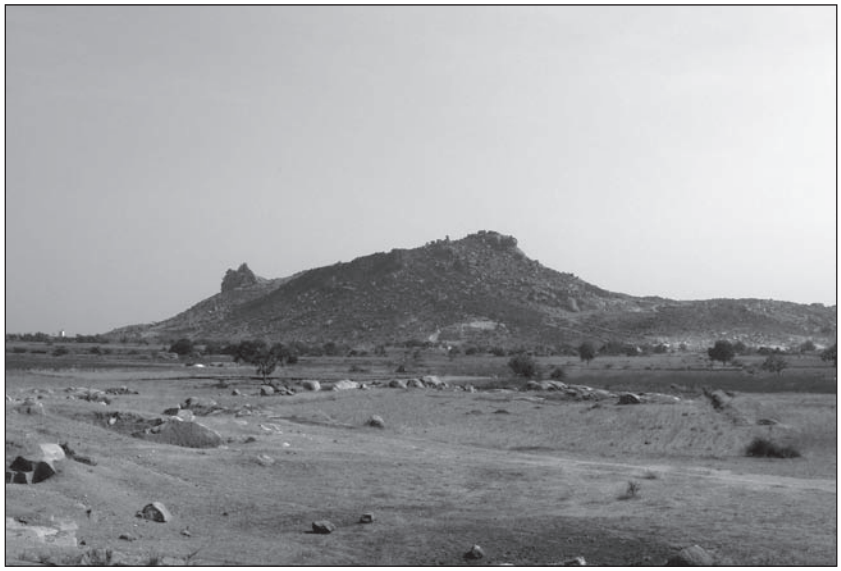

Figure 2. *Hiregudda, as viewed from the east.*

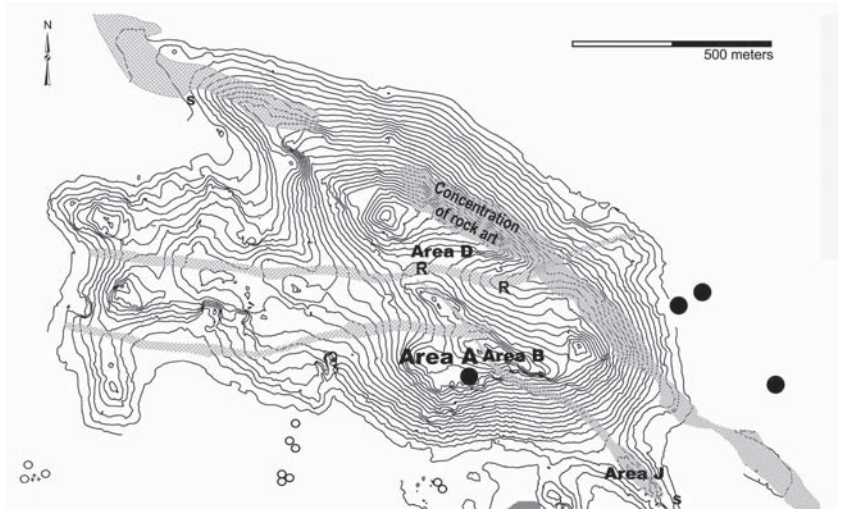

Figure 3. *Map of Hiregudda, showing the location of various key archaeological areas. Area A contains the richest archaeological deposits, and appears to have been a major focus for the production of edge-ground axes. Dolerite for production of the axes was procured from local quarries, such as those found in Areas B and J. Shaded areas denote dolerite trap dykes.*

The engraved stone specimens discussed in this article (see Figs. 8–13) come from three different excavated localities in Area A: 1) stratified deposits within Feature 1; 2) stratified deposits in the lithic dumping area (Trench 1) adjacent to Feature 1; and 3) deposits to the southwest of Trench 1 (Trench 6). The latter area consists primarily of artefacts redeposited by slope-wash from the lithic dumping area. Engraved dolerite artefacts were found in both the early and late chronological phases of occupation in Feature 1 (see Tables 1 & 2).

Recent radiocarbon dating evidence (Fuller *et al.* mss.) suggests that Feature 1 was the focus of domestic habitation during the earliest phase of occupation of the structure (*c.* 1750–1500 BC). Relatively thin layers of pale brown-grey ashy silt and compact brown silt lying atop granite bedrock represent the early

Figure 4. *Circular stone structure (Feature 1) in Area A, Hiregudda.*

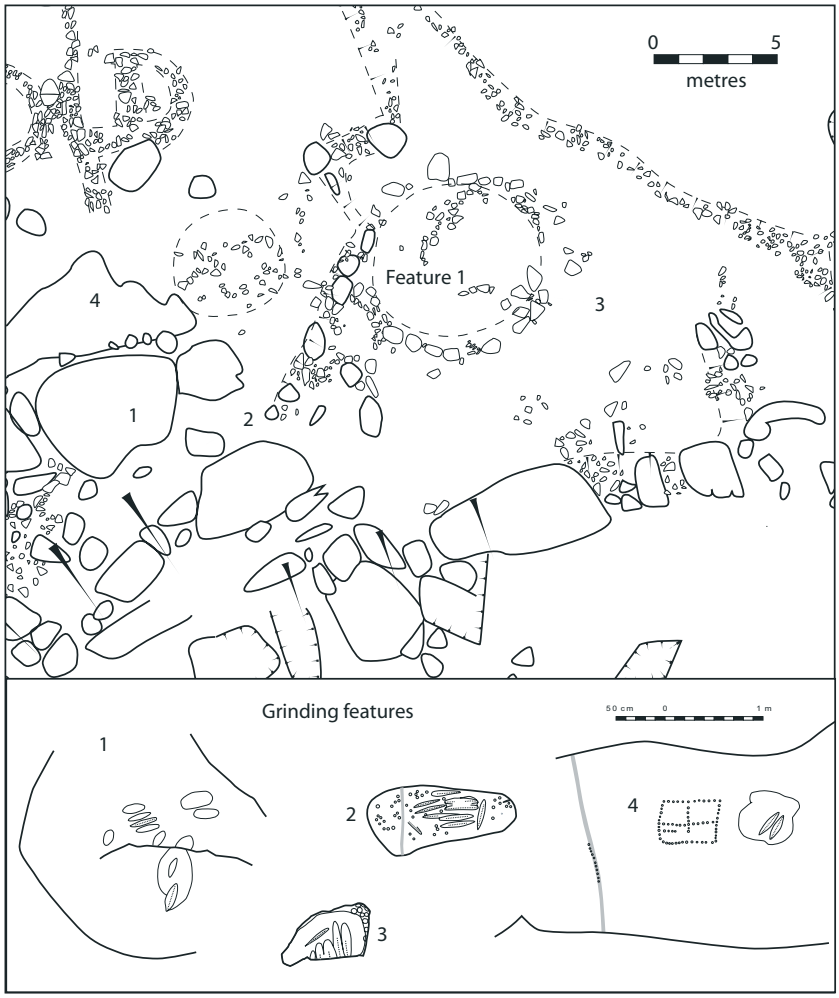

Figure 5. *Plan view showing Feature 1. Also depicted are rock surfaces with axe-grinding grooves (1–4) and cupule-like grinding hollows (2–3), petroglyphs (4) and pecked and ground quartz veins (2, 4; quartz veins are represented by grey shaded lines) associated with axe-grinding grooves.*

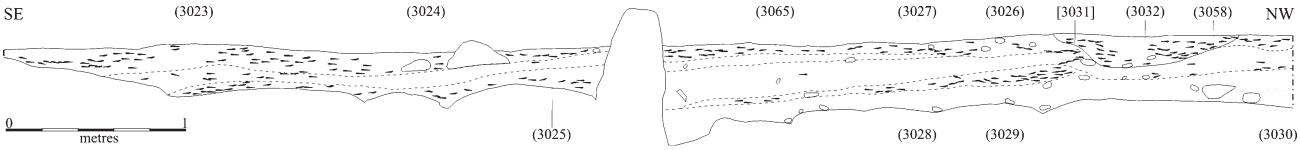

Figure 6. *Section drawing showing stratified occupation deposits within Feature 1. The northwest deposits lie within the circular stone structure, those to the southeast lie outside. Inside the structure, the basal stratigraphic contexts 3029 and 3030 comprised a dark brown clayey silt with a relatively small amount of lithics, and a dark brown compact grussy silt respectively. These layers correspond to the early occupation phase of the structure (*c. *1750 to 1500* BC*). Contexts 3026, 3027, 3028, 3031, 3058 and 3065 comprised of rich clayey silts and pale brown silts. Dolerite axe manufacturing debitage was extremely dense in these upper layers, which correspond to the late phase of the structure (*c. *1400–1250* BC*). Context 3032 consisted of a hollow fill containing very dense dolerite debitage.*

Table 1. *Trenches/features and particular stratigraphic contexts in Area A in which engraved artefacts have been discovered to date.*

Trench/Feature	Contexts in which engraved artefacts were found
Feature 1	3034, 3035, 3038, 3058, 3059, 3060, 3061, 3151, 3153, 3167
Trench 1	3015, 3016
Trench 6	3073, 3078

Table 2. *Radiocarbon ages (from wood charcoal) and preliminary chronological phasing for Feature 1 contexts in which engraved artefacts have been discovered. Radiocarbon dates are after Fuller* et al. *(mss.).*

Feature 1 contexts in which engraved artefacts were found	Contexts with radiocarbon ages	Chronology	Phase
3034, 3035, 3038, 3058, 3059, 3060, 3061	3034 (3042±30)	*c.* 1400–1250 BC	late phase (Neolithic to Megalithic transition)
3151, 3153, 3167	3151 (3314±30)	*c.* 1750–1500 BC	early phase (Late Neolithic)

occupation phase (Fig. 6). Artefact densities are comparatively low in these bottom layers, suggesting the floor of the dwelling may have been kept clean of refuse during this occupation phase. Dolerite stone axes were manufactured inside Feature 1 during this early phase, but on a much less intensive scale than in succeeding layers.

The early habitation phase of the structure probably terminated at around 1500 BC, when permanent Neolithic settlement at Hiregudda may have been discontinued. Feature 1 was reoccupied at around 1400 BC, at which point it became the focus of intensive stone axe production. Considerably thicker stratified layers of rich clayey silt and pale brown silt admixed with dense lithic deposits represent the late occupation phase. Very substantial quantities of dolerite debitage and other refuse (i.e. potsherds and animal-bone fragments) accumulated in the floor of the dwelling during this phase, with most of the lithic debris accruing in the northwest quadrant towards the rear of the structure. The degree of patination on most lithics and the weathered state of some recovered bone fragments suggests that artefacts probably lay exposed on the ground surface for extended periods during the late occupation phase. This could

Figure 7. *Thickly stratified lithic deposits exposed by excavations in Area A, Hiregudda.*

Figure 8. *Engraved dolerite weathering spall. Scale bar is in 10-mm increments. (Photo: M. Moore.)*

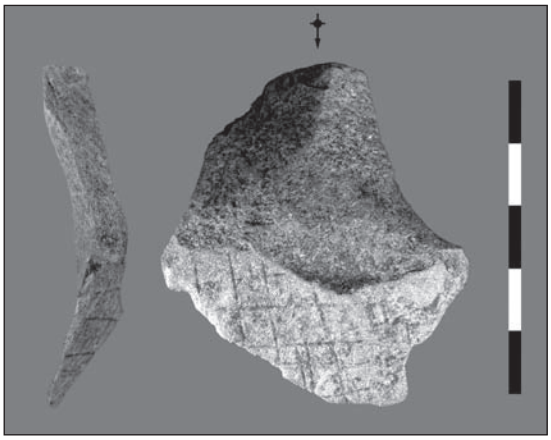

Figure 9. *Dolerite biface thinning flake engraved with grid-like pattern. Scale bar is in 10-mm increments. (Photo M. Moore.)*

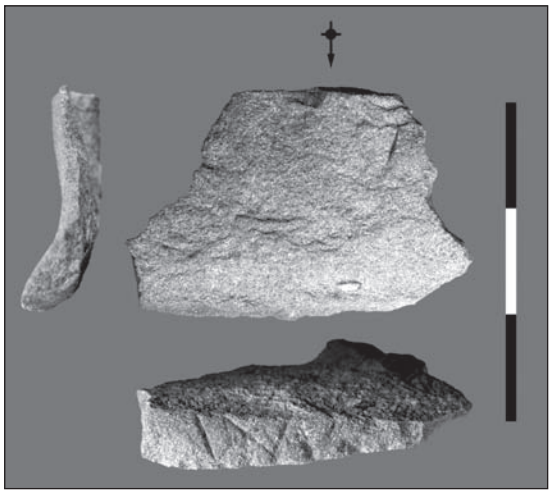

Figure 10. *Engraved dolerite flake. Scale bar is in 10-mm increments. (Photo M. Moore.)*

Figure 11. *Bifacially reduced tabular dolerite cobble, marked with a carefully pecked grid-like pattern on one side. Scale bar is in 10-mm increments. (Photo M. Moore.)*

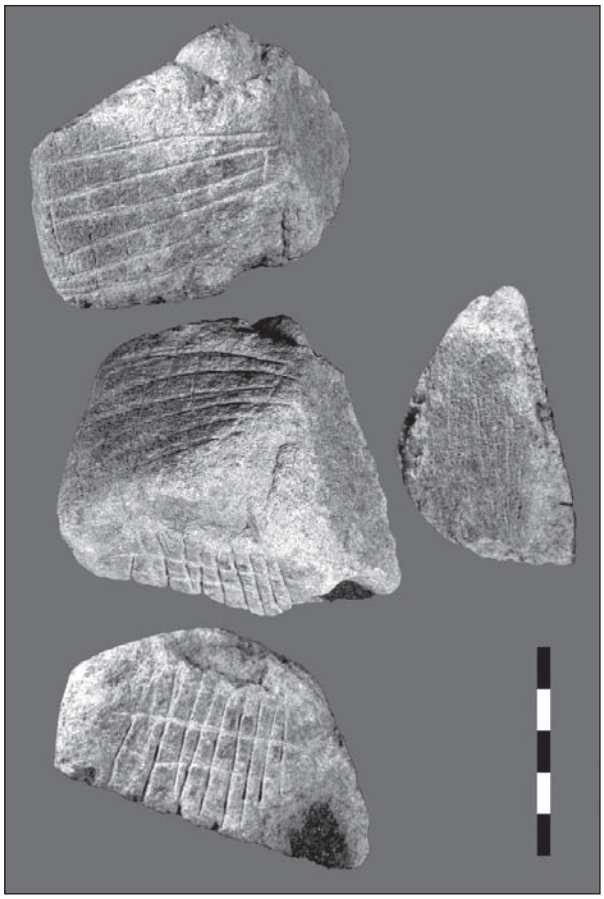

Figure 12. *Fractured dolerite cobble engraved with complex grid-like patterns on three adjoining sides. Scale bar is in 10-mm increments. (Photo M. Moore.)*

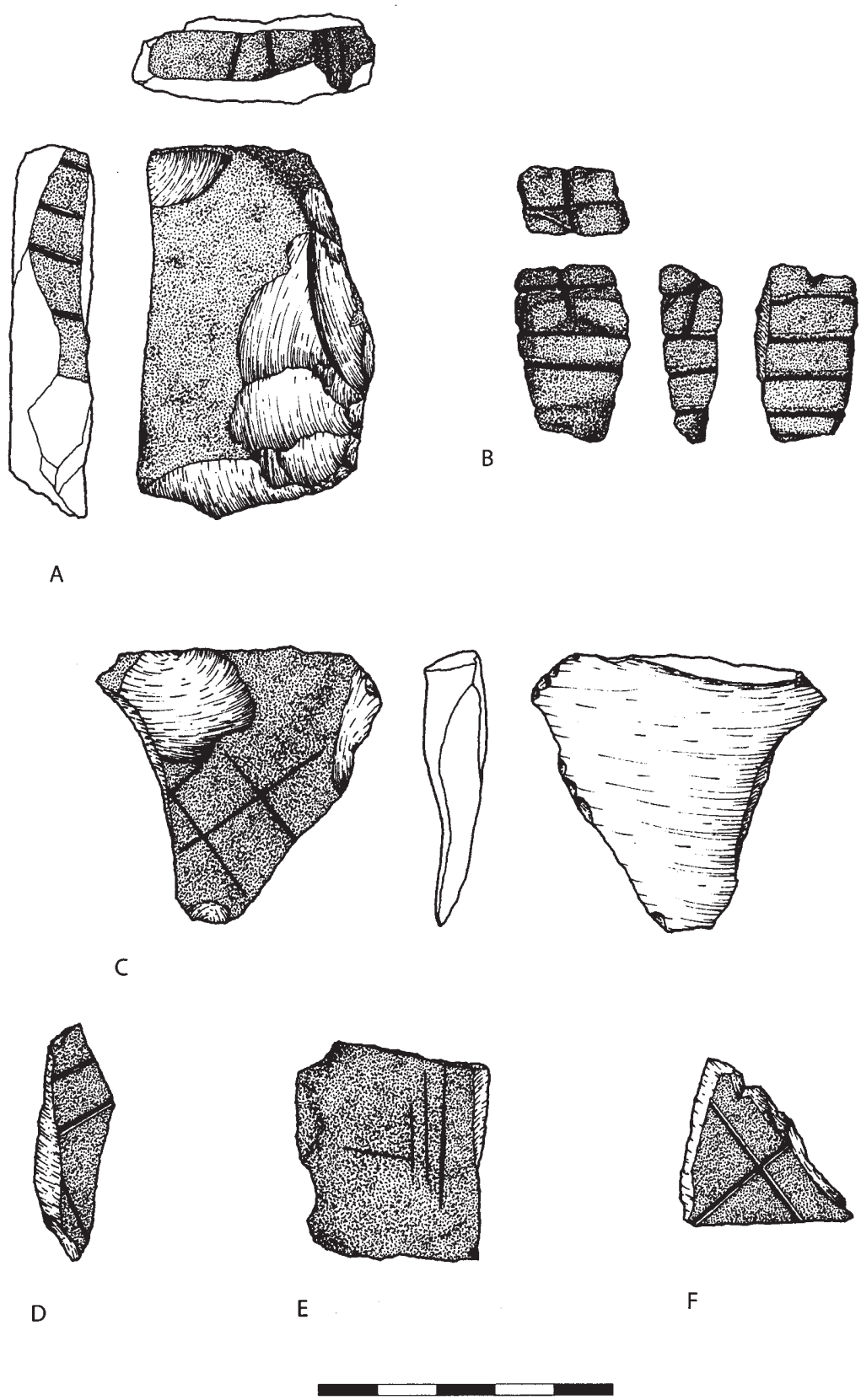

Figure 13. *A–F: Various engraved dolerite debitage pieces recovered from excavations at Area A. Scale bar is in 10-mm increments.*

Figure 14. *Photomicrograph of engraved lines on the fractured dolerite cobble (see Fig. 12). Width of field: 20 mm.*

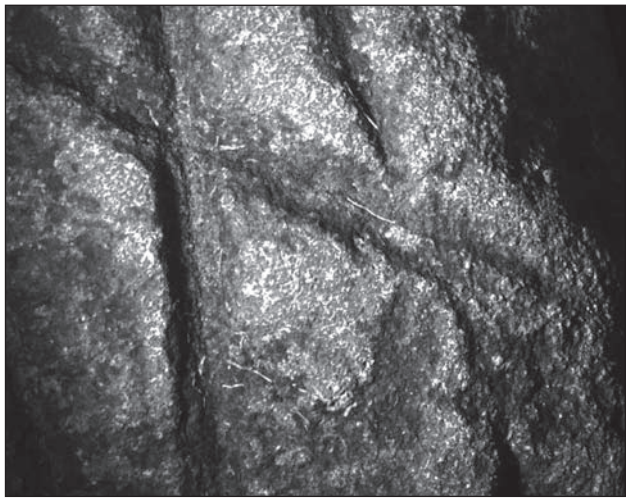

Figure 15. *Photomicrograph of engraved lines on the dolerite weathering spall (see Fig. 8). Width of field: 20 mm.*

imply periodic abandonment of the structure.

Engraved dolerite artefacts are found both in the earliest phase of domestic habitation in Feature 1 and during the later 'industrial' phase (see Table 2). They are, however, mostly found in contexts associated with the late axe-production phase. Based on recent chronometric evidence and stratigraphical correlation with nearby sites, this late phase of occupation in Feature 1 and adjacent areas in Area A on Hiregudda has been attributed to the Neolithic–Megalithic **Mesolithic??** transition (Fuller *et al.* mss.).

Further analysis of the extremely large assemblage from Area A will likely yield additional discoveries of engraved artefacts, as may analysis of lithic assemblages from other areas excavated by the Sanganakallu-Kupgal Project (reports of two surface finds of similar engraved dolerite artefacts in Area A and within the vicinity of Hiregudda have already come to light since work began on this manuscript). So far our work has sampled only a very small proportion of visible archaeological localities. What is clear from analyses carried out to date, however, is that these artefacts concentrate within Area A, and particularly within Feature 1. They also cover a significant time period (at least several hundred years), and are not the product of a limited number of events. This is indicated not just by their persistence through multiple phases of activity at the site, but also by the fact that none of the engraved artefacts discovered so far could be refitted, or appear to derive from common parent cores.

The engraved dolerite artefacts

Preliminary microscopic analysis conducted on the engraved artefacts confirmed our initial interpretation (based on examination with a hand-lens) that all of the pieces under question had been purposely engraved. Each artefact was examined under a stereo-zoom microscope (Zeiss Stemi) with an oblique external light source, at magnifications up to ×60. Surfaces were further examined under a metallographic microscope (Ziess Axio 100 and Olympus BX60) with vertical incident illumination (brightfield and darkfield) and polarizing filters, at various magnifications: ×50, ×100, ×200, ×500 and ×1000.

Under magnification, parallel alignments and overlaps of smoothing, linear striations and in some cases even gouges can be clearly observed in many of the grooves. These striations are consistent with the production of the grooves by a tool-edge (see Alvarez *et al.* 2001; Fritz 1999), probably sharp-edged flakes of dolerite used in repeated cutting strokes. The engraved grooves featured both angular to sharp 'V'- and concave 'U'-shaped cross-sections that may have been produced by tool-edges with different degrees of wear and slightly different shapes (Figs. 14 & 15). The absence of smoothing and linear striations inside some of the grooves helped us to distinguish between anthropogenic markings in the dolerite and other groove-like features formed by cracking and natural weathering processes (see below). In the case of one artefact, a bifacially reduced tabular cobble (see Fig. 11), however, impact marks and the absence of incised grooves with linear striations suggested that the markings were made using a different technique, probably

involving careful pecking.

Importantly, microscopic analysis of the engraved objects confirmed that the soft cortical surfaces of all of the incomplete pieces had been engraved *prior* to their reduction by knapping. In the laboratory, the criteria used to assess whether or not the engraved pieces were marked prior to their reduction was similar to those used in the analysis of flake scar overlap on flaked implements. For example, high-powered magnification revealed that flake scars and/or flake initiations or terminations had cleanly truncated many of the engraved grooves. This observation was consistent with engraving before reduction. It was also clear that where an engraved groove extended to the very edge of a flake or fragment, the engraving marks did not continue around onto the ventral surface of the artefact. This is what one would expect if the pieces of debitage had been engraved after, rather than prior to, reduction.

Table 3 lists the range of technological categories represented by the 24 engraved stone artefacts. While one of the artefacts consists of a weathering spall produced through natural processes, the rest of the pieces bear unambiguous evidence of production by direct freehand percussion. Despite the relative coarseness and patination of the dolerite material, a range of diagnostic features of percussive stone flaking, such as striking platforms, dorsal and ventral surfaces, bulbs of force, dorsal scarring, and 'lipped' platforms resulting from bending-initiated fractures (see Andrefsky 1998; Cotterell & Kamminga 1987) are readily identifiable on most of the debitage pieces. Significantly, one of the flakes consists of a biface thinning flake produced when knapping a biface (Fig. 9), another a redirecting flake produced when the platform surface of a core becomes re-oriented by a percussion blow (Fig. 13a), and another a probable 'contact removal flake' (a flake removed from a flake blank core, preserving the former point of impact on the flake). These three artefacts, and the degree of technological variability represented by the others, suggest that the engraved pieces were produced during complex core reduction strategies, especially bifacial axe manufacture (see Brumm *et al.* mss.).

The engravings were all non-figurative in nature. They consisted mostly of carefully executed sets of parallel and sub-parallel horizontal and vertical (in some cases diagonal) lines, sometimes converging to form grid- or lattice-like patterns. Very little morphological variability can be observed in the imagery. It seems that more or less the same pattern was depicted on all of the stones. While at least two of the engraved objects seem to have been used as tools for grinding other stones or hard surfaces (see below), none of the markings appear to have any conceivable utilitarian function. In their microscopic features and morphology, the grooves and lines are consistent with the types of markings produced during rock-art engraving (see Alvarez *et al.* 2001).

Other archaeological reports of engraved stones

As we have already suggested, the engraved dolerite artefacts from Hiregudda are not entirely unique. Indeed, part of the reason the artefacts deserve further consideration is that they are representative of a wider phenomenon. While we are unaware of any other reports of engraved stones in south India, such finds have been made in the northern part of the South Asian subcontinent, in Southwest Asia, and beyond. Though never very common in most areas, they date to a wide range of periods, from the Palaeolithic through to the historic era, and occur on both modified and unmodified stones **Aren't all stones they occur on modified by definition?- ed.**. Archaeological examples of engraved stones from a range of different time periods and geographical locations in Southwest Asia are summarized in Table 4. We limit the following discussion to those examples that are of direct relevance to the south Indian study area and the nature of the engraved stone assemblage. Examples discussed in the paper are not summarised in Table 4.

Only a few examples of engraved stone artefacts have previously been reported for South Asia. Kenoyer notes the recovery of an oval pebble engraved with markings (interpreted to represent eyes, nose and a mouth) from the Upper Palaeolithic cave site of Gar-I-Asp in northern Afghanistan (Kenoyer 1993, 239). This object has been dated to between 20,000 and 15,000 BC. Sonawane has also noted the discovery of a Mesolithic

Table 3. *Technological categories represented by the engraved dolerite artefacts from Hiregudda.*

Type	Number
Flakes	9
Flake shatter	6
Other non-flake debitage	2
Multiple platform core	1
Other core	1
Biface	1
Split cobble	1
Weathering spall	1
Other	2
Total	**24**

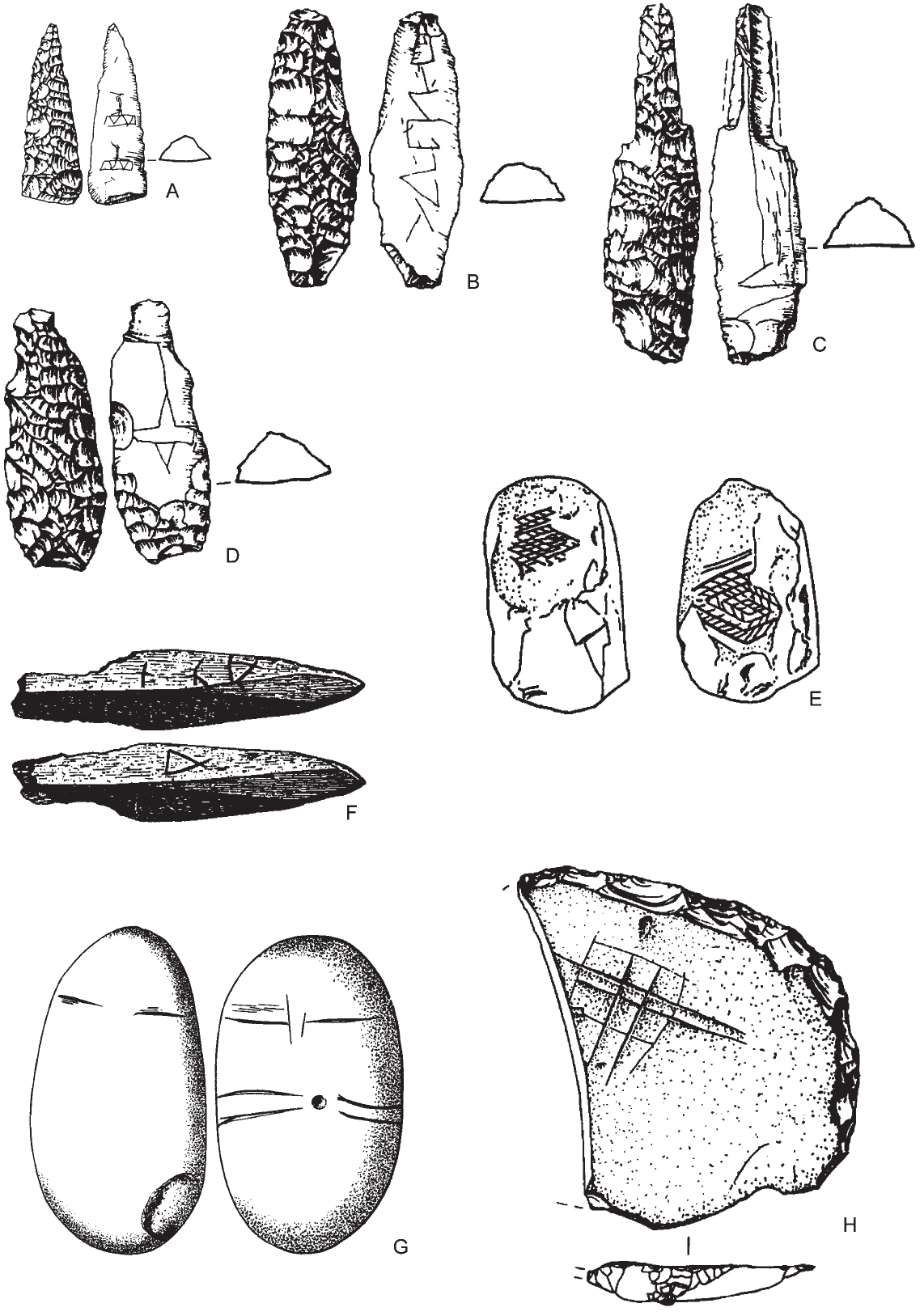
A
B
C
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Figure 16. *(on left) Engraved stones and stone tools from various archaeological contexts: A–D) engraved pressure-flaked obsidian projectile points from Can Hasan III, Neolithic Turkey (after Ataman 1988); E) engraved chert microblade core from Chandravarti in northern India, probably Mesolithic (after Sonawane 1987); F) engraved slate arrow-point from a Neolithic site in Scandinavia (after Goldhahn 2002); G) engraved pebble from the Yarmukian period, Levant (after Gopher & Orrelle 1996); H) engraved 'tabular scraper' from post-Neolithic Levantine region (after Rosen 1997). Drawings are not to scale.*

engraved chert microblade core in northwest India, near the town of Chandravati in Rajasthan (Sonawane 1987; see also Kenoyer 1993, 241; Fig. 16E). The engraved pattern on the core consists of a complex arrangement of cross-hatched geometric forms. After the pattern was engraved on the core, a few microblades were removed from it, destroying part of the imagery (Sonawane 1987, 54). Meanwhile, in Baluchistan, a stone 'spatula' incised with non-figurative geometric imagery has been reported from the earliest settlement layer at Mehrgarh (Jarrige & Lechevallier 1979, 470). In addition, at the Neolithic site of Burzahom in northern India, excavations revealed two flat plaque-like stone slabs, each of which featured engraved figurative and non-figurative imagery (Sant 1991, 163–4, pls. 35 & 36). Several small flat rectangular stone 'harvesters' with perforated holes and incised geometric motifs were also discovered at the Neolithic site of Gufkral, in Kashmir (Sant 1991, pl. 38). According to Sankalia, these objects were probably neck ornaments or pendants (Sankalia 1974, 303).

Important examples of engraved stone artefacts from the Near East archaeological record include some incised limestone and basalt pebbles from the late Neolithic Yarmukian culture in the Southern Levant (Gopher & Orrelle 1996; Fig. 16G; see also Eirikh-Rose 2004 and Stewart & Rupp 2004 for comprehensive lists of engraved stones from throughout prehistoric Southwest Asia and the Mediterranean). The Yarmukian incised pebbles, which date to around the mid-sixth millennium bp, assume a variety of forms. Most consist of elongated or sub-spherical natural pebbles marked with a fairly consistent range of imagery. Incised motifs include horizontal slits, deep linear engravings, parallel linear markings, and grid or net patterns. More complex arrangements of incisions supposedly representing anthropomorphic features are also found on some stones. Interestingly, several of the 39 incised pebbles illustrated by Gopher & Orrelle appear to have been worked as cores; flake scars with radiating compression rings are clearly evident in the drawings (e.g. Gopher & Orrelle's (1996), figs. 1:1, 1:4, 1:5, fig. 3:3 & fig. 5:1). These authors make no mention of this, however, and it is difficult to determine from the illustrated specimens alone whether these pebbles were incised before or after they were possibly flaked.

Engraved lithics have also been reported from more recent archaeological sites in the Levantine region. Rosen provides a brief overview of incised stone tools found at several different sites in the post-Neolithic Levant (Rosen 1997). These objects consist mostly of 'tabular scrapers' with a repetitive corpus of incised imagery (see Fig. 16h). Incised motifs on these artefacts are dominated by sets of horizontal, vertical and diagonal lines, sometimes converging to form grids or other complex abstract patterns. As with the Yarmukian pebbles, some illustrated examples of tabular scrapers seem to indicate that secondary retouch removed portions of the engraved imagery. Rosen, however, suggests that the images were incised on the stone tools after they were manufactured at quarry sites (Rosen 1997, 75).

Various engraved stone examples have been reported from sites beyond South and Southwest Asia, and span a wide range of time periods. In particular, many small 'portable' stones, rocks and pebbles engraved with figurative and non-figurative imagery have been documented at Upper Palaeolithic sites in Europe, as have tens of thousands of engraved stone plaquettes (Bahn & Vertut 1997, 89–92). At some Upper Palaeolithic sites in France (e.g. Labastide and Enléne), a few of these plaquettes bear evidence of percussion, suggesting intentional breakage (Bahn & Vertut 1997, 90).

Moving beyond the Palaeolithic, a number of 'carved stone balls', some featuring incised decorations, have been reported from the Aberdeenshire region of Neolithic Scotland (MacGregor 1999). Also, at the Graig Lwyd axe quarry in North Wales, a roughly oval stone plaque engraved with finely 'scratched' geometric motifs was located (Piggott 1954, 290). Outside prehistoric Europe, some of the earliest examples of engraved stones are the 77,000-year-old pieces of ochre engraved with geometric patterns from Blombos Cave in Southern Africa (Henshilwood *et al.* 2002). Other prominent examples include the ovate engraved pebbles discovered in the rockshelter site of Kamikuroiwa in Japan (Aikens & Higuchi 1982, 106–7). The latter stones were obtained from deposits radiocarbon dated to 12,165 bp, and feature arrangements of parallel, crosshatch and curvilinear lines. In North America, at least 30 plaque-like stones engraved

with complex geometric patterns were recovered from excavations at the 10,900- to 11,200-year-old Palaeoindian Clovis site of Gault in central Texas (Collins & Hester 2001). Of particular interest was a Clovis point found 'sandwiched' between two engraved stone cobbles at Site 41BL323 in southernmost Bell County, central Texas (Collins *et al.* 1991, 13).

As the preceding discussion suggests, only a small portion of reported engraved stones consist of stone tools or knapping by-products. These include the various examples mentioned above, and also perhaps one of the earliest recorded specimens: a stone pressure flaking tool engraved with geometric imagery from an Upper Palaeolithic site in northern Italy (Marshack 1972, 454). Another rare example of an engraved stone tool from Palaeolithic contexts **'Palaeo-Indian' is not normally referred to as 'Palaeolithic' – perhaps 'Pleistocene'? – ed.**. consists of a chert flake engraved with a geometric pattern on the exterior cortex, found at the Palaeoindian Wilson-Leonard Site (41WM235) in central Texas (Collins *et al.* 1991, 15). A soft limestone hammerstone incised with parallel lines was also recovered from Natufian deposits in Hayonim Cave in the Levant (Belfer-Cohen 1991, 576). In general, however, most examples of engraved stone artefacts from around the world seem to date to the Neolithic **'Holocene' is better as 'Neolithic' is not used in much of the world – ed.** period. For instance, incised stones used as bark cloth beaters have been recorded at several Neolithic sites in the Philippines and Indonesia (Sieveking 1956; see also Tolstoy 1991 for Mesoamerican examples). Incised stone tools have also been recovered from the late Neolithic site of Skara Brae in the Orkneys, with one notable example consisting of an elaborately engraved mace head (Malone 2001, 246). At several Neolithic sites in Scandinavia (such as Nämforsen), a number of red slate daggers and other tools engraved with 'zig-zag' and 'diamond'-like patterns have been recorded (Goldhahn 2002, 54-5; Fig. 16f). Ataman has also described a small assemblage of pressure flaked obsidian projectile points incised with figurative and non-figurative imagery, found at the Neolithic site of Can Hasan III, Turkey (Ataman 1986; 1988; Figs. 16a-d). The flat ventral portions of these points had been incised with non-figurative geometric patterns, probably with a sharp implement of chert or flint. Interestingly, microscopic analysis and experimental replication indicated that the incisions were made *before* the points were finished (Ataman 1986, 340).

Engraved stone tools have occasionally been recorded among hunter-forager societies of the Holocene period. For example, in mid to late Holocene contexts in eastern Australia, a stone axe with engraved depictions of a fish and a boomerang has been reported (Bramell 1941, 18; McCarthy 1976, 72). McCarthy also made note of specialised use-polished tools made from slate, found throughout the eastern part of South Australia (McCarthy 1976, 40). A number of these implements bear engraved animal tracks, sets of parallel lines, grid and linear patterns. The enigmatic 'morah' grindstones from the North Queensland rainforest consist of large flat slabs of hornfels slate engraved across the upper surface with deeply incised grooves, some arranged into patterns around the rim. McCarthy refers to them as a specialized milling stone restricted to northeastern Queensland (except for a pecked example from the Simpson Desert) (McCarthy 1976, 56, 64). The slabs of slate are quarried and most are smaller than about one foot (30 cm) long, with a series of parallel transverse (sometimes longitudinal) incisions across a grinding depression. It has been suggested they were used to process poisonous seeds with the grooves serving to drain away toxic secretions (which seems impracticable to McCarthy since grooves run into the middle). 'Morah' stones appear to be distinct in design and function from a range of other incised stones referred to by McCarthy (1976) including engraved stones (pp. 62, 68) message stones (p. 74), 'cylcons' (pp. 62, 75), phallic stones (p. 77), bone-shaping stones (p. 68), and *tjurunga* sacred stones (pp. 65, 76).

In Britain, stone incisions relating to stone-tool production include the markings made on the walls of Neolithic flint mines in Sussex (Thomas 1999; Russell 2000). While not on loose stones, such finds deserve mention here due to their Neolithic date, association with stone tool production and, in particular, close resemblance to the imagery on the dolerite artefacts at Hiregudda. In addition, the marks on the walls of mines at sites like Cissbury and Harrow Hill highlight the possibility that the incisions found on some engraved stones were made prior to their extraction from quarries.

Archaeological interpretations of engraved stones

Some of the engraved stone examples mentioned above carry imagery that is clearly representational, and hence allows the artefacts upon which it is found to fit fairly comfortably within the category of 'portable' or 'mobiliary' art (see Abadía & Morales 2004). However, many are marked by incisions that are far more enigmatic. These include a range of marks and lines, and parallel or crosshatched patterns like those found at Hiregudda are a not uncommon feature.

While attempts to attribute such designs to various pragmatic activities, such as tool sharpening and arrow/spear shaft straightening (e.g. Solecki & Solecki 1970), laundry scrubbing, vegetable grating, animal branding or childrens' play (e.g. Stewart & Rupp 2004) are occasionally made, they are often unconvincing (see Eirikh-Rose 2004). Controversy surrounds many such interpretations. A common alternative has been to suggest that the marks served as symbols that allow abstract cultural ideas to be expressed and communicated. The interpretation of the engravings as notational systems provides a clear example of this kind of reasoning. From such a perspective, the marks are seen as possible coded entries that allowed the recording or computation of abstract numerical entities. The interpretation of the 'chessboard' or 'ladder-pattern' incisions at the Neolithic mines in Sussex, England as indicative of a primitive type of tally-system (Russell 2000) provides a salient example of this kind of reading, as does the suggestion that the Urkan pebble (see Table 4) may have functioned as a device for recording cyclic and seasonal notations (Hovers 1990, 321; see also Belfer-Cohen 1991, 579; Marshack 1972). Consider also Rosenberg's thoughts on the 'notched batons' from Hallan Çemi Tepesi (see Table 4):

> To the naked eye there is no evidence of wear within the notches or elsewhere on these objects; the notches were simply cut into the stone, as if to keep a formal count of something. If so, whatever was being tallied, it was arguably socially, economically, or politically important enough to record permanently on a highly uniform (i.e. formal) class of objects (Rosenberg 1999, 28).

Akin with such interpretations are those that link the marks to early forms of writing or signification. With respect to the incised tabular scrapers from the Levant, for example, Rosen has argued that while their function and meaning remain enigmatic, it is nonetheless '…tempting to correlate these incised symbols with early writing' (Rosen 1997, 75). Others similarly argue for a communicative function for the markings on engraved stones. Garfinkel, for example, observed that the Yarmukian incised pebbles bear marks that are similar to the geometric patterns that are found on contemporary stamp seals in the northern Levant and Mesopotamia, as well as on pintaderas (small stone and clay objects with carved relief designs) from the Neolithic period in Byblos (Garfinkel 1993, 125), thus implying that they may have served a similar communicative function (see also Eirikh-Rose 2004 and Stewart & Rupp 2004). Cauvin argues that the Neolithic marks on stone plaques in the Levant (see Table 4) form part of a 'universe of 'signs'' that appear at the same time on various forms of material culture (Cauvin 2000, 48).

Perhaps one of the most common arguments made about stones engraved with non-figurative imagery is that they represent anthropomorphs, animals or other beings or things, a somewhat paradoxical situation given the apparently non-representational nature of much of the imagery. For example, Kenoyer suggested that the elongated oval pebble from Upper Palaeolithic Gar-I-Asp was engraved with markings representing eyes, a nose and mouth, forming an anthropomorphic figure (Kenoyer 1993, 239). Similarly, Gopher and Orrelle have interpreted a number of the Yarmukian incised pebbles to be figurines representing the female body at different stages of sexual development (Gopher & Orrelle 1996). According to this model, pairs of short slit marks at one end of elongated pebbles are interpreted to represent '…young girls, perhaps at menarcheal rites, whose body lines are completely concealed, only the eyes being visible' (Gopher & Orrelle 1996, 267). Single vertical slit-lines on figurine pebbles, they further suggest, represent the genitals of young girls, whereas parallel vertical or horizontal lines converging to form grid-like patterns are interpreted as the labia of older women, parturition scars, or scarring from genital mutilation (Gopher & Orrelle 1996, 267). In addition, the incised pebbles from Kamikuroiwa in Japan have been interpreted to represent bare-breasted women with long hair and skirts made of hanging cords (Aikens & Higuchi 1982, 107). Hermansen also interprets a piece of sandstone with rough linear engravings at one end (from the Neolithic site of Basta in Syria-Palestine) as an anthropomorphic figurine (Hermansen 1997, 334). However, given the non-figurative nature of the markings, he concludes: '…this piece was apparently discarded in unfinished condition' (Hermansen 1997, 334).

Ethnographic perspectives on stone

Archaeology, therefore, has tended to interpret the marks on engraved stones as attempts to represent ideas, numbers, words, things or people on the surfaces of the stones. Accordingly, little attention has been paid to the stones themselves within such accounts. It is as though people just needed a handy surface for marking, and stone simply fulfilled that purpose. And yet engraving stone surfaces is often no easy matter, and, compared to marking softer materials like wood, bone, antler, shell and clay, could hardly have been the most convenient way to temporarily store data, record information or communicate messages. So why stone? While archaeology is somewhat reticent on this question, ethnography, in contrast, is full of

Table 4. *Examples of engraved stones from a range of archaeological sites and time periods in Southwest Asia.*

Site/Location	Age	Description
Qafzeh Cave (Israel)	100,000 bp	Broken Levallois core incised with parallel and overlapping non-figurative lines on the outer cortical surface. Incisions were made after the core was flaked.
Quneitra (Israel)	50,000 bp	Supposed flint plaque engraved with non-figurative imagery.
Hayonim Cave (Israel)	'Aurignacian'	Two engraved limestone slabs, one incised with lines interpreted to resemble an ungulate. Piece of basalt with a deep central groove and several parallel incisions.
Urkan e-Rub II (Lower Jordan Valley)	19,000–14,400 bp	Limestone pebble incised on both sides with complex repeated geometric patterns.
Karain and Öküzini caves (southern Anatolia)	17,000–12,000 bp	Several incised stone pebbles and small tablets at both sites. From Karain, a sub-spherical pebble featuring natural markings that had been 'completed by thinly carved, man made incisions as well as dots which seem to have an intentional order' (Anati 1968, 25).
Central Béqaa Valley (Lebanon)	12,500–10,200 bp	Several limestone pebbles engraved with sets of parallel lines.
Wadi Hammeh 27 (Jordan)	12,500–10,200 bp	Several limestone pebbles and fragments incised with a range of non-figurative patterns. Limestone pebbles with central grooves and adjacent geometric incisions.
Nahal Oren (Israel)	12,500–10,200 bp	Basalt 'shaft-straightener' with a complex grid-like design incised on one side.
Salibiya I (Lower Jordan Valley)	12,500–10,200 bp	Fragment of an incised limestone plaquette.
Hayonim Cave (Israel)	12,500–10,200 bp	Pebble criss-crossed with net-like incisions. Ochre-stained limestone fragment with net-like incisions. Flat limestone fragment with an incised pattern of horizontal lines.
Hallan Çemi Tepesi (eastern Anatolia)	eleventh millennium BC	Several pendulous objects made from soft metamorphic rock and featuring arrangements of variably spaced notch marks (and in one example, an incised 'hourglass design'); known as 'notched batons'.
Cafer Höyük (eastern Anatolia)	8500 bp	Piece of green stone with a central encircling groove and incised geometric pattern.
Jerf el Ahmar, Çayönü, Mureybet, Sheikh Hassan, Cafer (Levant)	'Neolithic'	Grooved stones with engraved geometric and linear motifs; 'shaft-straighteners'.
Aşıklı Höyük mound (Anatolia)	Eighth millennium BC	Small polished stone plaque incised with 'V' and 'O' patterns.
Jerf el Ahmar (Syria)	'Neolithic'	Double-sided stone plaques featuring incised figurative images interpreted by Cauvin to represent a range of animals, including a small owl, large insect, serpent-shape, straight lines or snake-shapes, and a grid motif with a snake.

insights on stones in general and why people mark and modify them.

Stone is in many cultural contexts considered to be not a passive entity or blank canvas, but instead a very meaningful, indeed often animated, substance (Boivin 2004a; Brumm 2004; Taçon 1991; see also Boast 1997, Kopytoff 1986 and Knappett 2002 for discussion of the agency of material objects in some cultural contexts). This is especially true for many small-scale foraging and farming societies in India, Southeast Asia and the Western Pacific and Australasian regions, most notably central and northern Australia, Indonesia, New Guinea and Melanesia. For these indigenous people — many of whom had recent, little or no knowledge of metals at the time of ethnographic documentation — stones are often considered to be sentient, volitional beings who interact freely with the world of humans.

A review of the ethnographic literature suggests that many indigenous societies hold the belief that deceased relatives, spirit entities and other supernatural potencies dwell within particular stones, or indeed, are embodied as the stones themselves. Belief in the 'life-force' (after Taçon 2004) of stones commonly involves large immobile rocks, such as standing stones and other types of megaliths. For example, among Naga Hills villagers in recent northern India, it was believed that the souls of the dead became infused into stone menhirs, which in turn made the land fertile (Hutton 1927). Likewise, in the jungles of Pengkalan Kempas in eastern Malaysia, stone megaliths were associated with certain noted ancestors, and referred to by local people as *batu hidup* or literally, 'living stones' (Chandran 1973, 97). And as King noted of the 'Maloh' of Indonesian Borneo (Kalimantan), stones are perceived to be both the potential receptacles of spirits and material manifestations of the human soul (King 1975, 108; see also Linehan 1940 and Sukendar 1985 for further ethnographic insights from Indonesia).

In addition to large immobile stones rooted to permanent locations in the landscape, smaller, more portable stones are or were often considered by many indigenous peoples to be living entities. Many such cultures describe portable stones moving around of their own accord. For example, in the Tangma area of Irian Jaya (West Papua, Indonesia), green schist axes are believed to fly through the air at night, and also travel underground through subterranean passageways (Pétrequin & Pétrequin 1993, 375). Dani people wishing to obtain these stones had to first catch them in a special ceremony requiring the use of pork fat as bait. In other Melanesian societies, ethnographers have recorded examples of stones believed to walk around, dance, light fires, transmit and cure disease, speak, procreate and kill (Kahn 1990; Roe & Taki 1999).

Nagas from northern India kept small black oval stones in their households that were believed to be possessed by spirits (Hutton 1926, 79). The stones magically protected the rice crops and were even reputed to do battle with the mice and rats that came to eat the rice, bearing 'scars' from these fights in the form of small incisions resembling rodent teeth-marks. Indeed, Hutton wrote that, to the Nagas '…[a]ny stone…that is at all out of the ordinary is liable to be regarded as the abode of a deity…it seems possible to treat any smooth stone complete in itself as the abode of a spirit' (Hutton 1926, 79).

Some small stones may require food and sustenance like any living being. Religious specialists or balien of the Taman of Indonesian Borneo, for instance, 'feed' their spirit-stones rice, glutinous rice, palm wine, and rice wine, with the stones in return ensuring bountiful rice harvests and protecting their owners from danger (Bernstein 1997; see also King 1975). Similarly, the Nagas of northern India are said to have kept their rodent-fighting stones carefully hidden in specially woven rattan baskets, occasionally taking them out to be rubbed with pig fat (Hutton 1926). Hampton noted similar practices among the Langda of Irian Jaya, who rubbed cores selected for quarrying with sacralized pig fat, in order to make the stones beautiful and please the spirits inside (Hampton 1999, 257).

On this note, it is important to point out that it is not only megaliths and small natural pebbles that become imbued with such deeper symbolic meanings. Many indigenous people also regard the stones used to make tools as alive. As Pétrequin and Pétrequin recalled of the green schist axes used in the abovementioned Tangma area in Irian Jaya:

> …the green schists themselves are treated with respect. The slabs are gathered in the stream-beds and are ground to give an even shape. If a rough-hewn blade breaks, it is placed vertically along the walls of the rocky overhang of Biganme. Everything takes place as if a certain force pre-existed in the rock before the consecration of the finished object (Pétrequin & Pétrequin 1993, 375).

A similar perspective is found amongst the Langda stoneworkers of Irian Jaya, where Stout recorded that:

> …the adze makers view the stones they work with as living, intentional subjects. Thus, knappers will speak of stones being 'angry' if they fail to fracture as desired and will call out to them using their 'secret names' as they search for them at the quarry sites along the river. The boulders themselves are believed to grow with age as people do … with 'old stone' (wisy-ya) being darker and stronger than 'young stone' (ya-babau). Social relations with stone are an important part of production, and care must be taken to avoid angering pieces through improper practices such as placing finished pieces on the ground in an improper orientation (Stout 2002, 704).

When knapping, bifacial axe blanks that broke unexpectedly were said by stoneworkers to have fallen ill and died (Hampton 1999). Similarly, it is reported that Langda people bring stone axes that break in the fields back to their villages for respectful discard, claiming that they 'feel sorry' for the tools (Toth *et al.* 1992, 92).

For many indigenous people, stone used for making tools is believed to grow in the ground like a plant, and even give birth to young. For example, at the Ngiliptiji blade quarry in eastern Arnhem Land,

some of the quartzite stones used to make spearpoints are believed by Yolngu people to be 'pregnant', and to give birth to 'baby stones' or 'eggs' (Jones 1990; Jones & White 1988). Similarly, stone axes (known as tobwatobwa) are believed to be living things on Sabarl Island in Melanesia (Battaglia 1983). As Battaglia recorded, the stone head is thought to be the 'content' or the hinona of the hafted tool. Hinona denotes the additional substance that animates things or resides within the body and makes it breathe (Battaglia 1983, 293). Axes themselves are said by Sabarl Islanders to develop in spawning grounds, where they grow like shells and also like people, that is, outwards from the centre. Interestingly, among the Nagas and Thado Kukis from the Naga Hills, the rodent-fighting stones mentioned above were believed to actively breed with one another and produce offspring (Hutton 1926). However, just as these stones were born, grew and were alive, so too could they die. As Hutton pointed out '[i]t is possible…to 'kill' [these] stones. Some of them split when burnt, others merely change colour, but in both cases the stone is 'dead' and the virtue departed' (Hutton 1926, 81–2).

In Australia, tjurunga stones are regarded by some Aboriginal people to be sentient beings, the very personification of living people and ancestral beings. In Aboriginal understanding, transformations to the body of the stone represent transformations to the person/entity it embodies. For example, Strehlow reported on a stone tjurunga that had been damaged when accidentally dropped: 'the tjurunga was regarded as the actual changed body of a ragia ancestor; and the chipped edge hence represented an injury done to this personage' (Strehlow 1970, 117). Analogous beliefs are found in Irian Jaya, where remnant flake scars left on the surfaces of edge-ground adzes after the grinding process are considered to be 'scars' or 'wounds' in the body of the adze (Stout 2002). In some cases, ochre was rubbed into these flake scars. Indeed, as Stout further recorded among the Langda:

> ...[s]ome of the deeper flake scars are usually left intact and may be painted with red and white pigments. These markings are both decorative and symbolically meaningful: Pétrequin and Pétrequin (1993) report on informants 'giving life' to the adze by putting 'blood' in its wounds (Stout 2002, 700).

Interpreting engraved stones at Hiregudda

The various ethnographic examples outlined above highlight the potential significance that stones themselves can take on, including stones that are to be manufactured into or used as tools. Crucially, they suggest that stones are understood by many peoples as more than just lifeless objects that function as passive receptacles of human energy. Stones can possess a life-force, which may need to be acknowledged, respected, mollified, nourished, or coaxed into human service. These examples suggest that when it comes to the prehistoric engravings, the stone itself may have been critical to the marks made on it. They encourage a shift away from the idea, common within archaeological interpretations, that the marks represented some sort of unrelated abstract notion or thing, and that the stone was just a convenient surface on which to engrave them.

The characteristics of the Hiregudda artefacts themselves further reinforce this impression. For example, it would be difficult to argue that any of them could have functioned as portable devices for storing calendrical, lunar or other information, as has been inferred for at least some prehistoric engraved objects (e.g. Marshack 1972). There is no consistent patterning to suggest that any of the markings on a single piece accumulated over a long period of time, and/or were produced by different tool edges. In fact, it is difficult to reduce any of the vertical or horizontal incisions on individual specimens into discrete sets or subsets of markings, such as might be expected with 'tally-marks'. In addition, microscopic examination of individual pieces confirm that different sets of grooves constituting complex patterns were all evenly weathered, suggesting that they were made at around the same time.

There is also no evidence to imply that the imagery was engraved in sequences of intentionally differentiated markings, as with, for example, the La Marche antler from Upper Palaeolithic France (see d'Errico 1995). D'Errico has argued that the engraved marks on this piece were aimed at the encoding of information, and required the engraver to implement 'complex technical procedures in order to be able visually to distinguish groups of marks' (d'Errico 1995, 198). Such carefully modified objects have been argued to constitute artificial memory systems, complex notational systems or 'codes' (d'Errico 1995). There is no evidence for such deliberate codification in the Hiregudda specimens. While there are variations on a common theme — for example, some lines on a single stone were engraved slightly deeper than others, and pecking rather than scratching produced one grid pattern — the lines on any given piece are generally very similar. Furthermore, microscopic analysis confirms that all of the stone objects have markings with more or less identical technical characteristics.

The engravings seem even less likely to have

acted as discrete symbols or sets of symbols, as has been argued for the enigmatic pictographs on the stone plaques from Jerf el Ahmar (see Table 4). The patterns found on each of the Hiregudda artefacts are ostensibly the same, and cannot obviously be broken down into component marks or symbols. Nor are the engravings comparable to the 'graffiti' marks that have been found on Megalithic pottery in south India, and that have been variously interpreted as potters' or owners' marks, clan symbols, ritual marks and early forms of script (Boivin *et al.* 2003; Coningham *et al.* 1996; Foote 1916; Lal 1960; Rajan & Bopearachchi 2002). In contrast to the engravings on the Hiregudda pieces, this graffiti is often comprised of discrete markings, or sets of markings, which in some cases have been interpreted as forming distinct symbols, such as svastikas, serpents, and the Brahmi sign ma (Coningham *et al.* 1996, 90).

Figure 17. *Neolithic petroglyphs depicting long-horned, hump-backed cattle, Hiregudda.*

Perhaps most importantly, there are no apparent parallels between the non-figurative imagery engraved on loose dolerite stones from Hiregudda and the rich record of Neolithic rock art at the site (see Boivin 2004b). This argument has sometimes been used to explain the meaning of other engraved stone objects. Sonawane, for example, likened the engraved image on the Chandravarti microblade core to certain designs recorded in the painted rock art at Bhimbetka and other Mesolithic Indian sites (Sonawane 1987, 55). Similarly, based on perceived similarities between parietal and portable imagery in the Scandinavian Neolithic record, Goldhahn has implied a relationship between petroglyph production and the engravings on red slate daggers at Nämforsen (Goldhahn 2002, 55). Both of these arguments suggest that engraved stone tools may have functioned simply as 'portable art', and thus should be interpreted in relation to the meaning and function of rock art images on immobile surfaces.

It is difficult to apply this reasoning to the Hiregudda case. As recently discussed by Boivin, the petroglyphs at Hiregudda are dominated by large naturalistic peckings of cattle and, more rarely, anthropomorphs (Boivin 2004b; see Fig. 17). The engraved stones from Hiregudda cannot by any means be seen as portable examples of this kind of parietal imagery. No figurative depictions of cattle, anthropomorphs or other subject matter were produced on the cortical surfaces of these stones. Moreover, repetitive arrangements of incised vertical and horizontal lines and grid-like patterns such as those found on the dolerite debitage are completely absent in the iconography of the petroglyphs. Despite a close spatial and probably temporal association at Hiregudda, there are no clear links between the subject matter depicted on stationary dolerite boulders and the dolerite stone artefacts.

There is thus no evidence, in either the content of the engravings, the method of their production, any aspect of their context or in the other marks on stones at Hiregudda to suggest a clear representational function for the engravings found on the Hiregudda artefacts. Roughly the same pattern is found on all the stones, and it extends across the available cortical surface. Indeed, one of the most salient features of the engraved pieces is that they are components of what were originally larger dolerite stones. After the soft exterior cortex of the dolerite nodules, cobbles and other pieces was incised, the stones and patterns were broken apart by knapping. The engravings were most likely produced on otherwise unremarkable dolerite stones with the expectation that they would be destroyed. Given then that a representational or communicative function is difficult to argue, it seems necessary, as the ethnographic examples outlined earlier suggest, to therefore turn to the stones themselves.

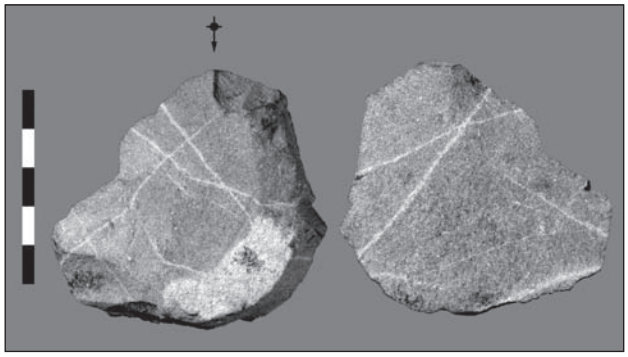

Figure 18. *Dolerite flake with multi-directional whitish lines formed by natural weathering processes in the stone. Scale bar is in 10-mm increments. (Photo M. Moore.)*

Figure 19. *Grid-like patterns formed by natural weathering processes in the exterior cortex of a dolerite stone in the Sanganakallu-Kupgal area. (Photo J. Koshy.)*

Figure 20. *Fractured dolerite boulder at Hiregudda. Natural lines form a cross-like pattern in the cortex.*

This avenue, indeed, proves much more fruitful. It is particularly interesting that the engraved images on the stones bear a striking resemblance to natural patterns in the dolerite. It was noted that many of the dolerite stones used to make tools at Hiregudda featured distinctive natural patterns formed by multi-directional whitish lines (see Fig. 18). These lines are quite an unusual and distinctive mineralogical feature within the otherwise homogenous dolerite. From a geological perspective, they seem to have formed when particular zones within the dolerite bedrock mass came under intense pressure or tension, creating small areas of isolated micro-faults or cracks amidst a large body of more stable material (G. Hunt pers. comm. 2004). Natural weathering processes may have led to crystal growth or mineral deposition along the fault-lines, similar to a broken bone knitting together. There is also the possibility that these lines may be micro-infills from some sort of hydrodynamic system involving the intrusion of hot fluid into the material.

However they formed geologically, these peculiar mineralogical features tend to appear as very straight and thin whitish lines or bands that stand out quite prominently against the darker blue-grey of the dolerite. The long thin whitish lines are multi-directional and often intersect, in many cases at right or diagonal angles to one another. On some individual dolerite pieces, this creates the effect of grid-like patterns in the dolerite. On some of the stones, linear planes of weakness are evident, but the whitish mineral formations do not appear to have been deposited in them. These features generally appear as long straight lines that seem to emerge abruptly from the homogeneous dolerite material, forming little disjointed 'shelves' and/or furrowed grooves in the stone. On flaked stone artefacts from Hiregudda, these are sometimes most evident at the thin lateral margins of flakes. Here they may be visible in a continuous straight line extending from the ventral to the dorsal surface. Where these features extend onto the dorsal surface, they often appear as long furrowed grooves in the cortex. Sometimes the grooves intersect to form prominent cross- and grid-like patterns in the cortex (see Figs. 19–20).

These natural grooves in the cortex closely resemble the humanly made grooves. In fact, during the sorting process it was a common error to mistake naturally grooved cortical pieces for ones that had been purposively engraved by tool-edges, especially on heavily weathered and/or unwashed artefacts. Microscopic examination under laboratory conditions was needed to distinguish cultural from natural grooves on these weathered specimens.

The similarity in natural and cultural patterns on

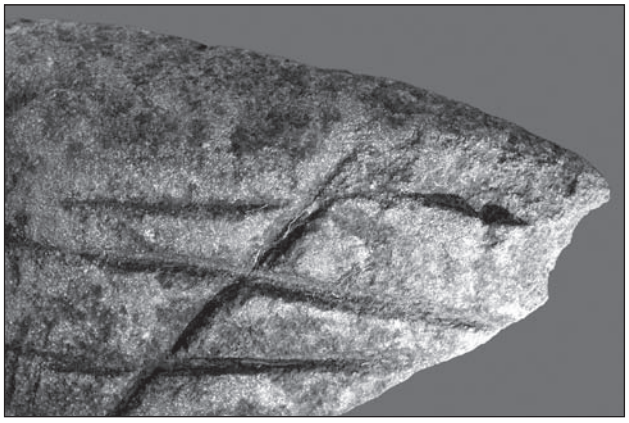

Figure 21. *Close-up view of engraved weathering spall (see Fig. 8) on which a natural cleft or furrow in the stone (at top right) has been incorporated into the engraved imagery. (Photo M. Moore.)*

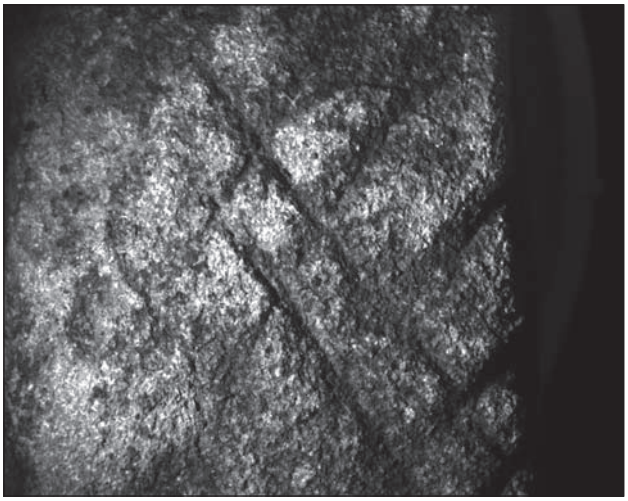

Figure 22. *Photomicrograph of an engraved dolerite artefact on which natural parallel linear grooves in the stone have been merged with deliberately engraved lines, forming a grid-like pattern. Width of field: 20 mm.*

Figure 23. *Unusual granite axe-grinding stone recorded in Area A. The axe-grinding grooves and cupules form a somewhat symmetrical effect in relation to the linear quartz vein on the right-hand side of the boulder, which has also been persistently ground and pecked.*

the engraved dolerite artefacts could suggest that the image-makers may have been intentionally emulating or drawing inspiration from these naturally occurring forms. Indeed, at least two of the engraved specimens illustrate this possibility nicely. On one deliberately engraved piece of dolerite (see Fig. 21), one of the grooves seems to have been incised such that it appears to merge with or emerge from a natural groove. On another artefact (see Fig. 22), microscopic analysis revealed that a complex grid-like pattern of converging lines had been formed by engraved grooves extending in one direction (evidenced by alignments of smoothing and linear striations within the grooves), and natural grooves (evidenced by the lack of alignments of smoothing and linear striations within the grooves) extending at right angles to these. Both of these artefacts suggest that natural grooves on the stones' surface were sometimes incorporated into the engravings made by Neolithic people. It is interesting that this recalls the engraved pebble from Karain Cave in Antalya, which, as described in Table 4, featured 'natural scratches completed by thinly carved, man made incisions' (Anati 1968, 25).

Importantly, the argument that the incised marks found on certain dolerite artefacts at Hiregudda must be understood in part as a response to natural patterns in the dolerite is supported by other examples in which Hiregudda Neolithic dwellers engaged with natural geological patterns. A large granite boulder used for grinding stone axes, located near Feature 1, is of particular interest (Brumm & Boivin in prep.; Figs. 5 & 23). The upper surface of this grinding rock is marked by a number of linear axe-grinding grooves and cupule-like grinding hollows. One end of the rock is bisected laterally by an extruding quartz vein that has been 'mirrored' by a deep linear axe-grinding groove on the opposite side of the rock. The quartz vein also appears to demarcate an area of predominately linear grooves from an area containing only groups of cupules, producing a rather symmetrical effect on the rock. Moreover, from the presence of smoothing and polish across the surface of the quartz vein, it seems that some portions of this mineral inclusion have been deliberately ground. Several lightly ground cupules have also been placed directly against the edge of

the vein in a distinctly patterned arrangement. On a nearby granite outcrop another linear quartz vein has also been recorded (Fig. 5), and similarly, this vein features a row of evenly spaced small pecked cupules carefully executed along its length.

Engaging with natural patterns and features

Both the engraved dolerite artefacts and the grinding and cupule features near Feature 1 highlight the possibility that for Neolithic people at Hiregudda, as for people in a number of ethnographically documented pre-industrial societies, stone may not have been a purely 'neutral' or 'blank' canvas. Instead, modifications to stone in some cases involved a response to natural geological features and patterns within the stone itself. These natural features have no apparent technological significance, and instead suggest that Neolithic understandings of stone at Hiregudda extended beyond the strictly utilitarian. As in the recent societies discussed earlier, it may be that stone itself or perhaps certain stones or types of stone were understood as meaningful and even powerful substances in Neolithic south India. Engaging with or mimicking patterns within them may have served as a way to draw upon their power, or interpret their deeper significance. The enigmatic markings found on some stones at Hiregudda may have been aimed less at representing abstract, cultural ideas than engaging with what are typically perceived to be natural, material substances in modern Western societies.

This interpretation is supported also by additional examples in which patterns, designs, marks and other features of interest that have formed naturally on stones are considered by people to be meaningful manifestations of powerful entities or forces. A good example can be found amongst the Yuman of California. To the Yuman, quartz crystals are known as Wii'ipay or 'living rocks', and they form part of the dangerous ritual paraphernalia of shamans (Levi 1978). Some quartz crystals are believed to be alive and to move around freely, leaving snake-like tracks in the desert sand. The Yuman pay close attention to the natural marks and patterns in crystals; shamans determine which crystals are alive and which are not by examining the endomorphology of stones, noting in particular the presence or absence of vein-like formations, for example (Levi 1978, 46). Reddish veins inside the crystal are taken as an indication that the stone is female rather than male.

The Australian ethnography suggests that lines, bands, stripes and other natural features forming interesting and/or attractive patterns in stones are often of particular symbolic and spiritual interest. Aboriginal healers, or marrnggitj, in northern Australia believe that stones that are striped with red bands of 'blood' will restore a patient's 'bad blood' (Reid 1983, 61). In the Western Desert region of Australia, Aboriginal people also associate certain natural patterns in stones with deeper ritual meanings and dangers. As Berndt illustrates:

> In a desert-fringe settlement, a woman walking along one of the tracks leading to the main camp tripped over a small stone, looked down at it, and exclaimed 'Darugu!' (sacred, with an aura of secrecy). She glanced around, then stooped to pick it up, and examined it. It was not the shape or the chalk-pink colour of the stone that had attracted her attention, but the particular pattern of concentric circles that she identified at first glance as daragu, and specifically as men's daragu — in other words, knew that she shouldn't see (Berndt 1978, 75).

Australian Aboriginal societies recognize a wide variety of marks on stones and other natural surfaces as significant. This is clear from the ways that Aboriginal linguistic terms for 'sign' or 'pattern' are employed in daily use:

> Each of the various [Aboriginal] languages has a term that essentially means sign, design, pattern, or meaningful mark. It is used to describe paintings and other designed things made by people, but it may also describe the patterns of honeycombs, spiders' webs, the wave-marked sand of the beach, variegated butterfly wings, and a host of other manifestations of similar formal properties. These usually include a combination of repetition, variation, symmetry, and asymmetry; and, like the designs of human artifacts, they are seen as ultimately derived from the Dreaming, the power-filled ground of existence. (Sutton & Anderson 1988, 3; emphasis added)

In the case of this Australian example, it is of interest not only that Aboriginal societies perceive natural patterns as meaningful, but also that they do not clearly distinguish them from anthropogenic marks or designs. All derive ultimately from the same source, the generalised 'power' field that permeates both land and people.

At Hiregudda, the 'echoing' of natural stone patterns on dolerite rocks that were to be made into axes suggests the possibility of a similar 'fuzzy' boundary between natural and anthropogenic patterns during the Neolithic period in south India. It may be that both were seen as a manifestation of the power inherent in the stone itself. Such power may have been important to the axes and other tools eventually produced from the dolerite on which they were engraved. It is also possible that knapping was part of a deliberate de-

struction or fragmentation of the engraved patterns. Archaeologists have often ignored evidence for flaking of engraved archaeological pieces, or interpreted it as accidental or irrelevant damage. Sonawane, for example, suggests that the 'artist' responsible for producing the geometric engraving on the Chadravarti microblade core may have obliterated the image simply as a passing whim (Sonawane 1987). In contrast, the consistent evidence for this type of activity over a long period of time at Hiregudda suggests that it was embedded within traditions of meaningful practice. Indeed, the systematic destruction of the engraved pieces implies that the actual technical process of knapping was an important, if not integral, part of a potentially ritualised activity. It is almost as though the power-filled stones had been symbolically 'killed', 'dismembered' or 'sacrificed' by knapping them.

Perhaps, as in cases where human sacrificial victims were involved in indigenous mineral extraction practices (e.g. Barley 1994; Sillar 1996), this procedure of 'killing' the stone was a ritually efficacious means of ensuring good luck in knapping, and/or the continued supply of high quality dolerite from local quarries. The ritual may even have functioned to protect the axe-makers from the dangerous power inherent in the stone (see Jones & White 1988); and axes made from engraved cores may have been seen as especially powerful, effective or ritually important tools. It may also be possible that the process of reproducing these images by engraving them on stones and then intentionally obliterating them indicates that the imagery may have been considered too powerful or dangerous to remain in the 'ordinary' realm of human existence; thus the images were intentionally destroyed after they were made. Again, however, it seems the process of knapping was critical to such symbolic beliefs.

Finally, it may be further, perhaps rather more tenuously suggested that, in line with Kenoyer's thoughts on the engraved core from Chandravarti, the incised debitage pieces were themselves considered special objects (Kenoyer 1993). They may have been used for ritual scarification, surgery, or some other ceremonial function, and thus were carefully curated objects. Offering support to this assertion, four engraved pieces from the Hiregudda assemblage feature secondary retouch. Moreover, at least two of the objects feature macroscopically visible use-wear on one or more margins, probably from grinding activities. One of these flakes featured smoothing use-wear consistent with its use as a tool-edge for making the actual engravings themselves. None of the other artefacts in the assemblage show obvious signs of use and/or modification. The careful curation and perhaps special disposal of engraved pieces may be part of the reason why so few of these enigmatic objects were found, and why none could be refitted or appear to derive from the same engraved core. In other words, the very rarity of the engraved stone artefacts from Hiregudda may be the strongest evidence for their special meanings and/or ritual associations for the Neolithic dwellers.

Conclusion

In closing, we would like to stress that we are not attempting to formulate a blanket interpretation for the engraving of all stones in the past — that the engravers believed the stones they were marking were sentient or powerful objects, and incised their marks as part of an engagement with the animate and powerful qualities such objects were believed to possess. Some non-figurative imagery on engraved stones might really have been aimed at representing something, however abstract (for example, grid patterns could, in other contexts, be depictions of nets, fields, or entoptic phenomena) — or otherwise functioned as symbols of individual or group identity. The problem we have attempted to highlight in this study is that archaeologists tend to interpret such imagery, as a matter of course, as representing some*thing*, any*thing*, such as an anthropomorphic form, animal, or being. This is a problem that other prehistorians have clearly noted (see especially Garfinkel 1999). What we have tried to demonstrate in this paper is that there are other, equally, if not more plausible, interpretations of such artefacts.

Drawing from the ethnographic record of modern cultural perceptions of stone, we particularly emphasise the need to move beyond interpretations of stone surfaces themselves as little more than blank canvases for the encoding of abstract ideas. Of course we cannot know if Neolithic people at Hiregudda actually thought certain stones were alive. However, the engraved stone artefacts from this site suggest that many ancient image-makers may have been just as concerned with the physical properties of stones and stone surfaces as the markings and patterns they produced. In religious worldviews where the material surfaces of things may be seen as 'zones' or 'veils' through which contact with other realities can be made — or as Lewis-Williams writes with reference to painted rock wall surfaces; 'the interface between materiality and spirituality' (Lewis-Williams 2002, 149; see also Bradley 2000; Lewis-Williams & Dowson 1990; Tilley 2004) — the particular nature of human interaction with material surfaces is important. Existing

features or properties of stone, in particular striking natural patterns, may be seen as having a certain kind of symbolic or spiritual relevance that helps guide how humans interact in a culturally appropriate manner with the materiality of these surfaces (e.g. Ouzman 2001). The compelling finds from Hiregudda suggest that such interpretations may apply as much to stone tools and portable stones as to immobile rock surfaces, such as cave and rock-shelter walls and large boulders.

The Hiregudda engraved stone artefacts also suggest, in concert with other findings concerning more aesthetic and symbolic aspects of lithic production at the site (see Boivin *et al.* mss.; Brumm & Boivin in prep.), that stone-axe production was more than just a straightforward utilitarian activity in Neolithic south India. As in Neolithic contexts in other parts of the world (discussed, for example, in Bradley 2000; Bradley & Edmonds 1993; Edmonds 1995; Larsson 2000; Patton 1993; Rudebeck 1998; Skeates 1995; 2001 **2002 in refs**; Thomas & Tilley 1993), axe production and use in Neolithic south India appears to have taken on a special significance that Western concepts of technological production and economic activity fail to anticipate. We have suggested that the engraving and intentional destruction by knapping of dolerite stones in the specialist axe production 'workshop' at Hiregudda may well relate to wider symbolic meanings and valuations of stone and of stone axes. These artefacts provide tantalising insights into the socio-symbolic contexts of axe production and use that remain to be elucidated through further archaeological work in south India, including in particular petrographic studies and the contextualization of stone-axe discoveries.

Finally, it is worth in conclusion drawing attention to the question of why engraved stone artefacts are so rarely recovered in the archaeological record, especially in South Asia. Why, at the time of present writing, have engraved and subsequently knapped stones only ever been found at Hiregudda and not at other Southern Neolithic sites? Is this simply because they are easy to overlook? We suspect not; during the sorting and analysis stage, stone tools engraved with symbolic imagery should most definitely stand out as artefacts of note. Furthermore, it is difficult to believe that such a compelling activity was confined to a single axe production site in all of Neolithic south India. We think it much more likely that many important examples of engraved and knapped stones from South Asia and beyond remain buried as footnotes in site reports, or indeed have gone entirely unreported. Certainly, as we have demonstrated here with numerous ethnographic examples, cultural practices underlying the marking of stones may have been structured in a complex manner, involving more than random 'doodling' on convenient surfaces. We hope that archaeologists will begin to actively record and report the discovery of similar finds — and in particular stones that have been worked into tools prior to or after being incised — to better understand enigmatic phenomenon.

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